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Monitoring Inland Storm Surge and Flooding from Hurricane Ike in Texas and Louisiana, September 2008

Open-File Report 2008–1365

U.S. Department of the Interior
U.S. Geological Survey

Cover left: Pressure transducer (sensor) attached to power pole to record storm surge.

Cover right: Global positioning system surveying of storm-surge site after Hurricane Ike.

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By Jeffery W. East, Michael J. Turco, and Robert R. Mason, Jr.

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The U.S. Geological Survey (USGS) deployed a temporary monitoring network of 117 pressure transducers (sensors) at 65 sites over an area of about 5,000 square miles to record the timing, areal extent, and magnitude of inland hurricane storm surge and coastal flooding generated by Hurricane Ike, which struck southeastern Texas and southwestern Louisiana September 12–13, 2008. Fifty-six sites were in Texas and nine were in Louisiana. Sites were categorized as surge, riverine, or beach/wave on the basis of proximity to the Gulf Coast. One-hundred five sensors from 59 sites (fig. 1) were recovered; 12 sensors from six sites either were lost during the storm or were not retrieved. All 59 sites (41 surge, 10 riverine, 8 beach/wave) had sensors to record water pressure (fig. 2), which is expressed as water level in feet above North American Vertical Datum of 1988 (NAVD88), and 46 sites had an additional sensor to record barometric pressure, expressed in pounds per square inch. Figure 3 shows an example of water level and barometric pressure over time recorded by sensors during the storm.

Data were collected and processed following protocols established by McGee and others (2005), which included correcting water pressure for changes in barometric pressure and salinity. Quality-control checks were made by colocating water-level sensors at a subset of sites and comparing data from those sensors to water levels computed from recorded pressure data at those sites; and by comparing water levels computed from recorded pressure data to water levels recorded at nearby USGS gaging stations and to independent high-water marks where possible. Elevation surveys using global positioning systems (fig. 4) and differential levels were done to relate all water-level data, reference marks, benchmarks, and sensor measuring points to NAVD88.

The data from the Hurricane Ike storm-surge network constitute an extensive collection of continuous water-level records documenting a single land-falling hurricane. The data can be used to evaluate the performance of storm-surge models for maximum and incremental water level and flood extent and site-specific effects of storm surge on natural and anthropogenic elements of the environment. The data are available on a provisional basis in tab-delimited, ASCII format by site for each sensor (see table 1 at http://pubs.usgs.gov/of/2008/1365/). Data for each site comprise date, time, water level, corresponding water pressure, barometric pressure, temperature from water-pressure sensor, temperature from barometric-pressure sensor, and indicators of missing data. The data-processing date is in the file header. The data also are available in a single folder at http://pubs.usgs.gov/of/2008/1365/.

Reference

McGee, B.D., Goree, B.B., Tollett, R.W., Woodward, B.K., and Kress, W.H., 2005, Hurricane Rita surge data, southwestern Louisiana and southeastern Texas, September to November 2005: U.S. Geological Survey Data Series 220, available at *http://pubs.usgs.gov/ds/2006/220/*.

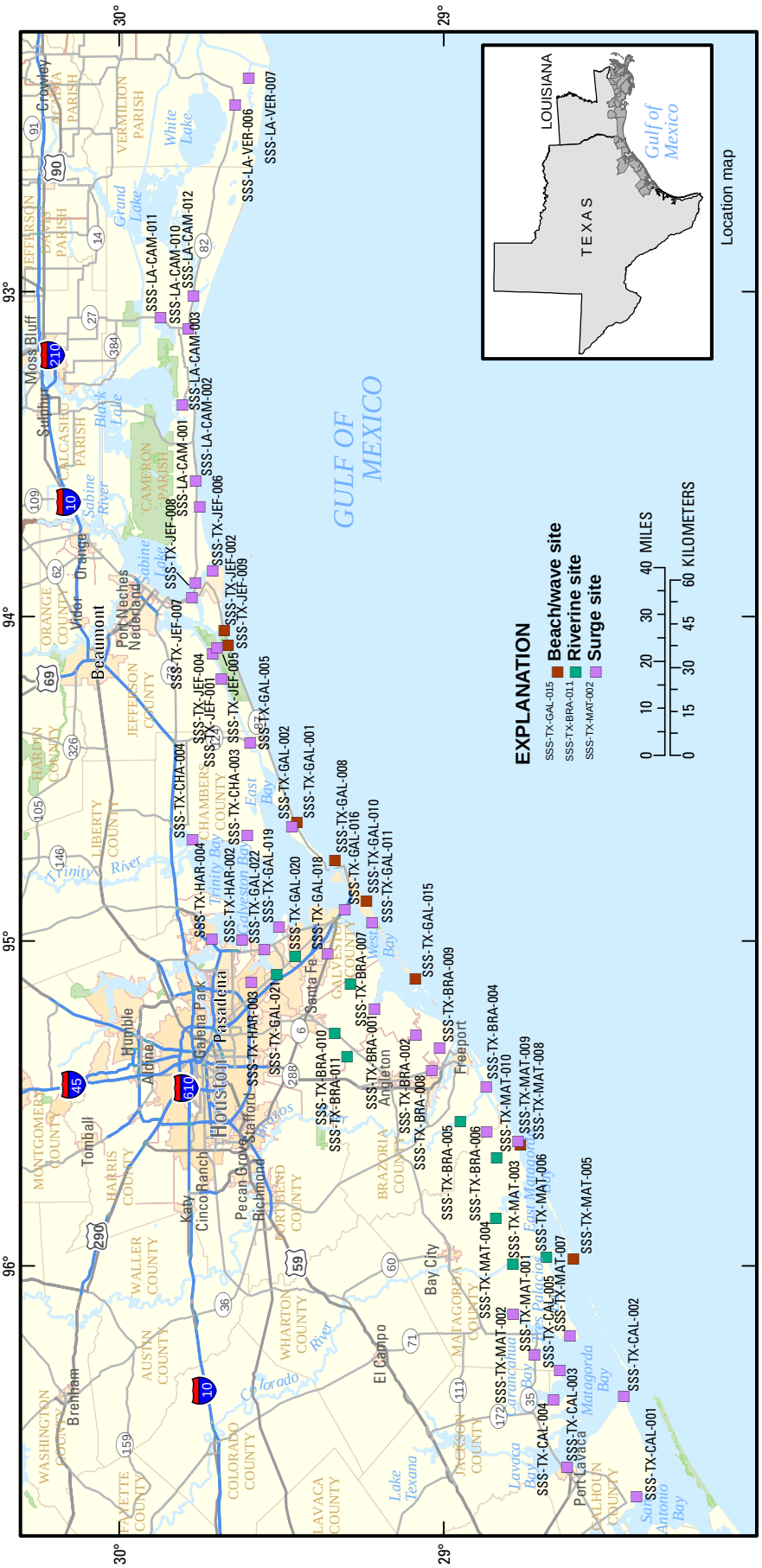


Figure 1. Sensor sites from which storm-surge data were obtained during Hurricane Ike.

Figure 2. Pressure transducer (sensor) attached to power pole to record storm surge.

Figure 4. Global positioning system surveying of storm-surge site after Hurricane Ike.

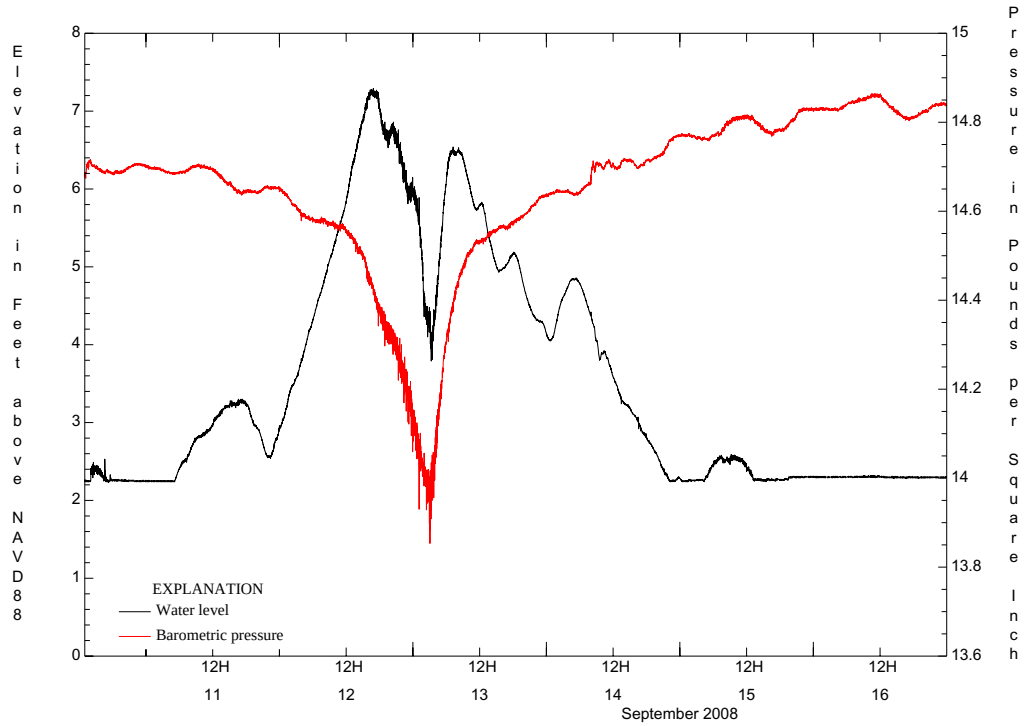


Figure 3. Example of water level and barometric pressure recorded during Hurricane Ike.

Table 1. Hurricane Ike storm-surge data for 59 sites in Texas and Louisiana, September 2008.

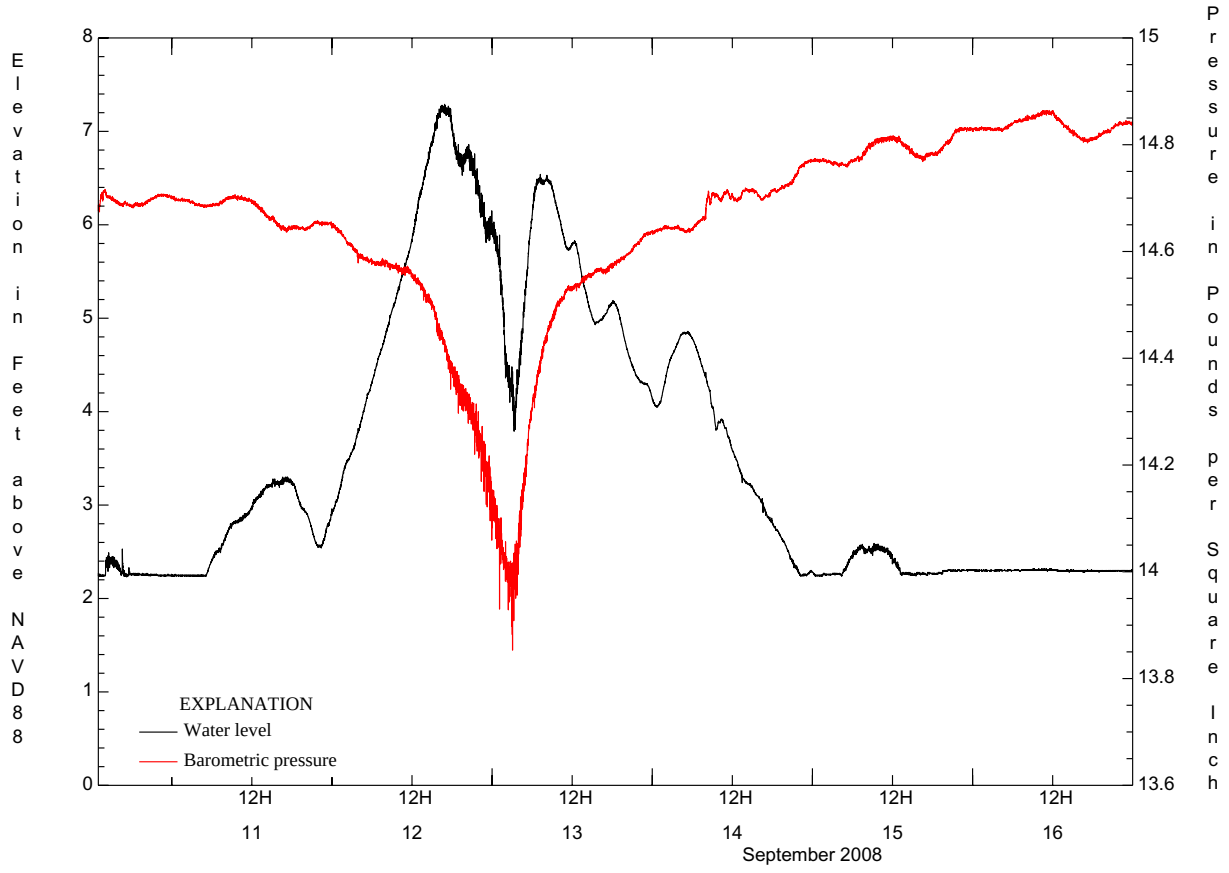
[All graphs of water level and barometric pressure are available at http://pubs.usgs.gov/of/2008/1365/; graphs are shown following this table as indicated]

Site name	County or parish	Latitude, decimal degrees	Longitude, decimal degrees	Site type	Graph (page number)
SSS-TX-BRA-001	Brazoria	29.21194	-95.20833	surge	5
SSS-TX-BRA-002	Brazoria	29.08472	-95.28806	surge	6
SSS-TX-BRA-004	Brazoria	28.86833	-95.44861	surge	6
SSS-TX-BRA-005	Brazoria	28.94944	-95.55556	riverine	7
SSS-TX-BRA-006	Brazoria	28.86667	-95.58722	surge	7
SSS-TX-BRA-007	Brazoria	29.28667	-95.13139	riverine	8
SSS-TX-BRA-008	Brazoria	29.03556	-95.39889	surge	8
SSS-TX-BRA-009	Brazoria	29.01306	-95.32972	surge	9
SSS-TX-BRA-010	Brazoria	29.33639	-95.28417	riverine	9
SSS-TX-BRA-011	Brazoria	29.29667	-95.35667	riverine	10
SSS-TX-CAL-001	Calhoun	28.40639	-96.71167	surge	10
SSS-TX-CAL-002	Calhoun	28.44444	-96.40250	surge	11
SSS-TX-CAL-003	Calhoun	28.61917	-96.61972	surge	11
SSS-TX-CAL-004	Calhoun	28.66056	-96.41167	surge	12
SSS-TX-CAL-005	Calhoun	28.64139	-96.32333	surge	12
SSS-TX-CHA-003	Chambers	29.60417	-94.67528	surge	13
SSS-TX-CHA-004	Chambers	29.77278	-94.68694	surge	13
SSS-TX-GAL-001	Galveston	29.45139	-94.63417	beach/wave	14
SSS-TX-GAL-002	Galveston	29.46583	-94.64806	surge	14
SSS-TX-GAL-005	Galveston	29.59444	-94.39028	surge	15
SSS-TX-GAL-008	Galveston	29.33444	-94.75111	beach/wave	15
SSS-TX-GAL-010	Galveston	29.23806	-94.87778	beach/wave	16
SSS-TX-GAL-011	Galveston	29.22083	-94.94472	surge	16
SSS-TX-GAL-015	Galveston	29.08611	-95.11722	beach/wave	17
SSS-TX-GAL-016	Galveston	29.30389	-94.90528	surge	17
SSS-TX-GAL-018	Galveston	29.35583	-95.04000	surge	18
SSS-TX-GAL-019	Galveston	29.50639	-94.95778	surge	18
SSS-TX-GAL-020	Galveston	29.45667	-95.04778	riverine	19
SSS-TX-GAL-021	Galveston	29.51333	-95.10389	riverine	19
SSS-TX-GAL-022	Galveston	29.55167	-95.02472	surge	20
SSS-TX-HAR-002	Harris	29.62028	-94.99889	surge	20
SSS-TX-HAR-003	Harris	29.59194	-95.12833	surge	21
SSS-TX-HAR-004	Harris	29.71306	-94.99333	surge	21
SSS-TX-JEF-001	Jefferson	29.68444	-94.19278	surge	22
SSS-TX-JEF-002	Jefferson	29.67500	-94.04361	beach/wave	22
SSS-TX-JEF-004	Jefferson	29.71028	-94.11639	surge	23
SSS-TX-JEF-005	Jefferson	29.69694	-94.09833	surge	23
SSS-TX-JEF-006	Jefferson	29.71111	-93.86000	surge	24
SSS-TX-JEF-007	Jefferson	29.77389	-93.94250	surge	24
SSS-TX-JEF-008	Jefferson	29.76472	-93.89778	surge	25
SSS-TX-JEF-009	Jefferson	29.66265	-94.08835	beach/wave	25

Table 1. Hurricane Ike storm-surge data for 59 sites in Texas and Louisiana, September 2008—Continued.

Site name	County or parish	Latitude, decimal degrees	Longitude, decimal degrees	Site type	Graph (page number)
SSS-TX-MAT-001	Matagorda	28.72056	-96.27389	surge	26
SSS-TX-MAT-002	Matagorda	28.78639	-96.15028	surge	26
SSS-TX-MAT-003	Matagorda	28.78750	-95.99583	riverine	27
SSS-TX-MAT-004	Matagorda	28.83889	-95.85278	riverine	27
SSS-TX-MAT-005	Matagorda	28.60056	-95.97806	beach/wave	28
SSS-TX-MAT-006	Matagorda	28.68306	-95.97556	riverine	28
SSS-TX-MAT-007	Matagorda	28.61139	-96.21528	surge	29
SSS-TX-MAT-008	Matagorda	28.76417	-95.62694	beach/wave	29
SSS-TX-MAT-009	Matagorda	28.77056	-95.61667	surge	30
SSS-TX-MAT-010	Matagorda	28.83639	-95.66833	riverine	30
SSS-LA-CAM-001	Cameron	29.75028	-93.66361	surge	31
SSS-LA-CAM-002	Cameron	29.76194	-93.58250	surge	31
SSS-LA-CAM-003	Cameron	29.80417	-93.34889	surge	32
SSS-LA-CAM-010	Cameron	29.78611	-93.11500	surge	32
SSS-LA-CAM-011	Cameron	29.87056	-93.07972	surge	33
SSS-LA-CAM-012	Cameron	29.77056	-93.01444	surge	33
SSS-LA-VER-006	Vermilion	29.64111	-92.42694	surge	34
SSS-LA-VER-007	Vermilion	29.60028	-92.34167	surge	34

SSS-TX-BRA-001 (surge)



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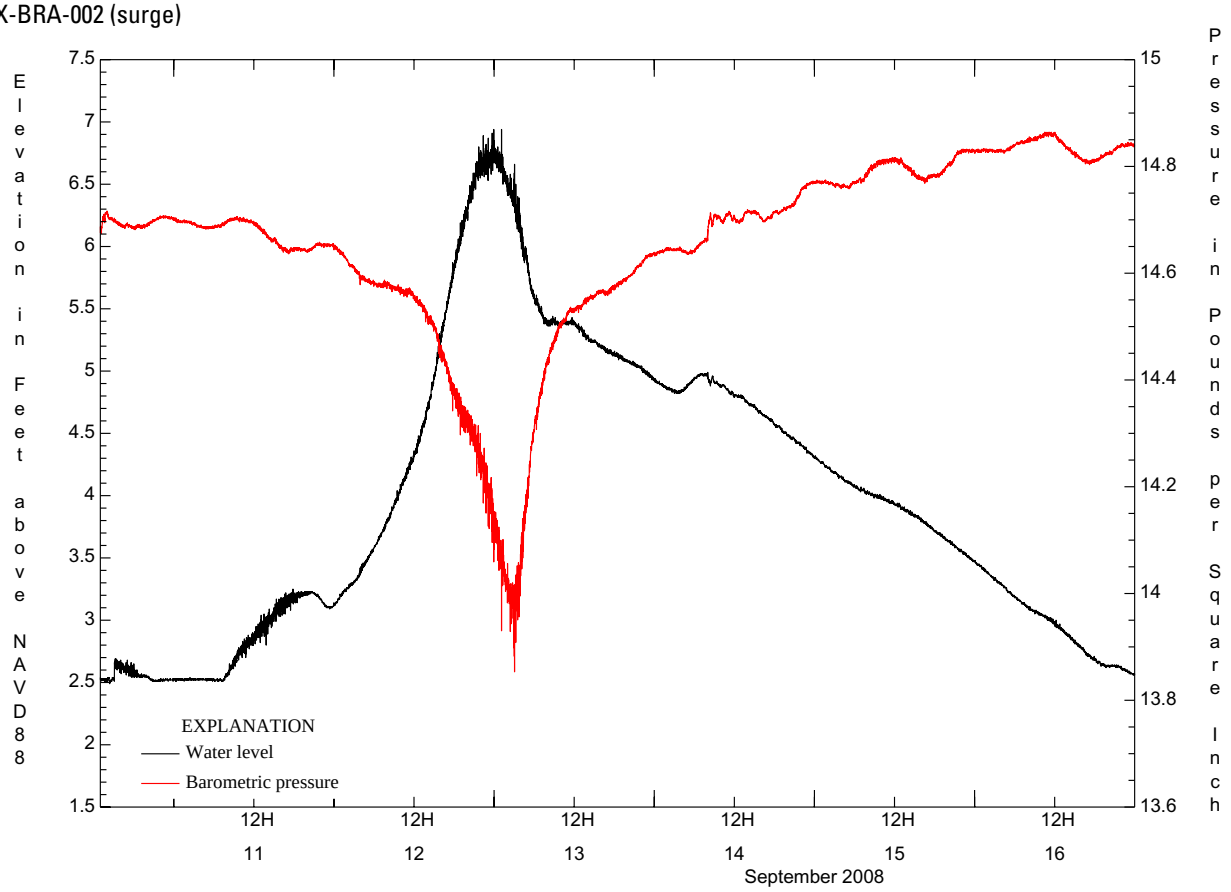

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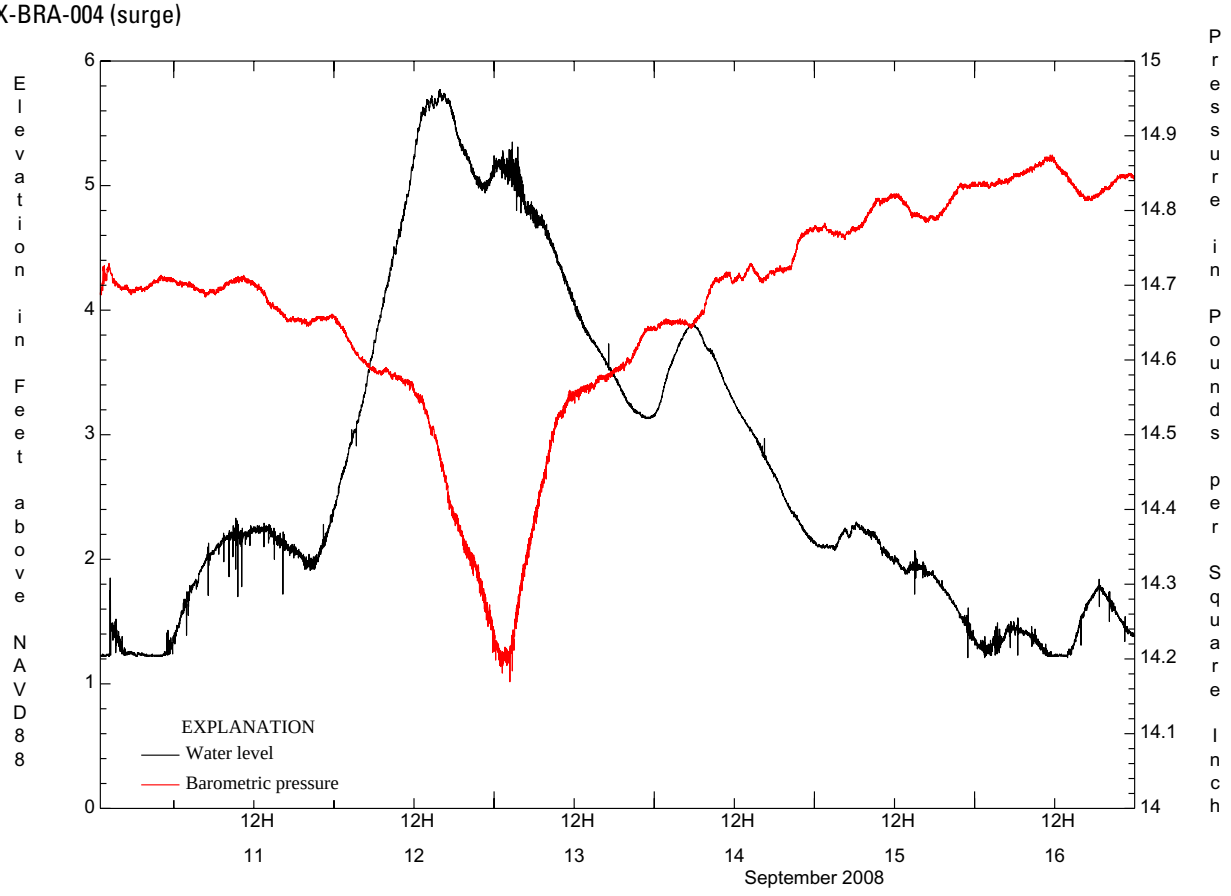

