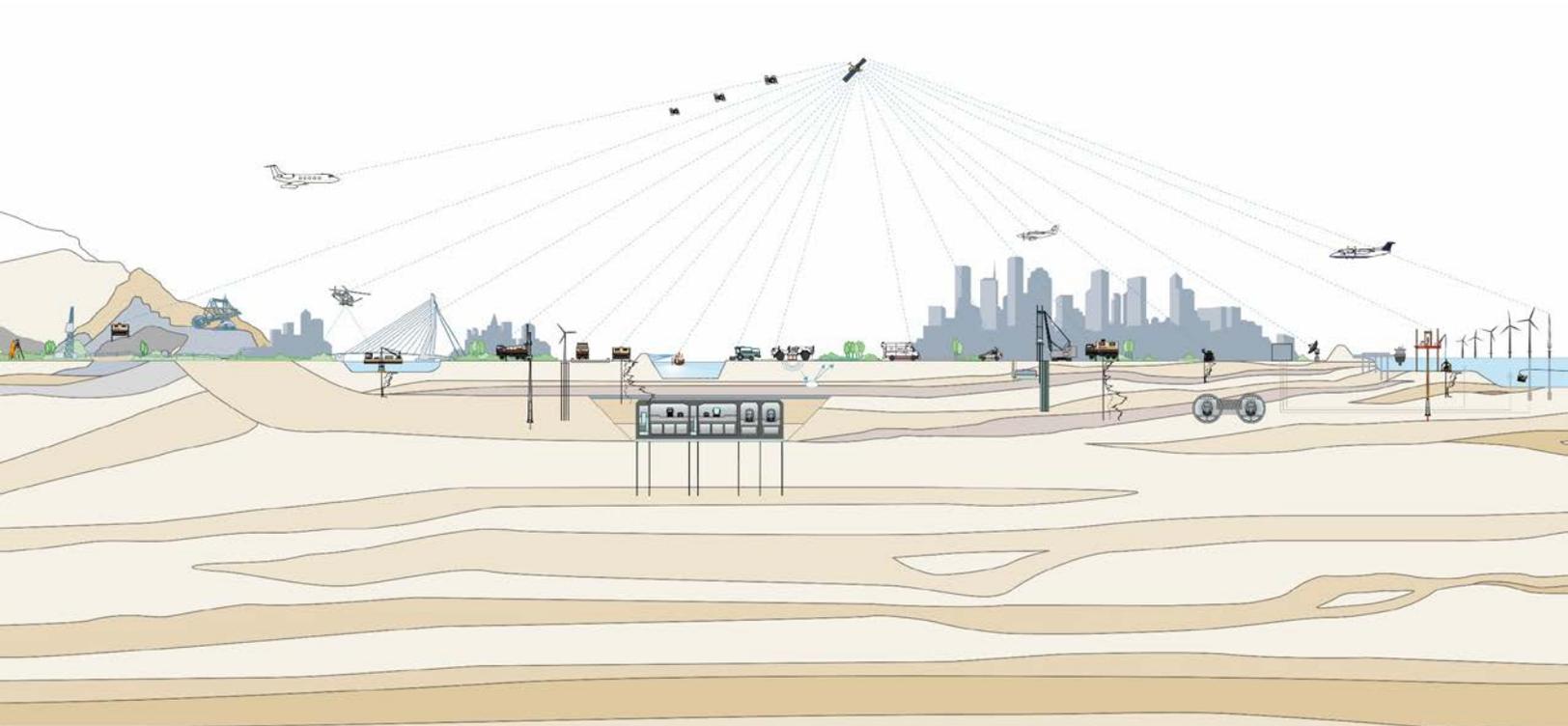


**ANNUAL REPORT
JULY 2015 THROUGH JUNE 2016
BIG ROCK MESA LANDSLIDE
ASSESSMENT DISTRICT
MALIBU, CALIFORNIA**

Prepared for:
City of Malibu

November 2016
Fugro Job No. 04.62160606





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November 29, 2016
Project No. 04.62160606

City of Malibu
23825 Stuart Ranch Road
Malibu, California 90265

Attention: Mr. Rob DuBoux, Esq., P.E.

Subject: Annual Report, July 2015 through June 2016, Big Rock Mesa Landslide Assessment District, Malibu, California

Dear Mr. Duboux:

Fugro is pleased to present the annual report for the Big Rock Mesa Landslide Assessment District. This report summarizes the monitoring and maintenance activities completed during the period of July 2015 through June 2016.

Fugro appreciates this opportunity to serve the City of Malibu and the District homeowners. Please contact Loree Berry at (805) 289-3830 if you have any questions regarding this report.

Sincerely,

FUGRO CONSULTANTS, INC.

A handwritten signature in blue ink, appearing to read "N. Simon".

Nicholas Simon, G.I.T.
Staff Geologist/Lead Project Technician

A handwritten signature in blue ink, appearing to read "Loree A. Berry".

Loree A. Berry, P.E.
Associate Engineer/Senior Project Manager



Copies Submitted: (1) Addressee and Pdf
(1) City of Malibu Geotechnical Staff and Pdf



CONTENTS

	Page
1.0 INTRODUCTION.....	1
1.1 Authorization	1
1.2 Background	1
1.3 Scope of Work.....	1
1.4 Report Organization	2
1.5 Report Availability	2
2.0 MONITORING.....	2
2.1 Rainfall Data.....	2
2.2 Master Water Meter.....	2
2.3 Groundwater Level Monitoring	3
2.3.1 Pacific Coast Highway (PCH) Region	4
2.3.2 Bluff Region.....	5
2.3.3 Eastern Mesa Region.....	5
2.3.4 Western Extension Region.....	7
2.3.5 Headscarp Region.....	8
2.4 Dewatering Well Production	8
2.5 Hydrauger Production	8
2.6 Slope Inclinerometers	9
2.6.1 Pacific Coast Highway Region	10
2.6.2 Bluff Region.....	10
2.6.3 Eastern Mesa Region.....	10
2.6.4 Central Mesa Region.....	10
2.6.5 Western Extension Region.....	10
2.6.6 Headscarp Region.....	11
2.7 Water Quality Monitoring.....	11
2.7.1 Regional Board Requirements	11
2.7.2 Water-Quality Results	12
3.0 DEWATERING FACILITY MAINTENANCE.....	12
3.1 CAPITAL IMPROVEMENTS	12
3.2 Facility Maintenance.....	13
4.0 SUMMARY AND CONCLUSIONS.....	13
4.1 Annual Summary.....	13
4.2 Concluding Comments.....	15
5.0 REFERENCES.....	16



CONTENTS – CONTINUED

TABLES

	Page
Table 1. Summary of Average Groundwater Elevations by Area	4
Table 2. Summary of Completed Facility Maintenance	13

PLATES

	Plate
Site Location Map	1
Assessment District Map	2
Malibu Area - Monthly & Average Annual Rainfall	3
Total Dewatering Rate vs. Total Water Consumption	4
Groundwater Elevation Map	5a
Change in Groundwater Elevation Map May 1995 to May 2015	5b
Change in Groundwater Elevation Map May 2014 to May 2015	5c
Summary of Groundwater Levels, Dewatering, & Rainfall	6

APPENDICES

APPENDIX A

GROUNDWATER LEVEL DATA

Piezometer Information – Standpipe Piezometers	Plate A-1a
Piezometer Information – Pneumatic Piezometers	Plate A-1b
Groundwater Elevation Data Analysis	Plate A-2a
Groundwater Elevation Data	Plate A-2b
Groundwater Elevation Data - PCH Region (Western Half)	Plate A-3a
Groundwater Elevation Data - PCH Region (Eastern Half)	Plate A-3b
Groundwater Elevation Data - Bluff Region	Plate A-4
Groundwater Elevation Data - Eastern Mesa Region	Plate A-5
Groundwater Elevation Data - Central Mesa Region	Plate A-6a
Groundwater Elevation Data - Central Mesa Region	Plate A-6b
Groundwater Elevation Data - Western Extension	Plate A-7
Groundwater Elevation Data - Headscarp Area	Plate A-8

APPENDIX B

DEWATERING WELL DATA

Dewatering Well Information	Plate B-1
Discharge Rate for Dewatering Wells - Eastern Mesa Region	Plate B-2a
Discharge Rate for Dewatering Wells - Eastern Mesa Region	Plate B-2b
Discharge Rate for Dewatering Wells - Central Mesa Region	Plate B-3a
Discharge Rate for Dewatering Wells - Central Mesa Region	Plate B-3b
Discharge Rate for Dewatering Wells - Central Mesa Region	Plate B-3c
Discharge Rate for Dewatering Wells - Western Extension	Plate B-4



CONTENTS - CONTINUED

APPENDIX C HYDRAUGER DATA

Summary of Hydrauger Information Plate C-1
 Discharge Rate for Hydraugers - Eastern Mesa Region Plate C-2a
 Discharge Rate for Hydraugers - Eastern Mesa Region Plate C-2b
 Discharge Rate for Hydraugers - Central Mesa Region Plate C-3a
 Discharge Rate for Hydraugers - Central Mesa Region Plate C-3b
 Discharge Rate for Hydraugers - Western Extension Plate C-4

APPENDIX D SLOPE INCLINOMETER PLOT / DATA

Slope Inclinator Information Plate D-1
 Cumulative and Incremental Deflection A Direction Plot SP-11 Plate D-2a
 Cumulative and Incremental Deflection B Direction Plot SP-11 Plate D-2b
 Displacement vs. Time A Direction Plot SP-11 Plate D-2c
 Displacement vs. Time B Direction Plot SP-11 Plate D-2d
 Cumulative and Incremental Deflection A Direction Plot SP-12 Plate D-3a
 Cumulative and Incremental Deflection B Direction Plot SP-12 Plate D-3b
 Displacement vs. Time A Direction Plot SP-12 Plate D-3c
 Displacement vs. Time B Direction Plot SP-12 Plate D-3d
 Cumulative and Incremental Deflection A Direction Plot SP-14 Plate D-4a
 Cumulative and Incremental Deflection B Direction Plot SP-14 Plate D-4b
 Displacement vs. Time A Direction Plot SP-14 Plate D-4c
 Displacement vs. Time B Direction Plot SP-14 Plate D-4d
 Cumulative and Incremental Deflection A Direction Plot SP-15 Plate D-5a
 Cumulative and Incremental Deflection B Direction Plot SP-15 Plate D-5b
 Displacement vs. Time A Direction Plot SP-15 Plate D-5c
 Displacement vs. Time B Direction Plot SP-15 Plate D-5d
 Cumulative and Incremental Deflection A Direction Plot SP-19 Plate D-6a
 Cumulative and Incremental Deflection B Direction Plot SP-19 Plate D-6b
 Displacement vs. Time A Direction Plot SP-19 Plate D-6c
 Displacement vs. Time B Direction Plot SP-19 Plate D-6d
 Cumulative and Incremental Deflection A Direction Plot SP-27A Plate D-7a
 Cumulative and Incremental Deflection B Direction Plot SP-27A Plate D-7b
 Displacement vs. Time A Direction Plot SP-27A Plate D-7c
 Displacement vs. Time B Direction Plot SP-27A Plate D-7d
 Cumulative and Incremental Deflection A Direction Plot SP-29 Plate D-8a
 Cumulative and Incremental Deflection B Direction Plot SP-29 Plate D-8b
 Displacement vs. Time A Direction Plot SP-29 Plate D-8c
 Displacement vs. Time B Direction Plot SP-29 Plate D-8d
 Cumulative and Incremental Deflection A Direction Plot SP-30 Plate D-9a
 Cumulative and Incremental Deflection B Direction Plot SP-30 Plate D-9b
 Displacement vs. Time A Direction Plot SP-30 Plate D-9c
 Displacement vs. Time B Direction Plot SP-30 Plate D-9d
 Cumulative and Incremental Deflection A Direction Plot SP-10 Plate D-10a
 Cumulative and Incremental Deflection B Direction Plot SP-10 Plate D-10b
 Displacement vs. Time A Direction Plot SP-10 Plate D-10c
 Displacement vs. Time B Direction Plot SP-10 Plate D-10d
 Cumulative and Incremental Deflection A Direction Plot SP-28 Plate D-11a
 Cumulative and Incremental Deflection B Direction Plot SP-28 Plate D-11b
 Displacement vs. Time A Direction Plot SP-28 Plate D-11c
 Displacement vs. Time B Direction Plot SP-28 Plate D-11d



CONTENTS - CONTINUED

Cumulative and Incremental Deflection A Direction Plot SP-32 Plate D-12a
Cumulative and Incremental Deflection B Direction Plot SP-32 Plate D-12b
Displacement vs. Time A Direction Plot SP-32..... Plate D-12c
Displacement vs. Time B Direction Plot SP-32..... Plate D-12d
Cumulative and Incremental Deflection A Direction Plot PC-1 Plate D-13a
Cumulative and Incremental Deflection B Direction Plot PC-1 Plate D-13b
Displacement vs. Time A Direction Plot PC-1 Plate D-13c
Displacement vs. Time B Direction Plot PC-1 Plate D-13d
Cumulative and Incremental Deflection A Direction Plot SP-3 Plate D-14a
Cumulative and Incremental Deflection B Direction Plot SP-3 Plate D-14b
Displacement vs. Time A Direction Plot SP-3..... Plate D-14c
Displacement vs. Time B Direction Plot SP-3..... Plate D-14d
Cumulative and Incremental Deflection A Direction Plot SP-3A Plate D-15a
Cumulative and Incremental Deflection B Direction Plot SP-3A Plate D-15b
Displacement vs. Time A Direction Plot SP-3A Plate D-15c
Displacement vs. Time B Direction Plot SP-3A Plate D-15d
Cumulative and Incremental Deflection A Direction Plot SP-33 Plate D-16a
Cumulative and Incremental Deflection B Direction Plot SP-33 Plate D-16b
Displacement vs. Time A Direction Plot SP-33..... Plate D-16c
Displacement vs. Time B Direction Plot SP-33..... Plate D-16d
Cumulative and Incremental Deflection A Direction Plot SP-9A Plate D-17a
Cumulative and Incremental Deflection B Direction Plot SP-9A Plate D-17b
Displacement vs. Time A Direction Plot SP-9A Plate D-17c
Displacement vs. Time B Direction Plot SP-9A Plate D-17d
Cumulative and Incremental Deflection A Direction Plot SP-16A Plate D-18a
Cumulative and Incremental Deflection B Direction Plot SP-16A Plate D-18b
Displacement vs. Time A Direction Plot SP-16A Plate D-18c
Displacement vs. Time B Direction Plot SP-16A Plate D-18d
Cumulative and Incremental Deflection A Direction Plot SP-17B Plate D-19a
Cumulative and Incremental Deflection B Direction Plot SP-17B Plate D-19b
Displacement vs. Time A Direction Plot SP-17B Plate D-19c
Displacement vs. Time B Direction Plot SP-17B Plate D-19d
Cumulative and Incremental Deflection A Direction Plot SP-24 Plate D-20a
Cumulative and Incremental Deflection B Direction Plot SP-24 Plate D-20b
Displacement vs. Time A Direction Plot SP-24..... Plate D-20c
Displacement vs. Time B Direction Plot SP-24..... Plate D-20d
Cumulative and Incremental Deflection A Direction Plot SP-34 Plate D-21a
Cumulative and Incremental Deflection B Direction Plot SP-34 Plate D-21b
Displacement vs. Time A Direction Plot SP-34..... Plate D-21c
Displacement vs. Time B Direction Plot SP-34..... Plate D-21d
Cumulative and Incremental Deflection A Direction Plot SP-35 Plate D-22a
Cumulative and Incremental Deflection B Direction Plot SP-35 Plate D-22b
Displacement vs. Time A Direction Plot SP-35..... Plate D-22c
Displacement vs. Time B Direction Plot SP-35..... Plate D-22d
Cumulative and Incremental Deflection A Direction Plot SP-36 Plate D-23a
Cumulative and Incremental Deflection B Direction Plot SP-36 Plate D-23b
Displacement vs. Time A Direction Plot SP-36..... Plate D-23c
Displacement vs. Time B Direction Plot SP-36..... Plate D-23d
Cumulative and Incremental Deflection A Direction Plot SP-20 Plate D-24a
Cumulative and Incremental Deflection B Direction Plot SP-20 Plate D-24b
Displacement vs. Time A Direction Plot SP-20..... Plate D-24c
Displacement vs. Time B Direction Plot SP-20..... Plate D-24d



CONTENTS - CONTINUED

Cumulative and Incremental Deflection A Direction Plot SP-21 Plate D-25a
 Cumulative and Incremental Deflection B Direction Plot SP-21 Plate D-25b
 Displacement vs. Time A Direction Plot SP-21..... Plate D-25c
 Displacement vs. Time B Direction Plot SP-21..... Plate D-25d
 Cumulative and Incremental Deflection A Direction Plot SP-22 Plate D-26a
 Cumulative and Incremental Deflection B Direction Plot SP-22 Plate D-26b
 Displacement vs. Time A Direction Plot SP-22..... Plate D-26c
 Displacement vs. Time B Direction Plot SP-22..... Plate D-26d
 Cumulative and Incremental Deflection A Direction Plot SP-23 Plate D-27a
 Cumulative and Incremental Deflection B Direction Plot SP-23 Plate D-27b
 Displacement vs. Time A Direction Plot SP-23..... Plate D-27c
 Displacement vs. Time B Direction Plot SP-23..... Plate D-27d
 Cumulative and Incremental Deflection A Direction Plot SP-26 Plate D-28a
 Cumulative and Incremental Deflection B Direction Plot SP-26 Plate D-28b
 Displacement vs. Time A Direction Plot SP-26..... Plate D-28c
 Displacement vs. Time B Direction Plot SP-26..... Plate D-28d

APPENDIX E WATER QUALITY TESTING

Summary of Water Quality Monitoring Data – Third Quarter (Jul.-Sep.) 2015..... Plate E-1
 Summary of Water Quality Monitoring Data – Fourth Quarter (Oct.-Dec.) 2015 Plate E-2
 Summary of Water Quality Monitoring Data – First Quarter (Jan.-Mar.) 2016..... Plate E-3
 Summary of Water Quality Monitoring Data – Second Quarter (Apr.-Jun.) 2016 Plate E-4



1.0 INTRODUCTION

1.1 AUTHORIZATION

Fugro Consultants, Inc. (Fugro) performed the work summarized in this report in accordance with our contract with the City of Malibu (City) and consistent with the cost estimate document "Exhibit A - FY 2016-2017 Maintenance Cost Estimate" presented in the Annual Assessment Report (Taussig, 2016).

1.2 BACKGROUND

The Big Rock Mesa Landslide Assessment District (Assessment District) was established in 1989 by the County of Los Angeles (County) following the activation of the Big Rock Mesa landslide in 1983. The Assessment District provides permanent funding to maintain and monitor dewatering facilities with the purpose of reducing landslide movements. The County administered the Assessment District until 1991 when the City of Malibu (City) incorporated. The Assessment District was re-authorized in May 1998 under Resolution No. 98-030. The City has since administered the Assessment District, utilizing consultants to maintain and monitor the district facilities.

1.3 SCOPE OF WORK

This annual report summarizes the current monitoring and maintenance of the geotechnical instrumentation and dewatering facilities for the period between July 1, 2015, and June 30, 2016 (hereinafter, the "monitoring period"). Data collected during this monitoring period included the following:

- Annual Rainfall data from Big Rock Mesa rain gauge number 1239, operated by the County of Los Angeles, Department of Public Works – Water Resources Division;
- Monthly groundwater level measurements from 29 standpipes;
- Periodic groundwater measurements from 16 pneumatic piezometers;
- Twice-monthly dewatering production readings from 23 dewatering wells;
- Monthly dewatering production readings from 31 horizontal drains (hydraugers);
- Quarterly or semi-annual ground deformation readings from 26 slope inclinometers (geotechnical instrumentation);
- Monthly readings of water usage data from the Mesa's master flow meter; and
- Water-quality sampling and analysis for National Pollution Discharge Elimination System (NPDES) compliance.

The operating condition of the instrumentation and dewatering facilities was checked during each field monitoring/observation event and by evaluating preliminary data in the office as they were received. Maintenance was performed as needed based on field observations, preliminary data evaluation, and correspondence from concerned homeowners and tenants.

The scope of our services is limited to monitoring and maintaining the Assessment District facilities. The services that are provided on an annual basis for the Assessment District do not include geologic or engineering evaluations of the stability of the landslide.

1.4 REPORT ORGANIZATION

This report summarizes the monitoring data collected during the July 1, 2015 to June 30, 2016 monitoring period and presents conclusions regarding the annual monitoring results. The location of the Assessment District is illustrated on Plate 1 - Site Location Map. Locations of the geotechnical instrumentation and dewatering facilities are shown on Plate 2 - Assessment District Map. Tabulated and graphic summaries of monitoring data are presented in Appendices A through E as indicated in the table of contents.

1.5 REPORT AVAILABILITY

The annual Assessment District reports are available for review at Malibu City Hall. Reports may also be viewed on the City's website at <http://www.malibucity.org>.

2.0 MONITORING

2.1 RAINFALL DATA

A graph of historical monthly rainfall and average annual rainfall from October 1968 through September 30, 2016 is shown on Plate 3 – Rainfall Graph. Monthly rainfall totals from 1968 through 2004 were obtained from County of Los Angeles Department of Public Works (LADPW) Carbon Canyon Rain Station 447C and monthly rainfall totals from 2004 to the present were obtained from LADPW Big Rock Mesa Rain Gauge 1239.

Rainfall data indicate that approximately 9.4 inches of precipitation fell during the monitoring period from July 1, 2015 through June 30, 2016. The average annual rainfall from 1968 to 2016 in the “Malibu area” for the same months is approximately 15.0 inches.

However, rainfall data are usually analyzed in terms of the annual "rain season" that covers the time period between October 1 through September 30. Rainfall for October 1, 2015, through September 30, 2016, was approximately 7.4 inches. That is approximately 48 percent of the average annual rainfall of 15.4 inches for the “rain seasons” between 1968 and 2016.

Plate 6 – Summary of Groundwater Levels, Dewatering, and Rainfall shows the yearly magnitude of deviation of each years’ rainfall relative to the mean annual rainfall. The graphic also shows the average annual dewatering output (gallons per day, gpd). The data illustrates that the average annual dewatering output has been decreasing with continued below average rainfall.

2.2 MASTER WATER METER

Water usage data are collected by performing monthly readings at the master water meter near the intersection of Rockport Way and Big Rock Drive. The master water meter measures all imported water supplied to the Big Rock Mesa area by Los Angeles County Waterworks District 29.



Processed readings are shown as a plot of flow rate versus time on Plate 4. Analysis of the data indicates the following.

- The recorded water usage rates are cyclic throughout the monitoring year reflecting higher levels of usage during the summer months.
- There has been a general trend of increasing water consumption since about 1995 interrupted with the reduced landscape irrigation during the extended high rainfall in the spring of 2005, 2006, and again in the winter of 2011.
- Average monthly water use has declined over the last two monitoring periods while residents implement water conservation efforts in response to the ongoing drought. Average water usage during the 2015 through 2016 monitoring year was approximately 141,500 gallons per day (gpd), which is approximately 19.4 percent less than the 2014 through 2015 monitoring year average of 175,600 gpd.

2.3 GROUNDWATER LEVEL MONITORING

The groundwater monitoring data collected during the 2015-2016 monitoring period are summarized in Appendix A. Groundwater levels fluctuate throughout the year, and from year to year, in response to natural and man-made influences. The primary natural influence is varying precipitation. Man-made influences include:

- Infiltration from onsite wastewater treatment systems;
- Infiltration from irrigation;
- Alterations to surface drainage by grading, landscaping, storm drains, and rain gutters;
- Inadvertent water discharges from leaking utilities such as water, irrigation, sewer, storm drain lines as well as from swimming pools; and
- Dewatering activities from pumping dewatering wells and gravity-draining hydraugers.

Groundwater levels were typically measured in monitoring wells on a monthly basis, pneumatic piezometers were measured intermittently. Monitoring data and graphs illustrating groundwater levels recorded in monitoring wells and pneumatic piezometers for the six physiographic regions of the Big Rock Mesa landslide are presented in Appendix A. Groundwater elevation maps for May 8, 1995 and May 17, 2016, are shown on Plate 5a. A map of the changes in ground water elevation between May 1995 and May 2016 is shown on Plate 5b. A map of the changes in ground water elevation between May 2015 and May 2016 is shown on Plate 5c.

Typically, groundwater levels rise relatively quickly following significant rainfall and gradually lower after a wet season ends. Groundwater levels recorded in the Assessment District typically peaked around late-March to mid-April and have gradually declined through late September to November.

The groundwater data were analyzed by evaluating changes that occurred during the monitoring period as well as changes in groundwater levels compared to historical averages (1984 through 2016). To analyze trends in seasonal groundwater fluctuations, the average (mean) annual



and highest annual recorded groundwater elevation for each piezometer were calculated (Appendix A) and summarized on Table 1.

Table 1. Summary of Average Groundwater Elevations by Area

	Total No. of Wells	2015-16 Average Groundwater Elevation (ft)	Change in Average Groundwater from Prior Monitoring Period Average (ft)	2015-2016 Average Peak Groundwater Elevation (ft)	Change in Average Peak Groundwater Elevation from Prior Monitoring Period (ft)
PCH Region	8	8.4	+0.3	9.5	+0.3
Bluff Region	4	31.9	-2.4	34.9	-1.5
Eastern Mesa	4	53.7	+2.7	56.1	+0.6
Central Mesa	8	191.6	-0.4	200.6	-1.4
Western Extension	4	379.3	-3.7	384.8	-10.0
Headscarp Region	1	551.9	-0.1	552.4	-0.1

A summary graph of normalized peak groundwater elevations for each of the six regions in Big Rock Mesa is presented on the bottom graph of Plate 6. The top graph on Plate 6 compares the average dewatering output (gpd) to the annual deviation from the mean annual rainfall over the same time period.

2.3.1 Pacific Coast Highway (PCH) Region

The PCH Region parallels the coastal highway at the base of the bluff, including the area between the bluff and the Pacific Ocean. The PCH Region includes the southern boundary of the 1983 landslide. The Shoreline fault and landslide rupture surface define both a zone of weakness and a groundwater barrier, extending approximately along the same alignment as the highway.

Groundwater data for the PCH Region are presented as hydrographs on Plate A-3a and A-3b. Groundwater levels in this area are monitored using standpipe piezometers SP-11, 12, 14, 15, 19, 27A, 29, and 30. In general, groundwater elevations in the PCH Region for the 2015-2016 monitoring year increased slightly. The calculated area average groundwater elevation increased by 0.3 feet when compared to the 2014-2015 monitoring period and is 0.2 feet below the mean groundwater elevation for the area for the period of record (1987 to 2016). Calculated average water elevations for individual standpipes during the 2015-2016 monitoring period varied by 1 foot or less when compared to average water elevations for the 2014-2015 monitoring year in all standpipes except SP-15, which showed an annual average increase of 2.0 feet, from 8.6 to 10.6 feet. Even though groundwater elevations within SP-15 have been variable, they remain within 0.1 feet of the average groundwater elevation for the period of record.

Average groundwater elevations in SP-30 had risen steadily from 8.5 feet in 1998 to 17 feet in 2014, before declining sharply in June 2014. During the 2015-2016 monitoring year, the average groundwater elevation in SP-30 rose by 0.2 feet when compared to the 2014-2015 monitoring year average. Groundwater elevations in SP-30 remain approximately 3 feet below the highest elevations recorded during 2014 but are still 1.9 feet above the average elevation for SP-30 for the period of record.

2.3.2 Bluff Region

The Bluff Region extends along the top of the slope immediately the north of the PCH Region, and is an area where intense ground cracking was observed during the 1983 landslide. The subsurface materials within the Bluff Region generally have a relatively high secondary permeability due to the level of fracturing that had occurred.

Groundwater data for the Bluff Region are presented as hydrographs on Plate A-4. Groundwater levels in this area are monitored using standpipe piezometers SP-10, 28, 32, and 34, and the pneumatic piezometers installed with SP-34. In general, groundwater elevations for the Bluff Region for the 2015-2016 monitoring year continued to decrease. The calculated area average groundwater elevation declined 2.4 feet when compared to the 2014-2015 monitoring period and is 25.1 feet below the mean water level elevation for the area for the period of record.

Calculated average water elevations for individual standpipes for the 2015-2016 monitoring year declined in SP-32 and SP-34, rose in SP-10, and rose slightly in SP-28. Groundwater elevations in standpipes SP-32 and SP-34 continue to decline in response to increased dewatering following installation of dewatering well FW-2 in 2010 and are now 64.7 and 41.0 feet below their respective mean groundwater elevations for the period of record. Groundwater elevations in standpipe SP-10 remained static during most of the 2015-2016 monitoring period with a temporary 3-foot rise during August and September 2015. Groundwater elevations in standpipe SP-28 remained stable with variations of 0.1 foot or less.

Pore pressures measured in SP-34 pneumatic piezometer tips 1 and 2 continued to decline in approximate correlation with the standpipe water levels. Standpipe SP-34 pneumatic tip 3 continues to measure 0 PSI and tip 4 is non-functional; therefore, no data for those tips are reported.

2.3.3 Eastern Mesa Region

The Eastern Mesa Region lies between the Bluff Region and Big Rock Mesa Drive east of the Piedra Chica cul-de-sac. Groundwater in this area occurs within low permeability deposits of the Sespe Formation.

Groundwater data for the Eastern Mesa Region is presented as hydrographs on Plate A-5. Groundwater levels in this area are monitored using standpipe piezometers SP-3, -3A, -33, PC-1, and the pneumatic piezometers installed with PC-1. Overall groundwater elevations for the Eastern Mesa for the 2015-2016 monitoring year increased. The calculated area average groundwater elevation rose 2.7 feet when compared to the 2014-2015 monitoring period and is 18.4 feet below the mean water level elevation for the area for the period of record.

Calculated average groundwater elevations for individual standpipes in the eastern Mesa Region declined during the 2015-2016 monitoring year when compared to the 2014-2015 monitoring year, except in SP-33 which rose by 10.6 feet and in SP-3 which continued to be dry with no measureable groundwater.

Groundwater levels in SP-33 have been rising steadily since September 2014 and by June 2016 were measured 16.5 feet higher than the September 2014 elevations. Despite the rise, water levels in SP-33 are still 73.5 feet lower than the initial 1988 water levels taken prior to major

dewatering. SP-33 groundwater elevation may be related to the intermittent decline in production rate at Eastern Mesa dewatering well BYA-5 as it is one of only two wells in the Eastern Mesa deeper than SP-33. BYA-5 was assessed in 2016 and it is scheduled for pump replacement during the 2016-2017, monitoring year.

It should be noted that this report uses the pre-1999 reference elevation for SP-33 to be consistent with measured field survey data and topographical maps. Groundwater elevation data (including historical data) for SP-33 presented in this report have been adjusted accordingly.

Pore pressures during the 2015-2016 monitoring year in PC-1 pneumatic Tip 1 declined slightly and pore pressures in Tip 3 were slightly variable. Both continue to correspond with groundwater elevations higher than the groundwater elevation directly measured inside the standpipe. Standpipe PC-1 Tip 2 has been reading a pore pressure of 0 PSI since 2011. Tips 4 and 5 five are not functional and no data is reported.

2.3.4 Central Mesa Region

The Central Mesa Region lies between the Bluff Region and Big Rock Mesa Drive, west of the Piedra Chica cul-de-sac. Groundwater within this area generally occurs within moderately permeable landslide deposits derived from the Topanga Formation.

Groundwater data for the Central Mesa Region is presented as hydrographs on Plate A-6a and A-6b. Groundwater levels in this area are monitored using standpipe piezometers SP-9A, 16, 16A, 17, 17A, 17B, 24, 35, 36, W-11, and W-15 and the pneumatic piezometers tips installed with SP-35 and 36. In general, groundwater elevations in the Central Mesa Region for the 2015-2016 monitoring year continued to decrease. The calculated area average groundwater elevation declined 0.4 feet when compared to the 2014-2015 monitoring period and are 5.3 feet below the mean groundwater elevation for the region over the period of record.

Calculated average groundwater elevations for individual standpipes in the Central Mesa Region during the 2015-2016 monitoring year declined compared to the 2014-2015 monitoring year for all standpipe piezometers except in SP-35, which increased by 19.0 feet and in SP-24 which increased by 1.1 foot.

Between May 2015 and January 2016, water elevations in SP-35 rose from El. 99 feet to a peak of El. 127 feet in January 2016. Between January 2016 and June 2016, water elevations in SP-35 declined to El. 108 feet. The variations in water level within SP-35 occurred around the same period that dewatering well BYA-4 decreased productivity and was repaired. The pump control electronics for dewatering well BYA-4, located approximately 212 feet Northwest of SP-35 began failing in March 2015, causing reduced and eventually no water production from the well until February 2016, when the pumpsaver was replaced and the well returned to operation.

Groundwater elevations in standpipe SP-24 were stable during the 2015-2016 monitoring year with variations between readings of 1 foot or less. The mean groundwater elevation for SP-24 for the monitoring year remained 4.5 feet above the long-term mean water elevation but is remains on the order of 175 feet below the pre-dewatering groundwater elevation.



Groundwater elevations in standpipes SP-16 and -16A recorded sudden increases in February 2015 as the pump in dewatering well BYA-1 began to fail. In February 2016, the pump in BYA-1 was replaced and the water elevations in SP-16 and -16A have since returned to below their long-term averages.

Groundwater elevations in Standpipes SP- 9A, -17, -17A, -17B, and -36 either remained static or declined slightly with little variation during the 2015-2016 monitoring year.

Pneumatic piezometer SP-35 Tip 1 recorded pore pressure increases between March and June 2016, approximately correlating with the rise and decline of measured groundwater levels in standpipe SP-35. Pore pressure readings from SP-35 pneumatic tips 2 and 3 remained approximately static during the monitoring year with slight increases possibly corresponding to the standpipe water level increases. Pneumatic piezometer SP-35 Tip 4 is not functioning and no data is reported.

Pneumatic piezometers SP-36 Tips 1 and 2 remained approximately stable during most of the monitoring year with Tip-2 recording pore pressure increases in June 2016. Pneumatic piezometers SP-36 Tip 3 has recorded 0 PSI since installation and no data is reported.

2.3.4 Western Extension Region

The Western Extension Region encompasses approximately 79 acres, from PCH on the south to the upper ridgeline on the north. The region is located immediately west of the active 1983 Big Rock Mesa Landslide area.

Groundwater data for the Western Extension Region is presented as hydrographs on Plate A-7. Groundwater levels in this area are monitored using standpipe piezometers SP-20, -21, -22 and -23. In general, groundwater elevations for the Western Extension Region for the 2015-2016 monitoring year continued to decrease. The calculated area average groundwater elevation declined by 3.7 feet when compared to the 2014-2015 monitoring period and was 4.7 feet below the mean groundwater elevation for the area for the period of record.

Calculated average groundwater elevations for individual standpipes in the Western Extension Region during the 2015-2016 monitoring year declined compared to the 2014-2015 monitoring for all standpipes except SP-21, which showed slight increase in groundwater elevation of 0.6 feet.

Standpipe SP-23 recorded a slight, 1.2-foot groundwater elevation increase between June 2015 and May 2016 and was then found to be dry to its total depth of 398 feet in April through June 2016. This corresponds to a minimum of 16.8 feet of groundwater elevation decline between May and April 2016 and is the first record of this standpipe being dry. Follow up measurements were performed using different sounding devices to confirm the readings.

Standpipes SP-21 and SP-22 remained stable throughout the monitoring year with variations between readings of less than one foot. Standpipe SP-20 declined steadily by 19.2 feet between June 2015 and May 2016 and then increased approximately 3 feet between April and June 2016.

2.3.5 Headscarp Region

The Headscarp Region borders the Central Mesa Region to the north. The ground surface elevation in the Headscarp Region is higher than other regions in Big Rock Mesa, and groundwater is relatively deep.

Groundwater data for the Western Extension Region is presented as a hydrograph on Plate A-8. Groundwater levels in this area are monitored using standpipe piezometer SP-26. In general, groundwater elevations for the Headscarp Region for the 2015-2016 monitoring year decreased slightly. The calculated area average groundwater elevation declined by 0.1 feet when compared to the 2014-2015 monitoring period and was 3.3 feet above the mean groundwater elevation for the area for the period of record.

Average groundwater elevations in standpipe SP-26 had increased by a total of 1 foot over the last two consecutive monitoring years (2013-2014 and 2014-2015). During the 2015-2016 monitoring year, groundwater elevations remained stable with variations of less than 1 foot between readings.

2.4 DEWATERING WELL PRODUCTION

The total production rate for all dewatering wells from 1993 through June 2016 is depicted on Plate 4. Dewatering well information, status and production rates for individual wells are presented on Plates B-1 through B-4 (Appendix B).

The average total well production rate for the monitoring period was approximately 35,018 gpd. This is approximately 14 percent less than the previous year's monitoring period value of 40,138 gpd, and below historical average production of 53,387 gpd measured from 1993 to the present. The decline in dewatering well production correlates with continued below average rainfall and continued decline in average groundwater levels. Additionally, total dewatering well production was affected during the year as mechanical, electrical or other issues caused wells to intermittently stop or reduce production. Over the course of the 2015-2016 monitoring year, dewatering wells W-8, W-16 and BYA-1, -4, -5, and -14 had periods without production.

2.5 HYDRAUGER PRODUCTION

The total production rate for all hydraugers from 1993 through June 2016 is depicted on Plate 4. Additional data regarding hydraugers and production rates are presented in Appendix C, Plates C-1 through C-4.

The average total hydrauger production rate over the monitoring period was approximately 12,578 gpd. That represents an approximately 11 percent decrease in production relative to the previous monitoring period (13,976 gpd).

Hydraugers produced below historical average volumes of water throughout the monitoring period. Because hydraugers rely on gravity and water pressure (related to elevated groundwater table) for water production, hydraugers generally produce lower volumes during lower rainfall periods. Hydraugers typically respond well to years of higher than average rainfall; production generally increases at a rapid rate immediately following larger rain events.



2.6 SLOPE INCLINOMETERS

Fugro monitored 26 slope inclinometers on a quarterly to semi-annual basis to check for subsurface ground deformation through June 2016.

Slope inclinometer measurement plots are presented in Appendix D. Four slope inclinometer plots are prepared for each inclinometer installation:

- The first plot shows the cumulative deflection and incremental deflection for the A-direction;
- The second plot shows the cumulative deflection and incremental deflection for the B-direction. Those two plots show approximately one curve per year from about 2006 to 2014 and also include plots for each quarter from the two most recent monitoring years.
- The third and fourth plots show displacement versus time for the same period as the first two plots (one for each direction) and the displacement time plots include intermediate readings for each of the years presented.

When reviewing and interpreting the slope inclinometer data plots, instrument limitations and movement history should be considered. Individual plots have been reviewed and interpreted with regard to movement along identified slide planes. Interpreted movement along the identified slide planes is summarized on Plate D-1 in Appendix D. Some slope inclinometer plots show minor (less than 0.2 inch) amounts of displacement measured at the ground surface during the July 2015 through June 2016 monitoring period.

Interpretation of inclinometer data shows small, but definable ground movement in only 4 of the 26 inclinometers monitored during the July 2015 through June 2016 monitoring period:

- SP-10 shows a change of about 0.1 inch at a depth of 130 feet;
- SP-26 shows a change of about 0.15 inches at a depth between 30 and 40 feet;
- SP-29 shows a change of approximately 0.1 inches at a depth of 50 to 52 feet; and
- SP-33 shows a change of <0.2 inches distributed through the top 100 feet.

Several inclinometers show some inconsistent changes (typically <0.1 to 0.2 inch), but the potential movement magnitude and orientation is not clear and is not within the reliable accuracy of the instrument. Some of the irregular shapes observed in the deep inclinometers can be attributed to depth position and rotation errors caused by cable length changes, local curvatures within the casings, and significant deviation from vertical during initial installation, which is common to deep inclinometers.

A brief summary of each region is presented below and is summarized on Plate D-1. It is important to keep in mind the high sensitivity of the inclinometer probes and the magnitude of the interpreted movements when reviewing the inclinometer data presented in this report. Plate D-1 notes the depths at which movement has been interpreted in the past, as well as whether the inclinometer penetrates the basal rupture surface. Shallower depths of historically interpreted movement above the base of the Big Rock Mesa Landslide have also been noted.



2.6.1 Pacific Coast Highway Region

The PCH Region extends along PCH in proximity of the southern boundary of the 1983 Big Rock Mesa landslide. SP-29 shows a movement toward the southwest of approximately 0.1 inch along a previously identified shear plane at a depth of 50 to 52 feet. The remaining inclinometers in the region do not show quantifiable movement.

2.6.2 Bluff Region

The Bluff Region extends along the top of the slope immediately the north of the PCH Region, where intense ground cracking was observed during the 1983 landslide. The inclinometers in that area are deep and show evidence of depth position and rotation errors, associated with cable stretch, casing curvature, and casing deviation from vertical. Inclinometer SP-10 measured a small (<0.1 inch) upslope movement along a previously identified shear plane at a depth of 130 feet. The upslope direction of movement at this depth is consistent with previous interpretations of conjugate shear planes as described in The Big Rock Mesa Geotechnical Engineering Evaluation (BYA, 1992). No other quantifiable offsets within the inclinometers of the Bluff Region were measured.

2.6.3 Eastern Mesa Region

The Eastern Mesa Region extends west to the ends of Inland Lane and the Piedra Chica cul-de-sac. This area is bordered to the north by Big Rock Drive and to the south by the Bluff Region. The inclinometers in the Eastern Mesa Region are deep and show evidence of depth position errors, as well as localized casing curvature, and casing deviation from vertical. No quantifiable offsets along identified shear planes were detected within the inclinometers of the Eastern Mesa Region during the current monitoring year. However, Inclinometer SP-33 shows a small amount (<0.2 inches) of creep type movement distributed from the surface to about 100 feet.

2.6.4 Central Mesa Region

The Central Mesa Region is located between the Bluff and Big Rock Mesa Drive and to the west of the Piedra Chica cul-de-sac. The inclinometers in that region are deep and show evidence of depth position errors, probably associated with ground settlement and/or cable stretch. No quantifiable offsets were measured within the inclinometers in the Central Mesa Region during the 2015-2016 monitoring year. However, SP-17B shows indications of past movement at a depth of about 200 feet and SP-24 has previously shown indications of movement within the upper 70 feet.

2.6.5 Western Extension Region

The Western Extension Region encompasses approximately 79 acres, from PCH on the south end to the upper ridgeline on the north, immediately west of the 1983 Big Rock Mesa landslide area. The inclinometers in that area are deep and show evidence of depth position errors, probably associated with local casing curvature and casing deviation from vertical. No quantifiable offsets within the inclinometers in the Western Extension Region were measured during the 2015-2016 monitoring year.

2.6.6 Headscarp Region

The Headscarp Region borders the Central Mesa Region to the north. SP-26 is the only inclinometer being measured in this region and, historically, has been the first to move and the last to cease movement in response to heavy rainfall within the assessment district. Inclinometer SP-26 is deep and shows evidence of depth position errors, probably associated with local casing curvatures and casing deviation from vertical. During the 2015-2016 monitoring year, approximately 0.15 inches of offset was measured along a previously identified slide plane at a depth of 30 to 40 feet. Most of the movement appears to have occurred between March and May 2016, following rainfall events that occurred between January and April 2016. Movement at this depth has previously been interpreted as occurring along a smaller “headscarp” landslide. Past movement has also occurred along the identified slide plane between a depth of 120 and 130 feet.

2.7 WATER QUALITY MONITORING

2.7.1 Regional Board Requirements

Water quality monitoring was completed in general compliance with the NPDES permit, as required by the California Regional Water Quality Control Board (RWQCB).

On March 2, 2004, the RWQCB issued General NPDES permit CAG994004, Order No. R4-2003-011. On October 3, 2008, Order No. R4-2003-0111 was superseded by Order No. R4-2008-0032, providing revised requirements for sampling and analysis. Residual chlorine was not a required element of the sampling and testing plan until the end of the second quarter 2010. A revised permit was issued to the City in October 2010 requiring all discharge points to be sampled monthly for all constituents, except for Acute Toxicity, which is to be tested annually. On June 5, 2015 order No. R4-2003-0032 was superseded by general order number R4-2013-0095 (current permit). Fugro conducted water quality monitoring during the 2015-2016 monitoring year consistent with the requirements of the RWQCB NPDES permit, No. R4-2013-0095.

Water produced by assessment district dewatering wells is pumped into the public storm drain system and water flow from the hydraugers is collected through a conveyance line system. Both the storm drain system and the conveyance line system empty into ten culverts on the north side of Pacific Coast Highway. Usually, effluent from several wells and hydraugers drain into a common culvert where they co-mingle and then flow under the PCH to a Discharge Point on the beach. The ten beach Discharge Points referred to in the permit are named M-001 through M-010. Other sources of surface water are collected by the storm-drain system including storm water runoff (during and following precipitation), irrigation runoff, domestic use surface runoff from car washing and hosing-off of driveways, illicit discharges, groundwater seepage, and other possible unidentified sources.

All samples during the 2015-2016 monitoring year were collected directly from the ten beach discharge points with two exceptions: 1) Discharge point M-009 cannot not be located and was instead sampled directly from hydrauger HD-7, which is the only assessment district dewatering source flowing into M-009; and 2) Discharge point M-003 flow was too low for sampling to be practical and, therefore water representative of M-003 was sampled directly from hydrauger HD-41, which provides the vast majority of the dewatering flow to M-003. During November and December 2015, and May and June 2016, Discharge Point M-003 and its contributing hydraugers were non-flowing and no sample was collected those months.



Representative samples from each discharge point were collected and analyzed for the entire suite of constituents listed in the permit once per month. Discharge points with analytes that were detected in concentrations exceeding permitted limits were subsequently sampled and tested for that analyte on a weekly basis. After at least three consecutive weekly follow-up samples are measured within permit limits, sampling for that analyte may return to once monthly.

All samples were collected in clean laboratory provided jars, placed in a cooler on ice and delivered to the analytic laboratory under proper chain of custody protocol within method specific holding times, with the exception of residual chlorine, pH, and temperature, which were measured in the field during sample collection. One quality control duplicate sample was collected for every monthly sampling event.

2.7.2 Water-Quality Results

Water quality data summary sheets for each quarter of the 2015-2016 monitoring period are provided as Plate E-1 through E-4 in Appendix E.

During the 2015-2016 monitoring year, samples collected from the ten Discharge Points exceeded permitted concentration limits for TPH, Zinc, Methylene Blue Activated Substances (MBAS), Biologic Oxygen Demand (BOD), Residual Chlorine, and Phenols. Most of the permit exceedances occurred over a short duration, while some, such as TPH at M-004, M-005 and M-007 and MBAS at M-004 and M-005 occurred intermittently throughout the year. Only Zinc concentrations at Discharge Point M-008 consistently exceeded permit limits throughout the monitoring year.

In accordance with the permit, bacteriological testing for Total Coliform, Fecal Coliform and Enterococcus was performed once monthly at each discharge point. With the exception from M-009/HD-7 and M-003/HD-41, results of bacteriological sampling through the 2015-2016 monitoring year consistently or intermittently detected Total Coliform and Enterococcus in concentrations exceeding NPDES general permit limits. Fecal Coliform was intermittently detected in concentrations exceeding NPDES general permit limits from all discharge points except M-009/HD-7 and M-003/HD-41. Fugro will continue to monitor and report the results of bacteriological levels once each month in consultation with the RWQCB.

Acute toxicity testing is required once per year under the permit. Acute toxicity was performed during Quarter 4 of 2015 and those results indicate a 96 to 100 percent survival rate from all discharge ports, which is within the effluent limit indicated in the permit.

The current permit requires quarterly and annual compliance reporting to the Regional Board. Those water quality reports are more comprehensive and provide details for each sampling event and exceedance. Quarterly and annual permit compliance reports may be downloaded and viewed from the RWQCB website.

3.0 DEWATERING FACILITY MAINTENANCE

3.1 CAPITAL IMPROVEMENTS

No capital improvements were performed during the monitoring period.

3.2 FACILITY MAINTENANCE

The operating status of each dewatering well and hydrauger was checked monthly. When necessary, repair work was scheduled and undertaken as expeditiously as reasonable - typically within a matter of a few hours to a few days after identifying a problem. Generally, repairs and maintenance consisted of brush clearance, cleaning, and well pump and electrical repairs. Table 2 presents a summary of facility maintenance/repairs that were completed during the 2015-2016 monitoring year.

Table 2. Summary of Completed Facility Maintenance

Facility	Date of Repair	Repair
W-2	7/25/2015	Replace flow meter
BYA-9	7/25/2015	Replace flow meter
FW-1	7/30/2015	Excavate and replace broken 24"X42" vault and lid
PCH Hydraugers	9/2/2015	Remove large vegetation overgrown along PCH hydraugers
W-8	11/24/2015	Repair leaking discharge line near meter vault, replace flow meter
Port-9	2/2/2016	Excavate and remove clogged hydrauger conveyance line draining from east into Port 9, attached interim flexible conveyance into port to bypass port filled with debris
BYA-1	2/11/2016	Replace pump/motor assembly, control box and 84 feet of steel drop pipe
BYA-14	2/11/2016	Remove and evaluate pump/motor assembly, replace 168 feet of cracked steel drop pipe, re-install original pump and motor
BYA-4	2/12/2016	Replace failed pump saver electronics
W-8	2/12/2016	Replace fuse and melted wiring
BYA-6	2/12/2016	Replace flow meter
Port 6/HD-10 and 11	2/15/2016	Chisel away mineralization and roots at discharge lines into Port 6, re-establish flow from hydraugers HD-10 and 11 through buried conveyance line. Remove bypass conveyance line.
BYA-6	5/2/2016	Install in-line filter and washout valve in discharge line before flow meter
W-16	5/24/2016	Replace pump/motor assembly control box and 84 feet of steel drop pipe

4.0 SUMMARY AND CONCLUSIONS

4.1 ANNUAL SUMMARY

The general status of the Big Rock Mesa Landslide Assessment District can be summarized as follows:

- The groundwater level in the Big Rock Mesa landslide is the primary factor controlling the stability of the landslide mass. Rises in groundwater level tend to de-stabilize the landslide. Previous episodes of movement of the landslide have been directly related to high groundwater levels. Therefore, controlling the long-term average and peak groundwater levels in the landslide mass is the primary means being used to reduce future



movements of the landslide. The primary factors influencing recharge of groundwater to the landslide are: 1) onsite wastewater treatment system discharge, 2) rainfall, 3) irrigation, and 4) water-line and pool leakage.

- Monitoring data related to rainfall and imported water usage indicate the following:
 - Rainfall during the 2015-2016 rain-season period (October to September) was 7.36 inches of precipitation, which is well below the historical average annual rainfall during the “rain season” of 15.4 inches. Rainfall during the Malibu “monitoring period” (July 2015 to June 2016) was 9.41 inches of precipitation, which is also well below the historical annual average of 15.0 inches per year measured between July and June from 1968 through June 2016.
 - Use of imported water decreased approximately 19.4 percent from the previous monitoring year (141,500 gpd versus 175,600 gpd) and is 21 percent above the average usage in 1984 (117,400 gpd).
- Groundwater levels in 29 standpipe piezometers were measured regularly during the monitoring period. Average groundwater levels and/or peak groundwater levels measured during the monitoring period were more than 1 foot above long term average groundwater levels for 3 of the 29 standpipe piezometers. The remaining 26 piezometers indicated a static or lowered groundwater level.
- Groundwater levels in the western region have been variable since 1998. That area of approximately 79 acres is dewatered by two wells and five hydraugers; however, over seventy percent of the dewatering production for the western region is provided by one well, W-18.
- Groundwater levels in SP-30 along Pacific Coast Highway reflect a long-term trend of increasing groundwater levels. Groundwater levels in SP-30 from the 2010-2011 year through the 2013-2014 monitoring year had stabilized (fluctuations less than one foot) and then declined over 2014-2015 monitoring year. Average water elevation in SP-30 remained relatively stable over the 2015-2016 monitoring year, increasing by less than one foot. No dewatering facilities have been constructed along Pacific Coast Highway.
- The average total well production rate for the 2015-2016 monitoring period was approximately 35,018 gpd. This is a 14 percent decrease when compared to the previous year’s monitoring period rate of 40,138 gpd and is below the historical average production rate of 53,387 gpd measured between 1993 and the present.
- The average total hydrauger production rate over the 2015-2016 monitoring period was approximately 12,578 gpd. That represents an 11 percent decrease in production relative to the previous monitoring period (13,976 gpd).
- Interpretation of inclinometer data shows minor but quantifiable ground movement in only a few of the inclinometers monitored during the 2015 through 2016 monitoring period. SP-33 and SP-26 recorded the most movement with approximately 0.2 inches and 0.15 inches respectively. Inclinometers SP-10 and SP-29 both measured approximately 0.1 inches of movement. The measured displacements within SP-26, SP-10, and SP-29 occurred as shear along previously identified slide planes. Quantifiable ground movement at SP-33 is indicative of creep type movement distributed over the top 100 feet of the casing.



- Water quality monitoring, conducted in general conformance with the requirements of the RWQCB NPDES Permit No. R4-2013-0095, which became effective June 5, 2015, indicate consistent exceedances for bacteriological analytes at several discharge points. It was also noted that revising sample locations from the individual facility discharge points back to the beach-side Discharge Points after March 2015 appears to have resulted in detection of exceedances that were not typically present when sampling occurred directly from the facilities during November 2004 to March 2015.
- Routine and minor maintenance was conducted throughout the 2015-2016 monitoring year on the dewatering wells, hydraugers, and conveyance systems. Ongoing maintenance and repair work is essential to maintaining the capacity of the dewatering system.

4.2 CONCLUDING COMMENTS

It is important to recognize that the dewatering facilities installed over the preceding decades are aging and require increasing maintenance and regular replacement. The anticipated lifespan of an average hydrauger is measured in years, not decades. Dewatering wells may last from a few years to several decades. In order to maintain the highest possible efficiency of the existing horizontal drains, cleaning should be conducted on a regular basis.

Dewatering wells should be reviewed on an individual basis and redeveloped, repaired, or replaced as necessary in an effort to help keep groundwater levels as low as possible.

The geology throughout the Assessment District is not uniform and varies from one location to another. Areas of low permeability, such as in the Eastern Mesa Region, can limit the dewatering production of individual facilities.

Water conservation throughout the Big Rock Mesa area is essential to reduce groundwater recharge. As previously stated, rainfall and imported (household) water usage are the primary sources of groundwater recharge and are the primary factors controlling the movement of the landslide. Seasonal rainfall is beyond the control of homeowners and the City, therefore, water conservation is the most critical remaining means of controlling groundwater recharge on the Mesa.



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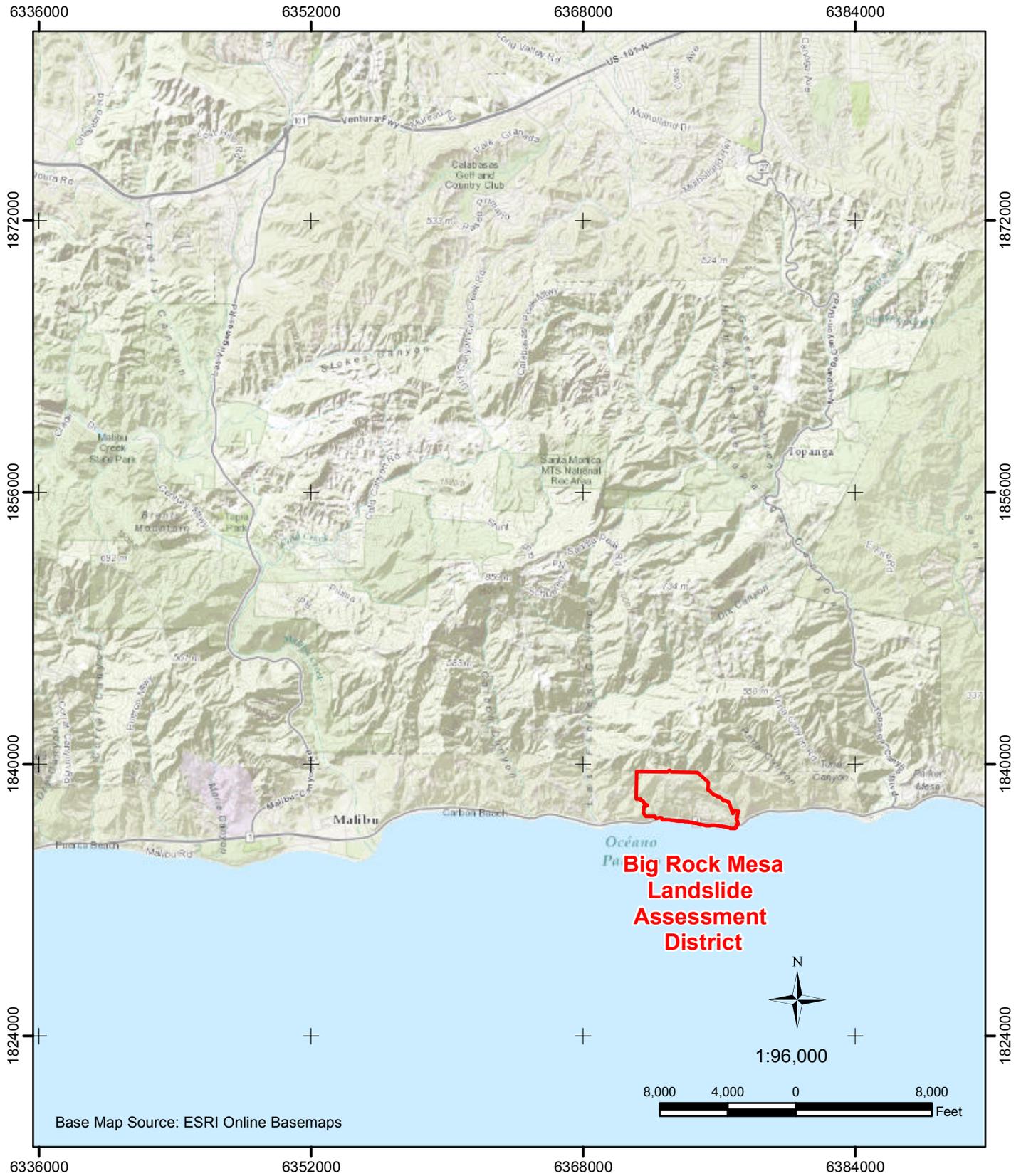
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PLATES



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SITE LOCATION MAP
Big Rock Mesa Landslide Assessment District
Malibu, California

**ASSESSMENT DISTRICT 98-1
BIG ROCK MESA
MALIBU, CALIFORNIA**

ASSESSMENT DISTRICT MAP

FUGRO CONSULTANTS, INC.
4820 McGrath St., Suite 100, Ventura, California 93003
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LEGEND

- Dewatering Well
- Slope Inclinometer that does not Penetrate Rupture Surface
- Slope Inclinometer that does Penetrate Rupture Surface
- Piezometer
- GPS Monument
- Hydrauger Discharge Point
- Storm Drain Outfall
- Catch Basin
- Hydrauger
- Approximate Limits of Primary Land Movement
- - - Western Extension Boundary
- Big Rock Mesa Landslide Assessment District Boundary
- Storm Drain
- Trees/Brush
- Streams
- ▭ Building
- + Coordinate Grid: California State Plane, Zone 7, NAD 27, Feet
Vertical Datum: NAVD88 Feet



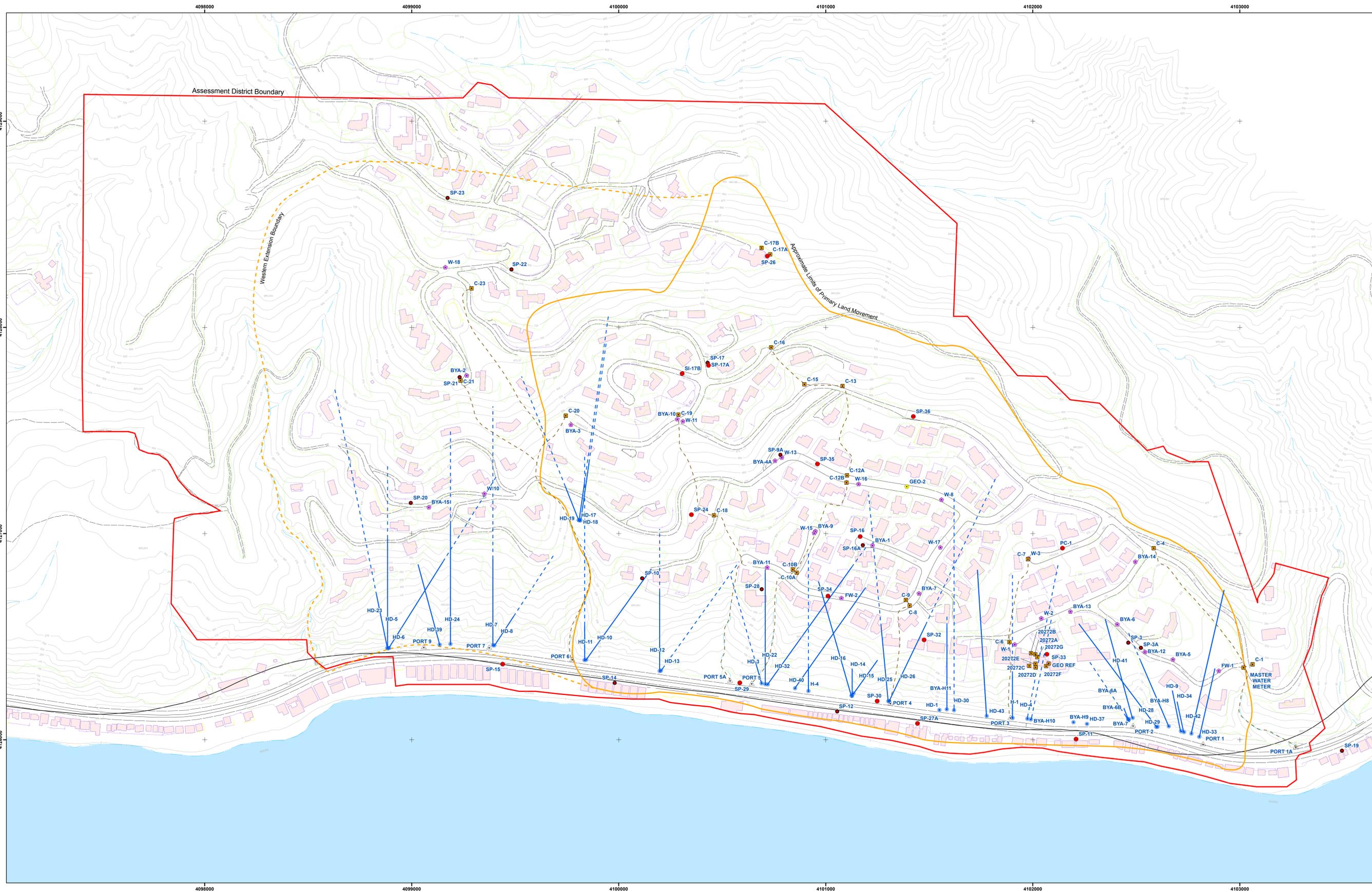
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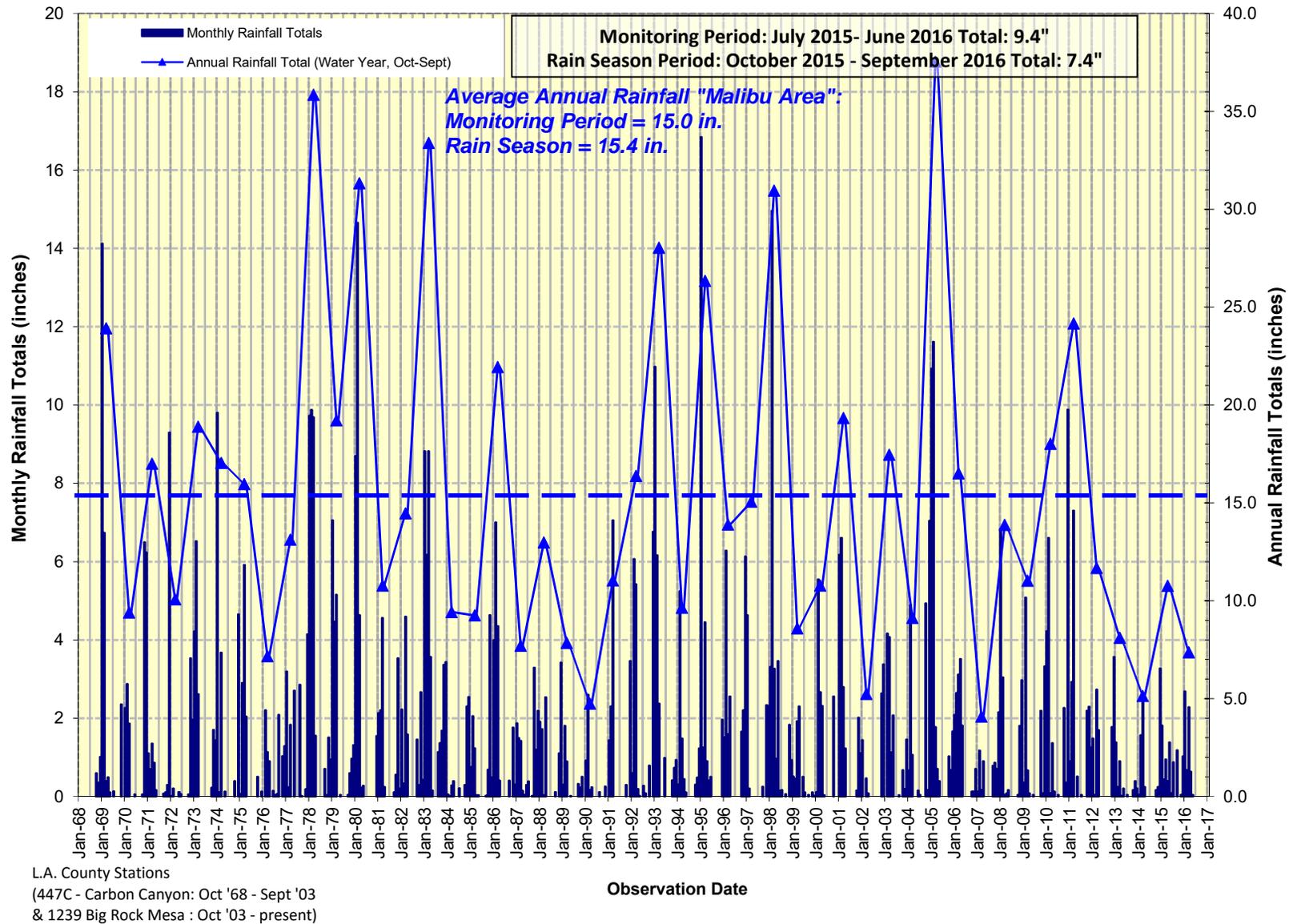
REVISIONS

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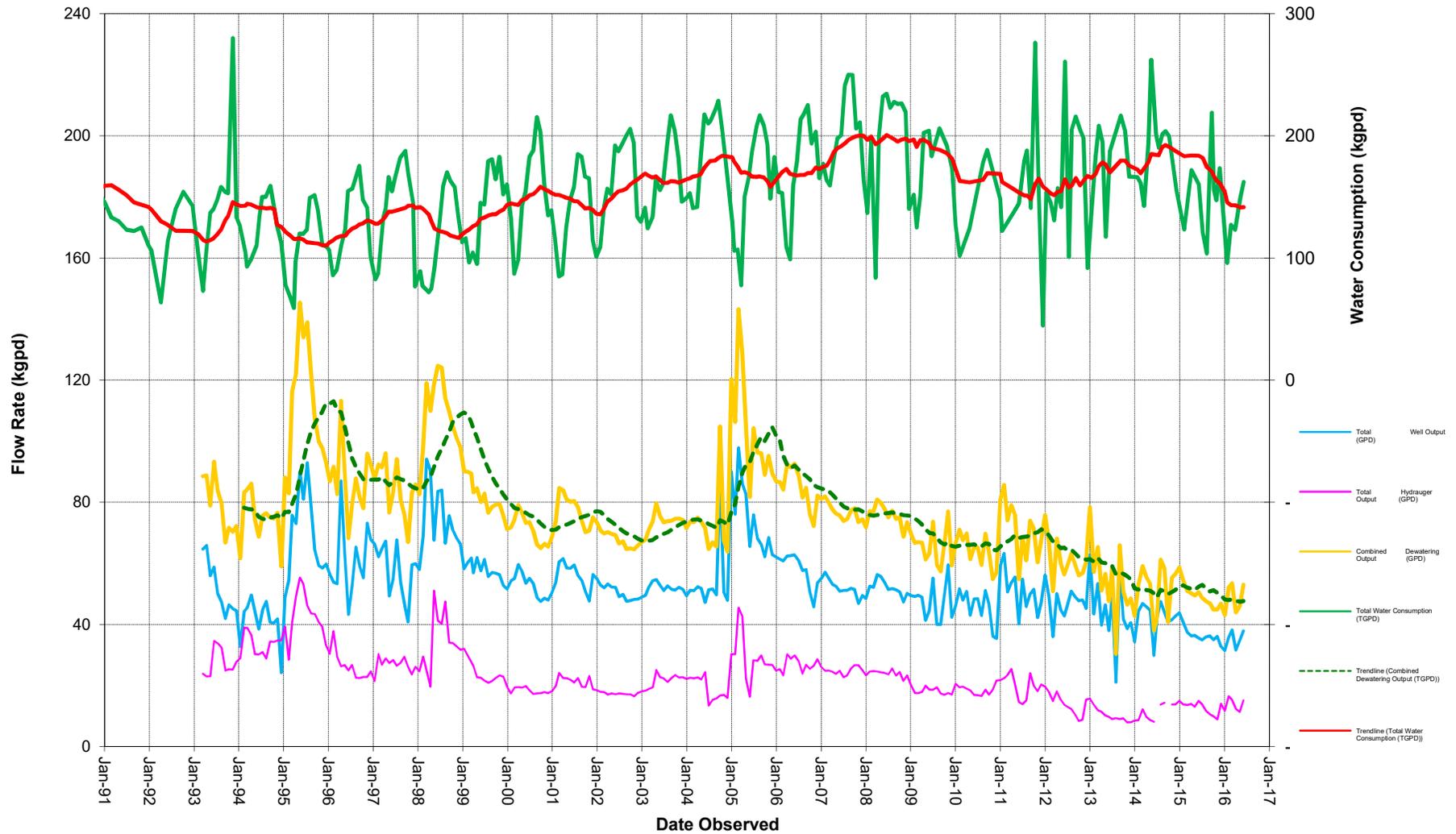
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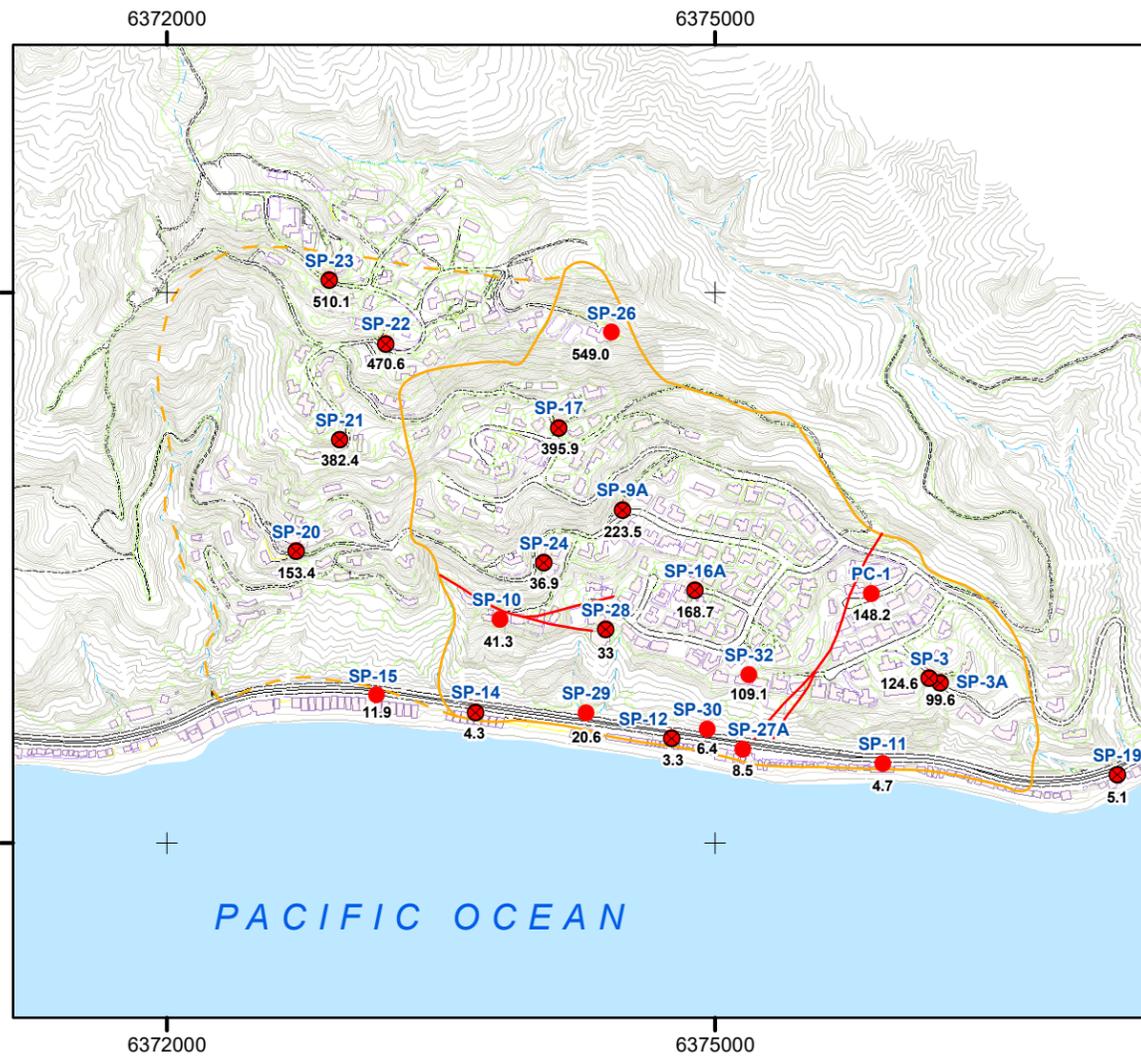


RAINFALL GRAPH
 Malibu Road Landslide Assessment District
 Malibu, California

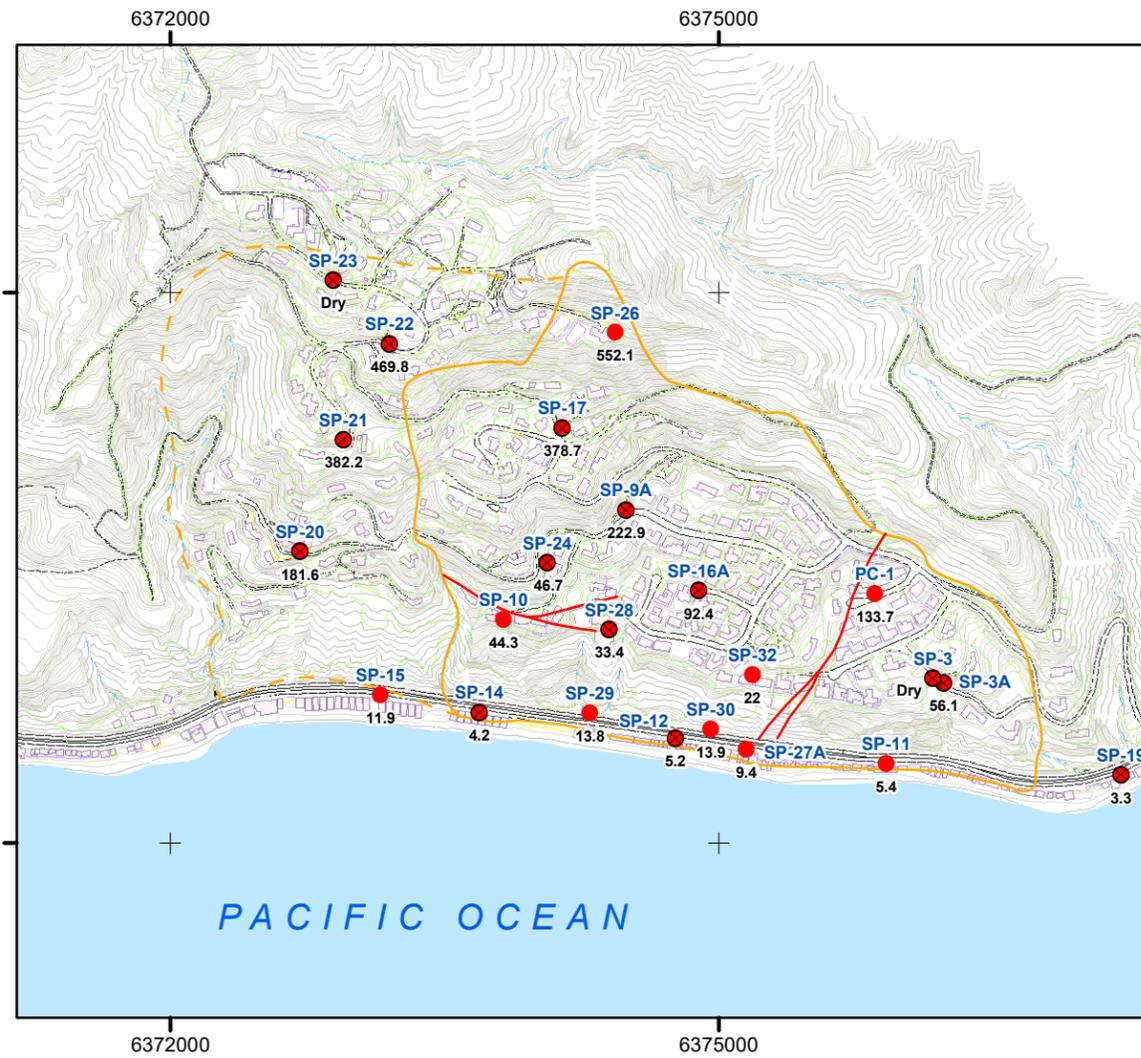


TOTAL DEWATERING RATE VS. TOTAL WATER CONSUMPTION
Wells and Hydraugers(Combined)/Total water Consumption
 Big Rock Mesa Landslide Assessment District
 Malibu, California

Groundwater Elevation (May 8, 1995)



Groundwater Elevation (May 17, 2016)



Legend

Instrumentation

- Slope Inclinator, does not Penetrate Rupture Surface
- Slope Inclinator, does Penetrate Rupture Surface

SP-16 Instrument Label and Ground Water Elevation in feet
 400

Site Map Features

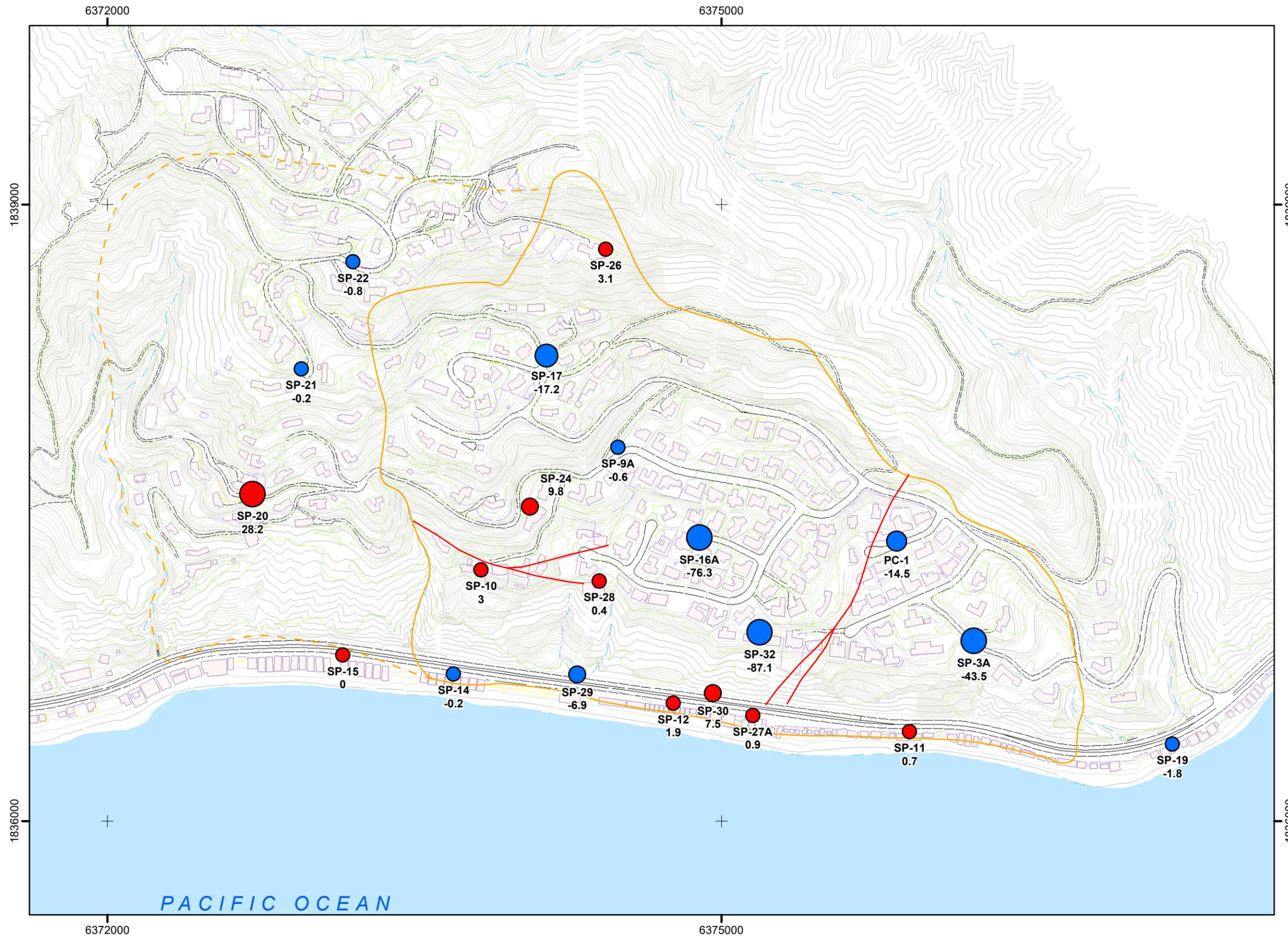
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- - - Approximate Landslide Limits
- Buildings



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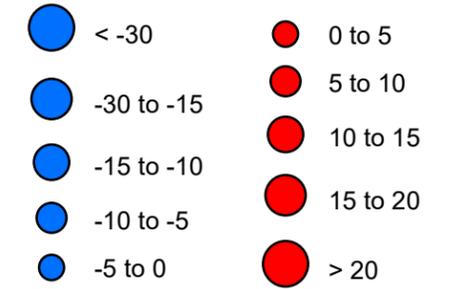


