

Improved Data Curation and Exploration: Timelines for Visualizing Data Inventory

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Cooperative Institute for Research in Environmental Sciences

and

NOAA National Centers for Environmental Information

(Center for Coasts, Oceans, and Geophysics)



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NOAA National Centers for Environmental Information (NCEI)

The screenshot shows the homepage of the NOAA National Centers for Environmental Information (NCEI). The header features the NOAA logo and the text "National Centers for Environmental Information" and "NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION". A navigation bar with links to Home, About, News, Access, Archive, Contact, and Search is visible. The main content area has a dark background with a globe graphic. The title "National Centers for Environmental Information" is prominently displayed. Below the title, a paragraph describes the mission of NCEI. On the left, a green button labeled "Feedback" is visible. At the bottom, four circular icons represent different centers: Weather and Climate (with icons for sun, snowflake, and water drop), Coasts (with a sun over waves icon), Oceans (with a ship icon), and Geophysics (with a globe and wrench icon). A "Read more about NCEI" button is located above the Oceans icon.

National Centers for Environmental Information

NOAA's National Centers for Environmental Information (NCEI) hosts and provides public access to one of the most significant archives for environmental data on Earth. Through the Center for Weather and Climate and the Center for Coasts, Oceans, and Geophysics, we provide over 25 petabytes of comprehensive atmospheric, coastal, oceanic, and geophysical data.

Feedback

Read more about NCEI

Weather and Climate

Coasts

Oceans

Geophysics



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NCEI/World Data Service

Global Historical Tsunami Database

Tsunami Runup Search - sorted by Date, Country, Location name																										
Tsunami Runups where (Year <= 2011 and Year >= 2011) and Type Measurement = 3										Tsunami Runup Location																
Date						Tsunami Source				Addl Info		Doubtful Runup	Country	State/Province/Prefecture	Name	Latitude	Longitude	Distance from Source	Arrival Time			Travel Time		Max Water Height	Max Inundation Distance	
Year	Mo	Dy	Hr	Min	Sec	Tsu Cau Val	Tsu Cau Code	Tsu Src	EQ Mag	Volcano	Tsu Runup							Day	Hour	Min	Hrs	Min				
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		CANADA	BC	889 BPR, BRITISH COLUMBIA	48.67065	-126.84849	6976						.14		
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		CANADA	BC	BARKLEY CANYON BPR, BC	48.31507	-126.05877	7046						.15		
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		CANADA	BC	CORK BPR, BRITISH COLUMBIA	47.76270	-127.75910	6964						.10		
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		CANADA	BC	FOLGER PASSAT BPR, BRITISH COLUMBIA	48.80833	-125.28333	7070						.34		
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		CANADA	BC	SAANICH INLET DSF-11, CM-887, BC	48.65144	-123.48677	7193								
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		CANADA	BC	SAANICH INLET DSF-11, CTD-4996, BC	48.65144	-123.48677	7193								
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		CANADA	BC	SAANICH INLET VIP-12, CTD-6536, BC	48.65133	-123.48632	7193								
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		CANADA	BC	STRAIT OF GEORGIA, VIP-05, CTD-4686	49.04220	-123.31760	7182								
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		CHILE	ARICA	D32401 BPR, W-SW OF ARICA, CHILE	-19.29700	-74.74600	15872								.10
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		JAPAN		D21413, SE TOKYO, JAPAN	30.55000	152.11700	1240	11	7	7	1	21		.74	
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		JAPAN		D21418 BPR, NE TOKYO, JAPAN	38.71000	148.67000	550	11	6	14	0	28		1.78	
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		MARSHALL ISLANDS, REP. OF	MH	D52402 BPR - 790 NM NW OF KWAJALEIN	11.57500	154.58800	3210	11	10	1	4	14		.11	
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		MEXICO	COLIMA	D43412 BPR, 240 NM SW MANZANILLO	16.03400	-107.00100	10614	11	19	7	13	20		.15	
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		MEXICO		D43413 BPR, 360 NM SW ACAPULCO	10.83720	-100.08420	11554	11	20	36	14	49		.20	
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		MICRONESIA, FED. STATES OF		D52403 BPR - 430 NM SW OF TRUK	4.05200	146.59200	3833	11	10	26	4	39		.13	
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		PANAMA		D32411 BPR, 710 NM WSW OF PANAMA	4.99500	-90.85000	12731	11	22	23	16	36		.11	
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		PAPUA NEW GUINEA		D55012 BPR, CORAL SEA	-15.80000	158.50000	6248							.04	
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		PAPUA NEW GUINEA		D55023 BPR, ETD CORAL SEA	-14.80300	153.58500	6021	11	15	1	9	14		.04	
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		PERU		D32412 BPR, SW OF LIMA, PERU	-17.97500	-86.39200	14805							.09	
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		PERU		D32413 BPR, 1000 NM W-NW OF LIMA	-7.39940	-93.50388	13469							.13	
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		RUSSIA	KURIL ISLANDS	D21401 BPR, 250NM SE OF ITIRUP IS	42.61700	152.58300	988	11	6	44	0	57		.67	
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		RUSSIA	KURIL ISLANDS	D21419 BPR, 209 NM S OF KURIL IS	44.45500	155.73600	1306	11	7	6	1	19		.54	
2011	3	11	5	46	24.1	4	1	*	9.1	*	*		SAMOA		D51425 BPR, 370 NM NW OF APIA	-9.49300	-176.24500	6830	11	13	48	8	1		.14	