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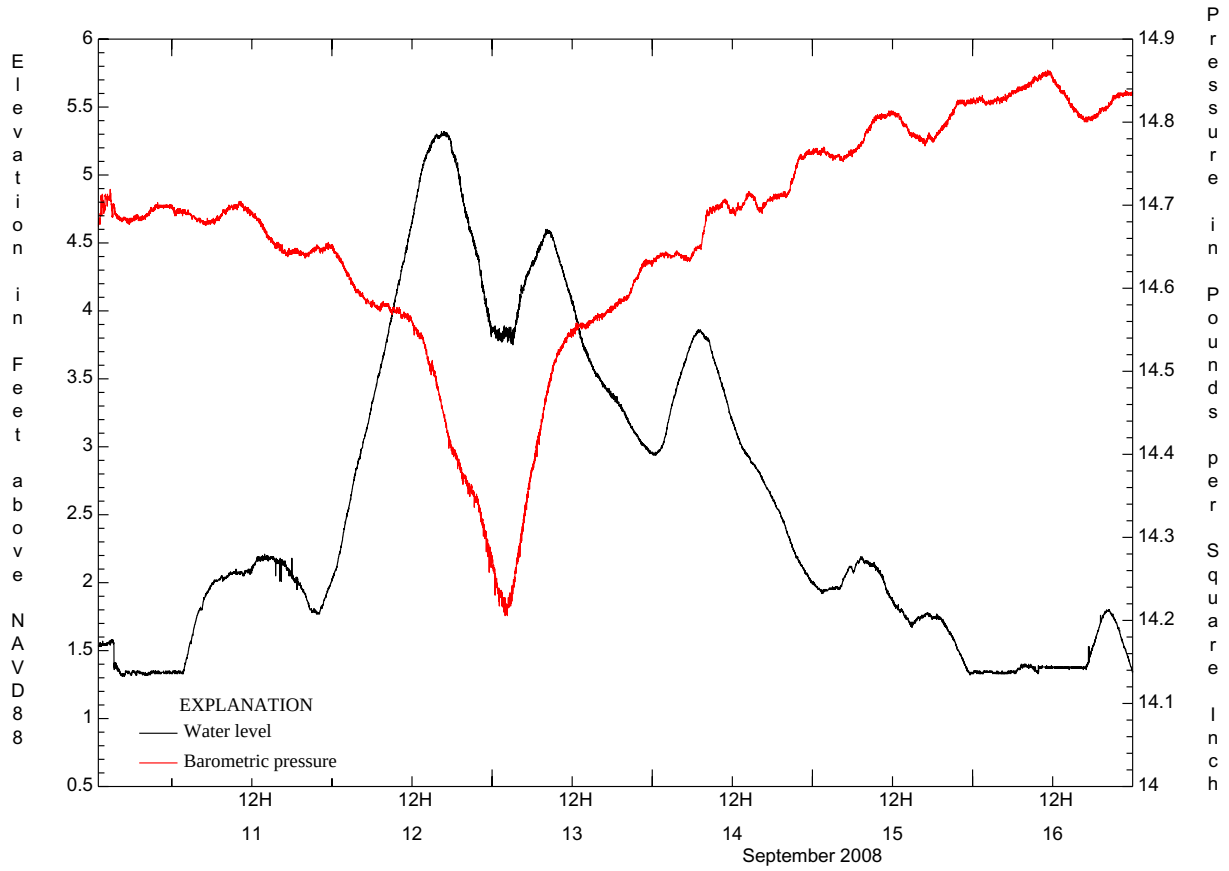

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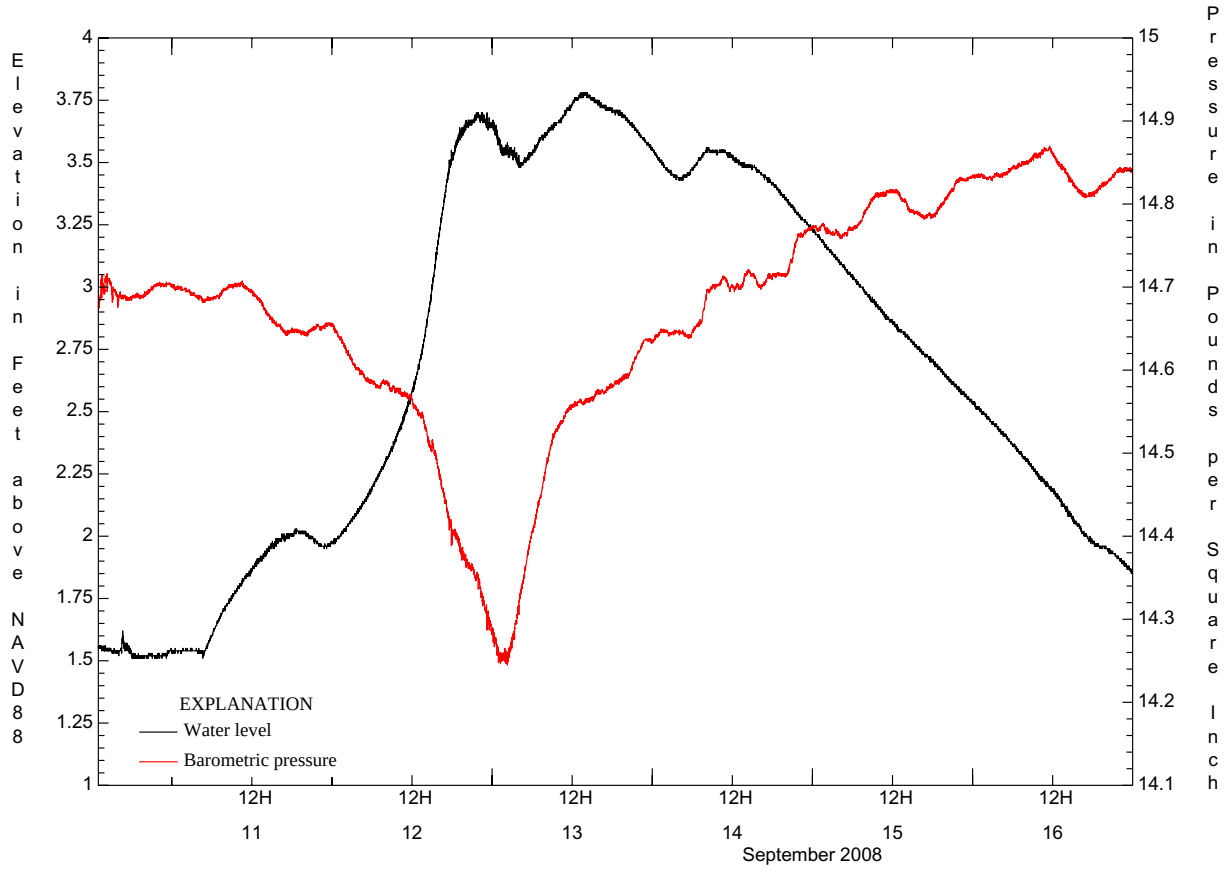

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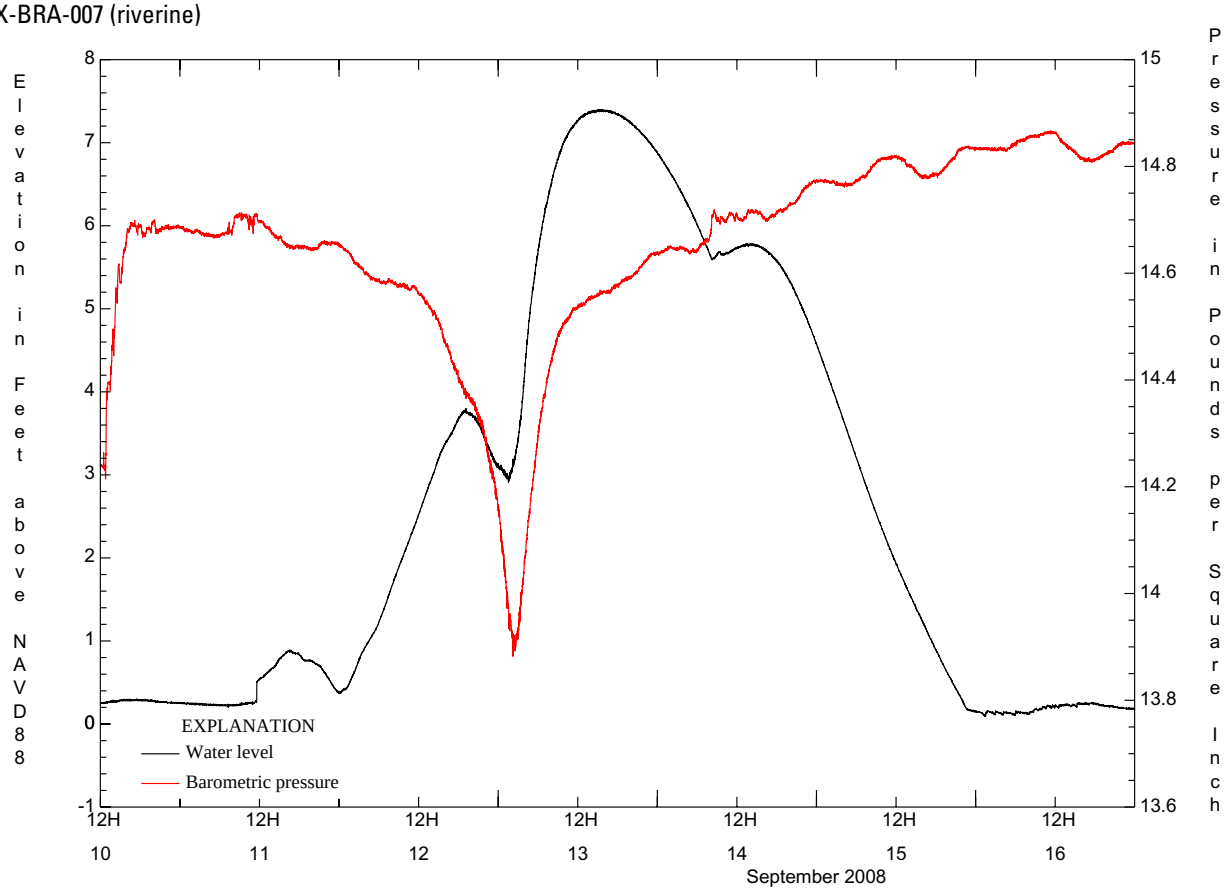

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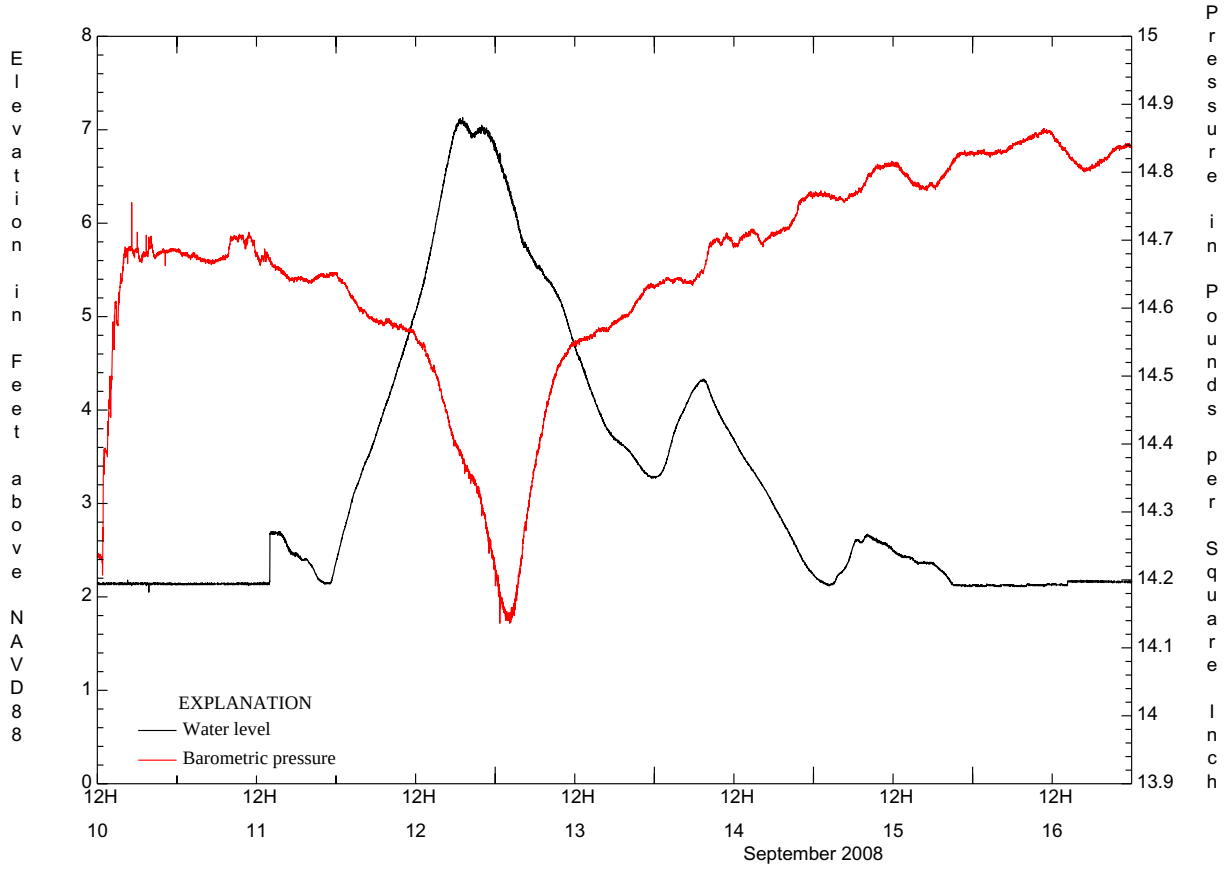

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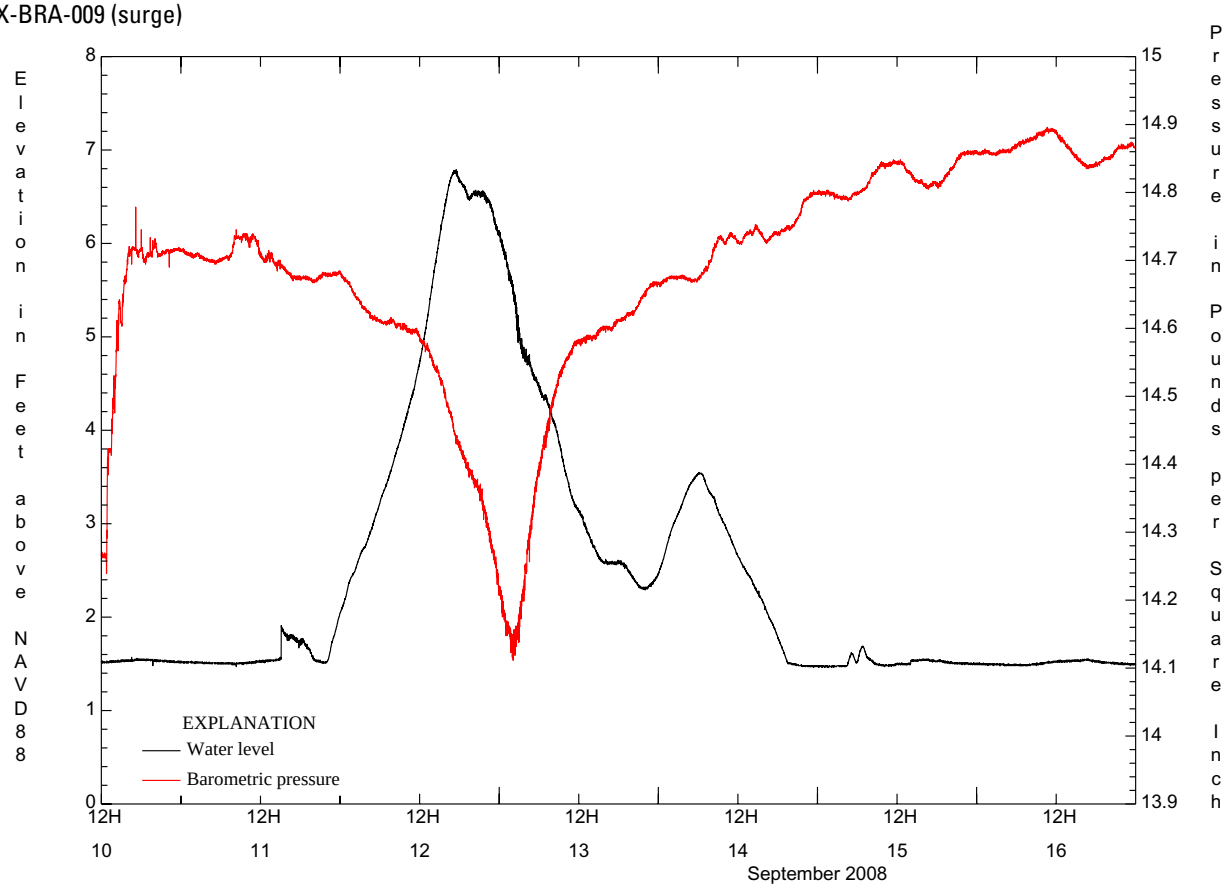

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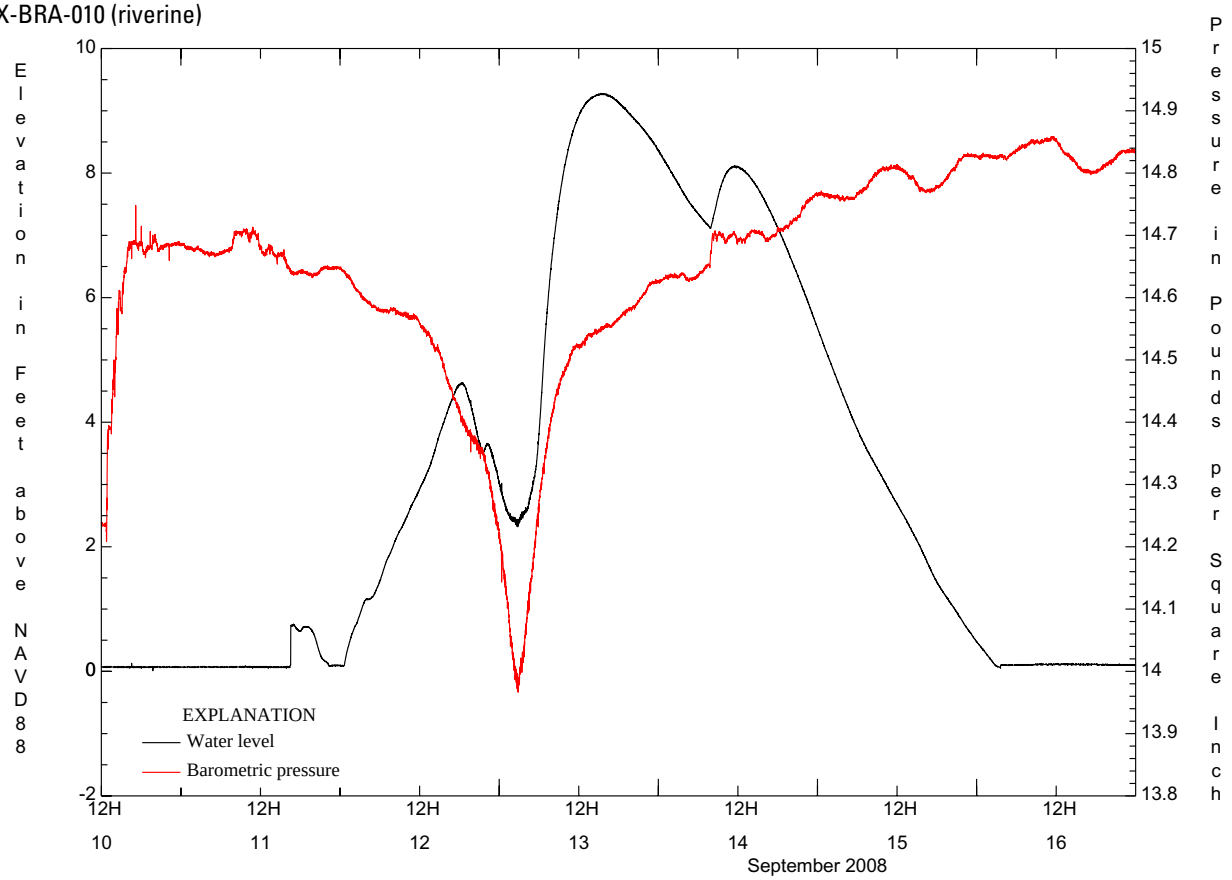

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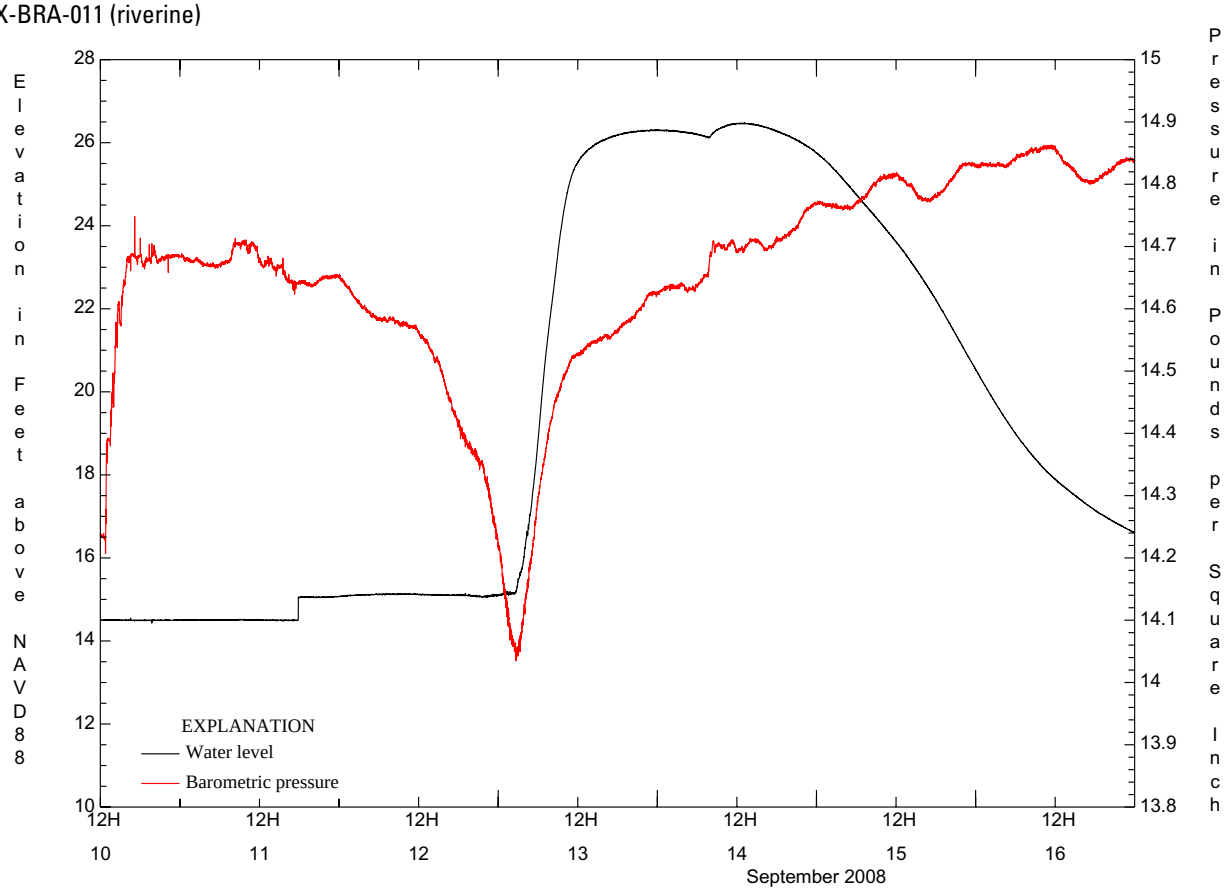

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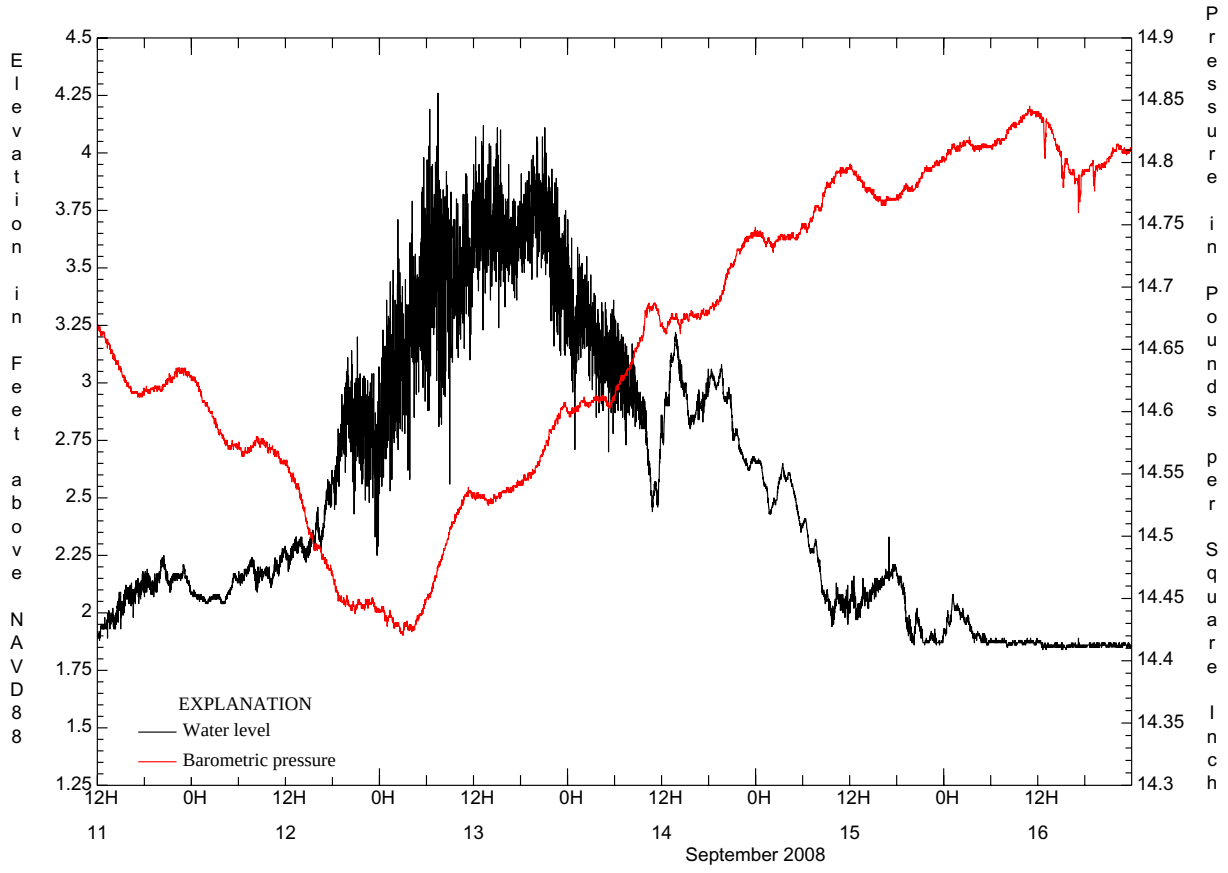