GROUNDWATER ELEVATION MAP
MAY 1995 AND MAY 2016
 Big Rock Mesa Landslide
 Assessment District
 Malibu, California



Legend

Groundwater Elevation Change (Feet)



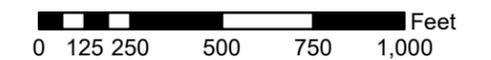
SP-16
-3.1
Instrument Label and Ground Water Elevation Change in feet

Site Map Features

- Faults
- Approximate Landslide Limits
- Buildings

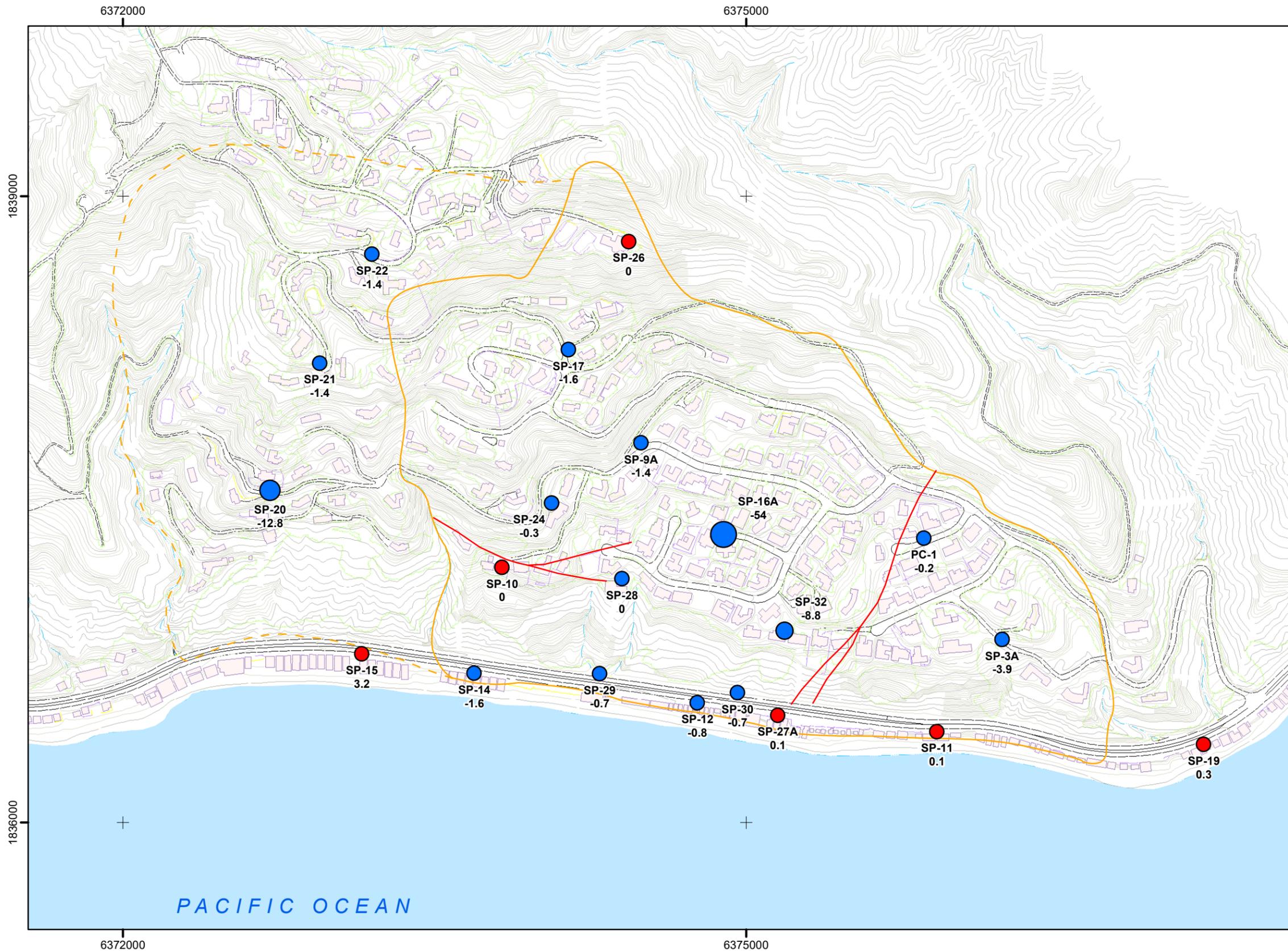


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CHANGE IN GROUNDWATER ELEVATION MAY 1995 TO MAY 2016
 Big Rock Mesa Landslide Assessment District
 Malibu, California

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Legend

Instrumentation

SP-16
3.6
Instrument Label and Ground Water Elevation Change in feet

Site Map Features

- Faults
- Approximate Landslide Limits
- Buildings

Groundwater Elevation Change (Feet)

● < -30	● 0 to 5
● -30 to -15	● 5 to 10
● -15 to -10	● 10 to 15
● -10 to -5	● 15 to 20
● -5 to 0	● > 20

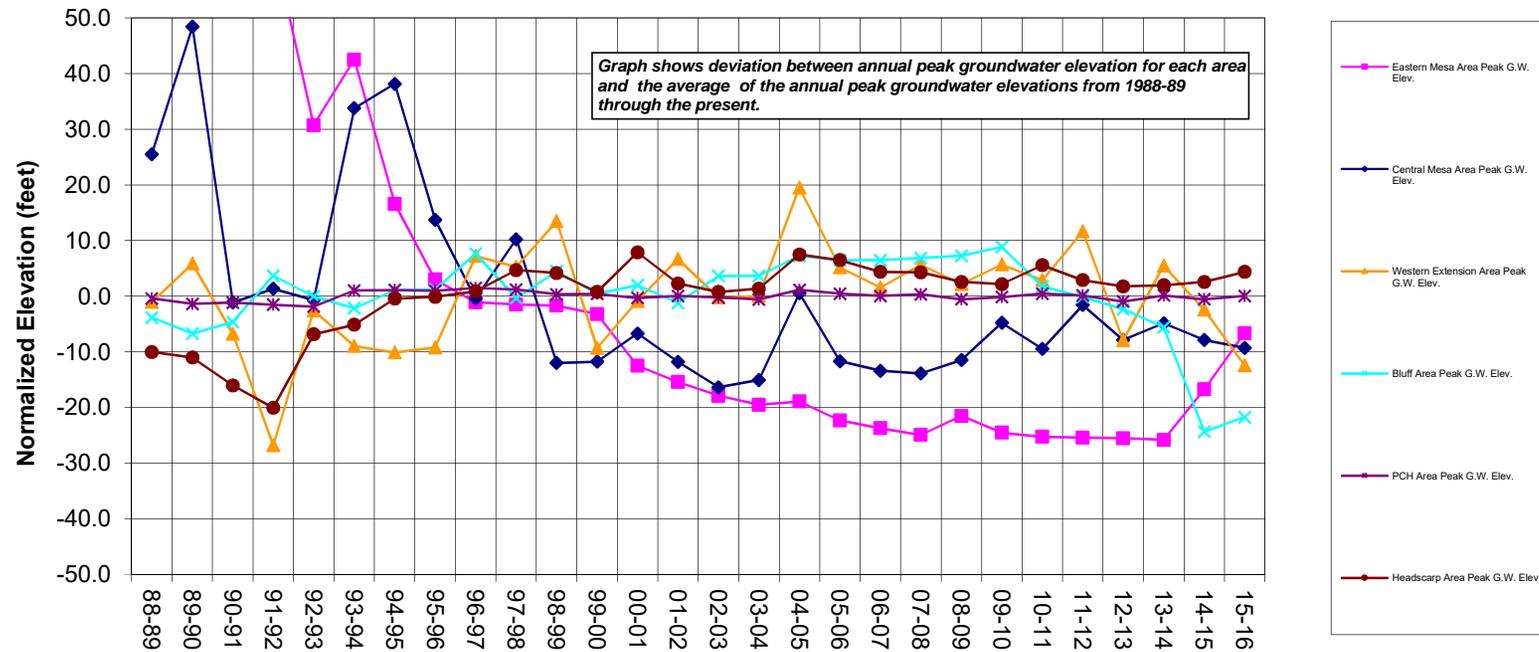
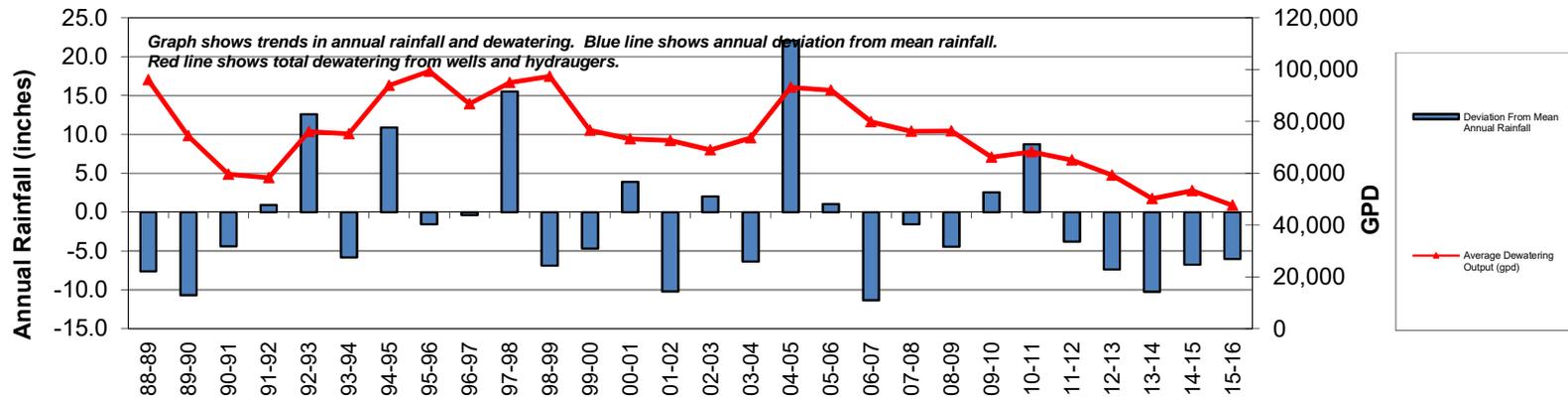


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CHANGE IN GROUNDWATER ELEVATION MAY 2015 TO MAY 2016
 Big Rock Mesa Landslide Assessment District
 Malibu, California

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SUMMARY OF GROUNDWATER LEVELS, DEWATERING, AND RAINFALL
 Big Rock Mesa Landslide Assessment District
 Malibu, California

APPENDIX A
GROUNDWATER LEVEL DATA



Big Rock Mesa: Standpipe Piezometer Information				
Piezometer ID	Surface Elev. (ft)	Depth (ft)	Perforation Interval Elevation (ft)	Installer
PCH Standpipe Piezometers				
SP-11	27	58	Unknown	Evans
SP-12	26	40	Unknown	Evans
SP-14	25	30	Unknown	Evans
SP-15	20	82	Unknown	Evans
SP-19	25	82	Unknown	Evans
SP-27A	29	94	Unknown	Evans
SP-29	27	138	Unknown	Evans
SP-30	29	128	Unknown	Evans
Bluff Standpipe Piezometers				
SP-10	295	332	Unknown	Evans
SP-28	270	358	Unknown	Evans
SP-32	233	354	Unknown	Evans
SP-34	270	382	-112 to -107	BYA
Headscarp Piezometers				
SP-26	745	346	Unknown	Conv
Central Standpipe Piezometers				
SP-9A	365	300	Unknown	Evans
SP-16	285	240	Unknown	Evans
SP-16A	285	392	Unknown	Evans
SP-17	540	192	Unknown	Evans
SP-17A	540	238	Unknown	BYA
SP-24	370	382	Unknown	Conv
SP-35	345	396	-51 to -46	BYA
SP-36	380	254	120 to 125	BYA
Western Standpipe Piezometers				
SP-20	430	326	Unknown	Conv
SP-21	660	280	Unknown	Evans
SP-22	780	332	Unknown	Conv
SP-23	860	398	Unknown	Conv
Eastern Standpipe Piezometers				
PC-1	250	160	87.5 to 90	BYA
SP-3	212	132	Unknown	Evans
SP-3A	203	246	Unknown	Evans
SP-33	208	374	Unknown	Evans

Evans - D.A. Evans

Converse - Converse Consultants

BYA - Bing Yen and Associates



PNEUMATIC PIEZOMETER INFORMATION					
Piezometer ID	Surface Elev. (ft)	Tip No.	TIP DEPTH (ft.)	INSTALL BY	STATUS
W-10**	432	230	230	BYA	No air-line, sounder access, no data reported
W-11**	507	214	214	BYA	Air-line present, no sounder access, no data reported
W-15**	295	164	164	BYA	Air-line present, no sounder access, no data reported
PC-1	250	TIP-1	120	BYA	Functioning, reported
		TIP-2	90		0 PSI since November 2011
		TIP-3	70		Functioning, reported
		TIP-4	40		Non-Functioning, no return air flow, not reported
		TIP-5	20		Non-Functioning, no return air flow, not reported
SP-5A*	NA	TIP-1		BYA	Non-functioning - Covered by asphalt pavement
		TIP-2	NA		
		TIP-3			
SP-8A*	NA	TIP-1		BYA	Non-functioning - Covered by landslide
		TIP-2	NA		
		TIP-3			
SP-17A*	540	TIP-1	Unknown	BYA	Non-functioning, no return air flow
		TIP-2	Unknown		
		TIP-3	Unknown		
		TIP-4	Unknown		
		TIP-5	Unknown		
SP-34	270	TIP-1	381	BYA	Functioning, reported
		TIP-2	282		Functioning, reported
		TIP-3	182		Low PSI since installation, not reported
		TIP-4	82		Non-Functioning, no return air flow, not reported
SP-35	345	TIP-1	393	BYA	Functioning, reported
		TIP-2	293		Functioning, reported
		TIP-3	193		Functioning, reported
		TIP-4	98		Non-Functioning, no return air flow, not reported
SP-36	380	TIP-1	255	BYA	Functioning, reported
		TIP-2	195		Functioning, reported
		TIP-3	95		0 PSI since installation, not reported
BYA-2*	665	TIP-1	Unknown	BYA	Non-functioning, no return air flow
		TIP-2	Unknown		
		TIP-3	Unknown		
BYA-3A*	NA	TIP-1		BYA	Non-Functioning
		TIP-2			
		TIP-3	NA		
		TIP-4			
BYA-4A*	NA	TIP-1		BYA	Non-functioning, no return air flow
		TIP-2			
		TIP-3	NA		
		TIP-4			
		TIP-5			
		TIP-6			
BYA-5A*	NA	TIP-1		BYA	Non-Functioning, Paved over
		TIP-2	NA		
		TIP-3			
		TIP-4			
GEO-2 (OB-2)*	305	TIP-1		GS	Non-Functioning
		TIP-2	NA		
		TIP-3			
GEO-1*	NA	TIP-1		GS	Restricted Access (possibly malfunctioning)
		TIP-2	NA		
		TIP-3			

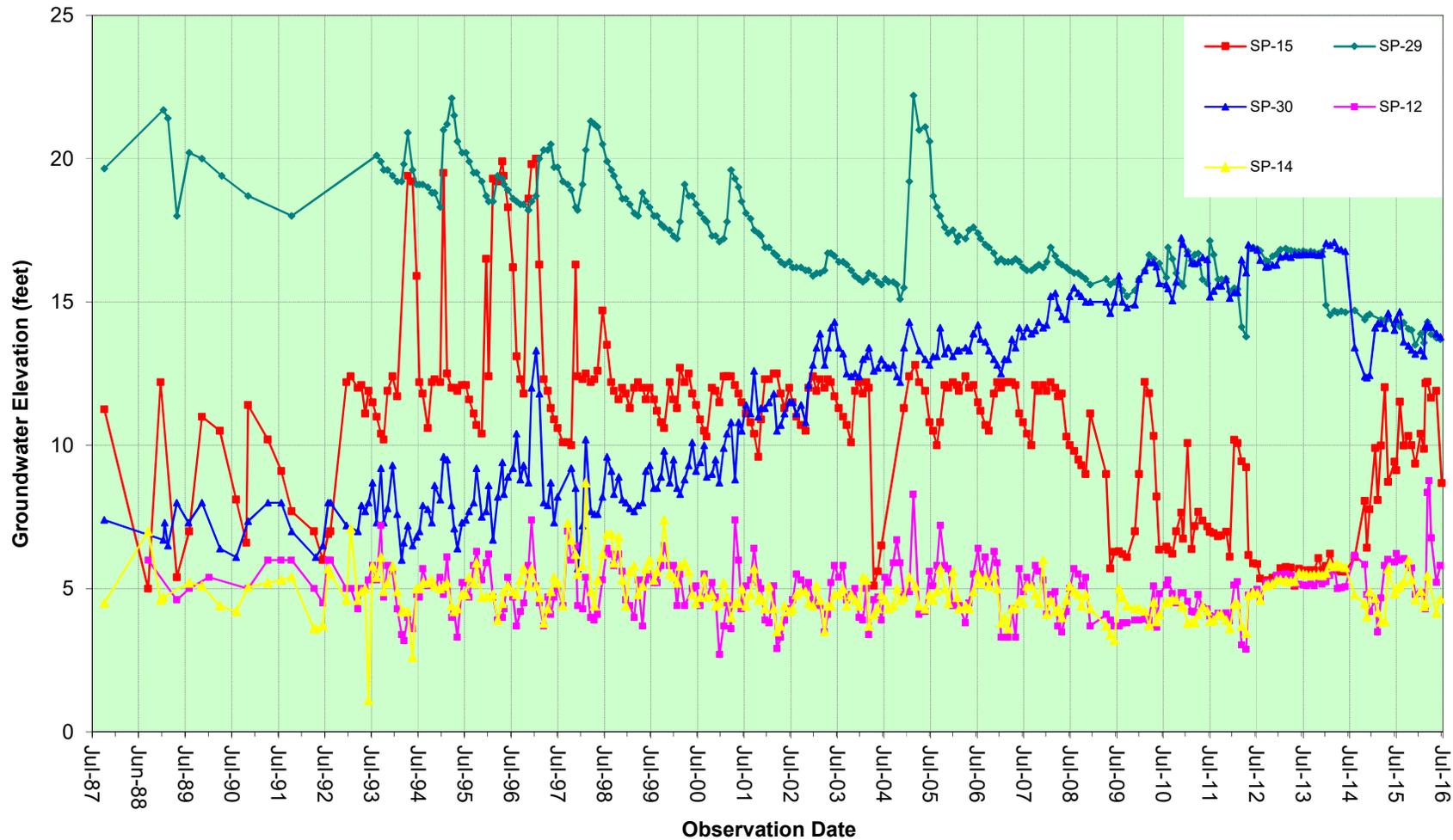
NOTE: * Not functioning or no longer monitored pneumatic peizometer
 ** Inactive dewatering well air-line



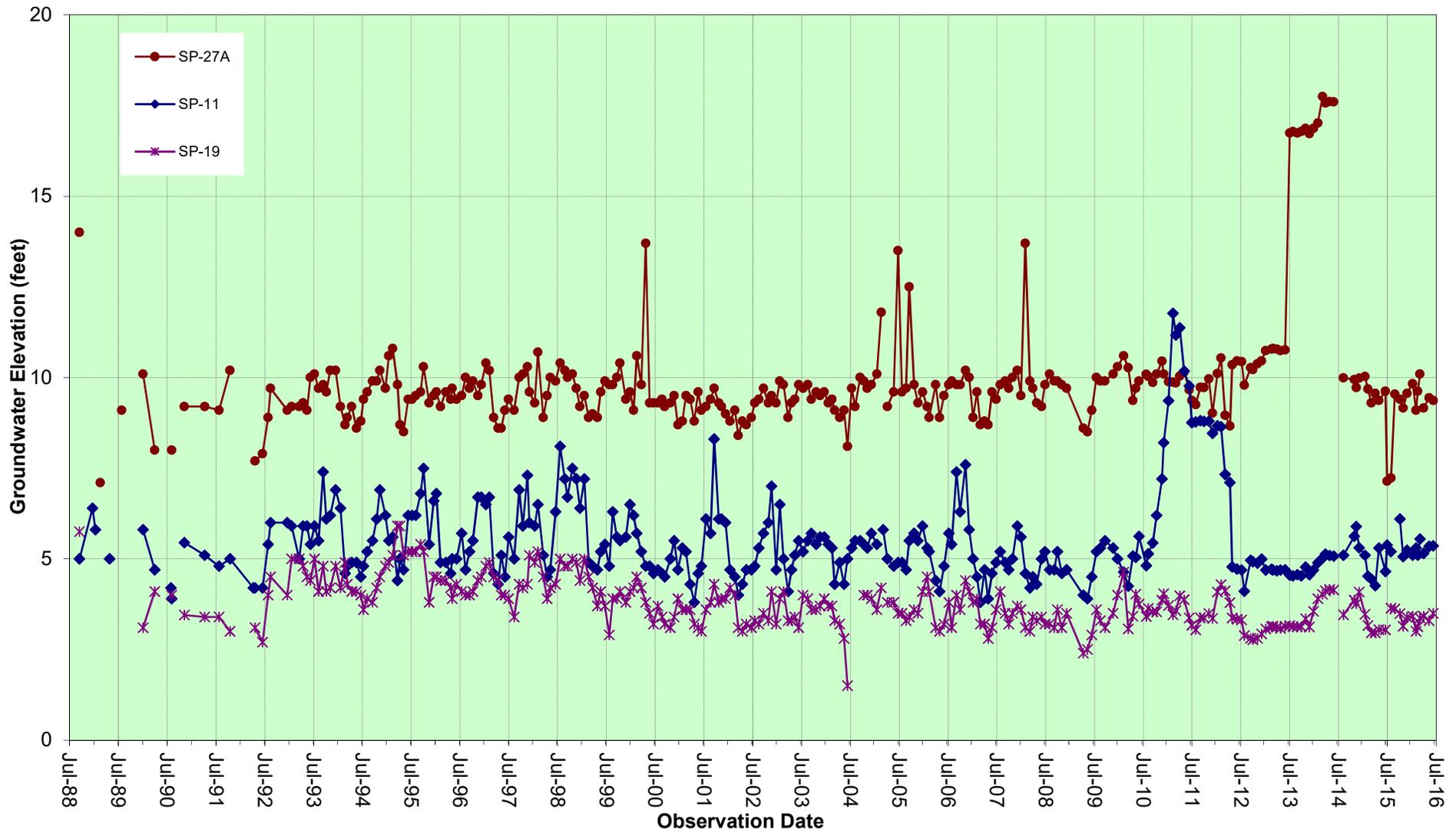
Piezometer I.D.		1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-2016	Highest Recorded	Mean '91-'15	Stand Dev.	'15-'16 vs '97-'98	'15-'16 vs '14-'15	'15-'16 vs mean		
PCH REGION																																										
SP-11	Mean El.						5.7	5.3	4.7	4.5	5.7	5.7	5.5	5.8	5.5	5.8	6.3	5.5	4.8	5.4	5.4	5.2	5.3	5.1	5.4	4.9	4.6	5.1	8.4	7.8	4.7	4.8	5.0	5.3	Feb-11	5.5	0.9	-0.5	0.3	-0.2		
	Highest El.						6.4	5.8	5.5	5.0	6.0	7.4	6.9	7.5	6.7	7.3	8.1	6.5	5.5	8.3	7.0	5.7	5.8	5.9	7.6	5.9	5.2	5.6	11.8	8.8	5.0	5.1	5.9	6.1	11.8	6.7	1.5	-1.2	0.2	-0.6		
SP-12	Mean El.						4.6	5.4	5.5	5.4	5.2	4.8	4.9	5.1	4.8	5.0	5.3	5.3	4.7	4.5	4.8	4.6	5.5	5.2	4.9	4.8	4.7	4.0	4.7	4.2	5.2	5.2	5.2	6.0	Mar-16	5.0	0.4	0.9	0.8	1.0		
	Highest El.						4.6	5.4	6.0	6.0	6.0	7.2	6.1	6.3	7.4	7.0	6.4	6.5	7.4	6.4	6.4	6.4	8.3	7.2	6.4	5.8	5.7	5.1	5.3	5.2	5.5	5.8	6.2	8.8	8.77	6.4	0.9	1.8	2.6	2.3		
SP-14	Mean El.						4.5	4.7	4.4	4.8	4.3	4.8	4.9	4.9	4.9	5.0	5.9	5.8	5.6	4.7	4.5	4.6	4.6	4.7	4.8	4.7	4.7	4.3	4.3	4.3	4.1	5.2	5.6	4.5	4.9	Feb-98	4.8	0.5	-0.9	0.4	0.1	
	Highest El.						4.5	4.7	4.4	5.2	5.4	7.1	6.1	5.3	5.9	5.7	8.7	6.9	7.4	5.4	5.7	5.1	5.4	5.4	5.7	5.5	6.0	5.1	5.0	4.6	4.9	5.5	5.5	5.7	6.0	8.7	5.8	0.9	-2.7	0.3	0.2	
SP-15	Mean El.						11.3	8.8	10.5	9.1	7.5	10.7	13.4	12.6	15.1	14.5	12.2	12.0	11.7	11.6	11.5	11.7	10.0	11.9	11.6	11.6	11.4	8.9	8.4	7.2	7.6	5.5	5.7	8.6	10.6	Jan-97	10.5	2.5	-1.6	1.9	0.0	
	Highest El.						11.3	12.2	10.5	11.4	9.1	12.4	19.4	19.5	19.9	20.0	16.3	13.5	12.7	12.4	12.5	12.4	12.2	12.8	12.4	12.2	12.2	11.1	12.2	10.1	10.2	5.9	6.2	12.0	12.2	20.0	12.9	3.7	-4.1	0.2	-0.7	
SP-19	Mean El.						3.6	3.6	3.1	4.5	4.4	4.7	4.6	4.3	4.4	4.5	3.8	3.4	3.7	3.5	3.4	3.9	3.6	3.6	3.5	3.1	3.6	3.7	3.6	3.0	3.6	3.4	3.4	Mar-95	3.8	0.5	-1.0	0.0	-0.4			
	Highest El.						4.1	4.0	3.4	5.0	5.0	5.9	5.4	4.9	5.2	5.0	4.5	3.9	4.3	4.1	4.0	4.2	4.5	4.4	4.1	3.6	4.6	4.0	4.3	3.3	4.2	4.1	3.6	5.9	4.4	0.6	-1.6	-0.4	-0.7			
SP-27A	Mean El.						7.1	9.1	8.8	8.7	9.3	9.4	9.7	9.5	9.5	9.7	9.6	10.1	9.2	9.0	9.5	9.3	10.2	9.7	9.5	10.0	9.5	10.0	10.0	9.7	10.5	17.1	9.7	9.1	Jun-15	9.9	1.6	-0.6	-0.6	-0.8		
	Highest El.						7.1	10.1	9.2	10.2	10.0	10.2	10.8	10.3	10.4	10.7	10.4	13.7	9.6	9.7	9.9	9.8	13.5	12.5	10.2	13.7	10.1	10.6	10.5	10.5	10.8	17.8	10.0	10.1	17.8	11.0	1.9	-0.6	0.1	-0.9		
SP-29	Mean El.						19.7	20.4	19.4	18.7	18.0		19.7	20.0	19.2	19.2	19.7	18.8	18.0	18.1	17.0	16.2	16.0	18.0	17.7	16.7	16.3	15.8	15.9	16.2	15.8	16.7	15.7	14.4	13.9	Feb-05	17.2	1.7	-5.8	-0.5	-3.3	
	Highest El.						19.7	21.7	19.4	18.7	18.0		20.9	22.1	20.2	20.5	21.3	19.9	19.1	19.6	18.1	16.7	16.4	22.2	18.7	17.4	16.9	16.1	16.6	16.9	17.1	16.9	16.8	14.7	14.3	22.2	18.2	2.3	-7.0	-0.4	-3.9	
SP-30	Mean El.						7.4	7.1	6.4	7.2	6.9	7.7	7.3	7.9	8.1	9.6	8.0	8.5	9.0	9.7	11.3	12.6	12.9	13.0	13.4	13.4	14.4	15.1	15.7	16.2	15.8	16.5	16.8	13.6	13.8	Nov-10	11.9	3.2	5.8	0.2	1.9	
	Highest El.						7.4	8.0	6.4	8.0	8.0	8.0	9.3	9.6	9.4	13.3	10.2	9.6	10.1	10.8	12.6	14.3	13.4	14.3	14.1	14.2	15.3	15.5	16.4	17.2	17.0	16.8	17.1	14.6	14.7	17.2	13.0	2.9	4.5	0.1	1.6	
Area Average	Mean El.						10.7	8.3	8.0	7.8	7.3	6.8	8.7	8.8	9.1	9.1	8.8	8.8	8.6	8.3	8.4	8.5	8.2	9.1	8.9	8.7	8.7	8.2	8.4	8.8	8.6	8.4	9.3	8.1	8.4		8.6	0.5	-0.5	0.3	-0.2	
	Highest El.						10.7	9.2	8.3	8.5	8.1	7.8	10.7	10.8	10.6	11.1	10.8	10.0	10.1	9.3	9.7	9.5	9.2	10.8	10.1	9.7	10.0	9.1	9.5	10.1	9.8	8.7	9.8	9.1	9.5		9.8	0.8	-1.4	0.3	-0.3	
Change vs Prior	Mean El.						-2.4	-0.3	-0.2	-0.5	-0.4	1.8	0.1	0.3	0.0	-0.2	0.0	-0.2	-0.3	0.1	0.2	-0.3	0.8	-0.2	-0.2	0.0	-0.5	0.2	0.4	-0.3	-0.1	0.9	-1.3	0.3								
	Highest El.						-1.5	-1.0	0.2	-0.4	-0.4	2.9	0.1	-0.2	0.5	-0.3	-0.9	0.1	-0.7	0.4	-0.2	-0.3	1.7	-0.7	-0.4	0.3	-0.9	0.5	0.5	-0.3	-1.0	1.1	-0.7	0.3								
BLUFF REGION																																										
SP-10	Mean El.	144.7	76.0	50.0	50.5	49.2	47.4	45.9	48.8	55.3	44.6	42.9	41.6	42.0	41.6	41.3	42.4	42.8	42.9	43.3	43.7	44.3	45.5	45.2	45.2	44.8	43.7	44.0	43.9	42.6	43.7	43.5	43.9	45.8	Dec-83	43.5	2.7	4.5	1.9	2.2		
	Highest El.	174.2	130.0	50.0	50.5	50.0	52.0	46.0	55.5	74.0	45.9	44.4	42.2	42.6	41.9	41.6	44.8	43.4	43.3	43.6	44.1	44.4	47.2	45.4	45.4	45.2	44.9	44.6	46.0	44.7	44.1	44.0	44.3	48.7	174.2	44.4	6.1	7.1	4.4	4.2		
SP-28	Mean El.						36.4	33.7	37.5	33.7	33.6	33.7	33.0	32.7	32.2	31.9	32.6	33.2	33.1	33.0	32.9	32.9	34.9	34.7	33.3	33.1	32.8	33.1	32.8	35.2	32.8	32.8	33.4	33.4	Jan-12	33.2	0.8	1.5	0.1	0.2		
	Highest El.						40.5	33.8	40.0	36.0	35.2	35.2	33.1	33.1	32.4	32.2	34.9	33.6	33.2	33.3	33.0	32.9	36.0	33.6	33.1	33.1	33.4	33.8	42.0	33.7	33.6	33.4	33.5	42.0	34.1	2.0	1.3	0.1	-0.5			
SP-32	Mean El.						75.3	79.1	72.6	76.1	90.1	85.9	92.5	92.5	94.9	76.5	84.2	79.7	88.2	70.1	89.9	91.1	99.9	100.2	102.3	102.4	104.4	105.1	102.3	104.8	106.4	105.6	35.0	24.0	Apr-96	88.7	20.5	-52.5	-11.0	-64.7		
	Highest El.						78.2	82.3	72.8	83.2	101.0	96.2	110.2	110.2	130.9	107.4	95.3	88.4	97.0	83.6	106.0	105.8	106.7	105.9	105.9	105.8	105.8	105.8	105.9	106.9	106.9	107.1	41.3	30.3	130.9	98.6	21.0	-77.1	-11.0	-68.3		
SP-34	Mean El.																74.4	77.6	76.2	76.4	73.5	73.8	80.0	79.7	82.8	84.5	86.0	88.6	53.2	44.7	37.1	35.9	24.7	24.2	Nov-09	65.2	22.0	24.2	-0.4	-41.0		
	Highest El.																85.9	79.5	77.3	77.7	74.4	74.5	82.1	81.4	83.8	86.1	88.0	94.5	64.5	48.8	48.7	36.2	26.7	27.1	94.5	68.7	21.6	27.1	0.4	-41.6		
Area Average	Mean El.	144.7	76.0	50.0	50.5	49.2	53.0	52.9	53.0	55.0	56.1	54.2	55.7	55.7	56.2	49.9	58.4	58.3	60.1	55.7	60.0	60.5	65.1	64.9	65.9	66.2	66.7	67.7	58.0	56.8	55.0	54.5	34.2	31.9		57.0	8.6	-18.0	-2.4	-25.1		
	Highest El.	174.2	130.0	50.0	50.5	50.0	56.9	54.0	56.1	64.4	60.7	58.6	61.8	62.0	68.4	60.4	65.2	61.2	62.7	59.6	64.4	64.4	68.0	67.2	67.2	67.6	68.0	69.6	62.5	60.6	58.4	55.2	36.4	34.9		61.0	8.5	-25.5	-1.5	-26.1		
Change vs Prior	Mean El.						-68.7	-26.0	0.5	-1.3	3.8	-0.2	0.1	2.0	1.1	-1.9	1.5	0.1	0.5	-6.3	8.5	-0.1	1.8	-4.4	0.3	0.5	0.6	0.9	-9.6	-1.2	-1.8	-0.5	-20.2	-2.4								
	Highest El.						-44.2	-80.0	0.5	-0.5	6.9	-2.9	2.1	8.3	-3.7	-2.1	3.2	0.1	6.4	-8.0	4.8	-4.0	1.5	-3.2	4.8	0.0	3.6	-0.8	0.0	0.4	0.4	1.6	-7.0	-2.0	-2.2	-3.1	-18.8	-1.5				
HEADSCARP REGION																																										
SP-26	Mean El.						541.9	540.2	538.9	535.8	532.4	527.0	532.6	543.6	543.3	547.8	547.1	549.9	551.9	549.8	550.7	550.6	549.1	550.7	553.1	554.7	553.8	552.9	551.4	551.2	552.5	551.9	551.0	551.4	552.1	551.9	Apr-01	548.6	6.4	2.0	-0.1	3.3
	Highest El.						542.0	540.2	540.0	539.0	534.0	530.0	543.2	544.9	549.6	549.9	550.9	554.7	554.2	550.8	557.9	552.3	550.8	551.4	557.5	556.5	554.4	554.3	552.6	552.2	555.6	552.9	551.8	552.0	552.6	552.4	557.9	551.3	5.6	-2.3	-0.1	1.1
Change vs Prior	Mean El.						0.0	0.0	541.9	-1.6	-1.4	-3.1	-3.3	-5.4	5.6	11.0	-0.3	4.4	-0.7	2.8	2.1	-2.1	0.9	-0.1	-1.5	1.6	2.5	1.5	-0.9	-0.9</												



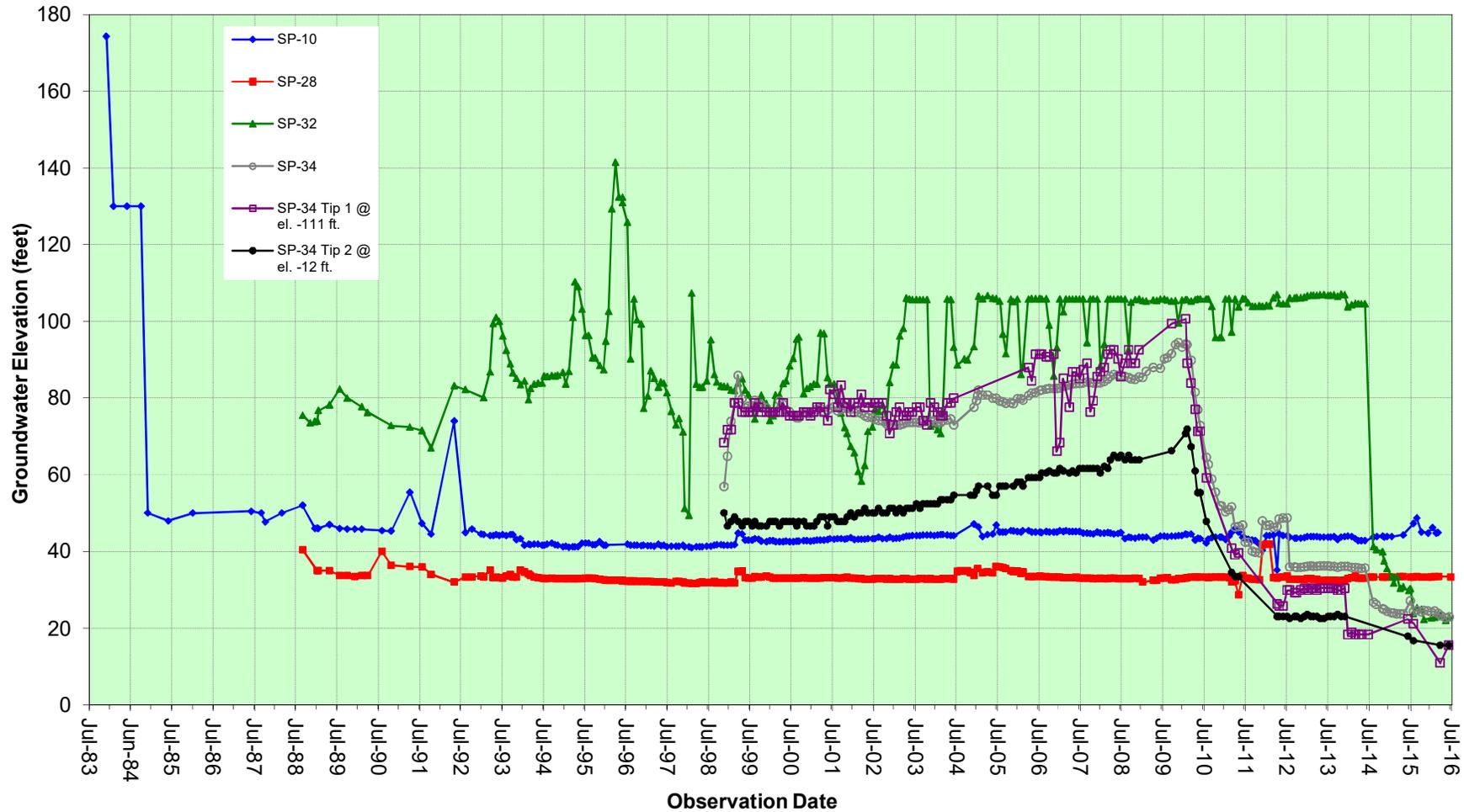
Piezometer I.D.		1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-2016	Highest Recorded	Mean '91-'15	Stand Dev.	'15-'16 vs '97-'98	'15-'16 vs '14-'15	'15-'16 vs mean																																												
CENTRAL MESA																																																																																				
SP-9A	Mean El.	254.7	232.0	232.0	227.5	236.3	222.2	220.0	233.3	215.1	221.9	226.8	220.8	222.0	222.0	224.6	226.8	226.4	228.0	229.3	229.5	230.0	229.7	229.9	228.3	227.5	227.1	227.7	226.6	230.6	230.6	238.6	224.9	223.5	Dec-83	226.7	4.5	-1.1	-1.4	-3.3																																												
	Highest El.	270.0	232.0	232.0	232.0	236.3	224.0	222.2	235.2	222.9	228.5	228.5	225.5	223.8	223.7	231.1	229.0	226.9	231.0	230.6	232.3	231.5	232.5	231.9	229.7	229.7	228.4	229.2	227.5	238.6	238.6	238.9	225.7	224.2	270.0	229.6	4.4	-6.9	-1.5	-5.4																																												
SP-16	Mean El.	226.5	195.4	174.3	171.9	171.5	161.8	113.0	161.8	96.5	95.7					68.2	47.9	48.0	46.5	48.4	53.1	47.9	46.0	46.6	87.0	51.6	50.1	50.1	53.7	107.8	117.4	81.8	63.3	56.9	92.6	92.0	66.0	22.8	44.1	-0.6	26.0																																											
	Highest El.	226.5	214.7	180.3	174.2	177.1	182.5	147.8	89.5	121.0						117.8	61.3	66.5	53.5	78.7	89.7	64.4	46.6	49.2	124.0	57.7	50.9	61.8	79.4	121.3	121.1	120.5	75.4	58.2	117.5	113.6	226.5	84.1	29.3	47.1	-3.8	29.5																																										
SP-16A	Mean El.						181.2	153.3	122.0	108.4	108.3	122.2	125.7	147.9	127.6	113.4	126.0	126.8	149.2	180.8	146.0	105.0	133.0	185.1	182.1	180.1	165.8	173.7	166.3	136.0	106.3	149.4	130.0	128.9	111.4	141.1	25.9	-14.6	-17.5	-29.7																																												
	Highest El.						181.2	180.3	148.8	124.5	124.5	184.5	169.1	186.3	182.3	154.9	185.5	182.4	189.4	184.5	183.9	170.0	183.0	196.2	183.8	182.8	184.4	181.8	183.1	153.7	131.9	149.7	149.6	169.8	150.3	196.2	171.9	19.0	-35.2	-19.6	-21.6																																											
SP-17	Mean El.	406.0	401.8	395.4	399.1	398.3	393.3	392.0	385.1	382.7						385.5	390.1	389.3	388.3	393.6	390.0	385.6	389.1	386.9	387.9	388.6	393.8	393.6	391.9	388.4	386.8	386.1	387.5	385.4	386.0	385.9	381.1	379.4	387.6	3.6	-14.1	-1.7	-8.2																																									
	Highest El.	410.0	403.0	395.3	400.1	400.0	401.0	394.1	386.0	383.2						389.8	404.3	396.5	396.5	408.8	395.5	386.9	399.2	389.1	396.4	392.0	406.5	398.1	401.5	392.5	394.8	397.0	393.0	388.0	386.1	386.8	382.0	380.0	410.0	393.5	7.5	-28.8	-2.0	-13.5																																								
SP-17A	Mean El.						360.1	377.4	376.6	374.5	379.2	379.8	377.8	379.3	377.2	379.1	379.1	375.3	376.6	375.6	374.9	376.0	378.0	379.4	378.4	375.3	374.2	372.8	373.4	374.6	376.5	375.2	369.7	367.8	367.8	367.8	367.8	367.8	376.0	3.0	-11.3	-1.9	-8.2																																									
	Highest El.						372.4	378.5	377.7	375.7	385.0	389.8	384.4	381.6	380.5	386.7	382.9	376.4	381.1	377.3	376.5	377.2	385.2	383.4	380.7	376.3	376.3	373.7	375.0	376.2	377.0	376.8	370.6	368.7	389.8	389.8	389.8	389.8	389.8	379.0	5.1	-18.0	-1.9	-10.3																																								
SP-24	Mean El.	195.3	102.1	49.0	49.2		49.0		35.1	38.6	38.5	38.9	37.2	39.0	39.1	40.0	41.6	41.4	41.7	42.3	41.4	43.3	46.3	47.6	46.1	45.3	45.6	47.0	46.7	43.0	36.8	87.9	47.8	49.0	49.0	49.0	49.0	44.5	9.7	9.0	1.1	4.5																																										
	Highest El.	220.6	170.0	50.0	52.0		52.0		39.6	40.0	38.9	41.0	39.6	39.6	39.8	42.0	43.3	42.2	43.0	43.7	41.8	44.0	51.0	50.2	48.2	46.0	46.0	49.0	47.5	45.1	38.9	142.6	50.0	49.8	220.6	48.1	20.1	7.8	-0.3	1.6																																												
SP-35	Mean El.																																								93.3	8.1			19.0	25.9																																						
	Highest El.																																								101.3	91.0	104.0	102.9	92.7	90.6	95.2	89.0	87.2	86.4	90.2	95.8	94.1	112.9	96.9	94.7	109.7	127.2	127.2	97.9	10.4		17.5	29.3																				
SP-36	Mean El.																																								193.3	193.0	192.8	192.3	191.4	191.0	191.4	191.3	191.0	190.7	190.1	190.4	190.6	201.3	196.5	191.2	190.7	190.6	190.6	190.6	190.6	190.6	190.6	190.6																				
	Highest El.																																									195.2	193.4	193.0	192.7	191.9	191.2	192.2	191.8	191.3	190.9	190.5	191.4	191.3	253.0	253.1	192.2	190.8	191.0	253.1	198.7	19.8		0.2	-7.7																			
Area Average	Mean El.	270.6	232.8	212.6	211.9	246.8	223.3	244.9	204.1	202.5	190.4	231.3	234.7	204.2	198.0	201.9	187.0	188.4	194.5	189.7	183.3	187.2	200.3	195.4	194.1	191.1	192.1	198.4	195.8	190.9	191.7	195.0	192.0	191.6							196.9	12.0	-10.3	-0.4	-5.3																																							
Change vs Prior	Mean El.																																										281.8	254.9	214.4	214.6	248.7	235.4	258.3	208.8	211.2	209.2	243.6	248.0	223.6	209.5	220.1	197.9	198.1	203.2	198.1	193.5	194.8	210.4	198.2	196.5	196.0	198.4	205.1	200.4	208.3	202.0	200.6											
	Highest El.																																												-37.8	-20.2	-0.7	34.9	-23.5	21.6	-40.8	-1.7	-12.0	40.9	3.4	-30.5	-6.2	3.9	-14.8	1.4	6.0	-4.7	-6.4	3.9	13.0	-4.8	-1.4	-3.0	1.0	6.3	-2.7	-4.9	0.8	3.2	-3.0	-0.4								
	Highest El.																																															-26.9	-40.5	0.2	34.1	-13.3	22.9	-49.5	2.5	-2.0	34.4	4.4	-24.4	-14.2	10.7	-22.2	0.2	5.1	-4.6	1.3	15.5	-12.1	-1.7	-0.5	2.4	6.6	-4.7	7.9	-6.3	3.0	-3.0	-1.4						
WESTERN EXTENSION																																																																																				
SP-20	Mean El.	317.0	254.6	220.5	213.3	194.5	217.5	186.2	198.8	160.3	184.9	175.1	149.8	155.0	162.1	165.5	231.8	196.9	204.6	195.8	186.4	183.1	219.7	228.8	230.9	237.6	221.0	215.9	214.3	202.2	151.2	177.1	198.3	187.1	Feb-84	193.4	27.1	21.6	10.0	-6.3																																												
	Highest El.	350.0	277.0	350.0	224.0	216.7	194.5	231.0	214.5	202.4	165.5	233.0	223.3	159.4	158.6	211.6	224.7	290.1	202.4	221.4	247.1	187.6	196.3	248.2	234.7	235.8	245.6	237.3	234.4	226.0	219.0	151.4	203.7	219.4	205.7	350.0	215.3	32.5	-19.0	2.0	-9.6																																											
SP-21	Mean El.	436.7	407.0			404.0	403.1	402.2	390.5	351.1	353.5	356.0	369.8	368.9	368.7	372.4	374.6	379.5	388.5	387.7	379.4	378.6	390.4	394.0	391.2	388.1	383.9	385.8	386.3	392.3	389.7	389.2	381.8	382.3	Apr-94	379.3	12.2	9.9	-6.9	3.0																																												
	Highest El.	450.9	407.0			405.0	407.0	410.4	399.1	358.9	361.2	358.0	393.9	374.3	377.1	396.4	379.3	389.6	401.2	393.0	385.5	381.9	408.9	403.3	396.4	393.2	387.5	392.5	394.7	395.0	389.9	389.9	383.6	383.2	450.9	386.7	13.1	-13.2	-6.6	-3.5																																												
SP-22	Mean El.	461.1	450.5	451.9	447.5	450.5	451.4	451.0	454.3	457.5	455.3	463.9	462.1	468.9	466.0	468.6	468.8	469.2	470.8	473.0	471.2	471.9	470.2	469.9	469.1	467.9	470.0	470.7	466.9	464.8	465.1	473.1	469.6	Dec-96	467.1	5.1	3.6	4.4	2.4																																													
	Highest El.	493.5	450.5	454.1	450.9	455.7	451.4	451.3	468.0	471.3	464.5	477.0	469.6	501.5	470.4	470.7	471.0	474.2	471.1	476.6	475.1	475.1	471.0	470.9	470.9	469.7	470.9	472.8	470.6	465.1	466.8	477.5	471.2	501.5	472.5	6.9	0.8	4.5	-1.3																																													
SP-23	Mean El.					514.2	491.0	499.2	495.6	486.0	496.6	500.8	508.6	511.6	501.5	500.4	486.7	478.0	473.9	476.2	488.9	486.1	496.1	490.7	489.8	494.1	499.8	503.6	495.4	511.1	550.8	519.2	479.0	478.4	May-12	496.1	16.5	-22.0	-40.8	-17.7																																												
	Highest El.					514.2	491.0	536.0	509.1	489.4	513.1	507.3	518.2	549.6	527.6	518.4	502.7	488.7	488.6	504.5	538.1	535.7	534.6	500.5	492.0	502.0	503.1	514.0	506.7	551.1	551.0	550.4	498.7	479.2	551.1	514.6	22.0	-39.3	-71.2	-35.5																																												
Area Average	Mean El.	317.0	384.2	359.3	332.6	390.0	390.5	384.7	384.0	362.9																																																																										



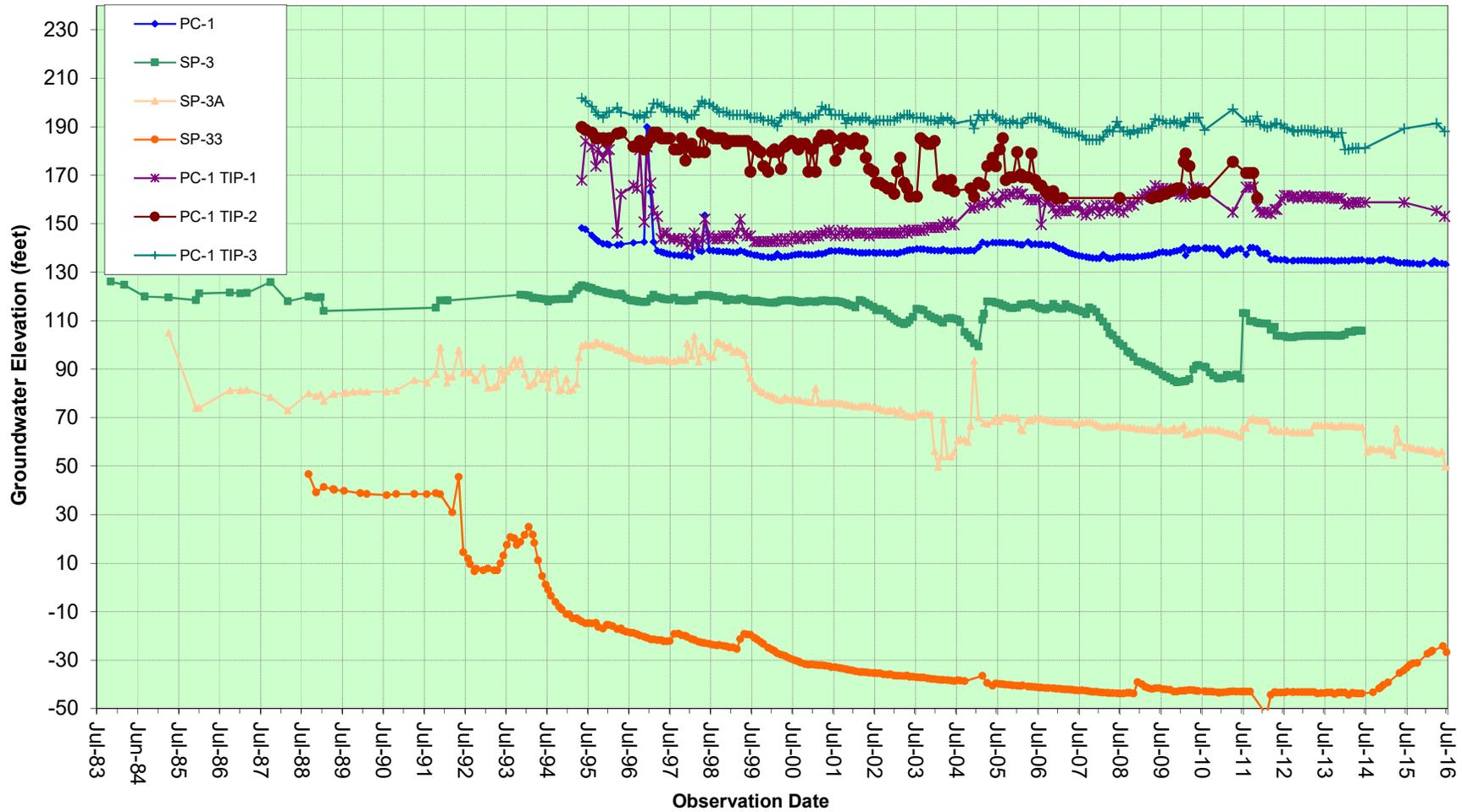
GROUNDWATER ELEVATION DATA
Pacific Coast Highway (Western Half)
Big Rock Mesa Landslide Assessment District
Malibu, California



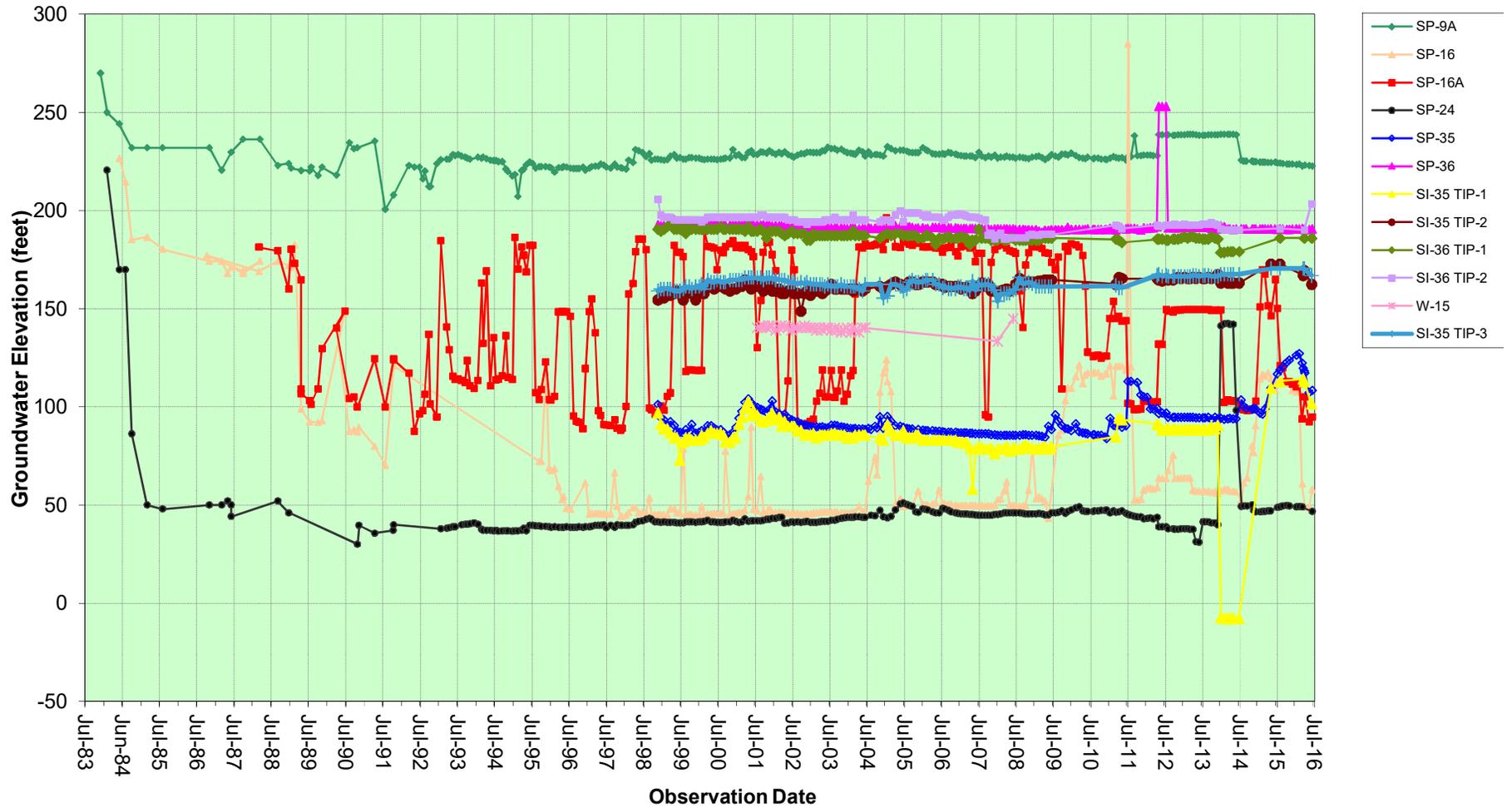
GROUNDWATER ELEVATION DATA
Pacific Coast Highway (Eastern Half)
Big Rock Mesa Landslide Assessment District
Malibu, California



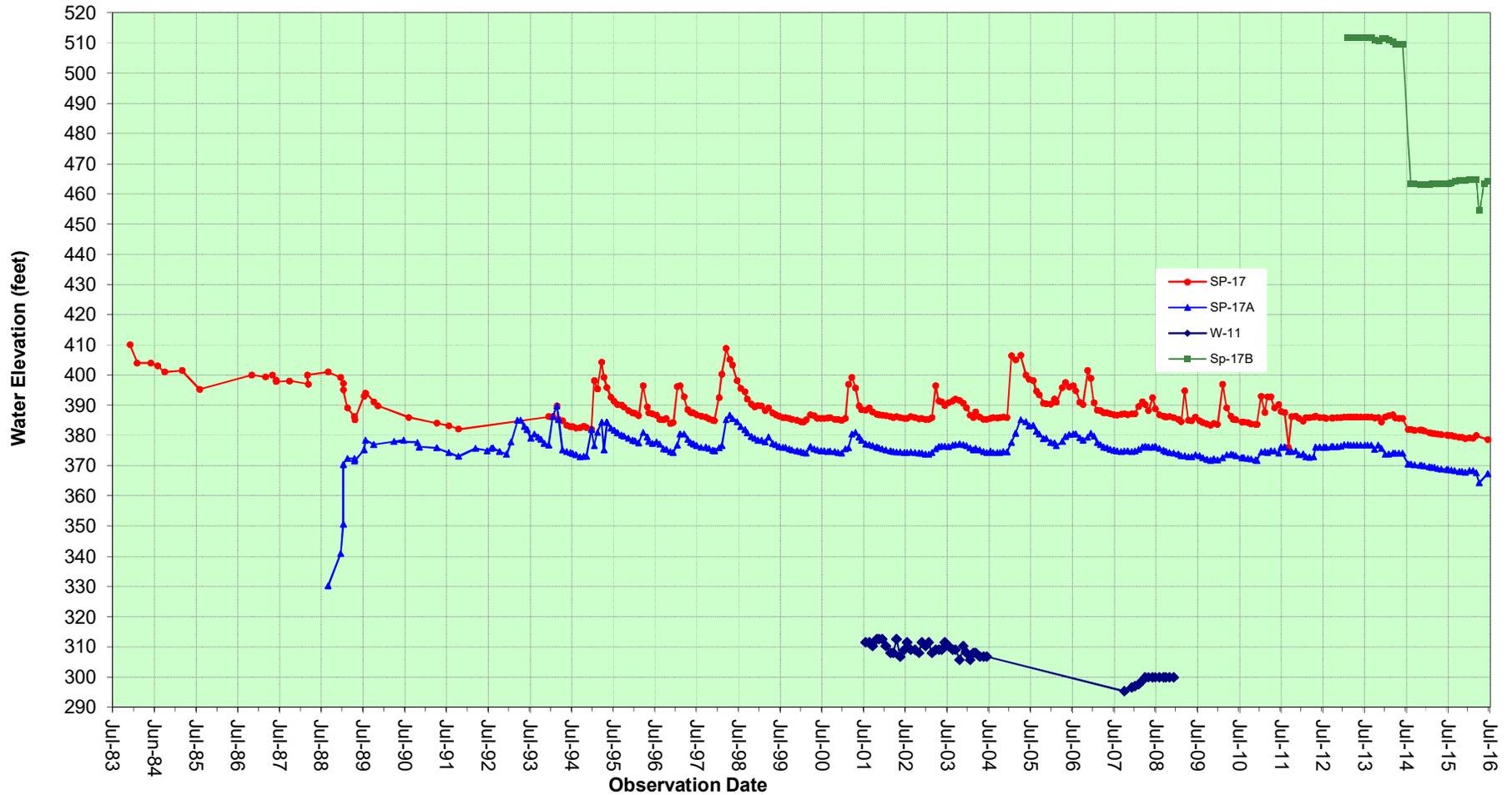
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Bluff Region
Big Rock Mesa Landslide Assessment District
Malibu, California



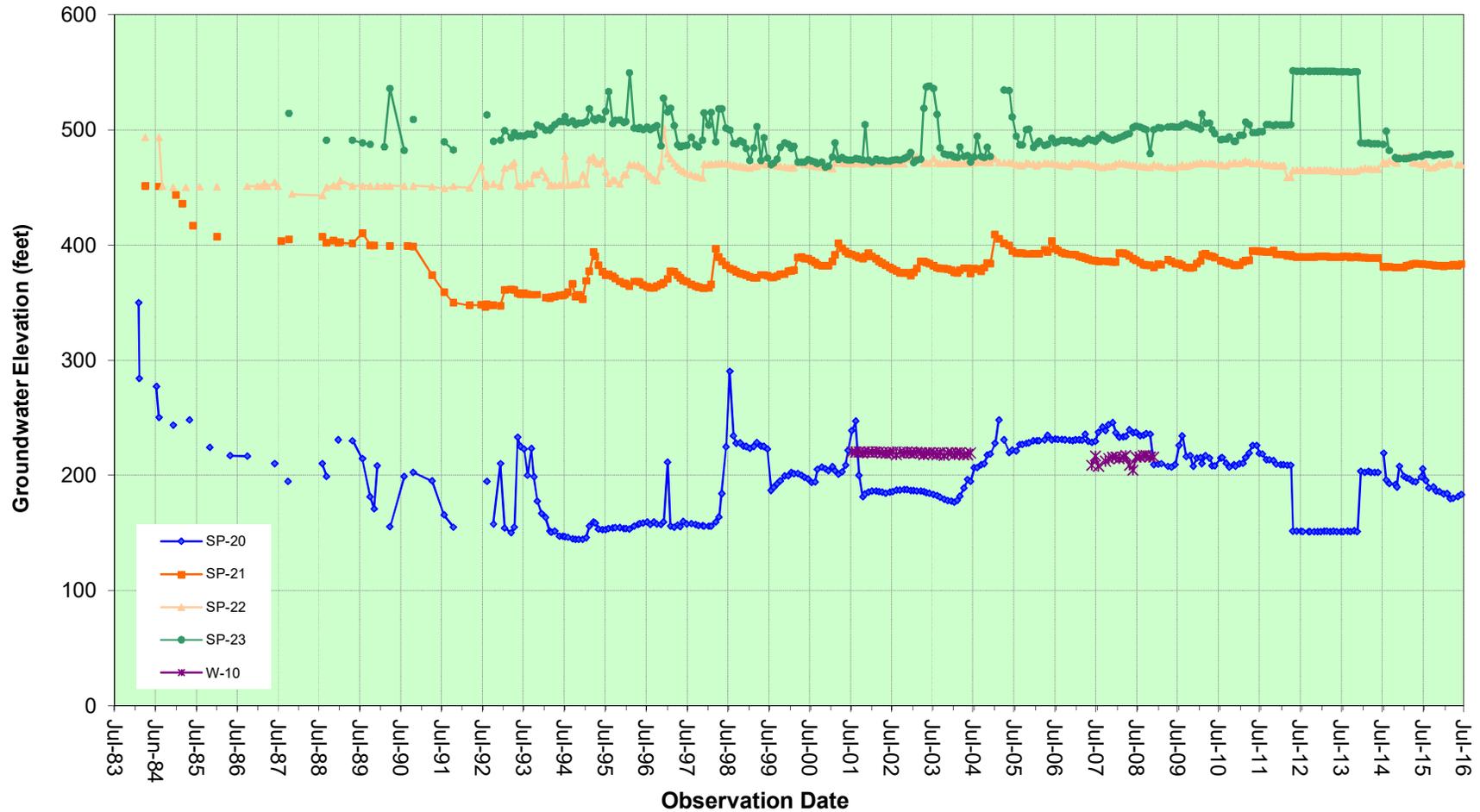
GROUNDWATER ELEVATION DATA
Eastern Mesa Region
Big Rock Mesa Landslide Assessment District
Malibu, California



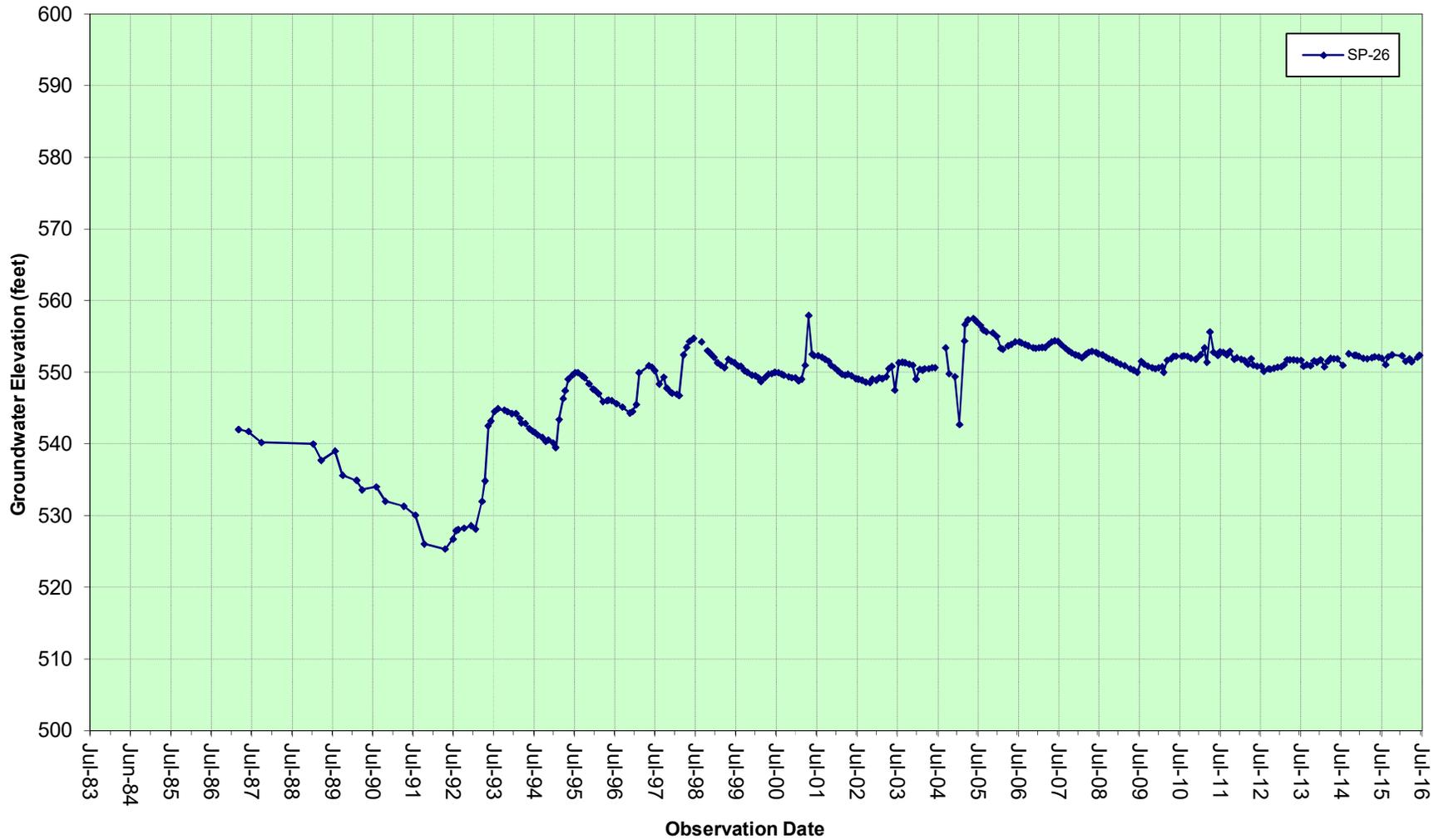
GROUNDWATER ELEVATION DATA
Central Mesa Region
Big Rock Mesa Landslide Assessment District
Malibu, California



GROUNDWATER ELEVATION DATA
Central Mesa Region
Big Rock Mesa Landslide Assessment District
Malibu, California



GROUNDWATER ELEVATION DATA
Western Extension
Big Rock Mesa Landslide Assessment District
Malibu, California



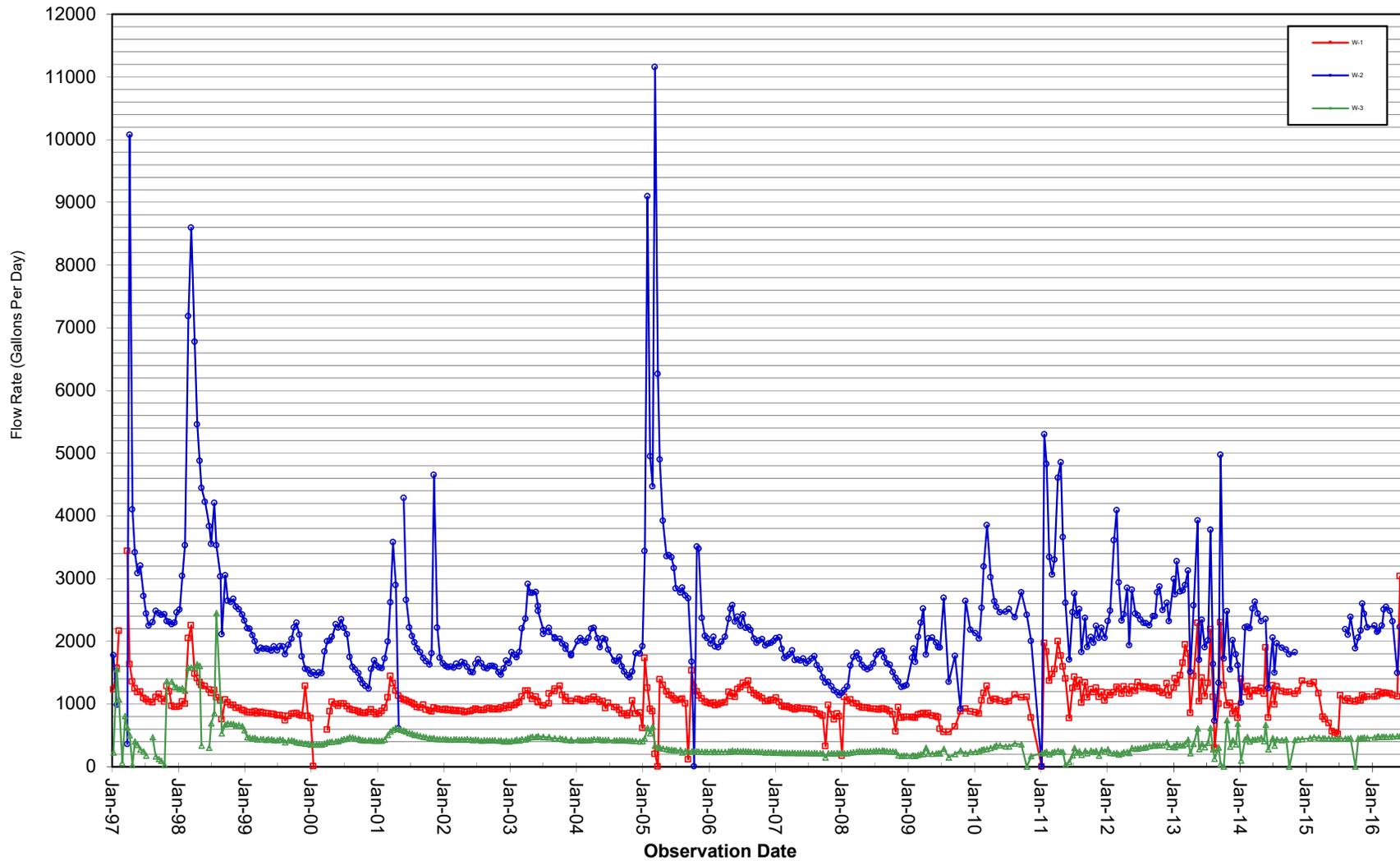
GROUNDWATER ELEVATION DATA
Headscarp Area
Big Rock Mesa Landslide Assessment District
Malibu, California

**APPENDIX B
DEWATERING WELL DATA**

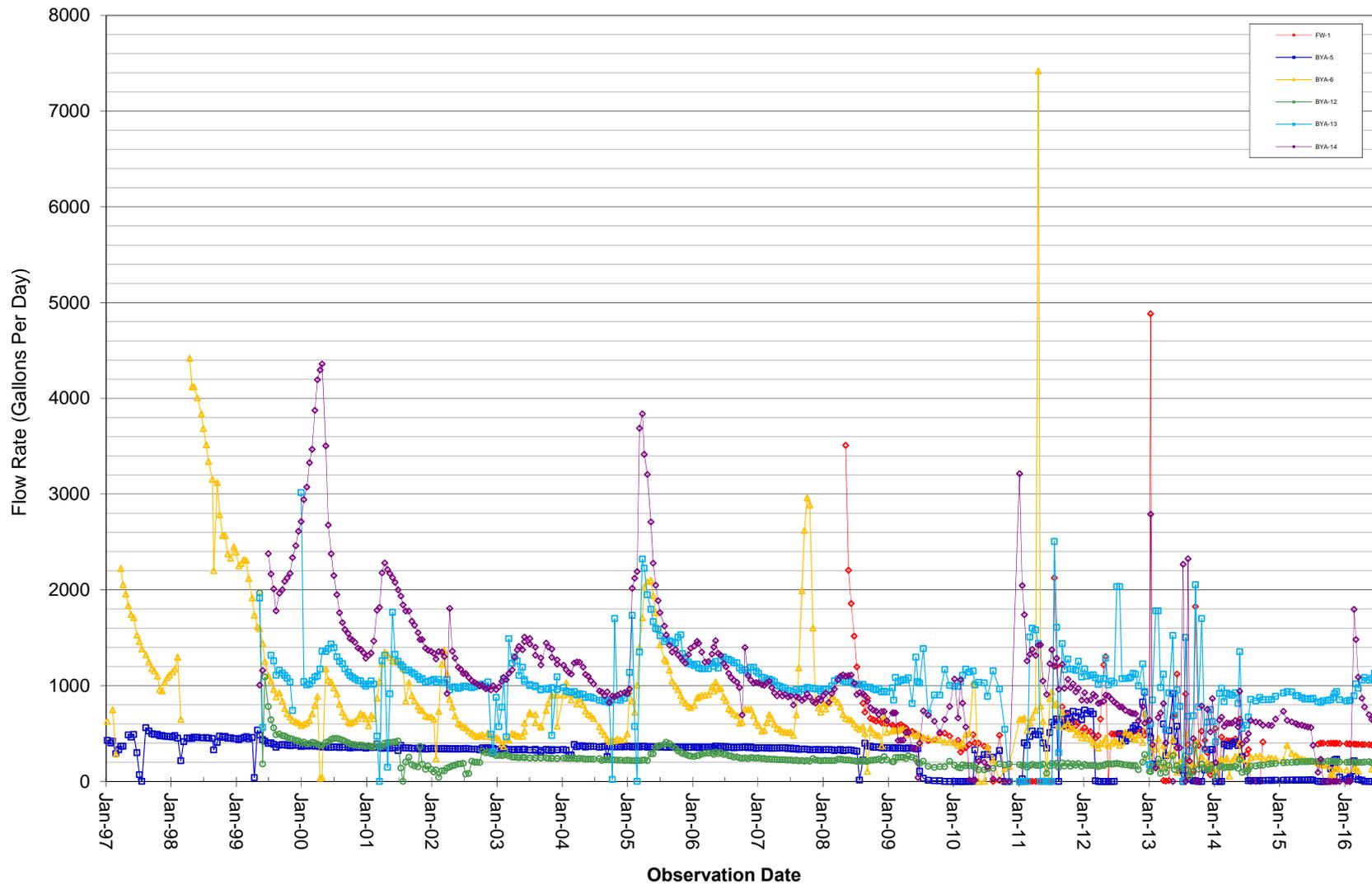


SUMMARY OF DEWATERING WELL INFORMATION										
Well I.D.	DATE COMPLETED (DA Evans 1986)	TOP ELEV. (ft.)	BOTTOM ELEV. (ft.)	PUMP ELEV. (ft.)	PUMP SIZE (HP)	2015-16 PUMPING RATE (GPD)	% of TOTAL PRODUCTION	Rank	Drainage Port	COMMENT
W-1	1977	210.5	-30	14.5	1.5	1,324	4%	9	3	Producing
W-2	1955	219	41	44	1.5	2,220	6%	6	3	Producing
W-3	1973	243.5	65.5	70.5	3/4	468	1%	18	3	Producing
W-4	1973	248	-10	N/A	N/A	0	0%	25	N/A	Non-producing, casing perforations closed due to siltation (BYA 1991)
W-5	1984	280	252	N/A	N/A	0	0%	25	N/A	Capped 4/4/84 (DA Evans 1986)
W-6	1983	174	80	N/A	N/A	0	0%	25	N/A	Non-producing, static water level at bottom of casing (BYA 1991)
W-7	1983	257	171	N/A	N/A	0	0%	25	N/A	Non-producing, static water level at bottom of casing (BYA 1991)
W-8	1983	287	93	98	1	3,701	10%	3	4	Producing
W-9	1983	282	87	N/A	N/A	0	0%	25	N/A	Non-producing, static water level at bottom of casing (BYA 1991), replaced with BYA-11
W-10	1983	432	192	194	3/4	0	0%	25	N/A	Inactive, no pump
W-11	1983	507	285	292	3/4	0	0%	25	N/A	Inactive, disconnected from electrical, replaced with BYA-10
W-12	1983	375	195	N/A	N/A	0	0%	25	N/A	Non-producing, casing sheared at 185 ft.elevation (BYA 1991)
W-13	1983	361	184	193	1	889	3%	13	5	Producing
W-14	1984	283	131	N/A	N/A	0	0%	25	N/A	Non-producing, static water level at bottom of casing (BYA 1991)
W-15	1984	295	121	130	3/4	0	0%	25	N/A	Inactive, no pump, replaced with BYA-9
W-16	1984	325	107	113	3/4	3,278	9%	4	5	Producing
W-17	1984	270	41	50	3/4	2,379	7%	5	4	Producing
W-18	1984	750	179	225	3	4,947	14%	2	6	Producing
BYA-1	1990	281	-162	-128	3	910	3%	12	4	Producing
BYA-2	1990	665	215	242	1.5	473	1%	17	6	Producing
BYA-3	1990	510	-40	29	3	1,988	6%	7	6	Producing
BYA-4	1990	372	-68	-28	1.5	1,799	5%	8	5	Producing
BYA-5	1990	189	-231	-211	1.5	54	0%	23	1	Producing
BYA-6	1996	220	-280	-275	0.75	137	0%	22	1	Producing
BYA-7	1996	240	-120	-115	0.75	658	2%	15	2	Producing
BYA-9	1996	295	-105	-100	7.5(5)	5,592	16%	1	5	Producing
BYA-10	1996	510	210	215	1	662	2%	14	5A	Producing
BYA-11	1996	275	-125	-120	0.75	1,309	4%	10	5	Producing
BYA-12	1998	207	-140	-137	0.5	203	1%	21	1	Producing
BYA-13	1998	329	-14	-18	0.5	934	3%	11	3	Producing
BYA-14	1998	265	38	40	0.5	423	1%	19	1A	Producing
BYA-15	2002	429	340	300	1	6	0%	24	6	Producing <10 GPD
FW-1	2008	170			1	391	1%	20	1A	Producing
FW-2	2009	270	-130	-115	1.5	637	2%	16	4	Producing

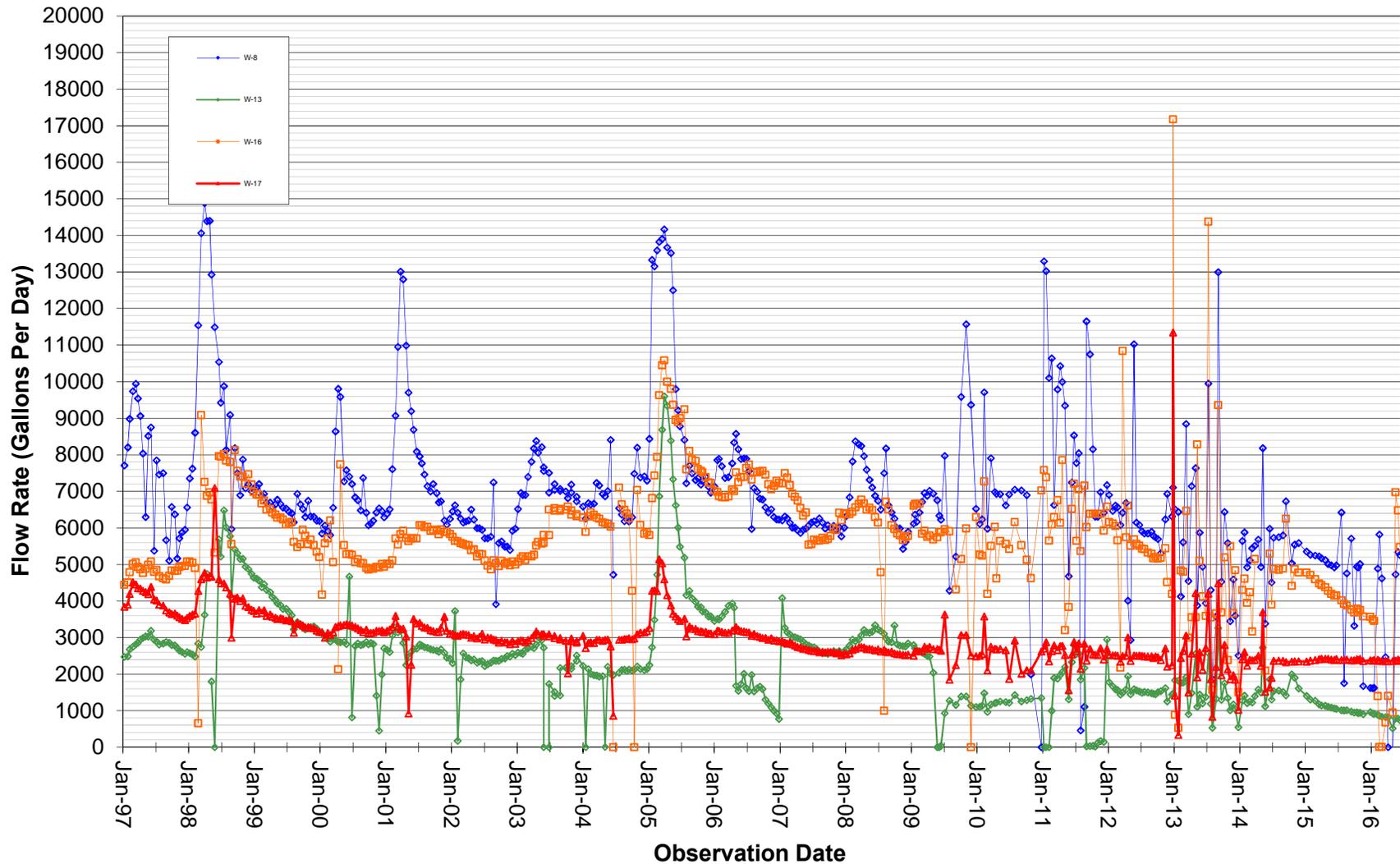
Note: - Not functioning or no longer monitored dewatering well