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U.S. Tsunami Program

Water Level Data



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U.S. Tsunami Program Water Level Data

39 Deep-ocean Assessment and Reporting of
Tsunamis (DART) Ocean Bottom Pressure
Recorders



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U.S. Tsunami Program Water Level Data

39 Deep-ocean Assessment and Reporting of
Tsunamis (DART) Ocean Bottom Pressure
Recorders

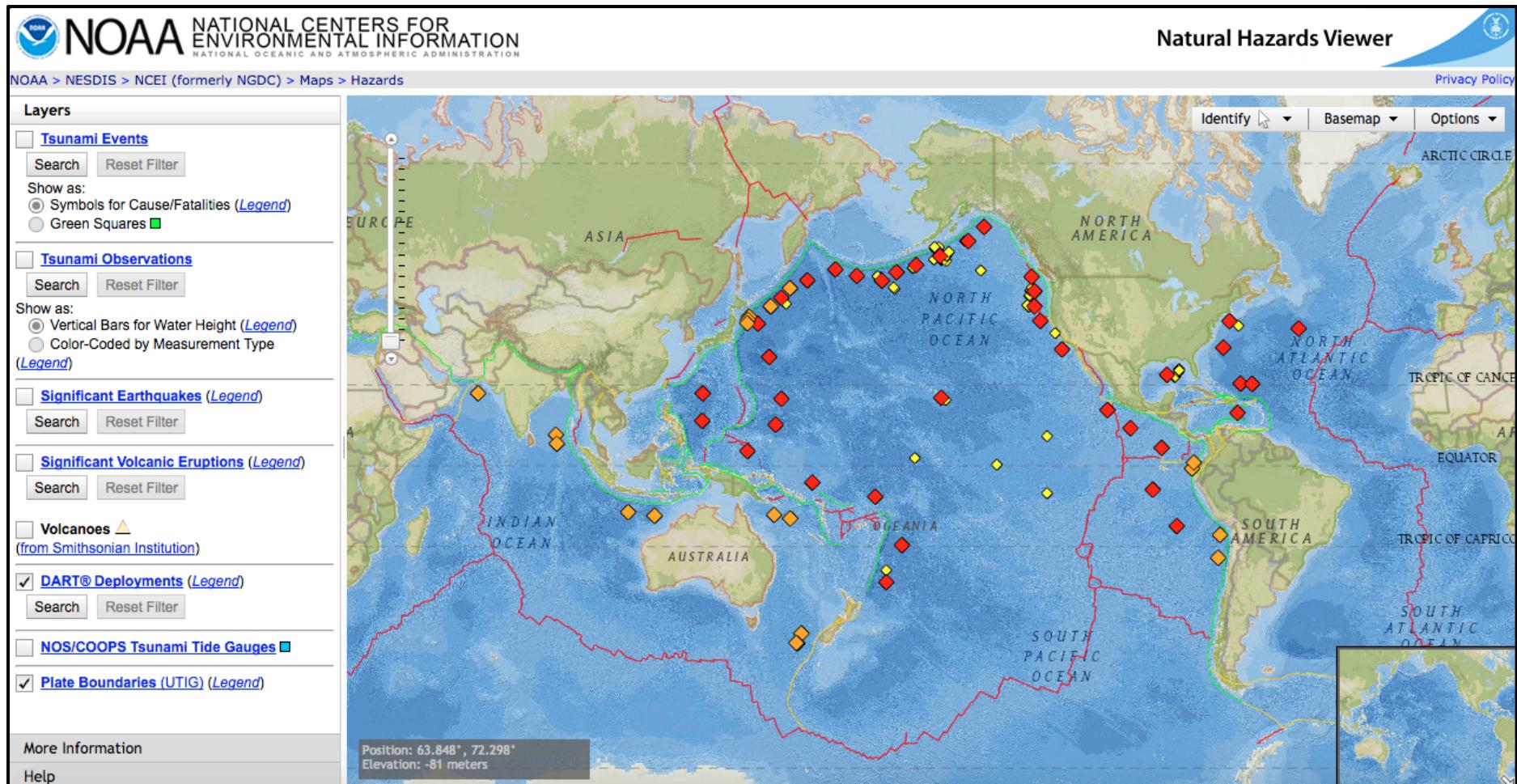
>200 Coastal Tide Gauge Stations



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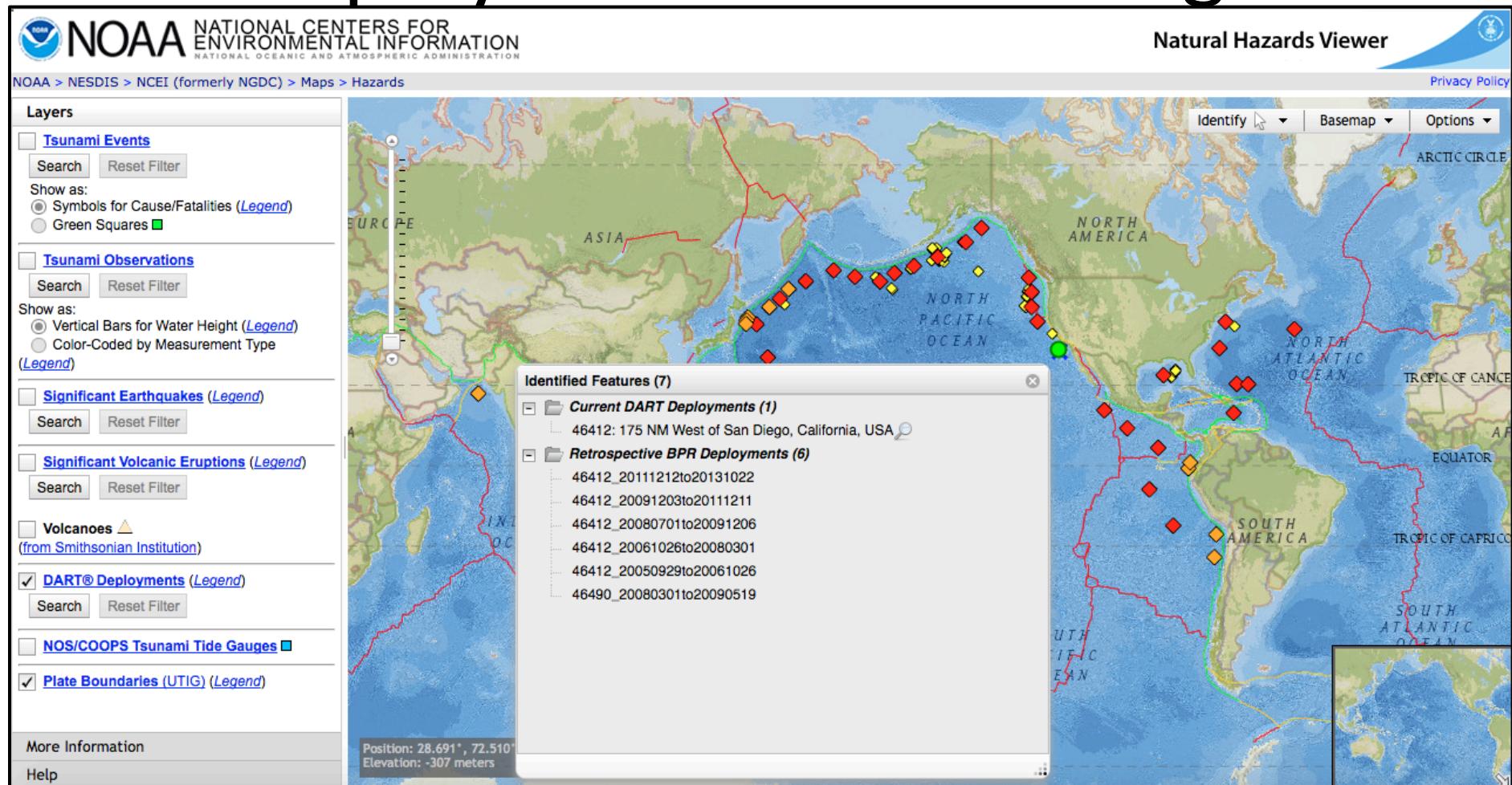