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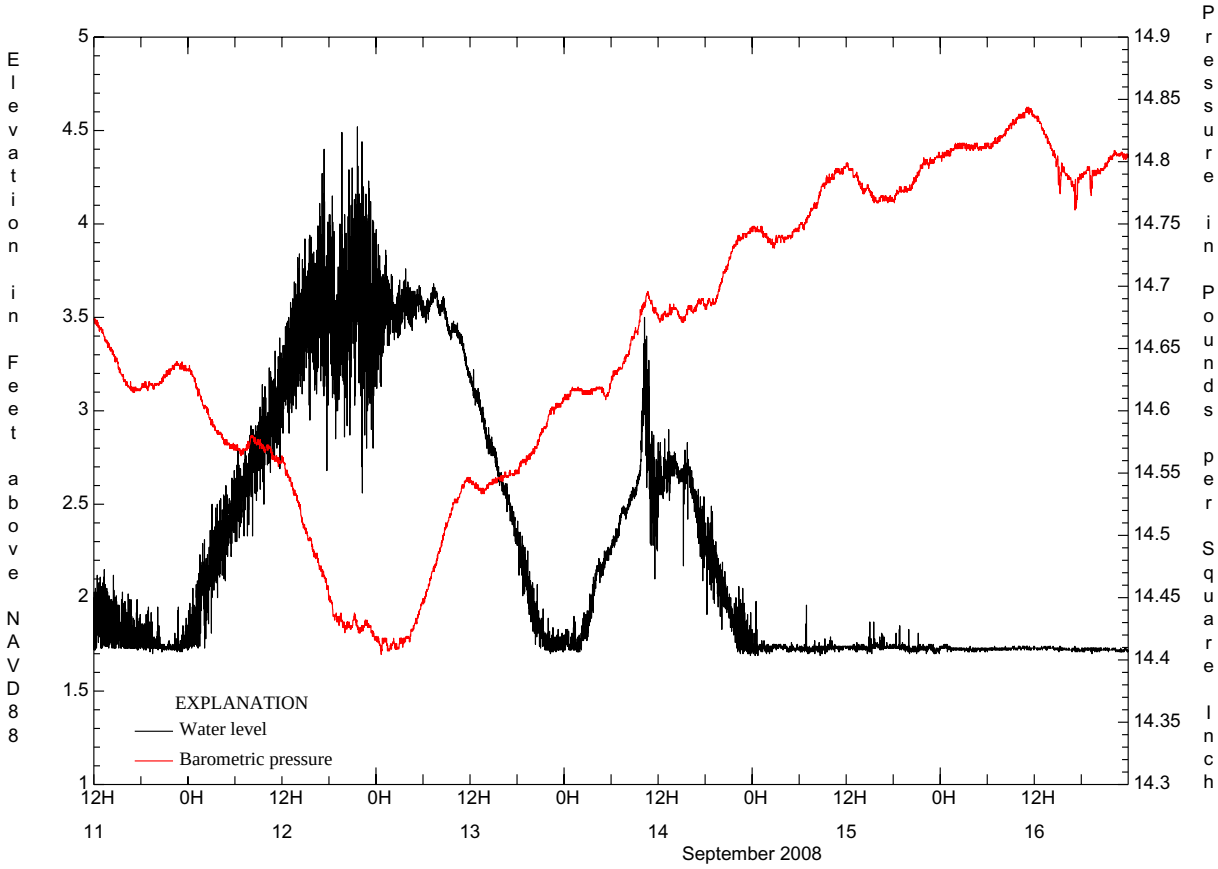

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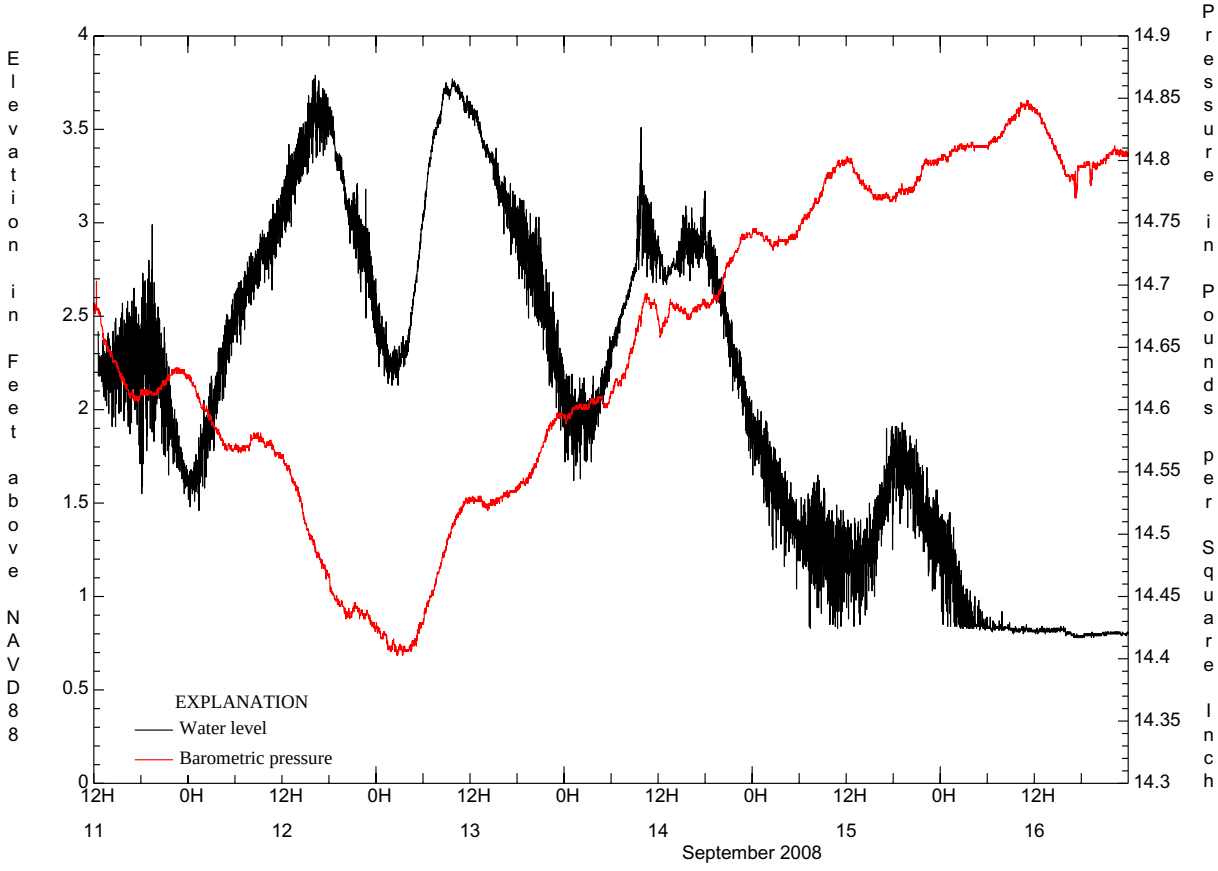

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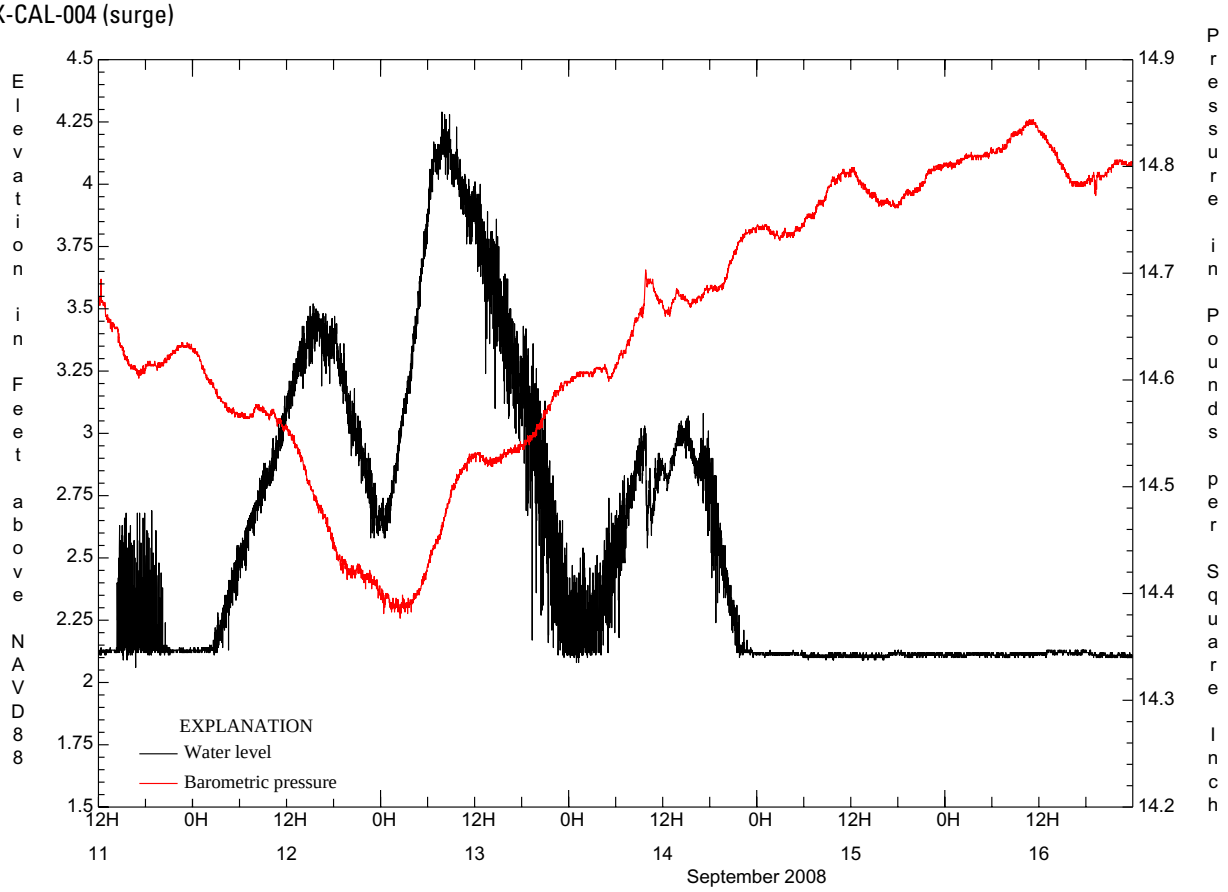

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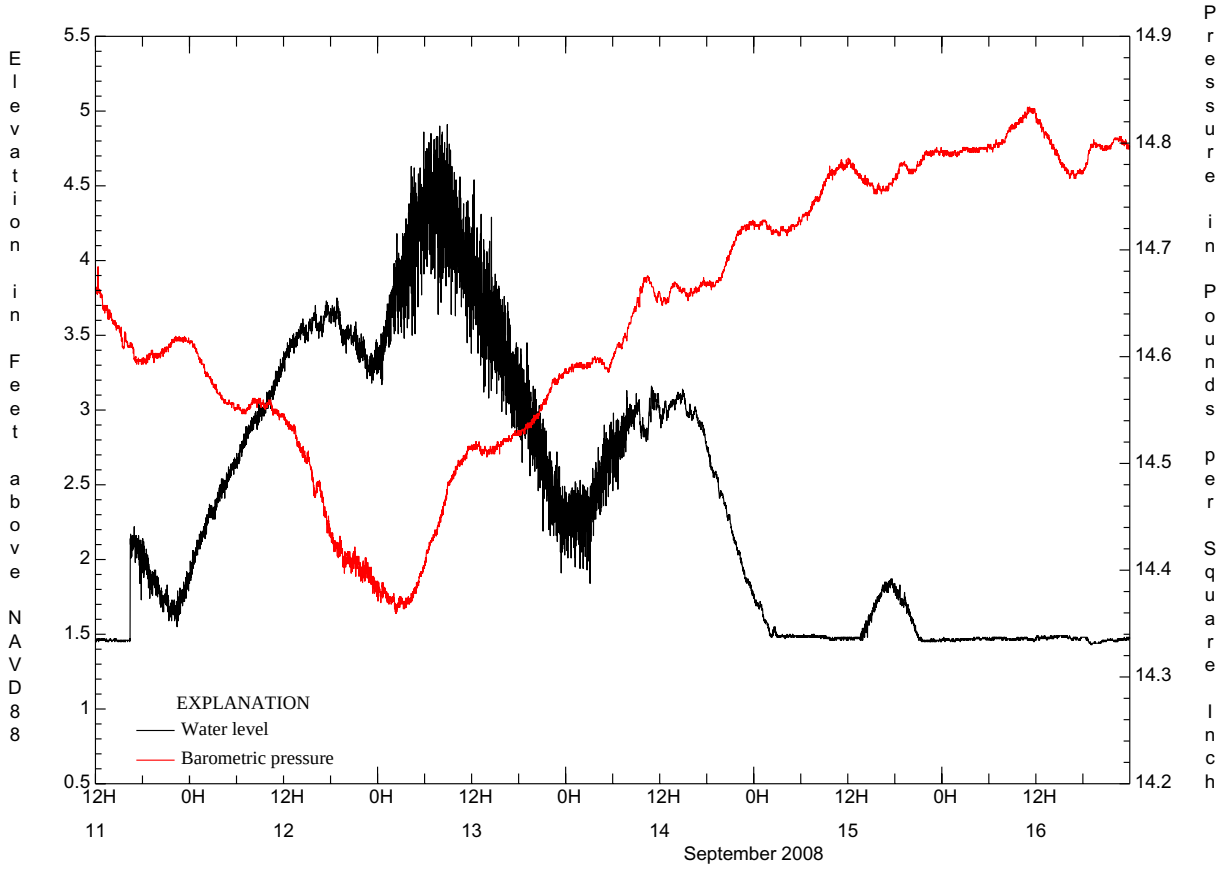

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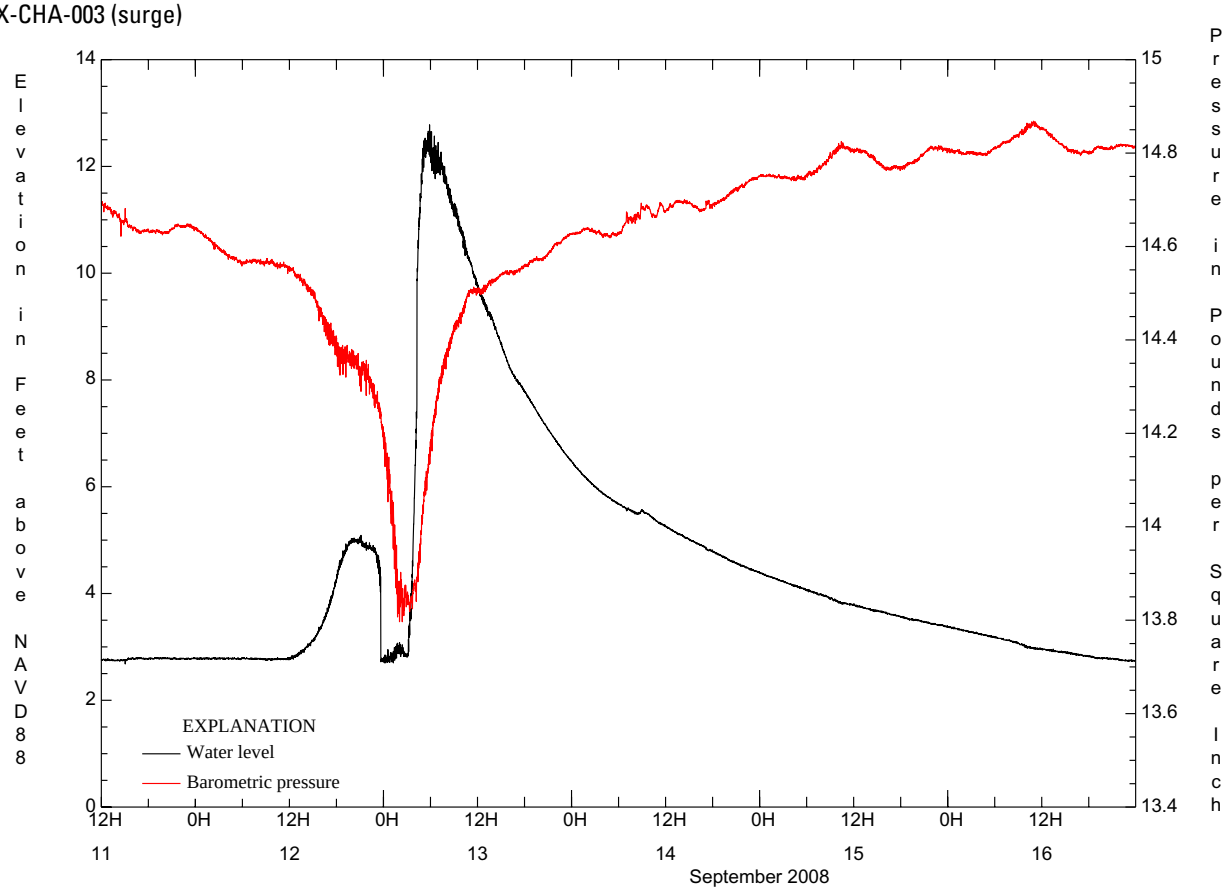

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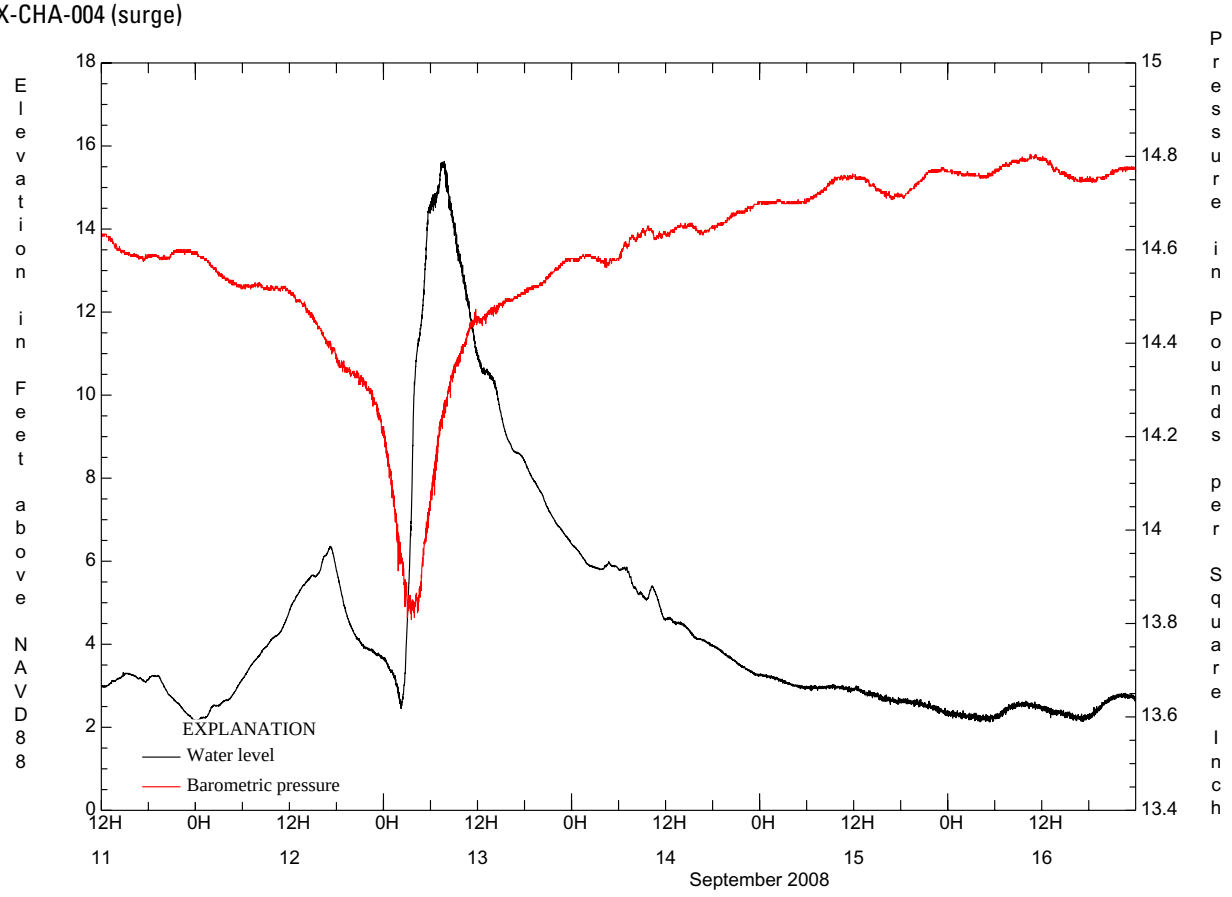

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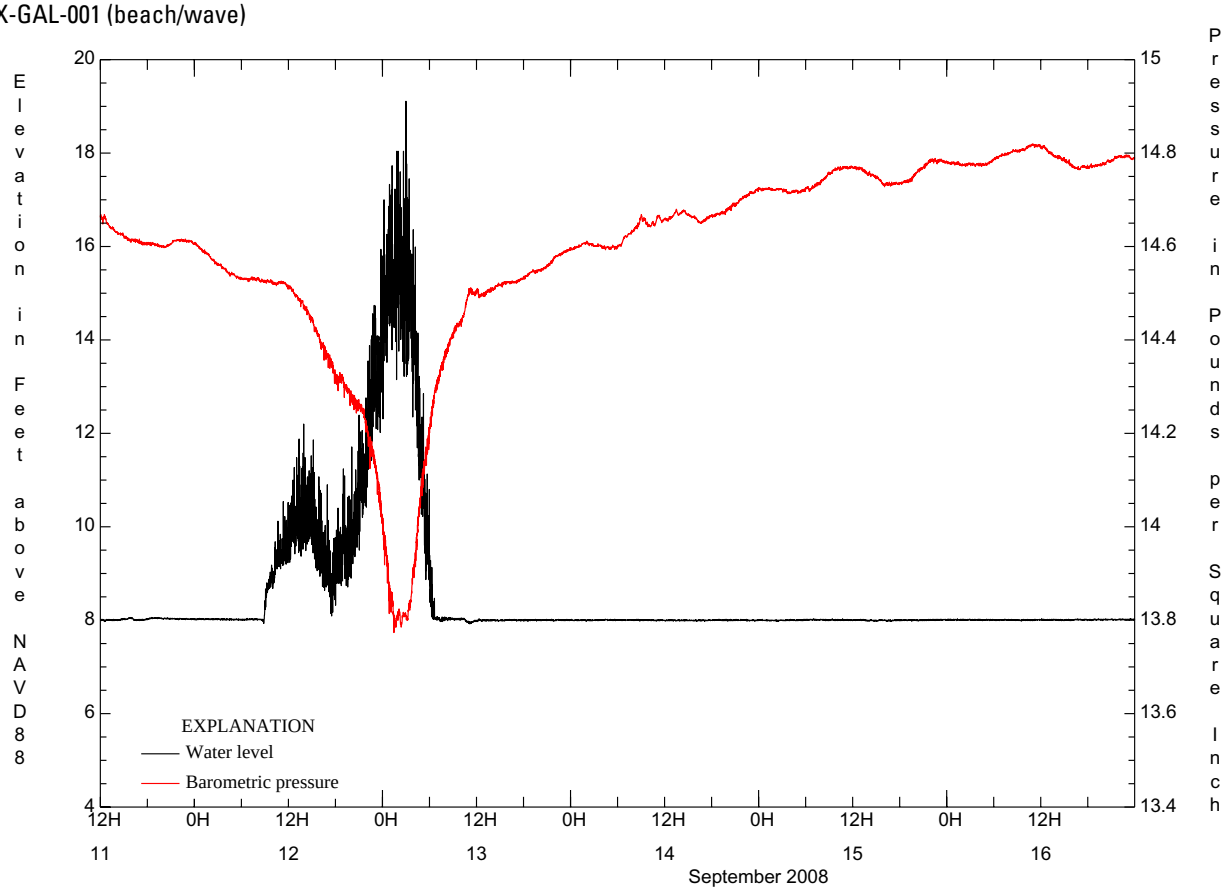

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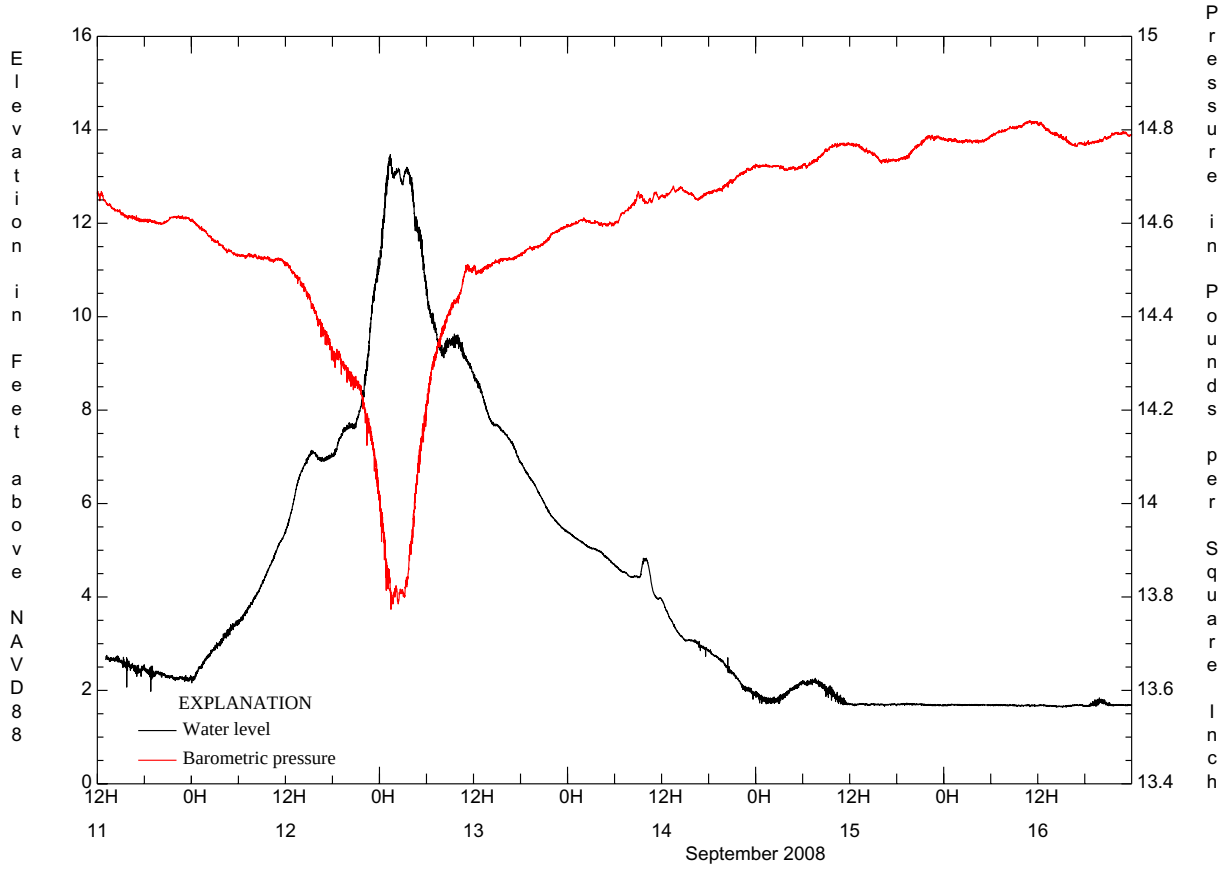