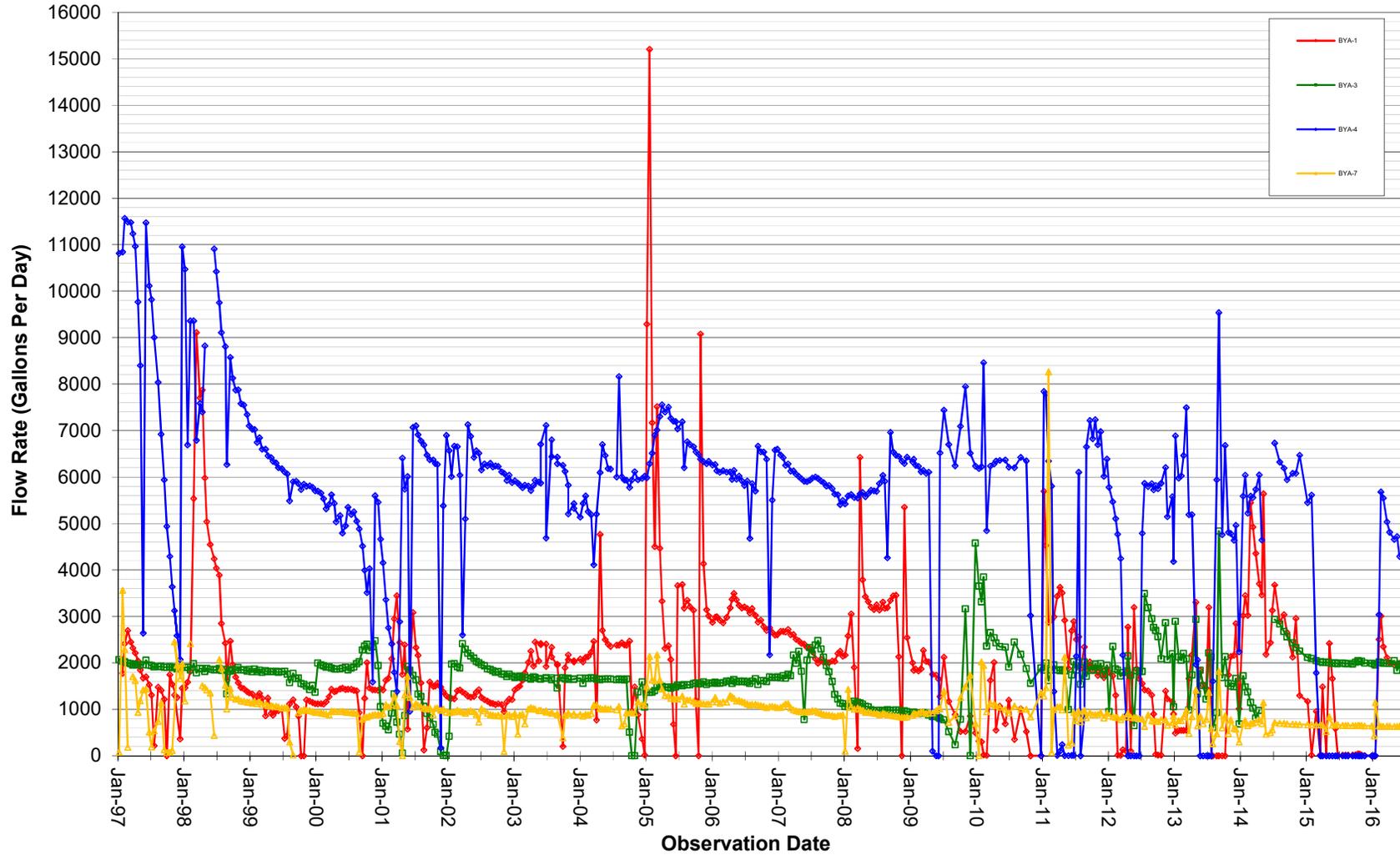
DEWATERING WELL HYDROGRAPHS
Eastern Mesa Region
Big Rock Mesa Landslide Assessment District
Malibu, California



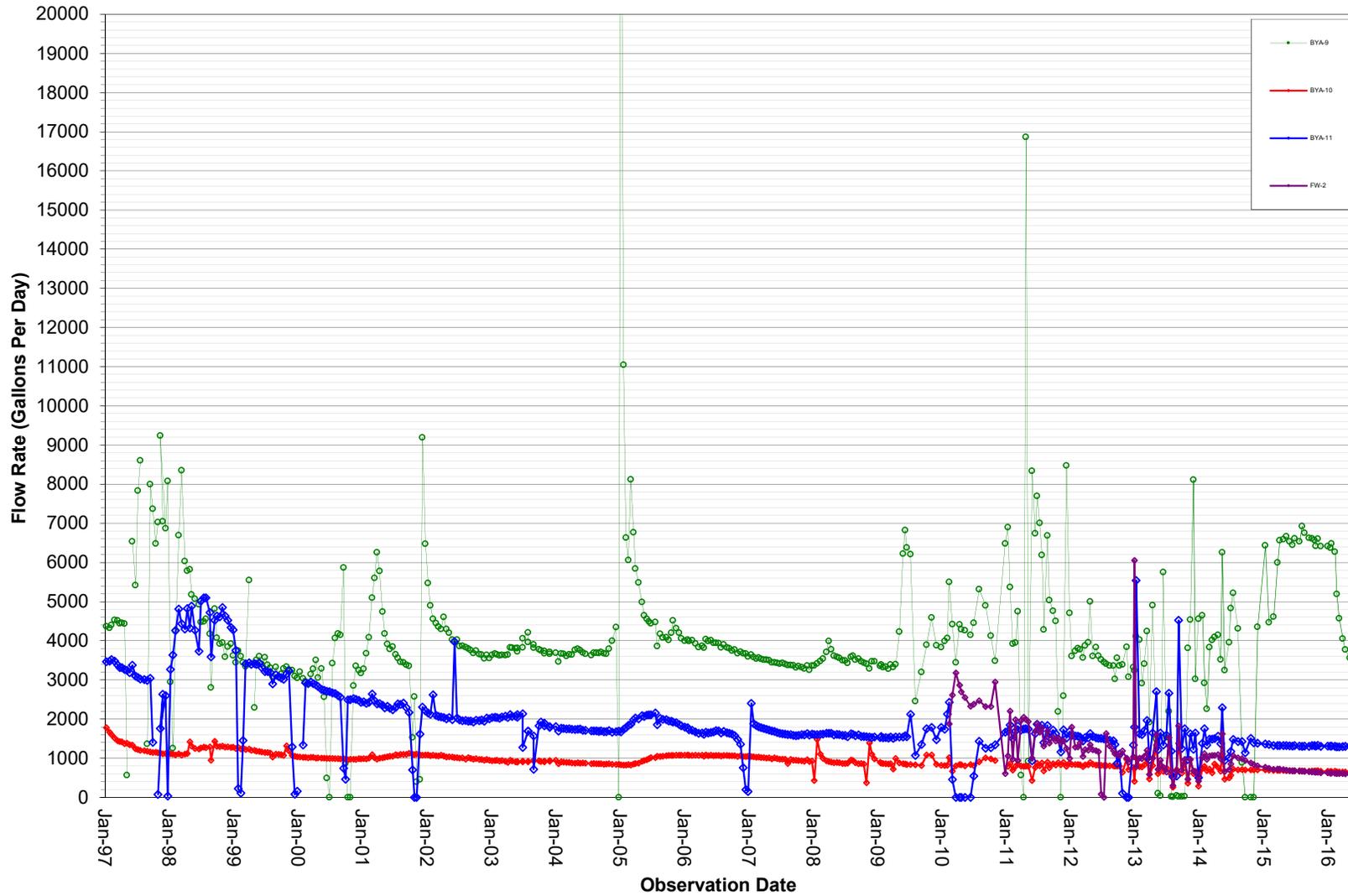
DEWATERING WELL HYDROGRAPHS
Eastern Mesa Region
Big Rock Mesa Landslide Assessment District
Malibu, California



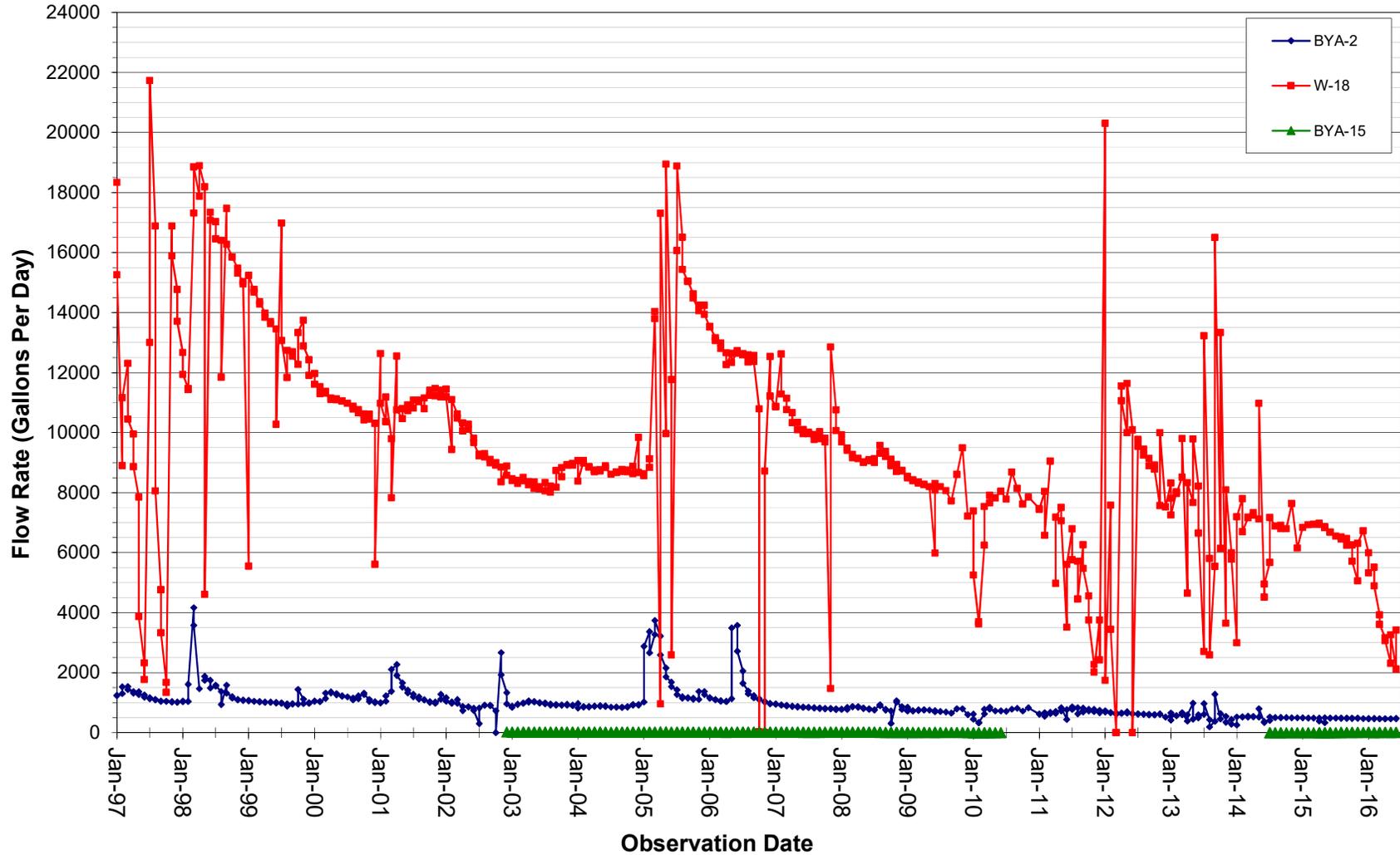
DEWATERING WELL HYDROGRAPHS
Central Mesa Region
Big Rock Mesa Landslide Assessment District
Malibu, California



DEWATERING WELL HYDROGRAPHS
Central Mesa Region
Big Rock Mesa Landslide Assessment District
Malibu, California



DEWATERING WELL HYDROGRAPHS
Central Mesa Region
Big Rock Mesa Landslide Assessment District
Malibu, California



DEWATERING WELL HYDROGRAPHS
Western Extension
Big Rock Mesa Landslide Assessment District
Malibu, California

**APPENDIX C
HYDRAUGER DATA**



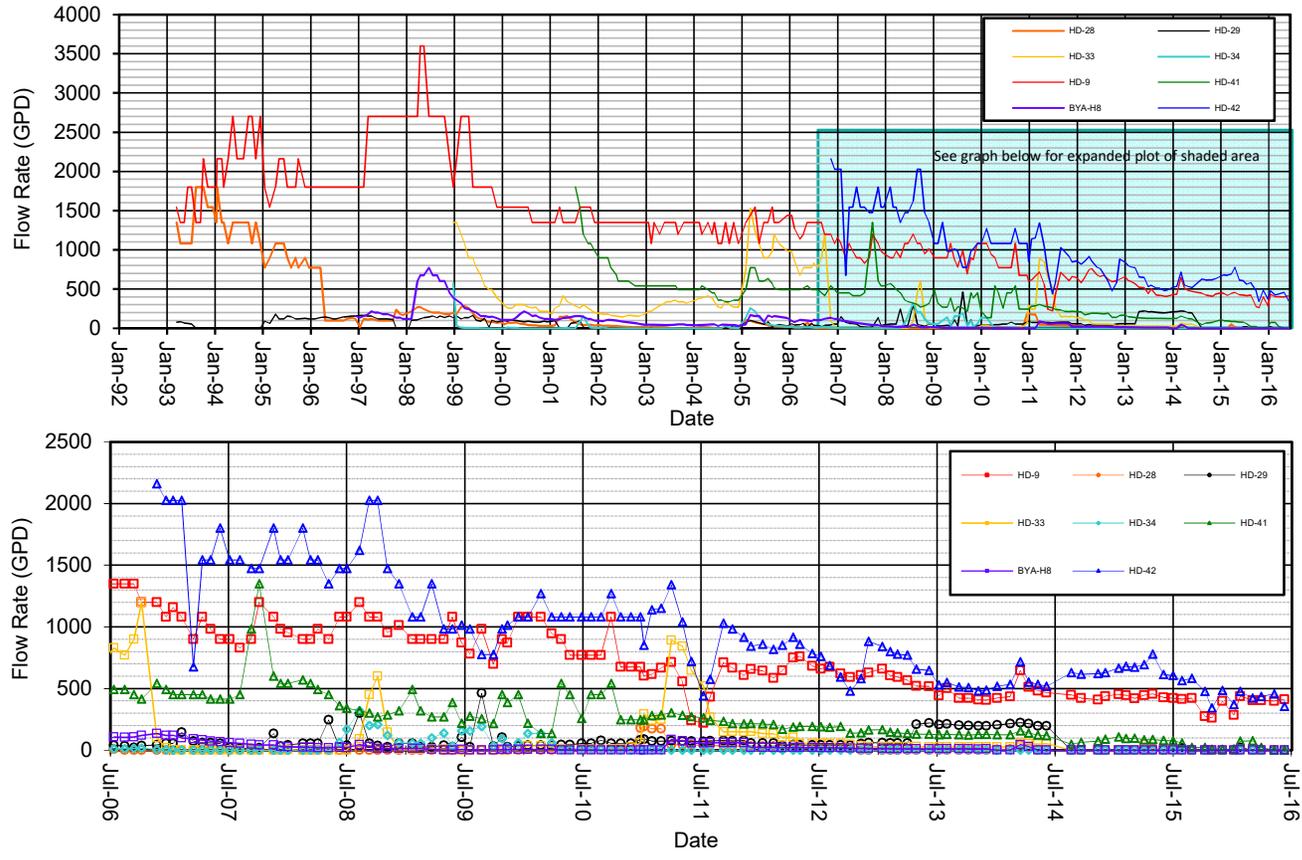
SUMMARY OF HYDRAUGER INFORMATION							
HYDRAUGER ID	INSTALLED LENGTH (ft.)	OPEN LENGTH (ft.)**	Orientation/ Slope	2015-2016 Average Flow (GPD)	% OF TOTAL PRODUCTION	Rank	INSTALLED BY
H-1	700	210**	S115W / 3	17	0.1%	20	MT
HD-4	760	10	-	592	4.7%	6	D.E.
HD-5	890	530**	-	515	4.1%	7	D.E.
HD-6	980	490**	-	424	3.4%	9	D.E.
HD-7	1160	420**	-	77	0.6%	16	D.E.
HD-9	205	205**	-	378	3.0%	10	D.E.
HD-10	990	170**	-	261	2.1%	13	D.E.
HD-11	540	540**	-	165	1.3%	14	D.E.
HD-12	690	385**	-	2148	17.1%	2	D.E.
HD-15	200	200**	-	21	0.2%	19	D.E.
HD-22	568	540**	-	1342	10.7%	4	D.E.
HD-23	1280	260**	-	1672	13.3%	3	D.E.
HD-24	1030	580**	-	87	0.7%	15	D.E.
HD-25	1005	360**	-	27	0.2%	18	D.E.
HD-26	1200	410**	S37W / 1	1098	8.7%	5	D.E.
HD-28	1420	595**	-	0	0.0%	22	D.E.
HD-29	1150	450**	-	5	0.0%	21	D.E.
HD-30	1040	10**	S13W / 7	2621	20.9%	1	D.E.
HD-33	340	340	S23W / 5	0	0.0%	22	BYA
HD-41	500	500	S18E / 3	31	0.2%	17	BYA
BYA-H8	500	345**	-	0	0.0%	22	BYA
BYA-H10	500	10**	-	291	2.3%	12	BYA
HD-42	700	700	-	464	3.7%	8	Fugro
HD-43	700	700	-	334	2.7%	11	Fugro
H-2*	Unknown	0	-	0	--	--	MT
H-3a*	Unknown	0	-	0	--	--	MT
H-3b*	Unknown	0	-	0	--	--	MT
H-3c*	Unknown	0	-	0	--	--	MT
H-4	680	115**	-	0	0.0%	22	MT
H-5a*	Unknown	0	-	0	--	--	MT
H-5b*	Unknown	0	-	0	--	--	MT
H-6a*	100	96	-	0	--	--	CT
H-6b*	100	96	-	0	--	--	CT
H-7a*	100	100	-	0	--	--	CT
H-7b*	100	96	-	0	--	--	CT
H-7c*	50	0	-	0	--	--	CT
H-8*	Unknown	0	-	0	--	--	CT
HD-1*	350	340**	-	0	--	--	D.E.
HD-2a*	70	33	-	0	--	--	D.E.
HD-2b*	Unknown	0	-	0	--	--	D.E.
HD-2c*	460	0	-	0	--	--	D.E.
HD-3	560	90**	-	0	--	--	D.E.
HD-8*	530	170**	-	0	--	--	D.E.
HD-13*	650	14	-	0	--	--	D.E.
HD-14*	130	130**	-	0	--	--	D.E.
HD-16	575	575**	-	0	--	--	D.E.
HD-17*	750	176	-	0	--	--	D.E.
HD-18*	870	285	-	0	--	--	D.E.
HD-19*	1000	182	-	0	--	--	D.E.
HD-20*	1000	446	-	0	--	--	D.E.
HD-21*	1560	147	-	0	--	--	D.E.
HD-27*	700	327	-	0	--	--	D.E.
HD-31*	140	113	-	0	--	--	D.E.
HD-32*	835	700**	-	0	--	--	D.E.
HD-34	150	150	S40W / 10	0	--	--	BYA
HD-35*	40	40	-	0	--	--	BYA
HD-36*	150	150	-	0	--	--	BYA
HD-37*	430	50	-	0	--	--	BYA
HD-38A*	140	140	S23W / 5	0	--	--	BYA
HD-38B*	140	140	S18W / 6	0	--	--	BYA
HD-39	400	400	S15E / 5	0	--	--	BYA
HD-40*	595	595	S25W / 6	0	--	--	BYA
BYA-6a*	350	20**	-	0	--	--	BYA
BYA-6b	60	60	-	0	0.0%	22	BYA
BYA-7	400	375**	-	0	0.0%	22	BYA
BYA-H9*	550	550**	-	0	--	--	BYA
BYA-H11*	450	400**	S7E / 3	0	--	--	BYA

* Not functioning or no longer monitored hydrauger

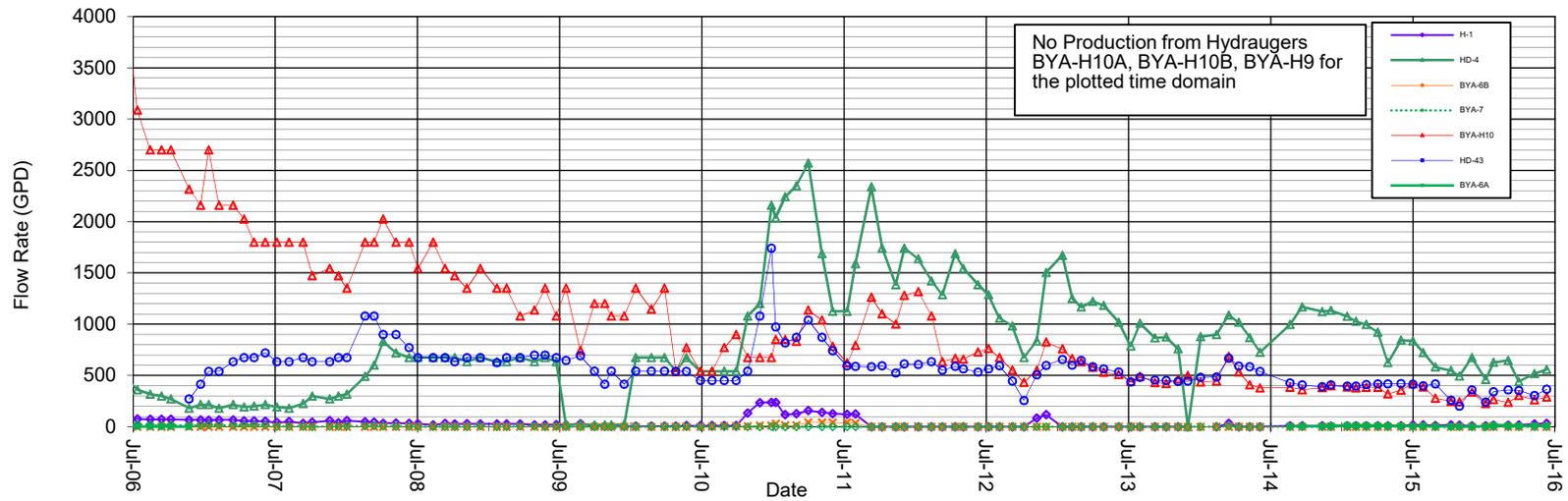
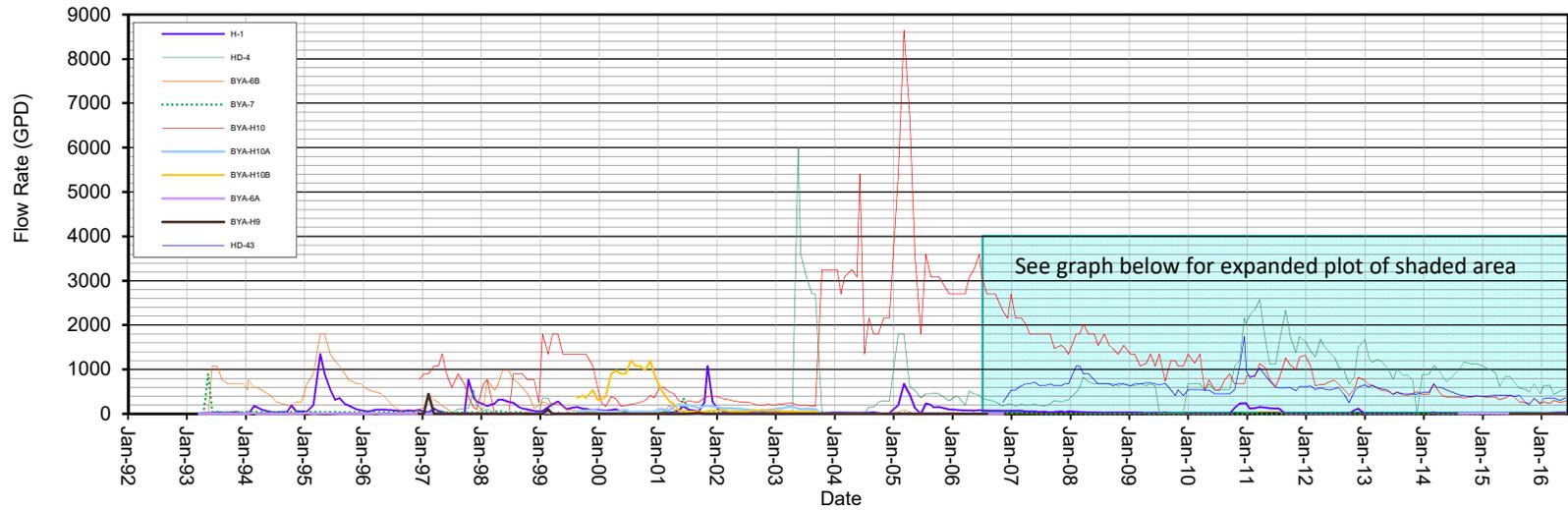
** Open Length is Measured on 10-1997 by BYA

Installed by: MT = Moore & Taber; CT = Caltrans; D.E. = D.A. Evans; BYA = Bing Yen & Associates

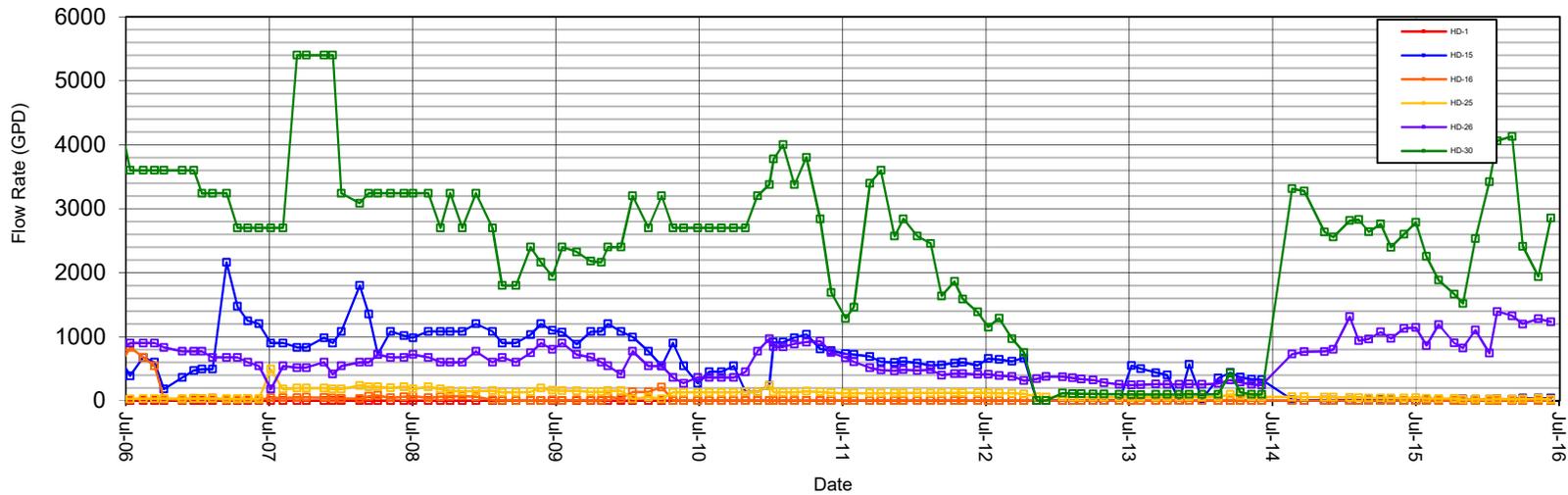
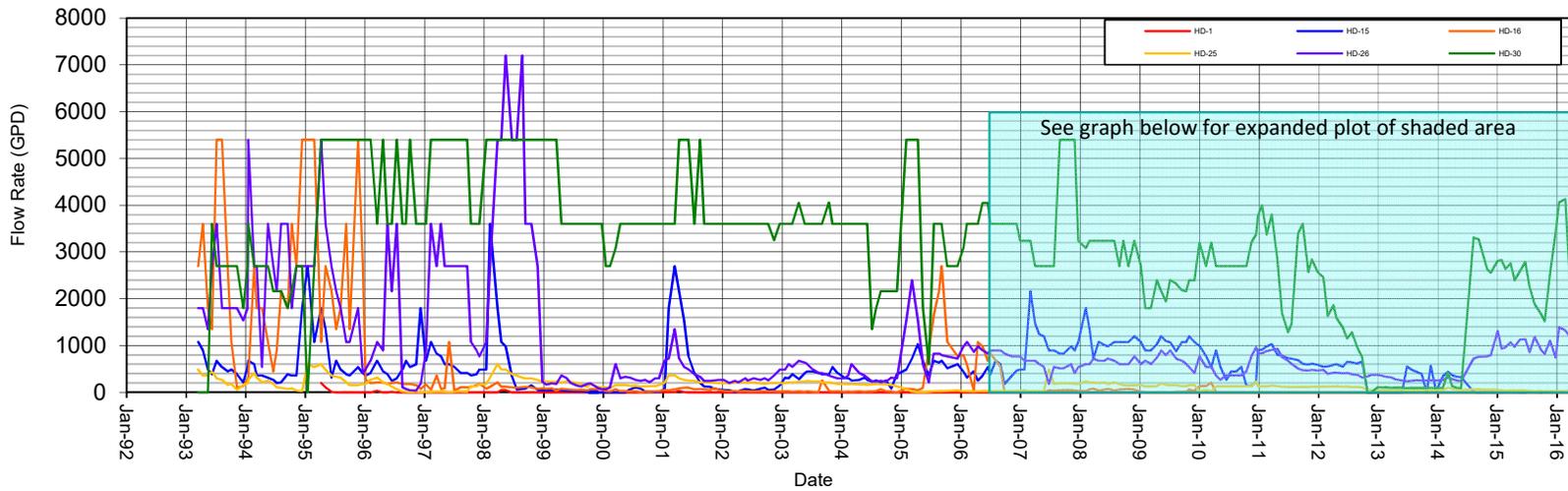
SUMMARY OF HYDRAUGER INFORMATION
 Big Rock Mesa Landslide Assessment District
 Malibu, California



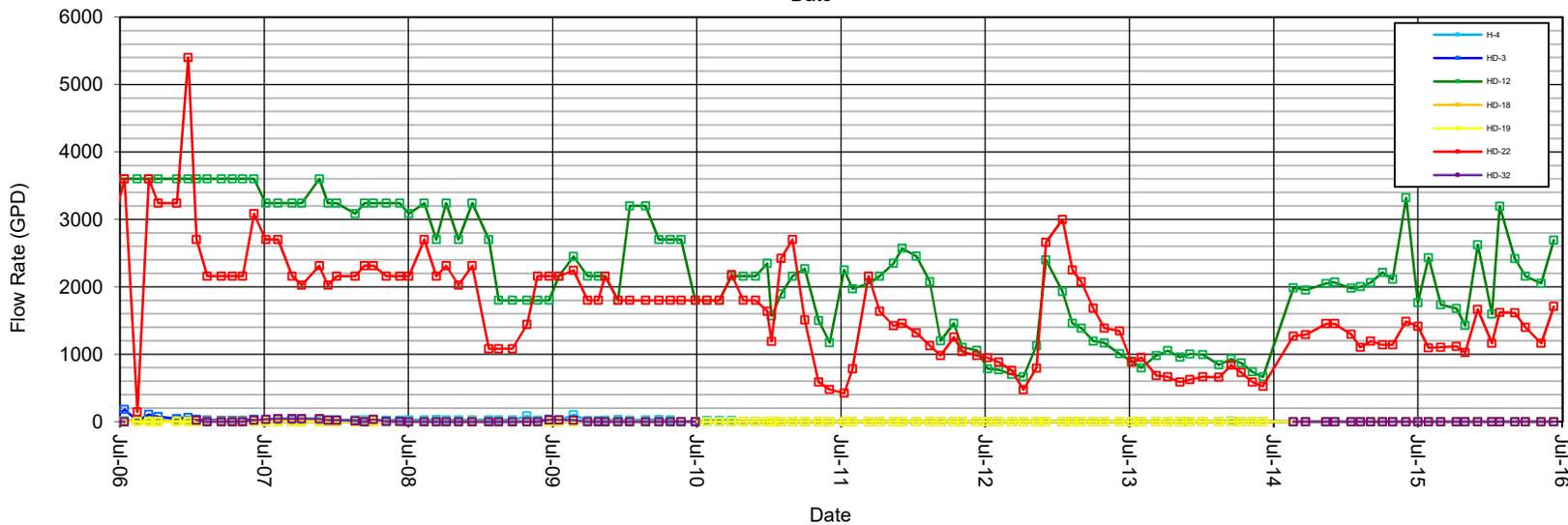
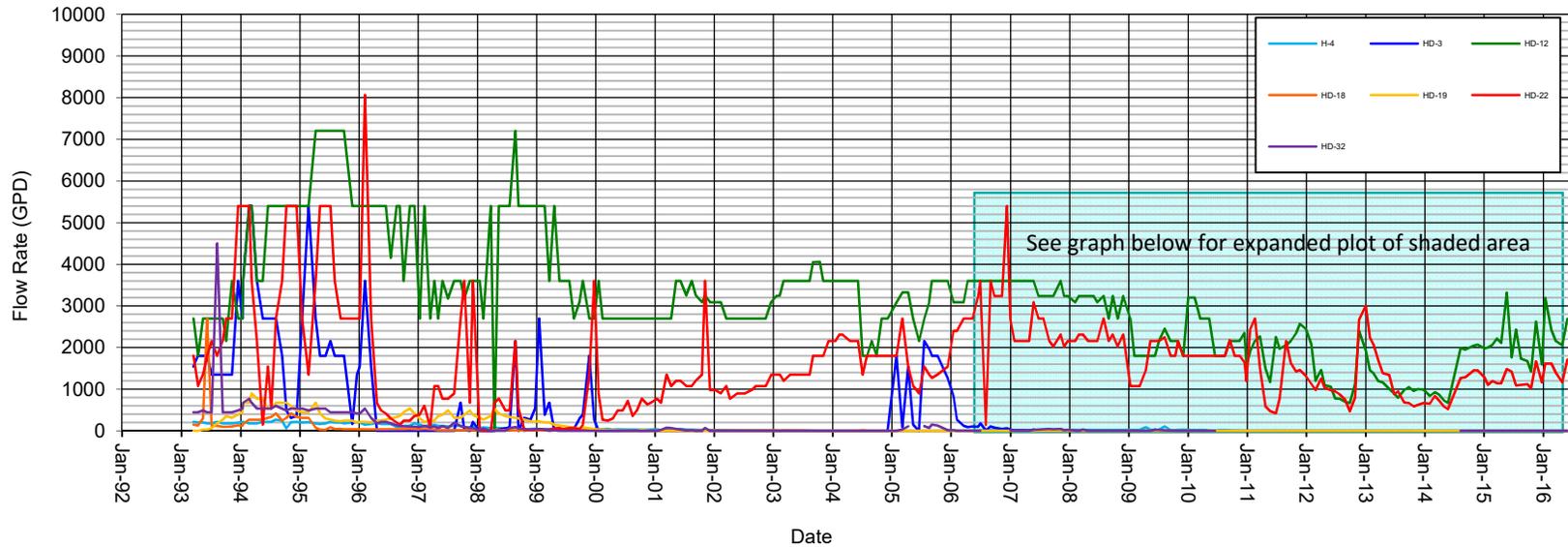
DISCHARGE RATE FOR HYDRAUGERS
Eastern Mesa Region
Big Rock Mesa Landslide Assessment District
Malibu, California



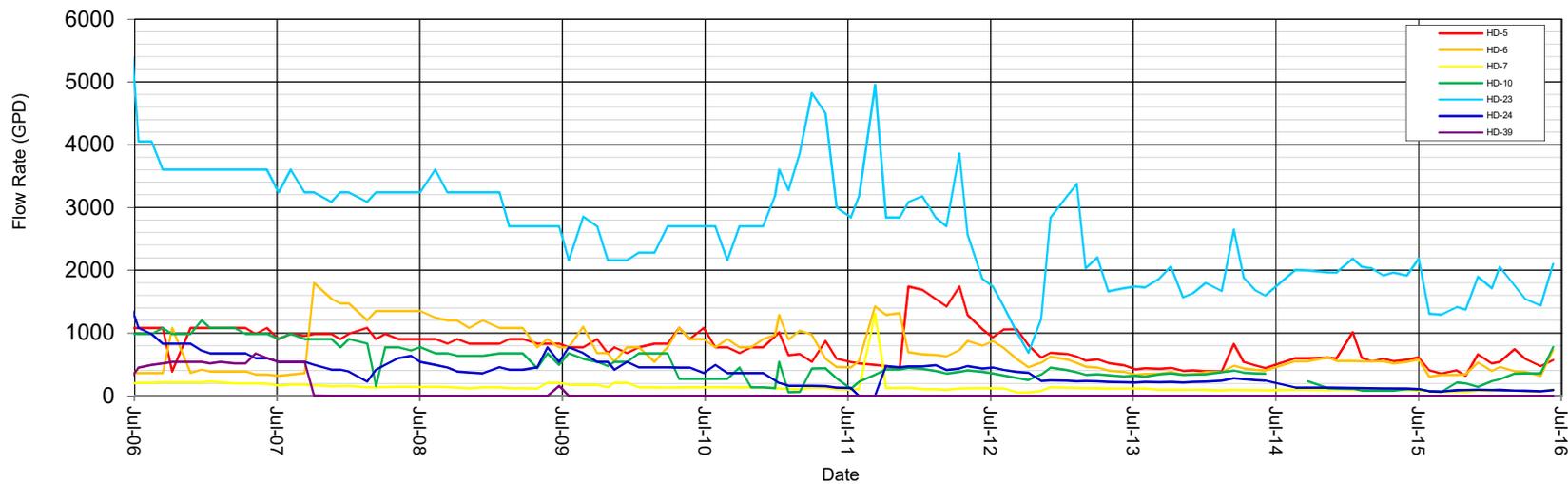
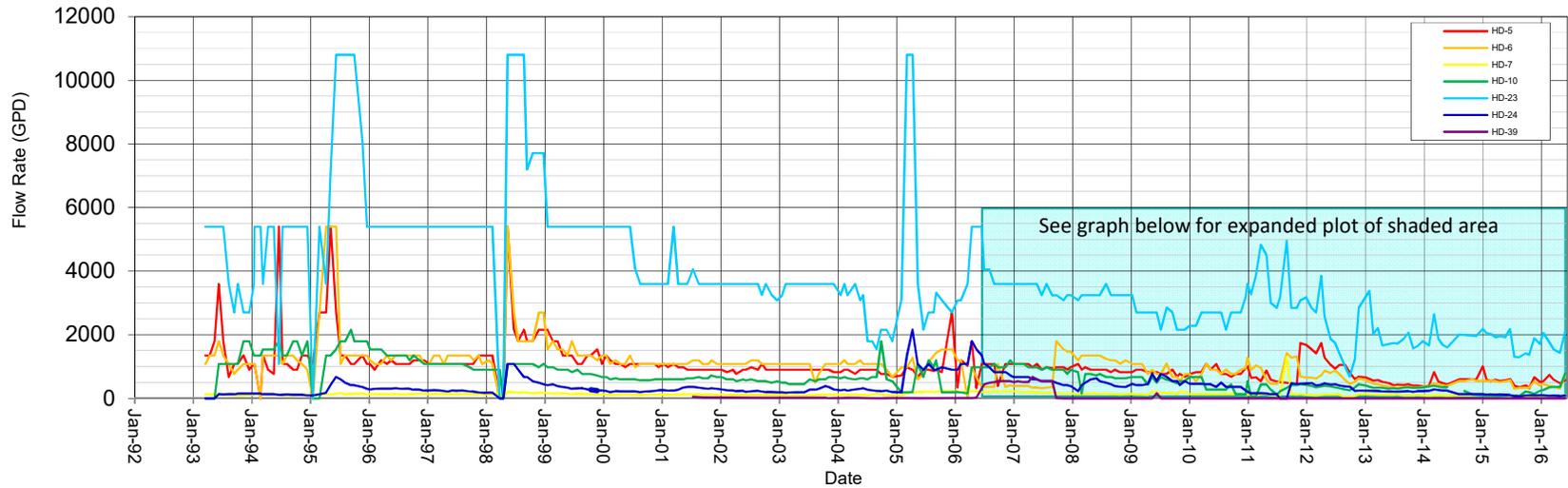
DISCHARGE RATE FOR HYDRAUGERS
Eastern Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California



DISCHARGE RATE FOR HYDRAUGERS
Central Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California

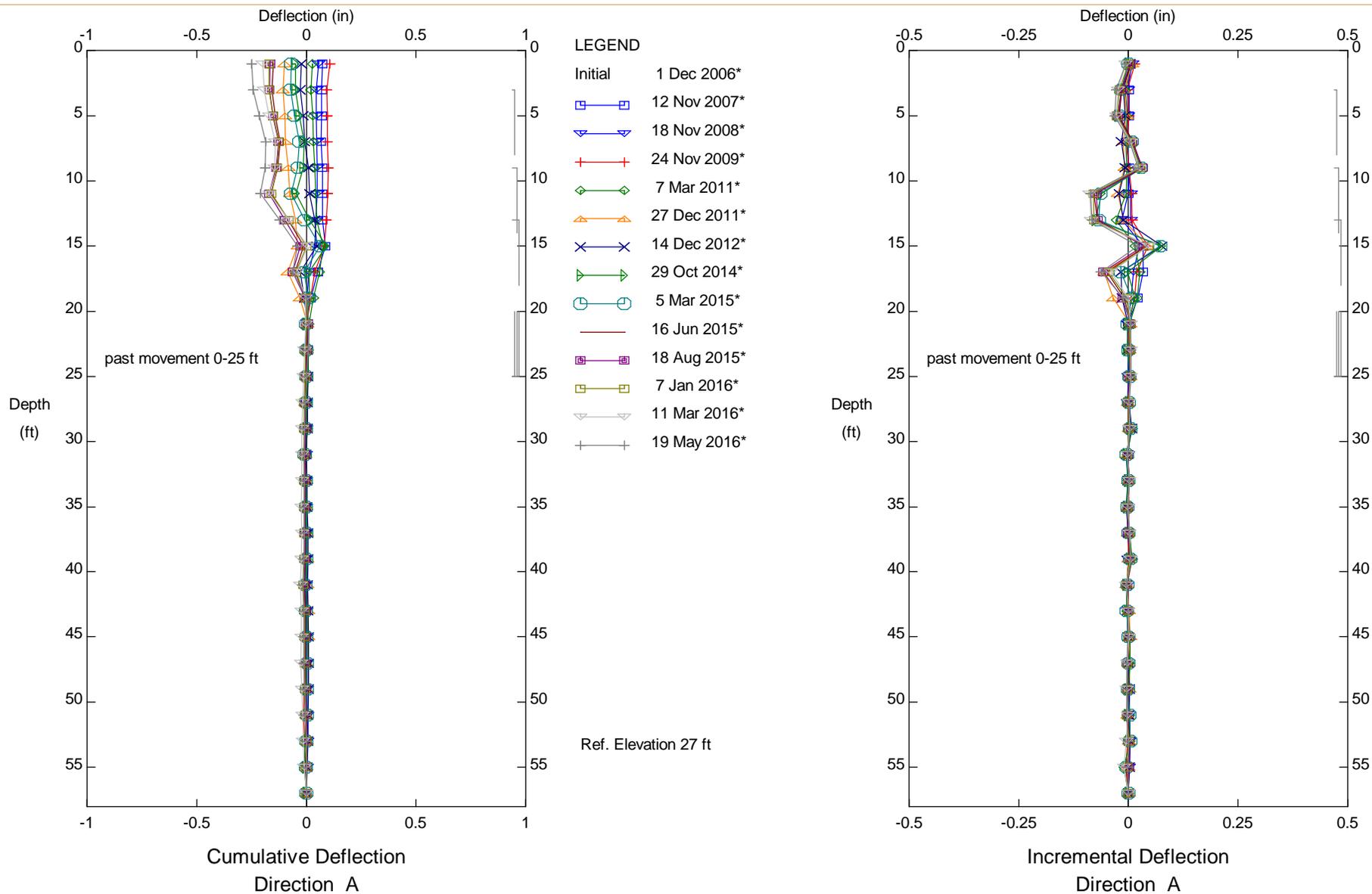


DISCHARGE RATE FOR HYDRAUGERS
Central Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California



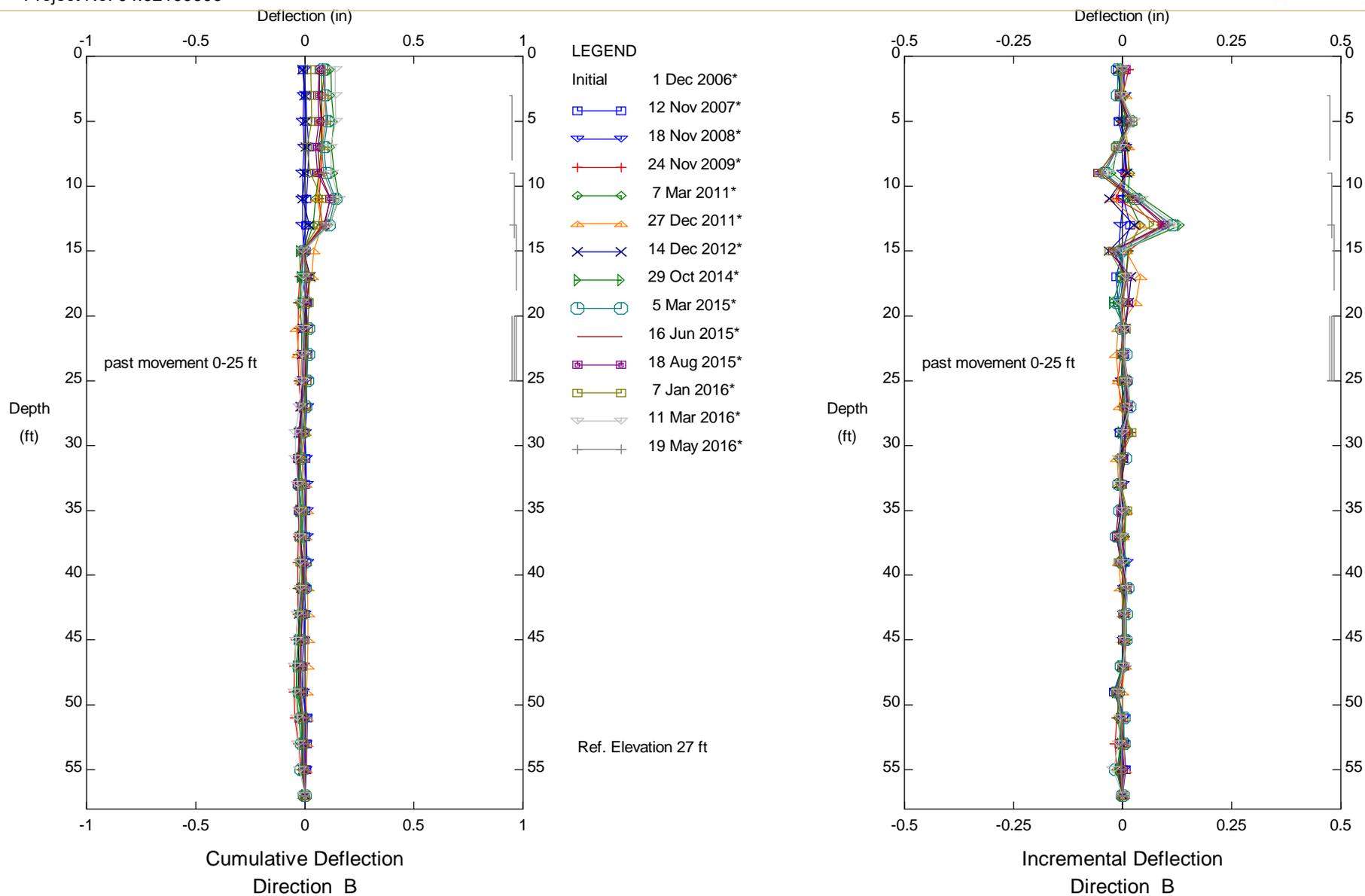
DISCHARGE RATE FOR HYDROGRAPHS
Western Extension
Big Rock Mesa Landslide Assessment District
Malibu, California

APPENDIX D
SLOPE INCLINOMETER PLOT/DATA



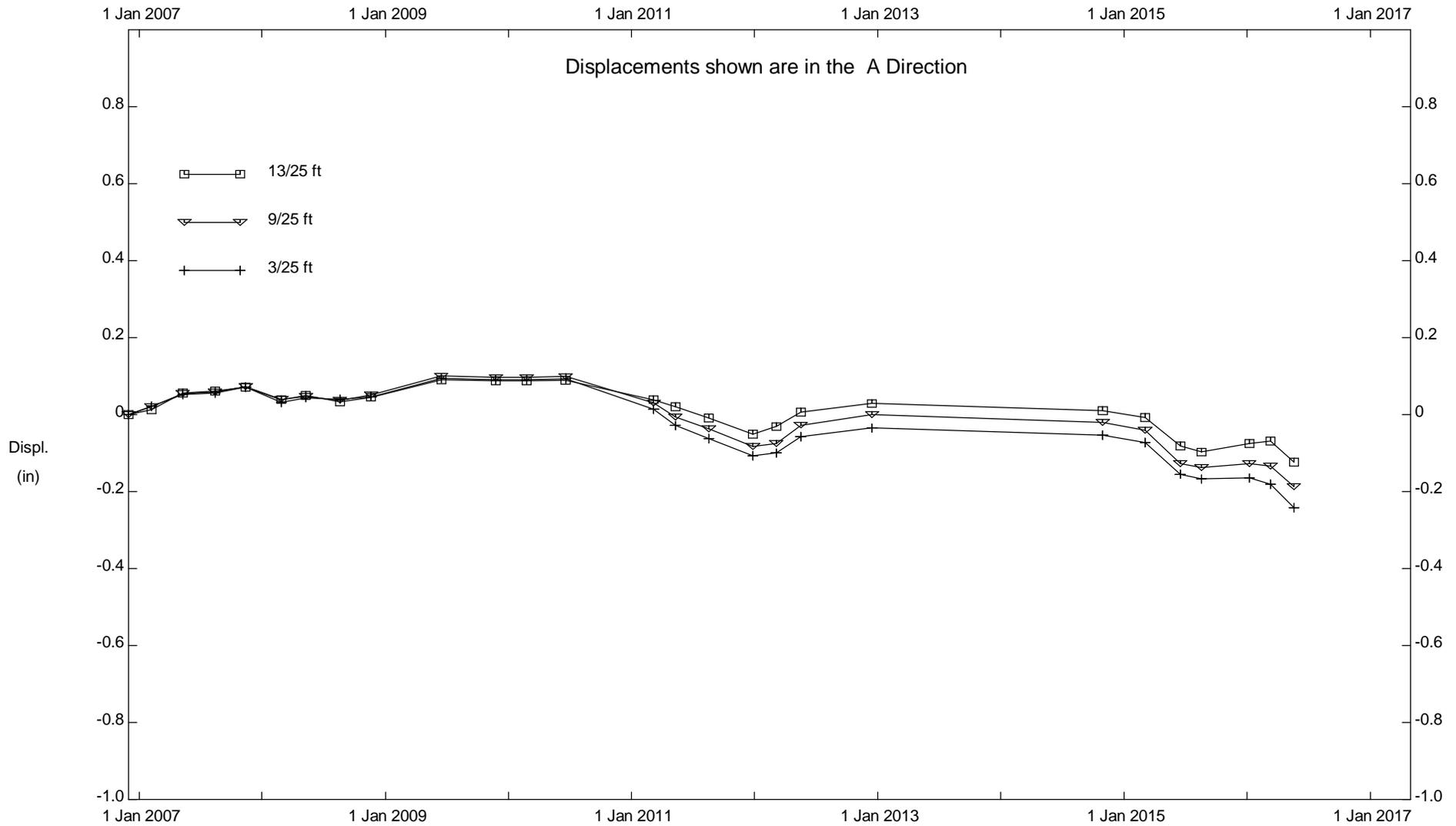
BIG ROCK MESA, Inclinometer SP-11
PCH REGION

Sets marked * include zero shift and/or rotation corrections.



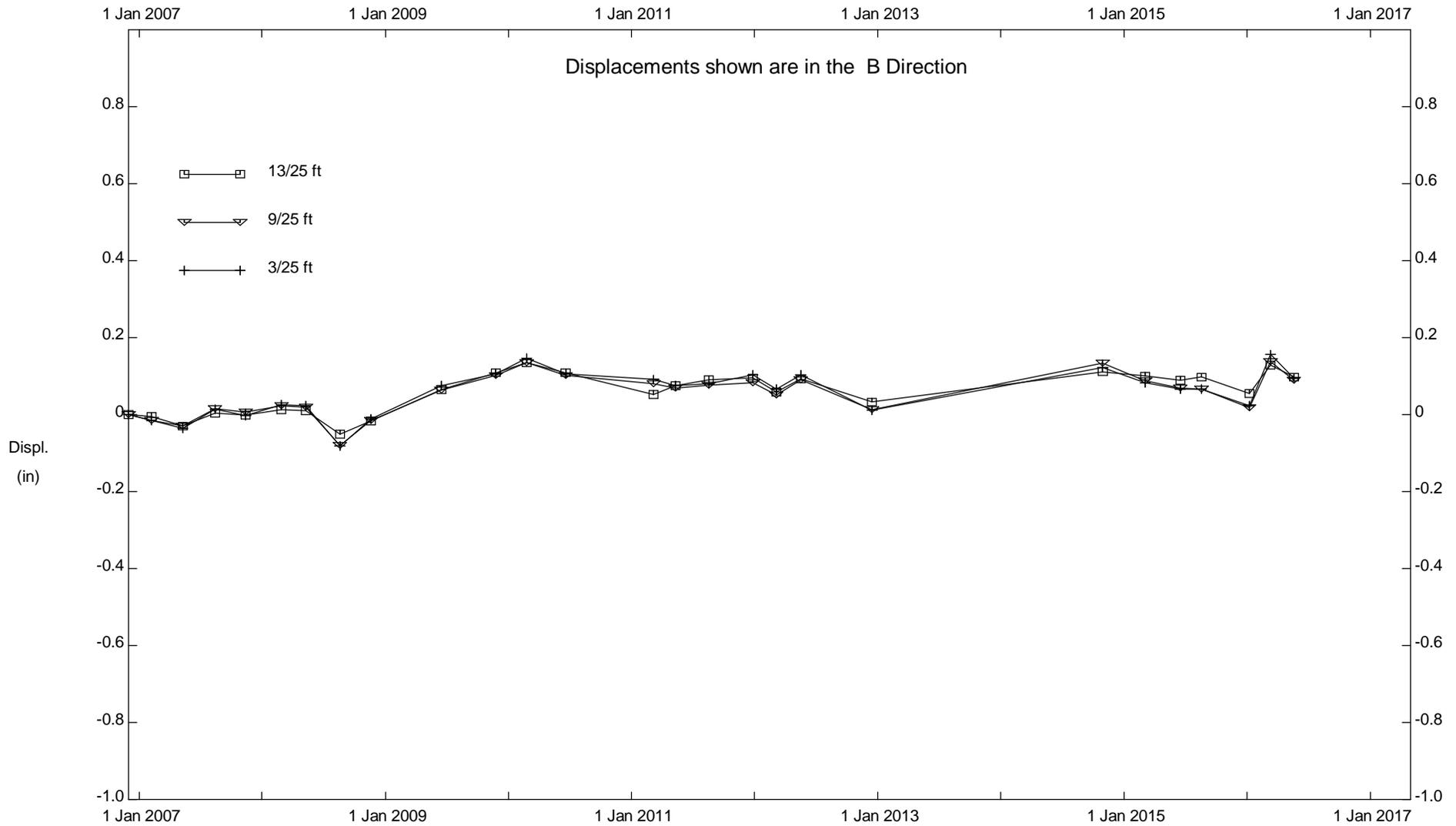
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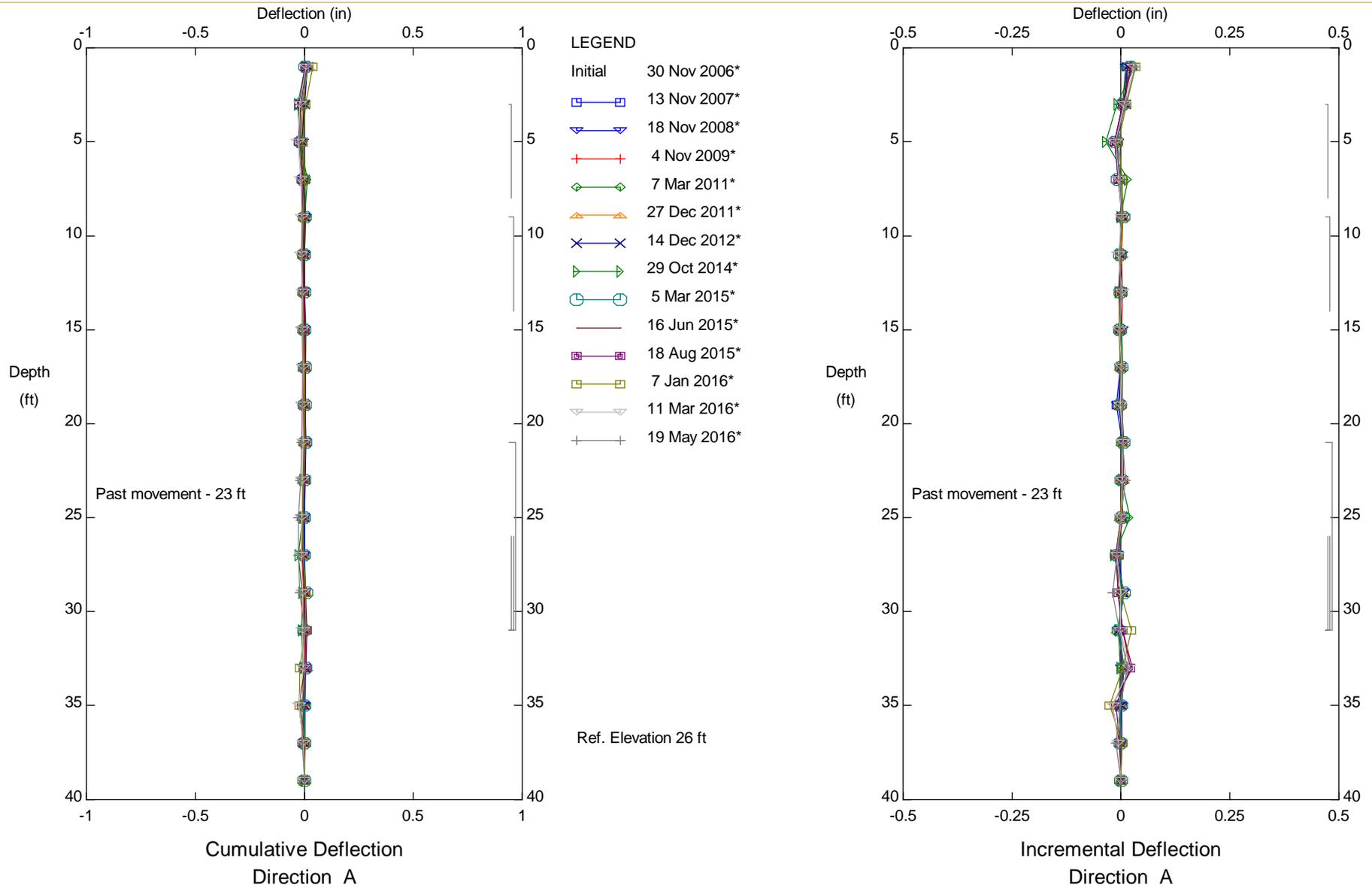
BIG ROCK MESA, Inclinometer SP-11

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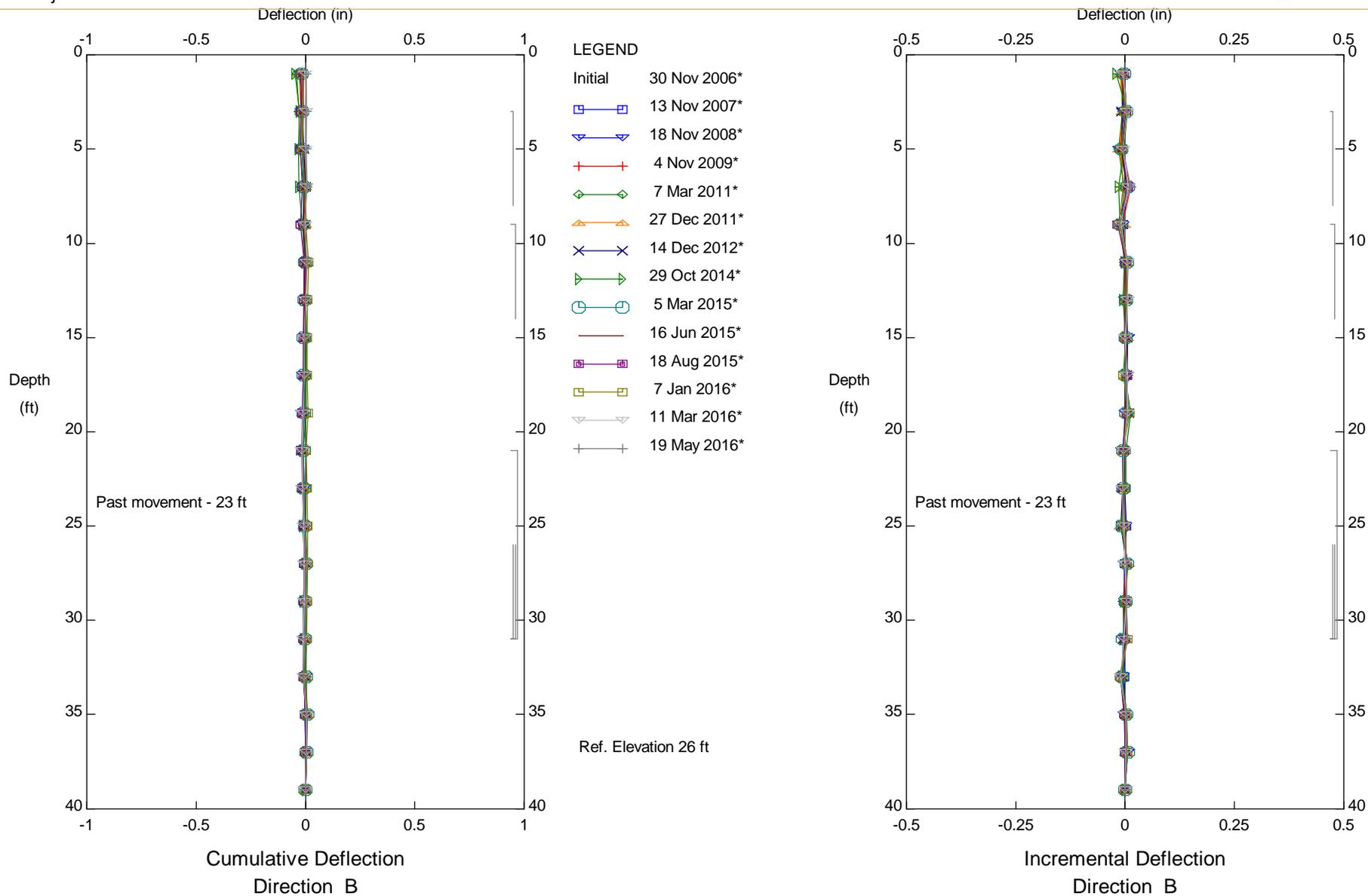
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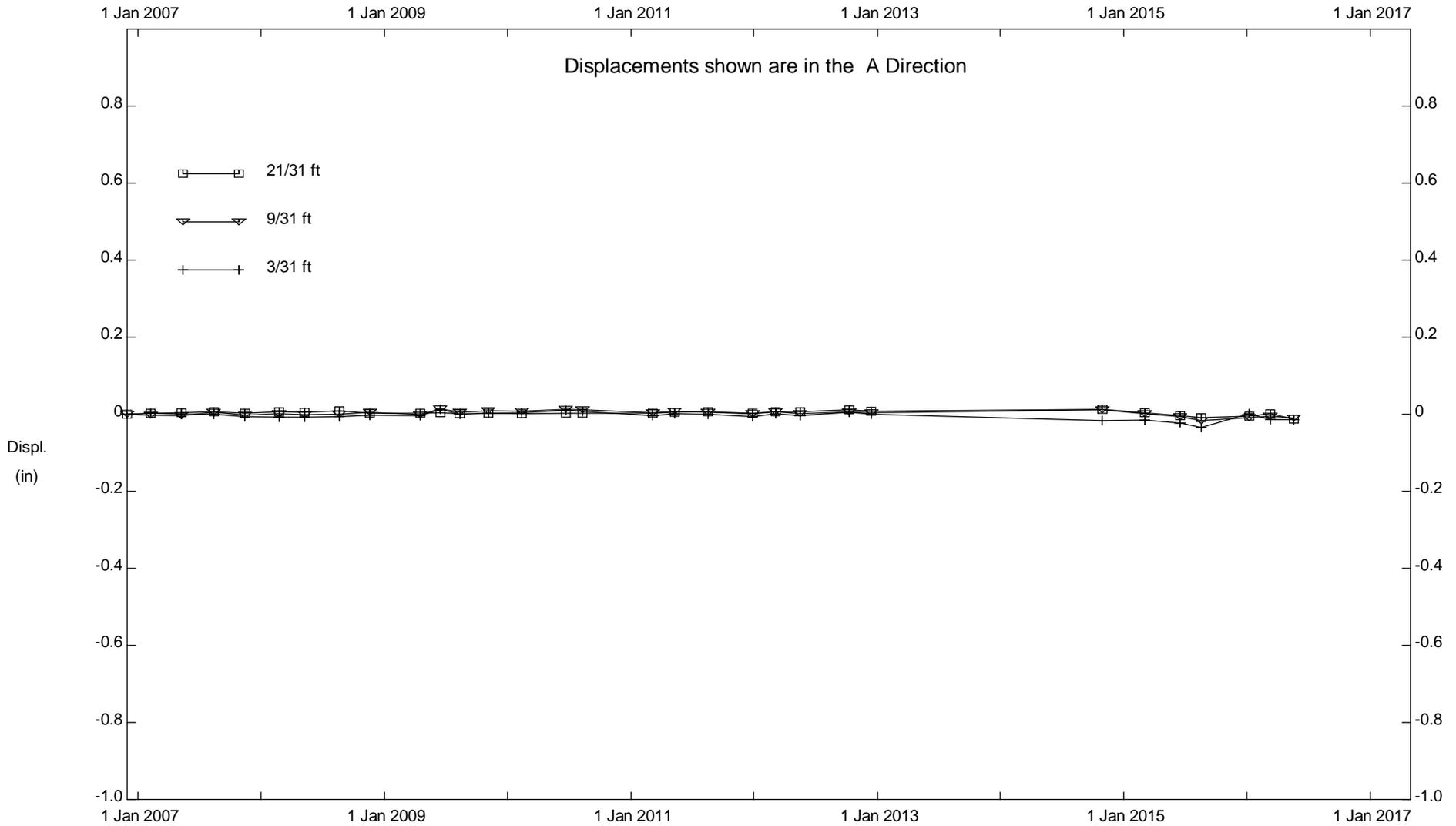
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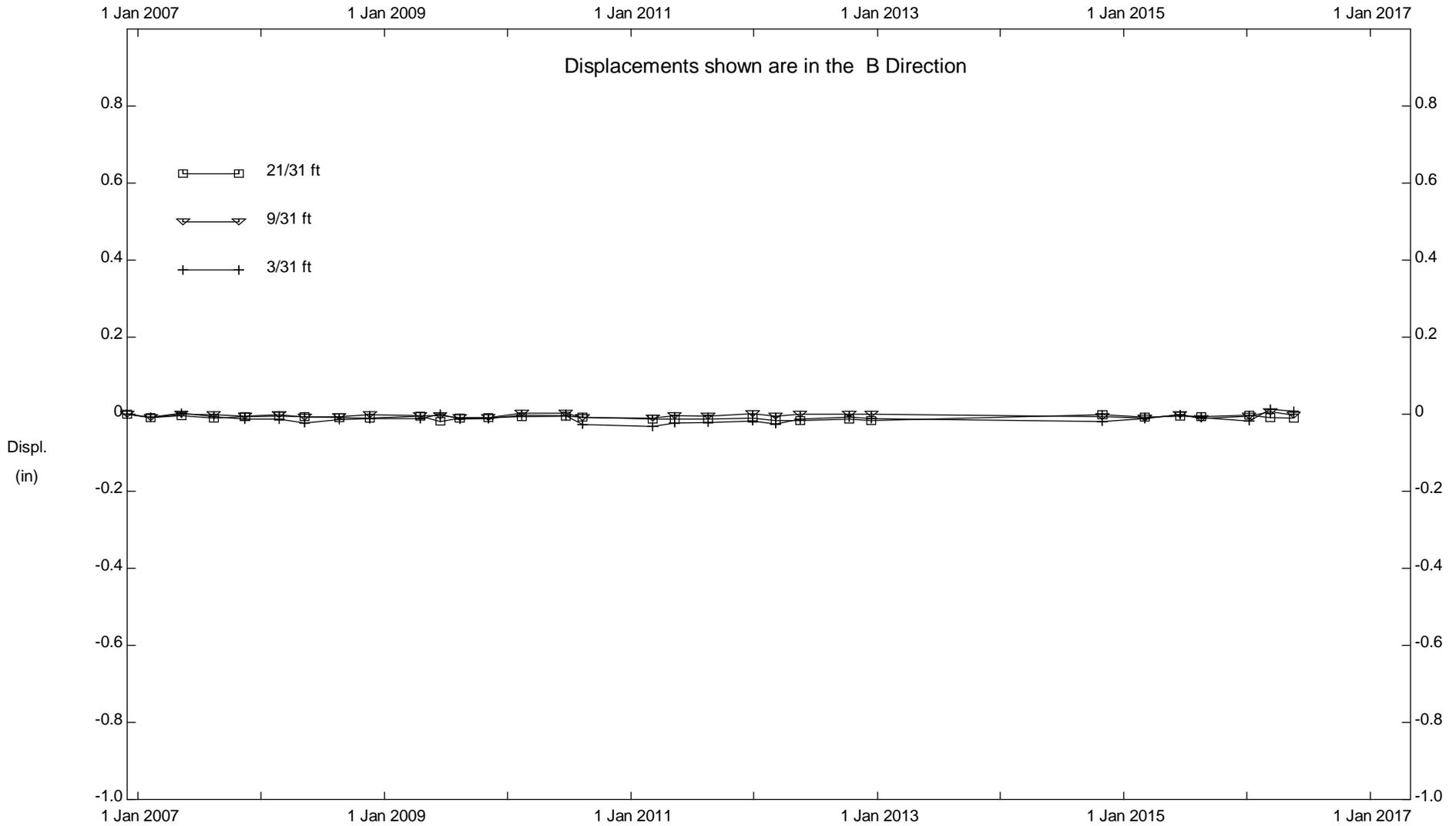
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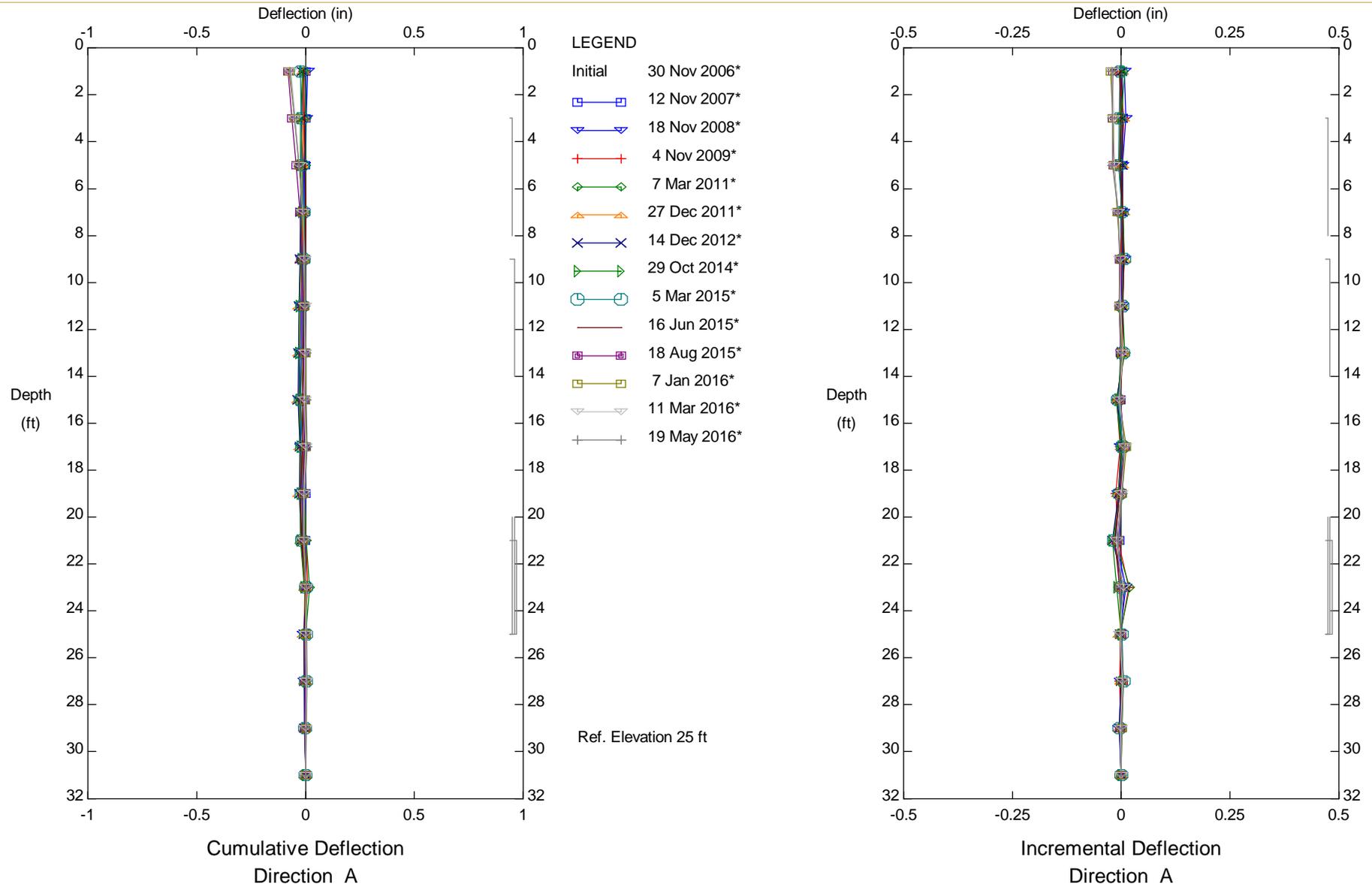
BIG ROCK MESA, Inclinometer SP-12

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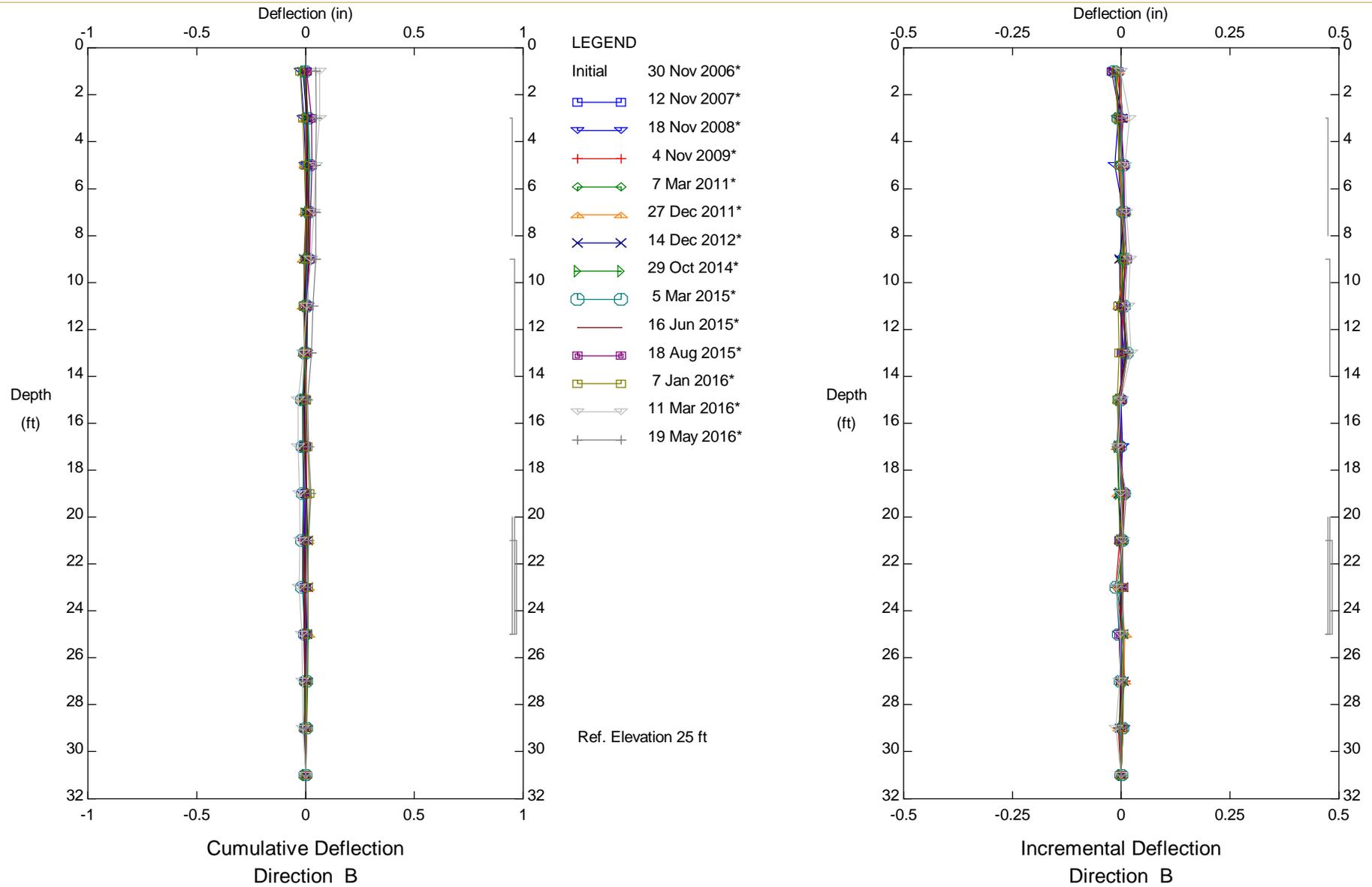
BIG ROCK MESA, Inclinator SP-12

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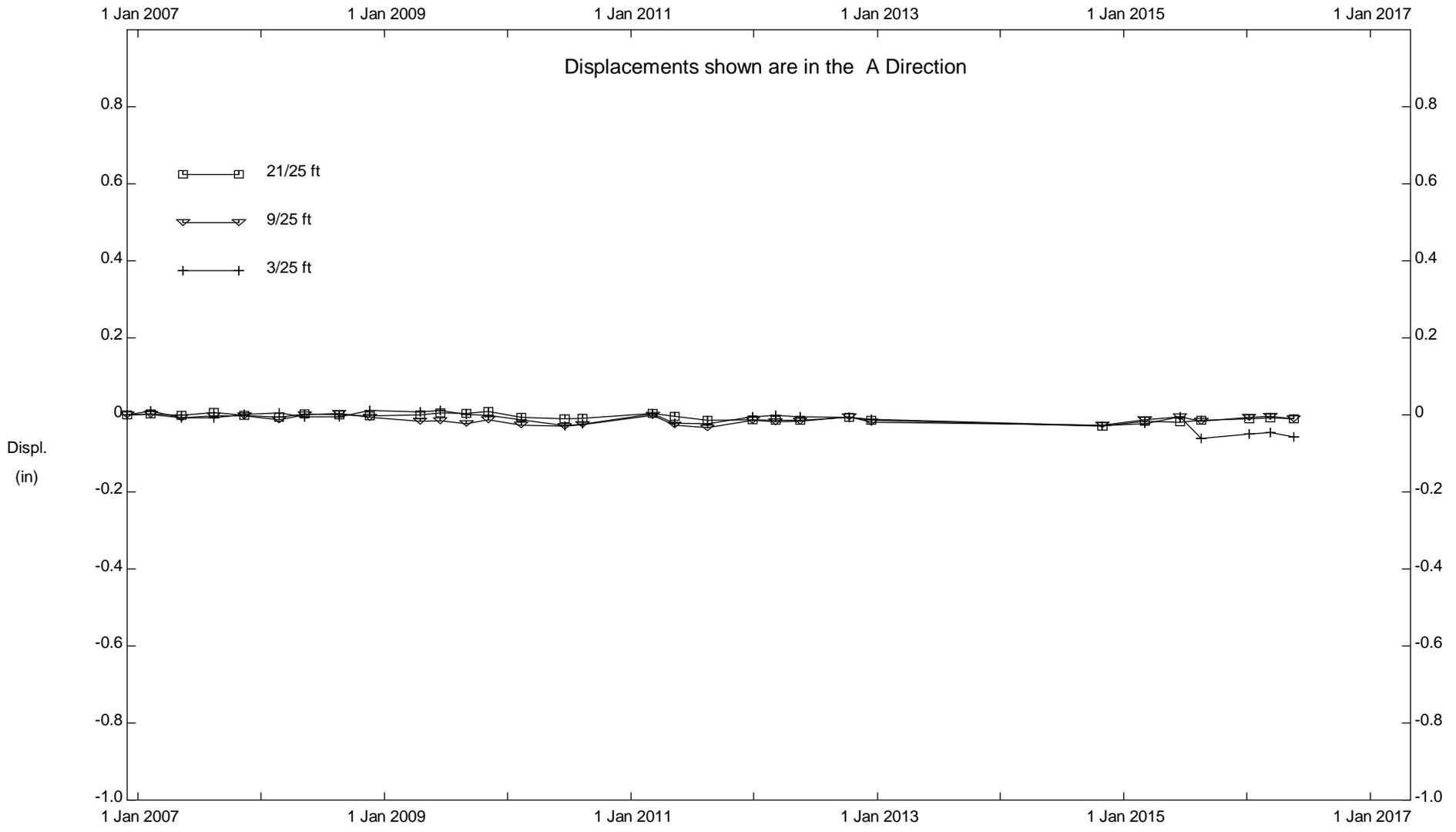
BIG ROCK MESA, Inclinator SP-14
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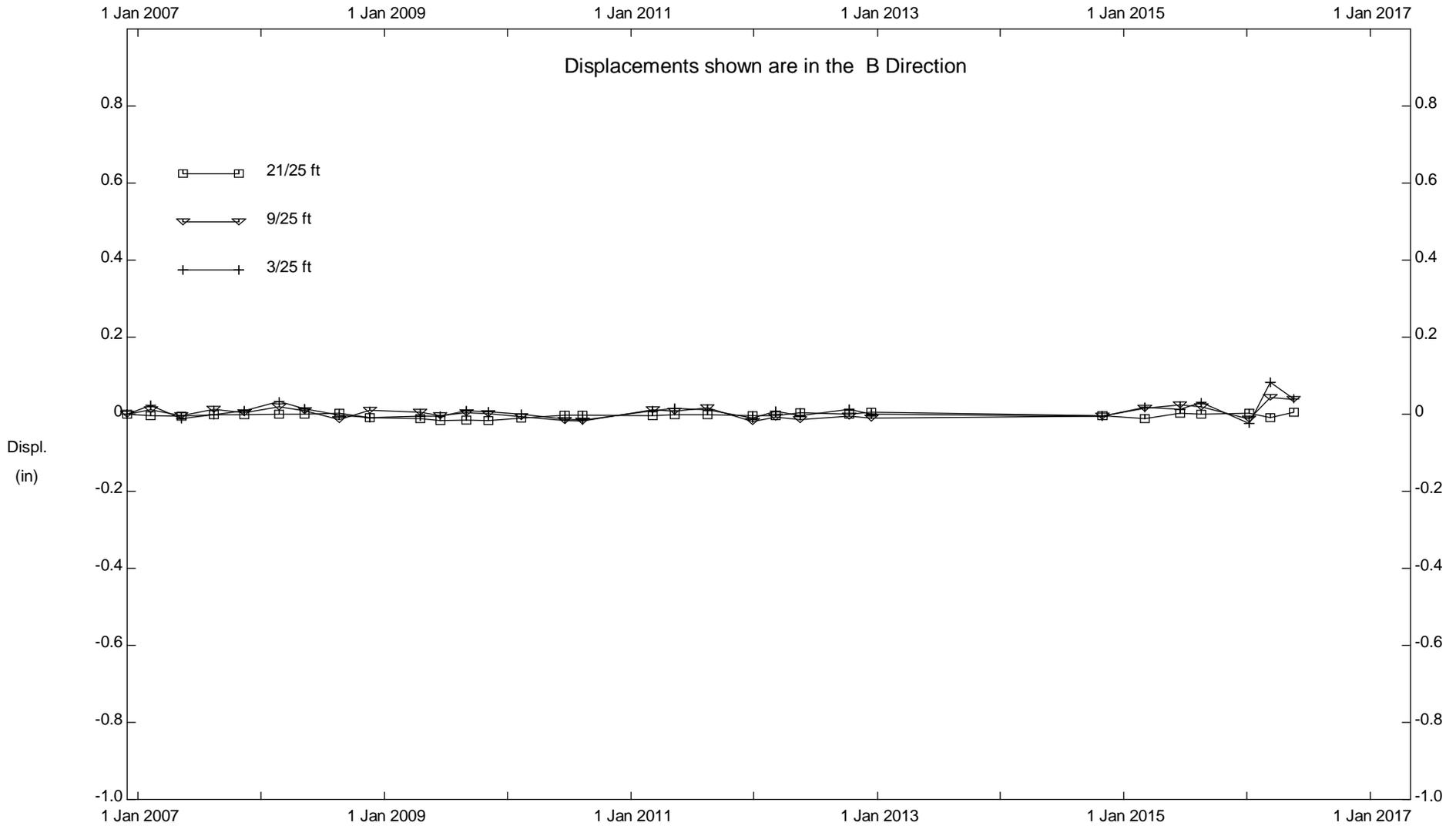
BIG ROCK MESA, Inclinometer SP-14
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Sets marked * include zero shift and/or rotation corrections.



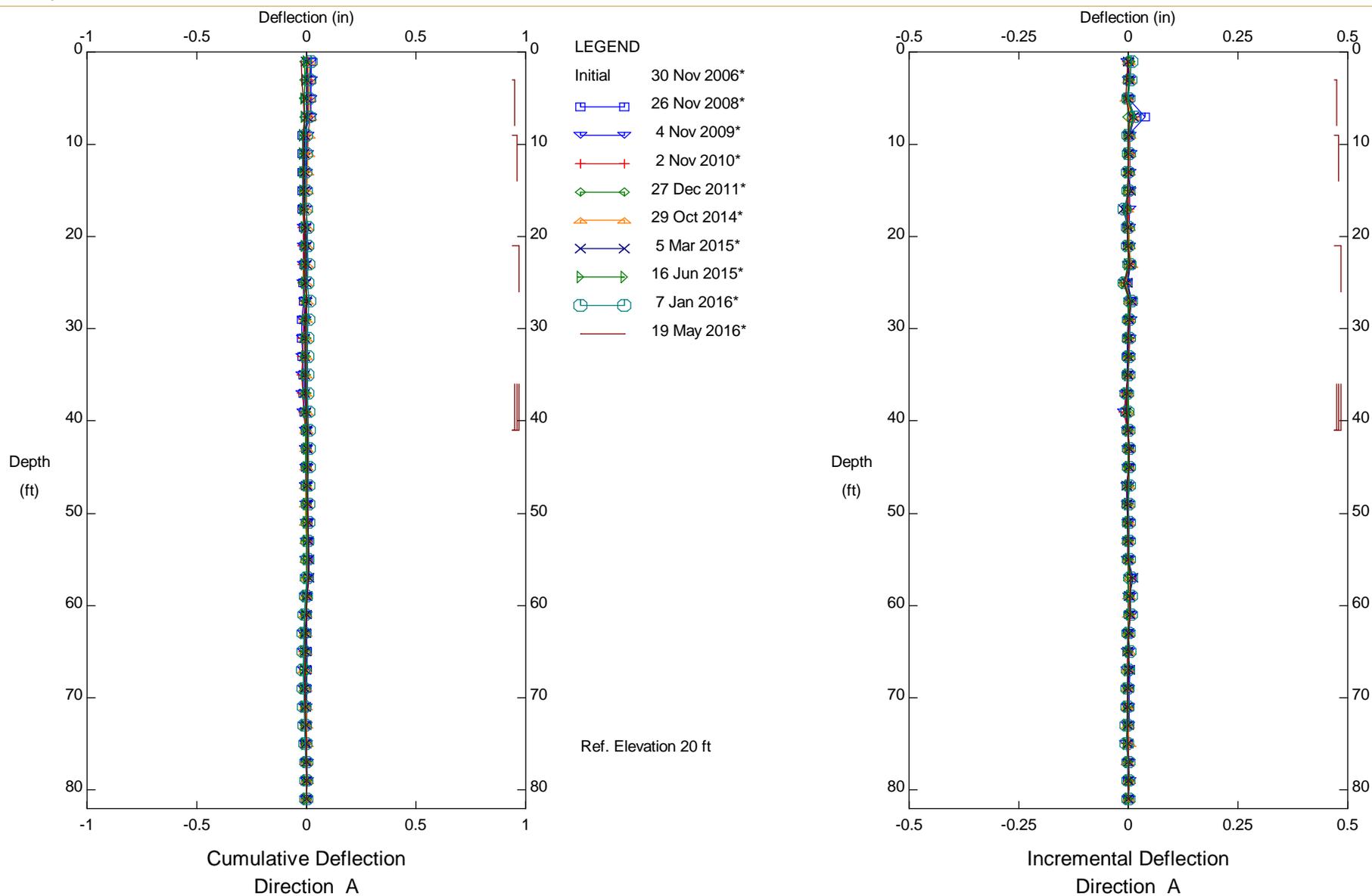
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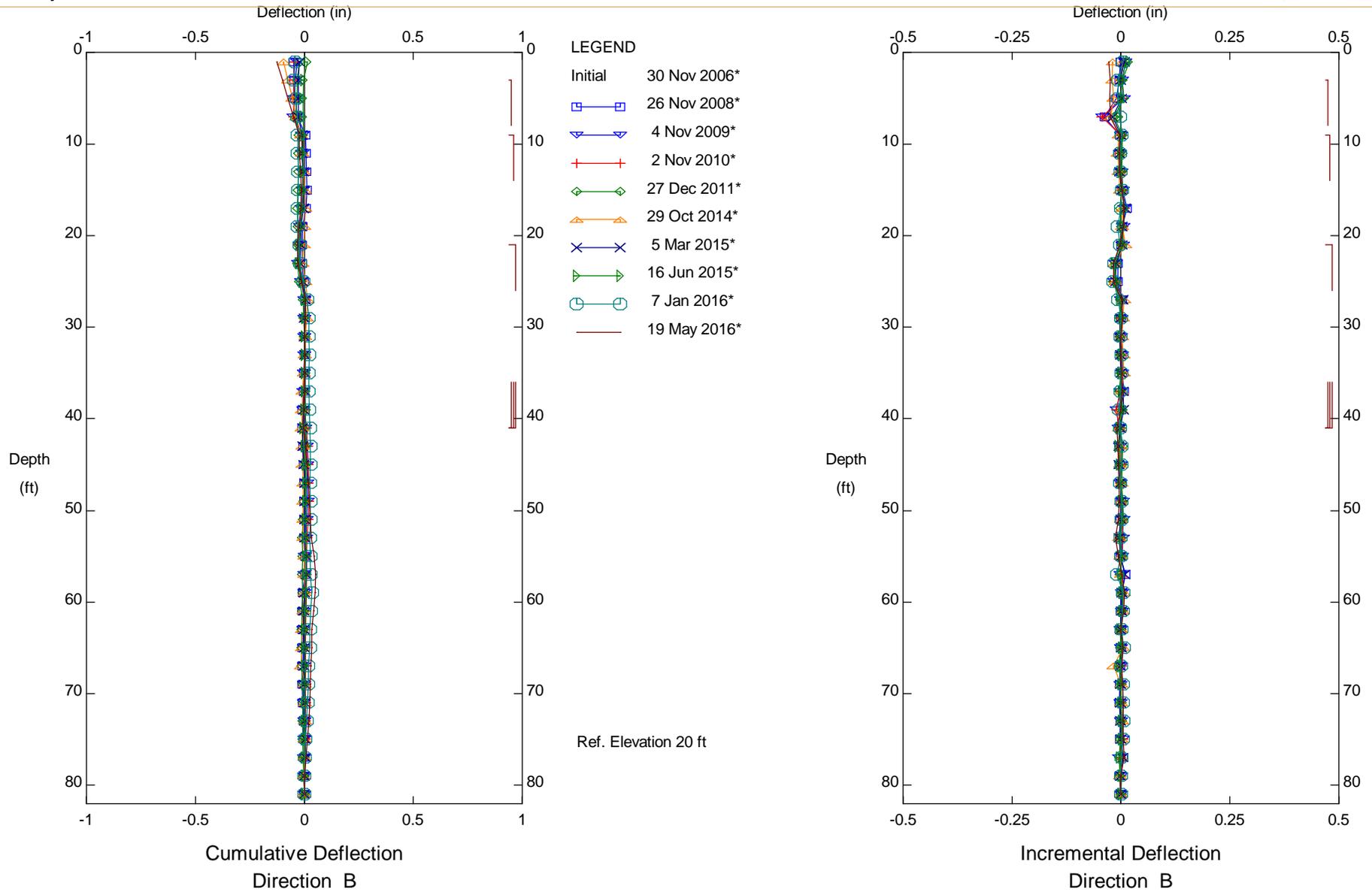
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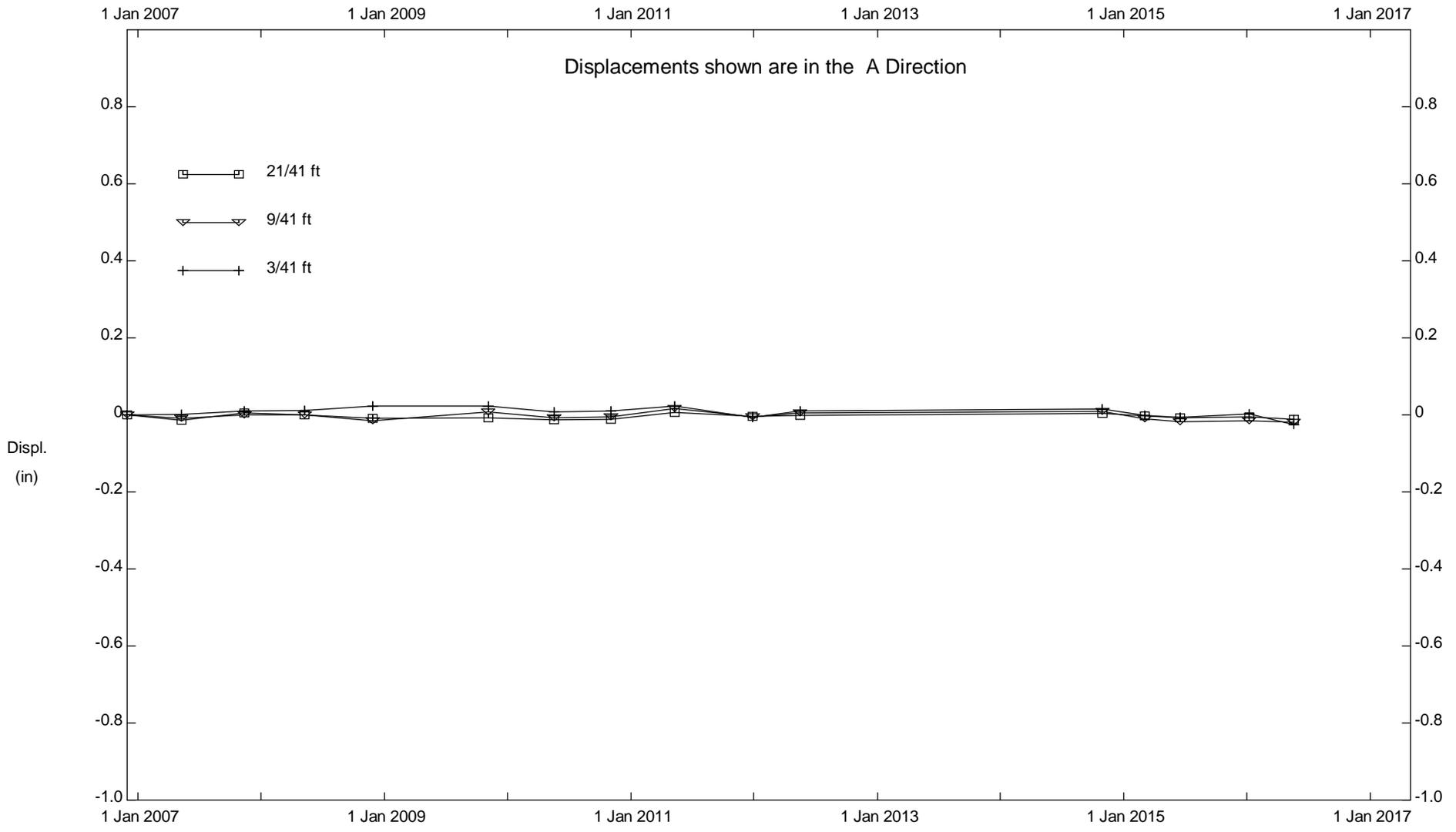
BIG ROCK MESA, Inclinometer SP-15
PCH REGION

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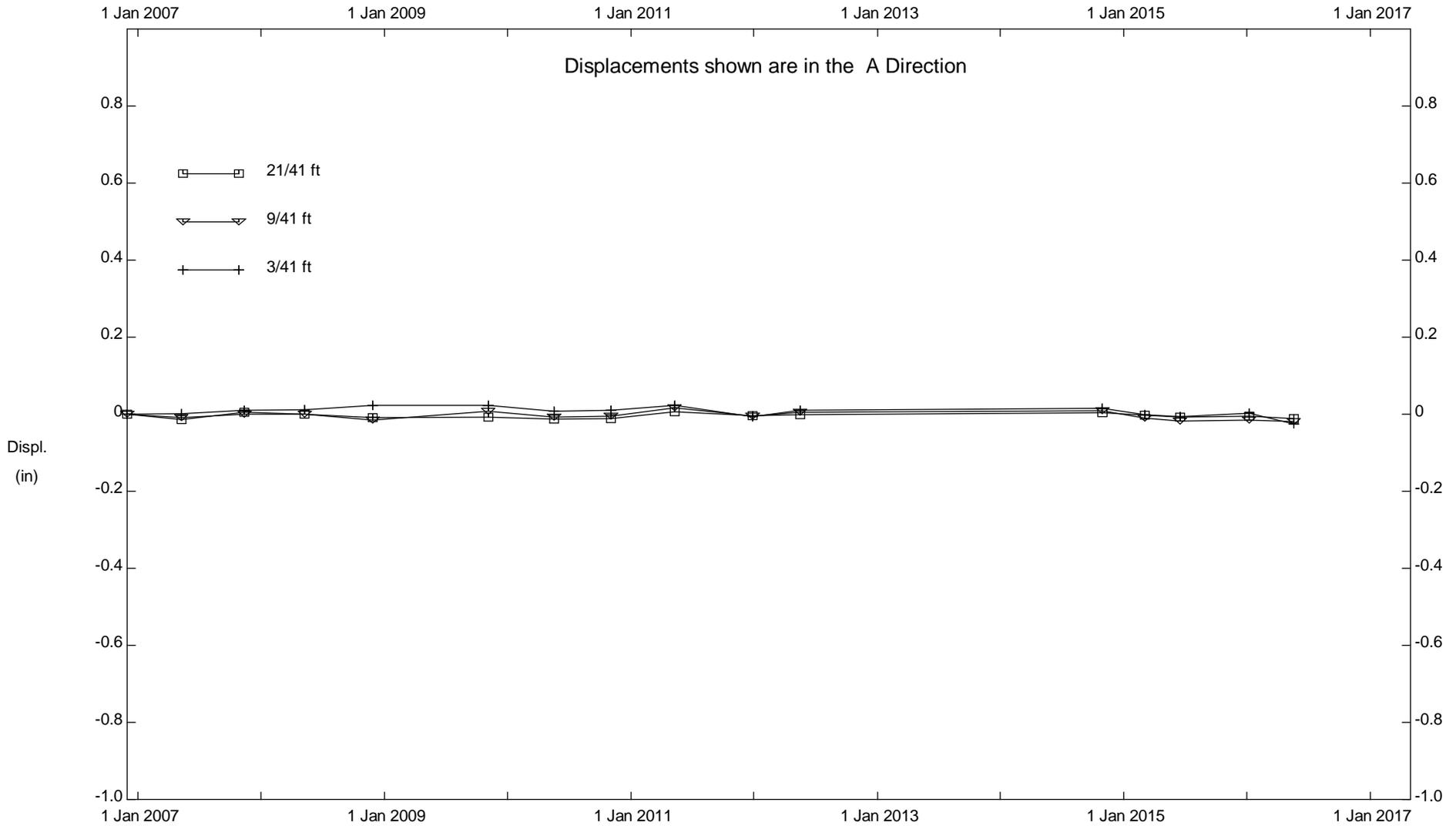
**BIG ROCK MESA, Incliner SP-15
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Sets marked * include zero shift and/or rotation corrections.



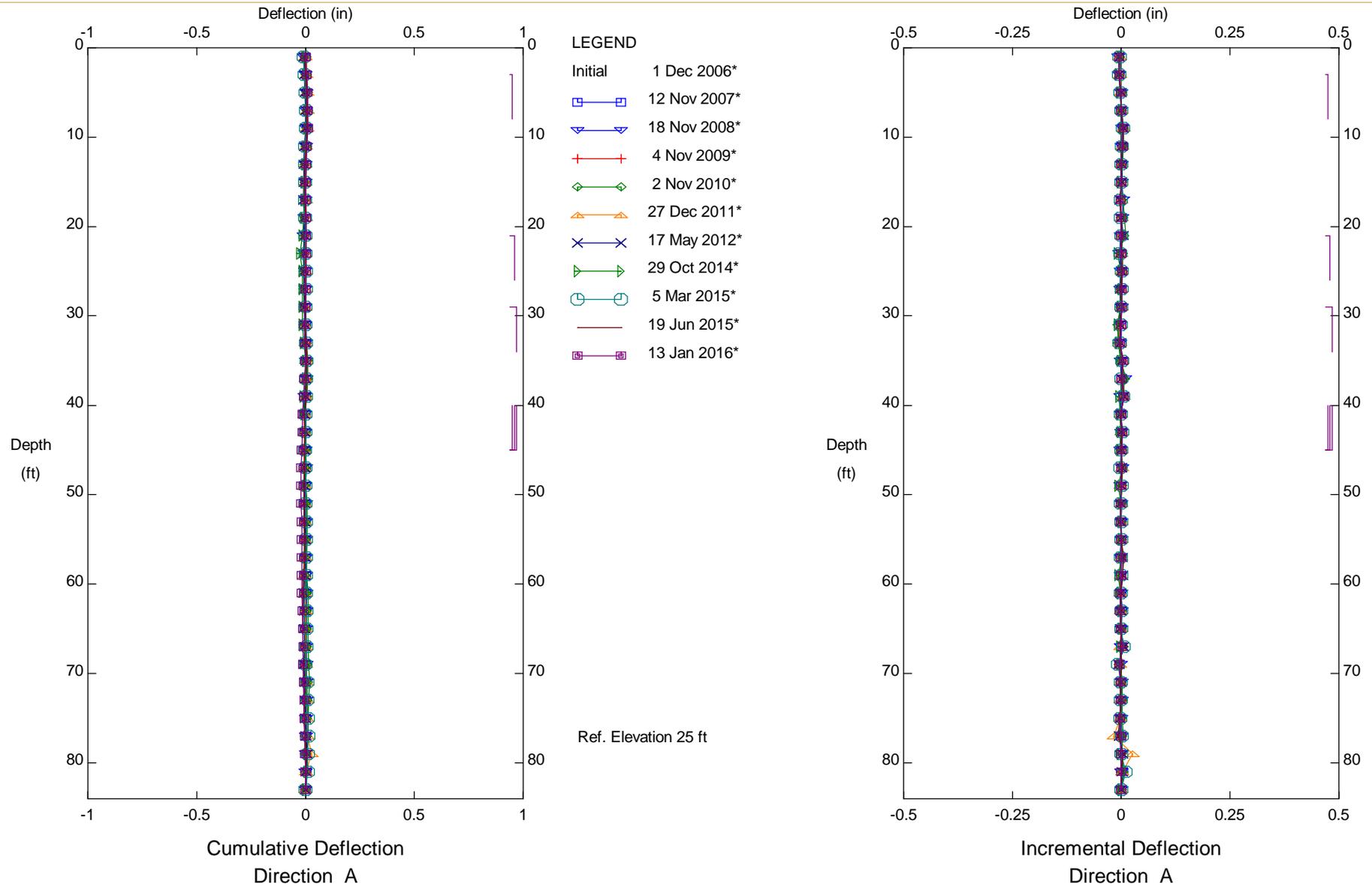
BIG ROCK MESA, Inclinator SP-15

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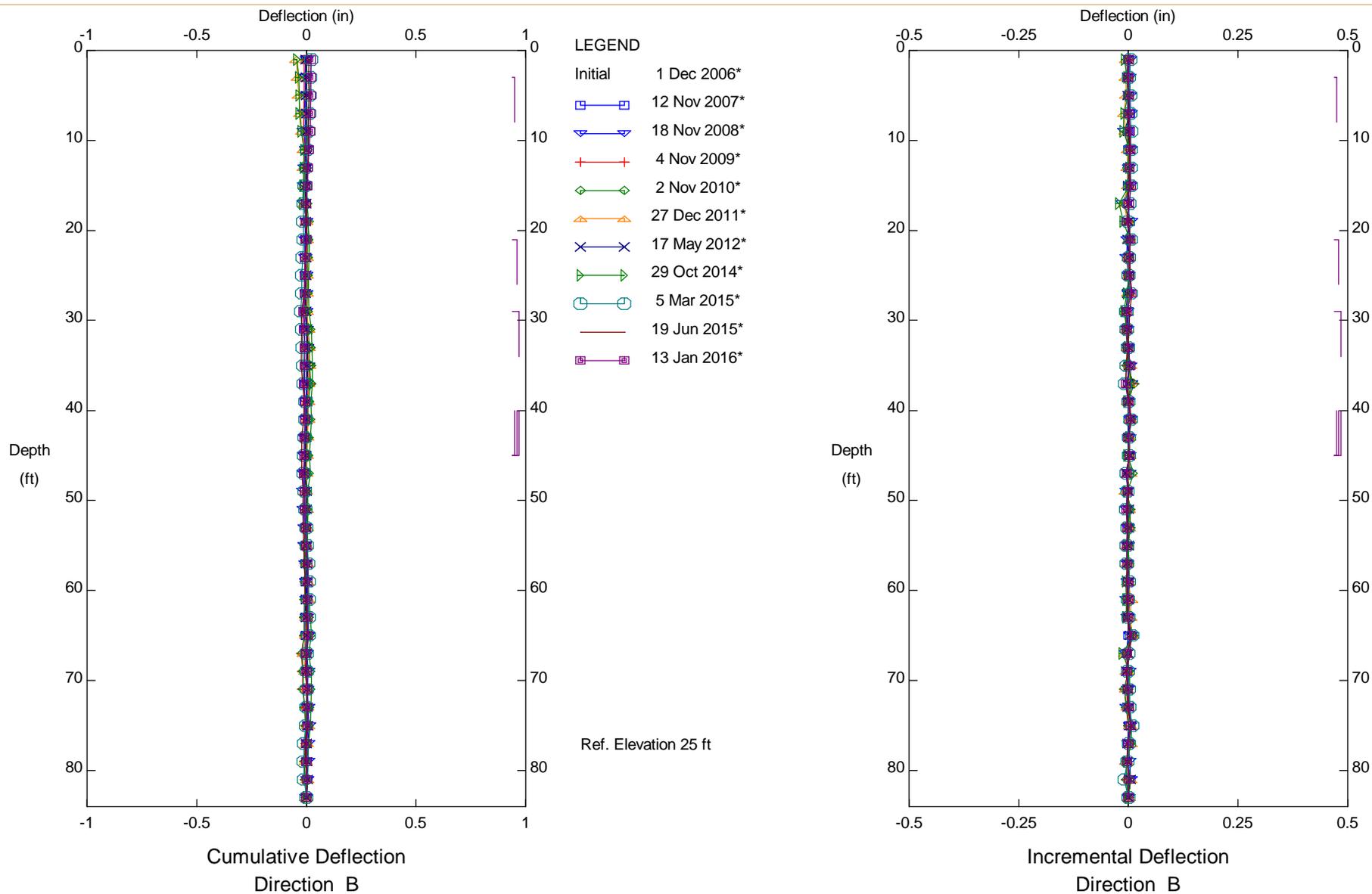
BIG ROCK MESA, Inclinometer SP-15

PCH REGION



BIG ROCK MESA, Inclinometer SP-19
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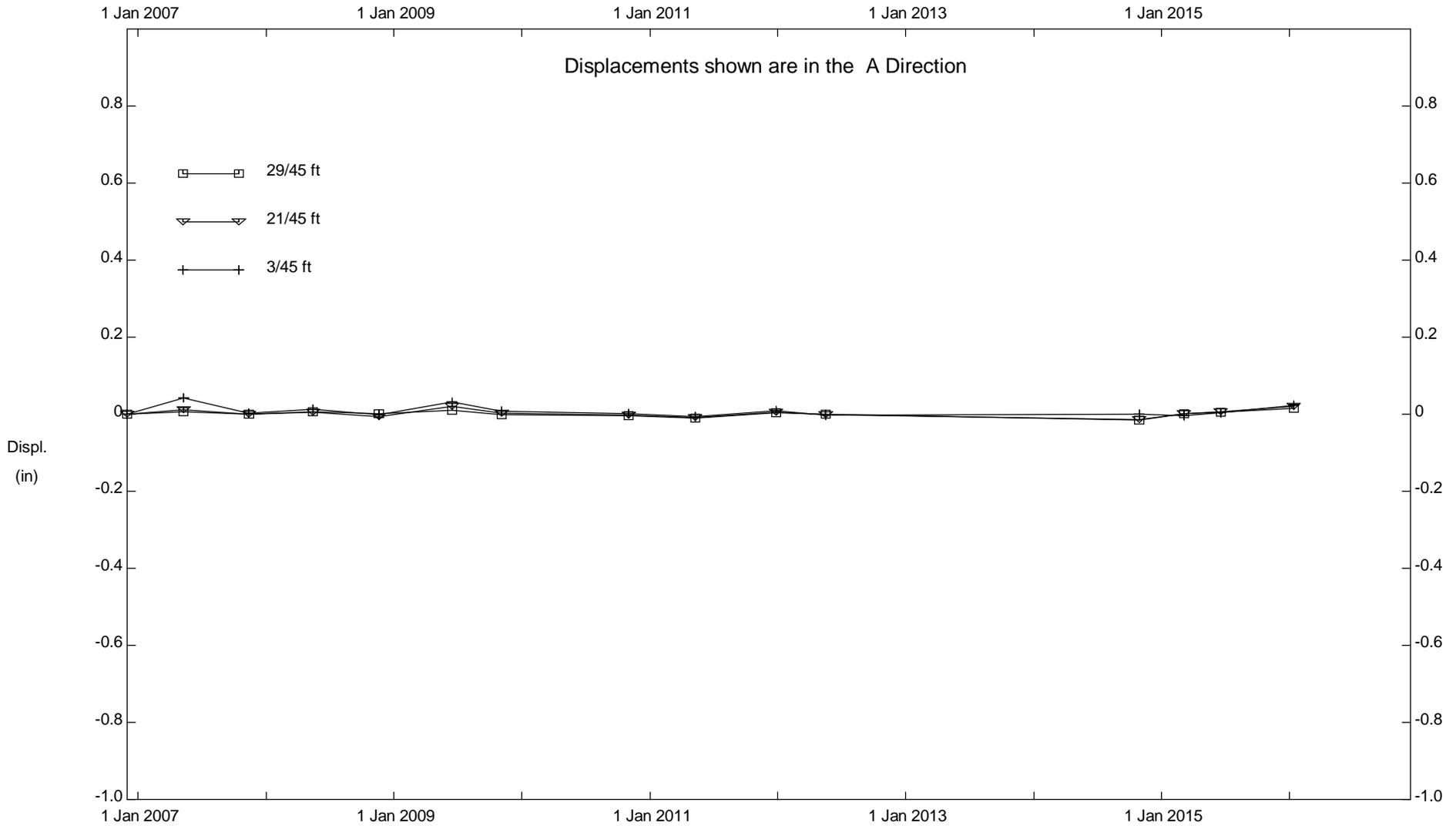
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BIG ROCK MESA, Inclinometer SP-19
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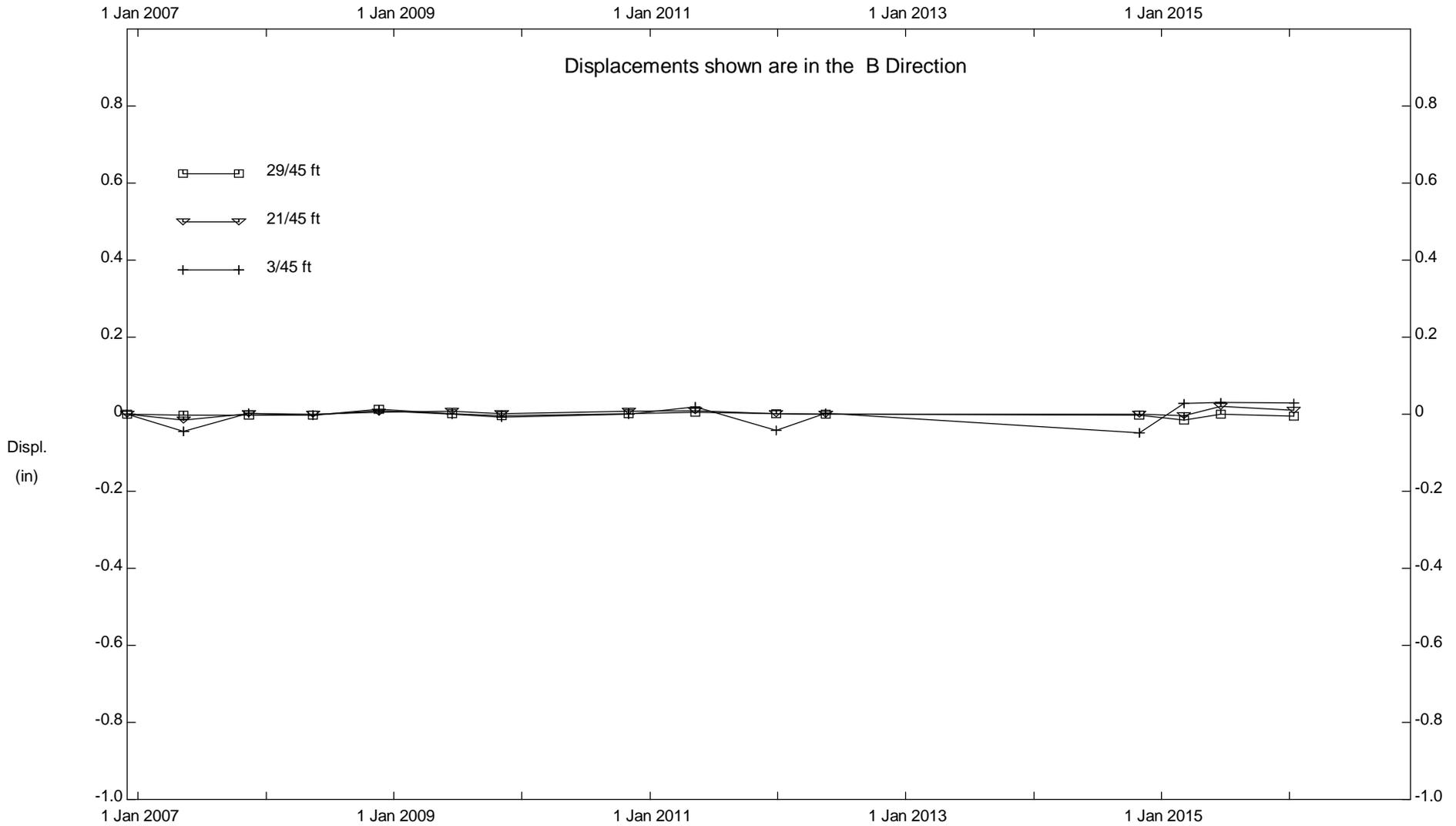
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PLATE D-6b



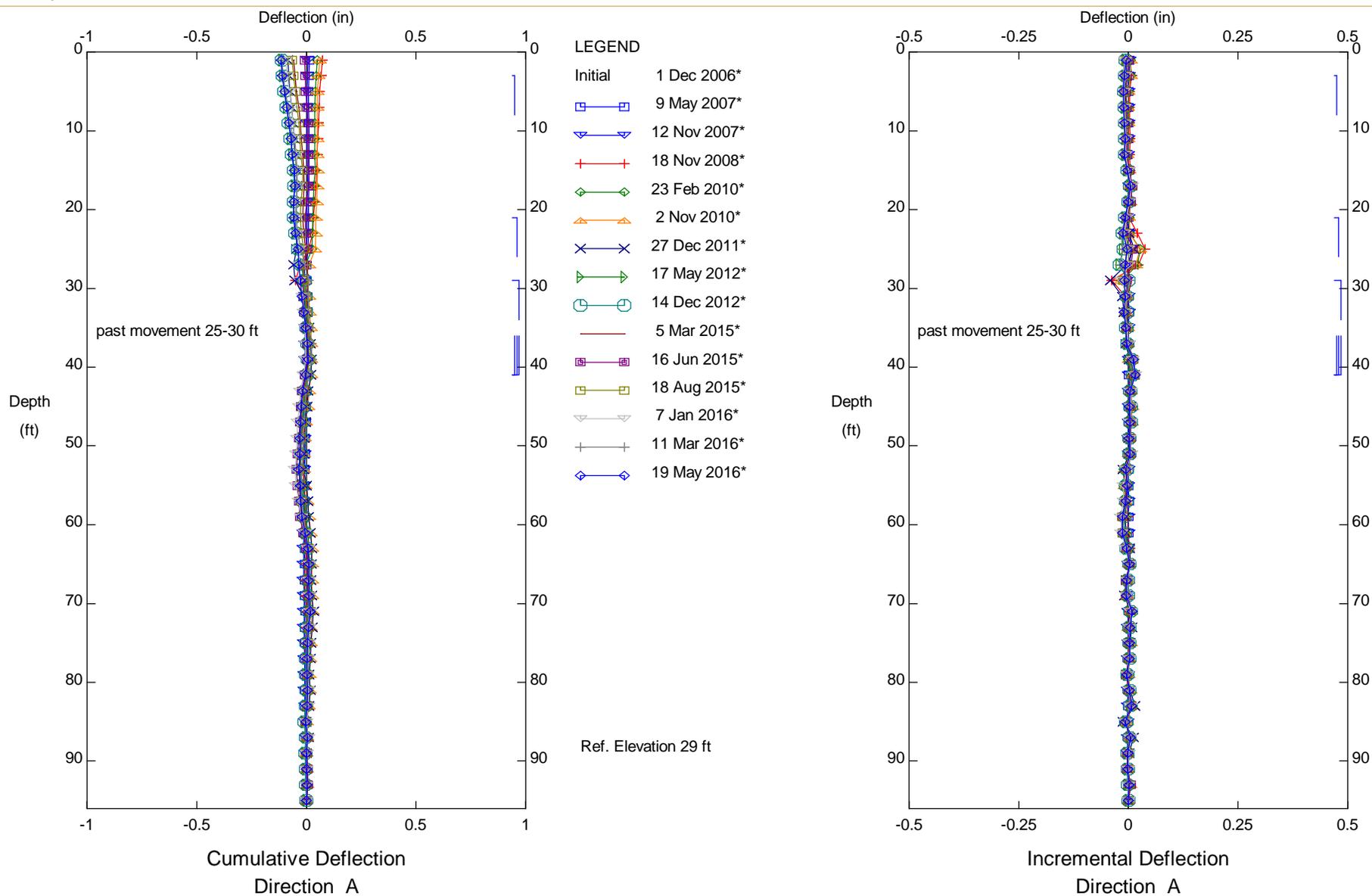
BIG ROCK MESA, Inclinometer SP-19

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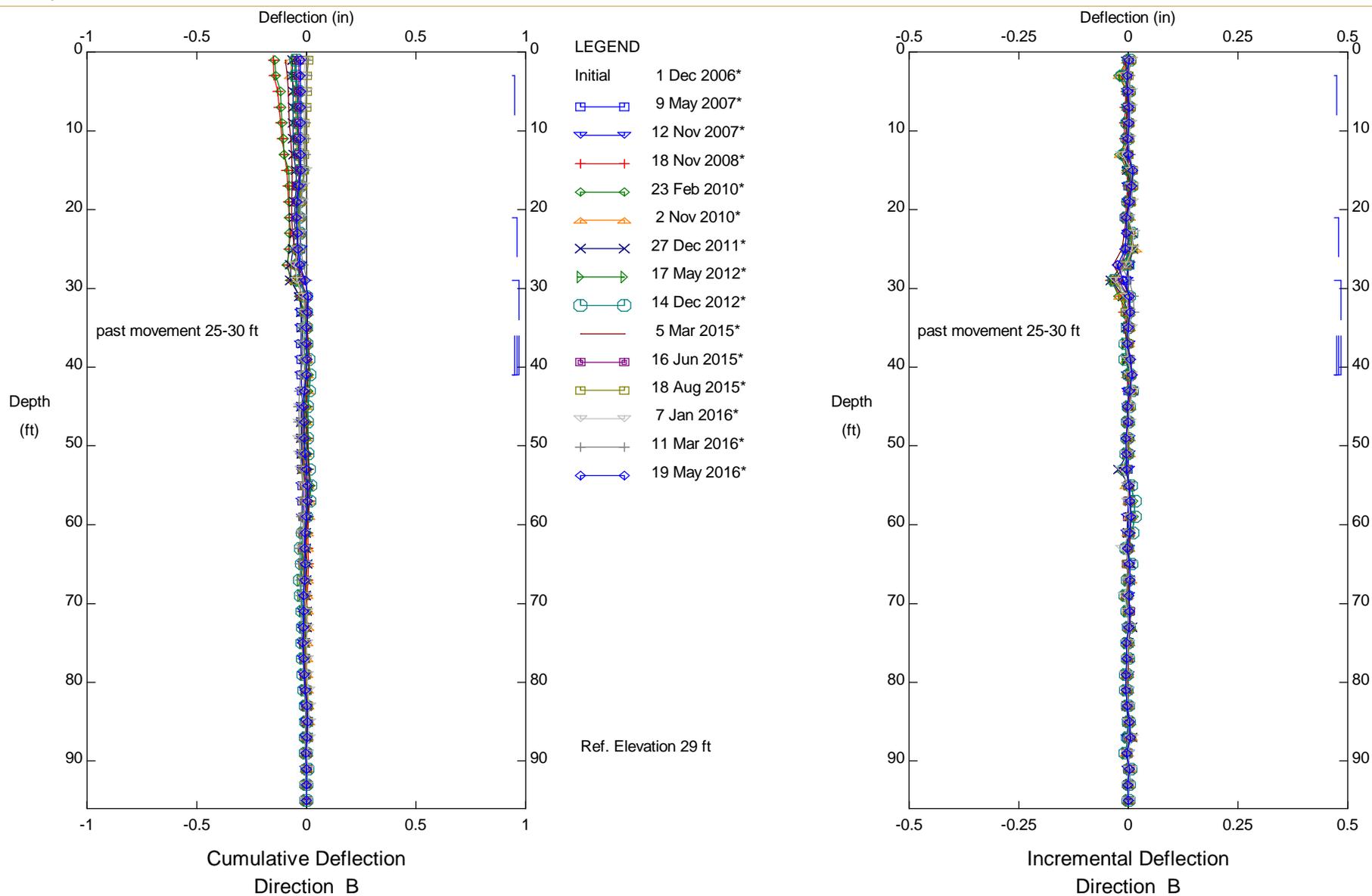
BIG ROCK MESA, Inclinator SP-19

PCH REGION



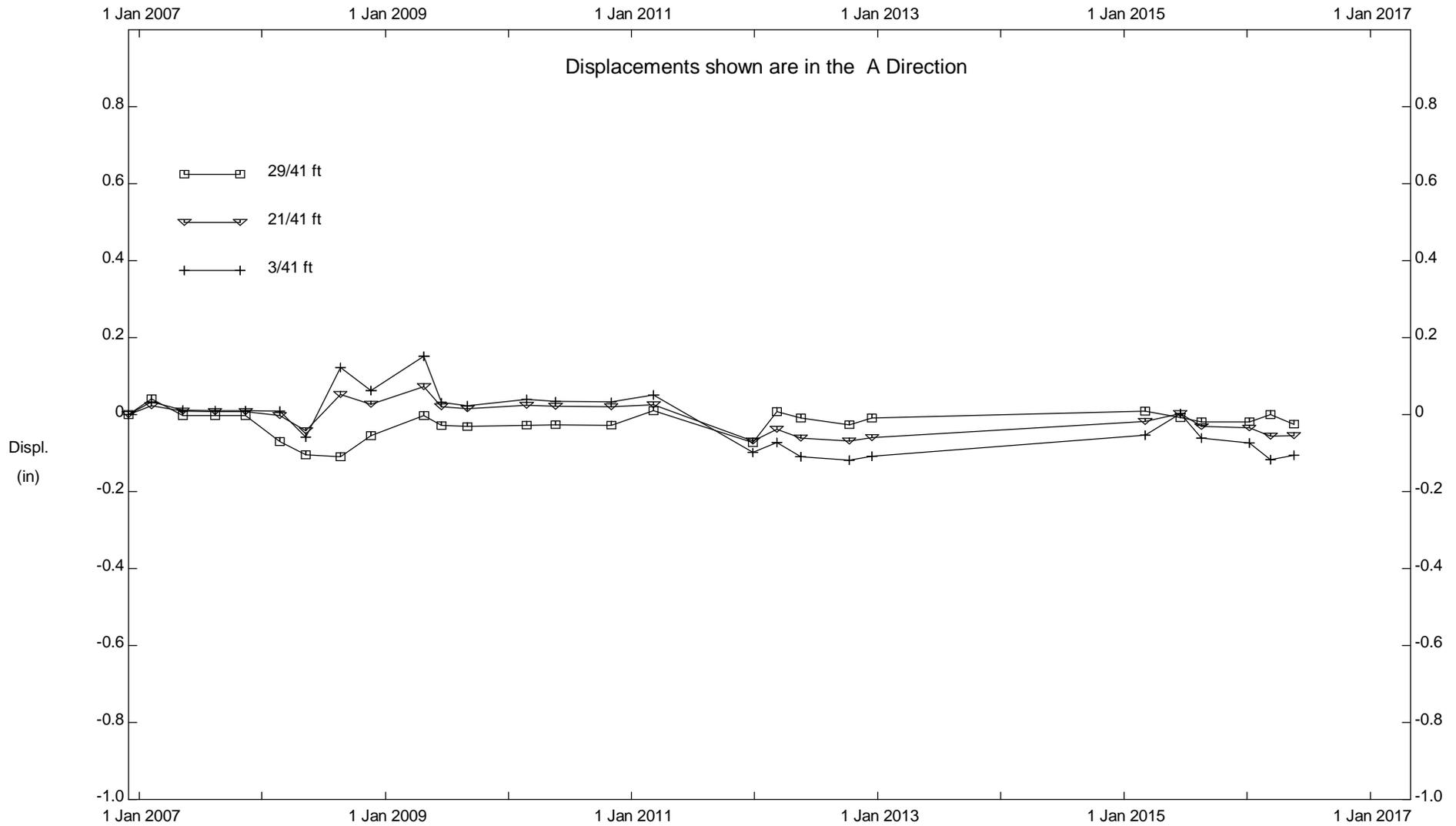
BIG ROCK MESA, Inclinometer SP-27A
PCH REGION

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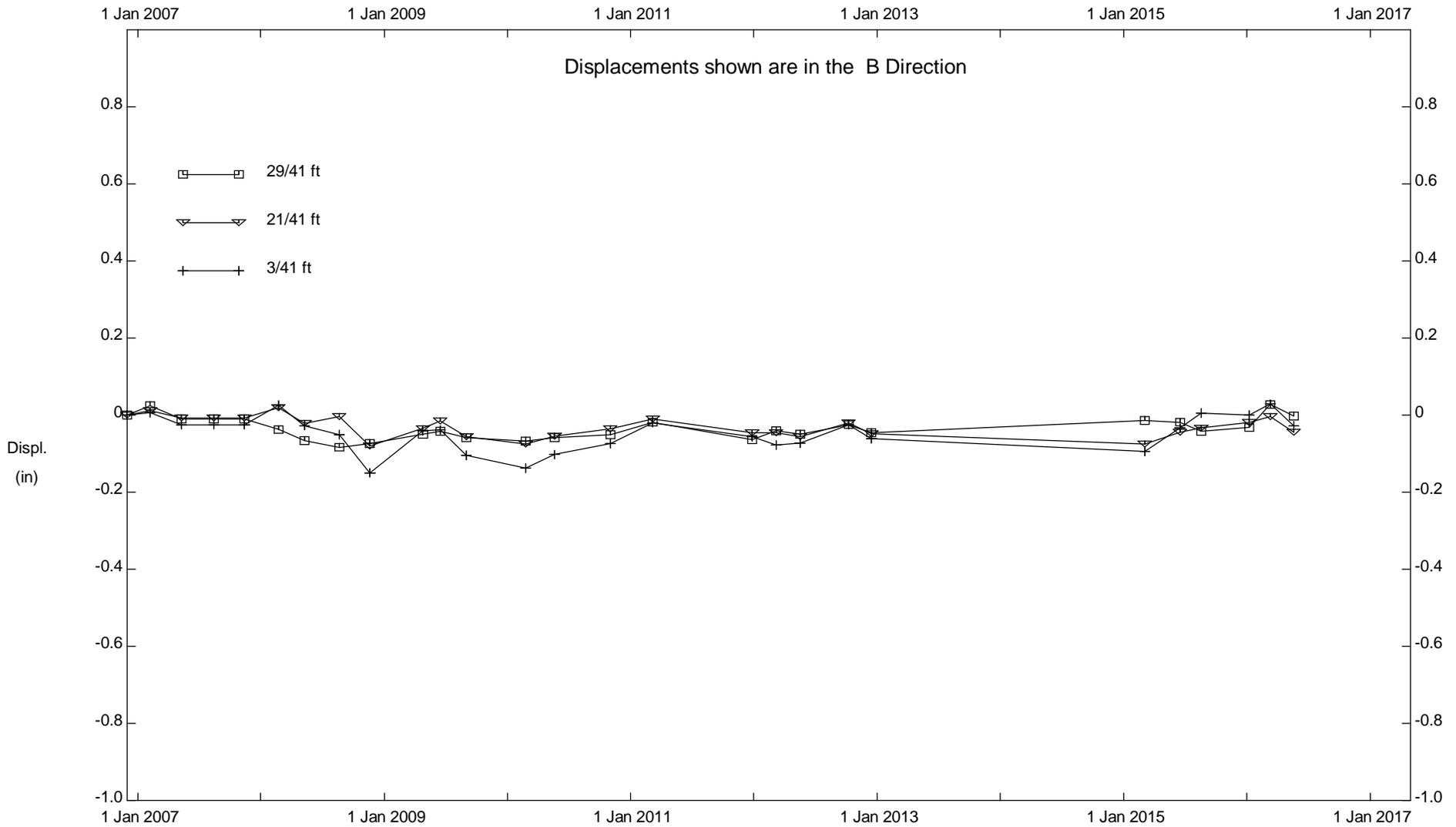
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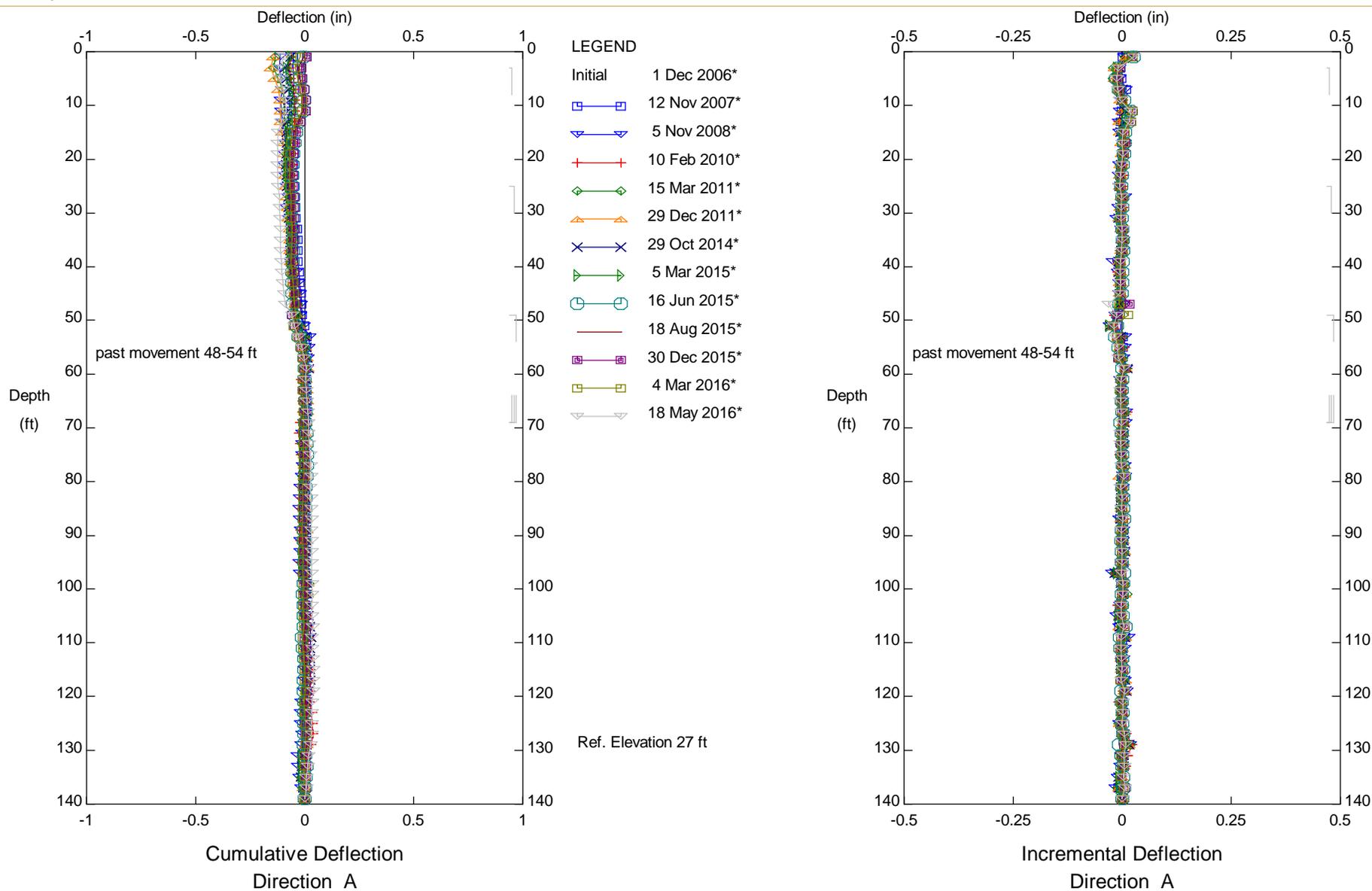
BIG ROCK MESA, Inclinometer SP-27A

PCH REGION



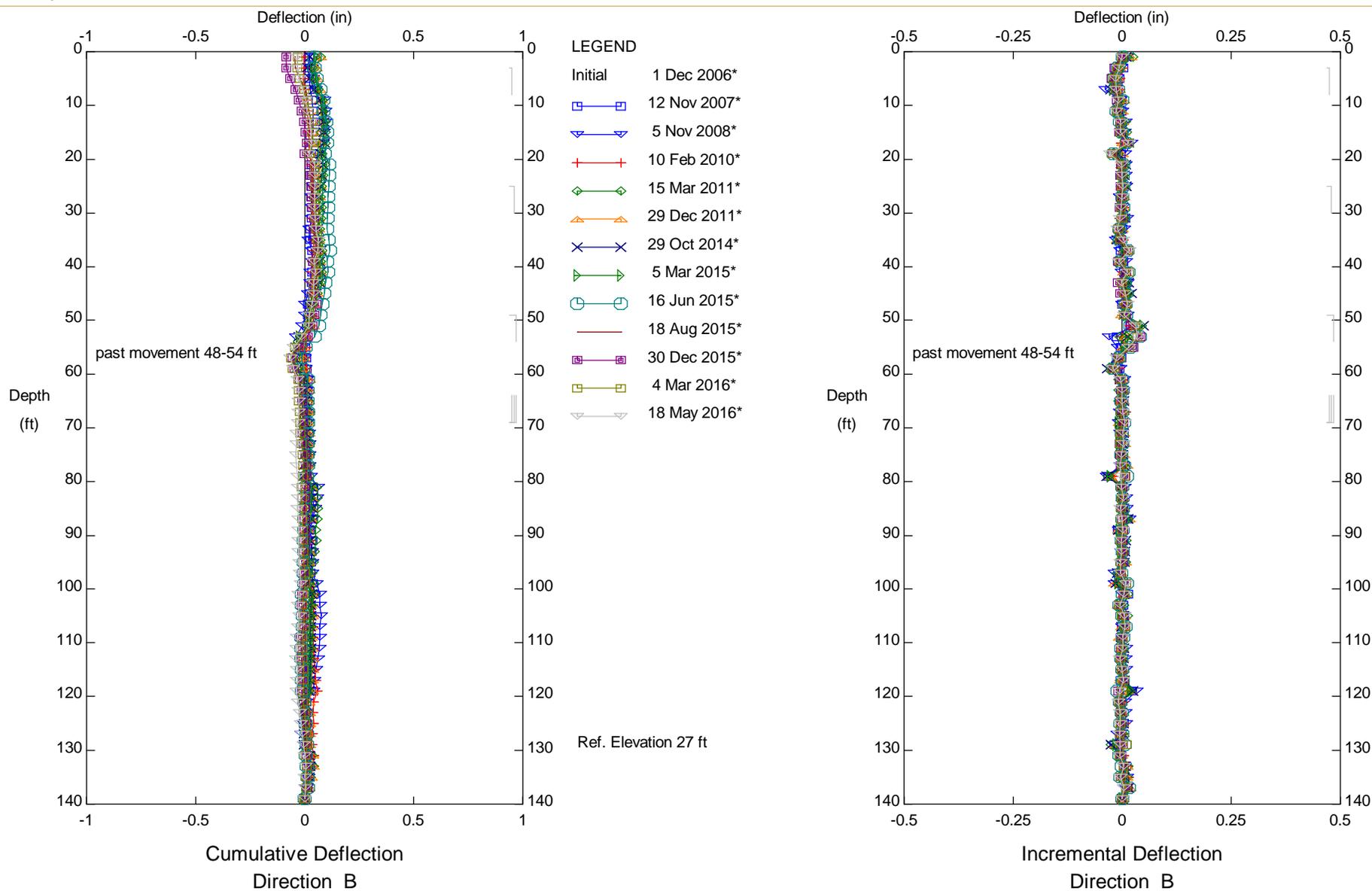
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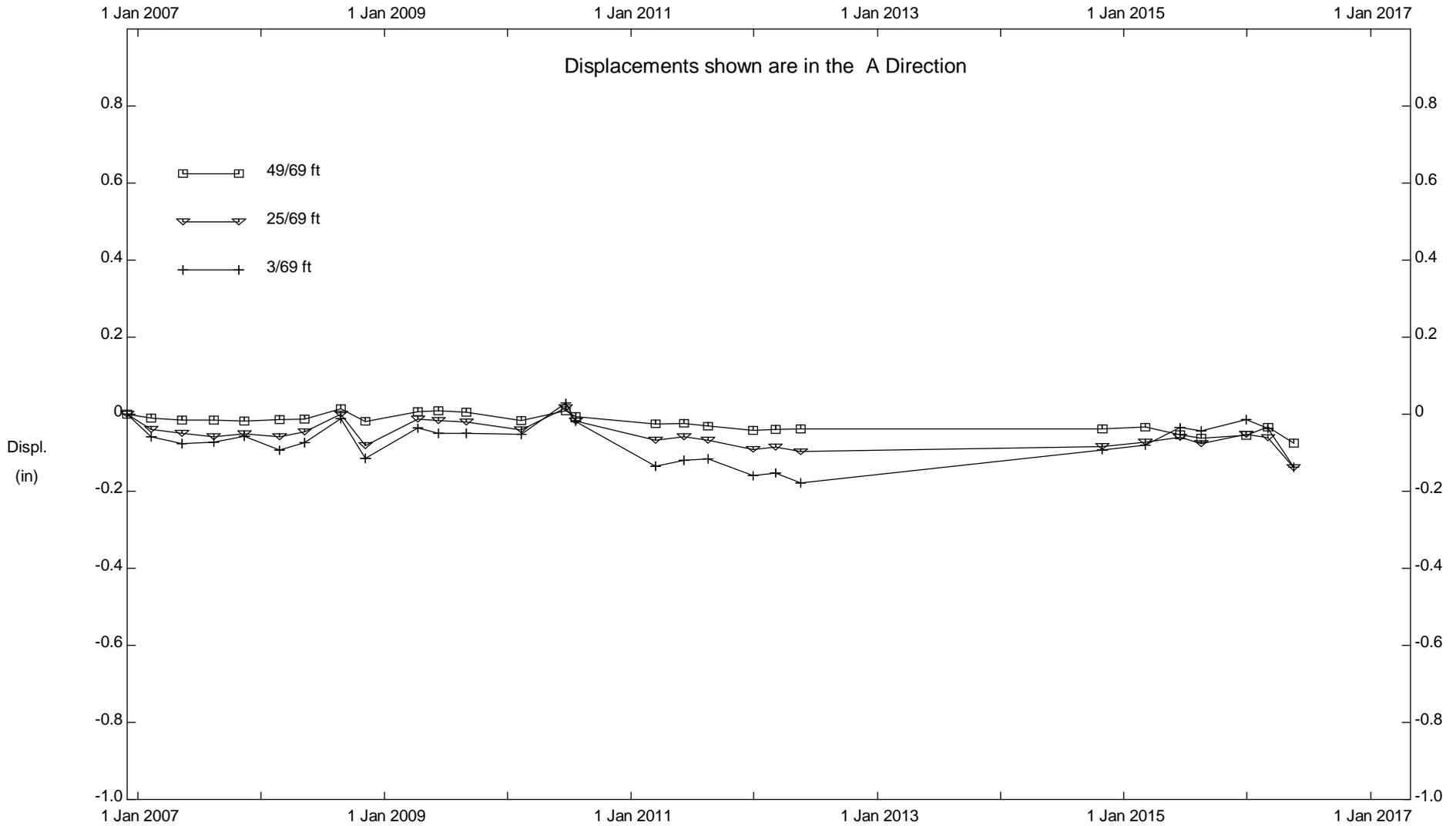
BIG ROCK MESA, Incliner SP-29
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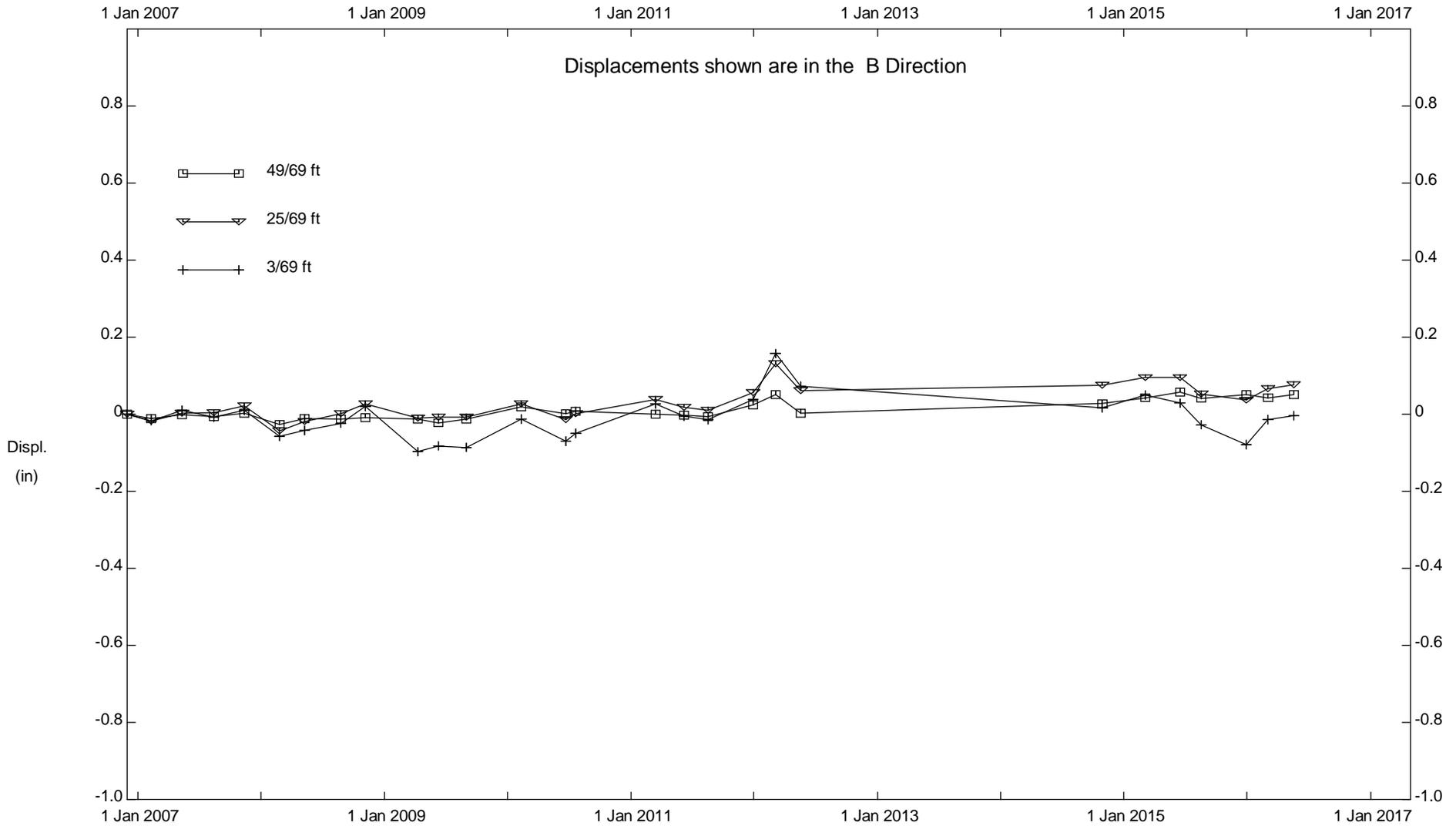
BIG ROCK MESA, Incliner SP-29
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Sets marked * include zero shift and/or rotation corrections.



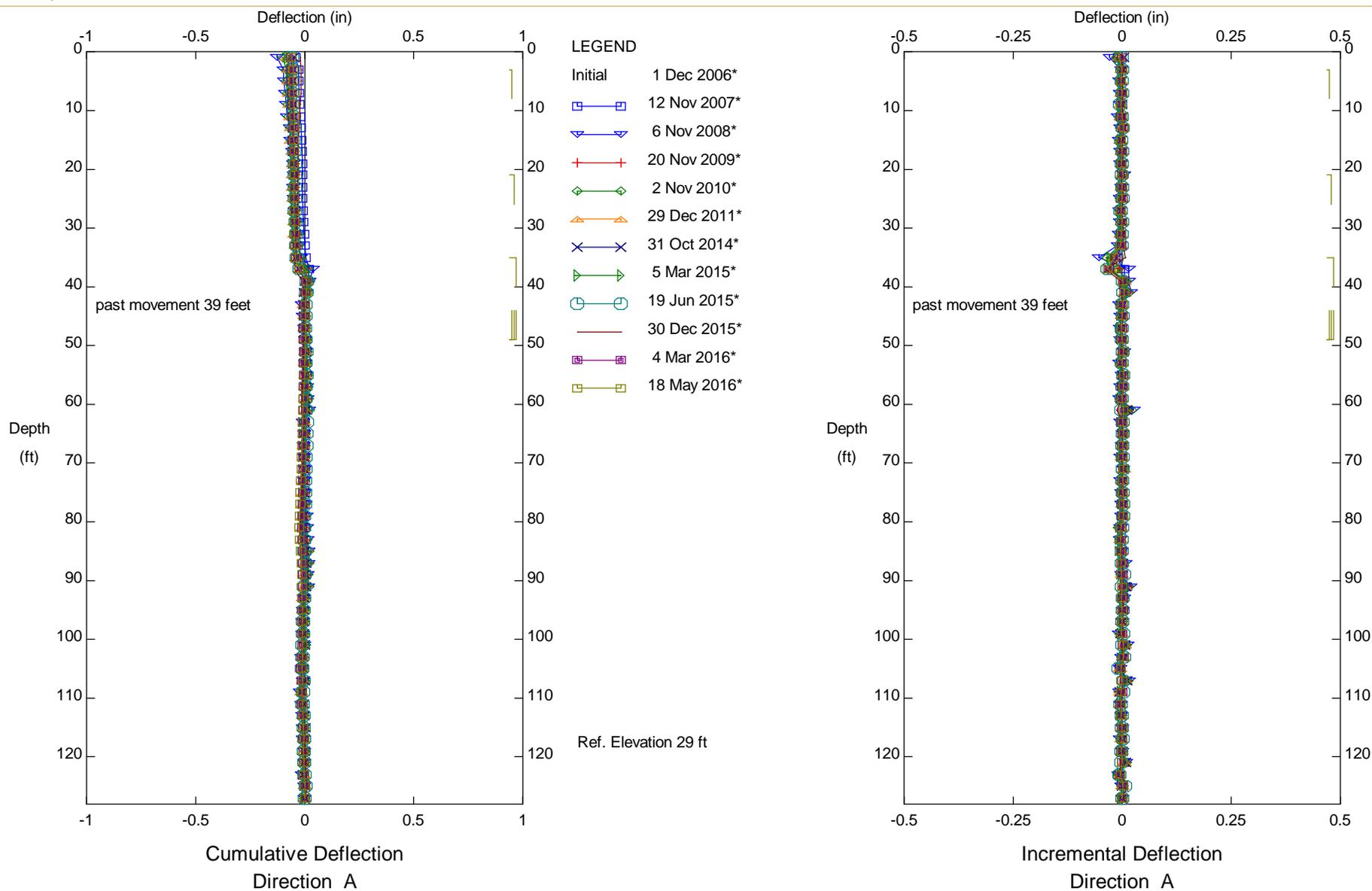
BIG ROCK MESA, Inclinometer SP-29

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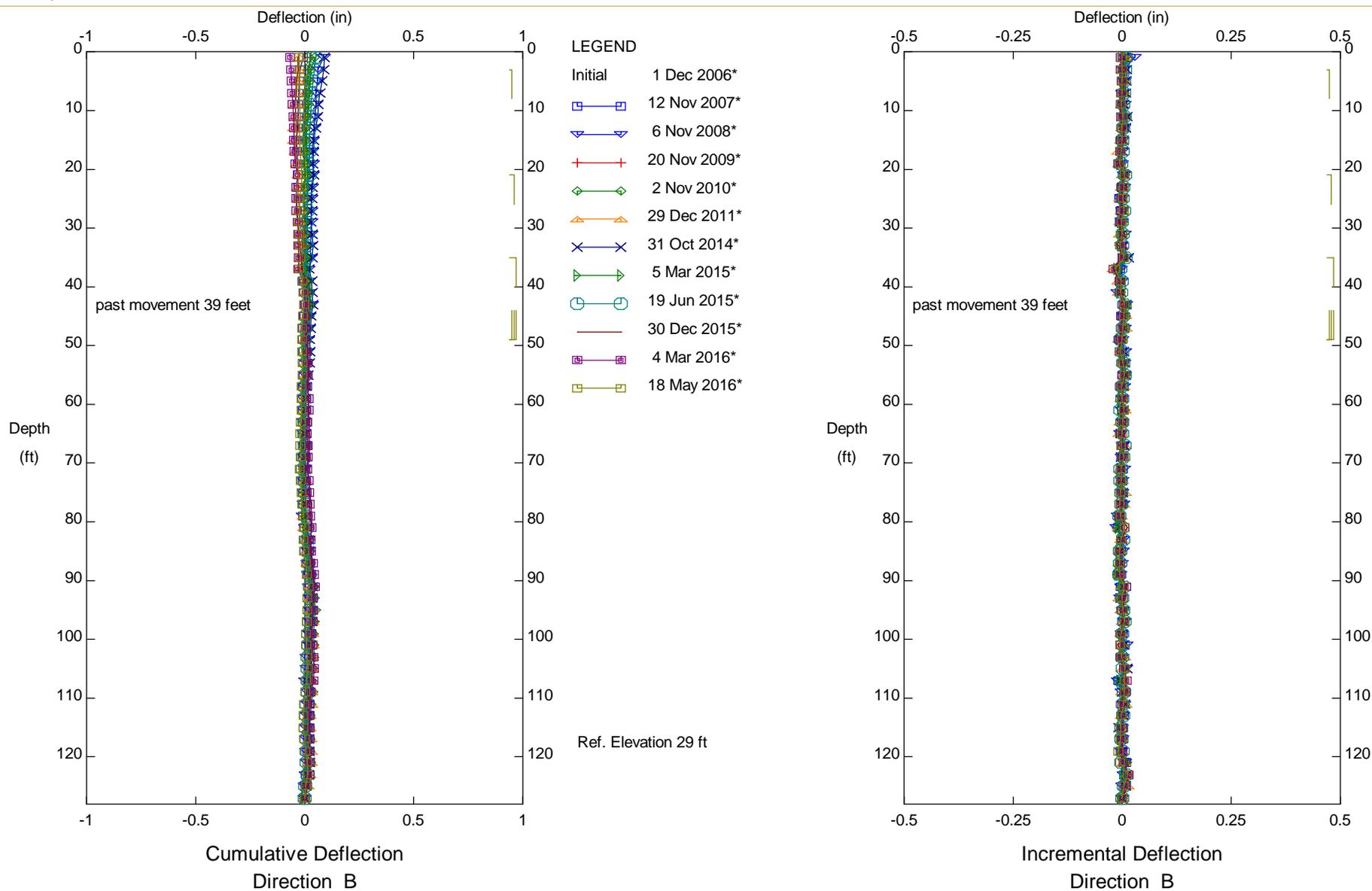
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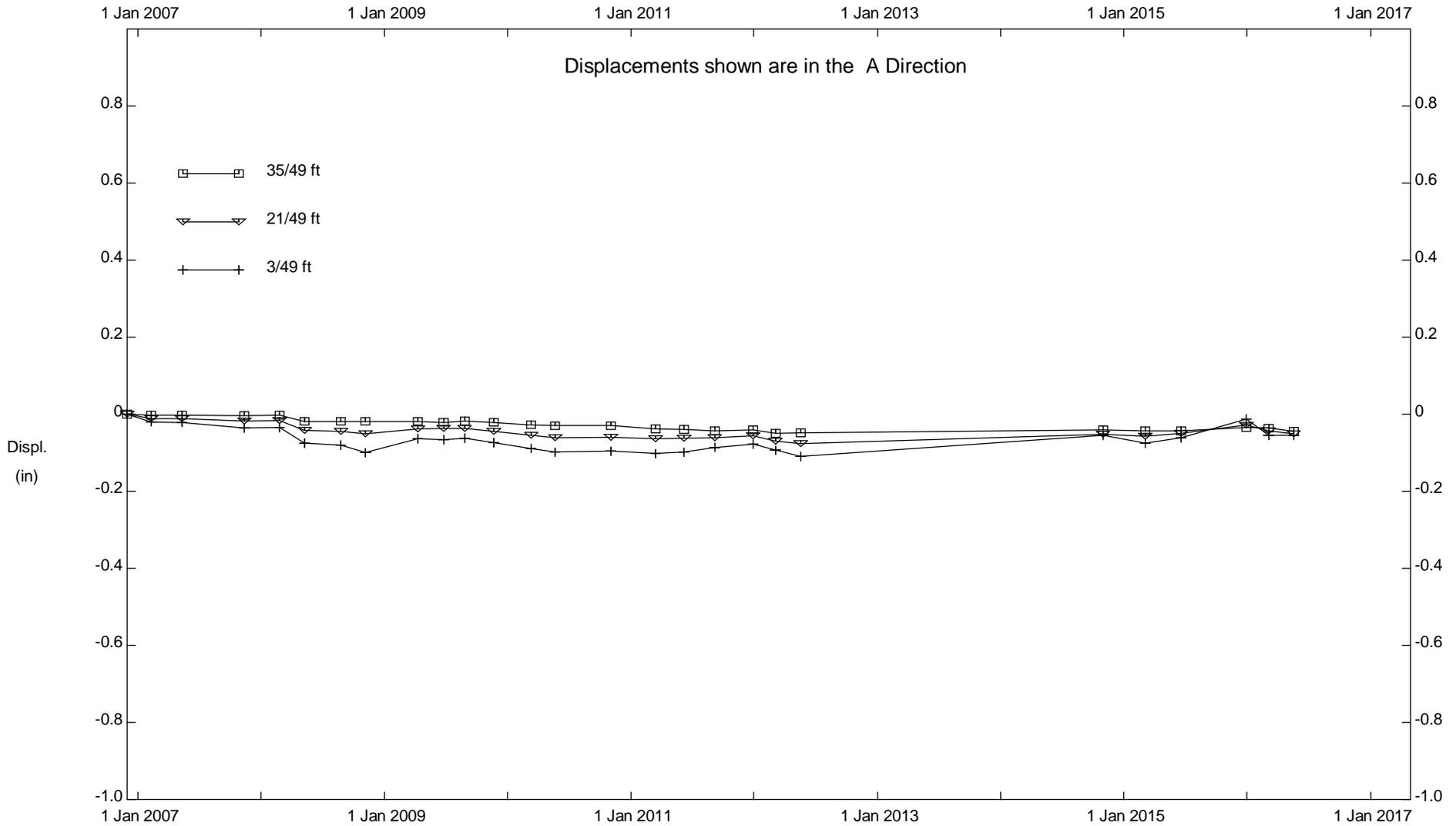
BIG ROCK MESA, Inclinometer SP-30
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Sets marked * include zero shift and/or rotation corrections.