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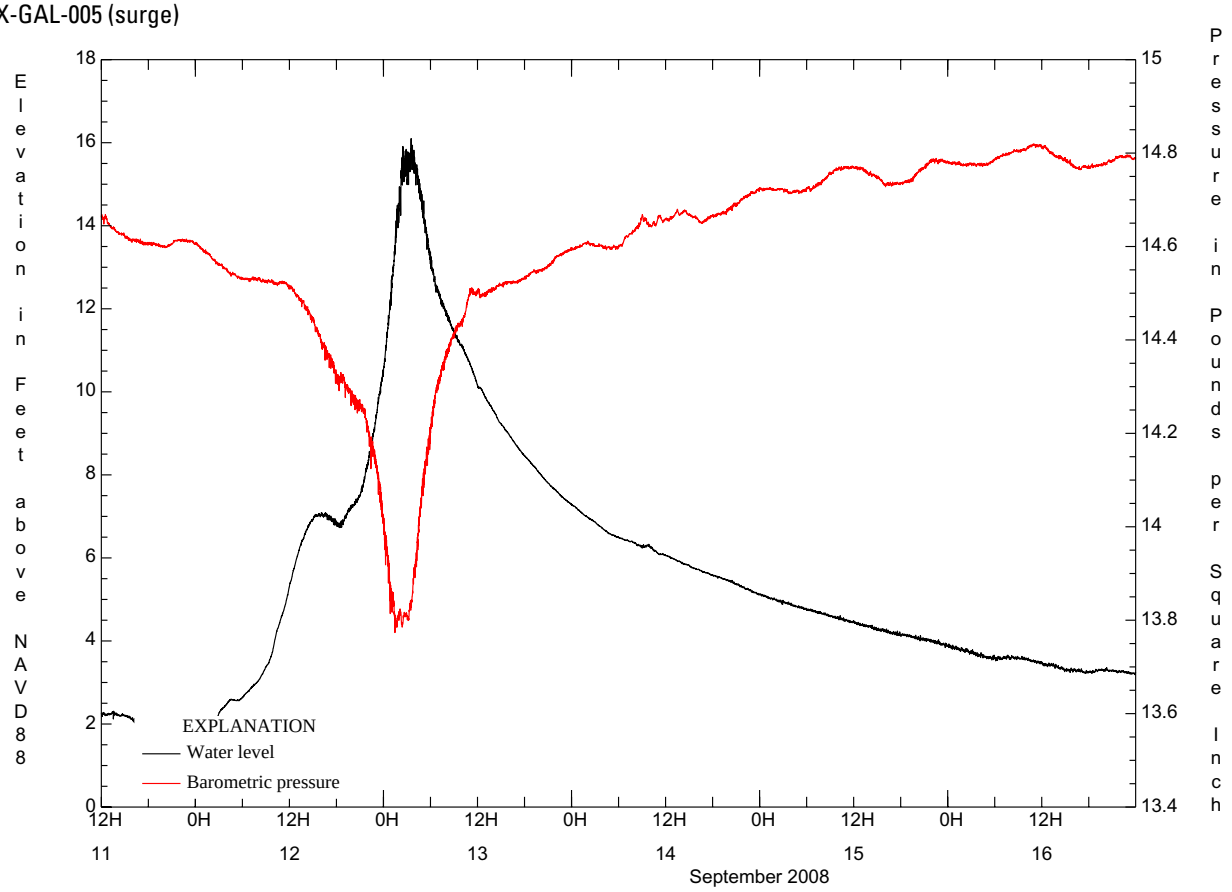

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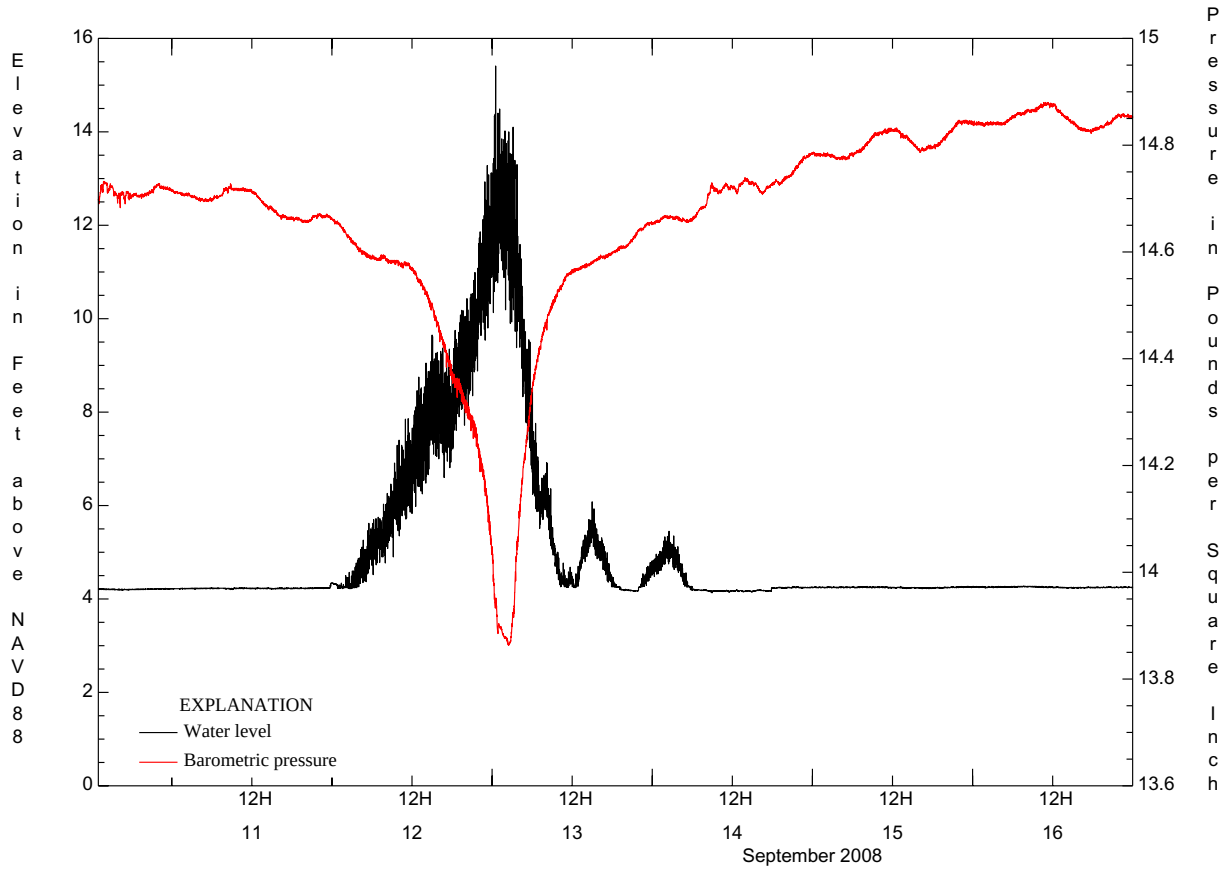

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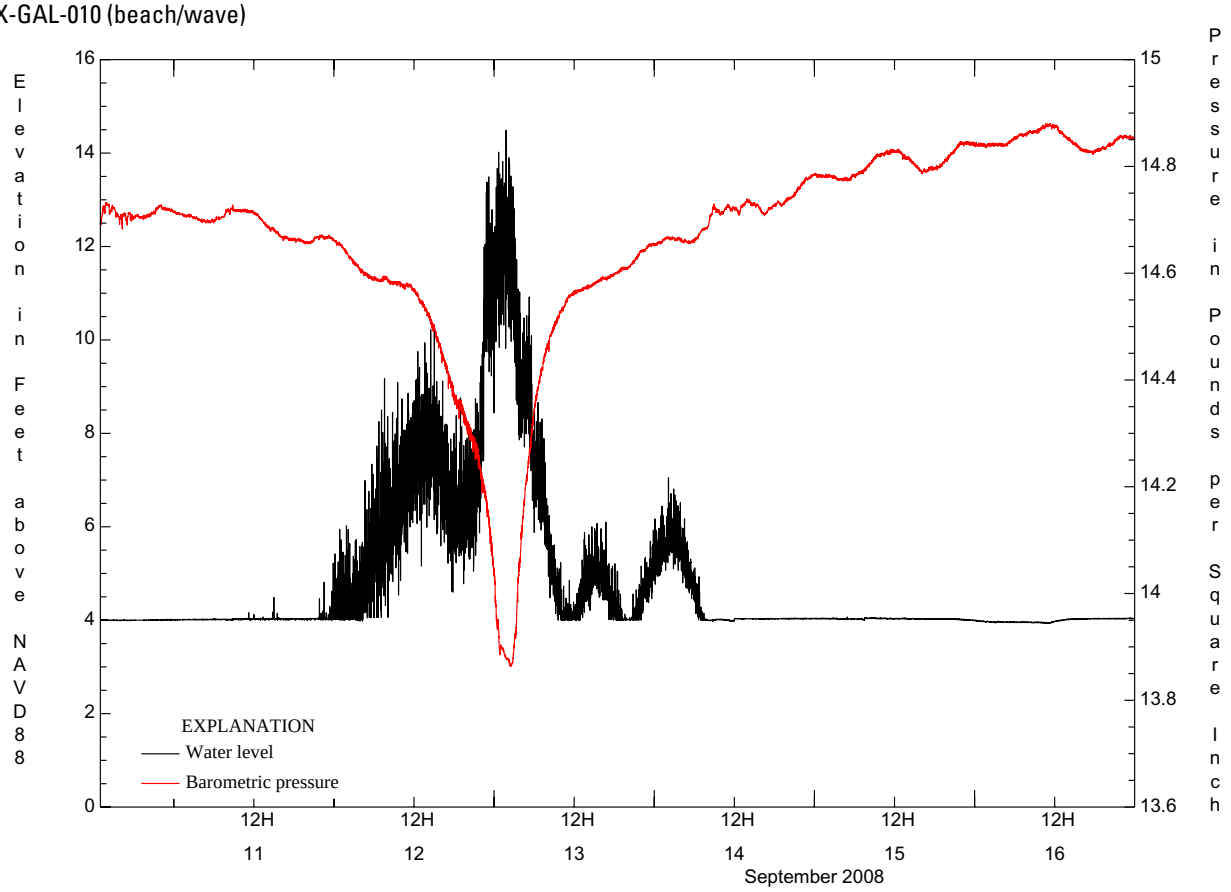

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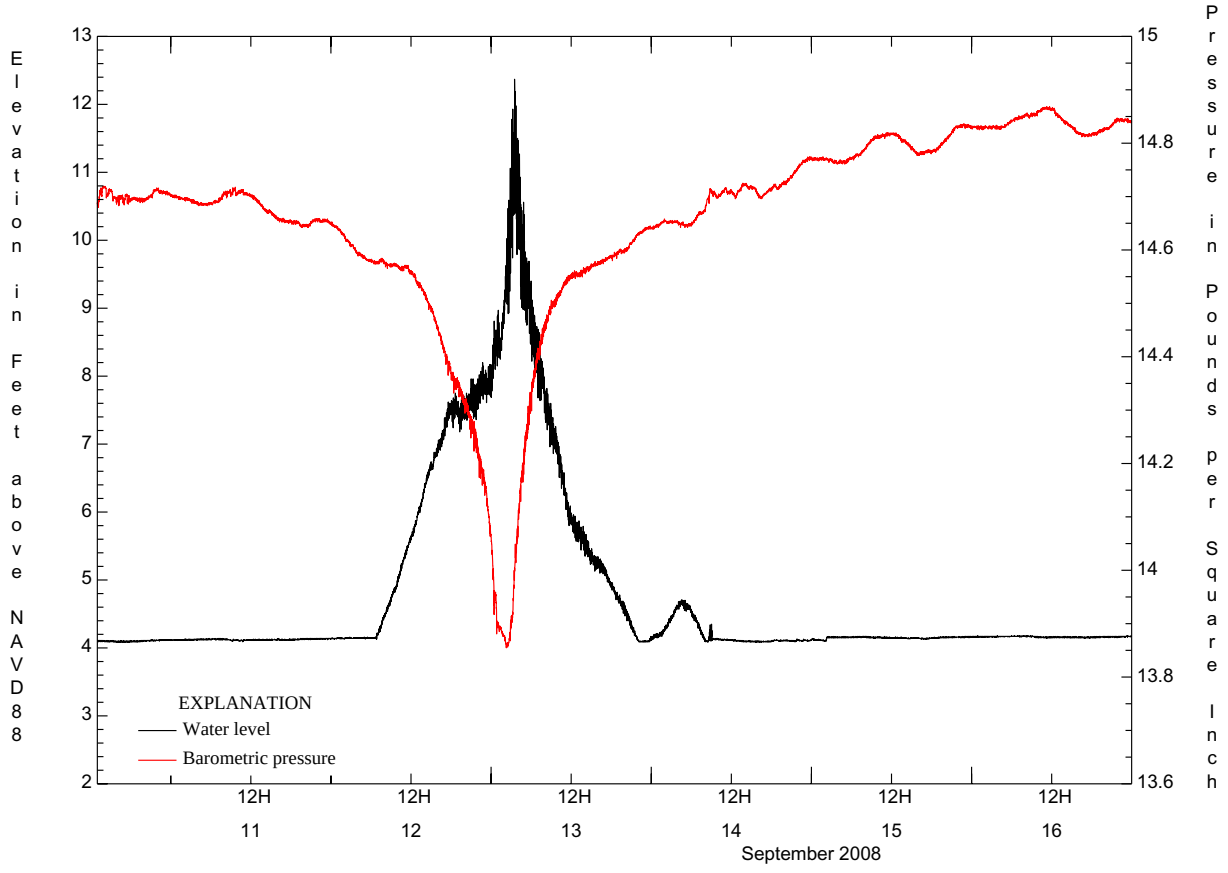

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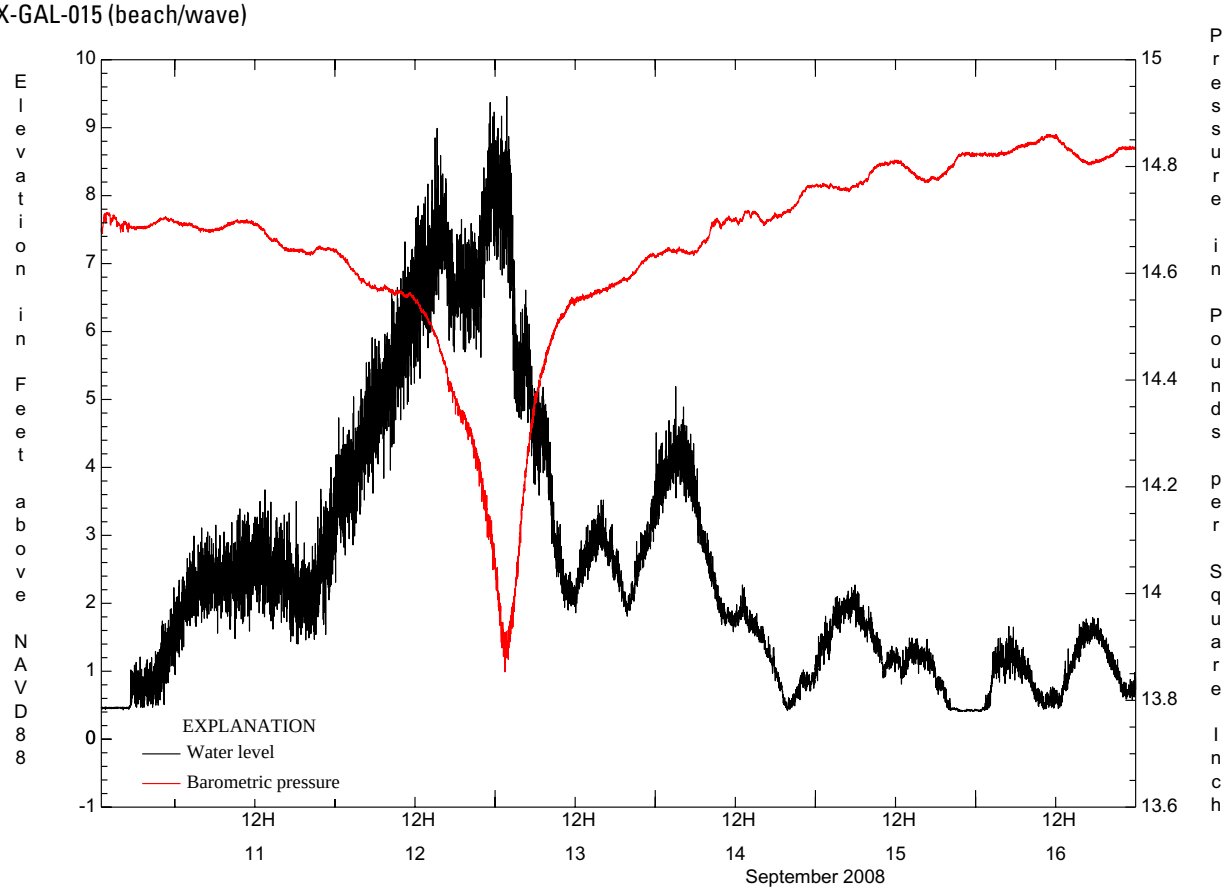

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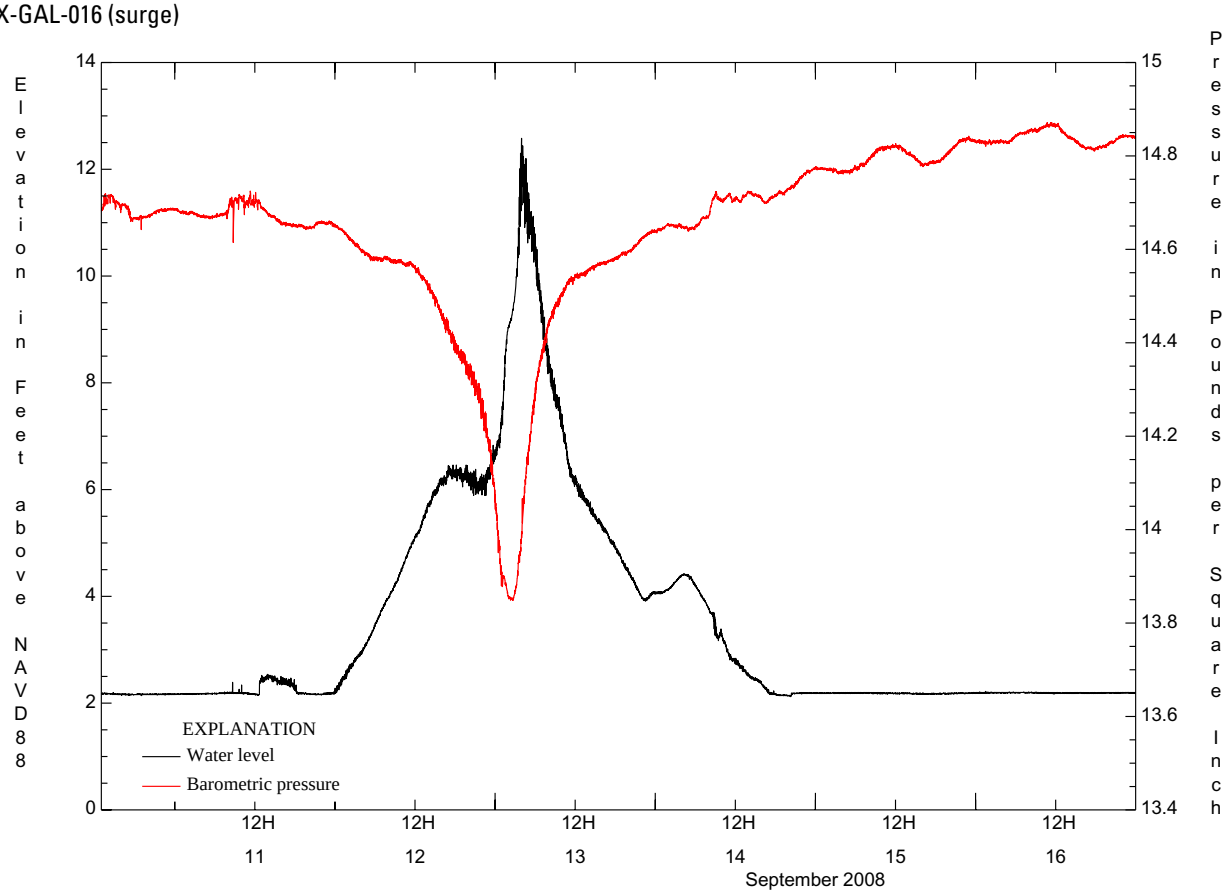

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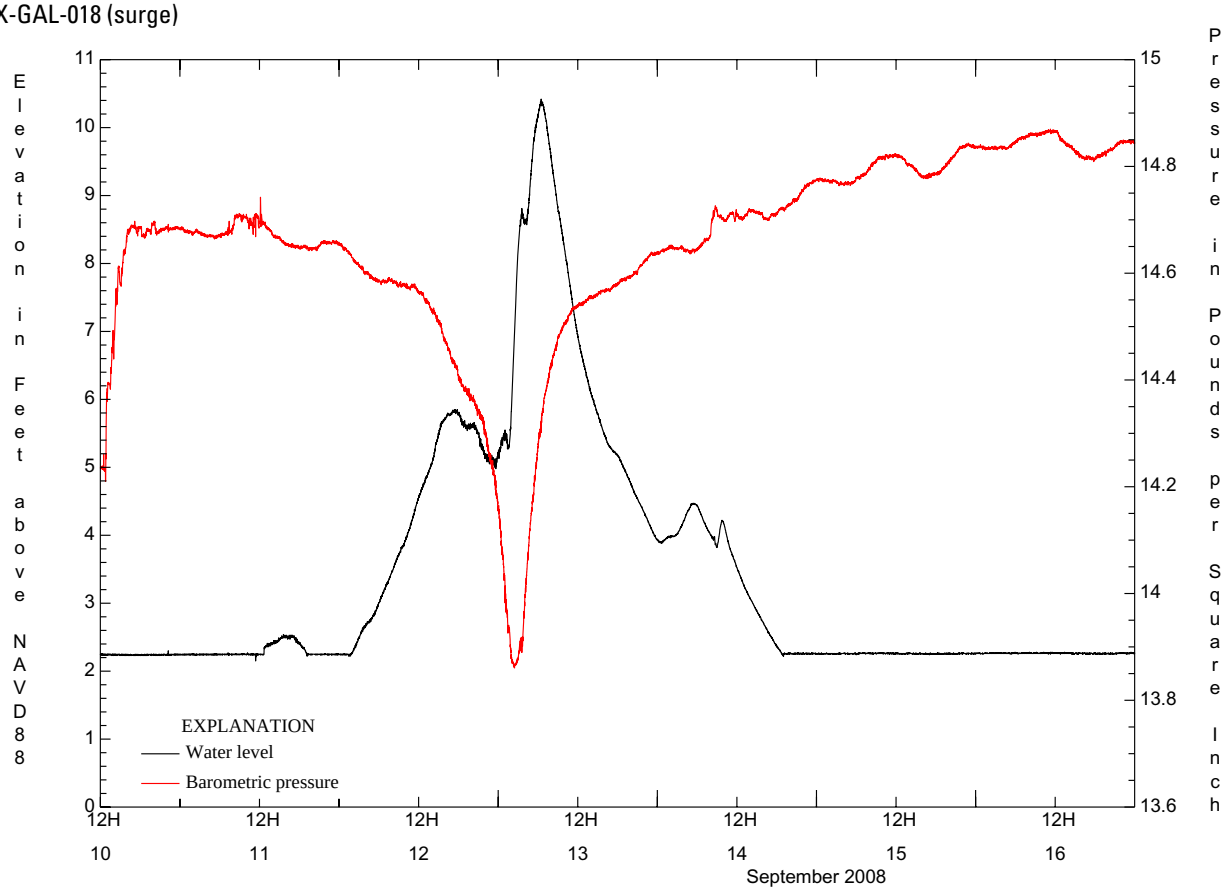

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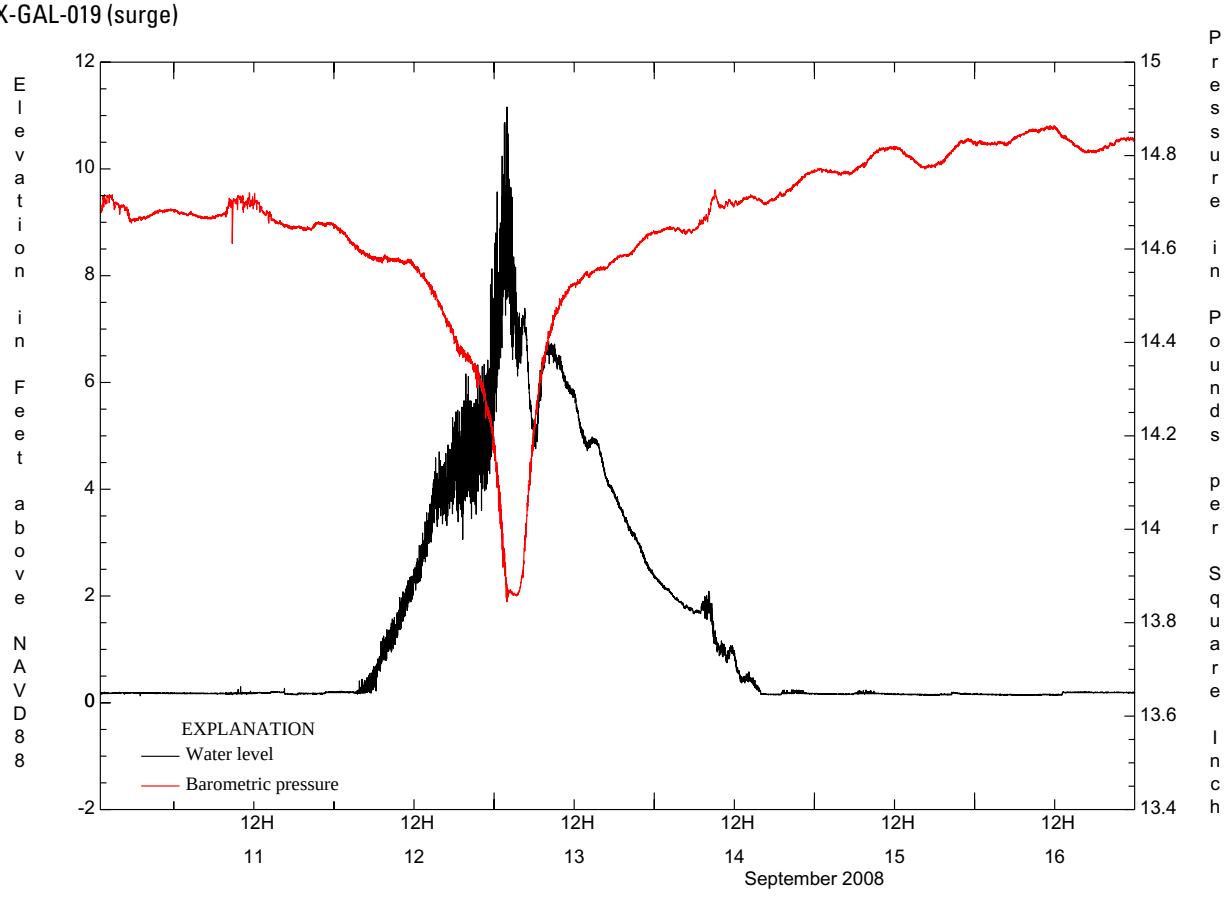