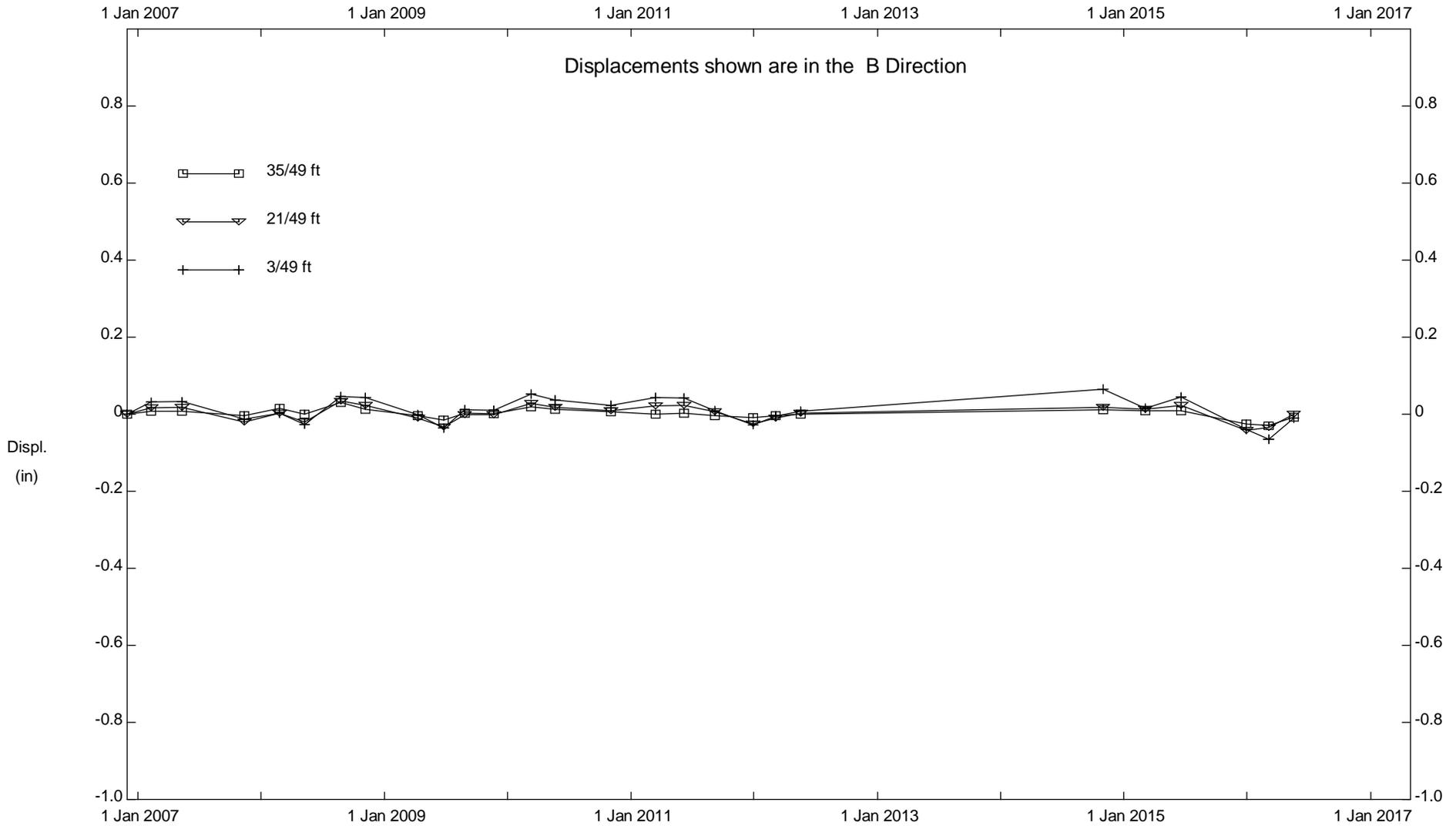
BIG ROCK MESA, Inclinometer SP-30
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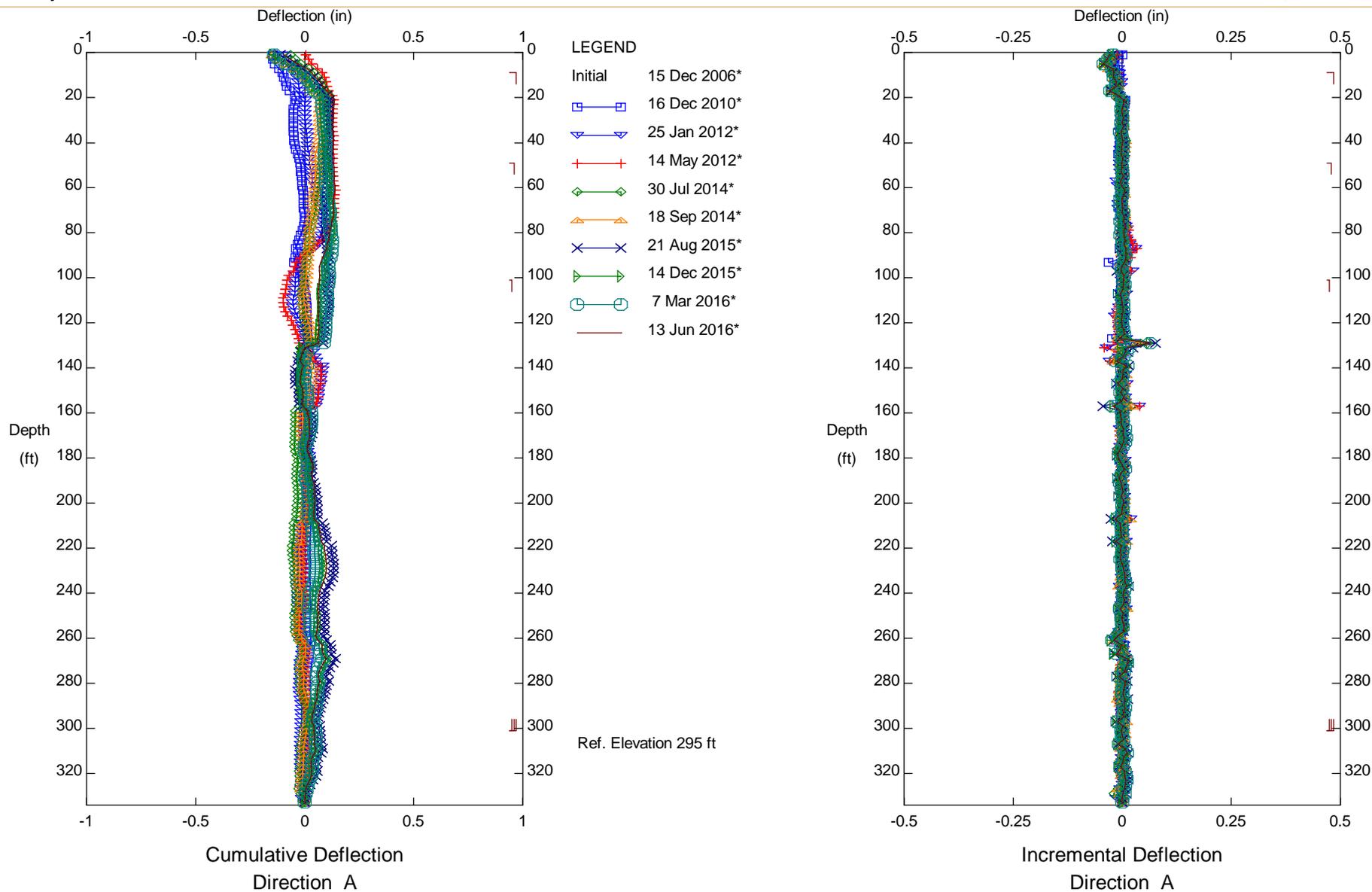
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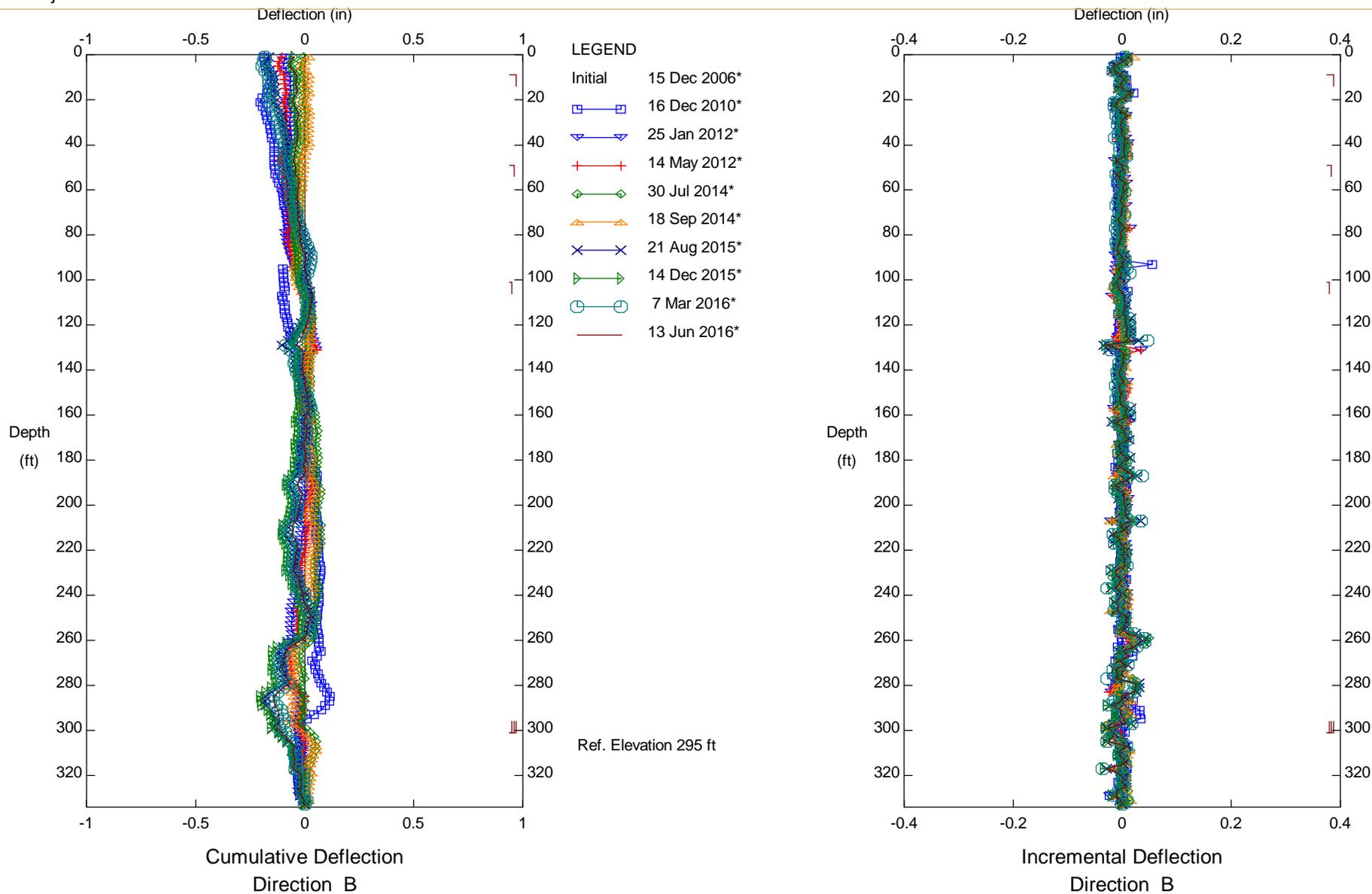
BIG ROCK MESA, Inclinator SP-30

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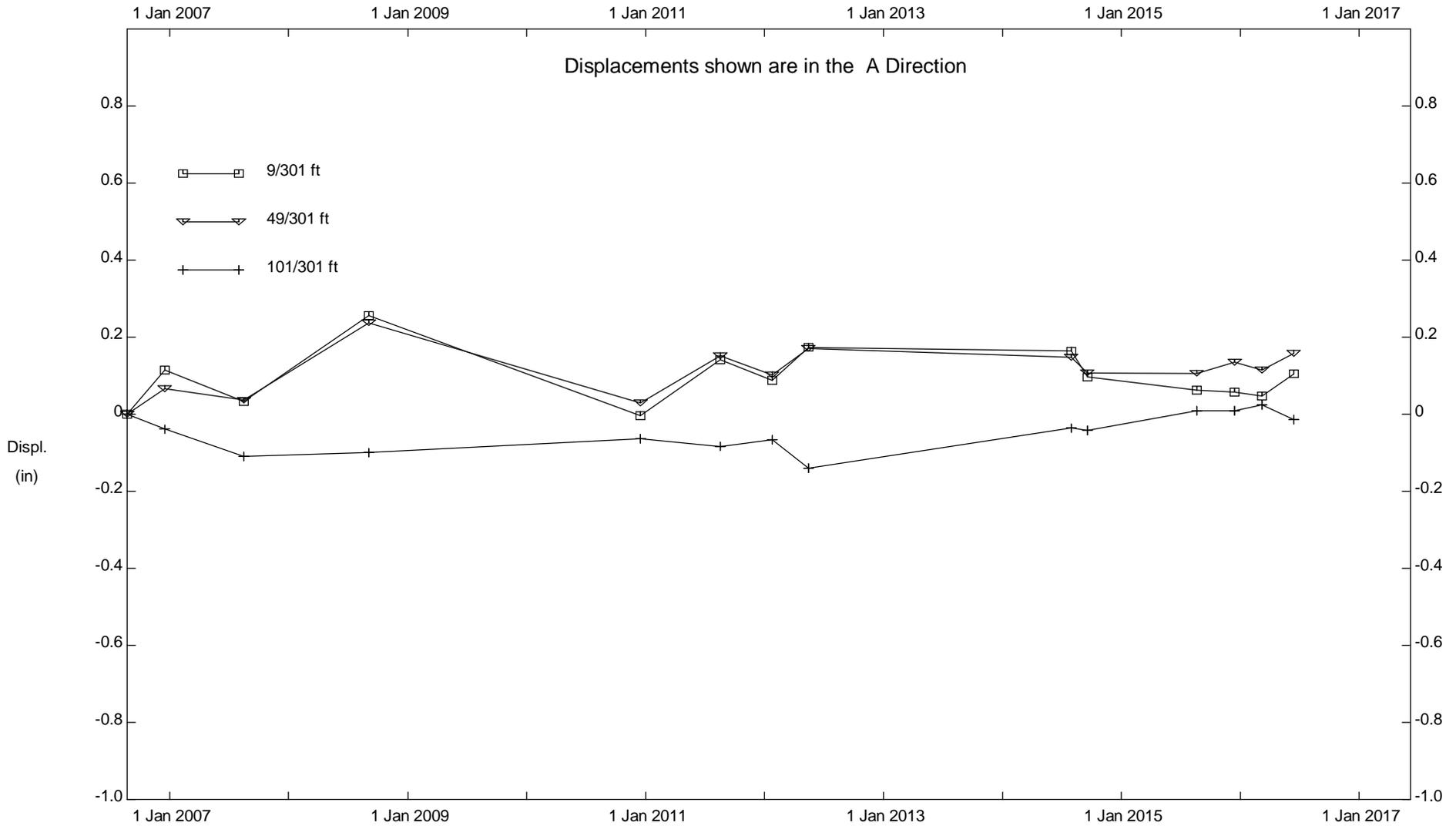
BIG ROCK MESA, Inclinometer SP-10
BLUFF REGION

Sets marked * include zero shift and/or rotation corrections.



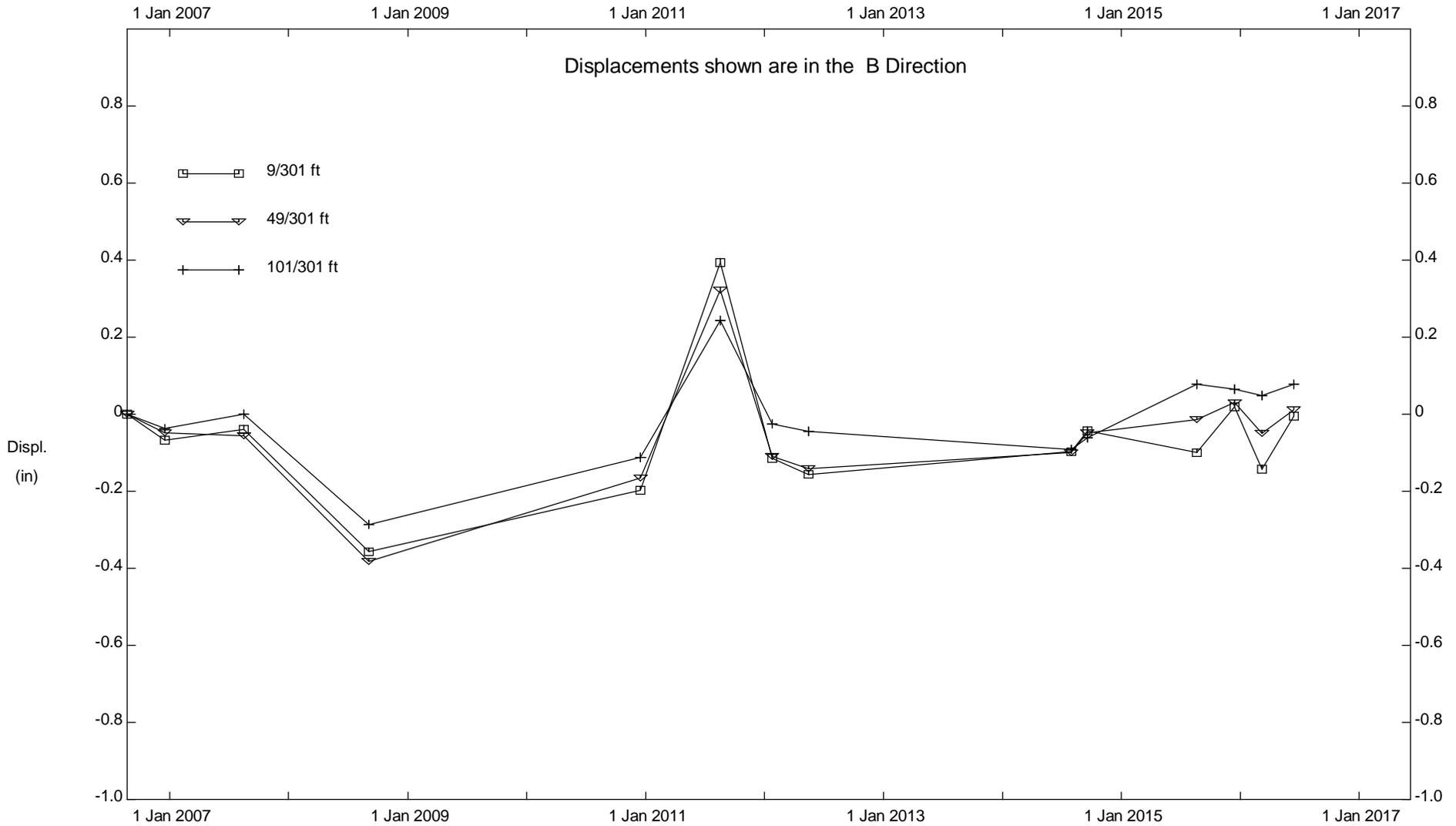
**BIG ROCK MESA, Inclinometer SP-10
BLUFF REGION**

Sets marked * include zero shift and/or rotation corrections.



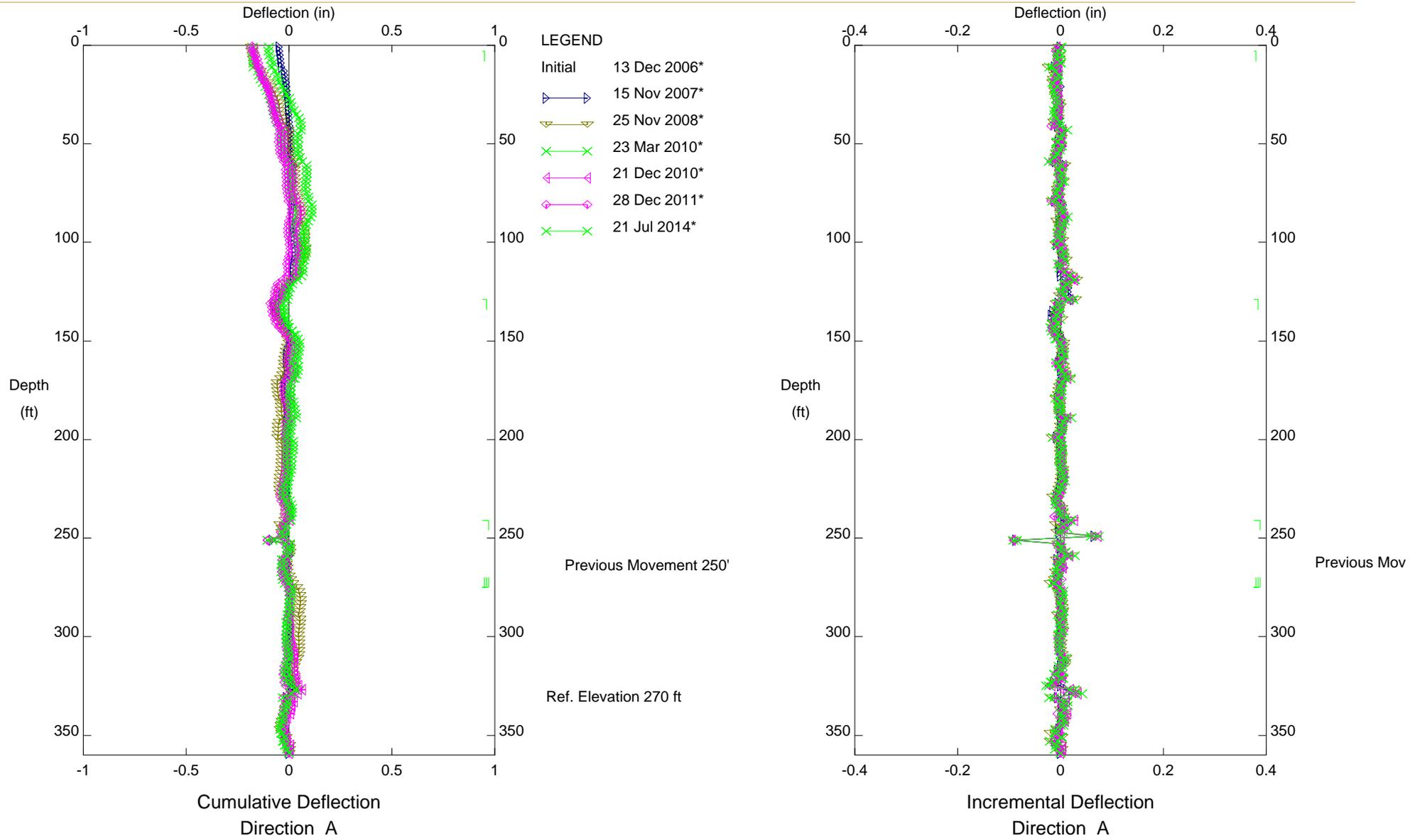
BIG ROCK MESA, Inclinometer SP-10

BLUFF REGION



BIG ROCK MESA, Inclinometer SP-10

BLUFF REGION



Cumulative Deflection
Direction A

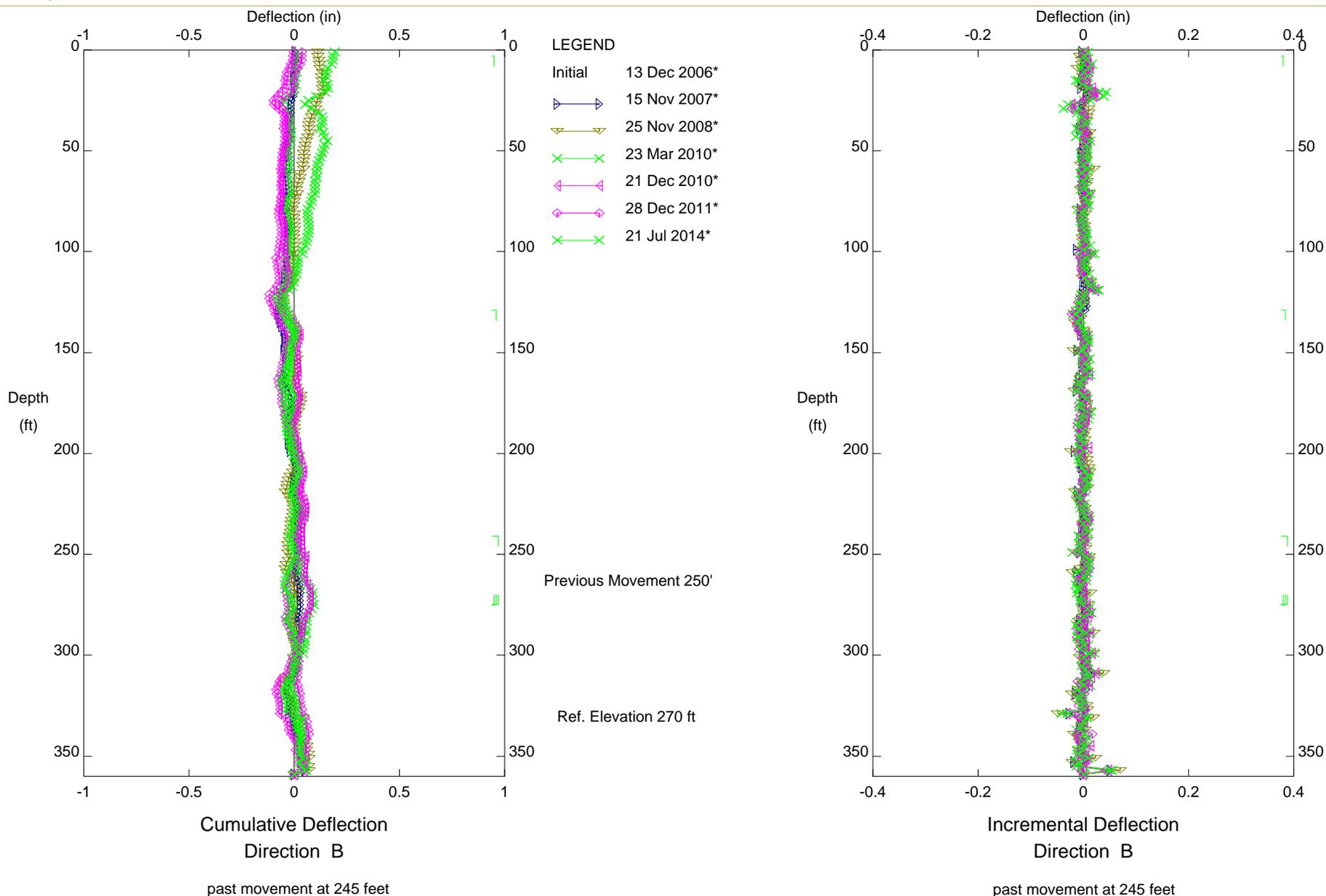
Incremental Deflection
Direction A

past movement at 245 feet

past movement at 245 feet

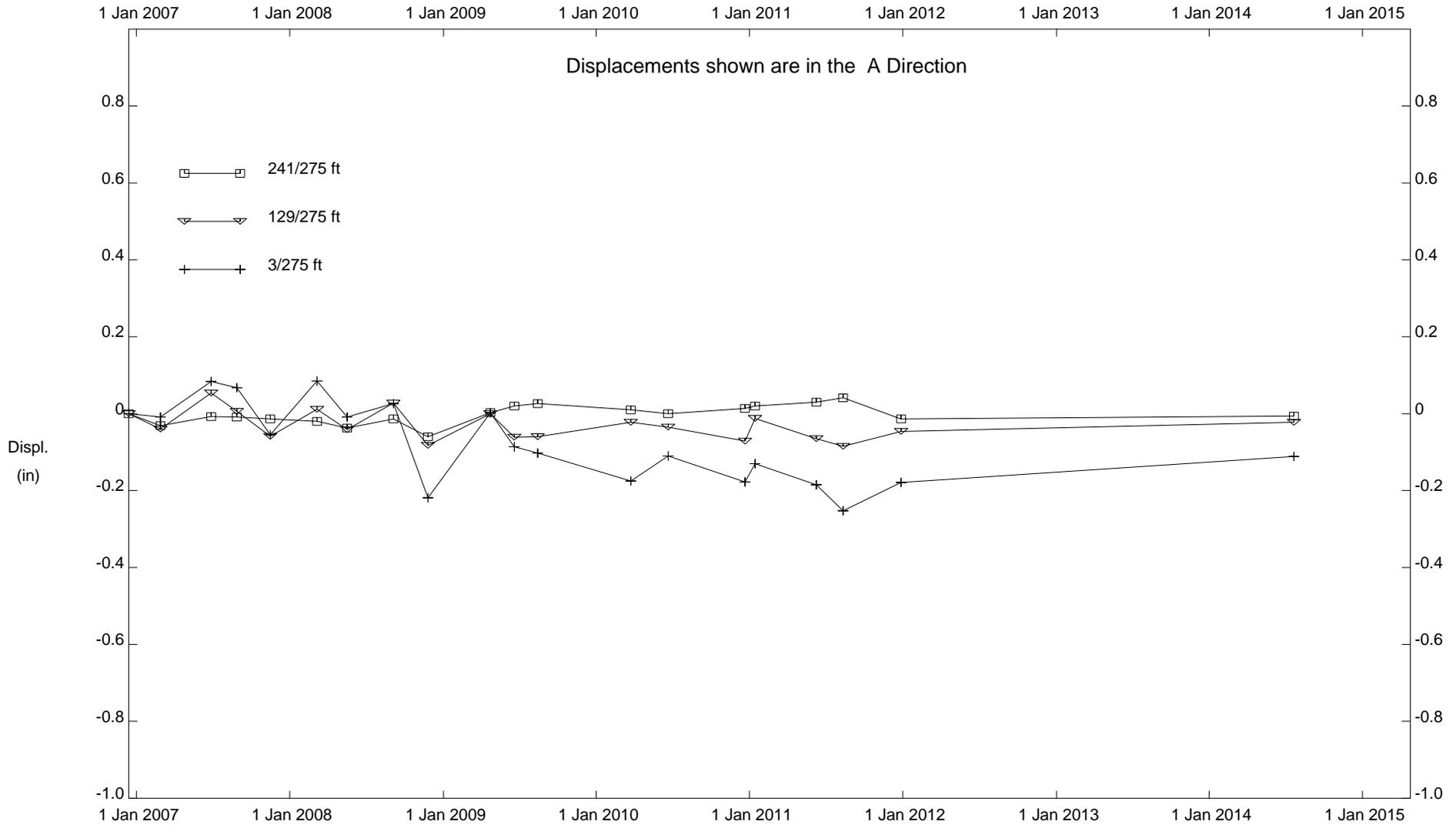
**BIG ROCK MESA, Inclinometer SP-28
BLUFF REGION**

Sets marked * include zero shift and/or rotation corrections.



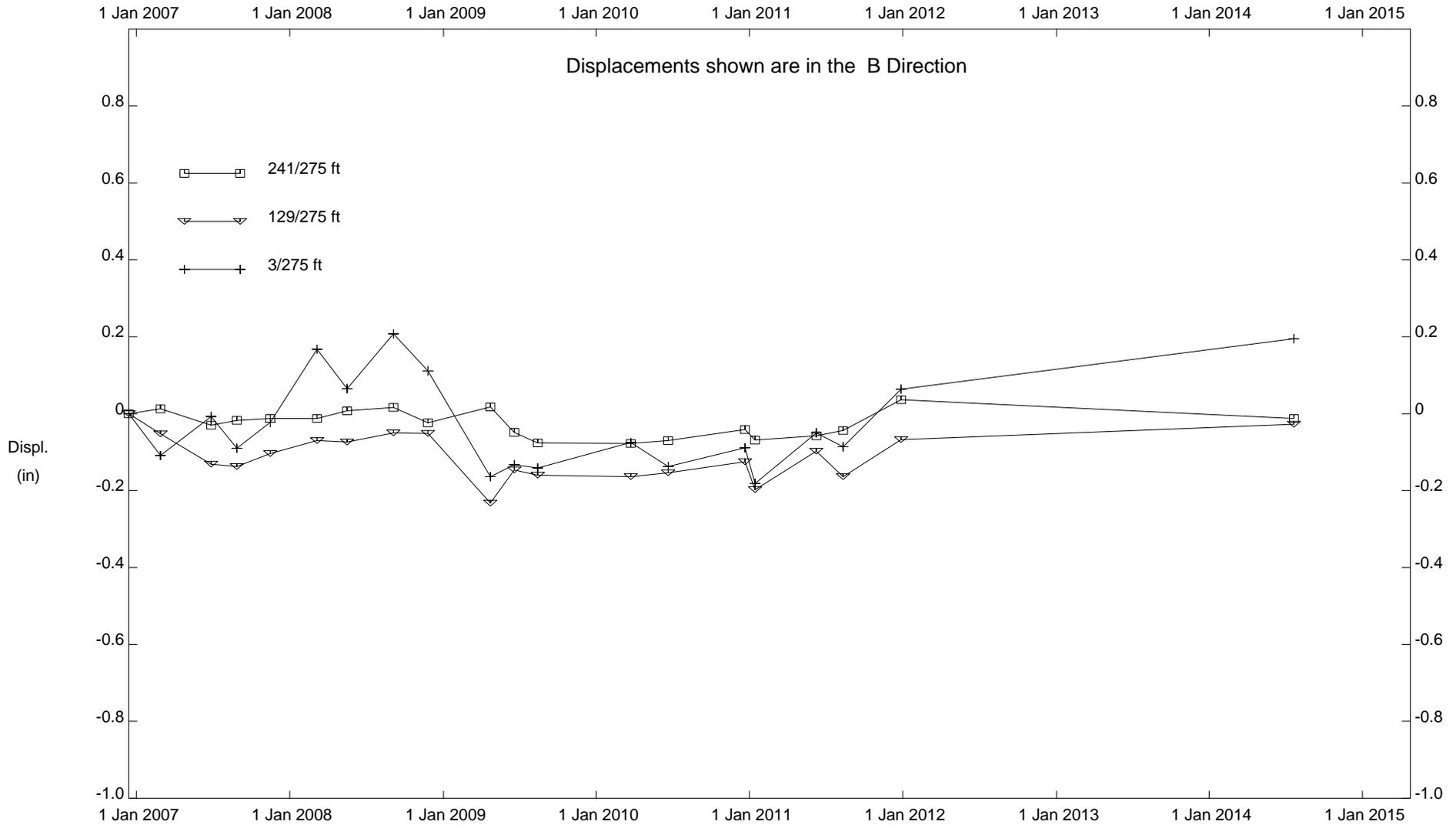
BIG ROCK MESA, Inclinometer SP-28
BLUFF REGION

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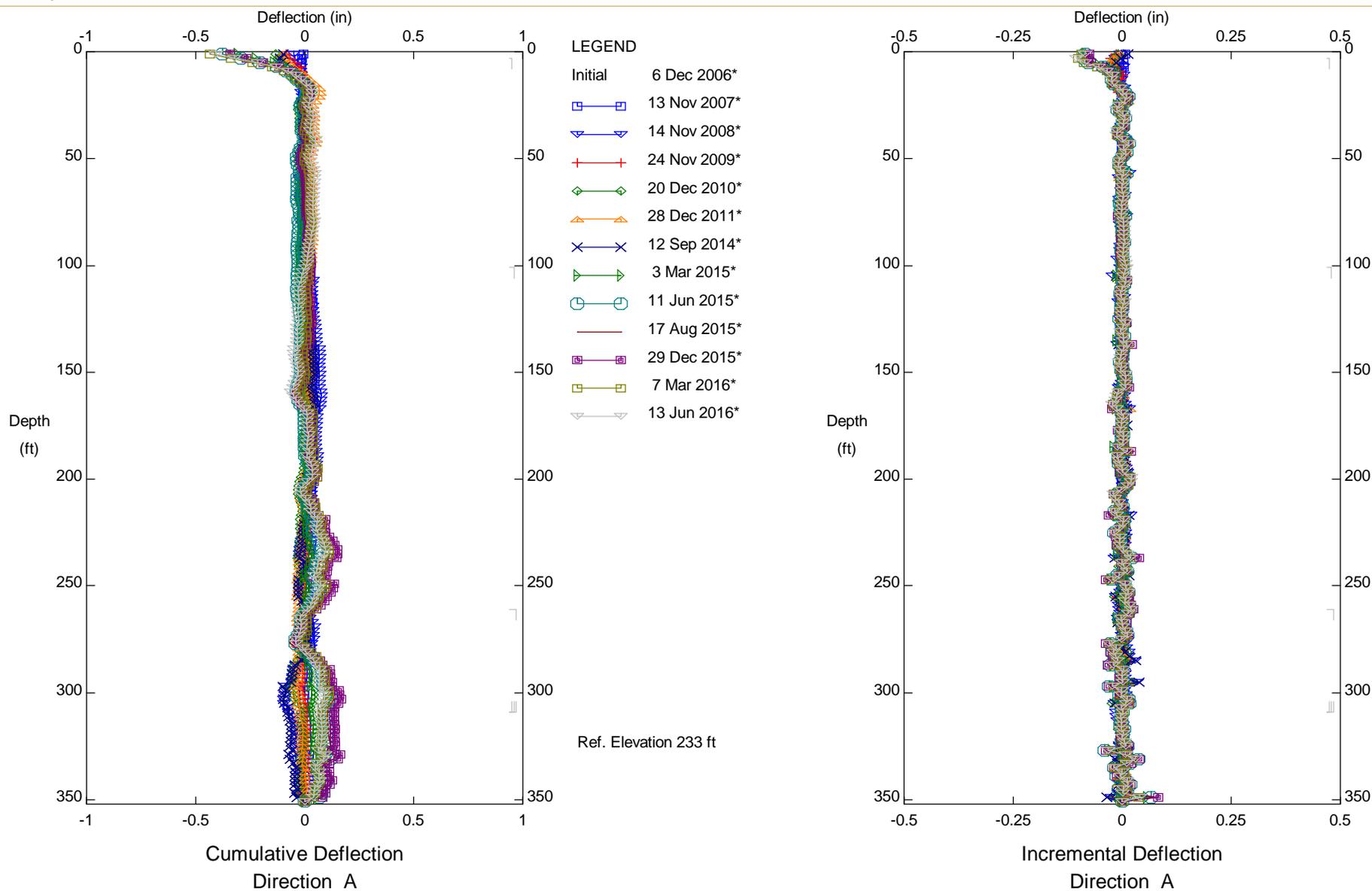
BIG ROCK MESA, Inclinometer SP-28

BLUFF REGION



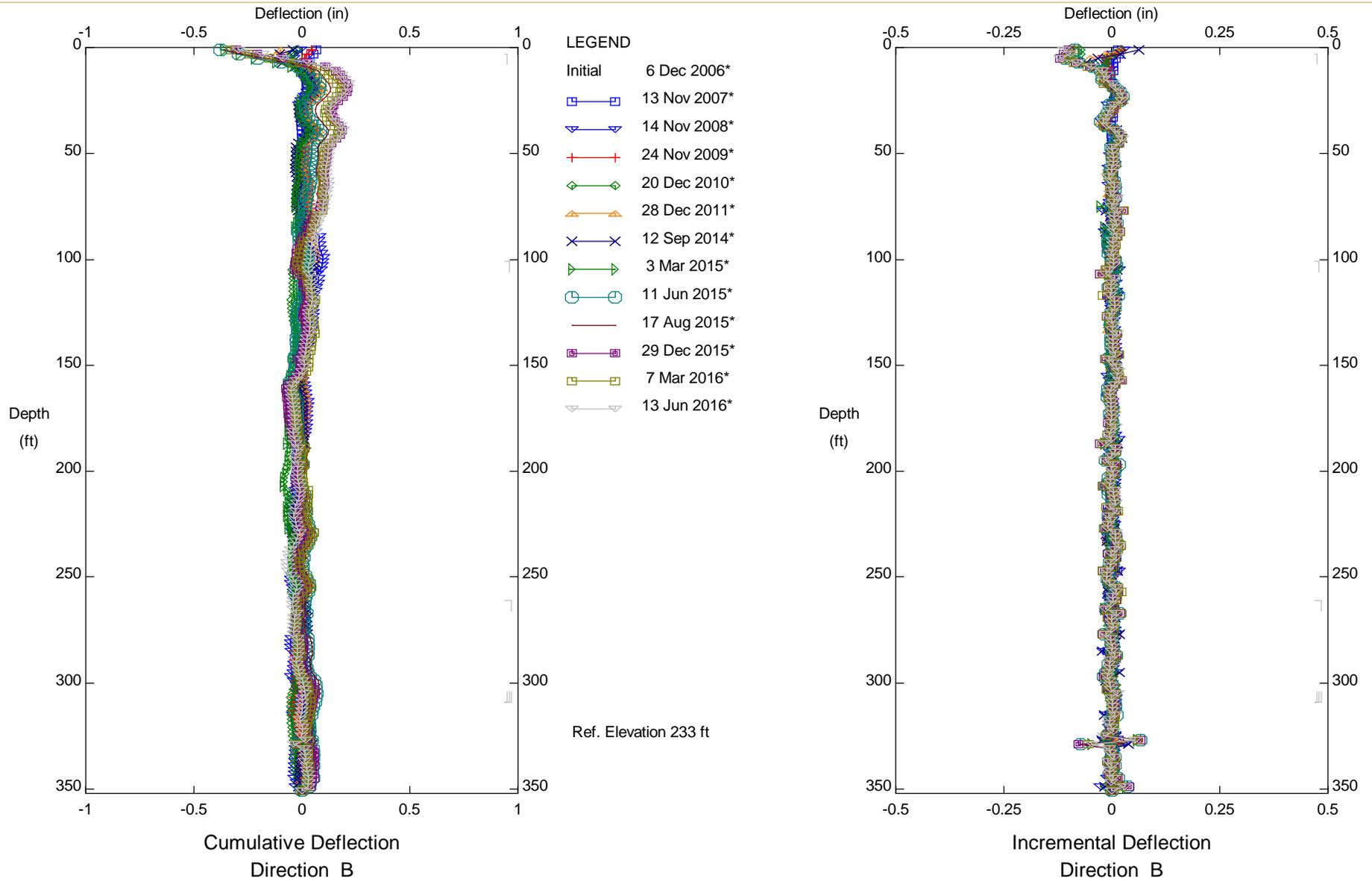
BIG ROCK MESA, Inclinometer SP-28

BLUFF REGION



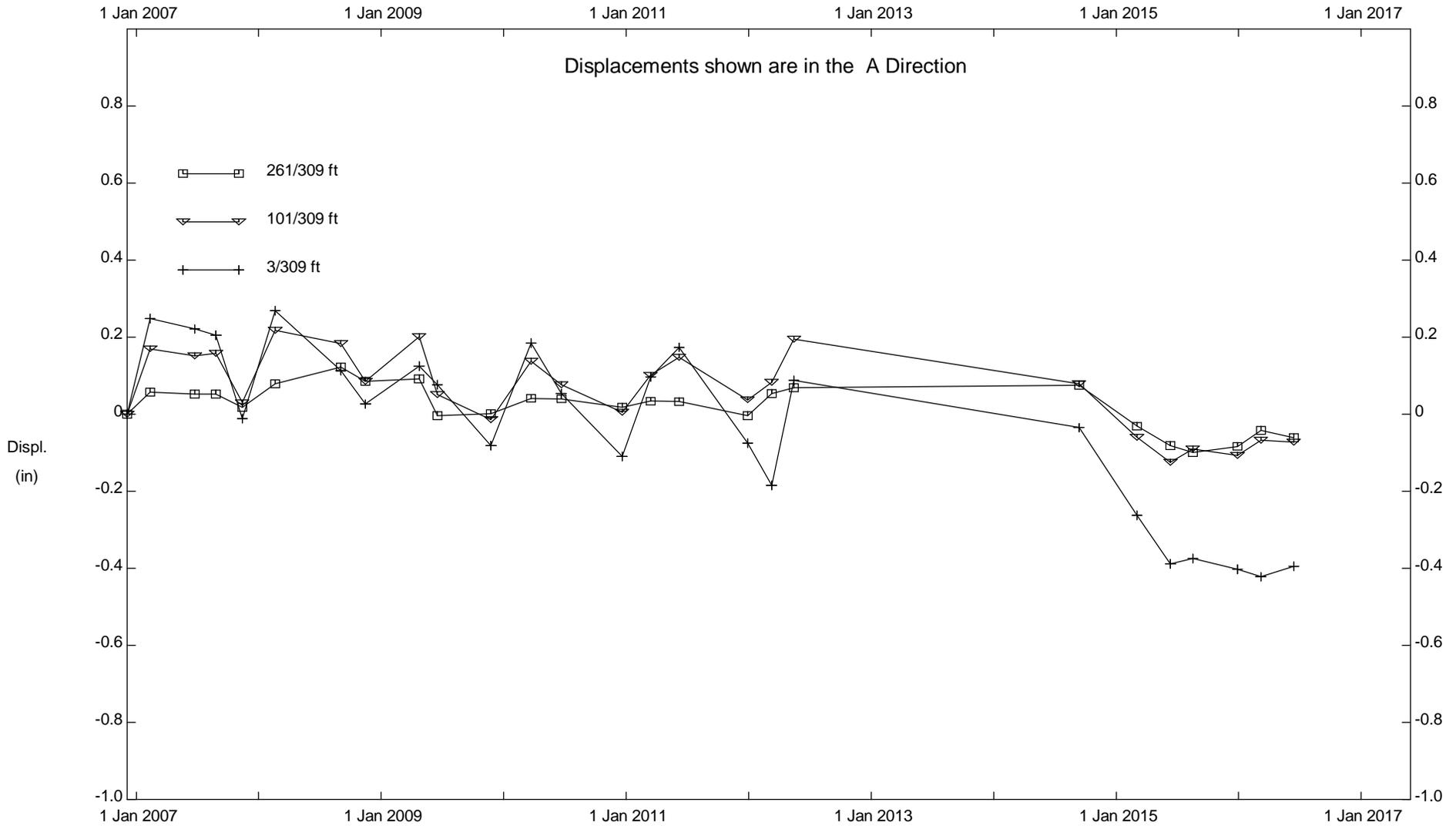
BIG ROCK MESA, Inclinometer SP-32
BLUFF REGION

Sets marked * include zero shift and/or rotation corrections.



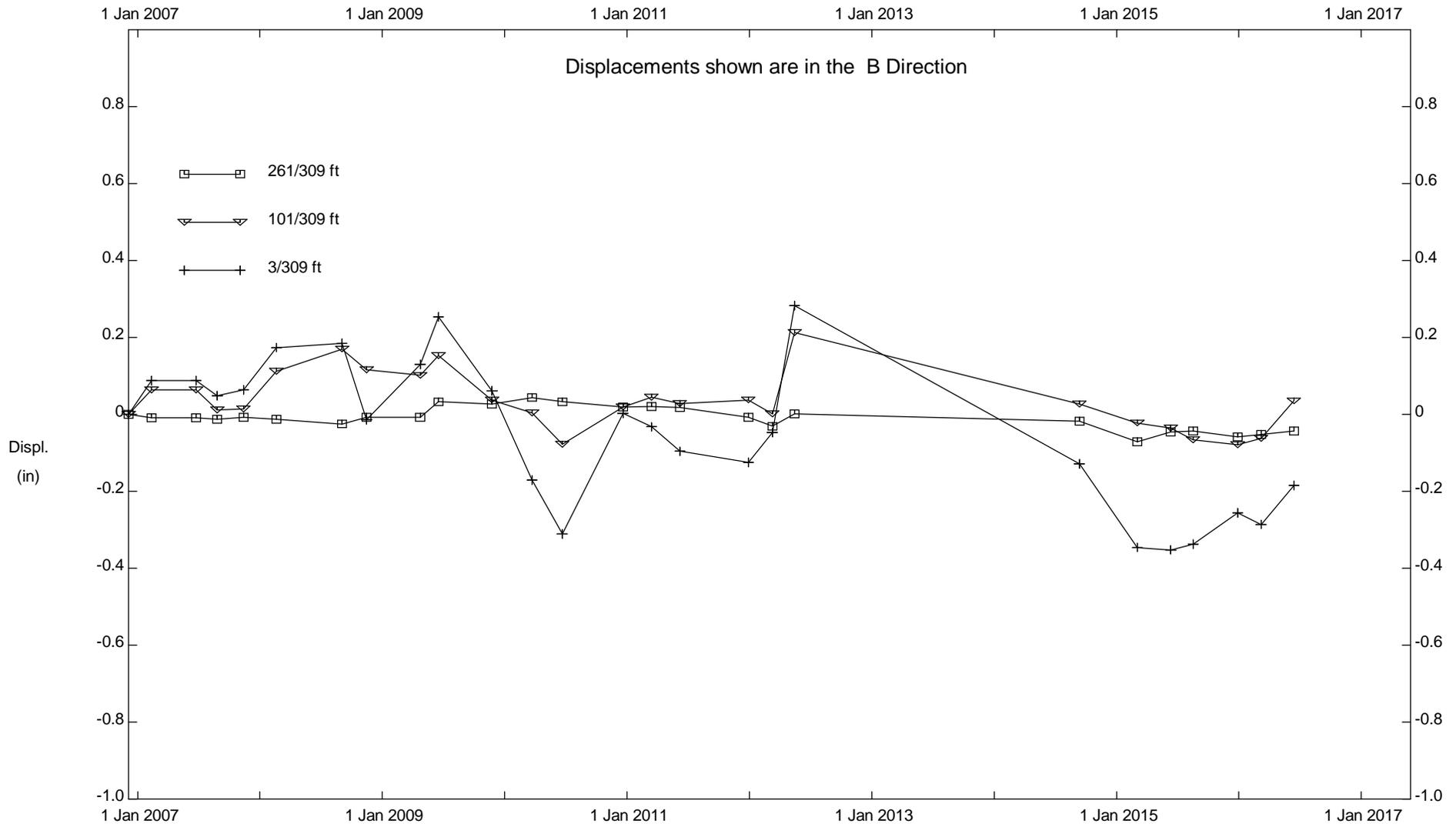
**BIG ROCK MESA, Inclinometer SP-32
 BLUFF REGION**

Sets marked * include zero shift and/or rotation corrections.



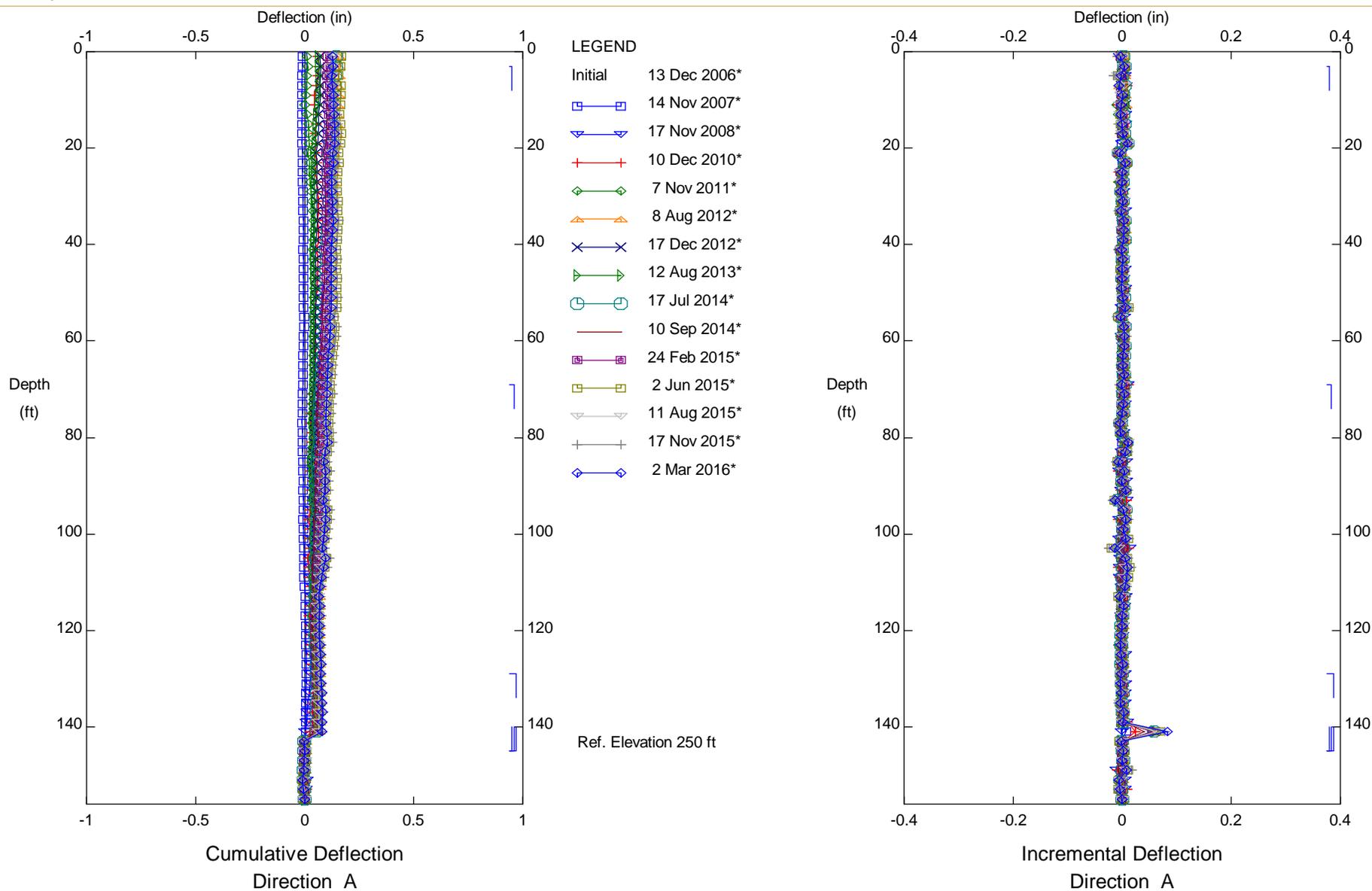
BIG ROCK MESA, Inclinometer SP-32

BLUFF REGION



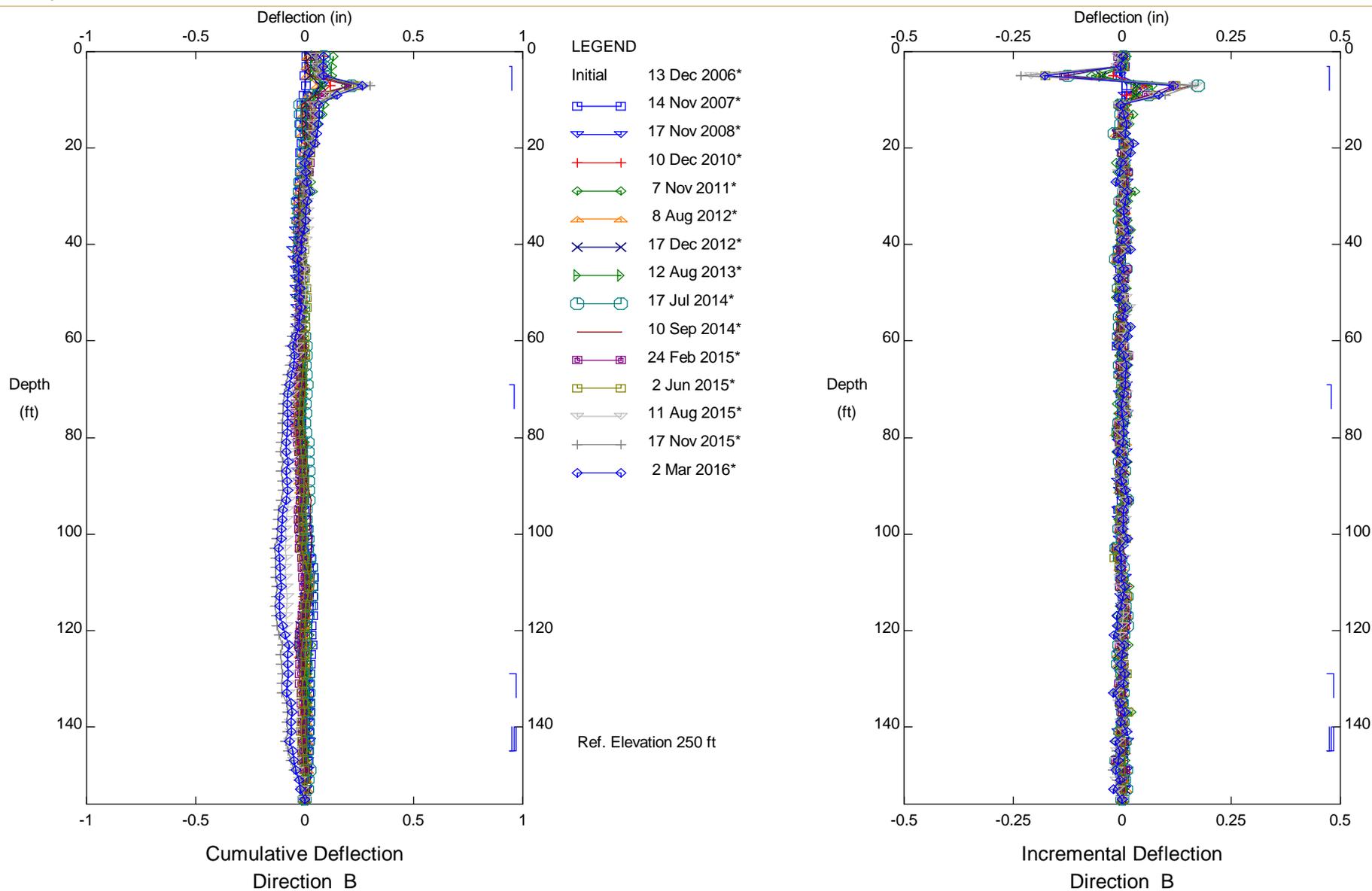
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BLUFF REGION



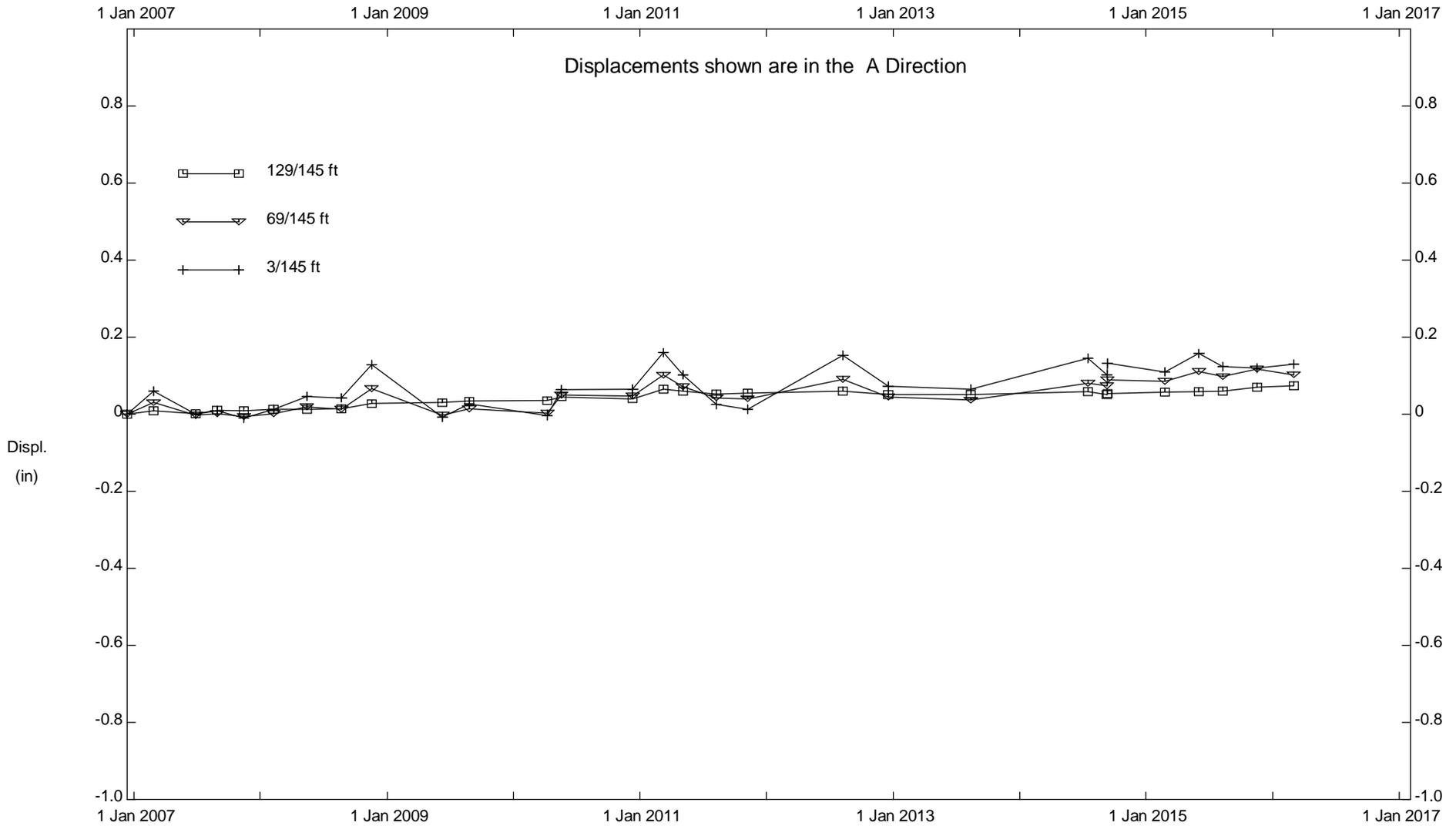
BIG ROCK MESA, Inclinometer PC-1
EASTERN REGION

Sets marked * include zero shift and/or rotation corrections.



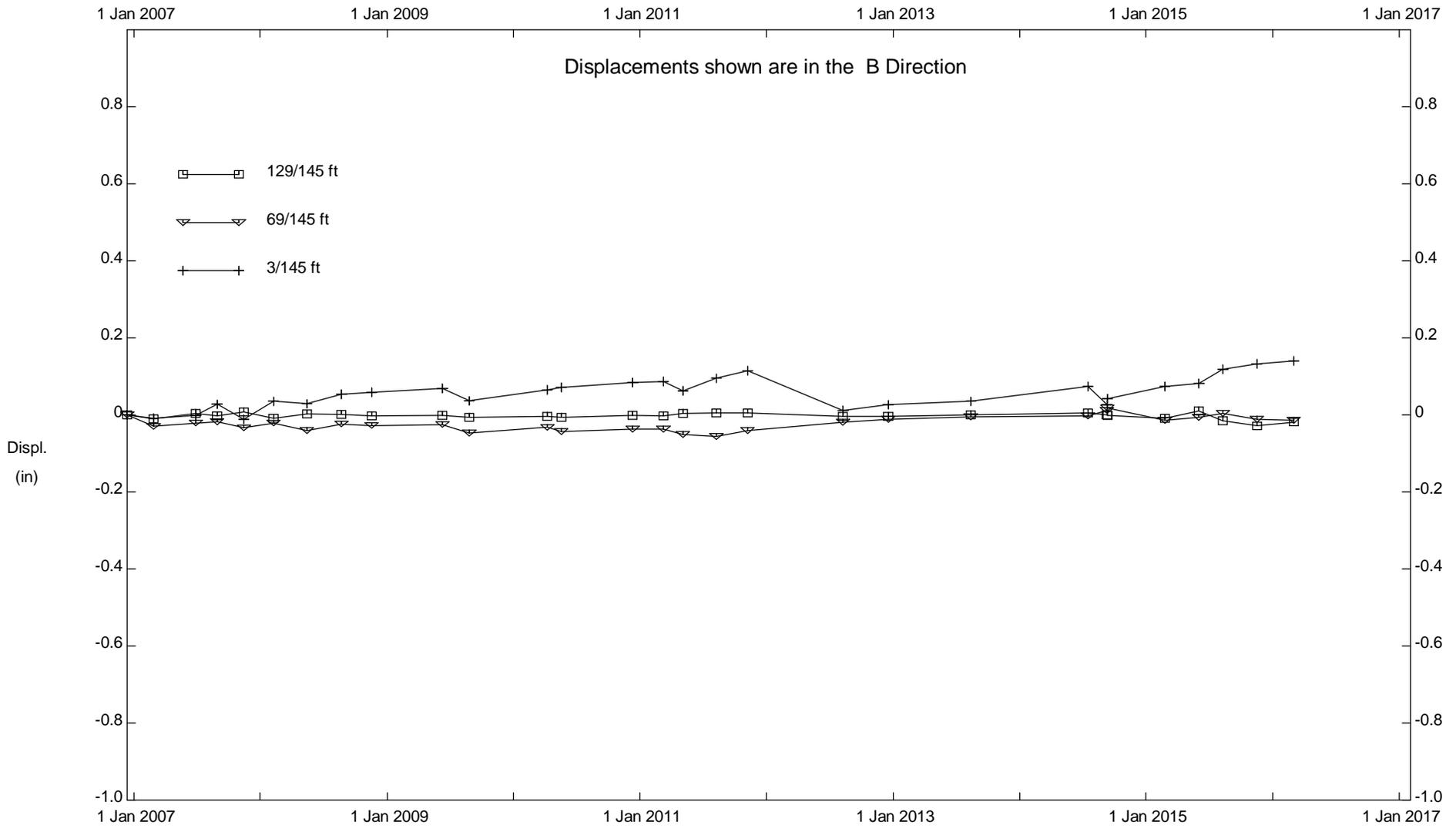
**BIG ROCK MESA, Inclinometer PC-1
EASTERN REGION**

Sets marked * include zero shift and/or rotation corrections.



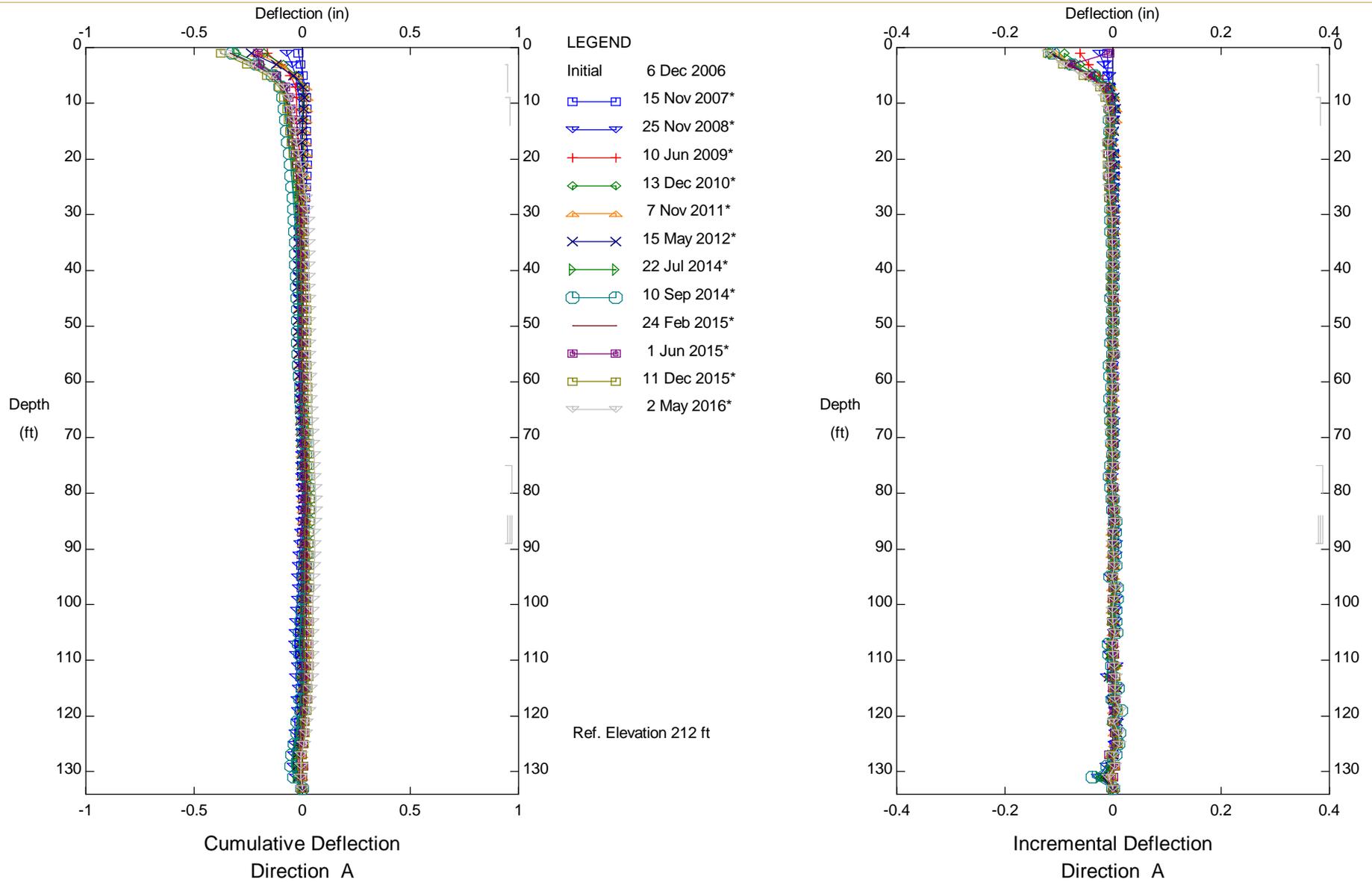
BIG ROCK MESA, Inclinometer PC-1

EASTERN REGION



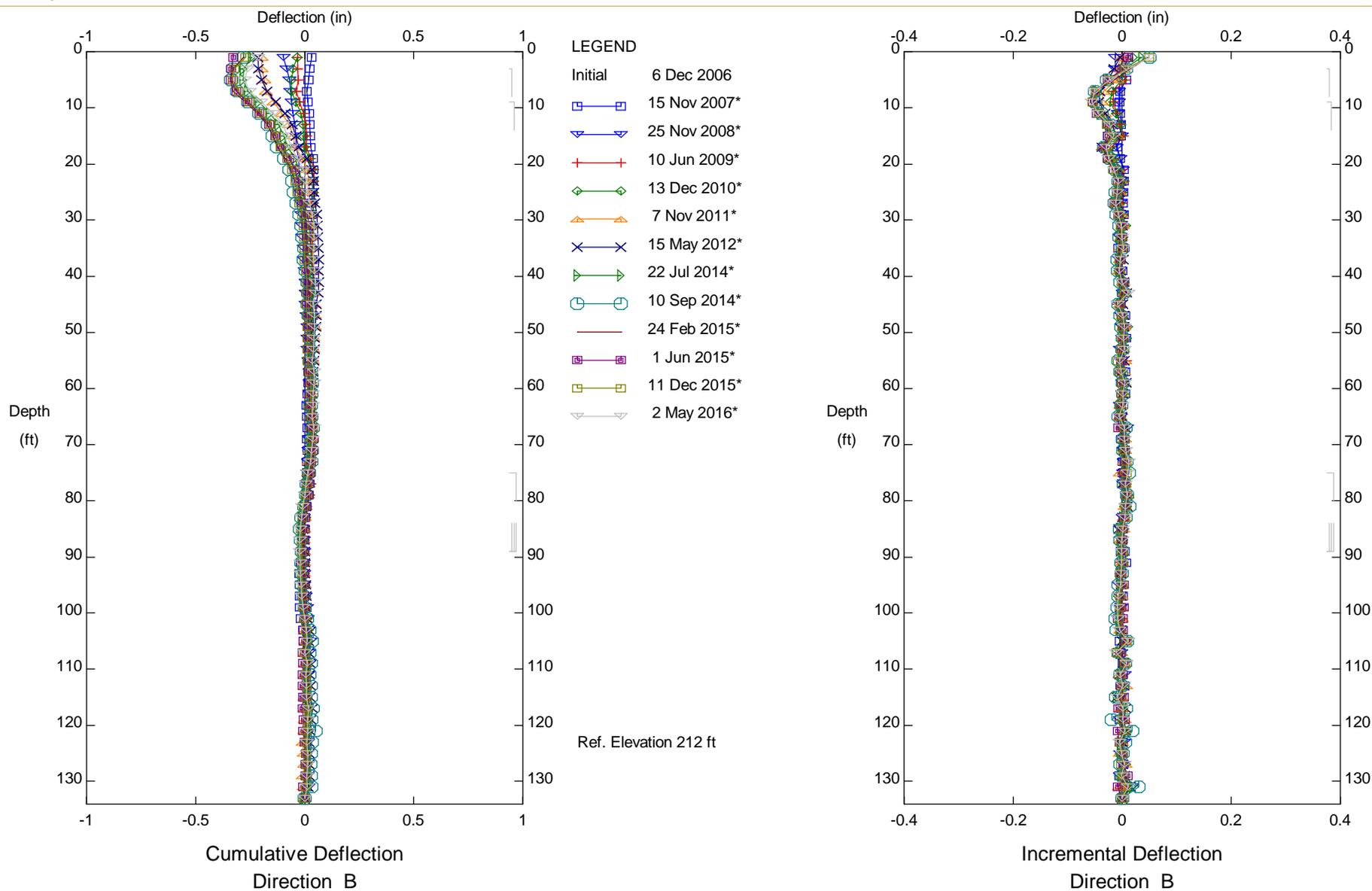
BIG ROCK MESA, Inclinometer PC-1

EASTERN REGION



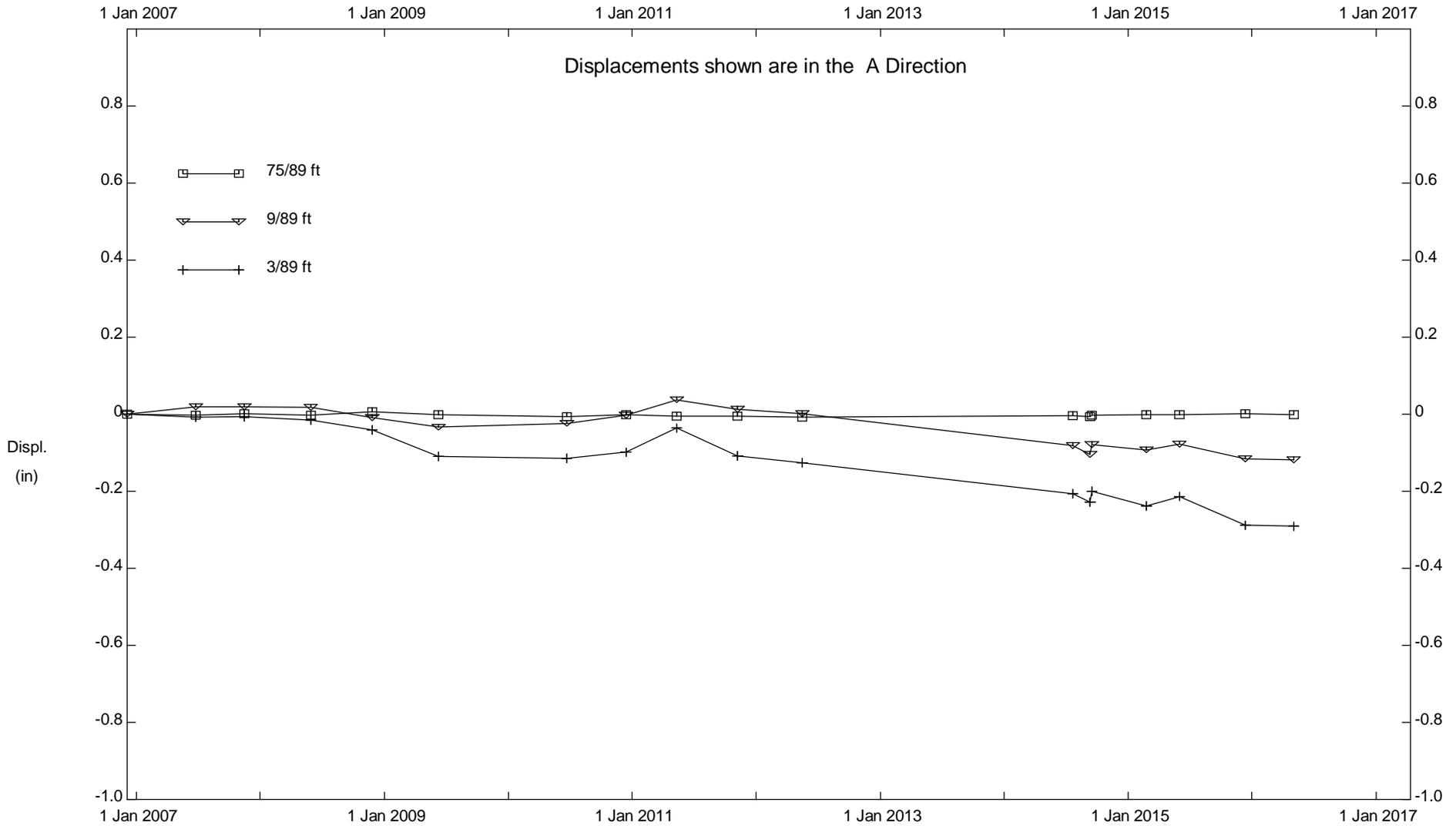
BIG ROCK MESA, Inclinometer SP-3
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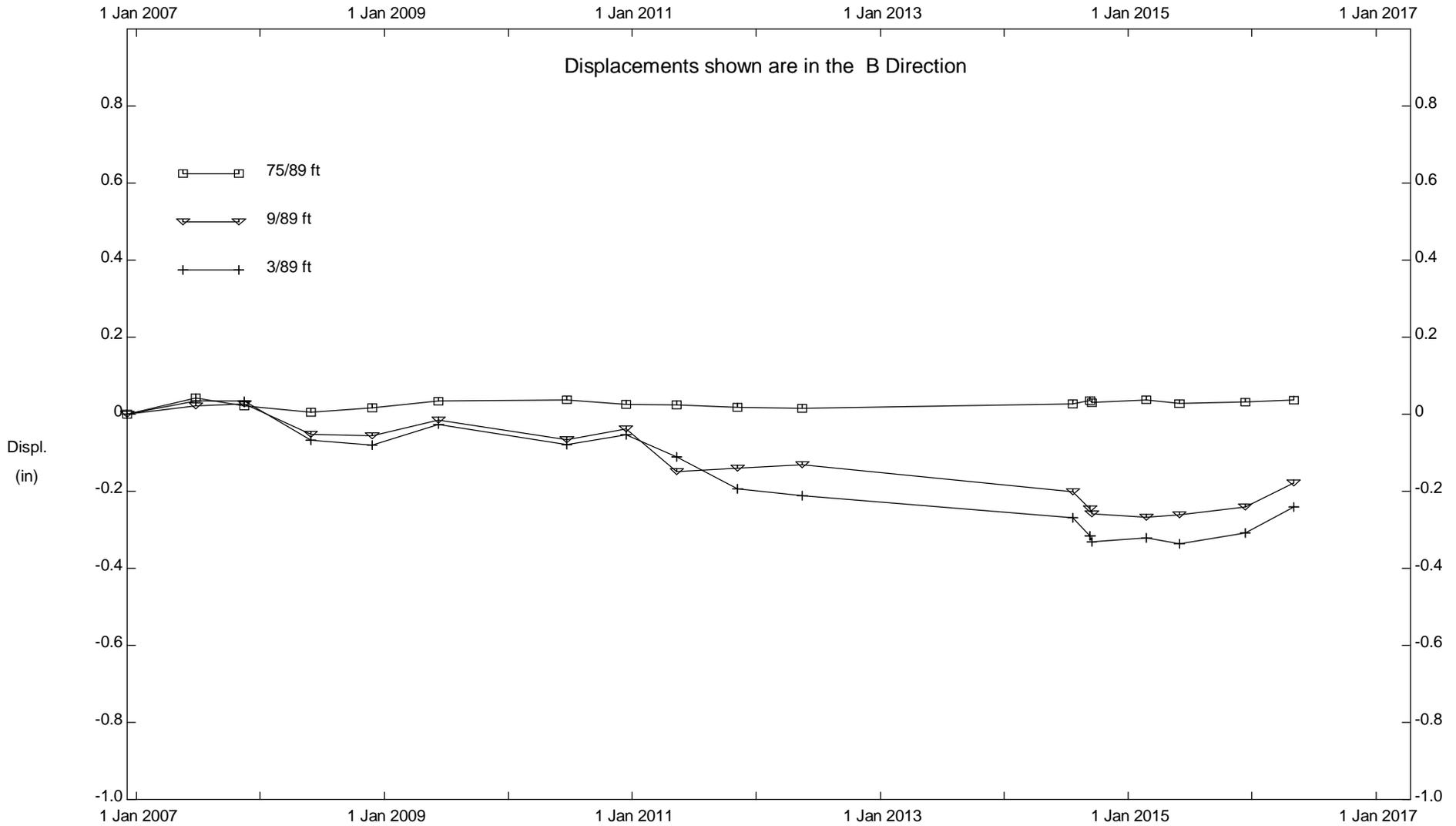
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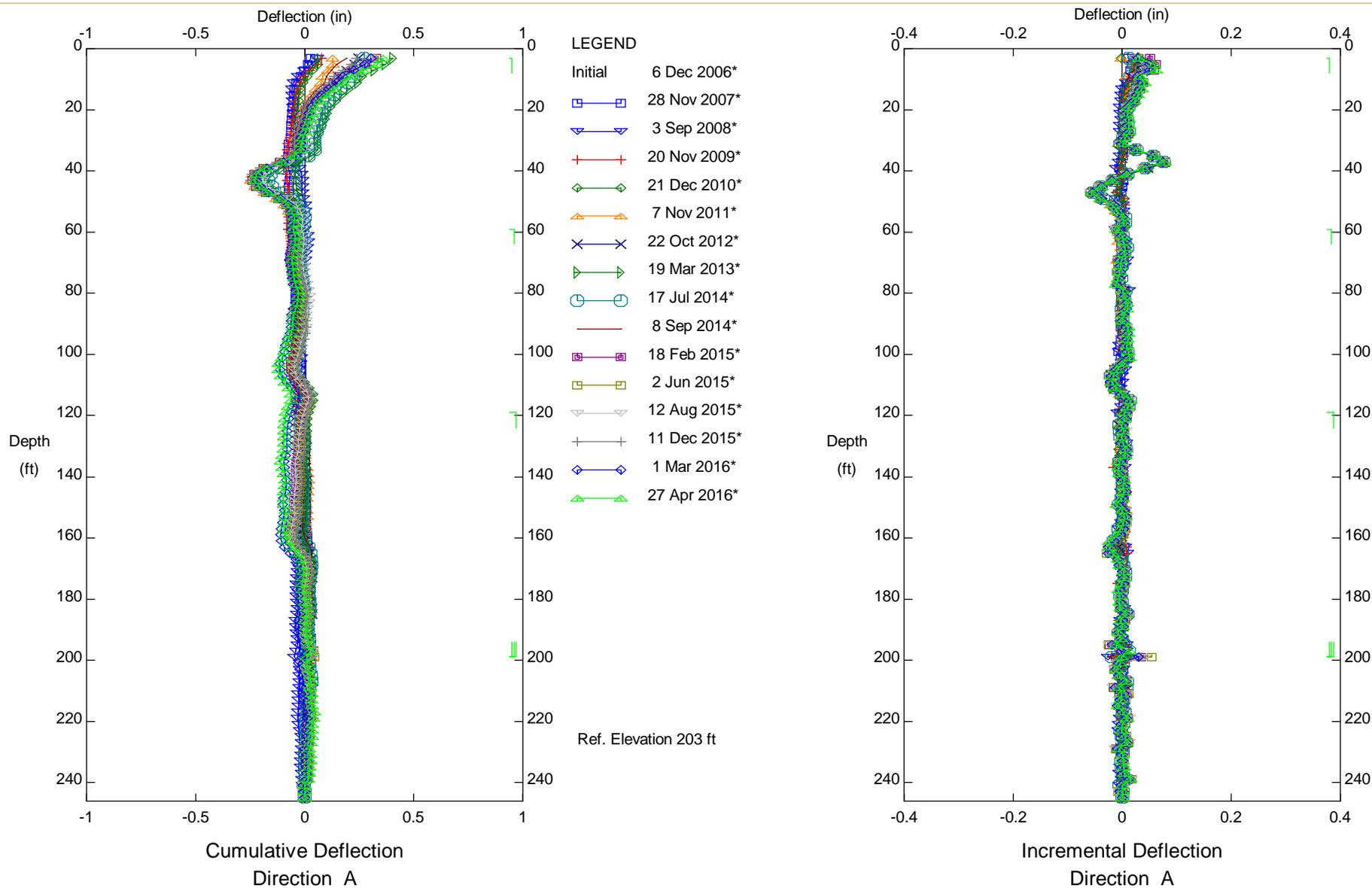
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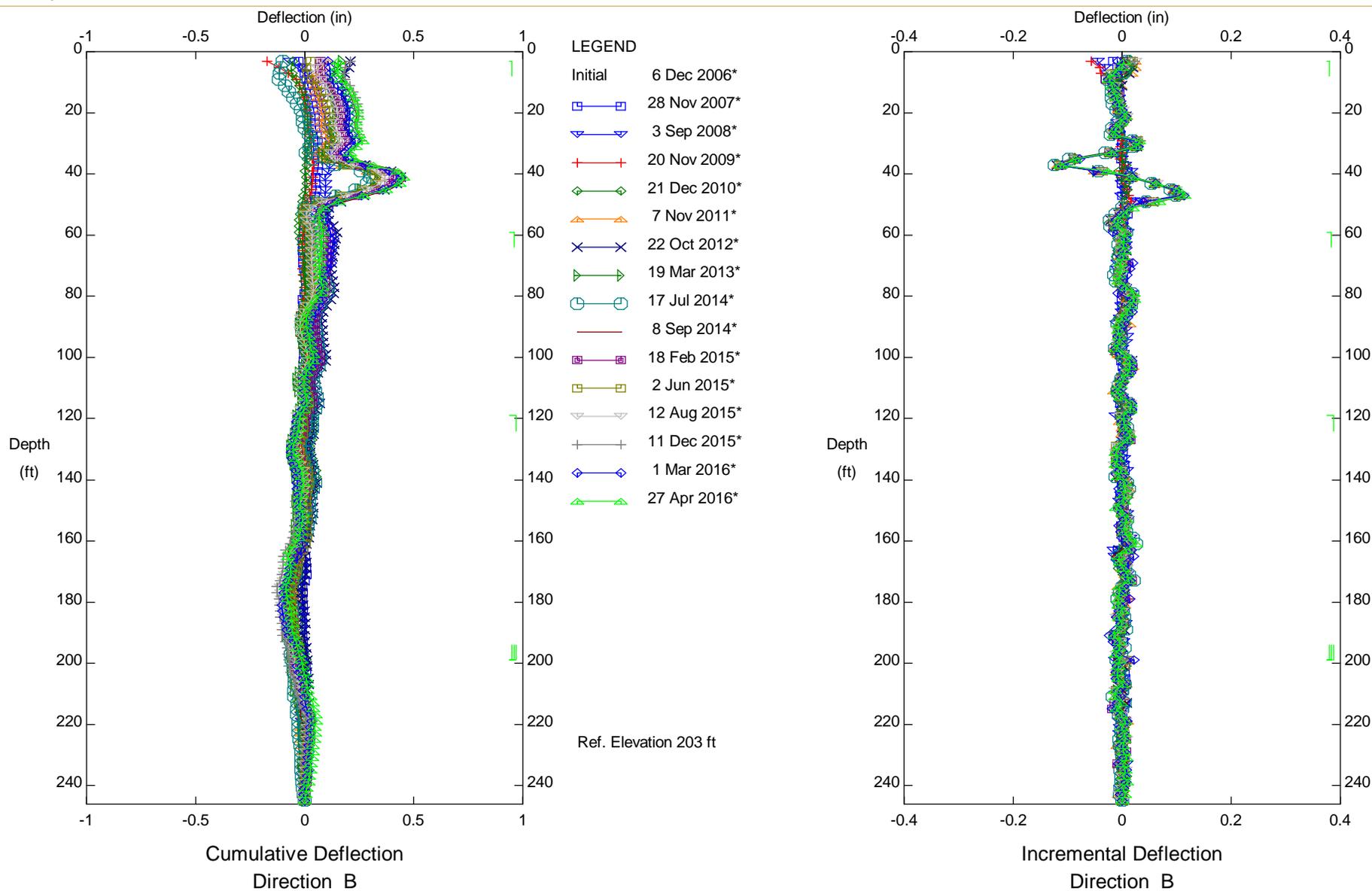
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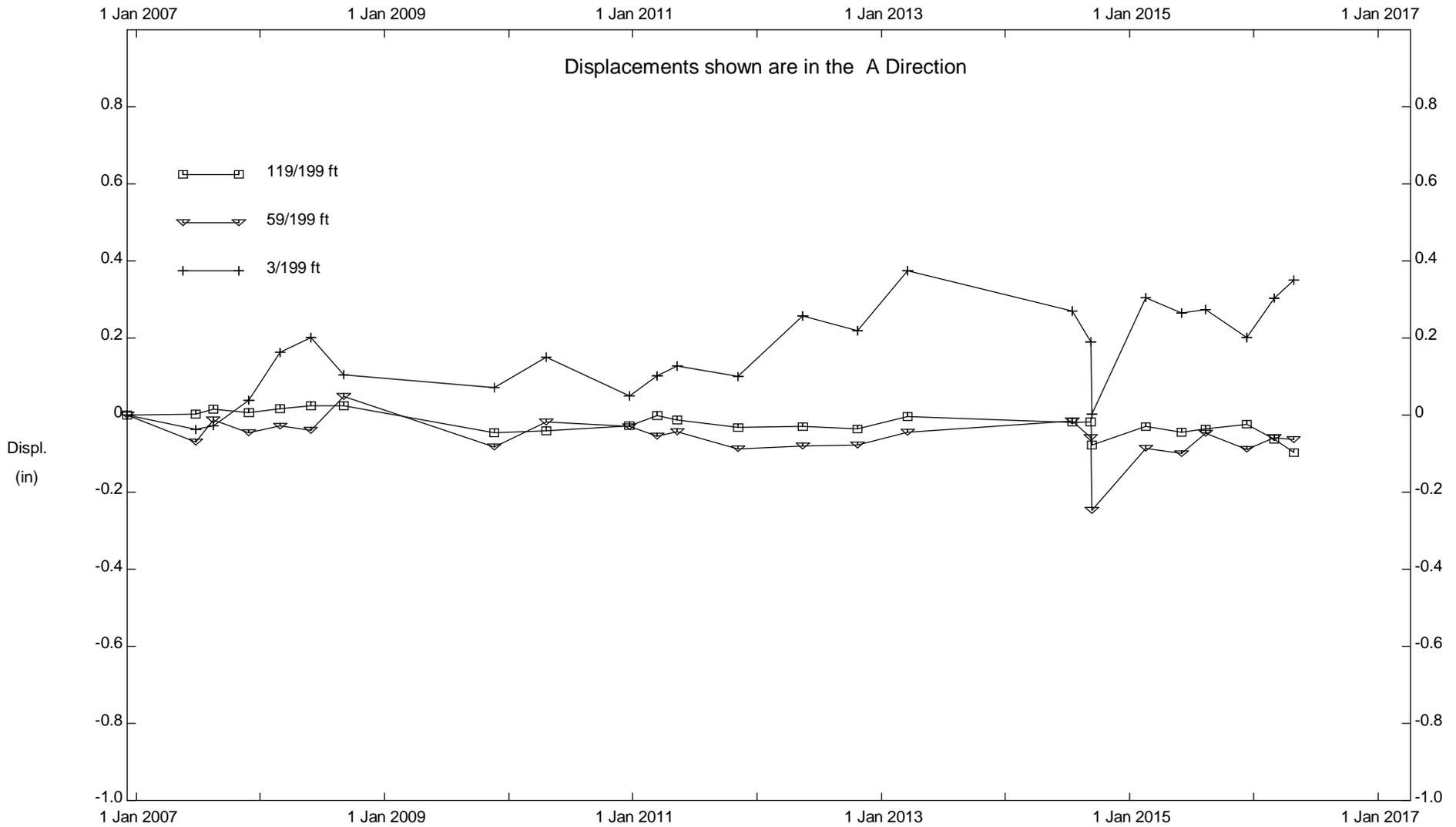
BIG ROCK MESA, Inclinometer SP-3A
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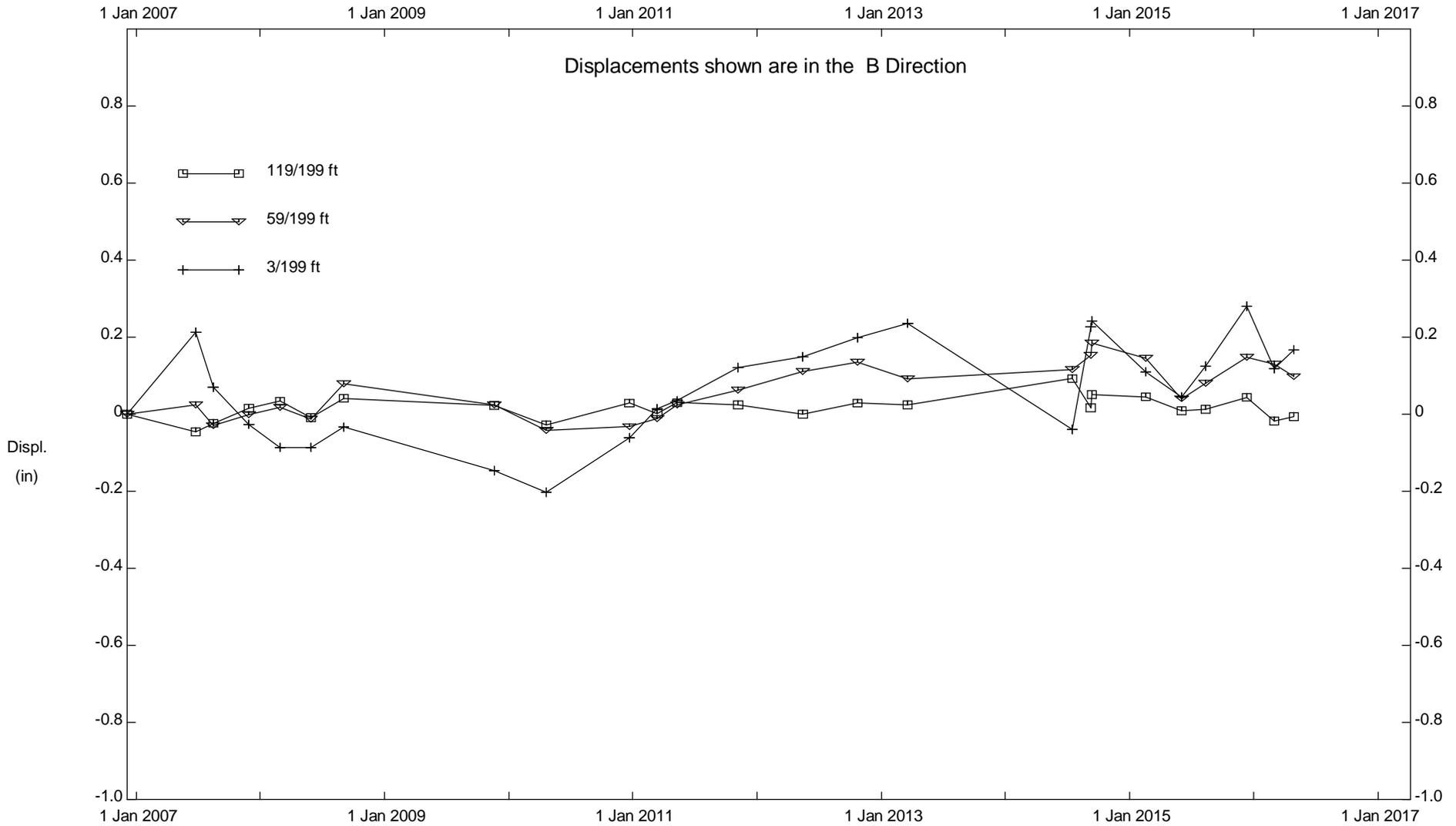
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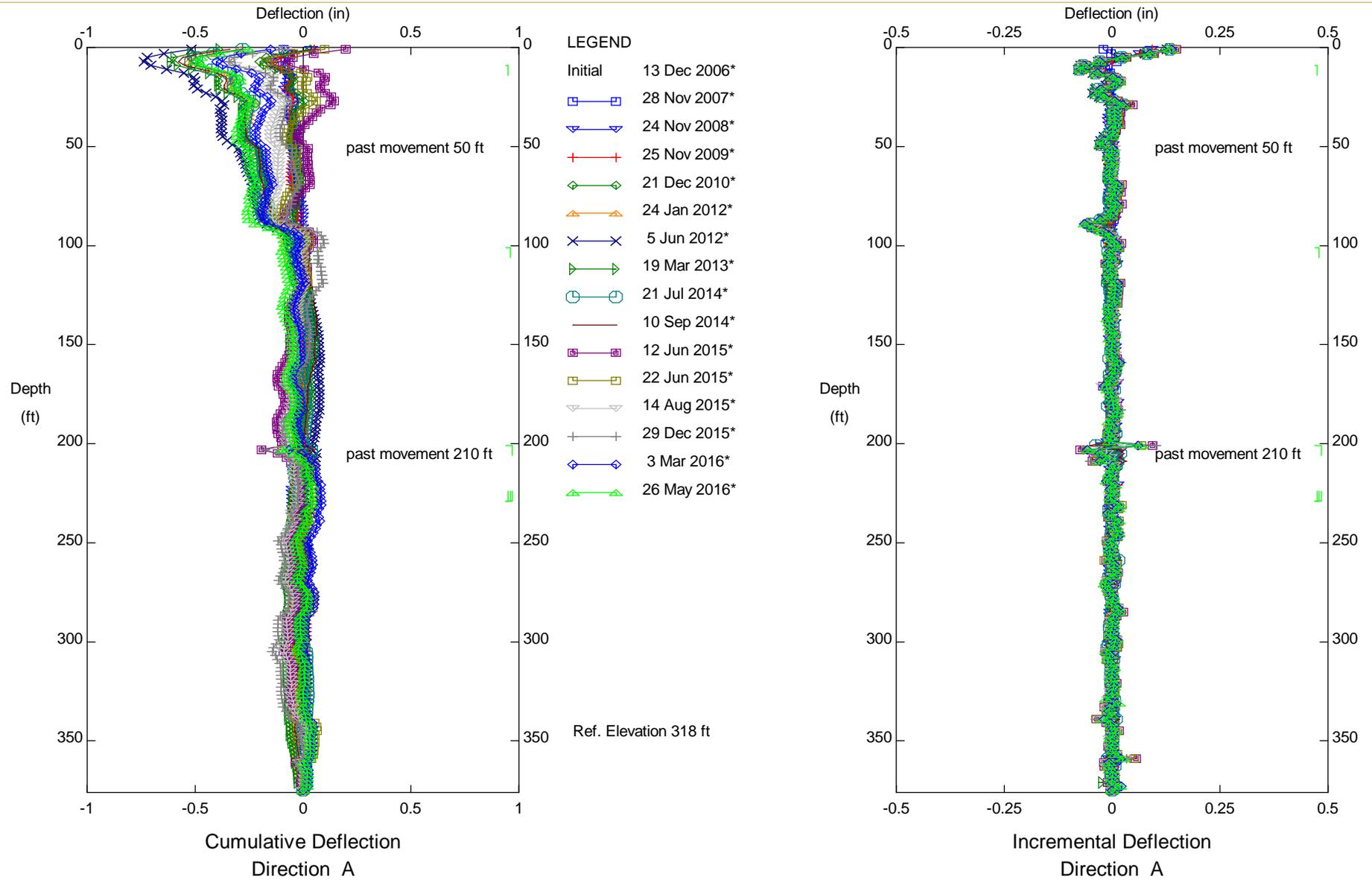
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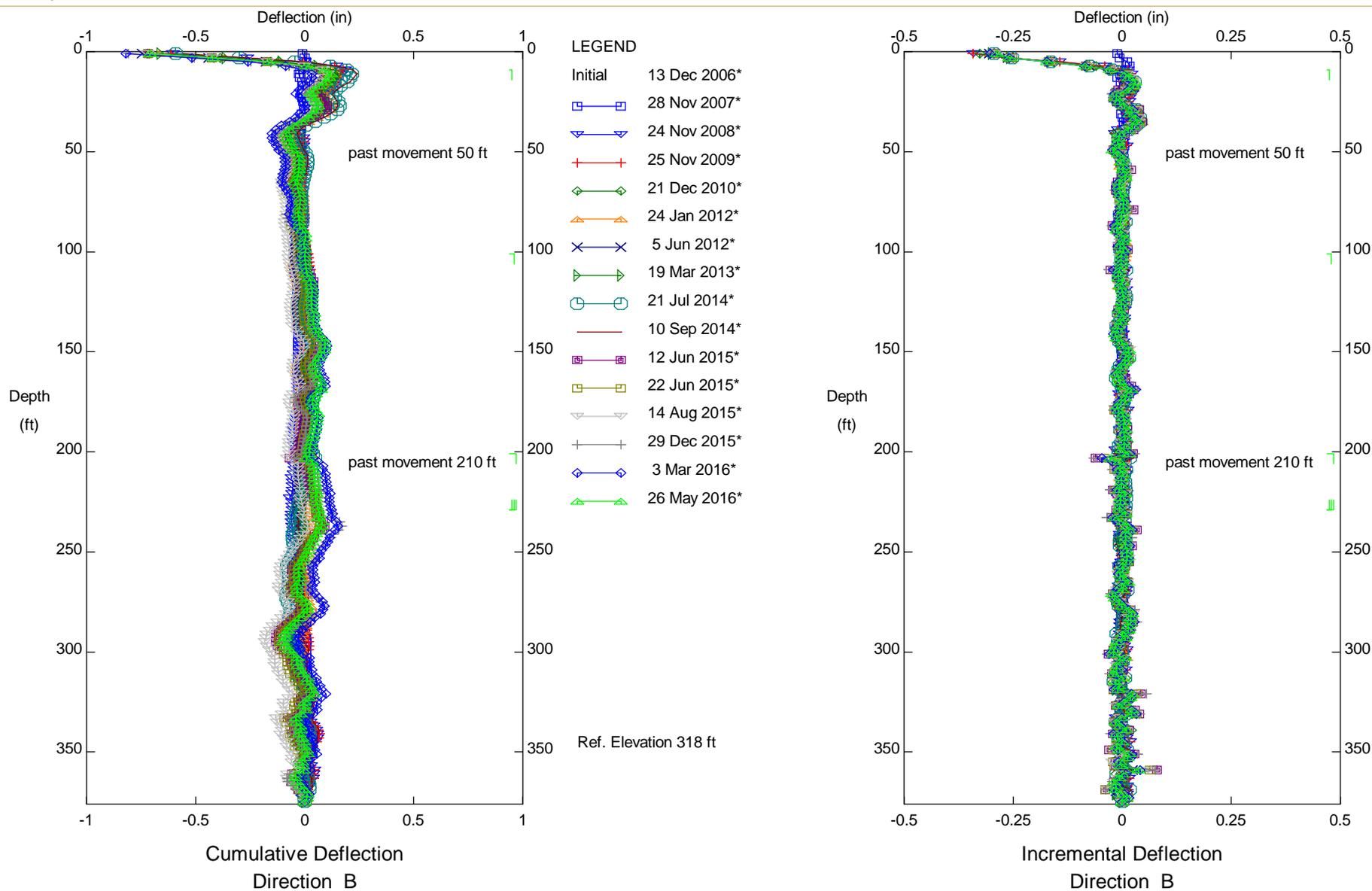
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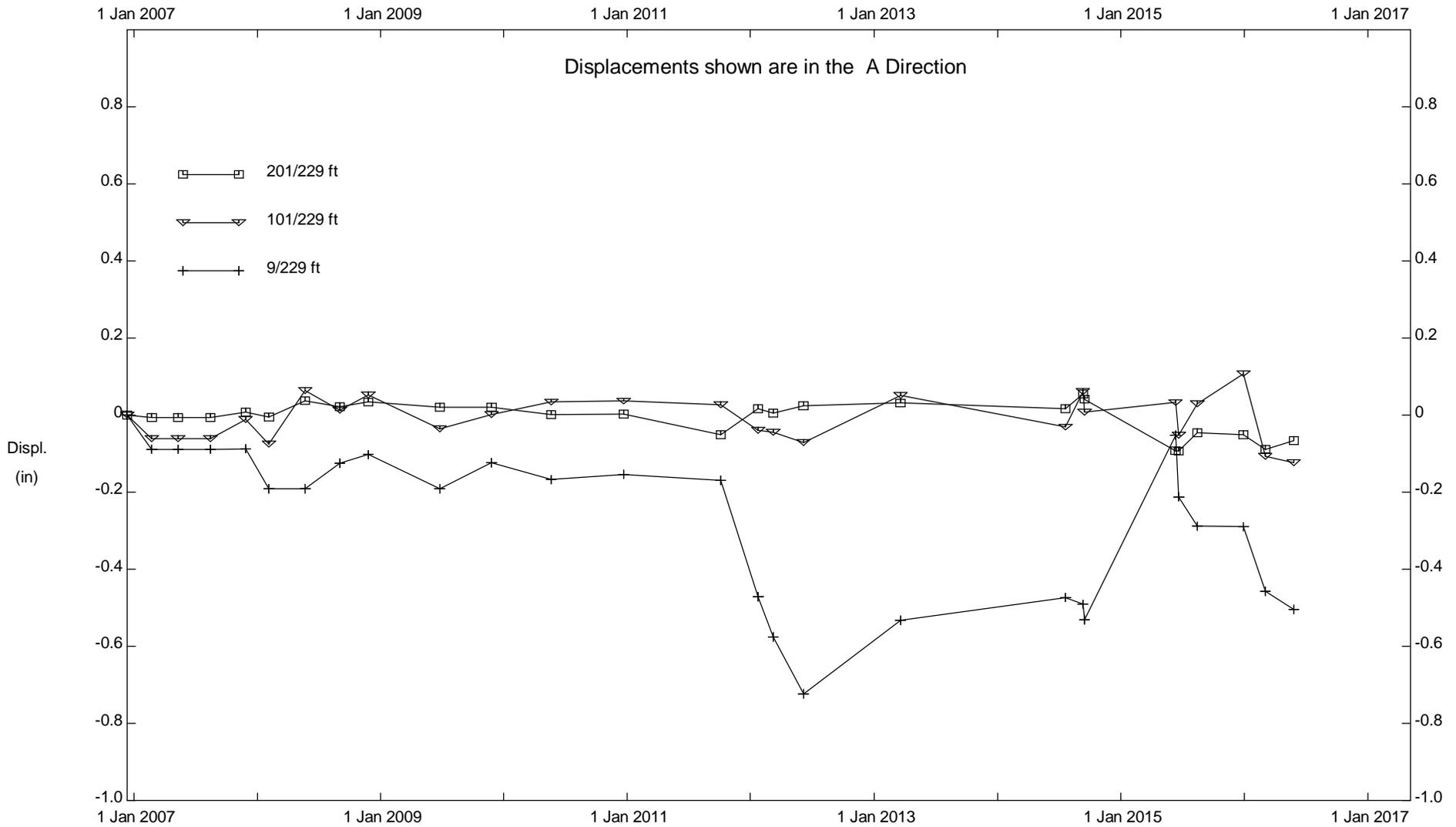
BIG ROCK MESA, Inclinerometer SP-33
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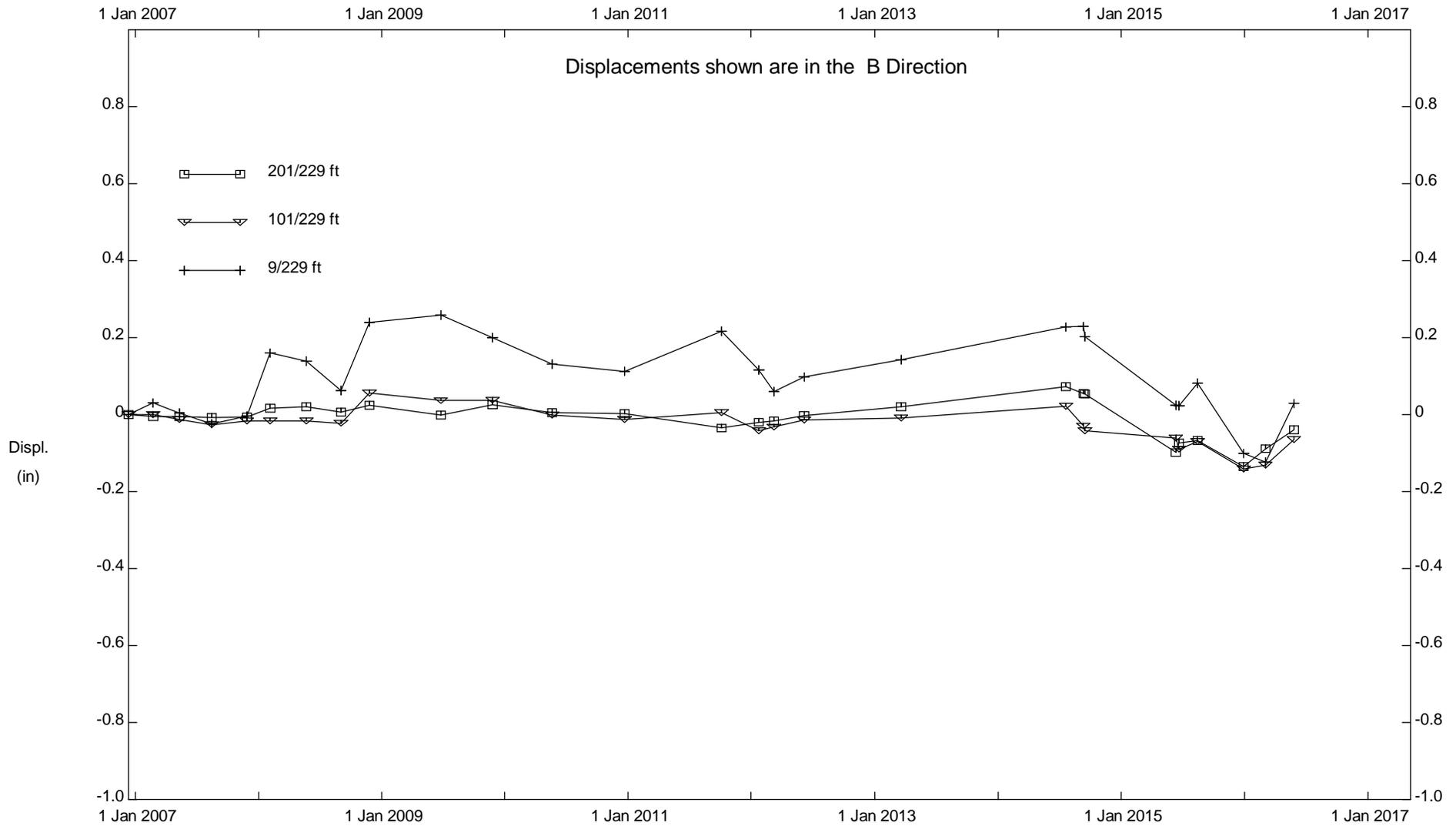
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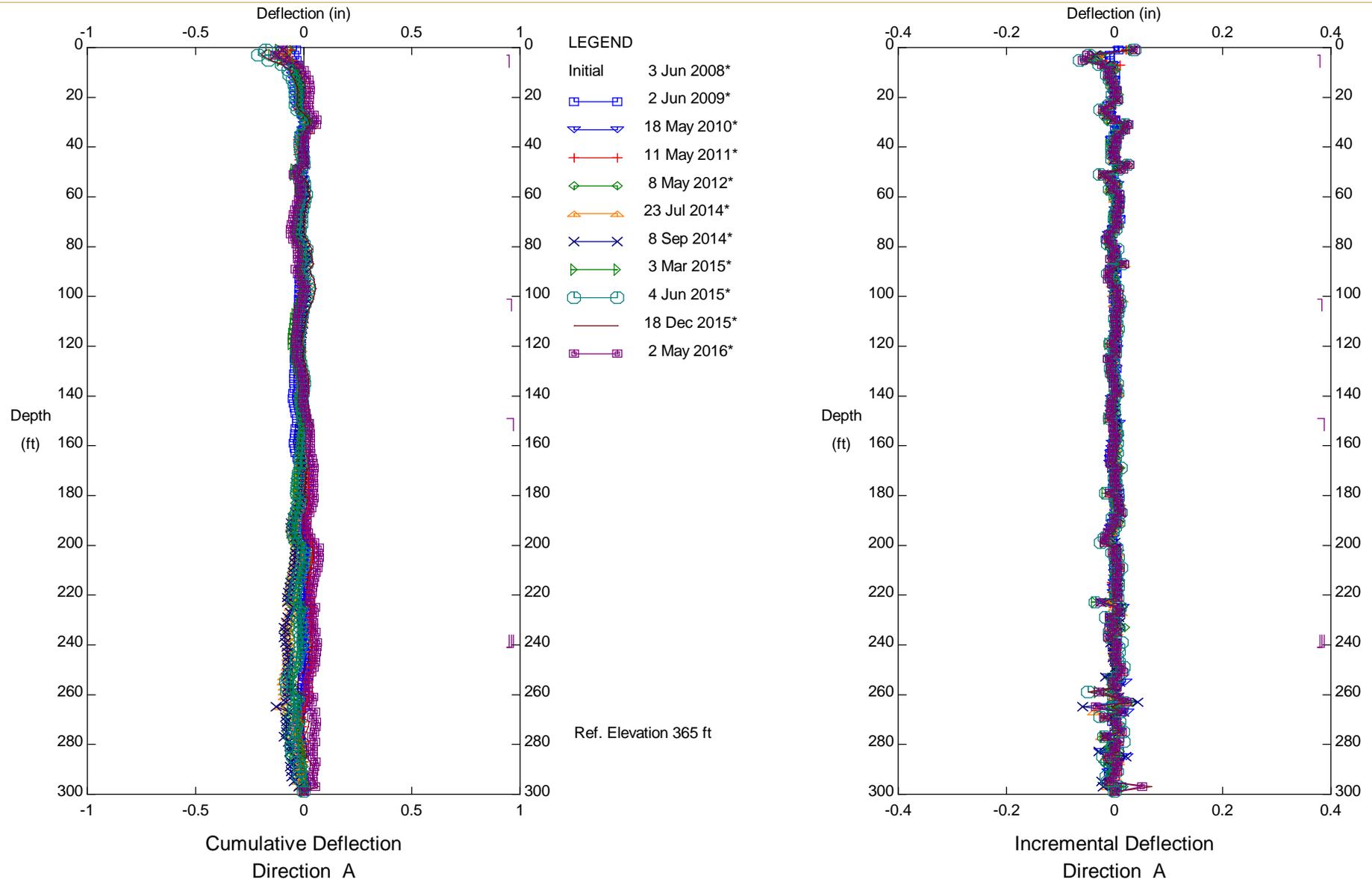
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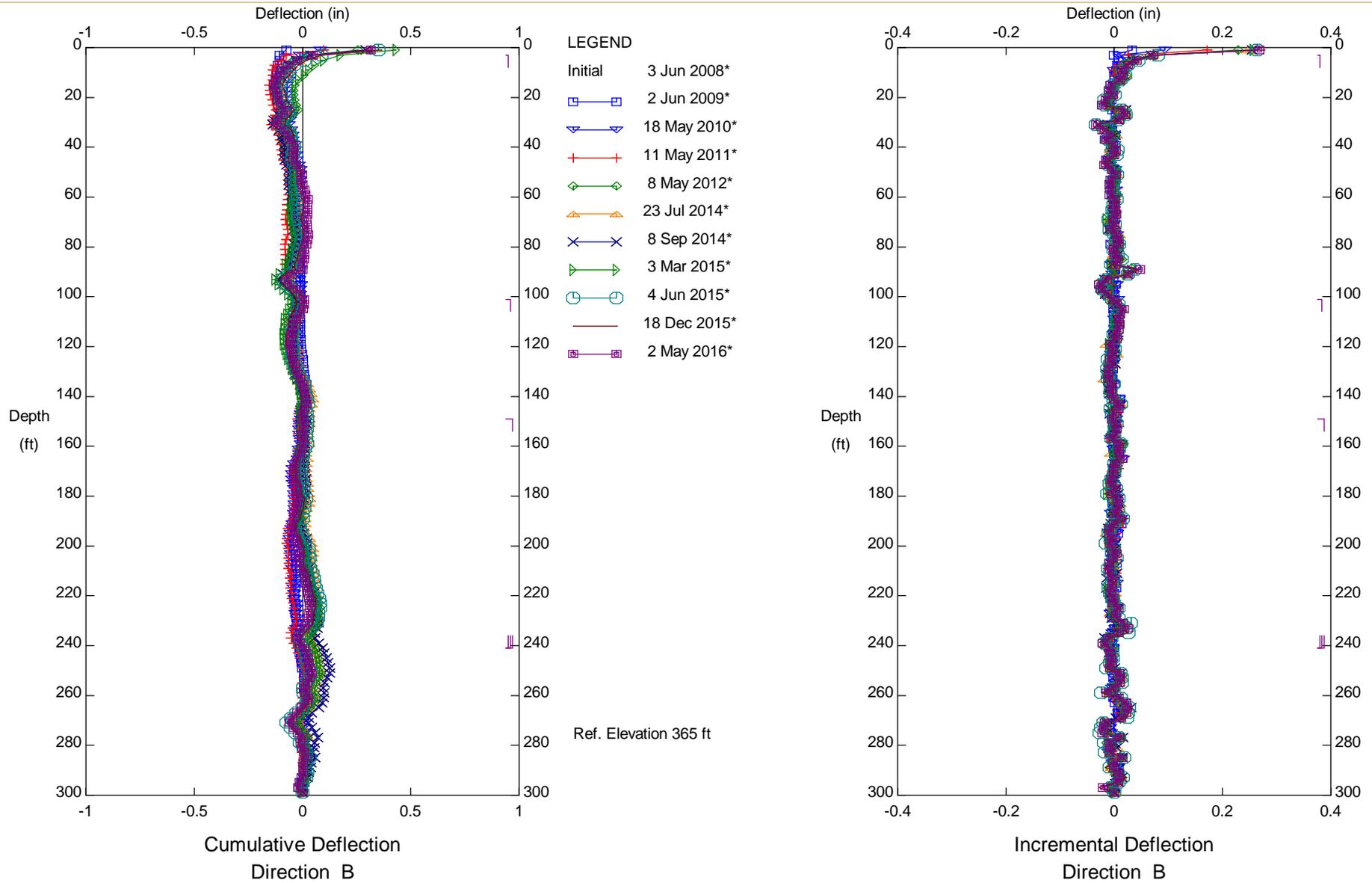
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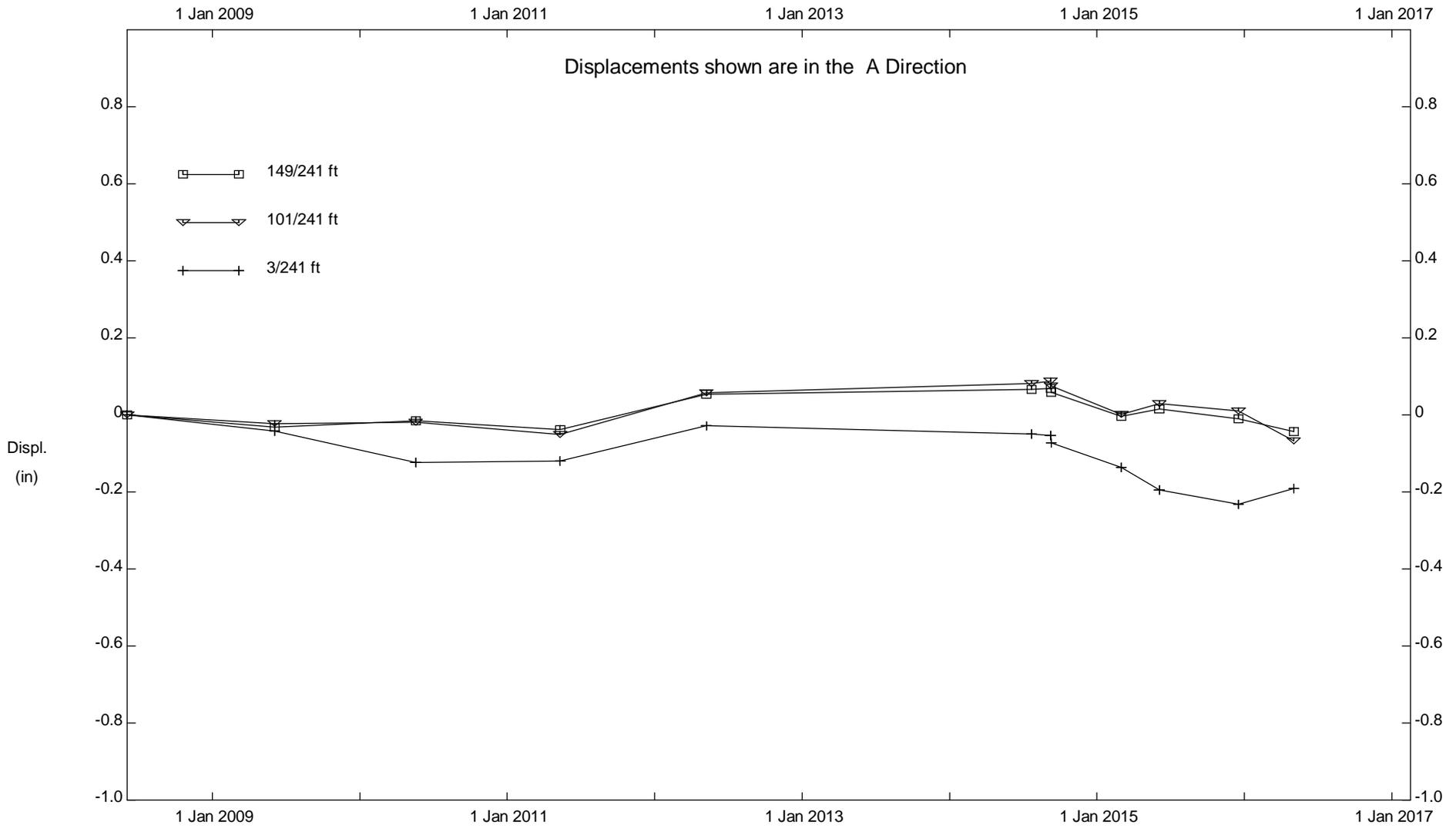
BIG ROCK MESA, Inclinometer SP-9A
CENTRAL REGION

Sets marked * include zero shift and/or rotation corrections.



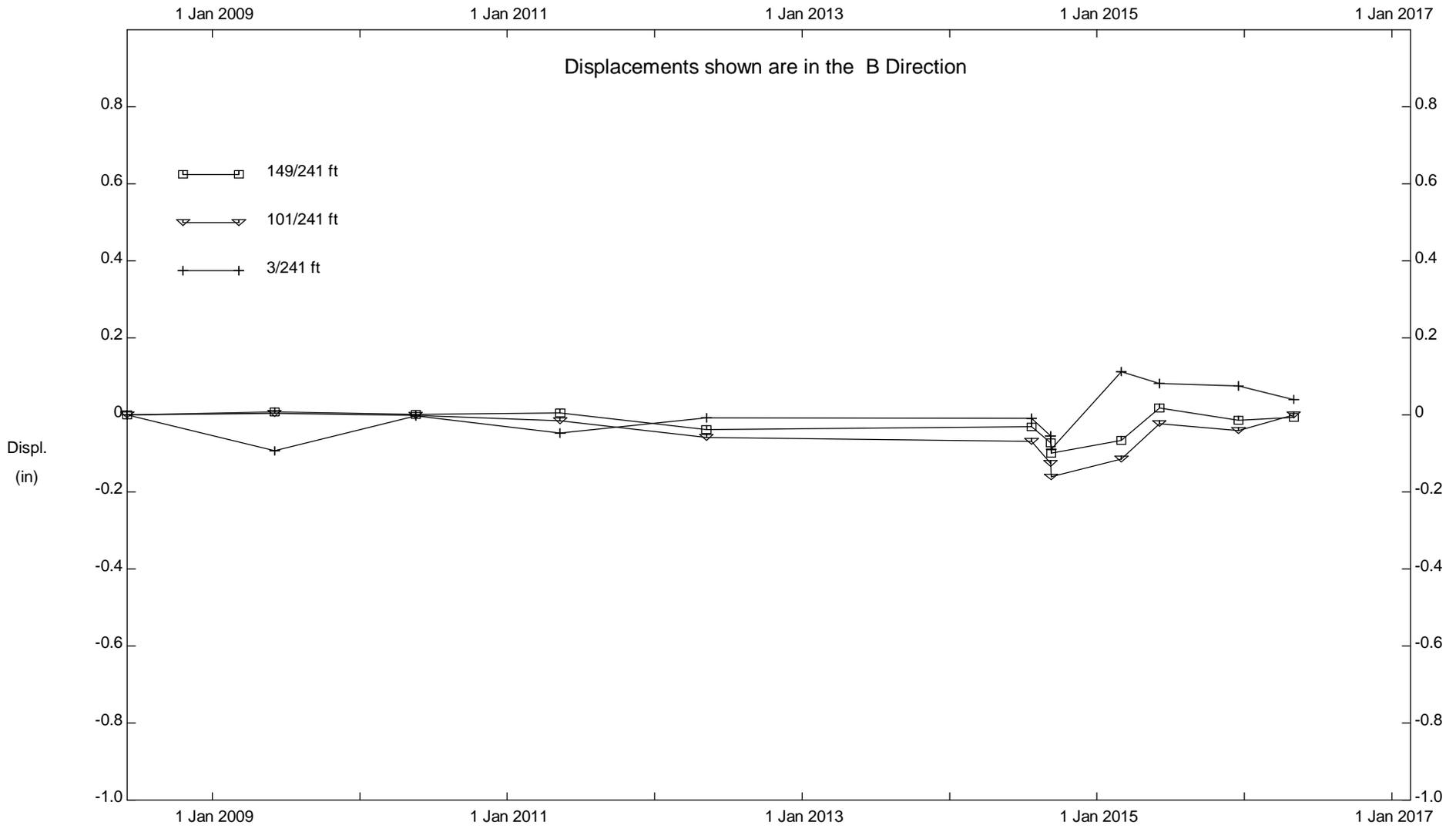
BIG ROCK MESA, Incliner SP-9A
CENTRAL REGION

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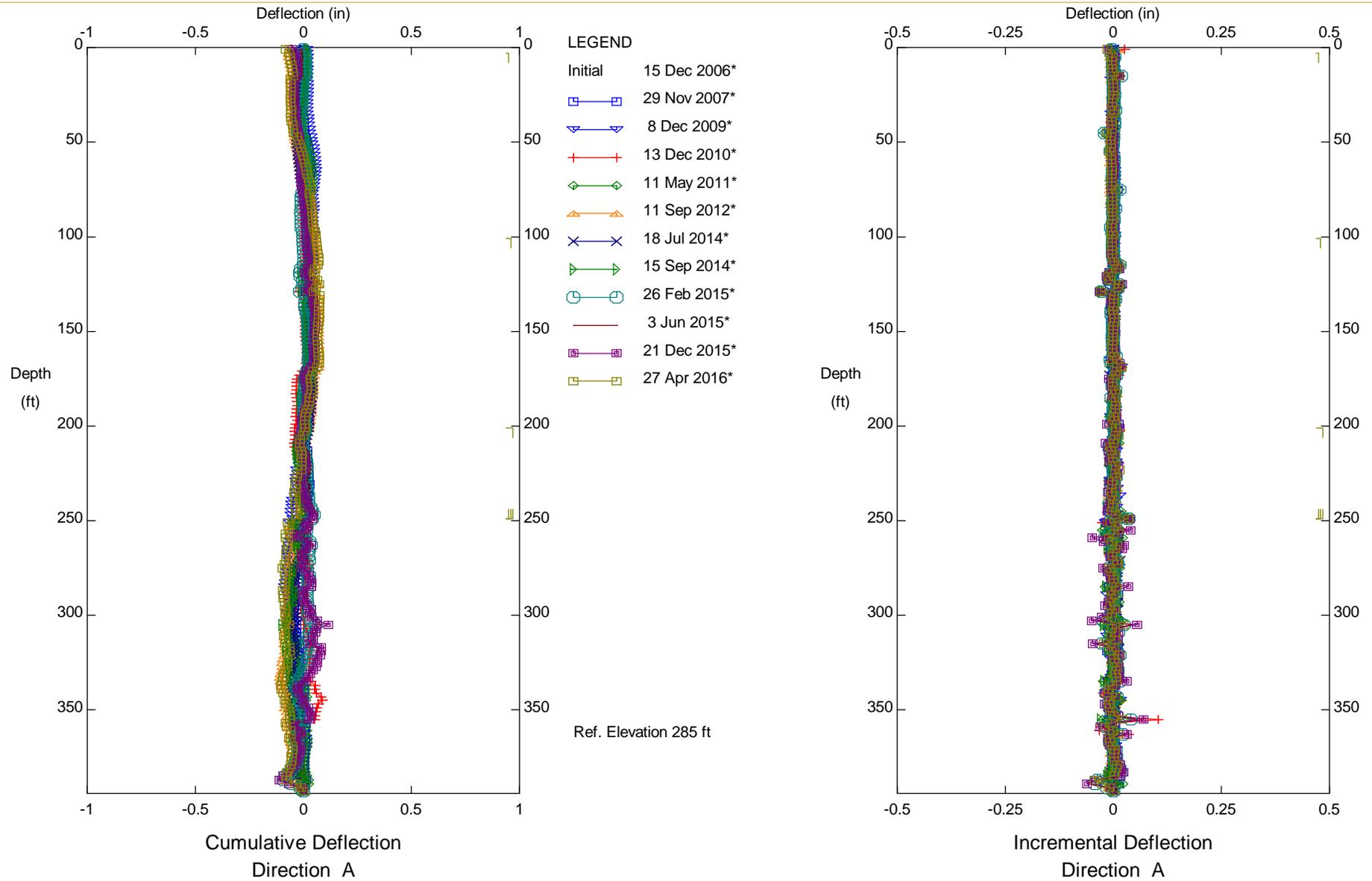
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CENTRAL REGION



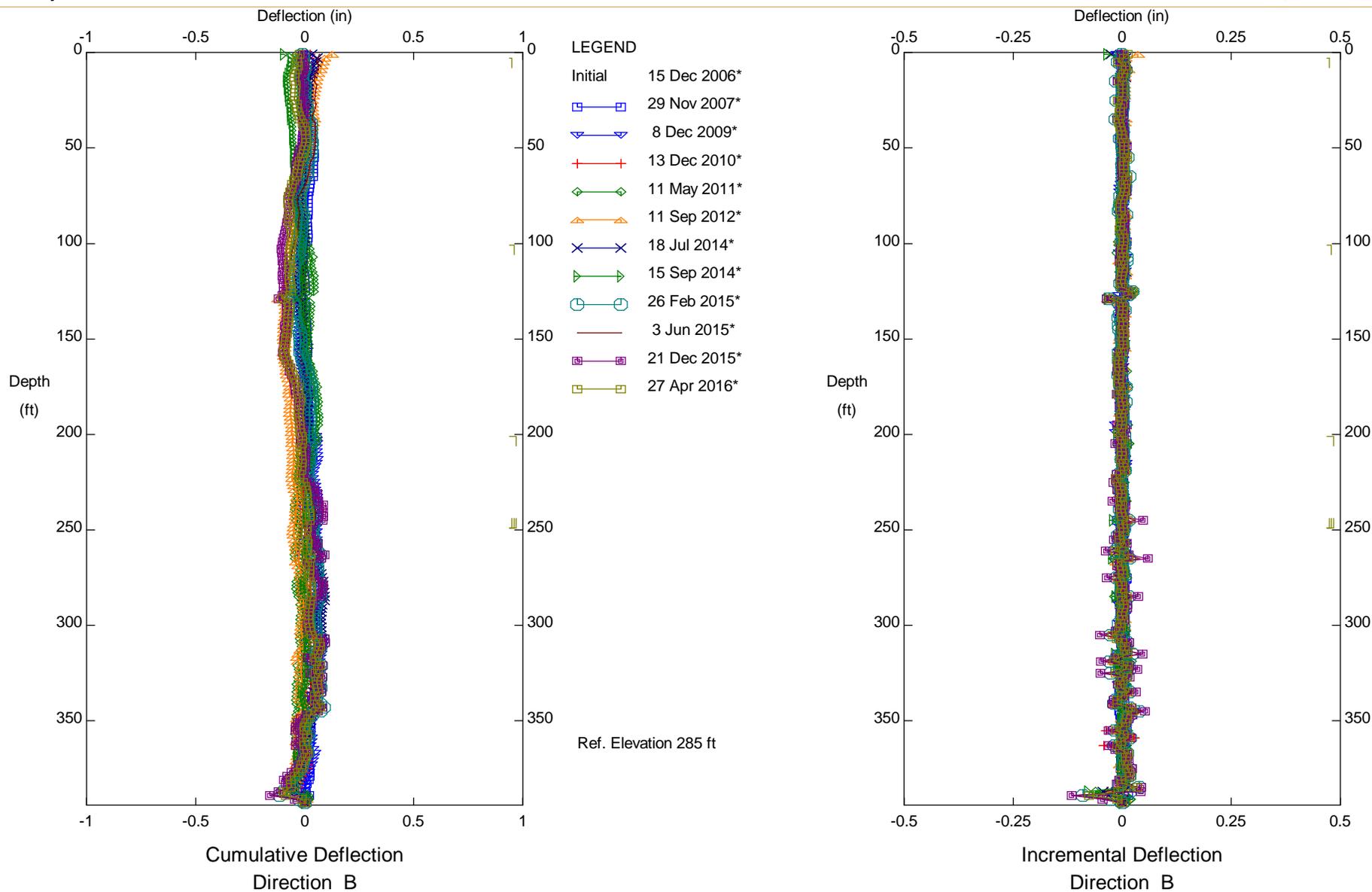
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CENTRAL REGION



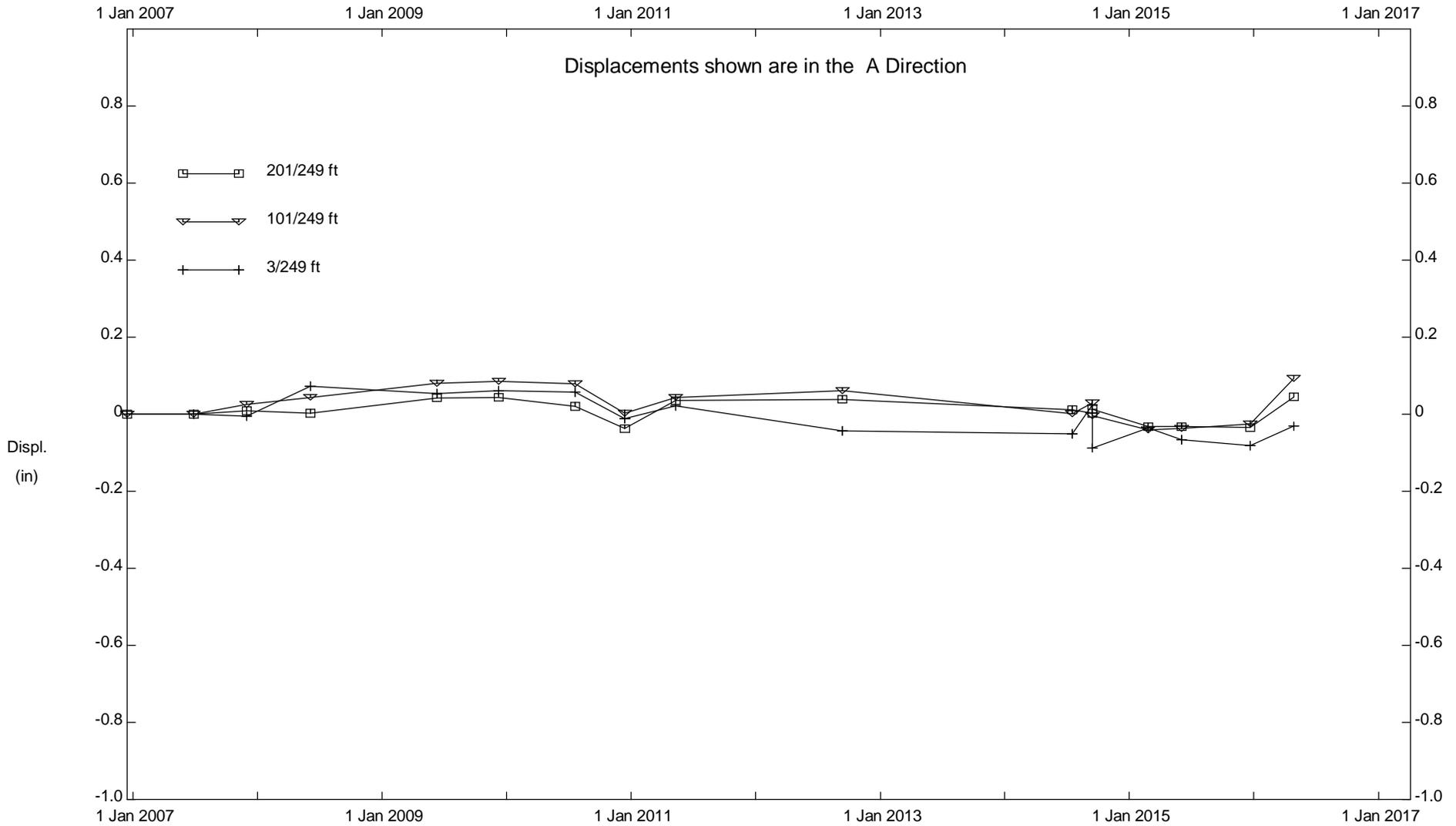
BIG ROCK MESA, Inclinometer SP-16A
CENTRAL REGION

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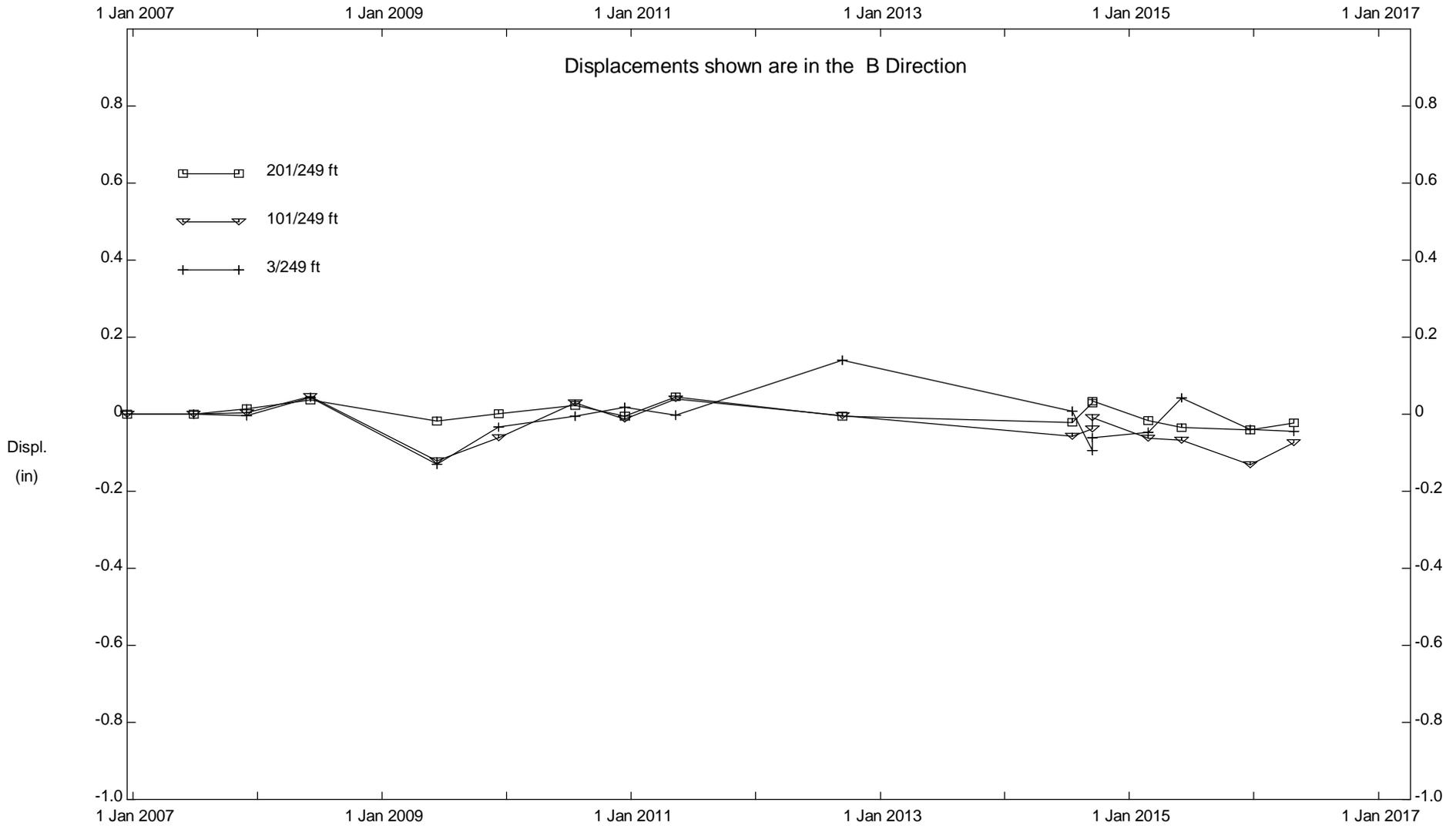
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CENTRAL REGION

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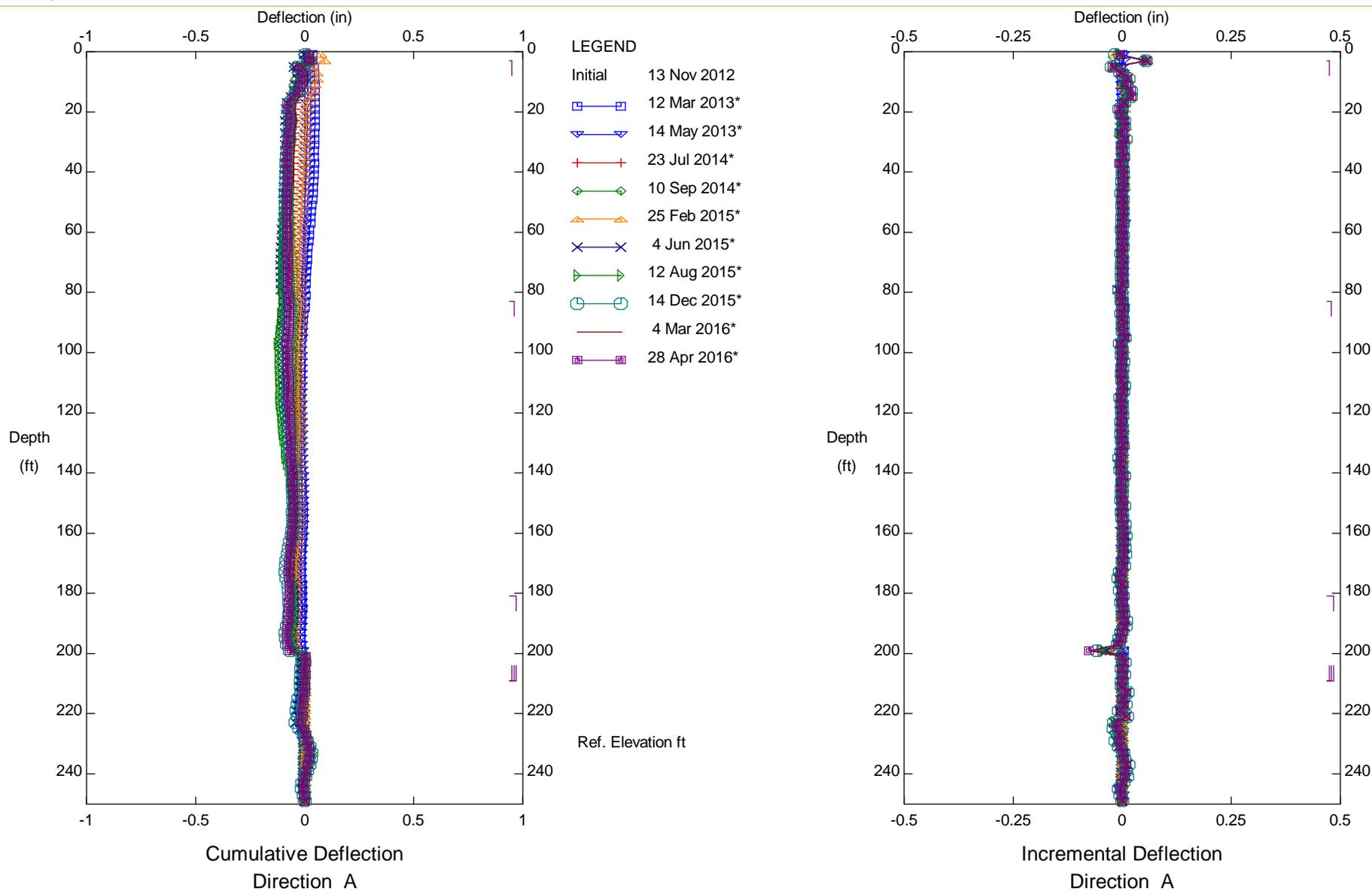
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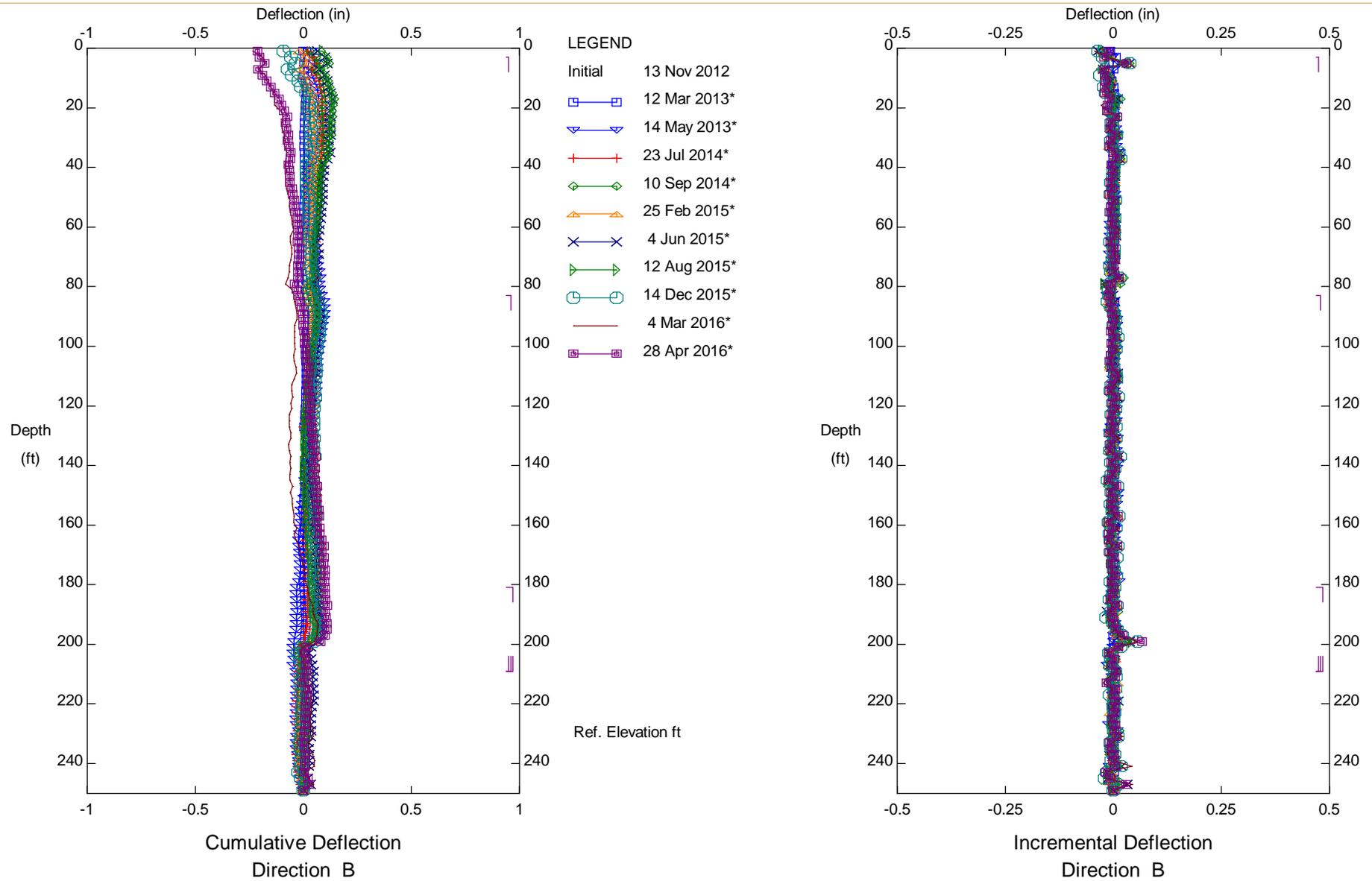
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CENTRAL REGION



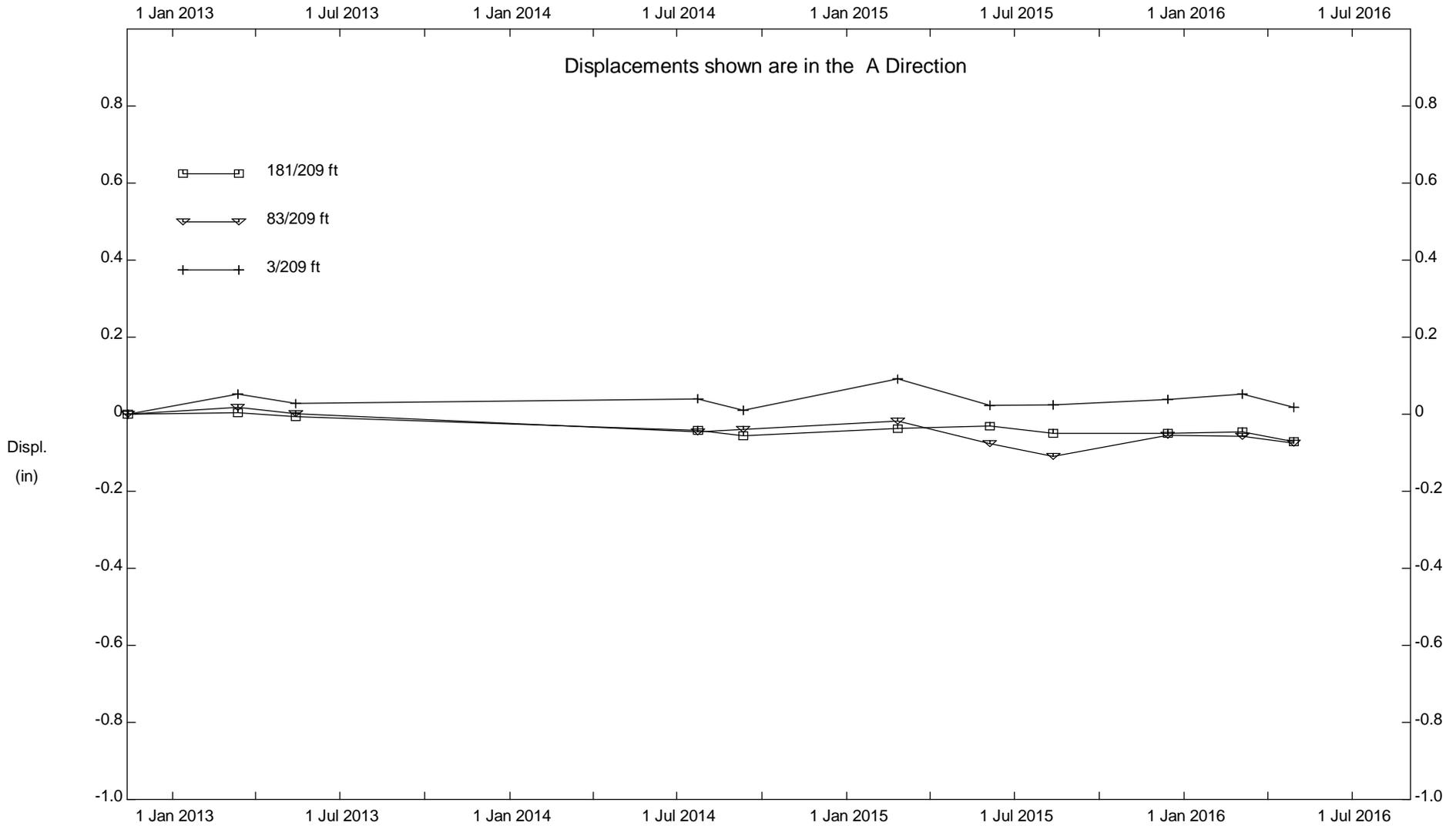
BRM, Inclinometer SP-17B

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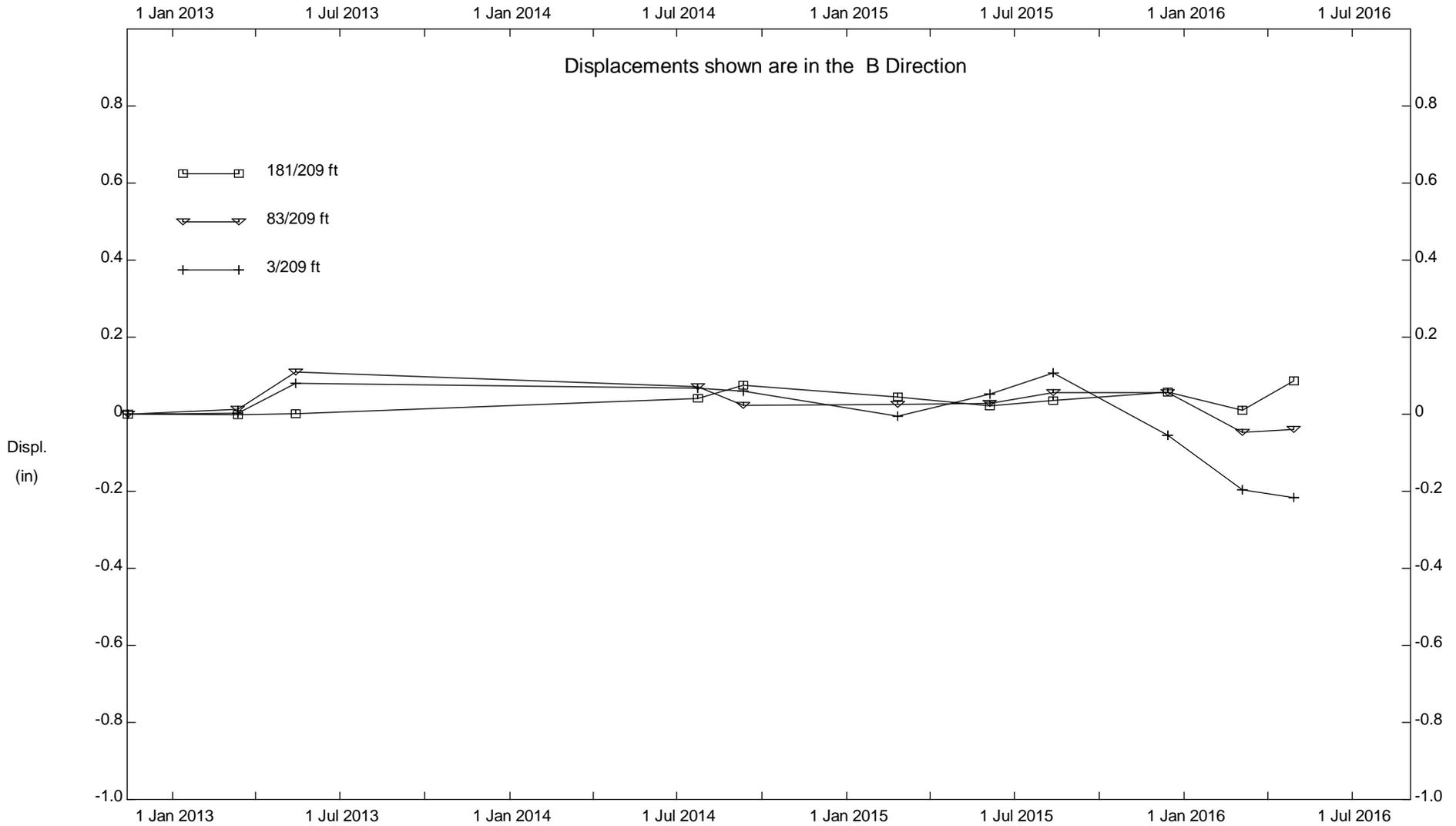


BRM, Inclinometer SP-17B

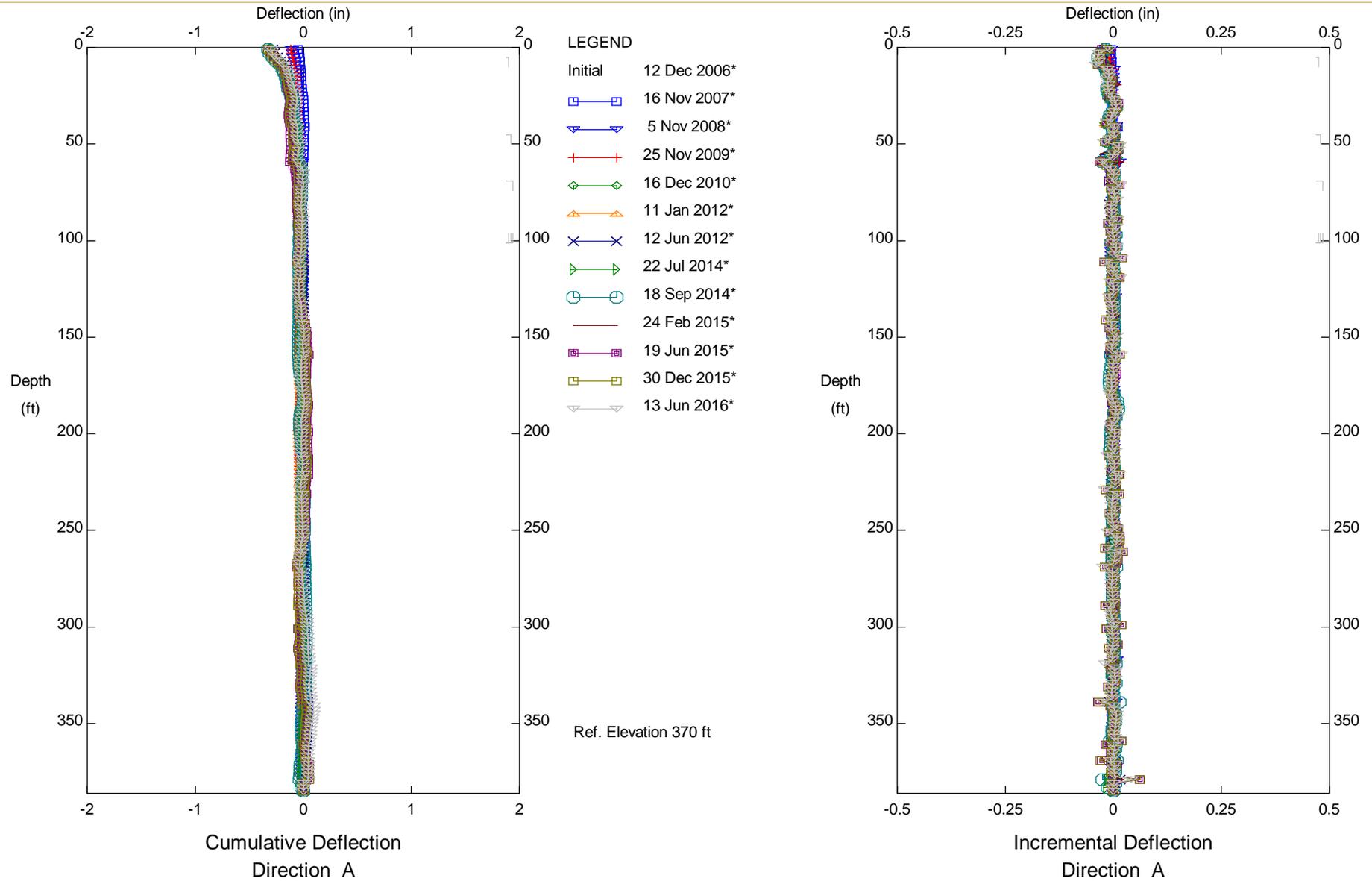
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BRM, Inclinator SP-17B