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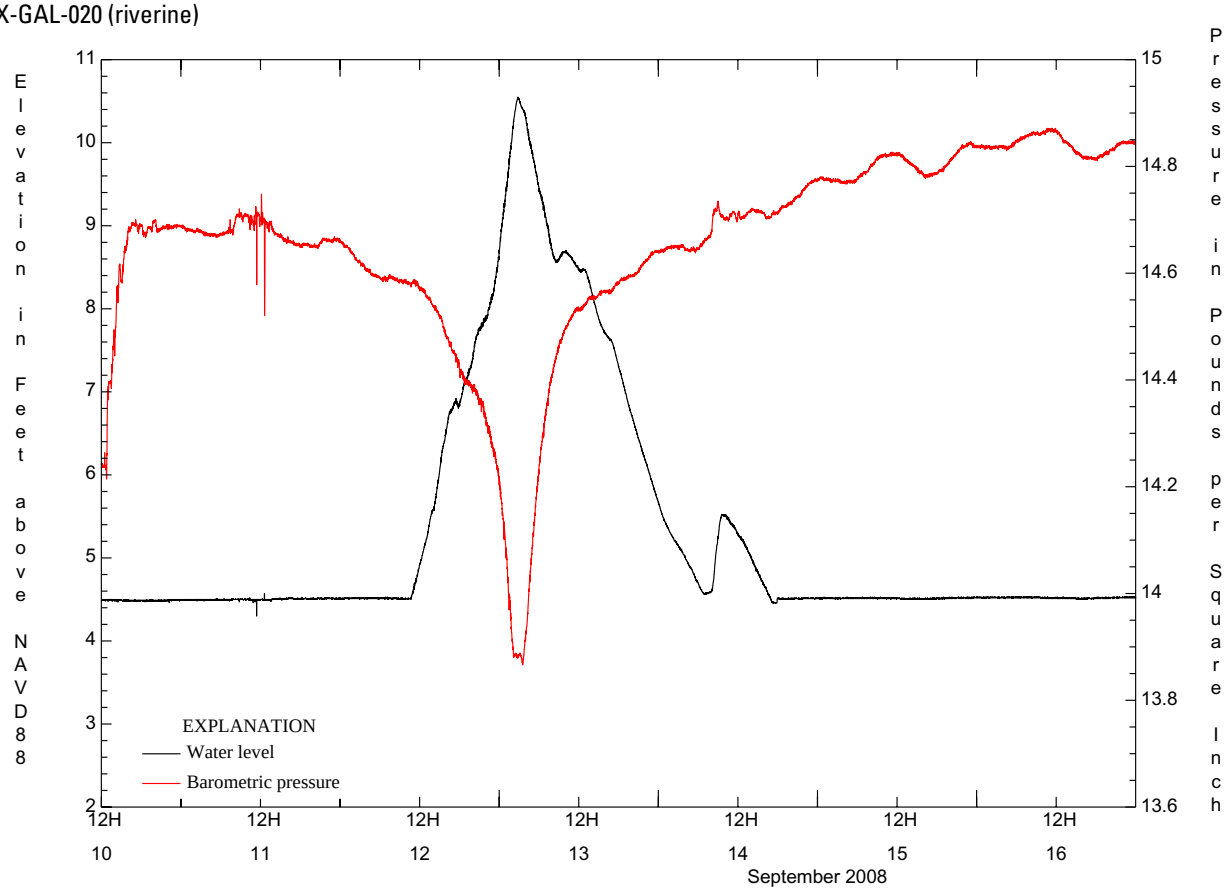

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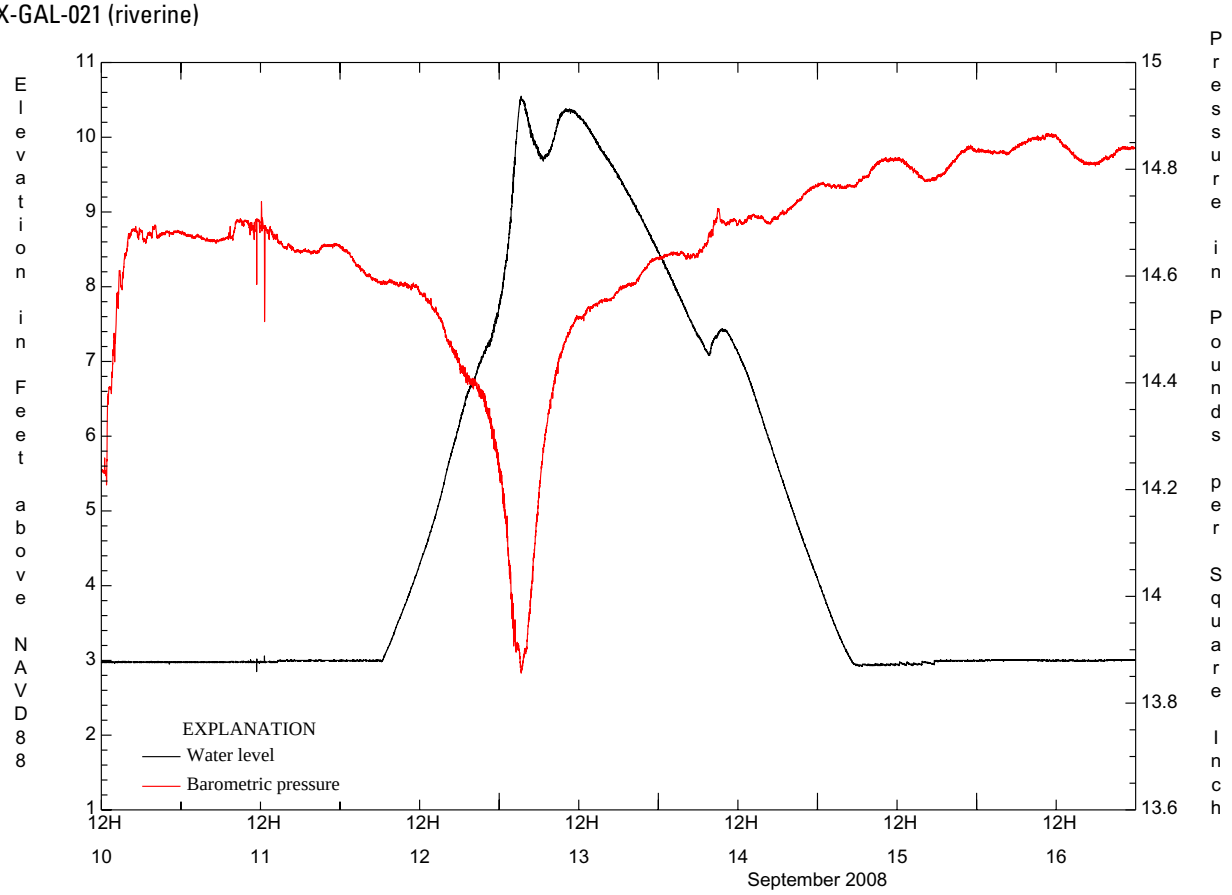

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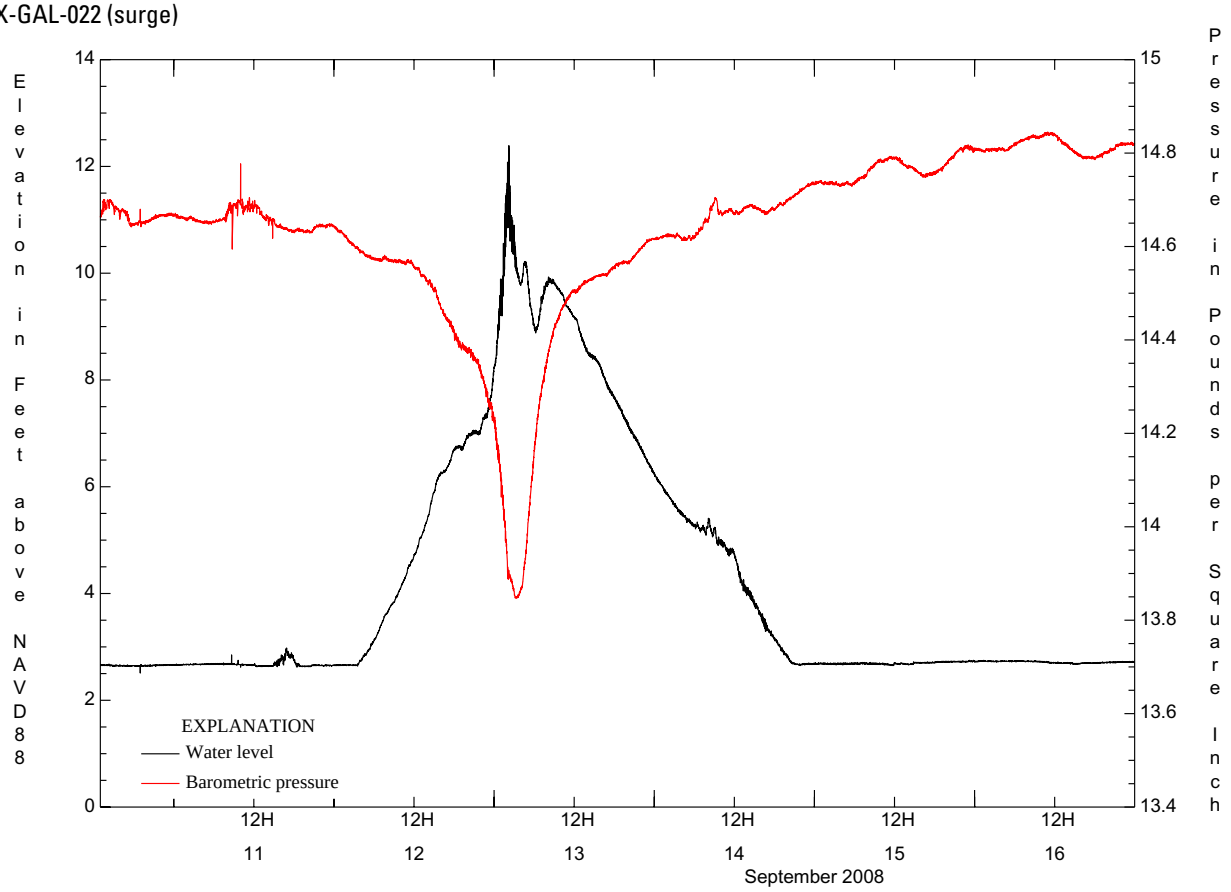

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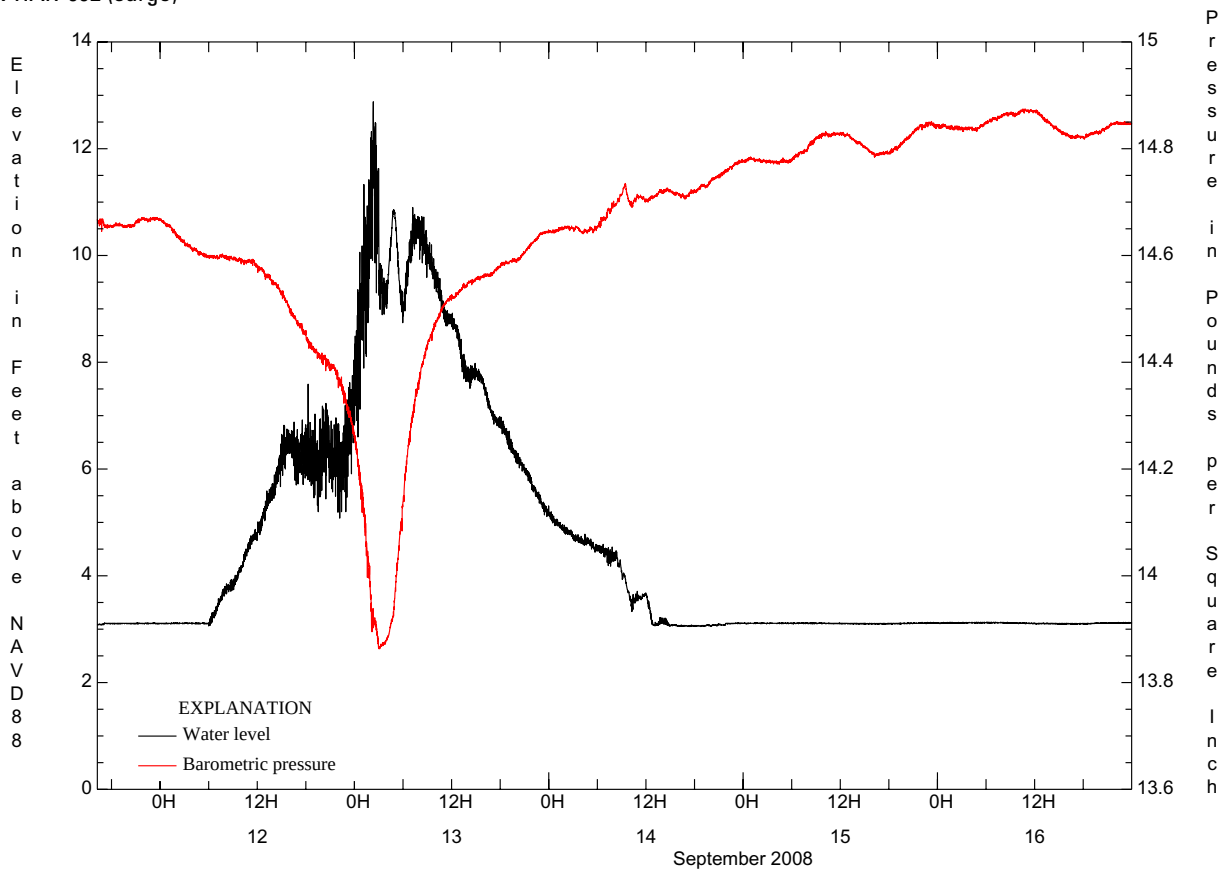

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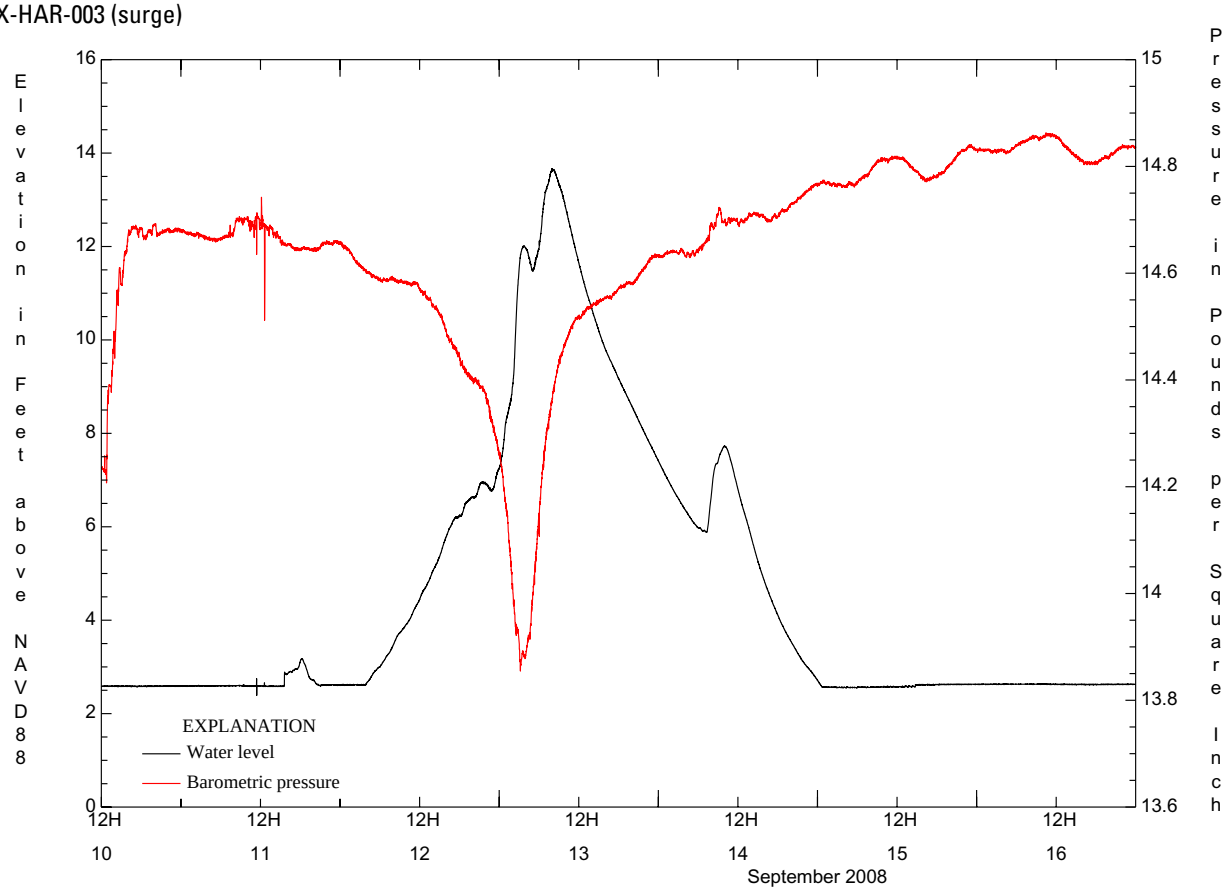

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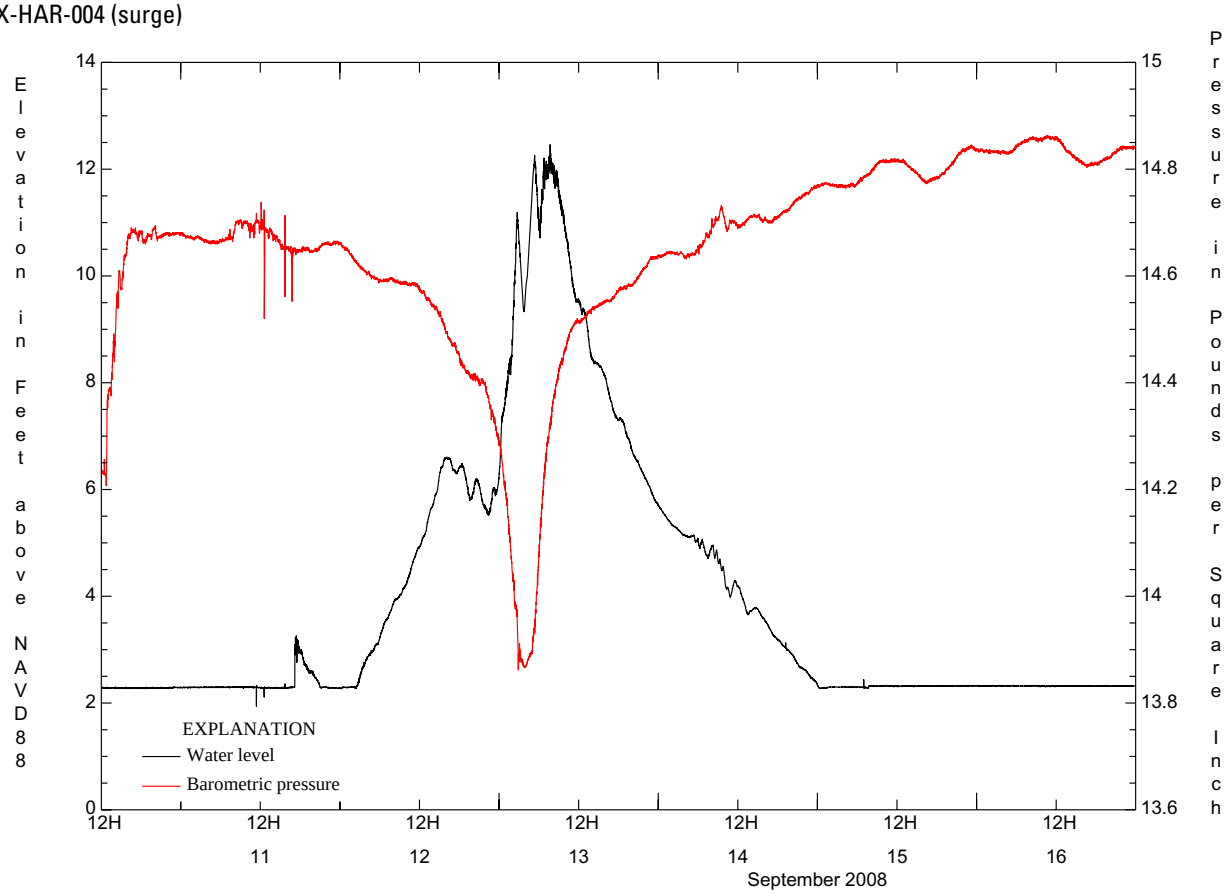

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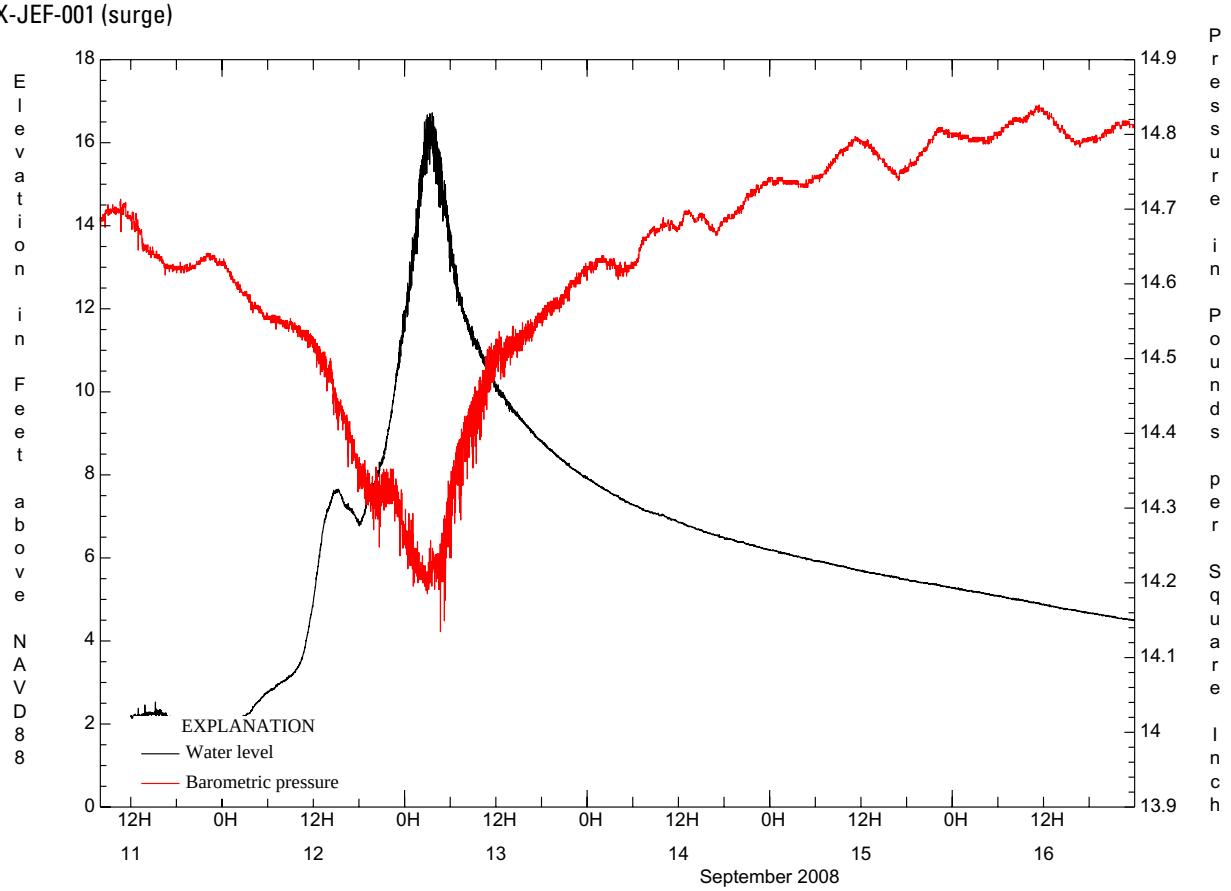
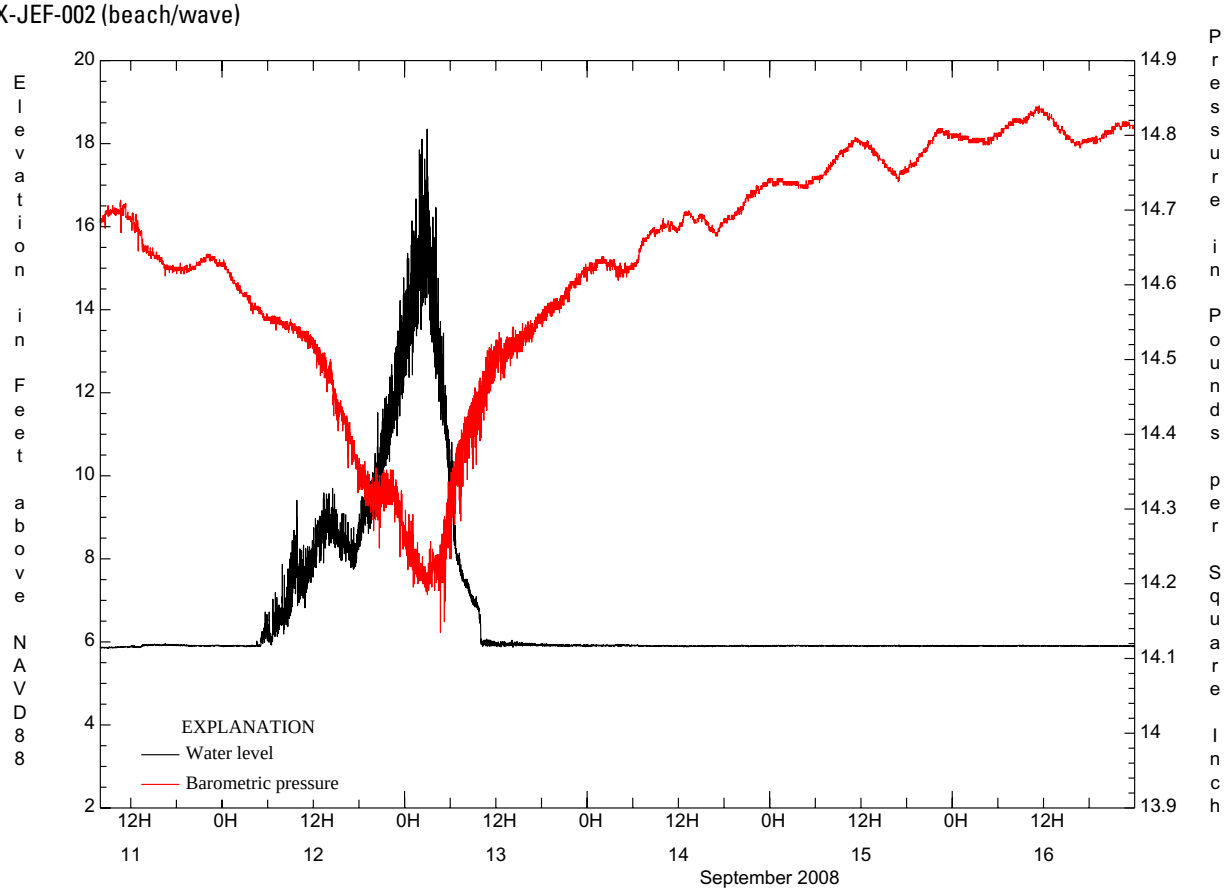
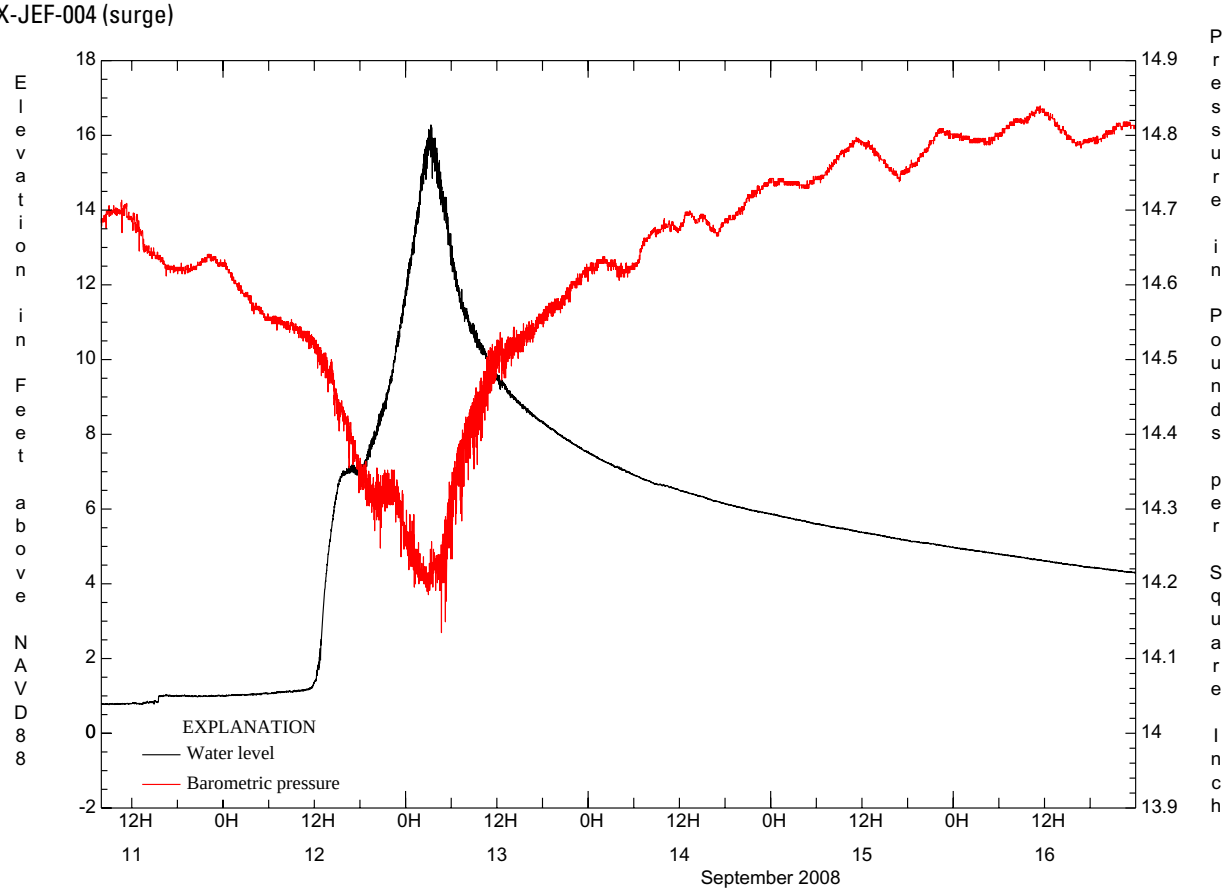