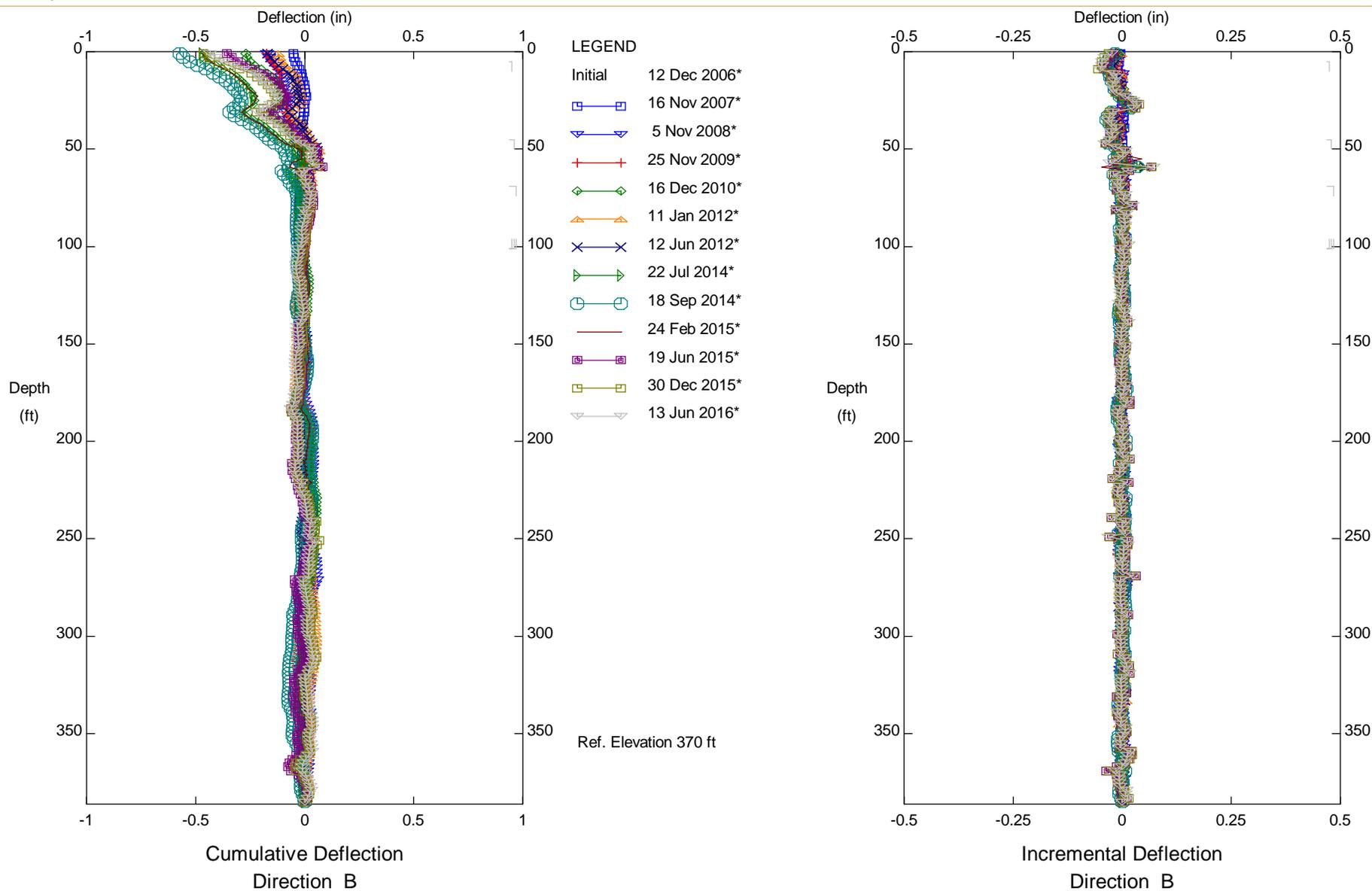


BRM, Inclinator SP-17B



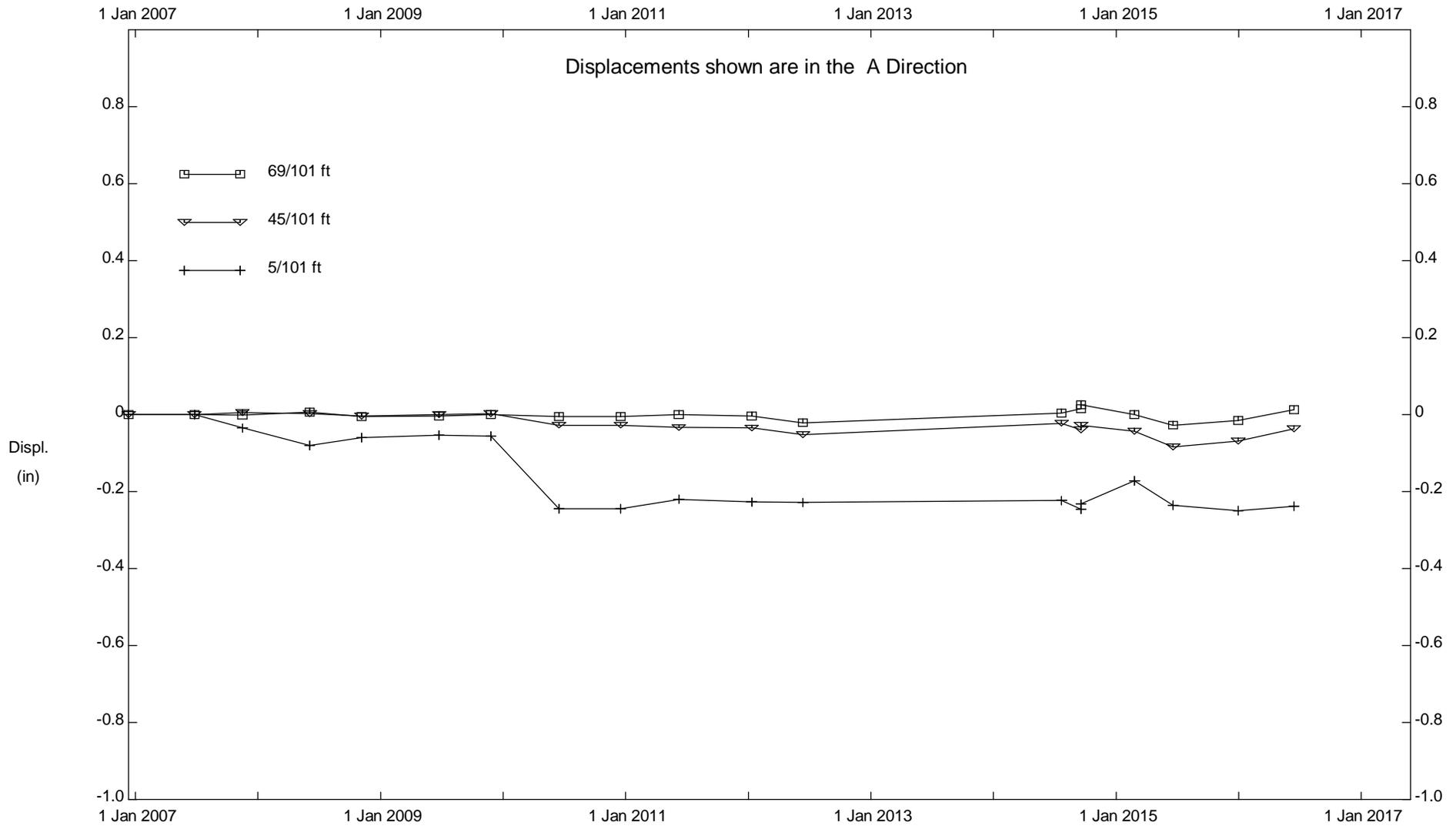
BIG ROCK MESA, Inclinometer SP-24
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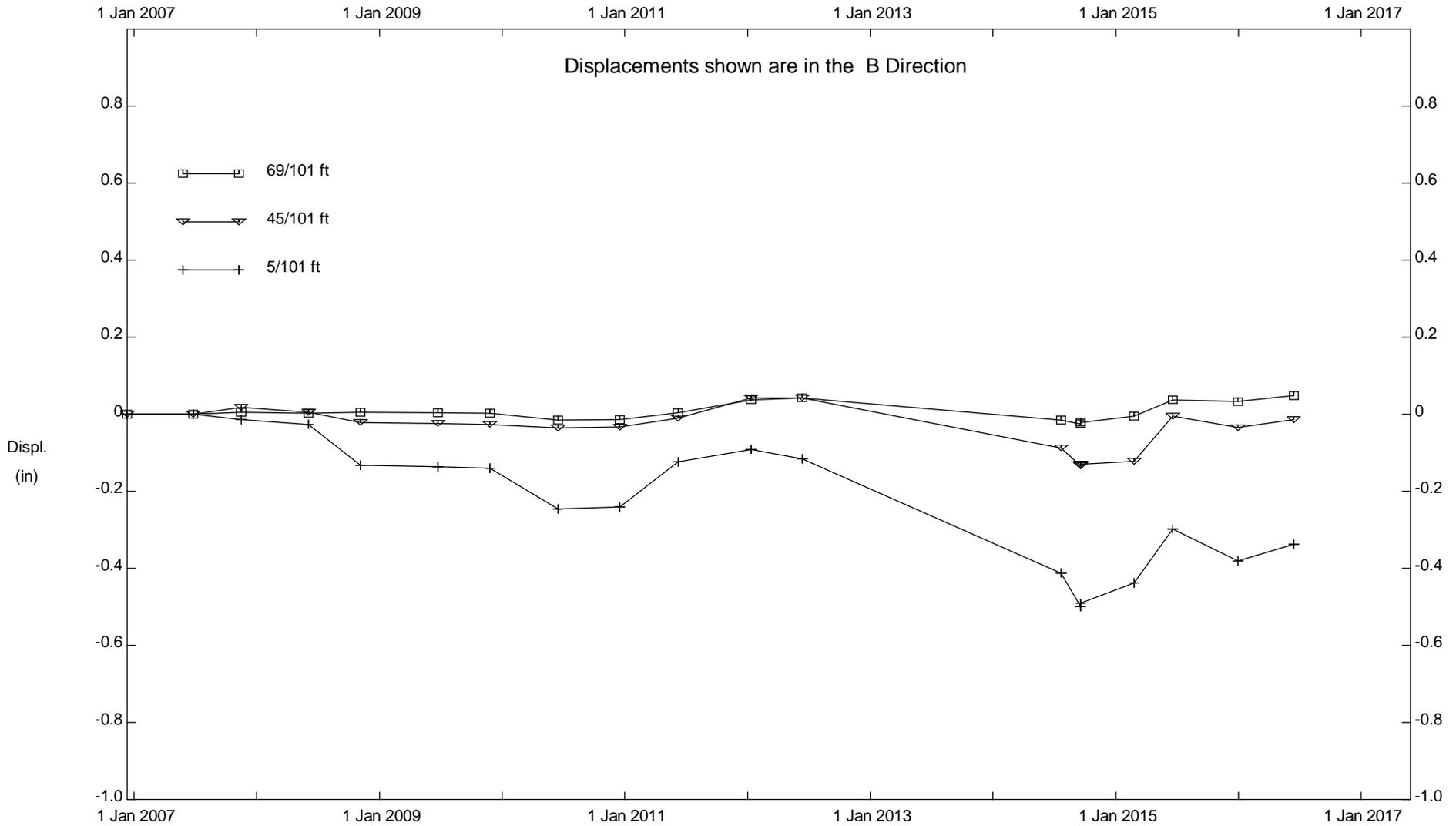
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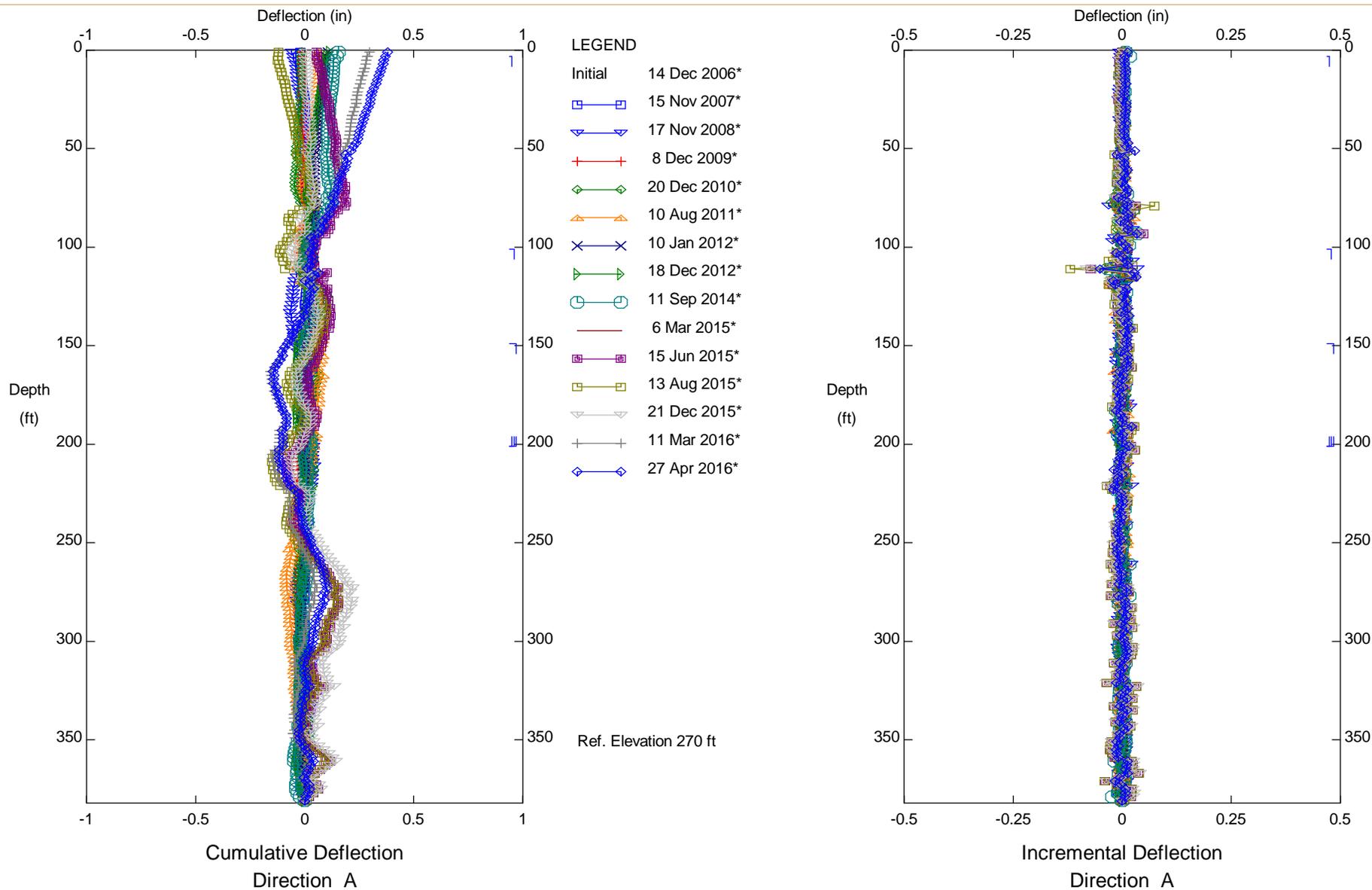
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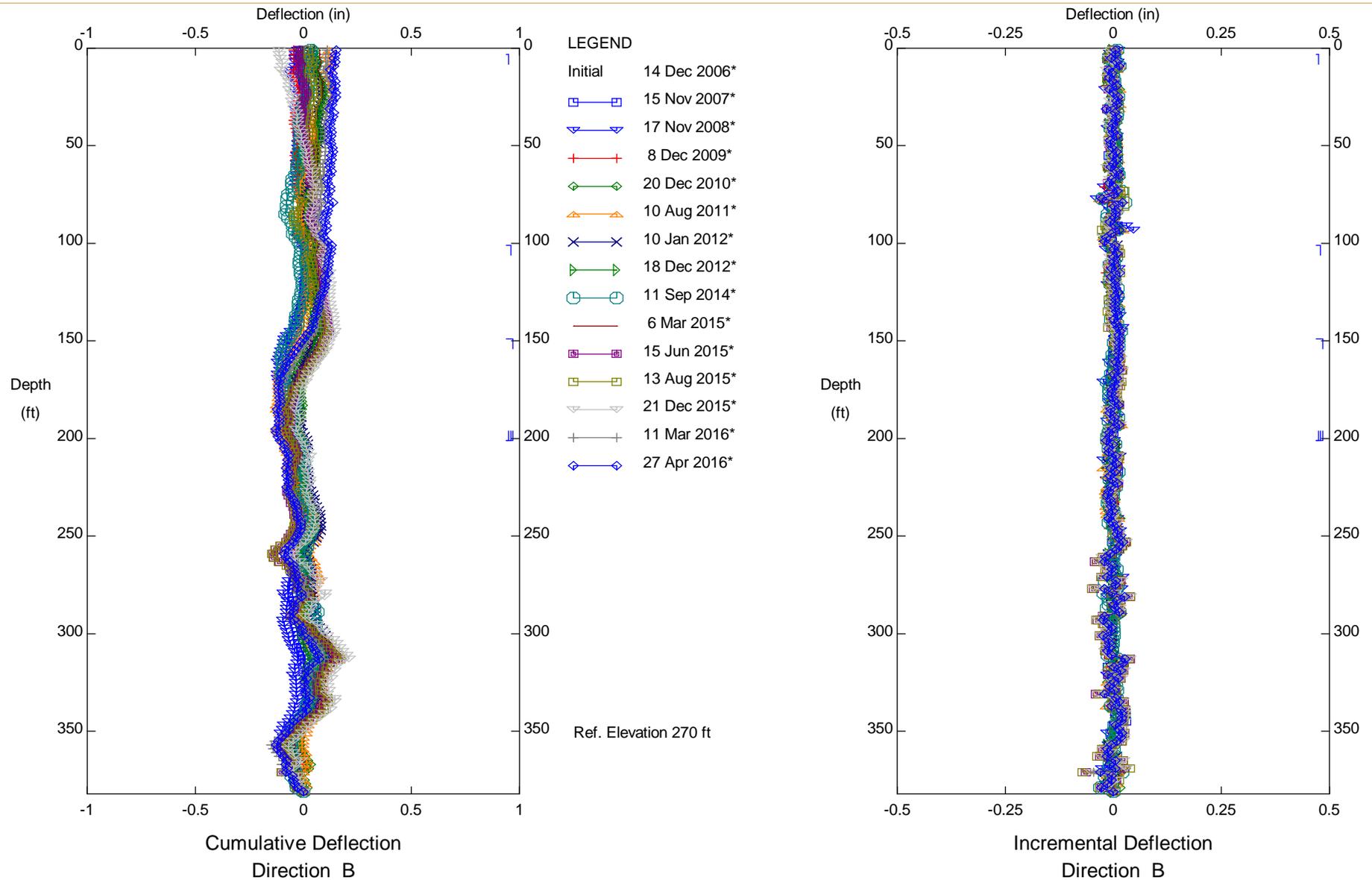
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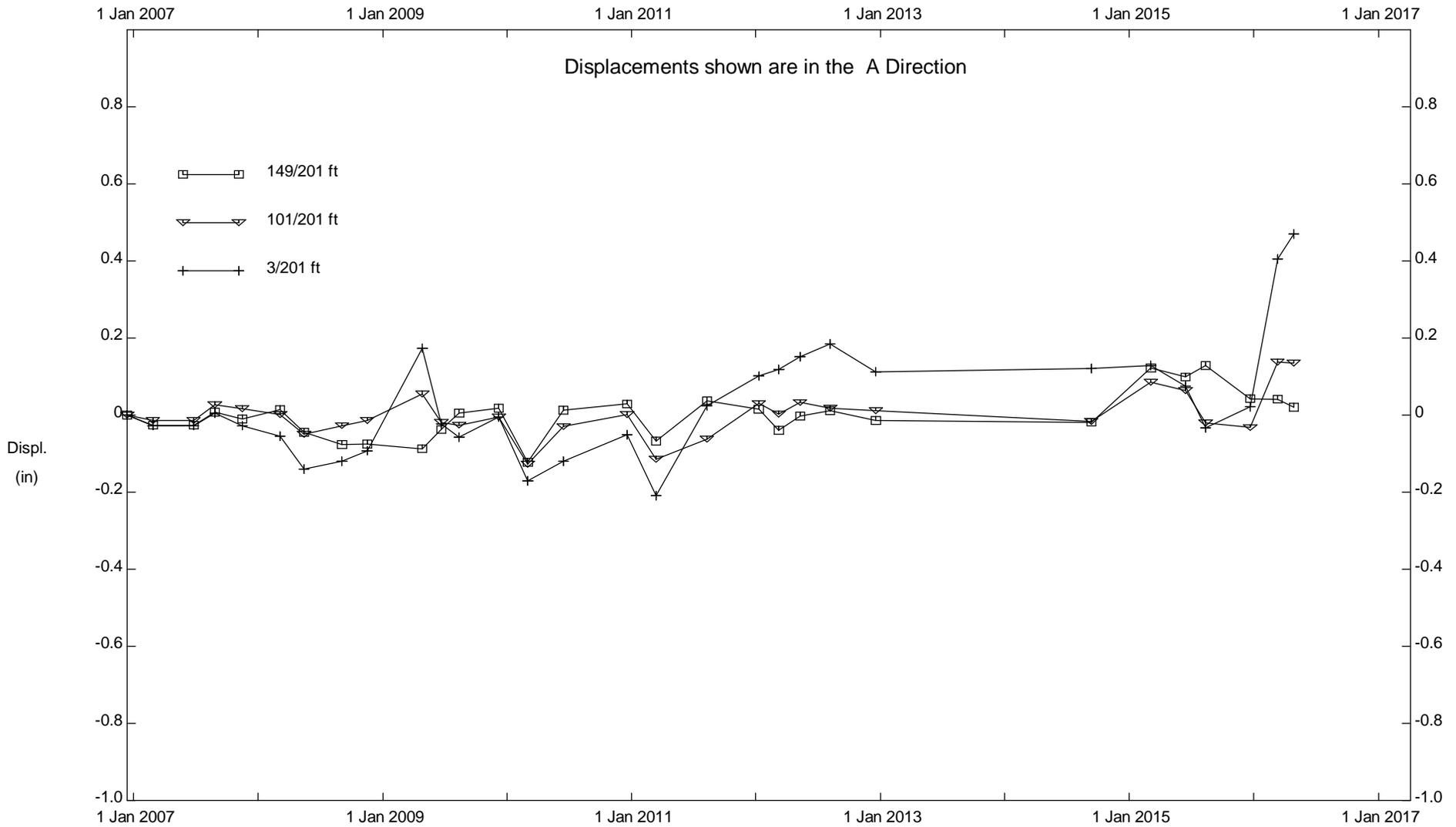
BIG ROCK MESA, Inclinometer SP-34
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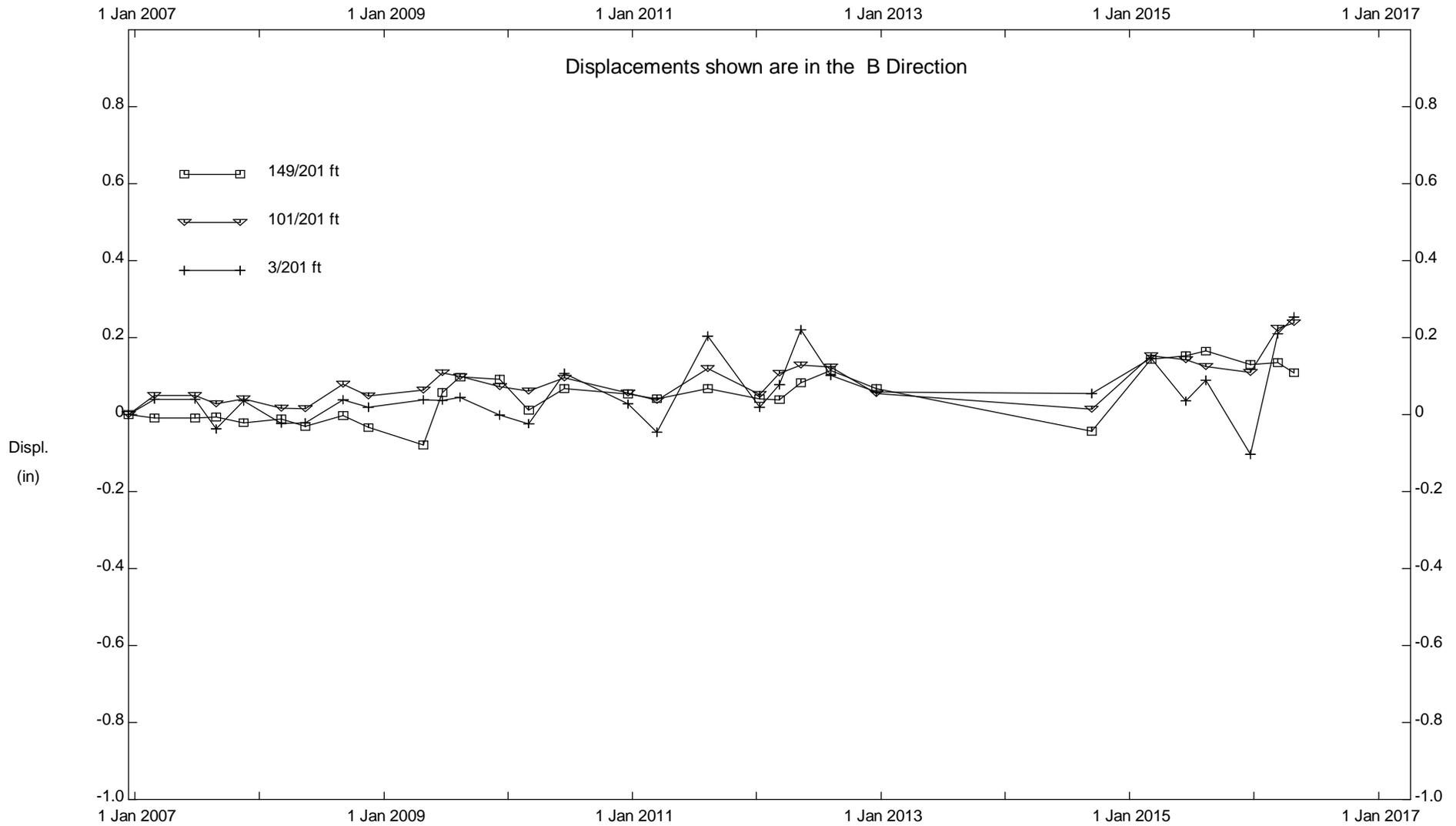
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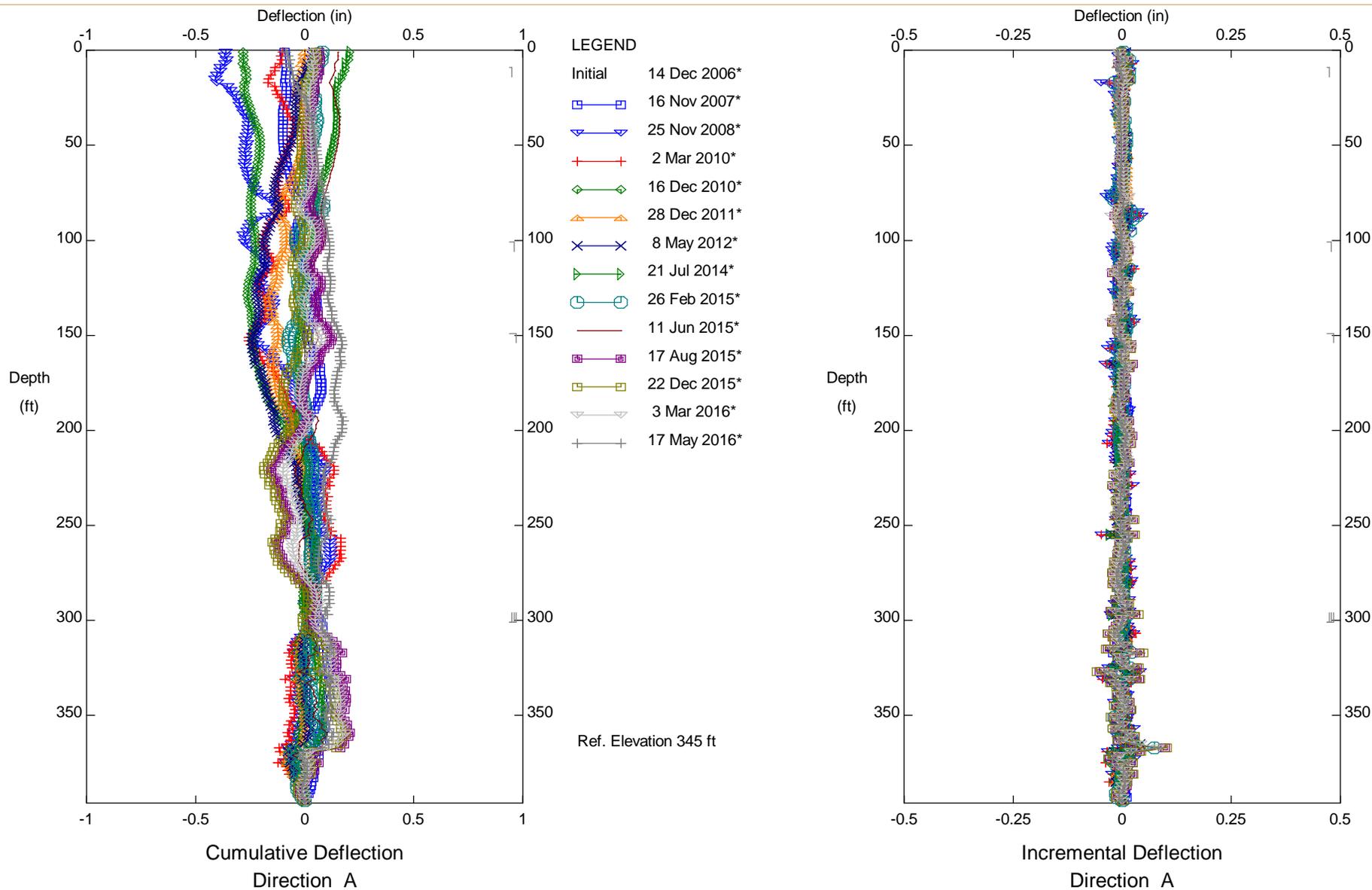
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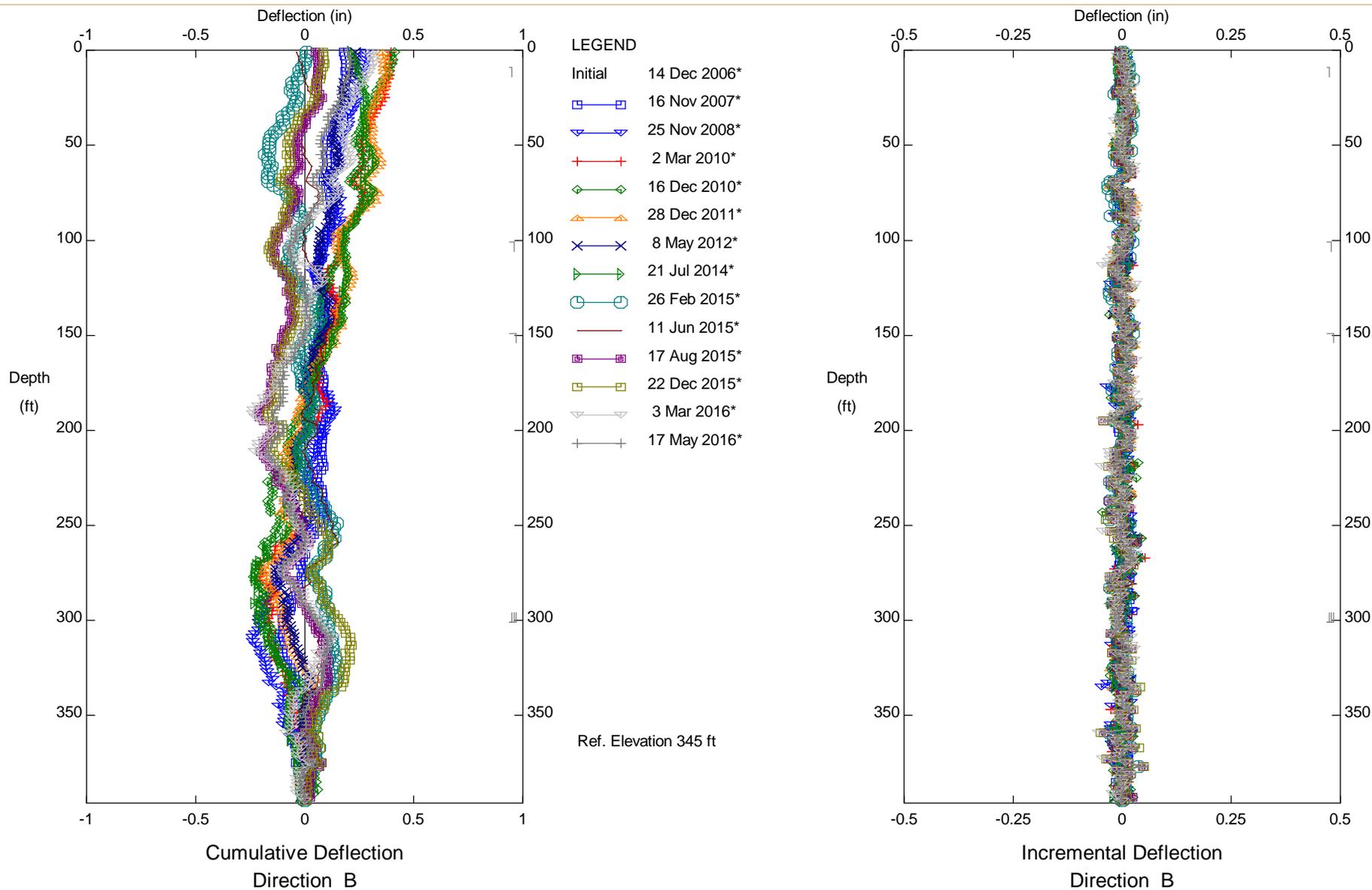
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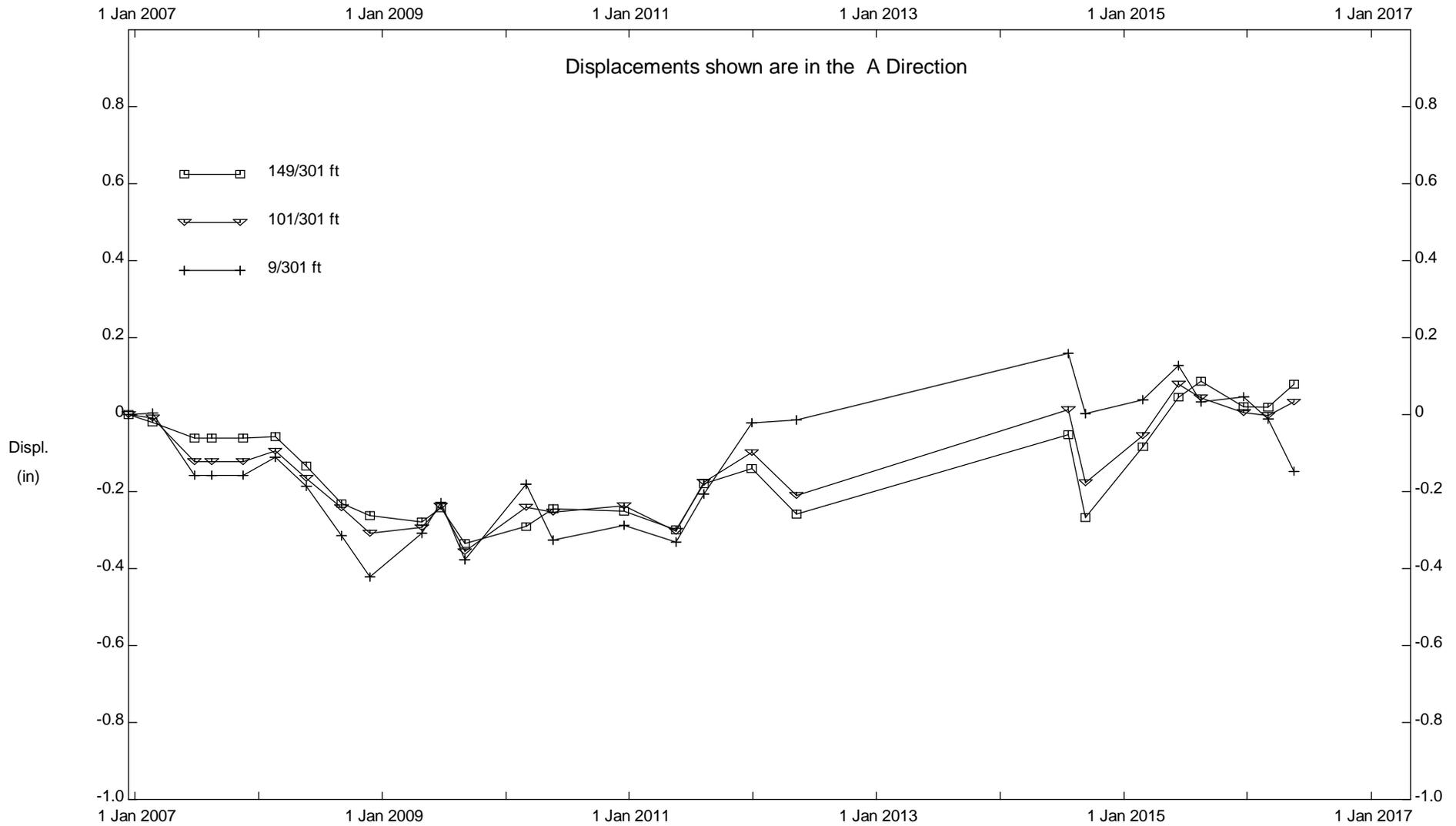
BIG ROCK MESA, Inclinometer SP-35
CENTRAL REGION

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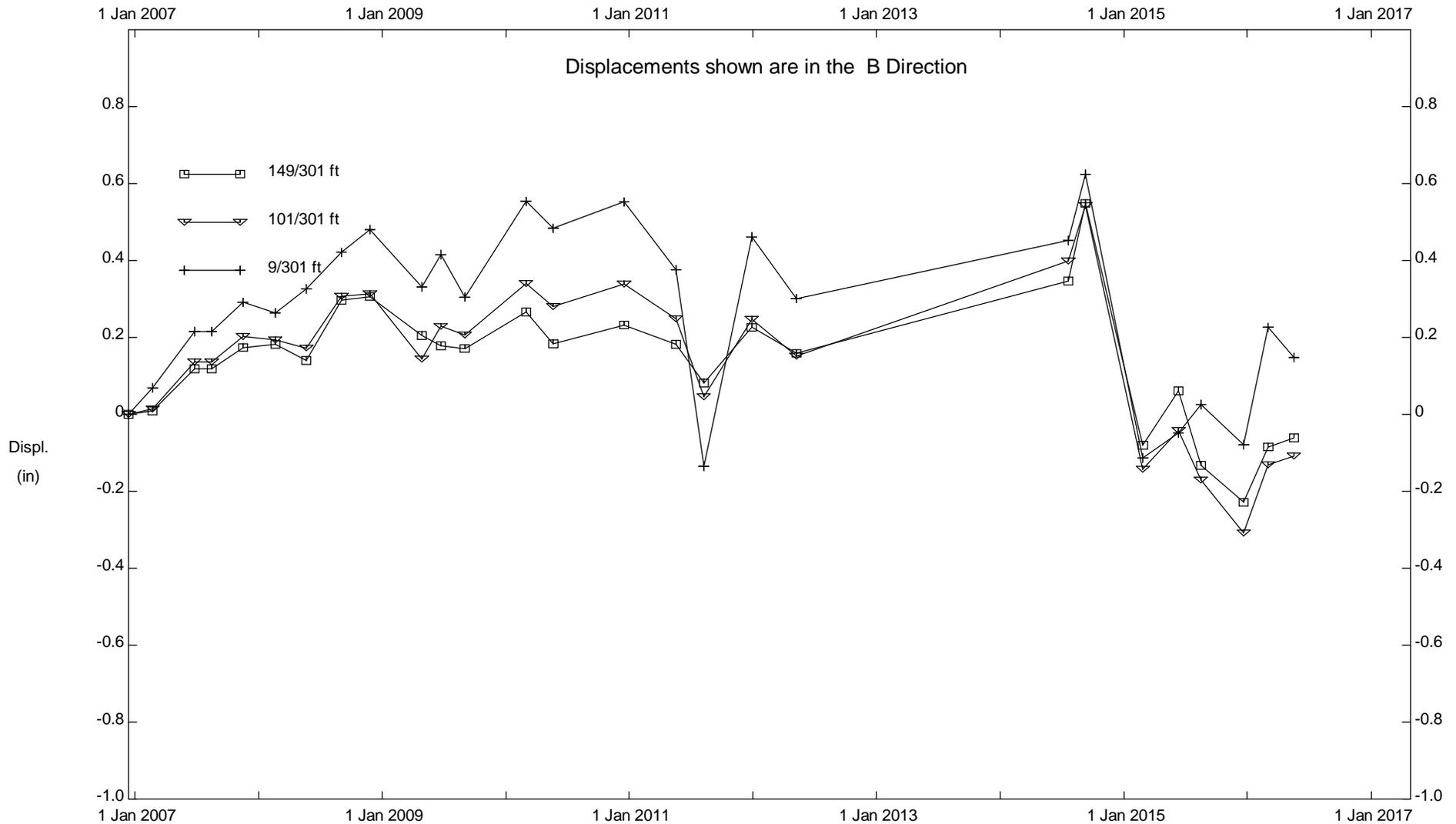
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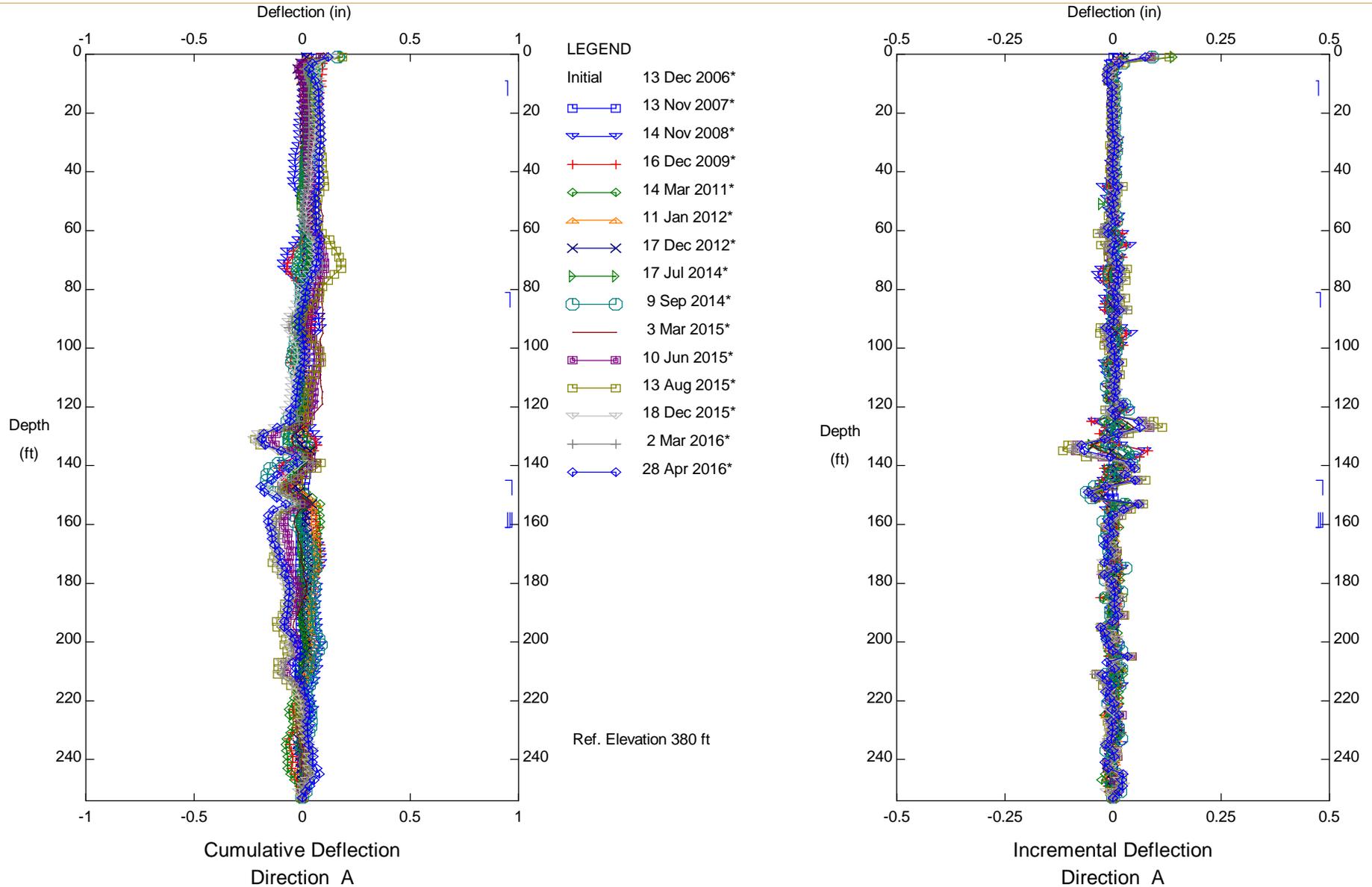
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PLATE D-22c



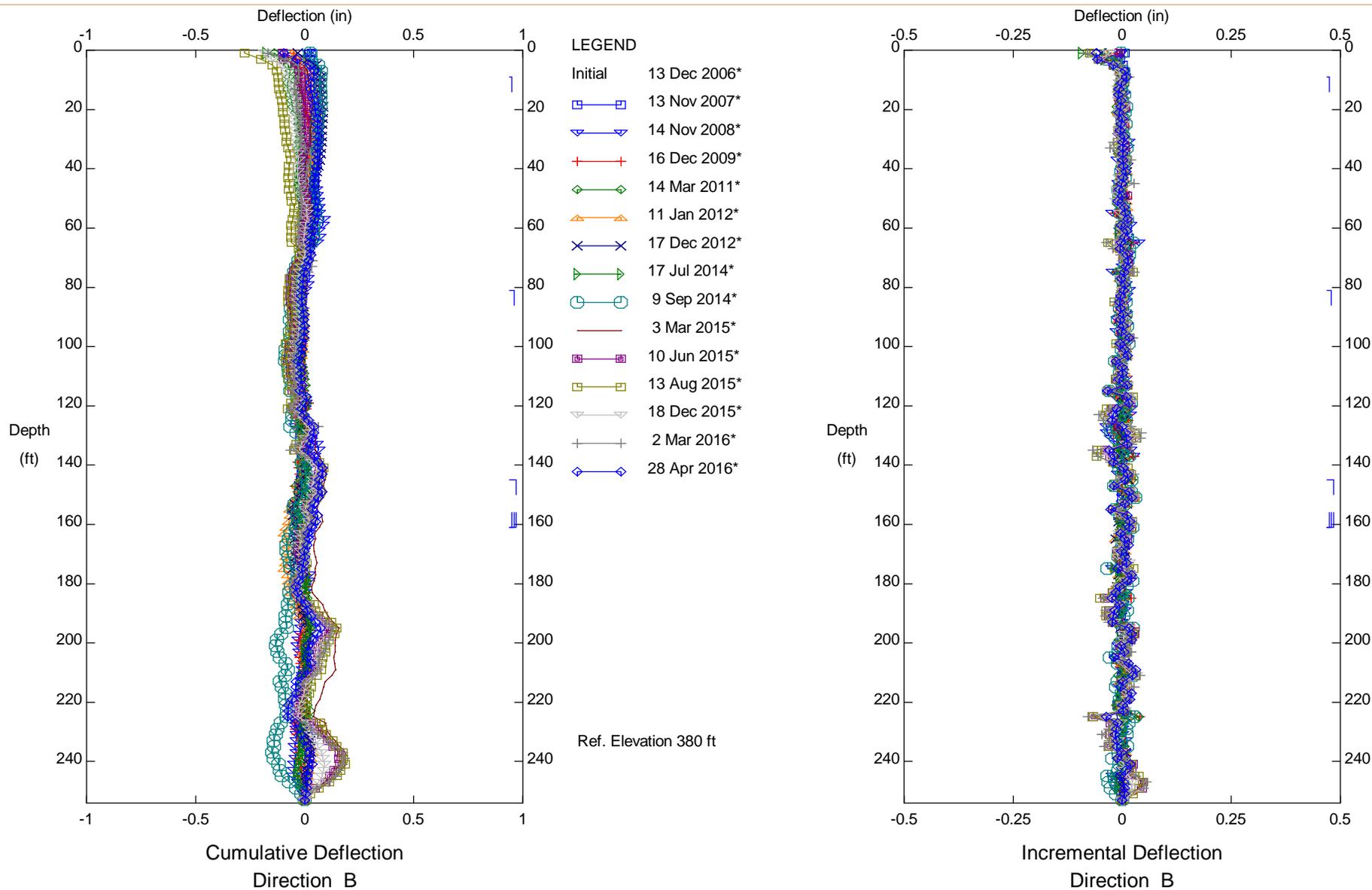
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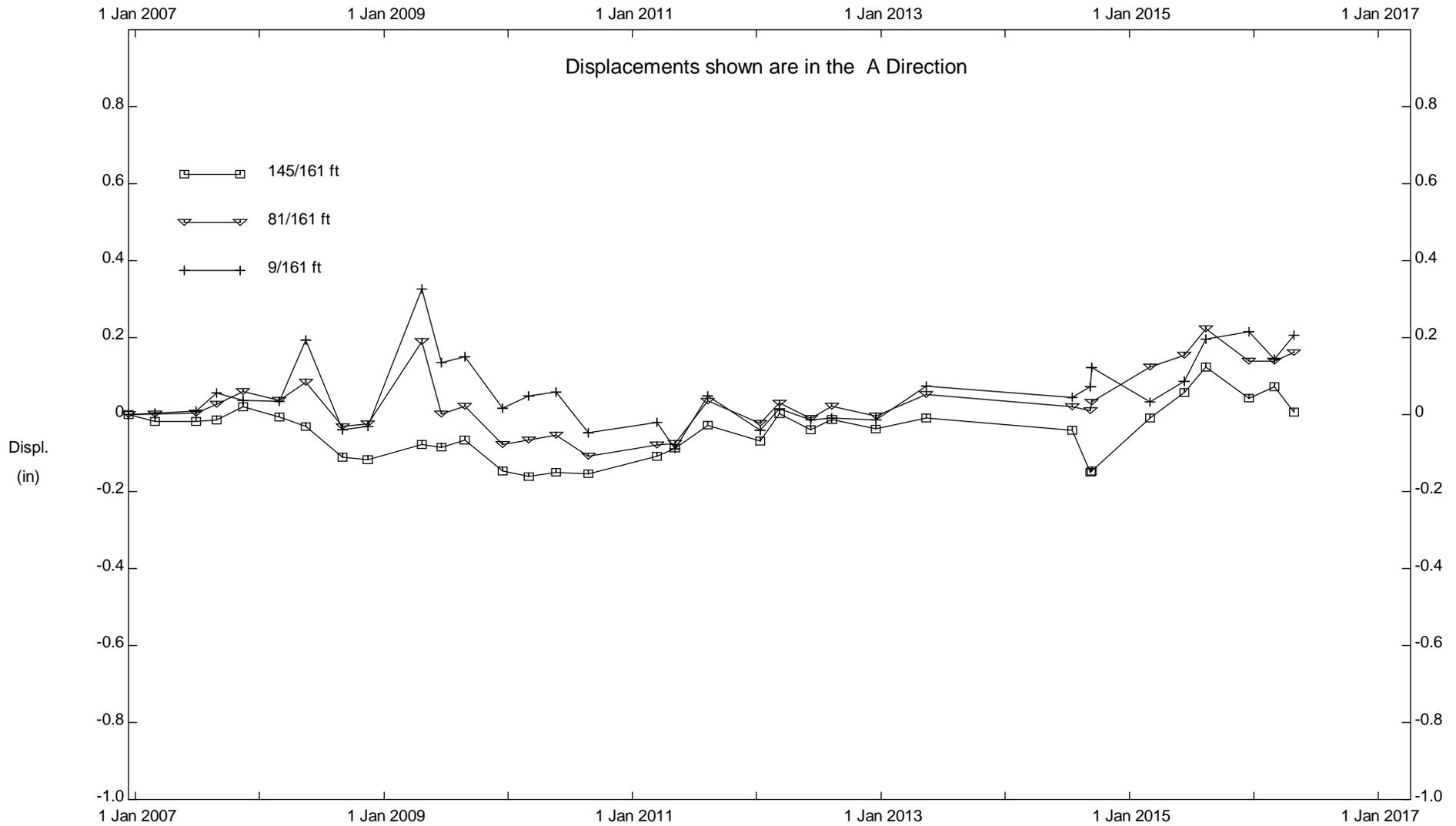
BIG ROCK MESA, Inclinometer SP-36
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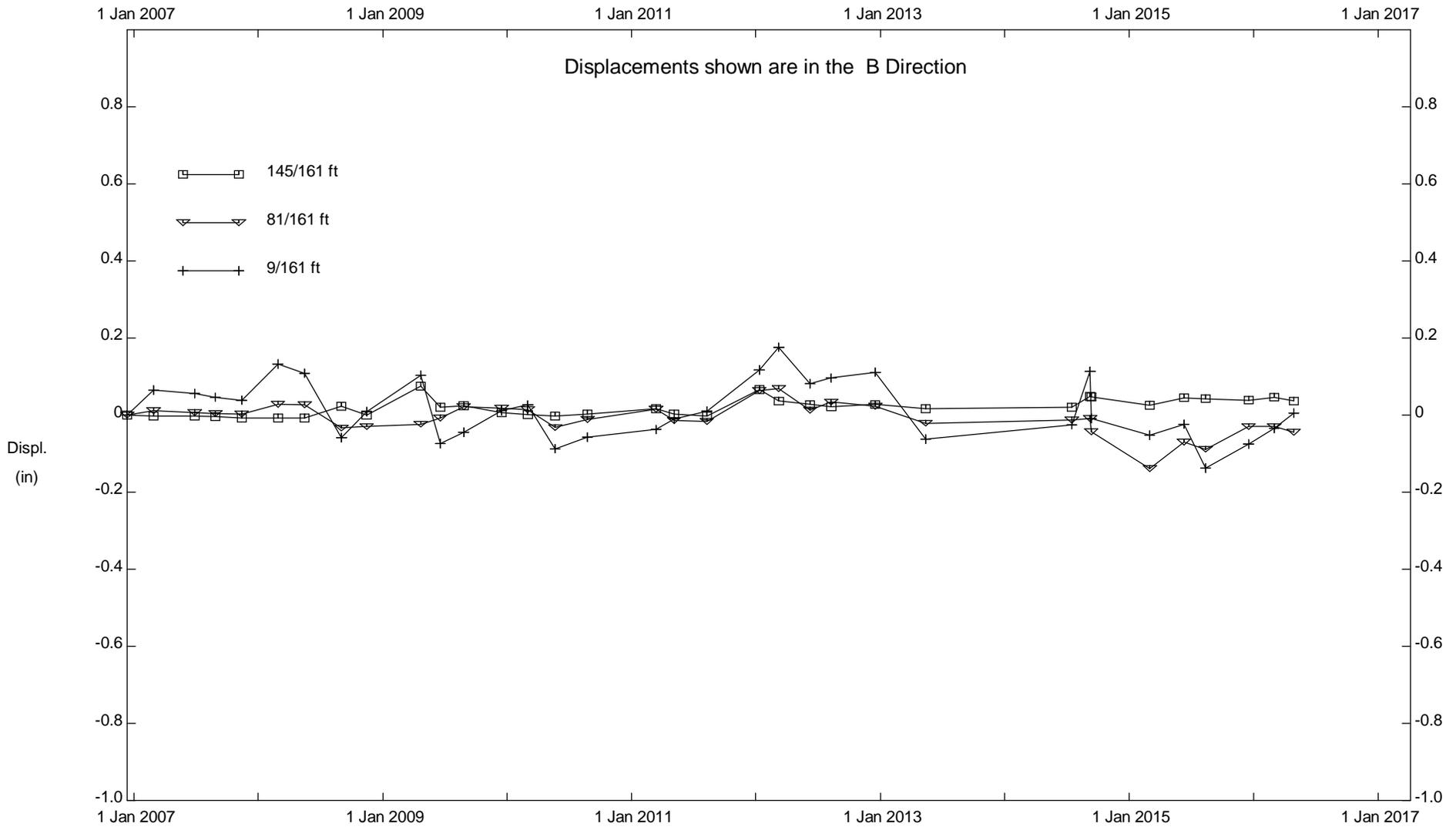
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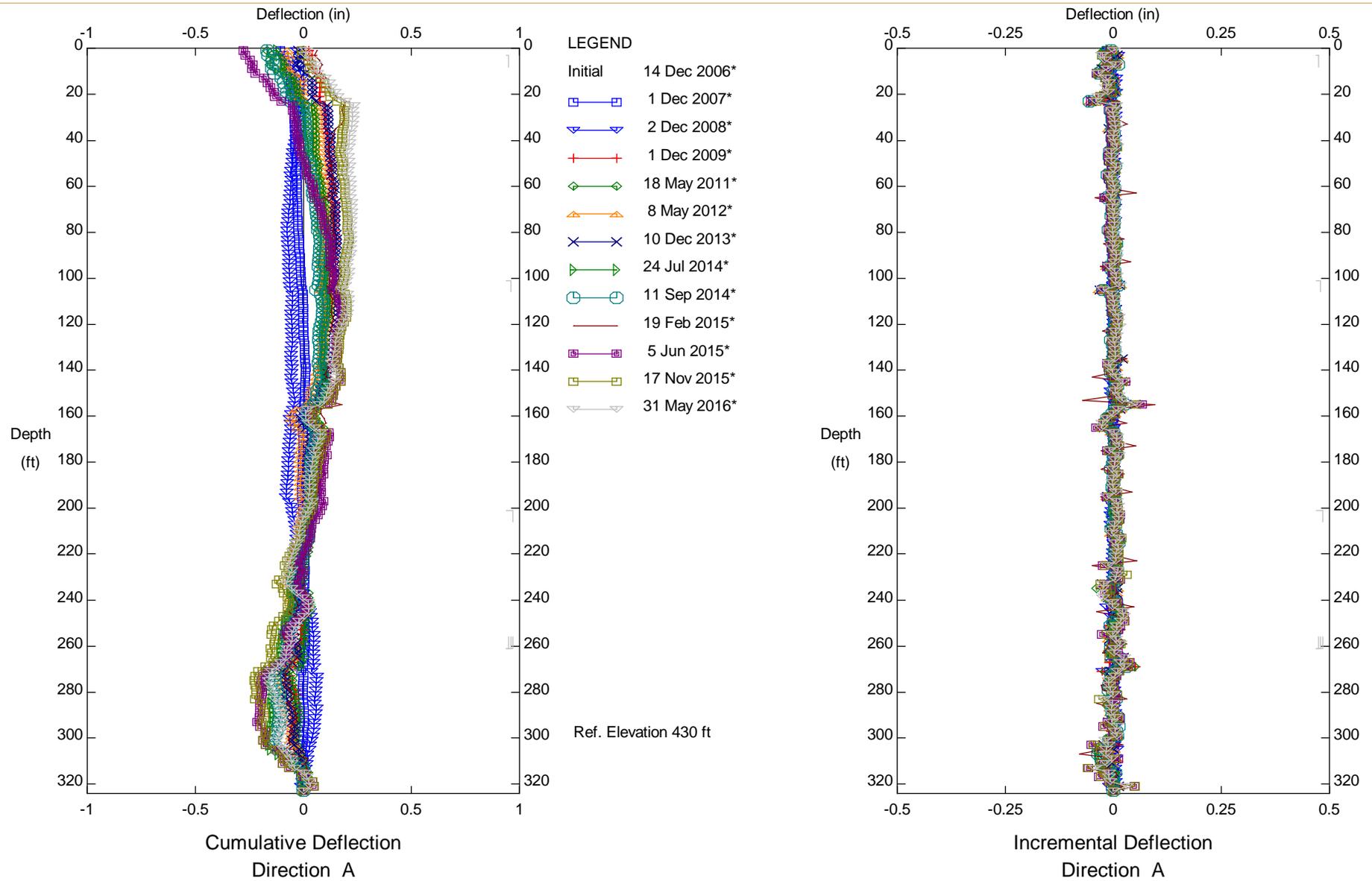
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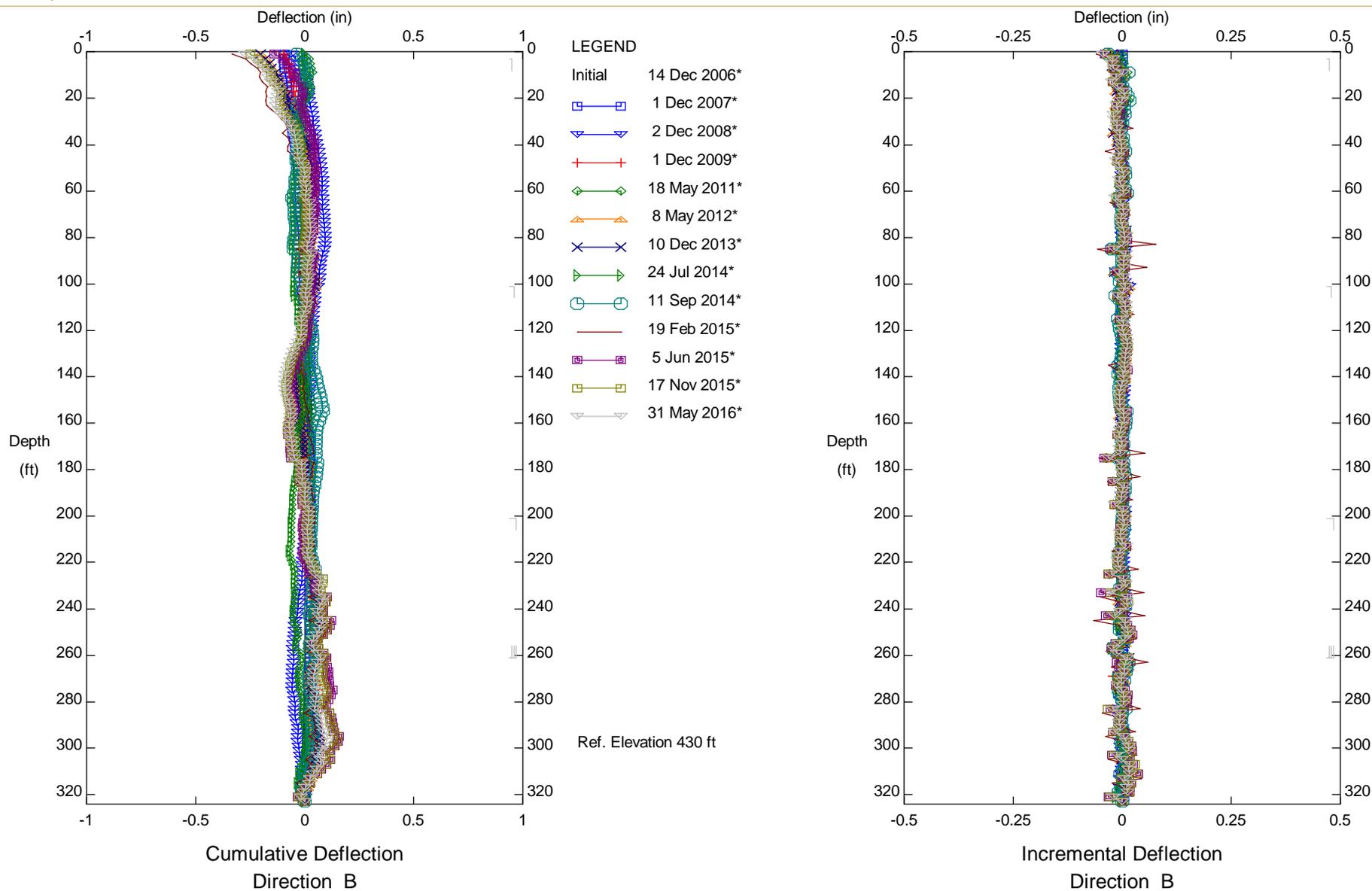
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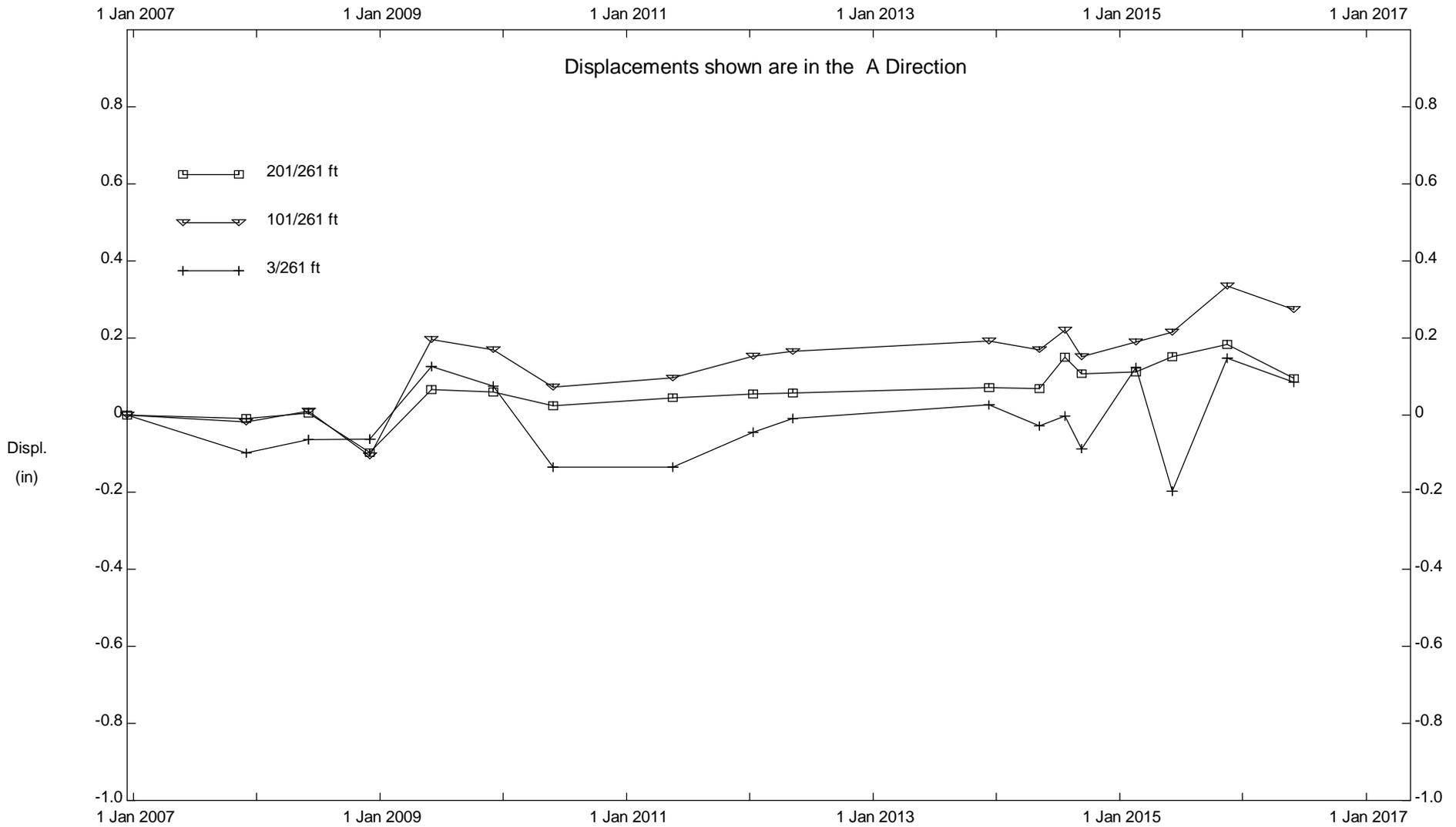
**BIG ROCK MESA, Inclinometer SP-20
WESTERN REGION**

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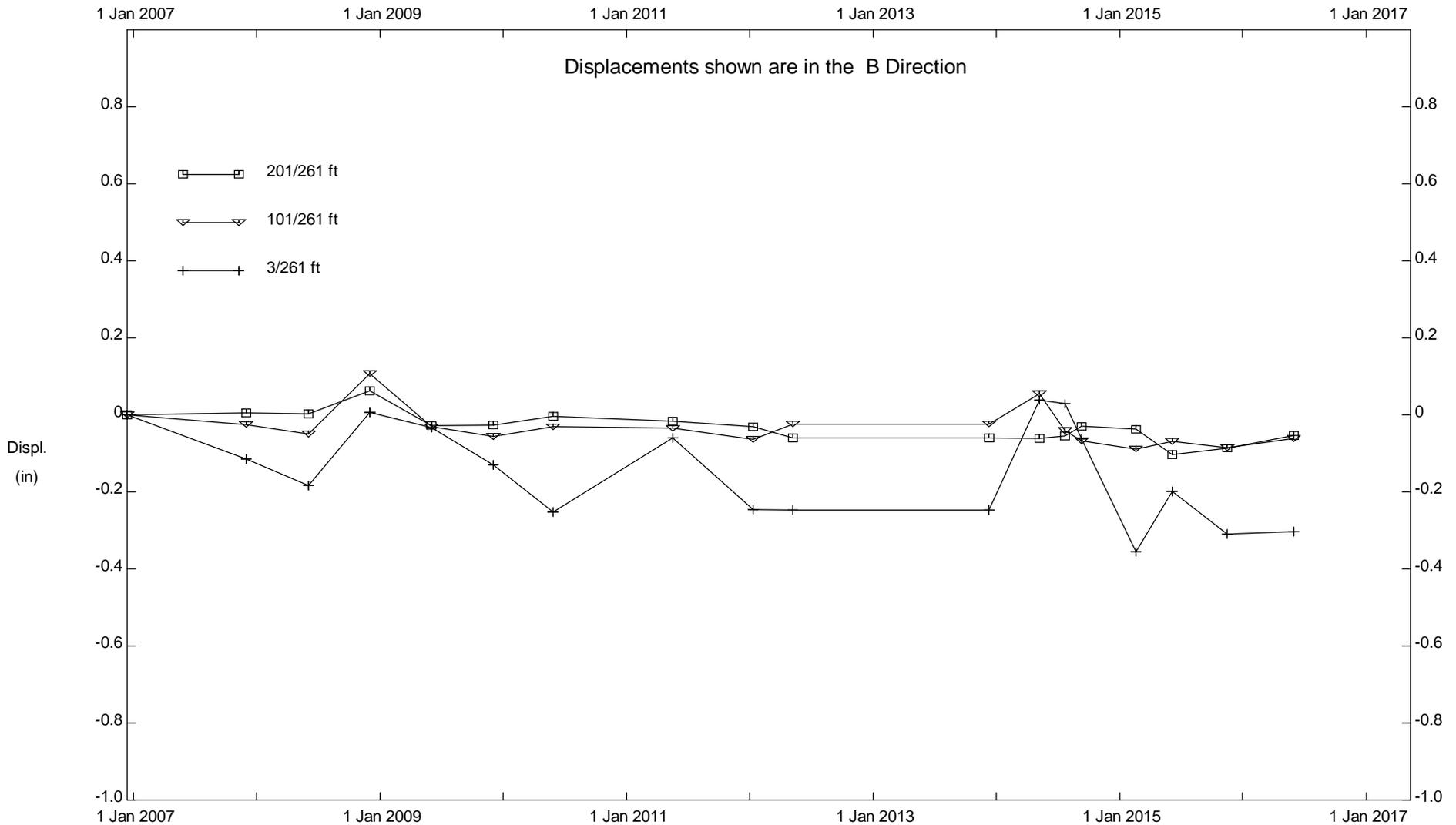
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WESTERN REGION**

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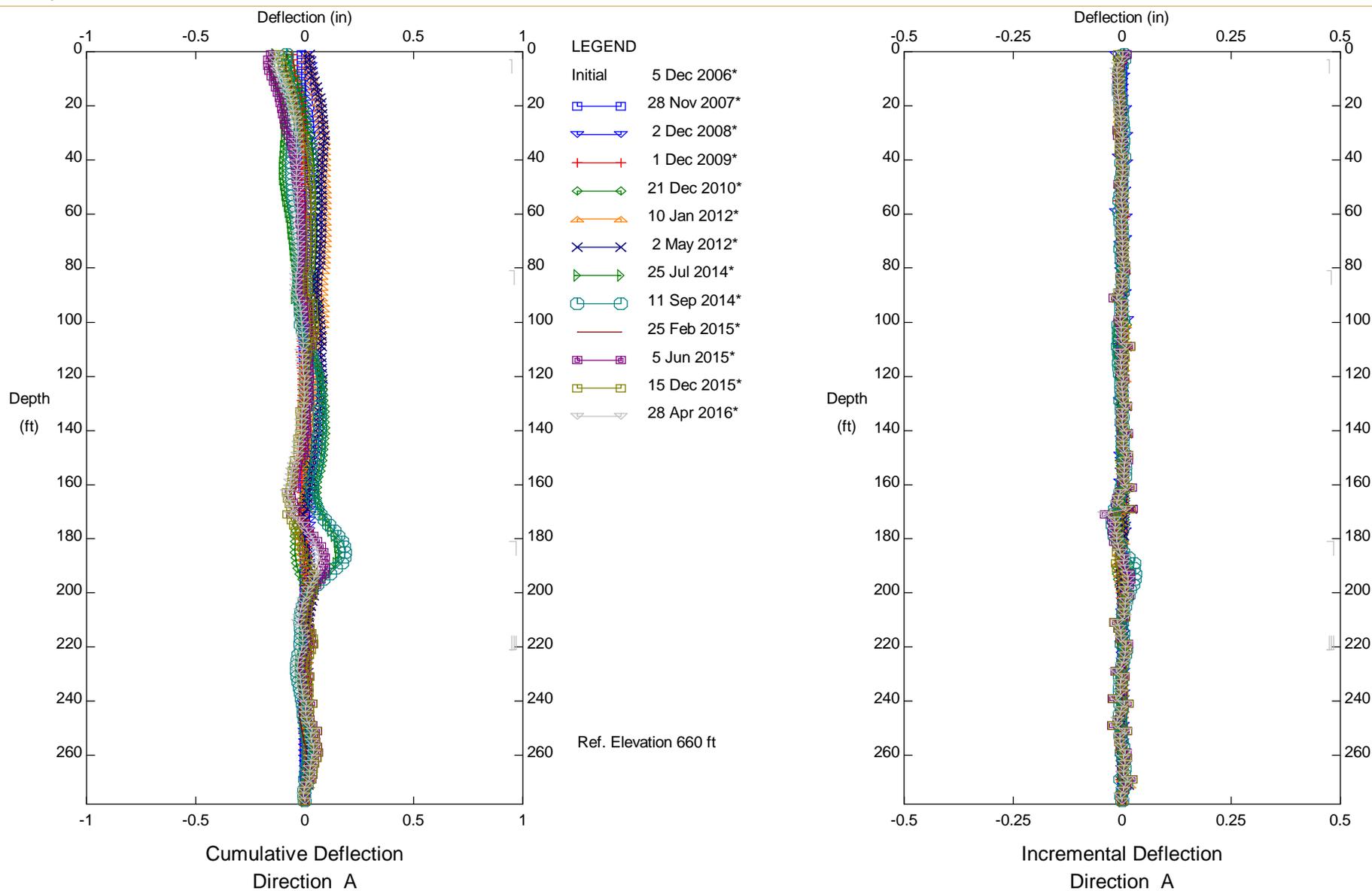
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WESTERN REGION



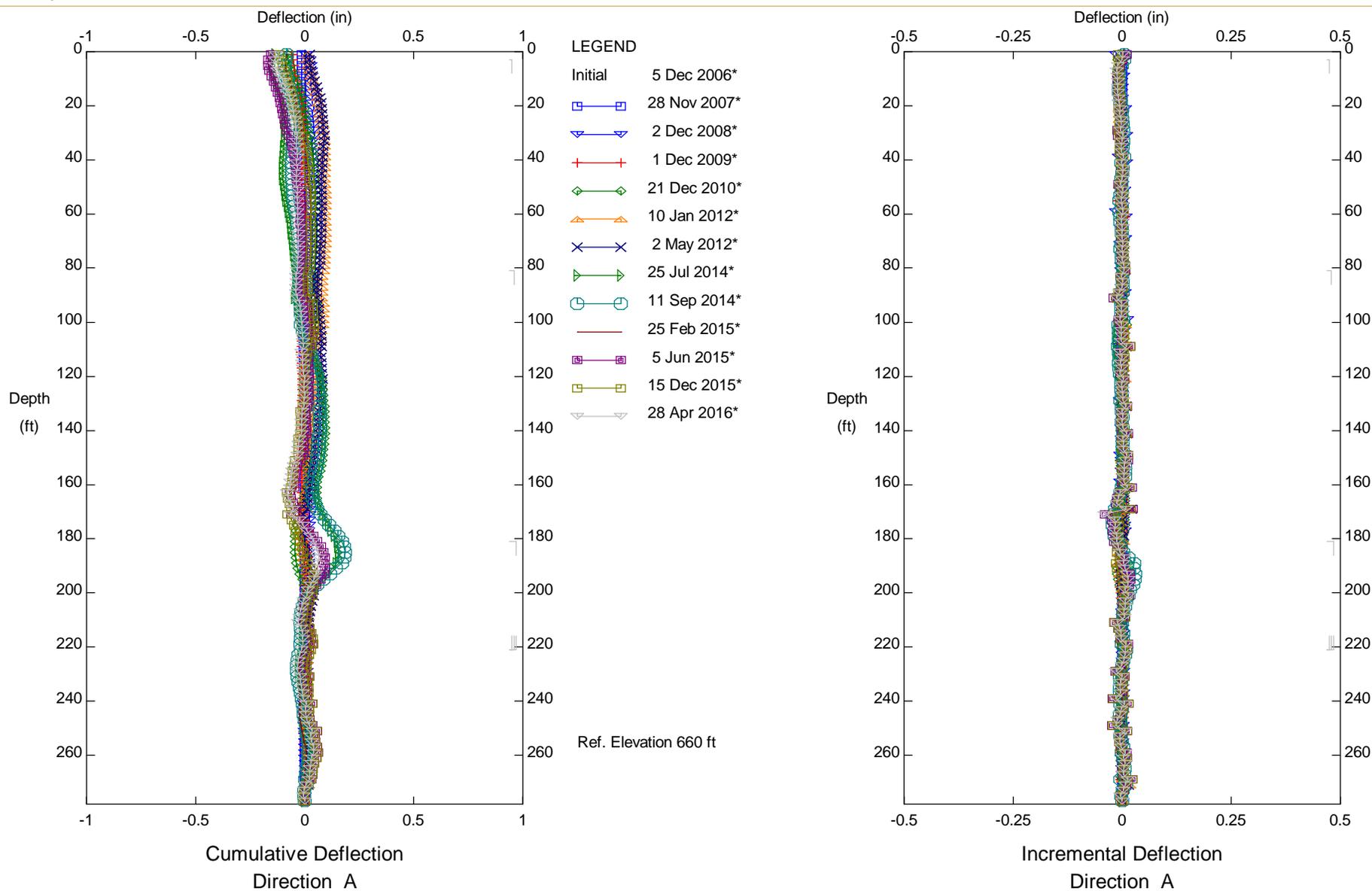
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WESTERN REGION



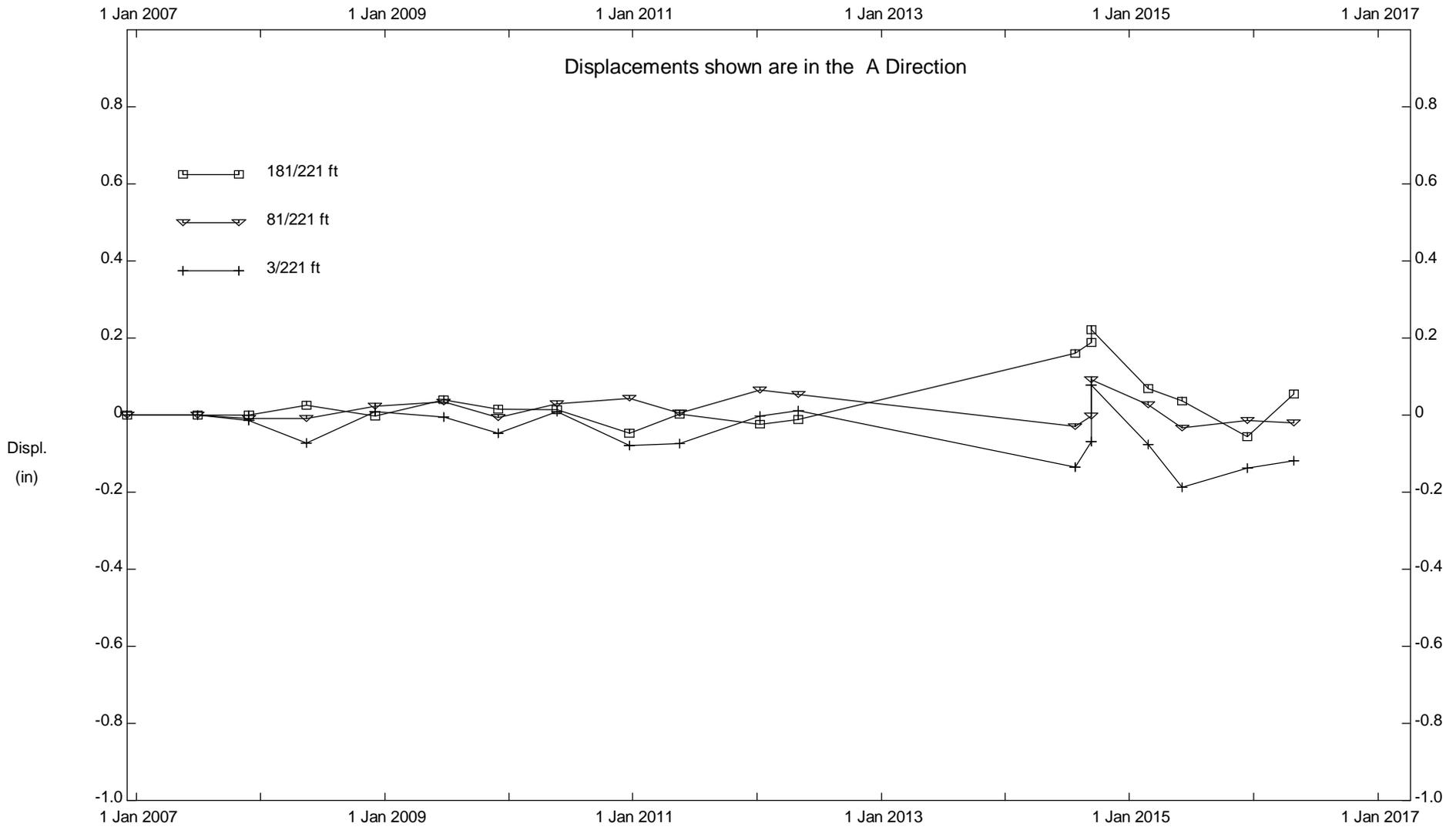
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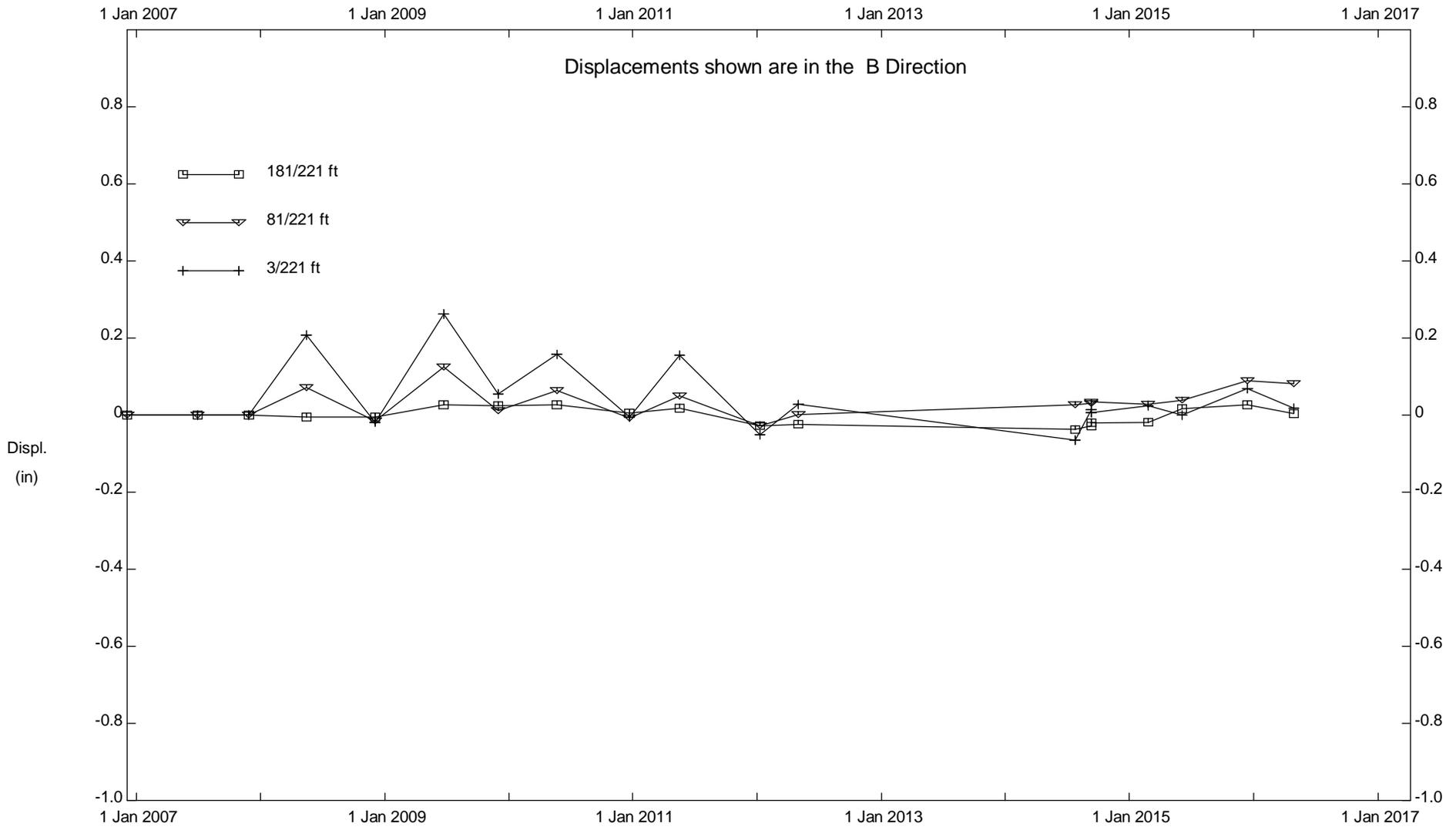
**BIG ROCK MESA, Inclinometer SP-21
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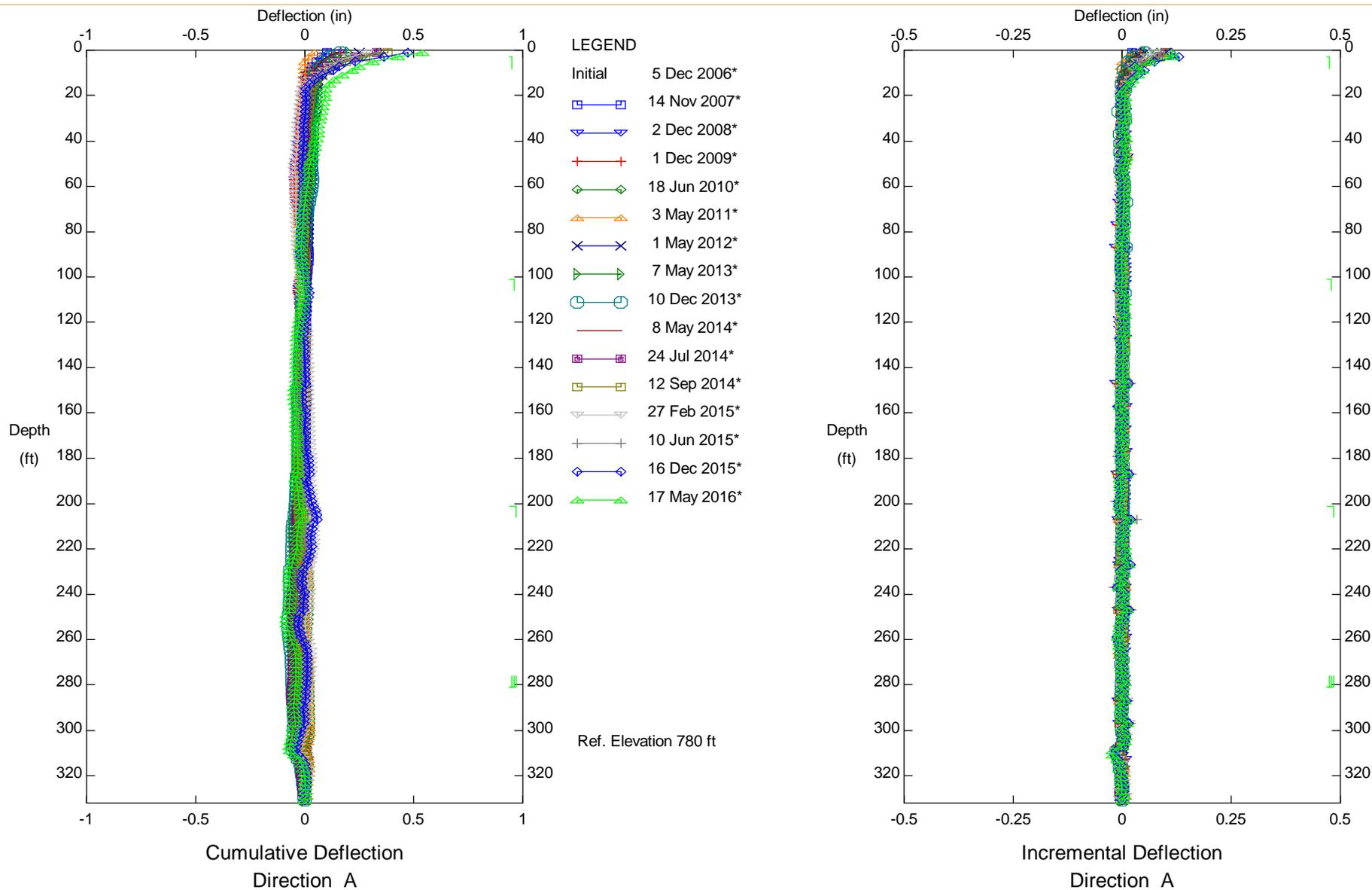
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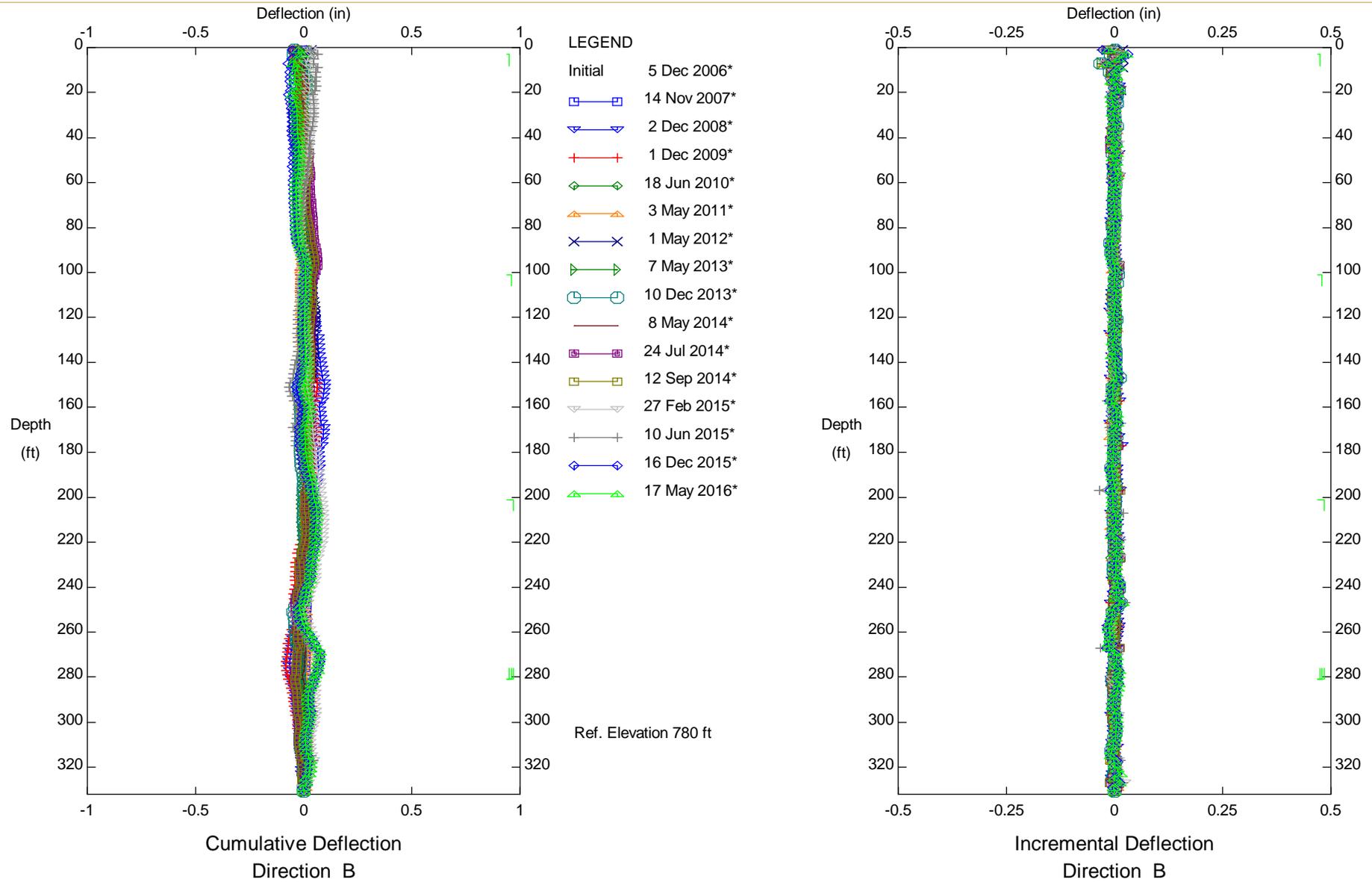
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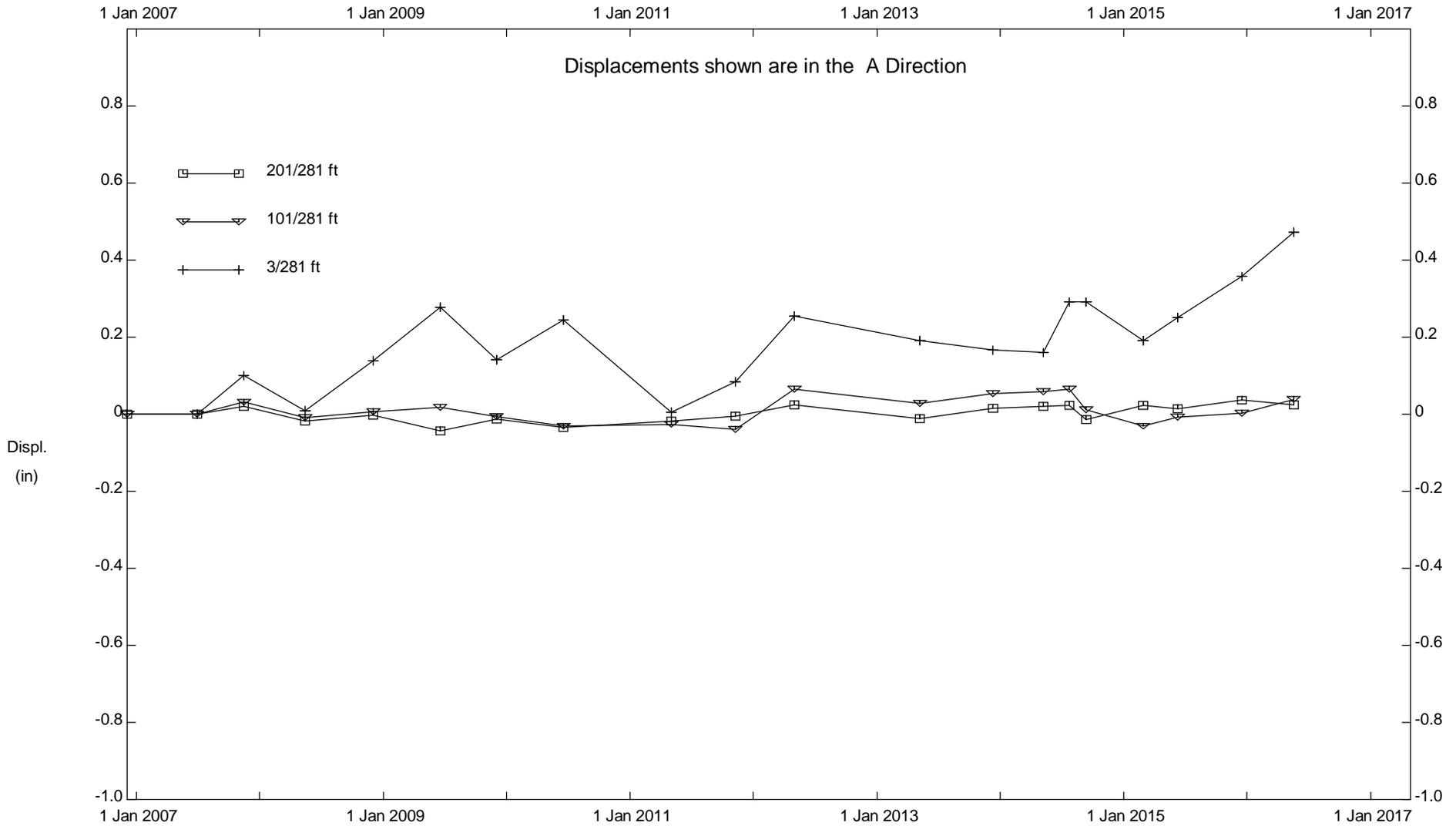
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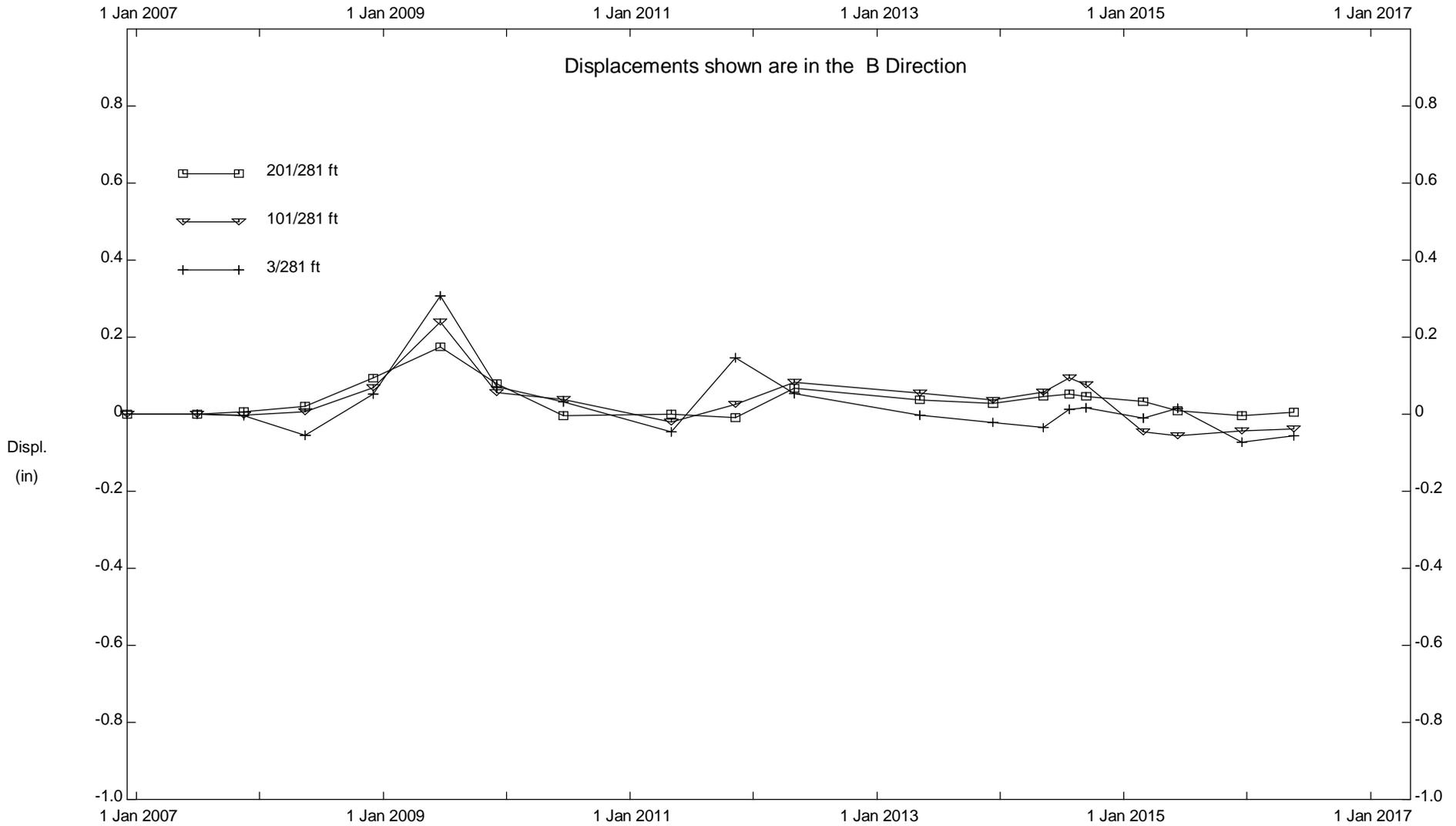
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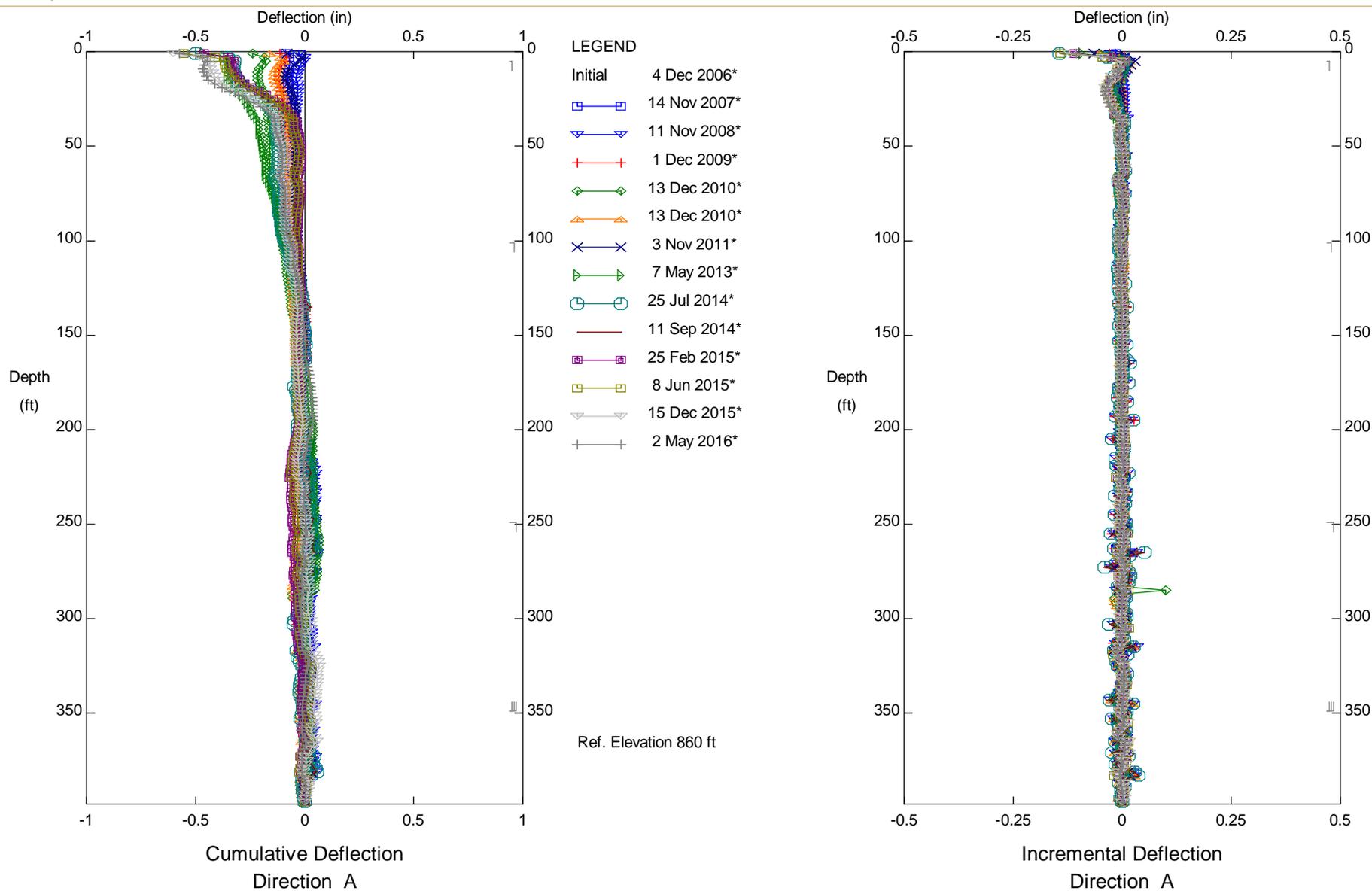
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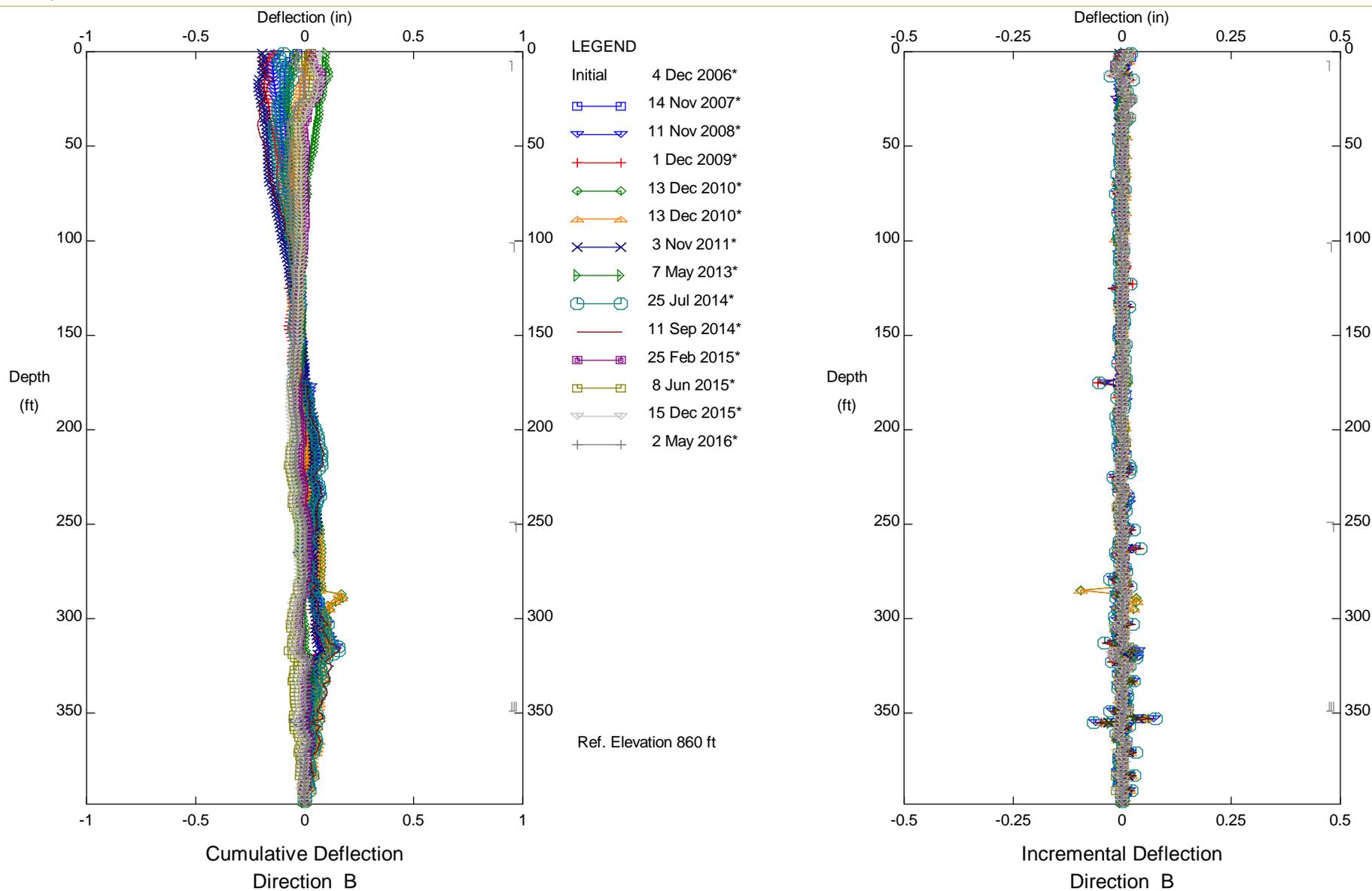
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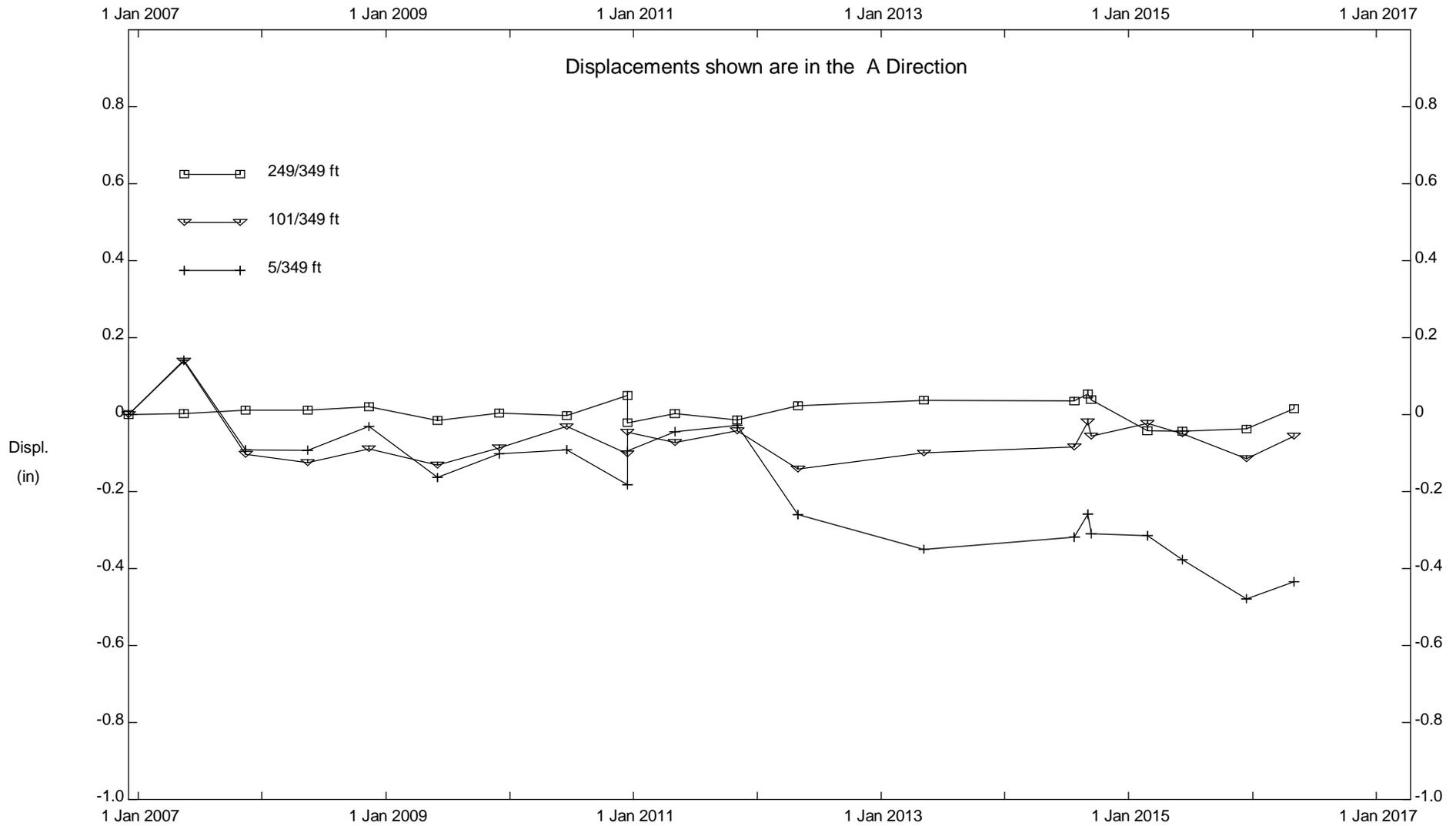
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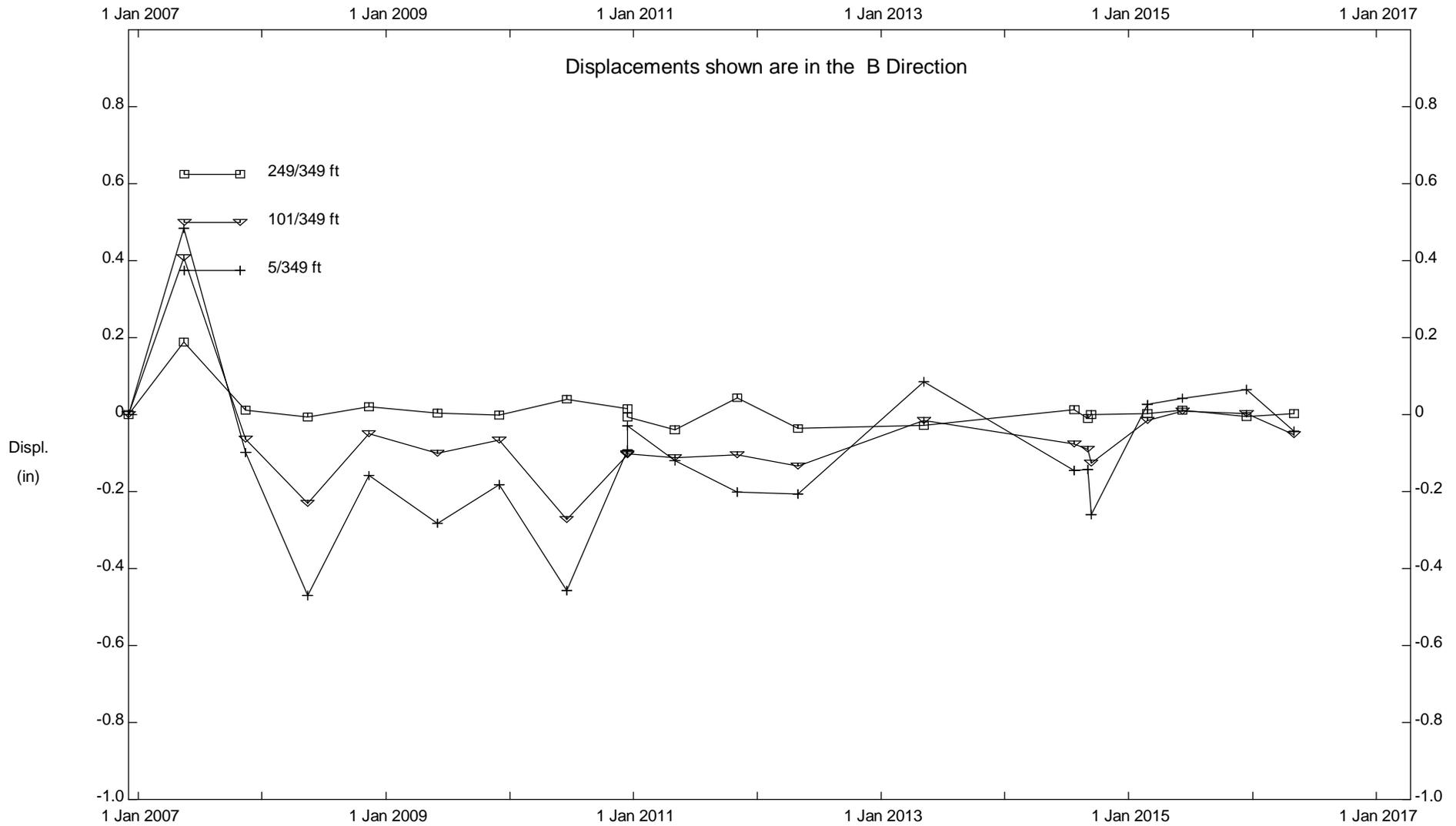
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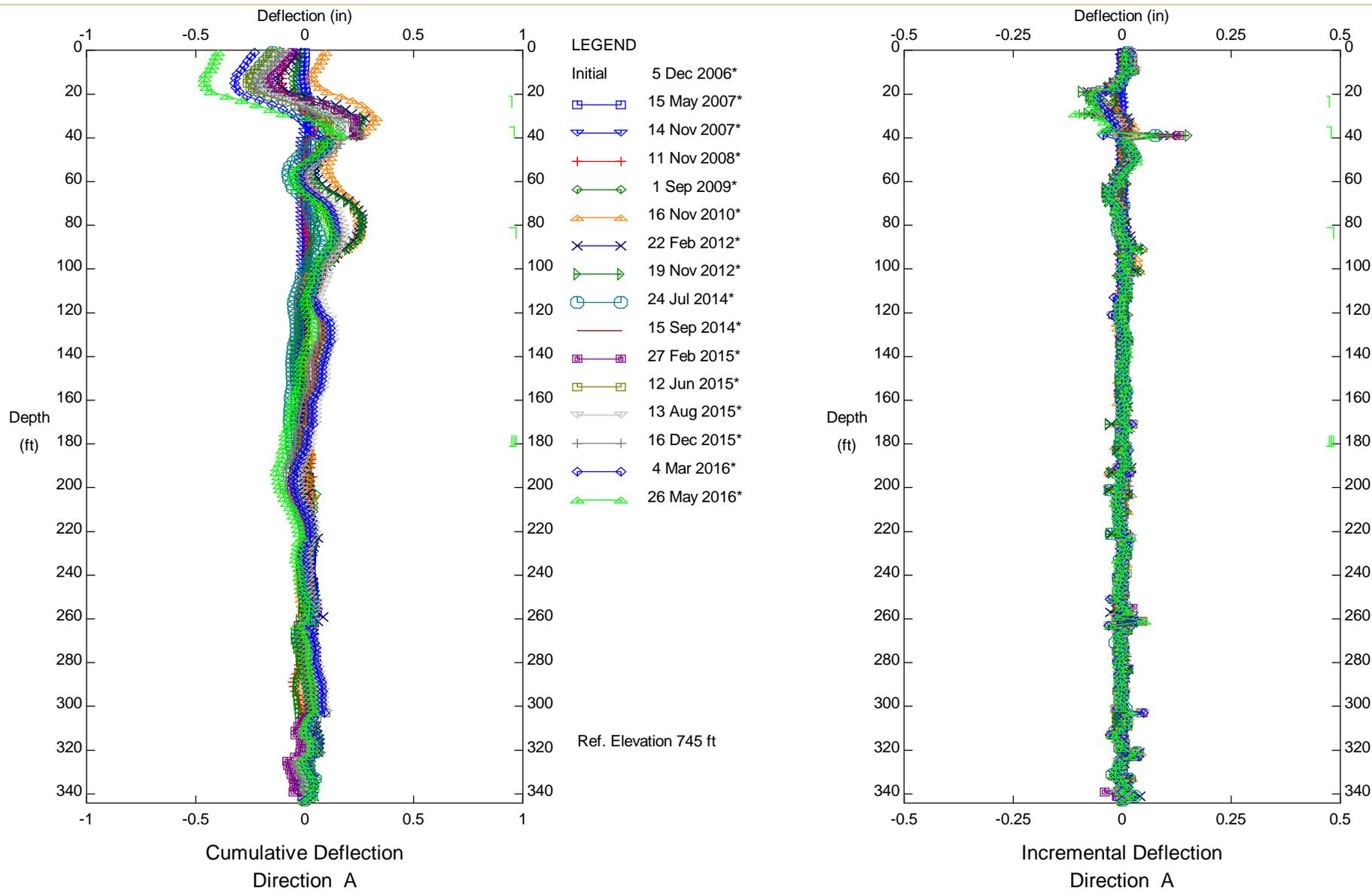
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WESTERN REGION



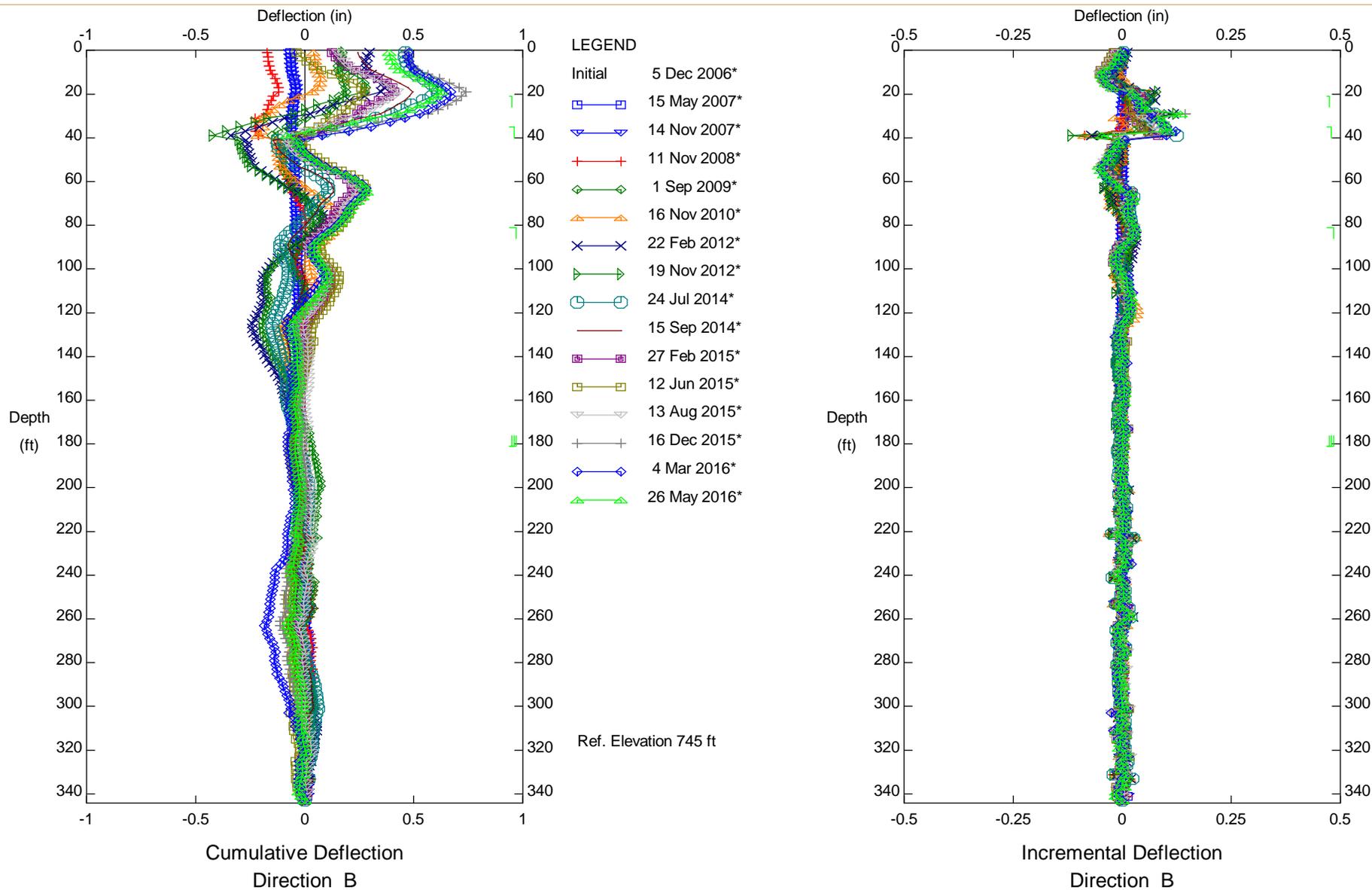
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WESTERN REGION



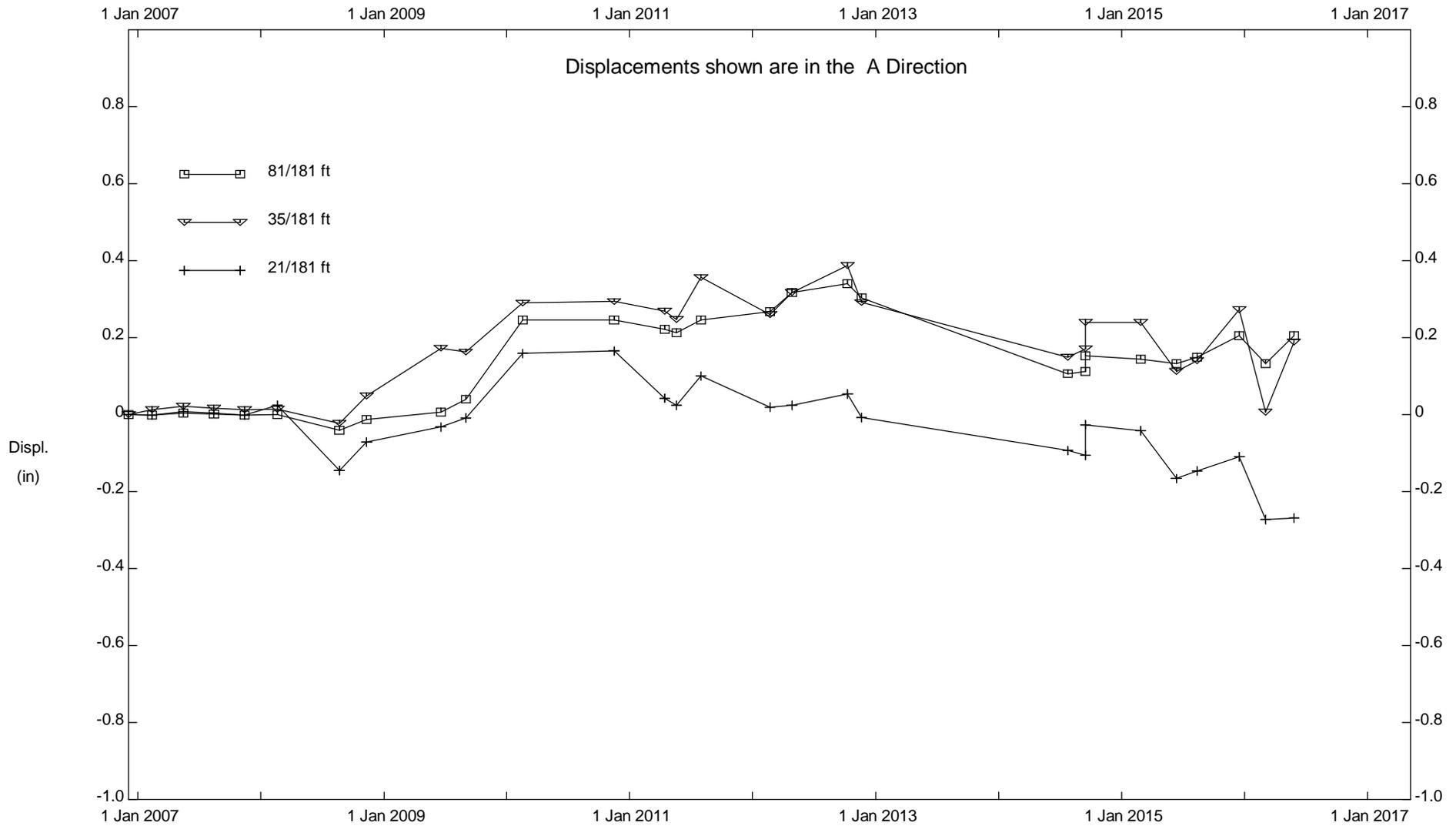
**BIG ROCK MESA, Inclinerometer SP-26
HEADSCARP REGION**

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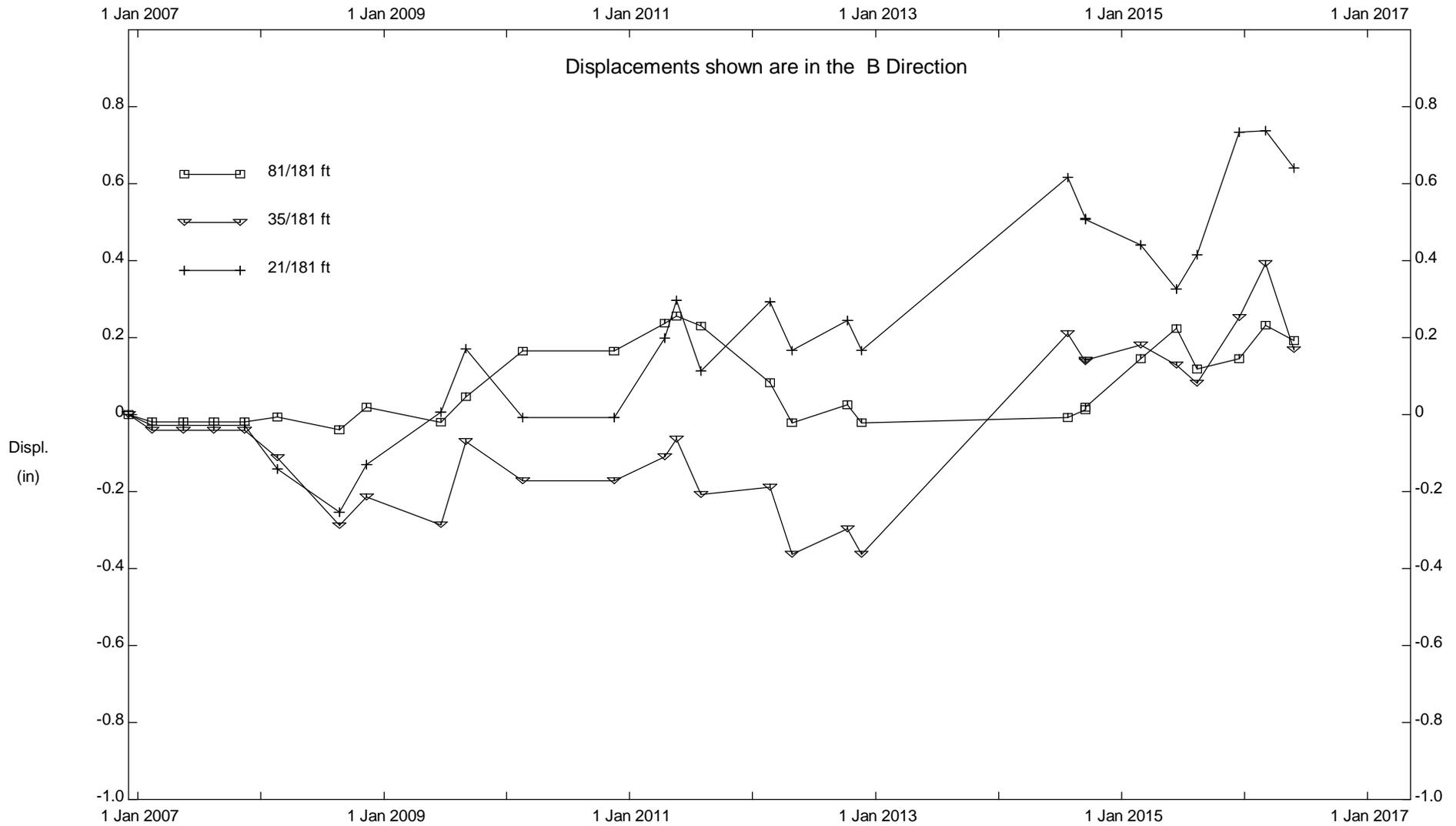
BIG ROCK MESA, Inclinometer SP-26
HEADSCARP REGION

Sets marked * include zero shift and/or rotation corrections.



BIG ROCK MESA, Inclinometer SP-26

HEADSCARP REGION



BIG ROCK MESA, Inclinometer SP-26

HEADSCARP REGION

APPENDIX E
WATER QUALITY TESTING

Date Sampled	Sample Point	pH (Field Measured)	Temperature	INORGANIC NON-METALS (Aqueous Matrix)																	
				Biochemical Oxygen Demand	Surfactants (MBAS)	Oil & Grease	Settleable Solids	Sulfides	Phenols	Residual Chlorine (Field Measured)	Total Suspended Solids	Turbidity	TPH Diesel	TPH Motor Oil	Bis(2-Ethylhexyl) Phthalate	Zinc	Total Coliform	Fecal Coliform	Fecal/Total Coliform > 0.1?	Enterococcus	Acute Toxicity***
Units:			°F	mg/L	mg/L	mg/L	mL/L	mg/L	mg/L	mg/L	mg/L	NTU	µg/L	µg/L	µg/L	µg/L	MPN/100ml	MPN/100ml		MPN/100ml	% Survival
Discharges to M-001 (Outfall/Port #1a)																					
7/9/2015	M-001	8.6	65.5	ND	ND	ND	ND	ND	ND	0.12	ND	0.28	ND	ND	ND	9.0 ^J	790	ND	--	10	--
7/9/2015	Duplicate	8.6	71.8	2.30	ND	ND	ND	ND	ND	0.12	3.30	1.5	ND	ND	ND	66	1700	13	No	27	--
8/6/2015	M-001	8.5	67.3	ND	0.022 ^J	ND	ND	ND	ND	0.02	ND	0.47	53 ^C	210 ^D	ND	13 ^J	790	79	No	107	--
8/26/2015	M-001	--	--	--	--	--	--	--	--	--	--	--	--	160 ^J	--	--	--	--	--	--	--
9/2/2015	M-001	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	--	--	--	--	--	--
9/10/2015	M-001	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	--	--	--	--	--	--
9/17/2015	M-001	8.5	69.1	ND	ND	ND	ND	ND	ND	0.08	13	0.99	ND	ND	ND	18 ^J	92000	1700	No	866	--
Discharges to M-002 (Outfall/Port #1)																					
7/9/2015	M-002	8.3	68.2	ND	ND ^A	ND	ND	ND	ND	0.08	ND	0.14	ND	ND	ND	ND	49	ND	No	ND	--
8/6/2015	M-002	8.2	69.6	ND	ND	ND	ND	ND	ND	0.02	ND	0.16	ND	ND	ND	2.5 ^J	4600	3300	Yes	1	--
9/24/2015	M-002	ND	ND	ND	0.024 ^J	ND	ND	ND	ND	0.0	ND	0.14	ND	ND	ND	ND	170	2	No	1	--
Discharges to M-003 (Outfall/Port #2)																					
7/9/2015	HD-41	7.2	68.2	ND	0.018 ^J	ND	ND	ND	ND	0.2	ND	0.14	ND	ND	ND	4.7 ^J	ND	ND	No	ND	--
8/6/2015	HD-41	7.5	76.2	ND	ND	ND	ND	ND	ND	0.2	ND	0.12	ND	ND	ND	6.0 ^J	<1.8	<1.8	No	<1	--
8/19/2015	HD-41	--	--	--	--	--	--	--	--	0.0	--	--	--	--	--	--	--	--	--	--	--
8/26/2015	HD-41	--	--	--	--	--	--	--	--	0.14	--	--	--	--	--	--	--	--	--	--	--
9/2/2015	HD-41	--	--	--	--	--	--	--	--	0.11	--	--	--	--	--	--	--	--	--	--	--
9/10/2015	HD-41	--	--	--	--	--	--	--	--	0.14	--	--	--	--	--	--	--	--	--	--	--
9/17/2015	HD-41	7.1	72.7	ND	ND	ND	ND	ND	ND	0.06	ND	0.21	ND	ND	ND	9.5 ^J	13	<1.8	--	<1	--
9/24/2015	HD-41	--	--	--	--	--	--	--	--	0.08	--	--	--	--	--	--	--	--	--	--	--
Discharges to M-004 (Outfall/Port #3)																					
7/9/2015	M-004	8.1	70.7	ND	ND	ND	ND	ND	ND	0.14	ND	0.19	ND	ND	ND	4.8 ^J	7900	2200	Yes	1550	--
8/6/2015	M-004	8.2	69.1	27	2.0 ^A	7.40	ND	ND	14 ^J	0.14	5.80	4.6	600 ^C	460 ^D	ND	14 ^J	160000	1300	No	>2420	--
8/19/2015	M-004	--	--	--	--	--	--	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
8/26/2015	M-004	--	--	ND	ND	--	--	--	ND	0.14	--	--	ND	ND	--	--	--	--	--	--	--
8/26/2015	Duplicate	--	--	--	--	--	--	--	--	0.11 ¹	--	--	--	--	--	--	--	--	--	--	--
9/2/2015	M-004	--	--	ND	ND ^A	--	--	--	ND	0.09	--	--	ND	ND	--	--	--	--	--	--	--
9/10/2015	M-004	--	--	ND	0.023 ^J	--	--	--	ND	0.06	--	--	ND	ND	--	--	--	--	--	--	--
9/17/2015	M-004	8.0	72.1	ND	0.021 ^J	ND	ND	ND	ND	0.03	ND	0.21	ND	ND	ND	2.2 ^J	330	33	No	12	--
Discharges to M-005 (Outfall/Port #4)																					
7/9/2015	M-005	8.5	69.8	ND	0.016 ^J	ND	ND	ND	ND	0.09	0.8	0.39	ND	ND	ND	6.1 ^J	13000	49	No	2420	--
8/6/2015	M-005	8.3	71.4	ND	0.05 ^J	ND	ND	ND	ND	0.09	3.2	0.3	ND	ND	ND	4.9 ^J	17000	3300	Yes	1990	--
9/17/2015	M-005	8.6	72.7	ND	0.015 ^J	ND	ND	ND	ND	0.04	ND	0.19	ND	ND	ND	2.4 ^J	4900	1100	Yes	980	--
Discharges to M-006 (Outfall/Port #5)																					
7/9/2015	M-006	8.4	71.8	ND	0.016 ^J	ND	ND	ND	ND	0.19	1.00	0.42	ND	ND	ND	6.8 ^J	170	17	No	16	--
8/6/2015	M-006	8.3	70.9	ND	ND	ND	ND	ND	ND	0.0	1.30	0.29	ND	ND	ND	3.1 ^J	700	79	Yes	68	--
9/17/2015	M-006	8.4	75.6	ND	0.031 ^J	ND	ND	ND	ND	0.03	0.80	0.41	ND	ND	ND	1.6 ^J	14000	700	No	866	--
Discharges to M-007 (Outfall/Port #5a)																					
7/9/2015	M-007	7.9	71.1	72	1.9 ^A	5.8	ND	1.4 ^A	17 ^J	0.08	17	14	1400 ^A	430 ^A	ND	7.9 ^J	35000	7900	Yes	>2420	--
8/6/2015	M-007	7.7	73.4	71	2.5 ^A	5.5	ND	2.1 ^A	69	0.00	18	14	1700 ^A	490	ND ^A	11 ^J	17000	1700	No	>2420	--
8/26/2015	M-007	--	--	23	0.076 ^J	--	--	ND	ND	--	--	--	390 ^C	ND ^D	--	--	--	--	--	--	--
8/26/2015	Port 5a ²	--	--	ND	ND	--	--	ND	ND	--	--	--	40 ^J	190 ^J	--	--	--	--	--	--	--
9/2/2015	M-007	--	--	14	0.31	--	--	ND	ND	--	--	--	280 ^C	130 ^J	--	--	--	--	--	--	--
9/10/2015	M-007	--	--	17	0.31	--	--	ND	ND	--	--	--	240 ^C	120 ^J	--	--	--	--	--	--	--
9/17/2015	M-007	8.0	73.4	4.4	0.15	ND	ND	ND	ND	0.02	1.0	1.3	86 ^C	120 ^J	ND	2.1 ^J	4900	3300	Yes	961	--
9/24/2015	M-007	--	--	--	--	--	--	--	--	--	--	--	690 ^C	230 ^D	--	--	--	--	--	--	--
Discharges to M-008 (Outfall/Port #6)																					
7/9/2015	M-008	8.6	69.3	ND	ND	ND	ND	ND	ND	0.2	1.90	0.65	ND	ND	ND	63	1400	49	No	388	--
8/6/2015	M-008	8.4	70.4	ND	ND	ND	ND	ND	ND	0.09	1.10	0.48	69 ^C	210 ^D	ND	28 ^J	140	13	No	21	--
8/6/2015	Duplicate	8.4	70.4	ND	0.038 ^J	ND	ND	ND	ND	0.09	ND	0.22	ND	ND	ND	29 ^J	430	13	No	24	--
8/26/2015	M-008	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	27 ^J	--	--	--	--	--
9/2/2015	M-008	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	37 ^J	--	--	--	--	--
9/10/2015	M-008	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	8.3 ^J	--	--	--	--	--
9/17/2015	M-008	8.5	75.9	ND	0.099 ^J	ND	ND	ND	ND	0.06	0.80	0.53	ND	ND	ND	69	54000	2300	No	572	--
9/17/2015	Duplicate	8.5	75.9	2.0	0.036 ^J	ND	ND	ND	ND	0.06	ND	4.1	ND	ND	ND	68	54000	7900	Yes	270	--
Discharges to M-009 (Outfall/Port #7)																					
7/9/2015	M-009	8.0	74.5	ND	ND	ND	ND	ND	ND	0.0	0.81	0.23	ND	ND	ND	2.5 ^J	ND	ND	Yes	ND	--
8/6/2015	HD-7	7.9	70.5	ND	ND ^A	ND	ND	ND	ND	0.0	ND	0.21	ND	ND	ND	2.1 ^J	<1.8	<1.8	No	<1	--
9/17/2015	HD-7	7.9	76.1	ND	0.065 ^J	ND	ND	ND	ND	0.07	ND	0.12	ND	ND	ND	ND	<1.8	<1.8	No	<1	--
Discharges to M-010 (Outfall/Port #8)																					
7/9/2015	M-010	8.5	71.8	ND	0.016 ^J	ND	ND	ND	ND	0.2	4.80	7.4	ND	ND	ND	11 ^J	790	17	No	249	--
8/6/2015	M-010	8.3	67.8	ND	0.028 ^J	ND	ND	ND	ND	0.06	1.50	0.42	ND	ND	ND	38 ^J	49	<1.8	No	14	--
9/24/2015	M-010	ND	ND	ND	0.032 ^J	ND	ND	ND	ND	0.09	3.1	0.38	ND	ND	ND	11 ^J	920	2	--	21	--
Effluent Limit (Daily Max.)																					

Effluent Limit (Daily Max. if Fecal/Total Coliform > 0.1)																					

Effluent Limit (Monthly Avg.)																					

- = Not tested for during monthly monitoring period.
- = No established limit.
- ** = Acute Toxicity samples were collected on 1/21/15
- ND = none detected above laboratory
- NR = No reading taken
- J = Laboratory estimated value, below PQL and above the MDL.
- A = Laboratory PQLs were raised due to sample dilution caused by high analyte concentration or matrix interference.
- B = Indicates laboratory measurement.
- C = Chromatogram not typical of diesel
- D = Chromatogram not typical of motor oil
- 1 = Chlorine test repeated after flow appeared to increase
- 2 = Area of coalescence that discharges through M-007

0.12 Exceedance of effluent limit.

Date Sampled	INORGANIC NON-METALS (Aqueous Matrix)																				
	Sample Point	pH (Field Measured)	Temperature	Biochemical Oxygen Demand	Surfactants (MBAS)	Oil & Grease	Settleable Solids	Sulfides	Phenols	Residual Chlorine (Field Measured)	Total Suspended Solids	Turbidity	TPH Diesel	TPH Motor Oil	Bis(2-Ethylhexyl) Phthalate	Zinc	Total Coliform	Fecal Coliform	Fecal/Total Coliform >0.1?	Enterococcus	Acute Toxicity**
Units:			°F	mg/L	mg/L	mg/L	mL/L	mg/L	mg/L	mg/L	NTU	µg/L	µg/L	µg/L	µg/L	MPN/100ml	MPN/100ml		MPN/100ml	% Survival	
Discharges to M-001 (Outfall/Port #1a)																					
10/8/2015	M-001	8.4	71.2	ND	ND	ND	ND	ND	ND	0.06	3.00	1.2	ND	ND	ND	57	35000	330	No	>2420	--
10/22/15	M-001	8.4	68.7	--	--	--	--	--	--	--	--	--	--	--	--	57 J A	--	--	--	--	--
10/28/2015	M-001	8.3	67.8	--	--	--	--	--	--	--	--	--	--	--	--	42 J	--	--	--	--	--
11/6/2015	M-001	8.5	64.4	--	--	--	--	--	--	--	--	--	--	--	--	24 J A	--	--	--	--	--
11/12/2015	M-001	8.8	59.5	ND	ND	ND	ND	ND	ND	--	1.6	0.66	ND	ND	ND	44	1700	4	No	13	--
11/16/2015	M-001	8.8	58.1	--	--	--	--	--	--	0.02	--	--	--	--	--	--	--	--	--	--	--
11/19/2015	M-001	8.7	63.3	--	--	--	--	--	--	--	--	--	--	--	--	50 J A	--	--	--	--	--
11/24/2015	M-001	8.3	62.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	100
12/17/2015	M-001	8.5	58.6	ND	ND	ND	ND	ND	ND	--	1.0	0.4	ND	ND	ND	19.0	13000	33	No	770	--
12/28/2015	M-001	8.2	53.6	--	--	--	--	--	--	0.04	--	--	--	--	--	--	--	--	--	--	--
Discharges to M-002 (Outfall/Port #1)																					
10/8/2015	M-002	8.2	73.0	ND	0.033	ND	ND	ND	ND	0.06	0.72	0.22	ND	ND	ND	7.2	490	23	No	2	--
11/12/2015	M-002	8.5	67.1	ND	ND	ND	ND	ND	ND	--	ND	0.21	ND	ND	ND	2.20	230	4.5	No	2	--
11/16/2015	M-002	8.2	65.3	--	--	--	--	--	--	0.02	--	--	--	--	--	--	--	--	--	--	--
11/24/2015	M-002	8.2	67.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	95
12/17/2015	M-002	8.2	62.4	ND	0.021	ND	ND	ND	ND	--	0.8	0.2	ND	ND	ND	1.3	1100	330	No	33	--
12/28/2015	M-002	8.4	62.1	--	--	--	--	--	--	0.02	--	--	--	--	--	--	--	--	--	--	--
Discharges to M-003 (Outfall/Port #2)																					
10/8/2015	HD-41	7.2	73.9	2.0	ND	ND	ND	ND	ND	0.00	0.57	0.20	ND	ND	ND	9.3	<1.8	<1.8	No	<1	--
11/12/2015	Non Flowing																				
11/24/2015	Non Flowing																				
12/17/2015	Non-Flowing																				
12/28/2015	Non-Flowing																				
Discharges to M-004 (Outfall/Port #3)																					
10/8/2015	M-004	8.0	73.8	ND	ND	ND	ND	ND	ND	0.05	2.20	5.7	41	ND	ND	11	790	49	No	135	--
11/12/2015	M-004	8.0	69.1	90	12	ND	ND	ND	31	--	19	23	1600	2400	ND	82	54000	24000	Yes	>2420	--
11/16/2015	M-004	8.4	65.3	--	--	--	--	--	--	0.03	--	--	--	--	--	--	--	--	--	--	--
11/24/2015	M-004	8.0	70.0	ND	0.045 J	--	--	--	ND	--	--	--	ND	ND	--	6.8 J	--	--	--	--	97.5
12/3/2015	M-004	--	--	8.4	0.096	--	--	--	0.079	--	--	--	97	160	--	18	--	--	--	--	--
12/11/2015	M-004	--	--	4.8	ND	--	--	--	ND	--	--	--	ND	ND	--	5.8 J	--	--	--	--	--
12/17/2015	M-004	8.1	66.6	13	7.1	ND	ND	ND	ND	--	32	29	240	340	4.6	43	17000	79	No	291	--
12/17/2015	Duplicate	--	--	15	4.7	MD	ND	ND	ND	--	9.3	2.6	190	350	4.7	40	13000	33	No	326	--
12/22/2015	M-004	8.1	65.8	2.9	1.2 A07	--	--	--	ND	--	--	--	87 A52	120 J	--	28 J	--	--	--	--	--
12/28/2015	M-004	8.1	62.4	--	0.033 J	--	--	--	--	0.06	--	--	ND	ND	--	--	--	--	--	--	--
Discharges to M-005 (Outfall/Port #4)																					
10/8/2015	M-005	8.3	72.9	ND	ND	ND	ND	ND	ND	0.06	ND	0.39	ND	130	ND	5.2	35000	790	No	>2420	--
10/22/2015	M-005	8.2	71.2	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
10/28/2015	M-005	8.2	70.9	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
11/6/2015	M-005	8.3	68.4	--	--	--	--	--	--	--	--	--	430	ND	--	--	--	--	--	--	--
11/12/2015	M-005	8.5	68.9	2.10	0.041	ND	ND	ND	ND	--	22	5	ND	ND	ND	11	35000	490	No	>2420	--
11/16/2015	M-005	8.5	64.2	--	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	--	--	--
11/19/2015	M-005	8.4	67.8	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
11/24/2015	M-005	8.3	68.5	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	97.5
12/4/2015	M-005	--	--	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
12/11/2015	M-005	--	--	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
12/17/2015	M-005	8.3	63.3	2.2	0.0	ND	ND	ND	ND	--	0.5	0.3	40	ND	ND	16	35000	170	No	1050	--
12/22/2015	M-005	8.3	64.2	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
12/28/2015	M-005	8.3	61.2	--	--	--	--	--	--	0.03	--	--	--	--	--	--	--	--	--	--	--
Discharges to M-006 (Outfall/Port #5)																					
10/8/2015	M-006	8.3	76.1	ND	ND	ND	ND	ND	ND	0.01	0.52	0.22	ND	ND	ND	2.7	7000	2200	Yes	345	--
11/12/2015	M-006	8.5	71.1	2.6	0.99	ND	ND	ND	ND	--	1.3	0.57	110	ND	ND	17	3300	33	No	161	--
11/16/2015	M-006	8.5	67.8	--	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	--	--	--
11/24/2015	M-006	8.3	68.7	--	0.031 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	100
12/3/2015	M-006	--	--	--	1.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
12/11/2015	M-006	--	--	--	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
12/17/2015	M-006	8.2	65.8	ND	0.64	ND	ND	ND	ND	--	28	0.3	49	ND	ND	6.0	24000	49	No	435	--
12/22/2015	M-006	8.4	65.8	--	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
12/28/2015	M-006	8.3	64.0	--	0.028 J	--	--	--	--	0.06	--	--	--	--	--	--	--	--	--	--	--
Discharges to M-007 (Outfall/Port #5a)																					
10/8/2015	M-007	8.0	73.9	7.7	0.28	ND	ND	0.19	ND	0.00	3.7	2.8	120	110	ND	3.0	3300	1700	Yes	>2420	--
10/22/2015	M-007	7.9	72.5	--	--	--	--	--	--	--	--	--	78	ND	--	--	--	--	--	--	--
10/28/2015	M-007	8.1	72.5	--	--	--	--	--	--	--	--	--	160 A52	ND	--	--	--	--	--	--	--
11/6/2015	M-007	8.1	69.8	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
11/12/2015	M-007	8.1	69.8	8.0	0.17	ND	ND	0.26	ND	--	1.1	1.3	130	ND	ND	4.3	3300	140	No	435	--
11/16/2015	M-007	8.2	66.9	--	--	--	--	--	--	0.02	--	--	--	--	--	--	--	--	--	--	--
11/19/2015	M-007	8.1	68.9	--	--	--	--	--	--	--	--	--	91 A52	ND	--	--	--	--	--	--	--
11/24/2015	M-007	8.0	69.4	--	--	--	--	--	--	--	--	--	53 A52	ND	--	--	--	--	--	--	100
12/3/2015	M-007	--	--	--	--	--	--	--	--	--	--	--	80	ND	--	--	--	--	--	--	--
12/11/2015	M-007	--	--	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
12/17/2015	M-007	8.0	66.4	ND	0.19	ND	ND	0.19	ND	--	4.1	2.6	130	ND	ND	3.7	4600	330	No	1410	--
12/22/2015	M-007	7.1	66.7	--	--	--	--	--	--	--	--	--	48 J A52	ND	--	--	--	--	--	--	--
12/28/2015	M-007	8.0	64.2	--	--	--	--	--	--	0.02	--	--	230 A52	ND	--	--	--	--	--	--	--
Discharges to M-008 (Outfall/Port #6)																					
10/8/2015	M-008	8.3	75.0	2.1	ND	ND	ND	ND	ND	0.02	0.66	0.17	ND	ND	ND	75	790	110	Yes	33	--
10/8/2015	Duplicate																				

Date Sampled	INORGANIC NON-METALS (Aqueous Matrix)																				
	Sample Point	pH (Field Measured)	Temperature	Biochemical Oxygen Demand	Surfactants (MBAS)	Oil & Grease	Settleable Solids	Sulfides	Phenols	Residual Chlorine (Field Measured)	Total Suspended Solids	Turbidity	TPH Diesel	TPH Motor Oil	Bis(2-Ethylhexyl) Phthalate	Zinc	Total Coliform	Fecal Coliform	Fecal/Total Coliform >0.1?	Enterococcus	Acute Toxicity**
Units:			°F	mg/L	mg/L	mg/L	mL/L	mg/L	mg/L	mg/L	mg/L	NTU	µg/L	µg/L	µg/L	µg/L	MPN/100ml	MPN/100ml		MPN/100ml	% Survival
Discharges to M-001 (Outfall/Port #1a)																					
1/14/2016	M-001	8.4	62.4	2.0	ND	ND	ND	ND	ND	0.02	0.94	0.65	ND	ND	ND	14 J,A07	1700	23	No	291	--
1/14/2016	Duplicate	8.4	62.4	ND	ND	ND	ND	ND	ND	0.02	1.10	0.86	ND	ND	ND	12 J	3300	7.8	No	219	--
1/21/2016	M-001	6.5	61.5	--	--	--	--	--	--	--	--	--	--	--	--	20	--	--	--	--	--
2/11/2016	M-001	8.32	67.1	ND	ND	ND	ND	ND	ND	0.03	1.60	1.20	ND	ND	ND	22 J	24000	330	No	770	--
3/10/2016	M-001	8.27	61.9	ND	ND	ND	ND	ND	ND	0.05	ND	0.58	ND	110 J	ND	180	2200	130	No	1120	--
3/23/2016	M-001	8.10	60.3	--	--	--	--	--	--	--	--	--	ND	ND	--	23 J	--	--	--	--	--
3/30/2016	M-001	8.16	57.6	--	--	--	--	--	--	--	--	--	ND	ND	--	37 J, A07	--	--	--	--	--
Discharges to M-002 (Outfall/Port #1)																					
1/21/2016	M-002	6.6	66.6	ND	0.050	ND	ND	ND	ND	0.01	ND	0.18	ND	ND	ND	ND	230	<1.8	No	<1	--
2/11/2016	M-002	8.2	70.2	ND	0.046 J	ND	ND	ND	ND	0.08	ND	0.14	ND	ND	ND	3.8 J	330	<1.8	No	<1	--
3/10/2016	M-002	8.2	64.4	ND	ND	ND	ND	ND	ND	0.02	ND	0.16	ND	ND	ND	2.7 J	330	17	No	<1	--
3/10/2016	Duplicate	8.2	64.4	ND	0.016	ND	ND	ND	ND	0.02	ND	0.17	ND	ND	ND	49	8	Yes	<1	--	
Discharges to M-003 (Outfall/Port #2)																					
1/14/2016	HD-41	7.4	70.3	ND	ND	ND	ND	ND	ND	0.08	ND	0.16	ND	ND	ND	3.6 J	--	--	--	--	--
1/21/2016	HD-41	7.1	66.6	--	--	--	--	--	--	--	--	--	--	--	--	--	<1.8	<1.8	No	<1	--
2/11/2016	HD-41	6.9	69.8	ND	ND	ND	ND	ND	ND	0.05	ND	0.15	ND	ND	ND	7.0 J	<1.8	<1.8	No	<1	--
3/10/2016	HD-41	7.0	69.4	ND	ND	ND	ND	0.04	0.04	ND	0.19	ND	ND	ND	ND	4.8 J	<1.8	<1.8	No	<1	--
Discharges to M-004 (Outfall/Port #3)																					
1/8/2016	M-004	7.2	63.9	--	0.97	--	--	--	--	--	--	--	75 A52	140 J,A57	--	--	--	--	--	--	--
1/14/2016	M-004	8.0	64.0	2.00	1.2 A07	ND	ND	ND	ND	0.20	0.62	0.28	45 J	ND	ND	13 J	11000	33	No	162	--
1/21/2016	M-004	7.7	67.1	--	16 A07	--	--	--	--	--	--	--	2300 A01,A52	2400 A01	--	--	--	--	--	--	--
1/27/2016	M-004	7.8	65.3	--	0.12	--	--	--	--	0.08	--	--	--	--	--	--	--	--	--	--	--
2/4/2016	M-004	8.0	64.9	--	3.3 A07	--	--	--	--	0.07	--	--	94 A52	290	--	--	--	--	--	--	--
2/11/2016	M-004	7.8	70.5	5.20	3.8 A07	ND	ND	ND	ND	0.02	0.84	1.00	87 A52	190 J, A57	ND	28 J	54000	490	No	>2420	--
2/17/2016	M-004	7.9	68.2	--	0.033 J, S05	--	--	--	--	--	--	--	50 A52	ND	--	--	--	--	--	--	--
2/25/2016	M-004	7.7	67.5	--	0.017 J	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
3/3/2016	M-004	7.9	67.1	--	26 A07	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
3/10/2016	M-004	8.1	68.0	ND	0.69 A07	ND	ND	ND	ND	0.04	ND	0.58	ND	ND	ND	14 J	24000	2300	No	613	--
3/16/2016	M-004	7.9	66.7	--	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3/23/2016	M-004	8.0	65.8	--	0.036 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3/30/2016	M-004	7.9	65.8	--	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Discharges to M-005 (Outfall/Port #4)																					
1/14/2016	M-005	8.4	63.0	2.6	0.024 J	ND	ND	ND	ND	0.01	0.59	0.35	ND	ND	ND	17 J	35000	23	No	517	--
2/11/2016	M-005	8.3	67.1	ND	0.036 J	ND	ND	ND	ND	0.00	ND	0.21	ND	ND	ND	17 J	13000	6.1	No	248	--
3/10/2016	M-005	8.3	68.9	ND	0.016 J	ND	ND	ND	ND	0.02	0.50	0.85	ND	ND	ND	41 J	23000	23	No	<1	--
Discharges to M-006 (Outfall/Port #5)																					
1/8/2016	M-006	8.1	63.7	--	5.4 A07	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/14/2016	M-006	8.4	64.6	ND	0.029 J	ND	ND	ND	ND	0.00	0.91	0.44	ND	ND	ND	3.8 J	3300	130	No	81	--
1/21/2016	M-006	8.2	67.3	--	0.053 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/27/2016	M-006	7.6	65.8	--	0.068	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2/4/2016	M-006	8.3	68.5	--	0.055 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2/11/2016	M-006	8.1	68.5	2.00	0.200	ND	ND	ND	ND	0.05	ND	0.29	ND	ND	ND	4.1 J	1700	330	Yes	248	--
2/11/2016	Duplicate	8.1	68.5	ND	0.280	ND	ND	ND	ND	0.05	ND	0.33	ND	ND	ND	4.6 J	1400	49	No	228	--
3/10/2016	M-006	8.3	68.4	ND	ND	ND	ND	ND	0.016 J	0.06	7.50	2.0	ND	ND	ND	5.9 J	7900	23	No	192	--
Discharges to M-007 (Outfall/Port #5a)																					
1/8/2016	M-007	8.1	64.6	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
1/14/2016	M-007	7.6	65.5	ND	0.050 J	ND	ND	ND	ND	0.00	0.82	0.54	ND	ND	ND	ND	2200	130	No	866	--
1/21/2016	M-007	8.0	66.6	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
2/11/2016	M-007	8.1	68.4	ND	ND	ND	ND	ND	ND	0.03	0.65	0.18	ND	ND	ND	ND	790	140	Yes	56	--
3/10/2016	M-007	8.1	66.2	ND	0.031 J,A07	ND	ND	ND	ND	0.02	0.60	0.41	ND	ND	ND	2.3 J	790	230	Yes	160	--
Discharges to M-008 (Outfall/Port #6)																					
1/8/2016	M-008	8.4	62.1	--	--	--	--	--	--	--	--	--	--	--	--	68	--	--	--	--	--
1/14/2016	M-008	--	59.2	ND	0.026 J	ND	ND	ND	ND	0.03	ND	0.37	ND	ND	ND	490	<1.8	No	299	--	
1/21/2016	M-008	8.5	64.6	--	--	--	--	--	--	--	--	--	--	--	--	51	--	--	--	--	--
1/27/2016	M-008	7.5	62.4	--	--	--	--	--	--	--	--	--	--	--	--	110	--	--	--	--	--
2/4/2016	M-008	8.5	63.3	--	--	--	--	--	--	--	--	--	--	--	--	220	--	--	--	--	--
2/11/2016	M-008	8.5	67.8	1.6	ND	ND	ND	ND	ND	0.01	ND	0.2	ND	ND	ND	56	330	<1.8	No	19	--
2/17/2016	M-008	8.4	65.7	--	--	--	--	--	--	--	--	--	--	--	--	67	--	--	--	--	--
2/25/2016	M-008	8.2	64.6	--	--	--	--	--	--	--	--	--	--	--	--	460	--	--	--	--	--
3/3/2016	M-008	8.4	63.3	--	--	--	--	--	--	--	--	--	--	--	--	87	--	--	--	--	--
3/10/2016	M-008	8.5	67.8	ND	ND	ND	ND	ND	ND	0.00	0.60	0.38	ND	ND	ND	58	3300	23	No	>2420	--
3/16/2016	M-008	7.9	66.4	--	--	--	--	--	--	--	--	--	--	--	--	110	--	--	--	--	--
3/23/2016	M-008	8.2	65.1	--	--	--	--	--	--	--	--	--	--	--	--	140	--	--	--	--	--
3/30/2016	M-008	8.3	61.2	--	--	--	--	--	--	--	--	--	--	--	--	69	--	--	--	--	--
Discharges to M-009 (Outfall/Port #7)																					
1/14/2016	HD-7	7.3	68.4	ND	ND	ND	ND	ND	ND	0.00	1.20	0.23	ND	ND	ND	ND	<1.8	<1.8	No	<1	--
2/11/2016	HD-7	7.8	74.3	ND	ND	ND	ND	ND	ND	0.03	1.10	0.20	ND	ND	ND	ND	<1.8	<1.8	No	<1	--
3/10/2016	HD-7	7.9	74.3	ND	ND	ND	ND	ND	ND	0.08	1.30	0.20	ND	ND	ND	2.0 J	<1.8	<1.8	No	<1	--
Discharges to M-010 (Outfall/Port #8)																					
1/14/2016	HD 5, 6, 23, 30	7.3	72.7	ND	ND	ND	ND	ND	ND	0.07	0.94	0.25	ND	ND	ND	ND	<1.8	<1.8	No	<1	--
2/11/2016	M-010	8.2	68.9	ND	ND	ND	ND	ND	ND	0.02	1.40	0.28	ND	ND	ND	2.0 J	49	<1.8	No	131	--
3/10/2016	M-010	8.2	66.6	ND	ND	ND	ND	ND	ND	0.02	11	0.38	ND	ND	ND	5.6 J	170	22	Yes	25	--
Effluent Limit (Daily Max.)																					
Effluent Limit (Daily Max. if Fecal																					

Date Sampled	INORGANIC NON-METALS (Aqueous Matrix)																				
	Sample Point	pH (Field Measured)	Temperature	Biochemical Oxygen Demand	Surfactants (MBA S)	Oil & Grease	Settleable Solids	Sulfides	Phenols	Residual Chlorine (Field Measured)	Total Suspended Solids	Turbidity	TPH Diesel	TPH Motor Oil	Bis(2-Ethylhexyl) Phthalate	Zinc	Total Coliform	Fecal Coliform	Fecal/Total Coliform >0.1?	Enterococcus	Acute Toxicity**
Units:			°F	mg/L	mg/L	mg/L	mL/L	mg/L	mg/L	mg/L	mg/L	NTU	µg/L	µg/L	µg/L	µg/L	MPN/100ml	MPN/100ml		MPN/100ml	% Survival
Discharges to M-001 (Outfall/Port #1a)																					
4/7/2016	M-001	8.32	61.7	ND	ND	ND	ND	ND	ND	0.02	0.80	0.61	ND	ND	ND	24 J	2,300	79	No	119	--
4/14/2016	M-001	8.38	63.0	--	--	--	--	--	--	--	--	--	ND	ND	--	40 J	--	--	--	--	--
5/10/2016	M-001	8.38	64.0	ND	ND	ND	ND	ND	ND	0.02	0.60	0.43	ND	ND	ND	29 J	3,300	<1.8	No	143	--
6/2/2016	M-001	8.27	61.9	ND	0.025 J	ND	ND	ND	ND	0.06	0.61	0.31	ND	ND	ND	57	1,300	<1.8	No	46	--
6/16/2016	M-001	8.54	64.9	--	--	--	--	--	--	--	--	--	--	--	--	24 J	--	--	--	--	--
6/23/2016	M-001	8.49	65.8	--	--	--	--	--	--	--	--	--	--	--	--	19 J	--	--	--	--	--
6/28/2016	M-001	8.39	70.3	--	--	--	--	--	--	--	--	--	--	--	--	47 J	--	--	--	--	--
Discharges to M-002 (Outfall/Port #1)																					
4/7/2016	M-002	8.42	64.4	ND	ND	ND	ND	ND	ND	0.02	ND	0.27	ND	ND	ND	ND	230	13	No	<1	--
5/10/2016	M-002	8.18	63.7	ND	ND	ND	ND	ND	ND	0.07	ND	0.16	ND	ND	ND	6.1 J	130	<1.8	No	<1	--
6/2/2016	M-002	8.13	63.7	ND	ND	ND	ND	ND	ND	0.00	ND	0.16	ND	ND	ND	1.8 J	49	<1.8	No	26	--
Discharges to M-003 (Outfall/Port #2)																					
4/7/2016	HD-41	6.83	66.2	ND	ND	ND	ND	ND	ND	0.03	ND	0.20	ND	ND	ND	5.1 J	<1.8	<1.8		<1	--
Discharges to M-004 (Outfall/Port #3)																					
4/7/2016	M-004	7.91	67.1	ND	0.30	ND	ND	ND	ND	0.07	0.50	0.30	46 J,A52	ND	ND	7.3 J	54,000	130	No	>2,420	--
5/10/2016	M-004	8.16	66.7	ND	ND	ND	ND	ND	ND	0.00	ND	0.14	ND	ND	ND	8.6 J	460	11	No	20	--
5/10/2016	Duplicate	8.16	66.7	ND	ND	ND	ND	ND	ND	0.00	ND	0.27	ND	ND	ND	4.9 J	230	13	No	17	--
6/2/2016	M-004	7.94	67.8	ND	0.22	ND	ND	ND	ND	0.02	1.2	0.28	30 J,A52	130 J,A57	ND	10 J	24,000	790	No	1,200	--
6/16/2016	M-004	7.78	69.4	--	--	--	--	--	--	--	--	--	58 A52	140 J,A57	--	--	--	--	--	--	--
6/23/2016	M-004	8.01	69.8	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
6/28/2016	M-004	8.01	71.6	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
Discharges to M-005 (Outfall/Port #4)																					
4/7/2016	M-005	8.12	66.4	14	1.4 A07	1.9	ND	ND	ND	0.07	2.2	2.9	160 A52	220 A57	ND	130	160,000	140	No	1050	--
4/20/2016	M-005	7.80	68.9	--	3.0 A07	--	--	--	--	--	--	--	460 A52	530 A57	--	190	--	--	--	--	--
4/28/2016	M-005	8.25	66.4	--	ND	--	--	--	--	--	--	--	ND	ND	--	160	--	--	--	--	--
5/5/2016	M-005	8.27	66.6	--	ND	--	--	--	--	--	--	--	ND	ND	--	92	--	--	--	--	--
5/10/2016	M-005	8.31	66.0	ND	ND	ND	ND	ND	ND	0.00	ND	0.58	ND	ND	--	110	13,000	23	No	1,410	--
5/19/2016	M-005	8.40	65.3	--	ND	--	--	--	--	--	--	--	ND	ND	--	27 J	--	--	--	--	--
5/26/2016	M-005	8.21	70.5	--	--	--	--	--	--	--	--	--	--	--	--	11 J	--	--	--	--	--
6/2/2016	M-005	8.10	70.2	ND	0.20	ND	ND	ND	ND	0.02	ND	0.47	43 J,A52	160 A57	ND	9.3 J	7,900	13	No	1,550	--
6/2/2016	Duplicate	8.10	70.2	ND	0.20	0.85 J	ND	ND	ND	0.02	ND	0.48	72 A52	170 J,A57	ND	8.8 J	3,300	49	No	>2,420	--
6/9/2016	M-005	8.28	69.4	--	--	--	--	--	--	--	--	--	--	--	--	21 J	--	--	--	--	--
6/16/2016	M-005	8.29	69.8	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
6/23/2016	M-005	8.22	70.9	--	--	--	--	--	--	--	--	--	65 A52	150 J,A57	--	--	--	--	--	--	--
6/28/2016	M-005	8.24	71.8	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
Discharges to M-006 (Outfall/Port #5)																					
4/7/2016	M-006	8.22	67.8	ND	0.25	ND	ND	ND	ND	0.06	1.70	0.41	30 J,A52	ND	ND	3.3 J	7,900	33	No	435	--
5/10/2016	M-006	8.33	67.8	ND	ND	ND	ND	ND	ND	0.00	0.81	0.42	ND	ND	ND	6.7 J	3,300	4.5	No	109	--
6/2/2016	M-006	8.22	69.4	ND	0.033	1.0 J	ND	ND	ND	0.07	2.60	0.56	ND	140 J,A57	ND	6.8 J	3,300	23	No	66	--
6/16/2016	M-006	8.31	72.5	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
6/23/2016	M-006	8.21	70.7	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
6/28/2016	M-006	8.31	73.9	--	--	--	--	--	--	--	--	--	69 A52	130 J,A57	--	--	--	--	--	--	--
Discharges to M-007 (Outfall/Port #5a)																					
4/7/2016	M-007	7.96	67.6	ND	ND	ND	ND	ND	ND	0.00	0.60	0.20	ND	ND	ND	1.3 J	330	33	No	5	--
5/10/2016	M-007	7.97	67.5	ND	ND	ND	ND	ND	ND	0.00	ND	0.18	ND	ND	ND	9.7 J	23	7.8	Yes	1	--
6/2/2016	M-007	8.01	68.9	1.5	ND	ND	ND	ND	ND	0.00	ND	0.16	ND	ND	ND	2.0 J	79	49	Yes	17	--
Discharges to M-008 (Outfall/Port #6)																					
4/7/2016	M-008	8.34	64.0	ND	0.022 J	0.85	ND	ND	ND	0.02	1.7	1.2	ND	ND	ND	110	130	2	No	64	--
4/7/2016	Duplicate	8.34	64.0	ND	ND	ND	ND	ND	ND	0.02	4.3	0.76	ND	ND	ND	100	790	<1.8	No	53	--
4/14/2016	M-008	8.42	64.8	--	--	--	--	--	--	--	--	--	--	--	--	75	--	--	--	--	--
4/20/2016	M-008	8.20	69.1	--	--	--	--	--	--	--	--	--	--	--	--	92	--	--	--	--	--
4/28/2016	M-008	8.48	65.8	--	--	--	--	--	--	--	--	--	--	--	--	80	--	--	--	--	--
5/5/2016	M-008	8.46	65.3	--	--	--	--	--	--	--	--	--	--	--	--	97	--	--	--	--	--
5/10/2016	M-008	8.31	66.9	ND	0.021 J	ND	ND	ND	ND	0.05	3.0	1.5	ND	ND	--	120	2,800	230	No	387	--
5/19/2016	M-008	8.36	67.1	--	--	--	--	--	--	--	--	--	--	--	--	63	--	--	--	--	--
5/26/2016	M-008	8.28	68.0	--	--	--	--	--	--	--	--	--	--	--	--	72	--	--	--	--	--
6/2/2016	M-008	8.28	67.5	ND	ND	ND	ND	ND	ND	0.02	ND	0.37	ND	ND	ND	64	4,900	330	No	980	--
6/9/2016	M-008	8.36	67.3	--	--	--	--	--	--	--	--	--	--	--	--	120	--	--	--	--	--
6/16/2016	M-008	8.53	66.7	--	--	--	--	--	--	--	--	--	--	--	--	150	--	--	--	--	--
6/23/2016	M-008	8.18	67.6	--	--	--	--	--	--	--	--	--	--	--	--	71	--	--	--	--	--
6/28/2016	M-008	8.27	71.4	--	--	--	--	--	--	--	--	--	--	--	--	40 J	--	--	--	--	--
Discharges to M-009 (Outfall/Port #7)																					
4/7/2016	HD-7	7.85	68.2	ND	0.025 J	ND	ND	ND	ND	0.02	1.2	0.29	ND	ND	ND	1.6 J	<1.8	<1.8	N/A	<1	--
5/10/2016	HD-7	7.96	68.7	ND	0.034 J	ND	ND	ND	ND	0.01	1.3	0.22	ND	ND	ND	4.5 J	<1.8	<1.8	N/A	<1	--
6/2/2016	HD-7	8.00	69.6	ND	0.044	ND	ND	ND	ND	0.00	ND	0.18	ND	110 J,A57	ND	2.9 J	<1.8	<1.8	N/A	<1	--
6/16/2016	HD-7	8.02	75.0	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
6/23/2016	HD-7	8.33	69.1	--	--	--	--	--	--	--	--	--	ND	110 J,A57	--	--	--	--	--	--	--
6/28/2016	HD-7	7.93	76.8	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
Discharges to M-010 (Outfall/Port #8)																					
4/7/2016	M-010	8.15	67.3	1.7	0.028 J	ND	ND	ND	ND	0.03	7.4	0.54	ND	ND	ND	2.4 J	2,300	2	No	<1	--
5/10/2016	M-010	8.41	66.0	ND	0.045J	ND	3.0	ND	ND	0.09	21	0.93	ND	ND	ND	19 J	2,200	<1.8	No	5	--
6/2/2016	M-010	8.19	68.0	ND	ND	ND	ND	ND	ND	0.00	1.9	0.53	ND	ND	ND	9.9 J	490	<1.8	No	1	--
Effluent Limit (Daily Max.)																					
				30																	