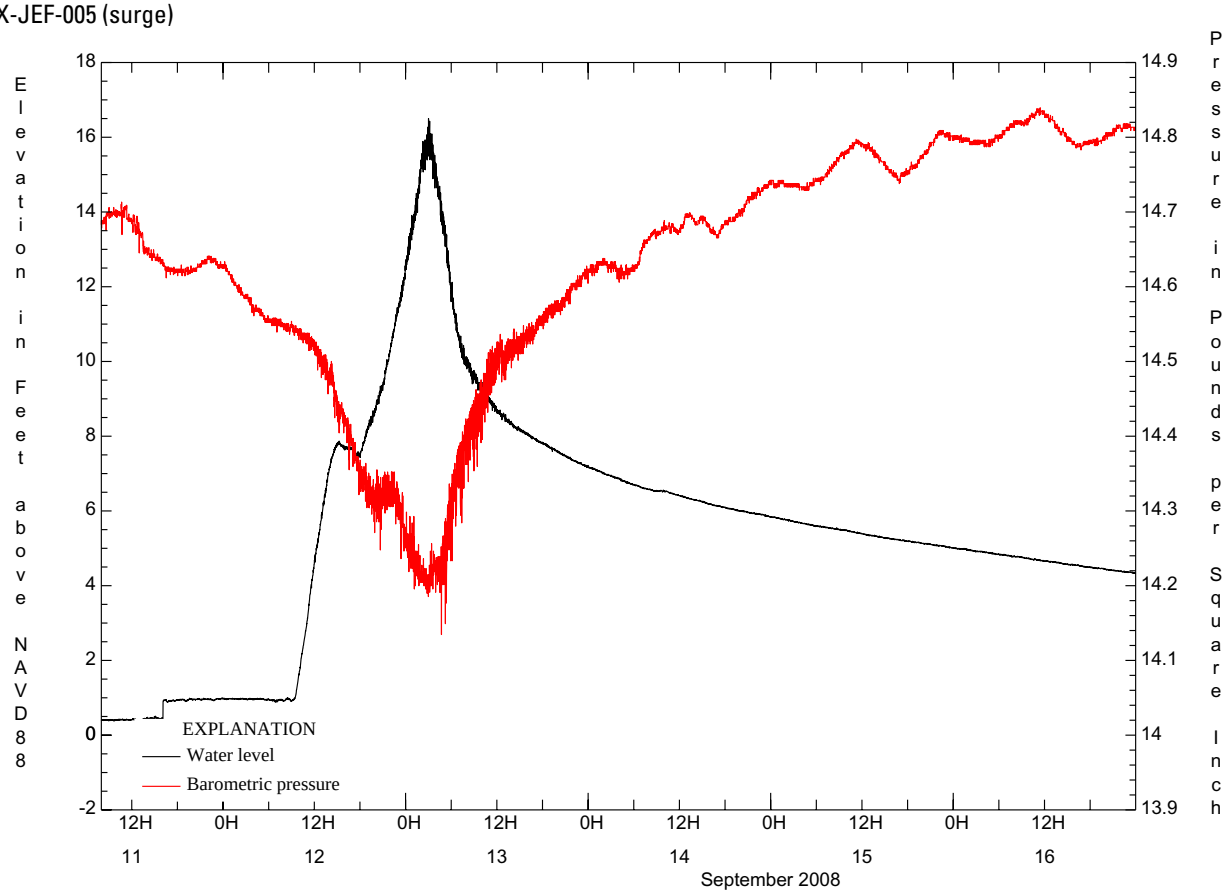
SSS-TX-JEF-002 (beach/wave)



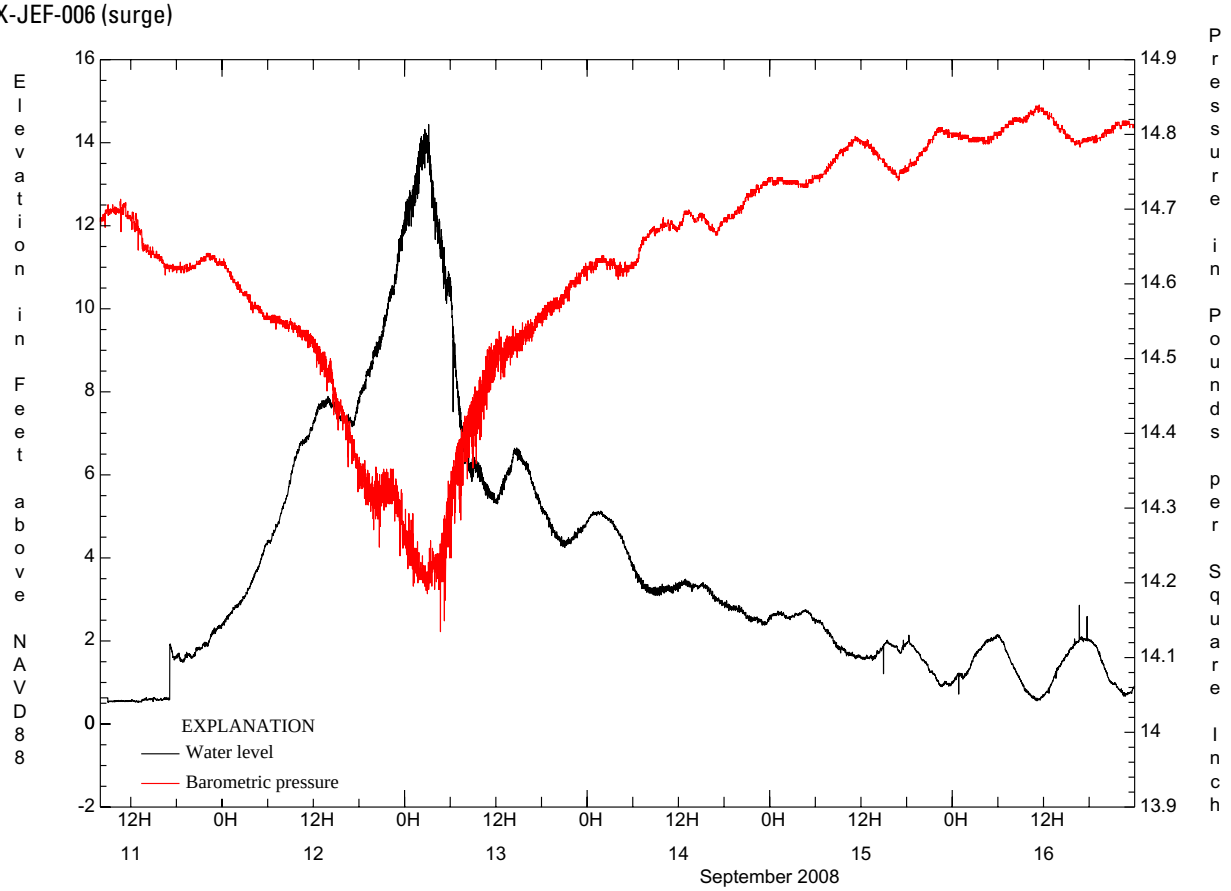
SSS-TX-JEF-004 (surge)



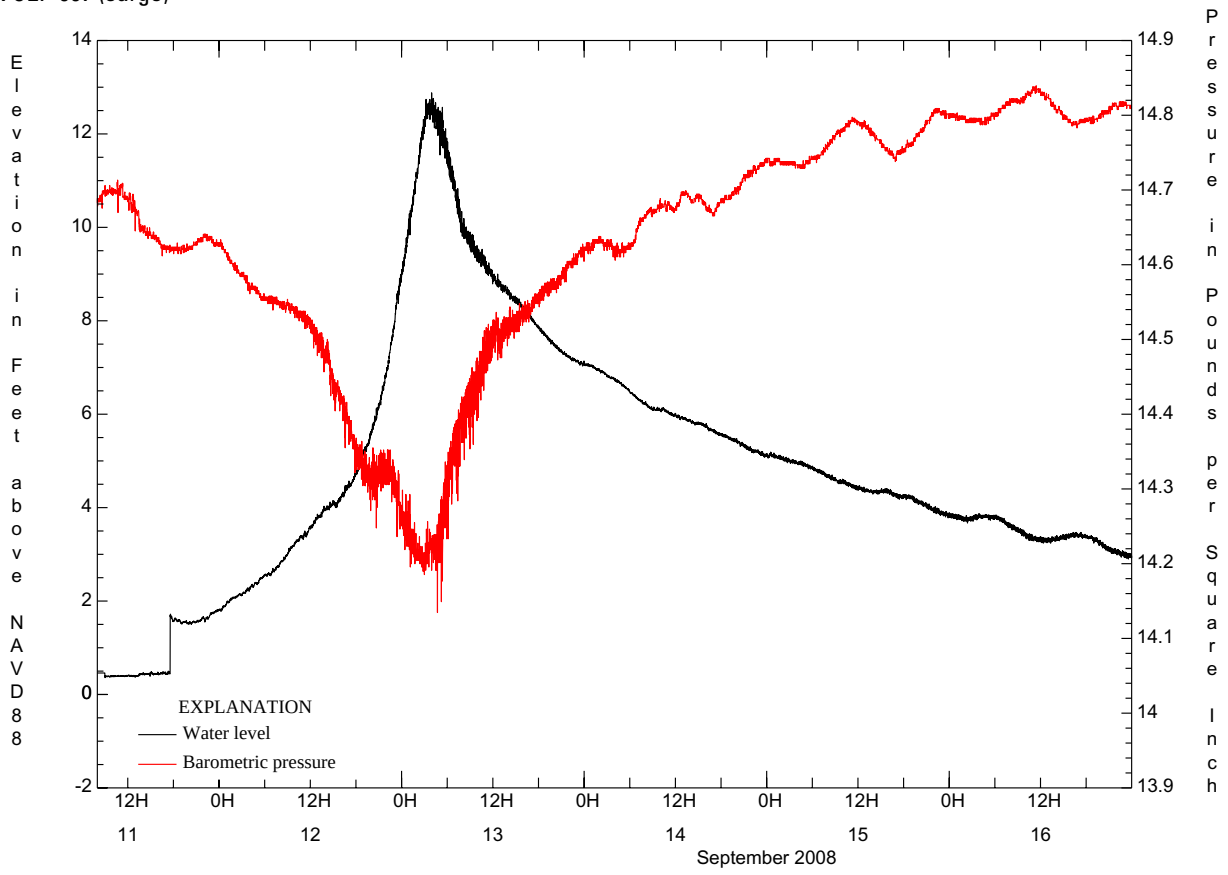
SSS-TX-JEF-005 (surge)



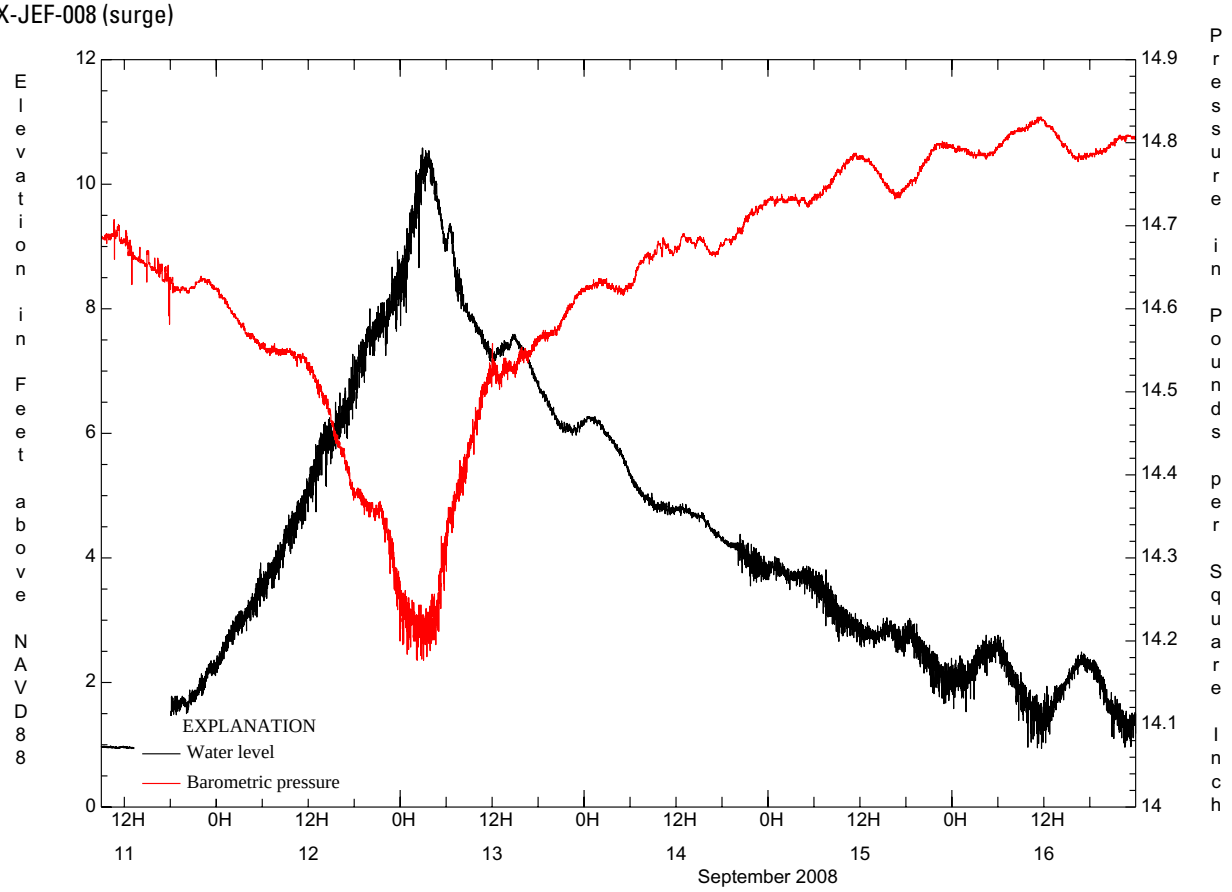
SSS-TX-JEF-006 (surge)



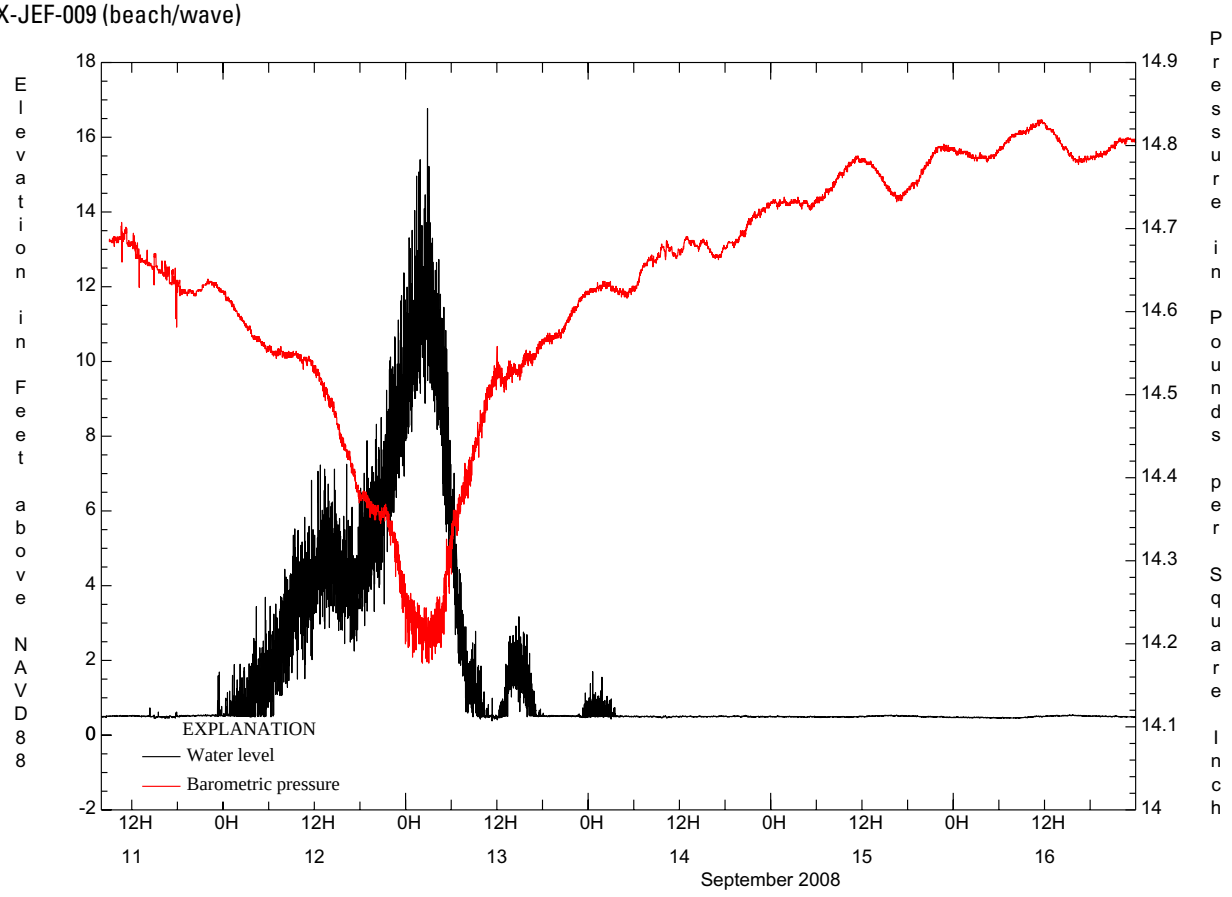
SSS-TX-JEF-007 (surge)



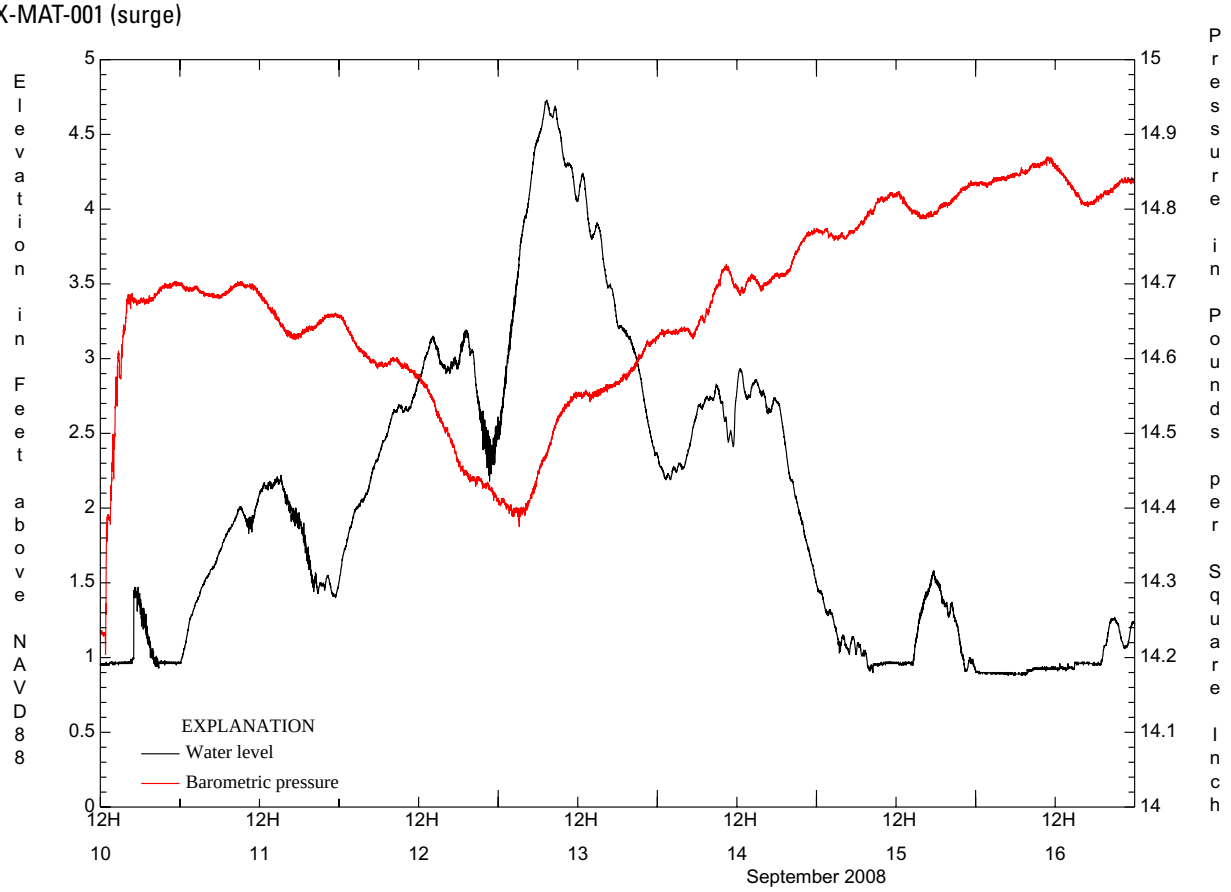
SSS-TX-JEF-008 (surge)



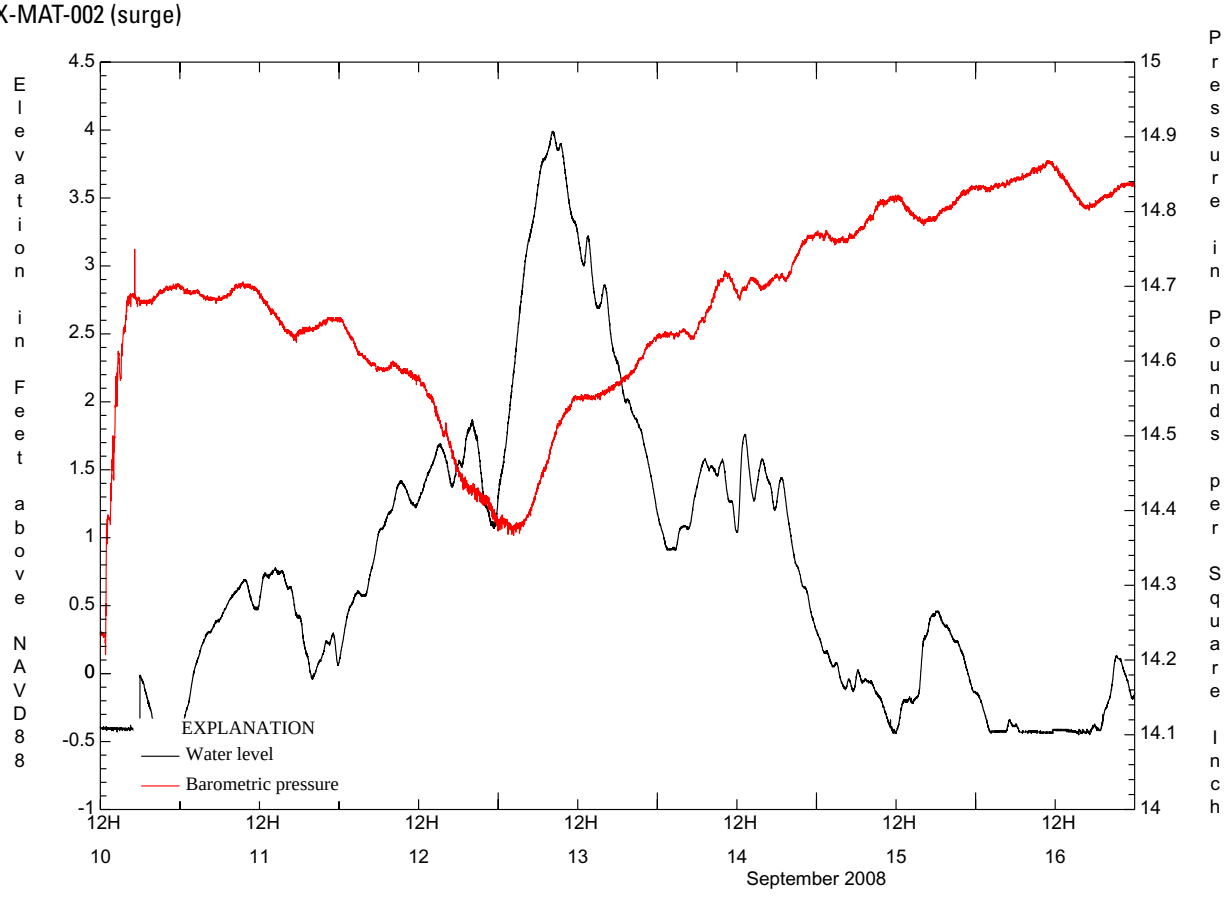
SSS-TX-JEF-009 (beach/wave)



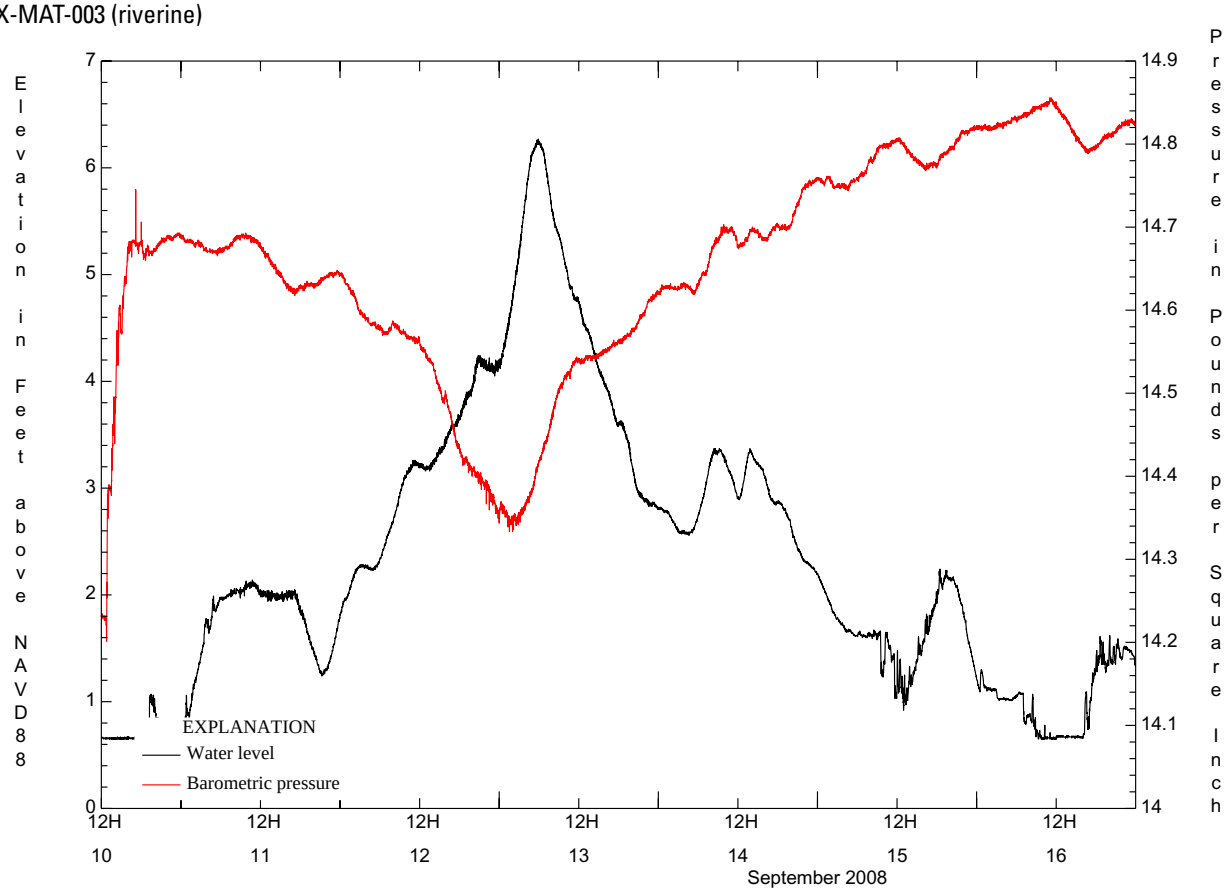
SSS-TX-MAT-001 (surge)



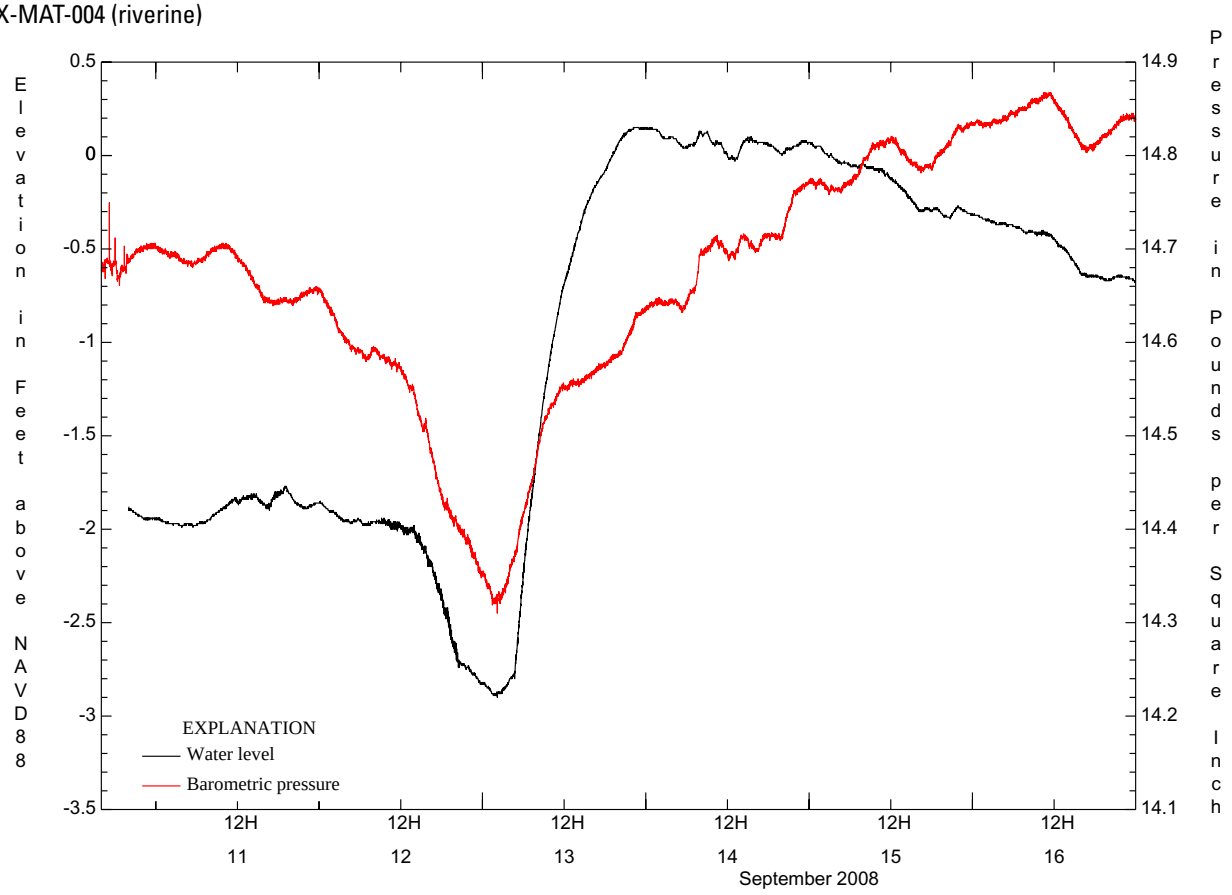
SSS-TX-MAT-002 (surge)



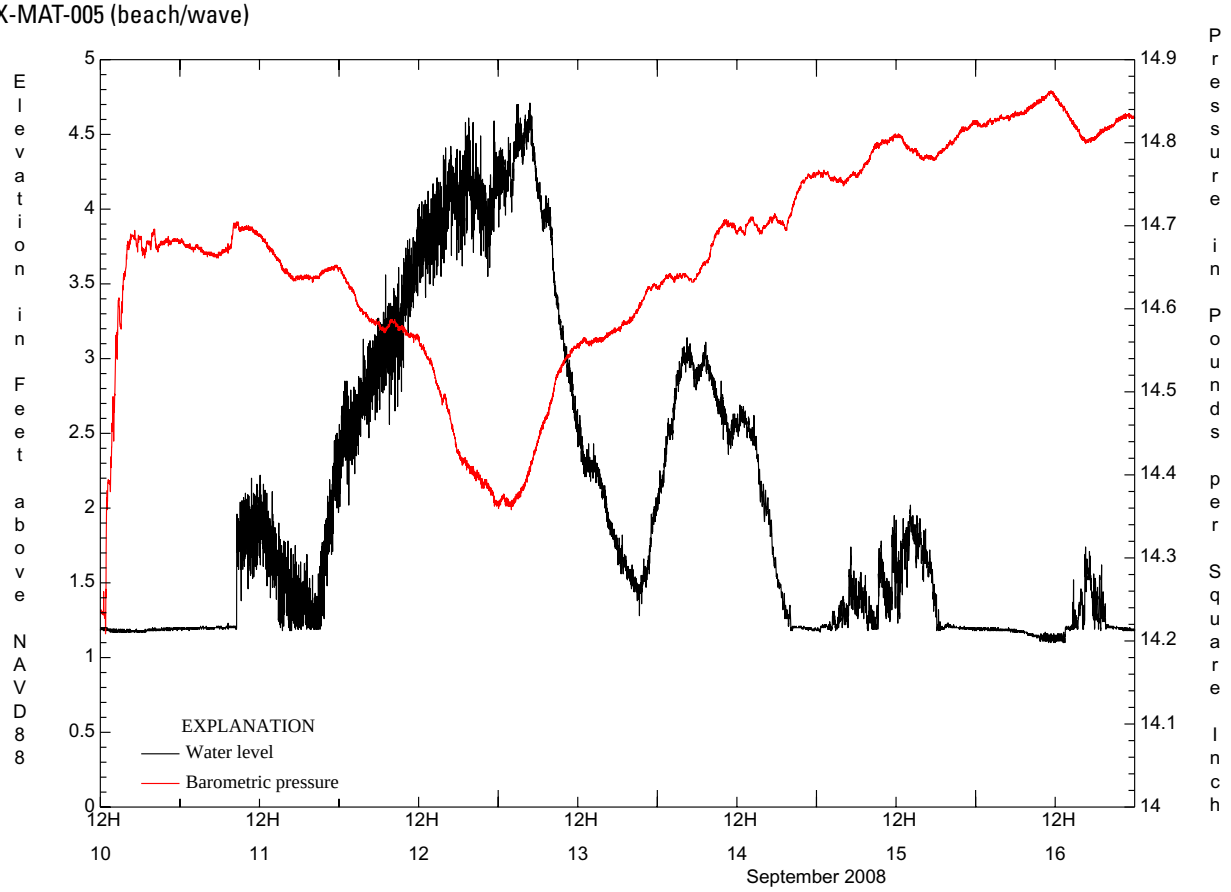
SSS-TX-MAT-003 (riverine)



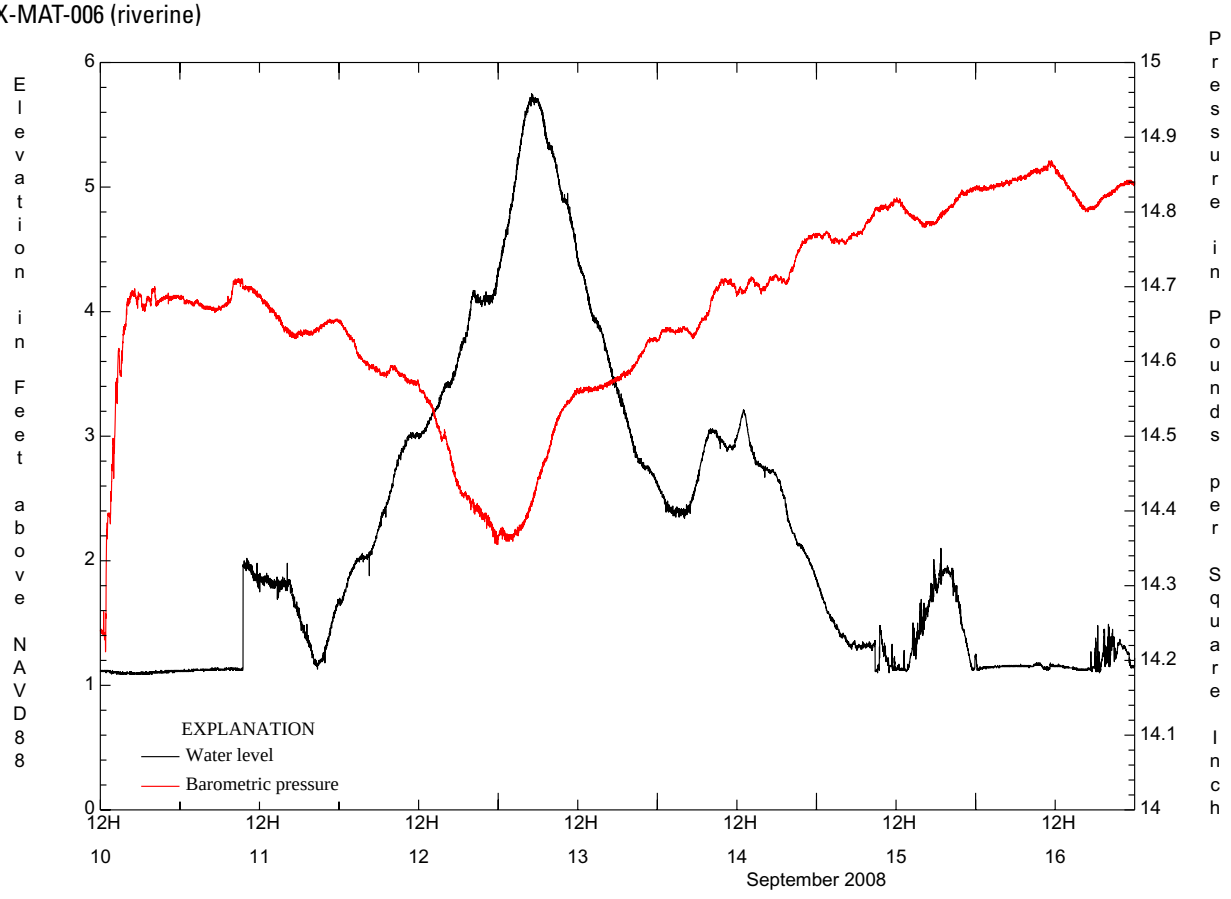
SSS-TX-MAT-004 (riverine)



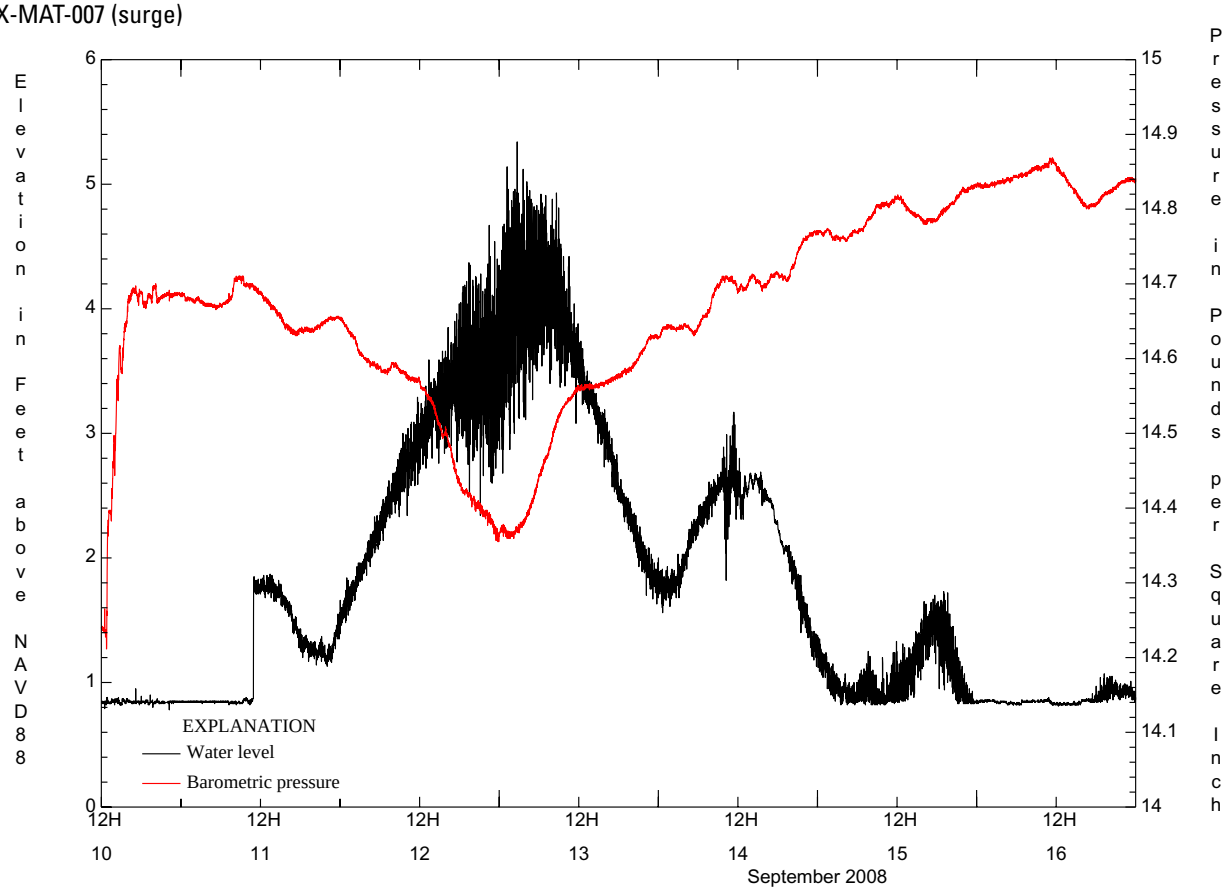
SSS-TX-MAT-005 (beach/wave)



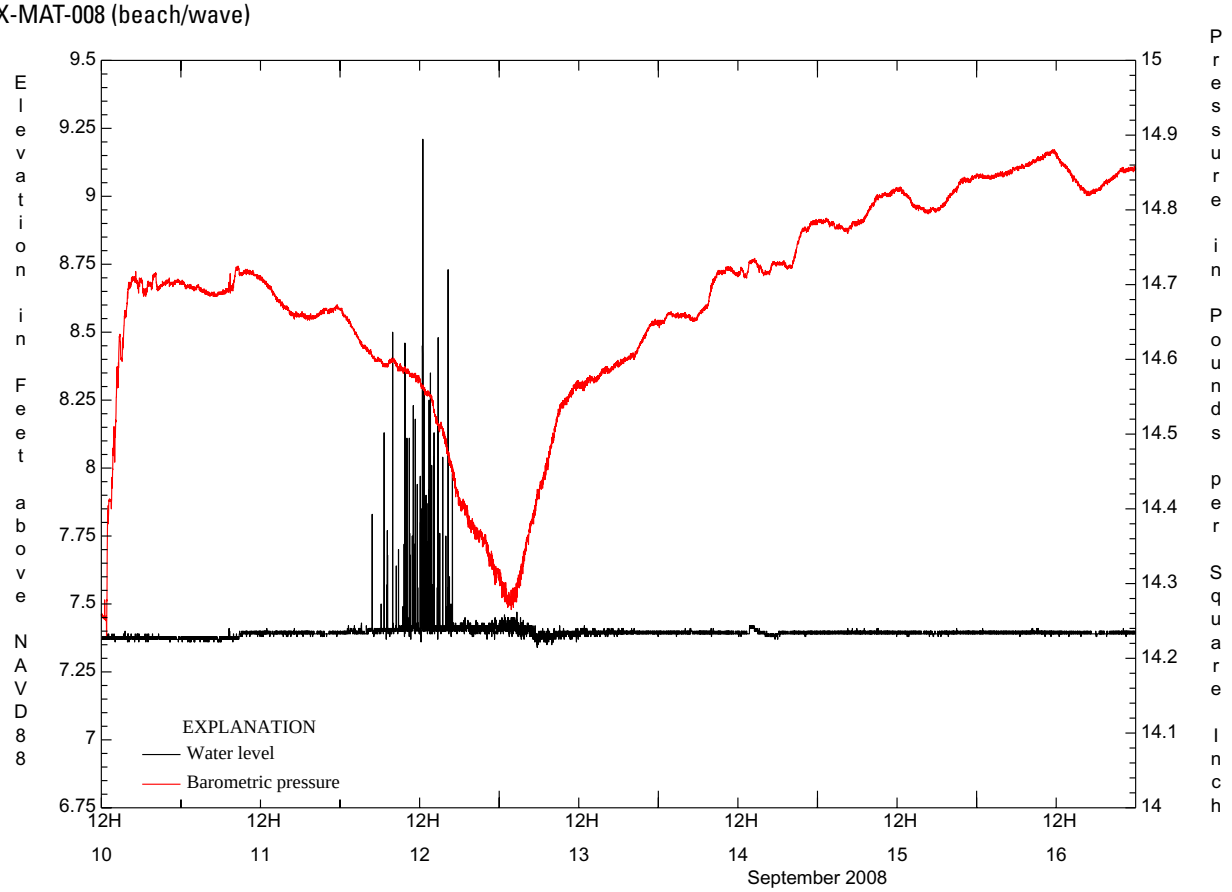
SSS-TX-MAT-006 (riverine)



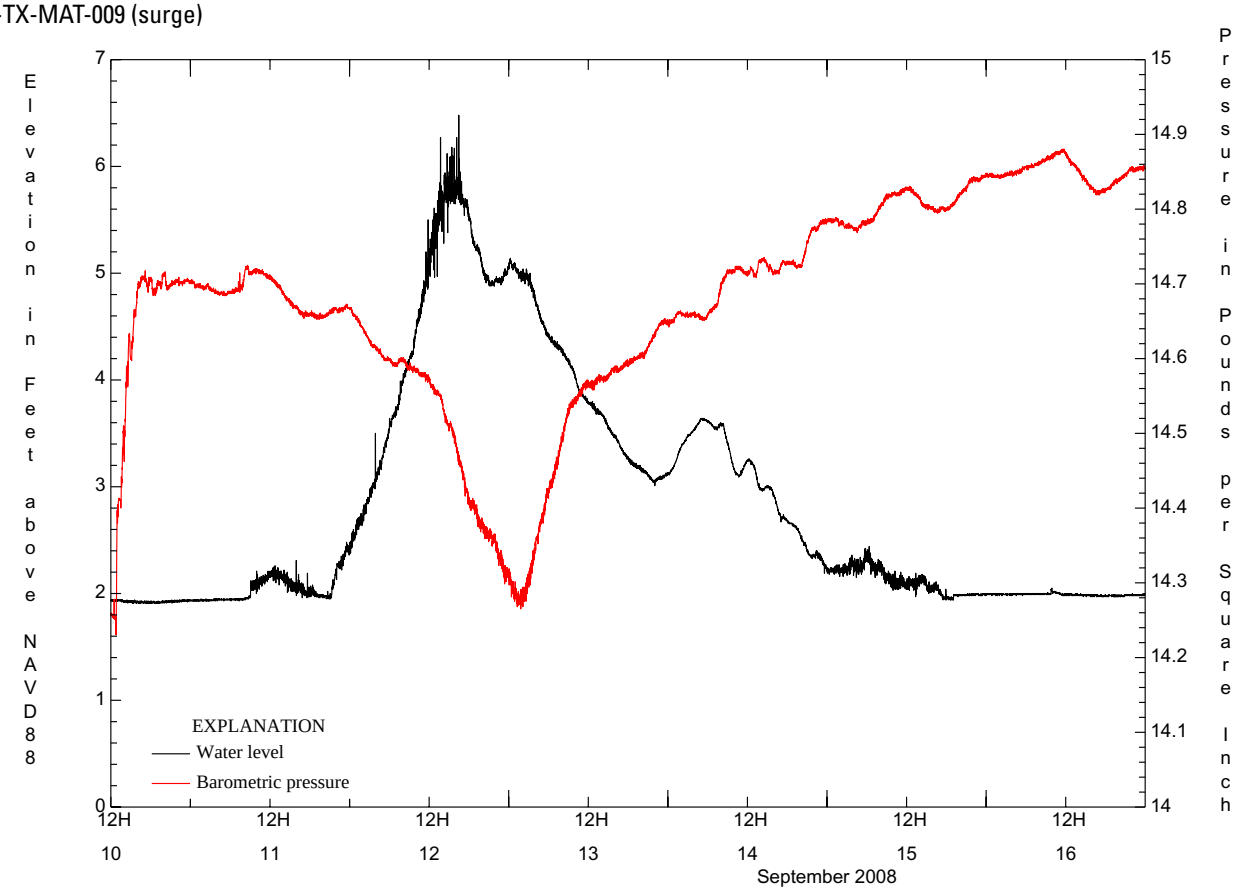
SSS-TX-MAT-007 (surge)



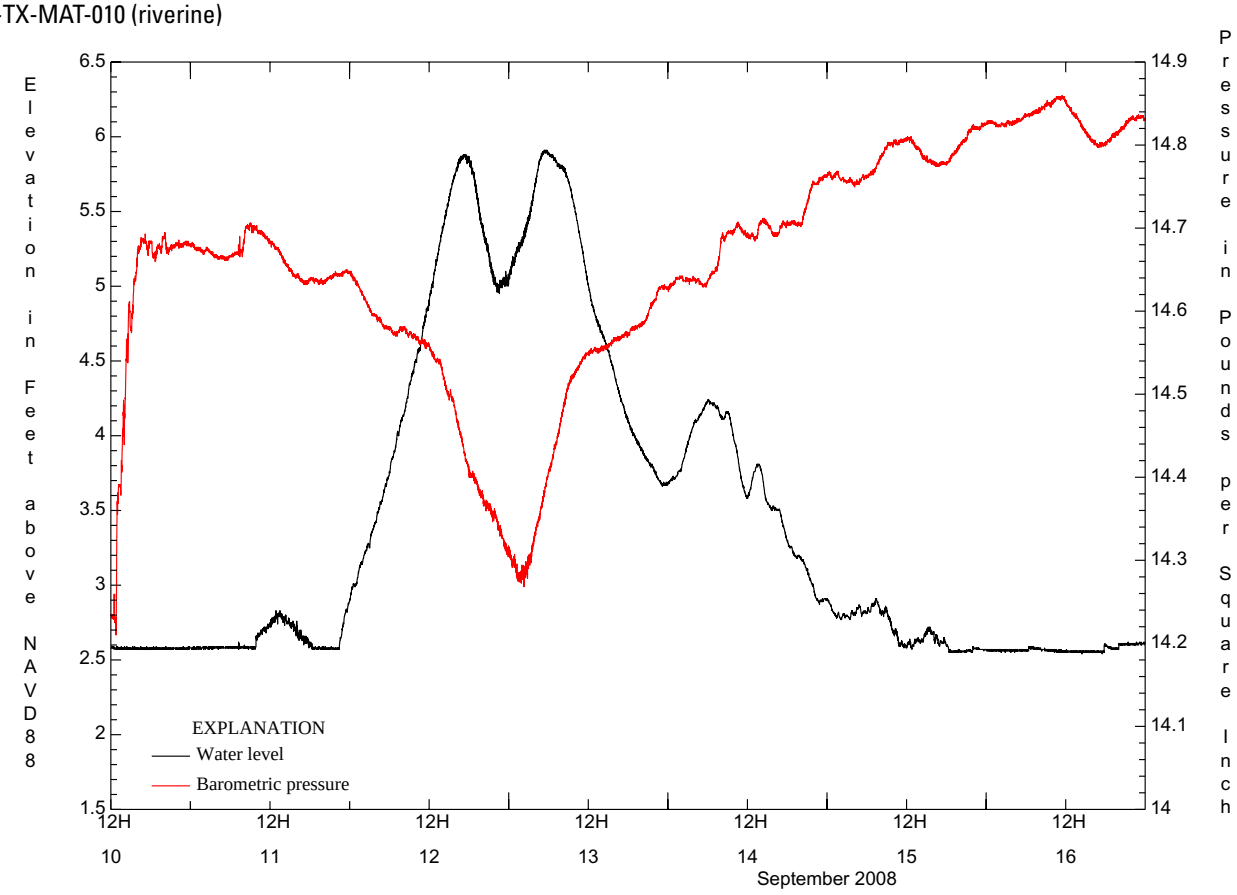
SSS-TX-MAT-008 (beach/wave)



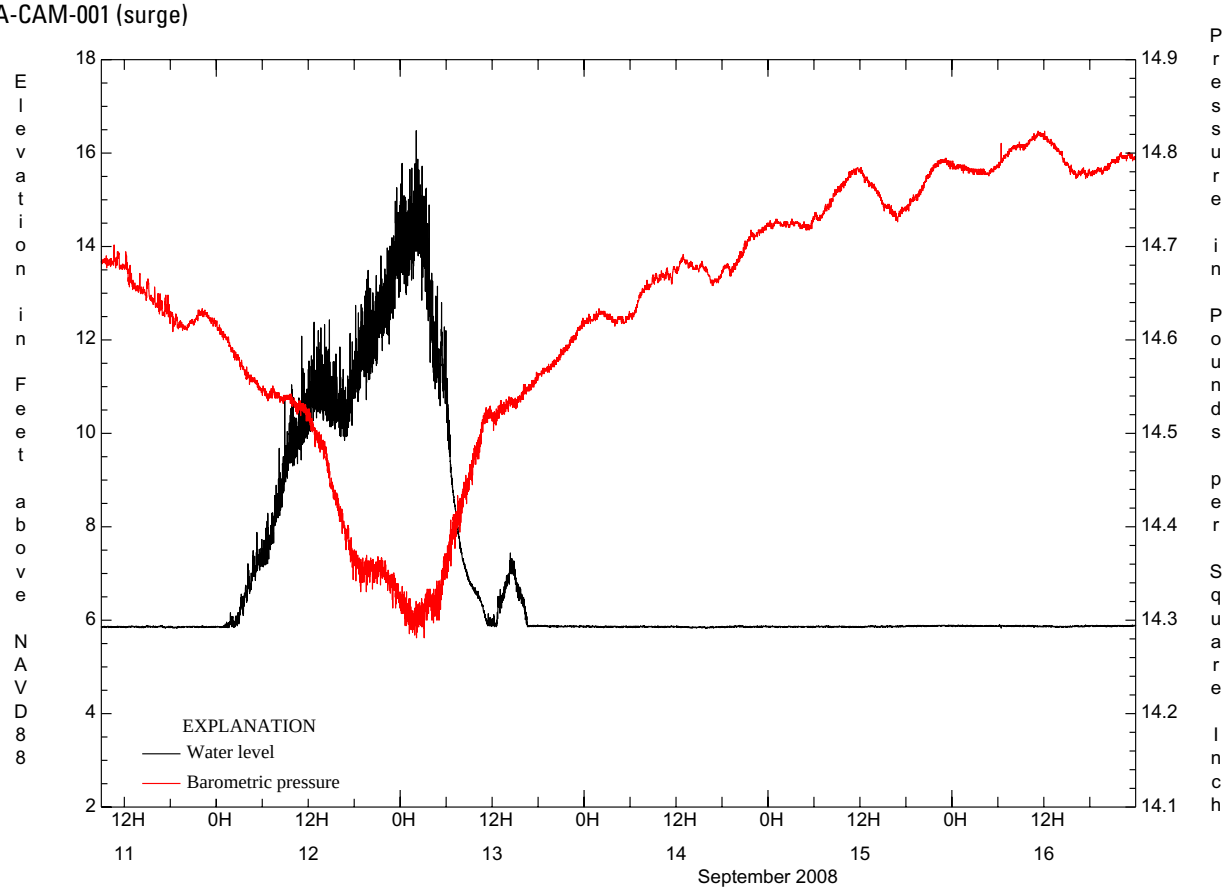
SSS-TX-MAT-009 (surge)



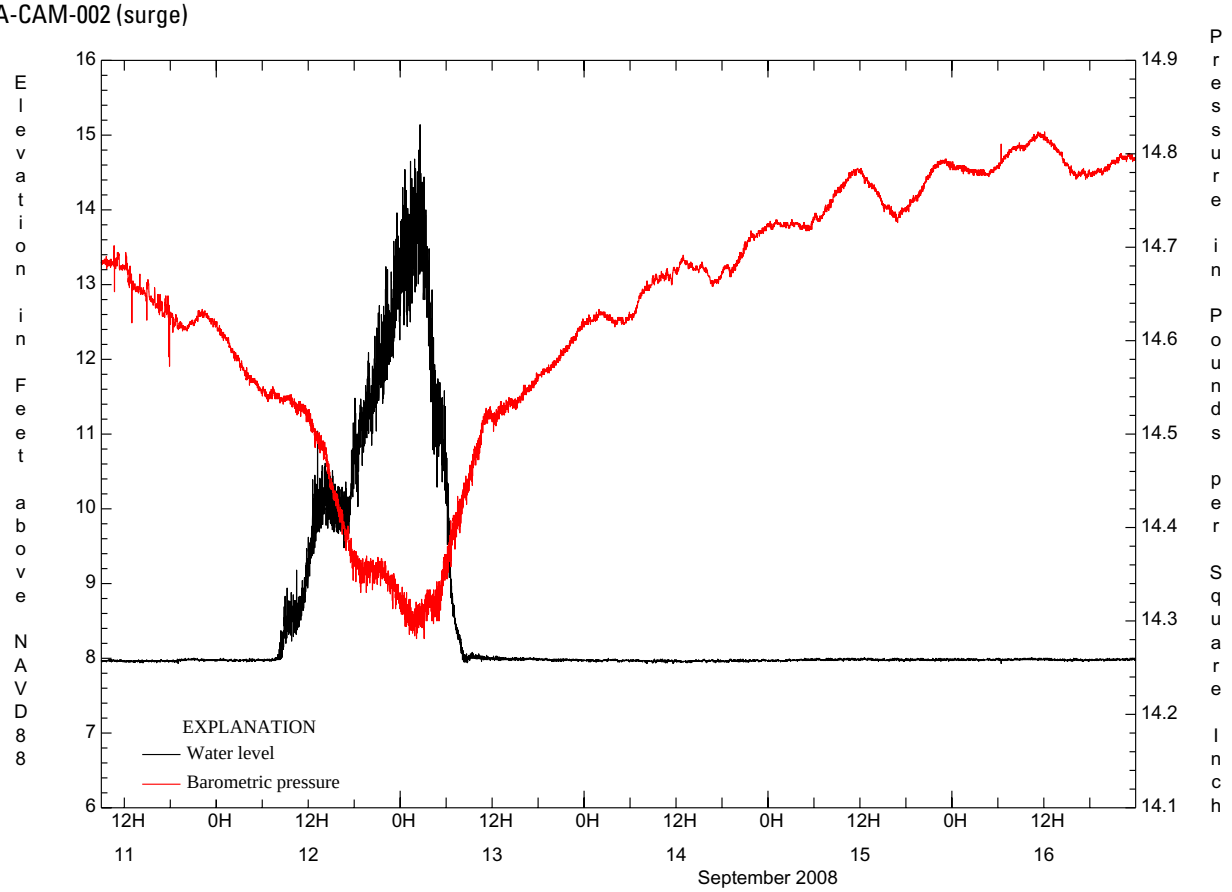
SSS-TX-MAT-010 (riverine)



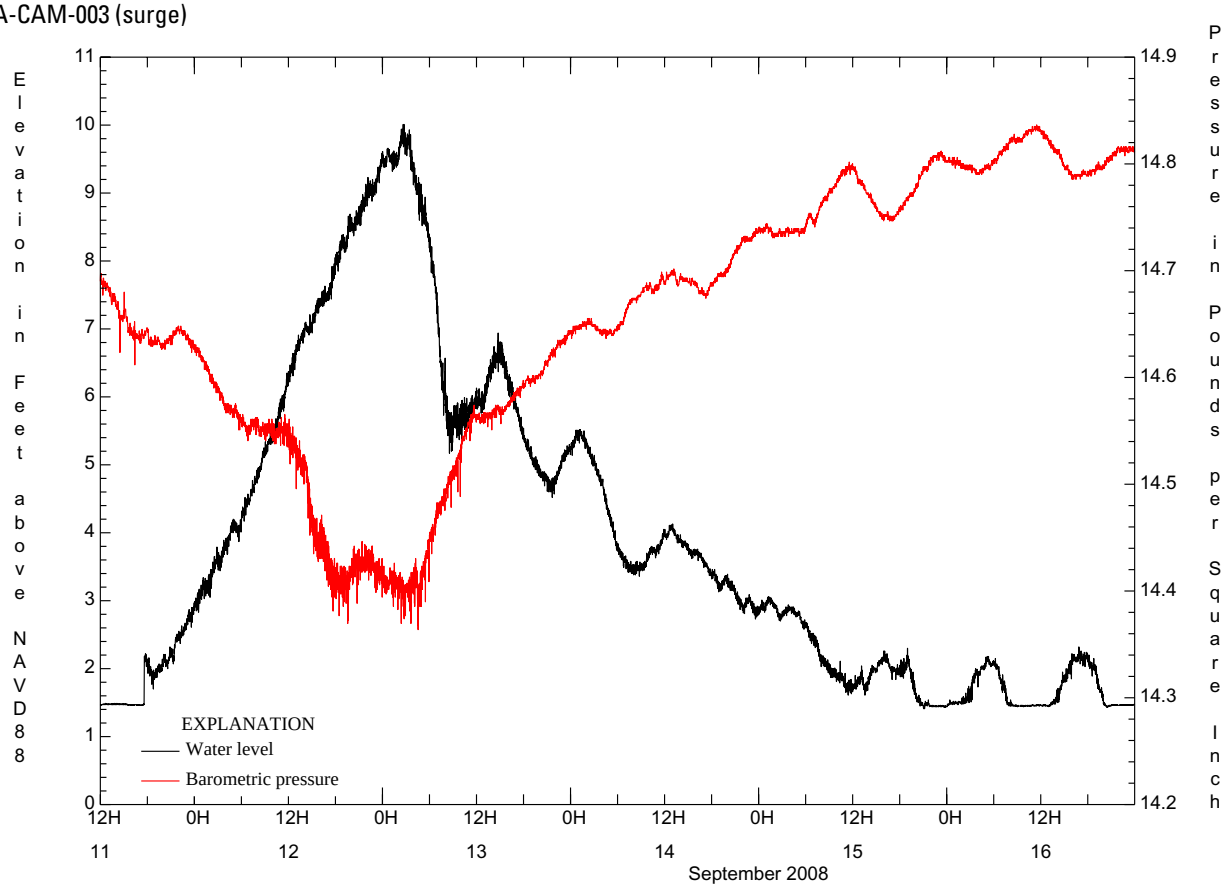
SSS-LA-CAM-001 (surge)



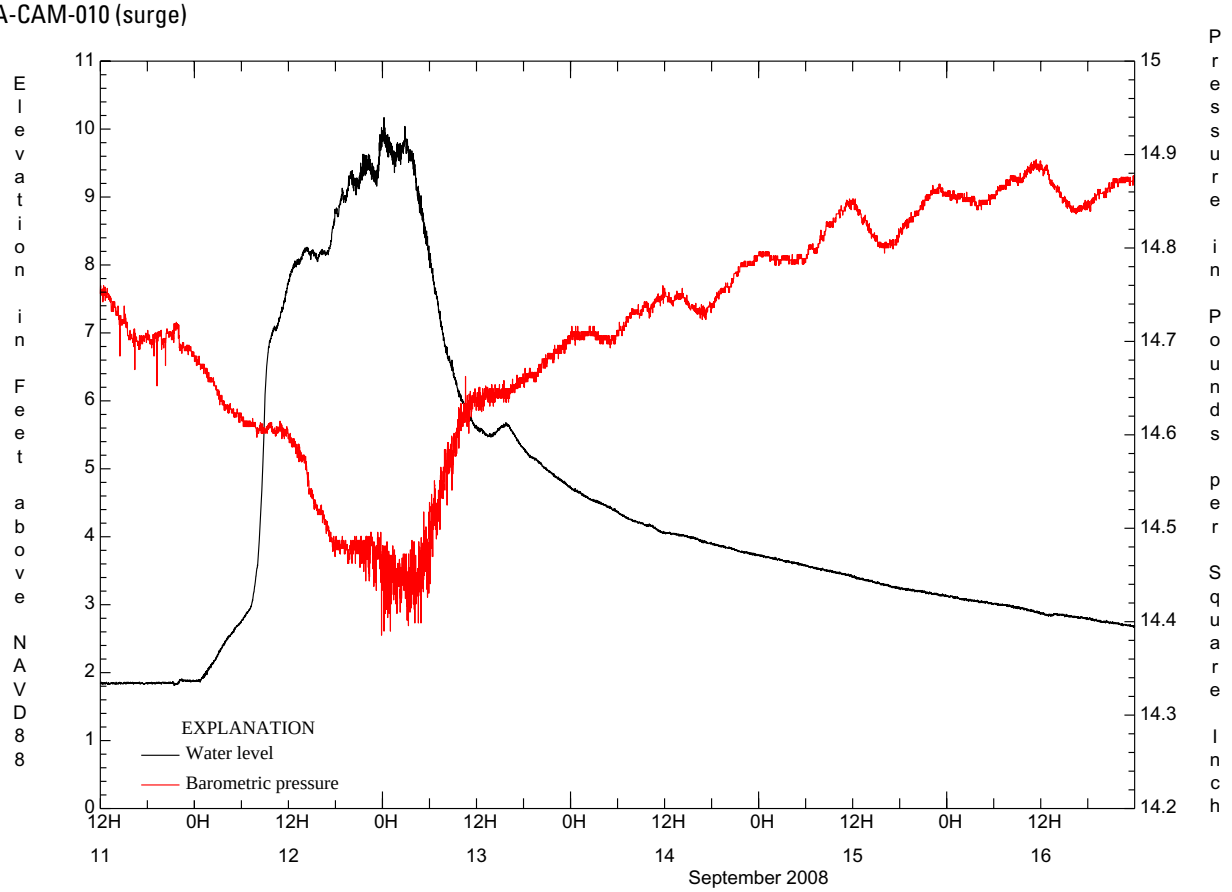
SSS-LA-CAM-002 (surge)



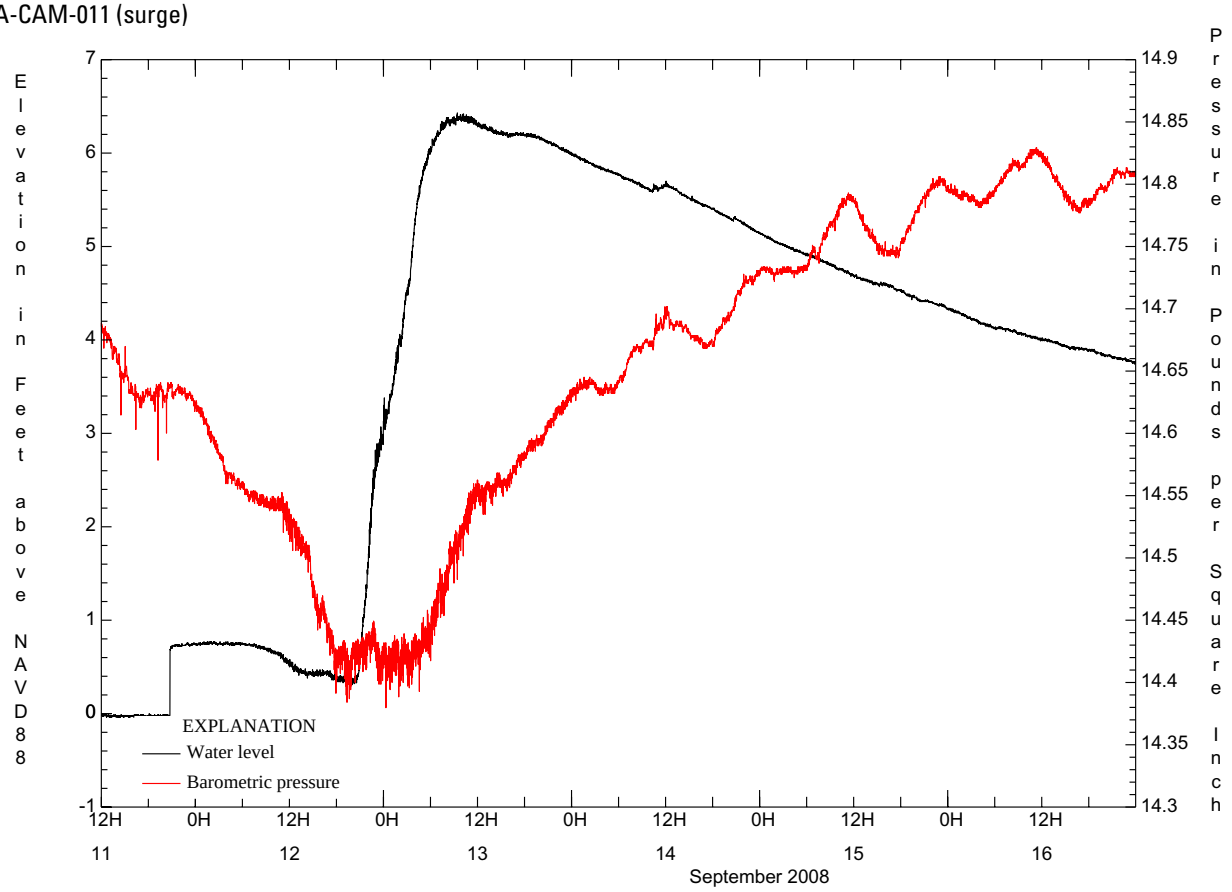
SSS-LA-CAM-003 (surge)



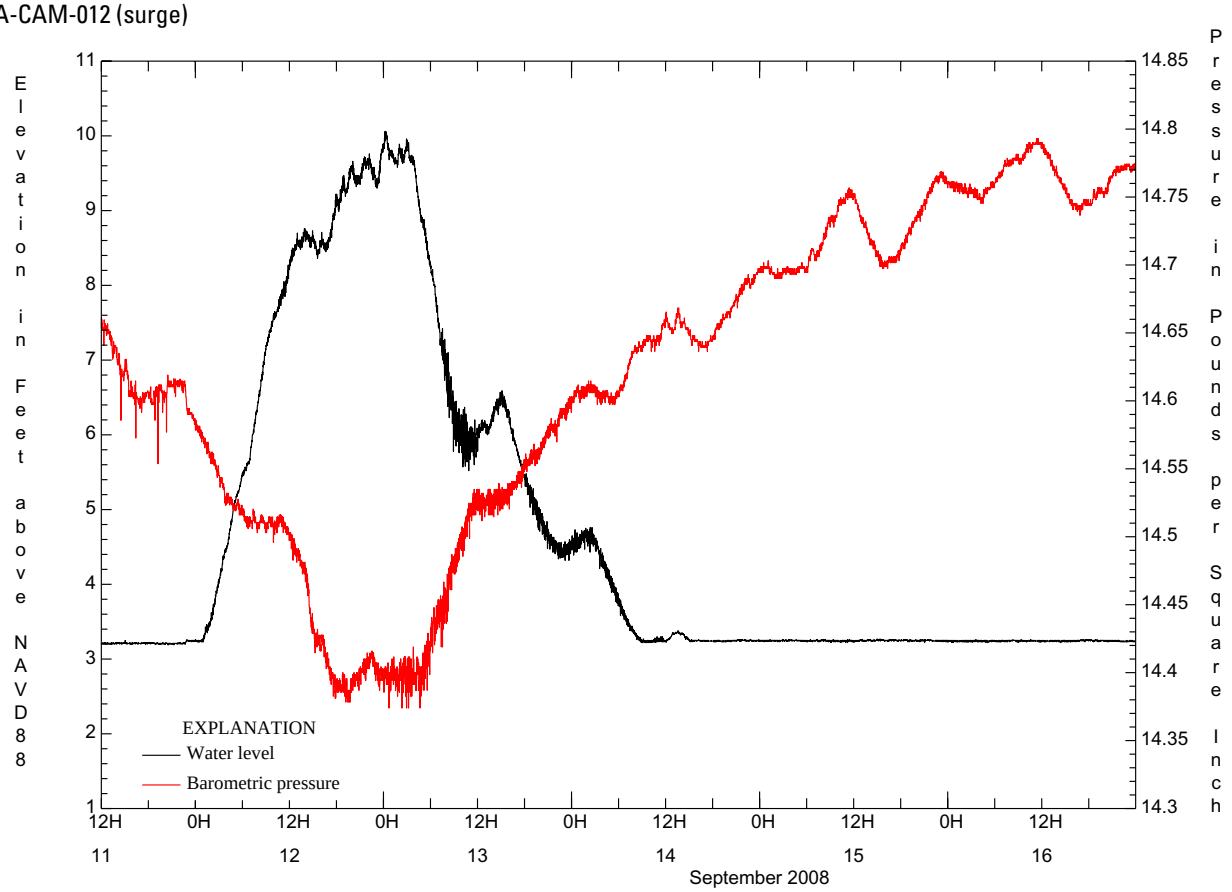
SSS-LA-CAM-010 (surge)



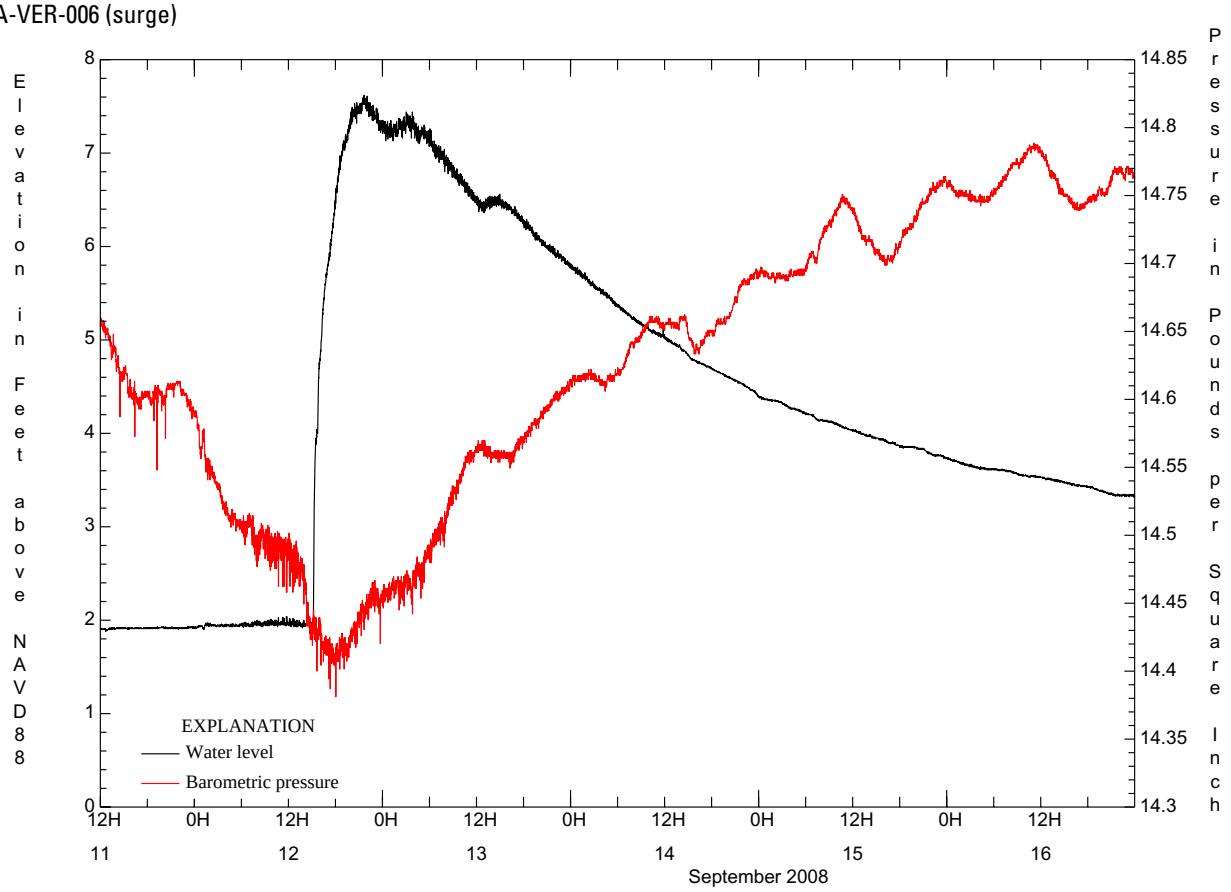
SSS-LA-CAM-011 (surge)



SSS-LA-CAM-012 (surge)



SSS-LA-VER-006 (surge)



SSS-LA-VER-007 (surge)