Locations of DARTs



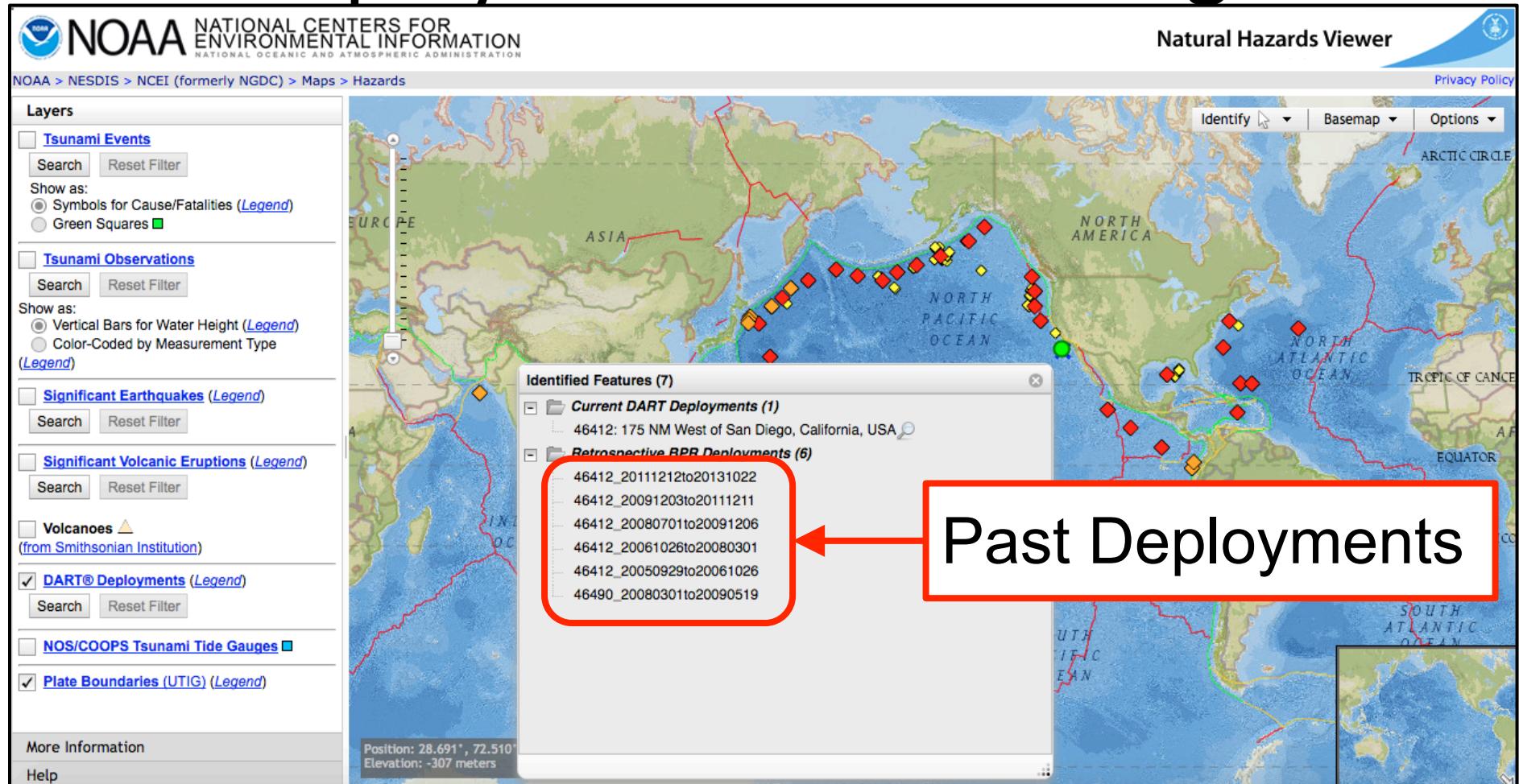
<https://maps.ngdc.noaa.gov/viewers/hazards/?layers=4>

Deployments off San Diego



<https://maps.ngdc.noaa.gov/viewers/hazards/?layers=4>

Deployments off San Diego



<https://maps.ngdc.noaa.gov/viewers/hazards/?layers=4>



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Observations

This list view is difficult to read!



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Observations

This list view is difficult to read.

How do we know what we have?



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Observations

This list view is difficult to read.

How do we know what we have?

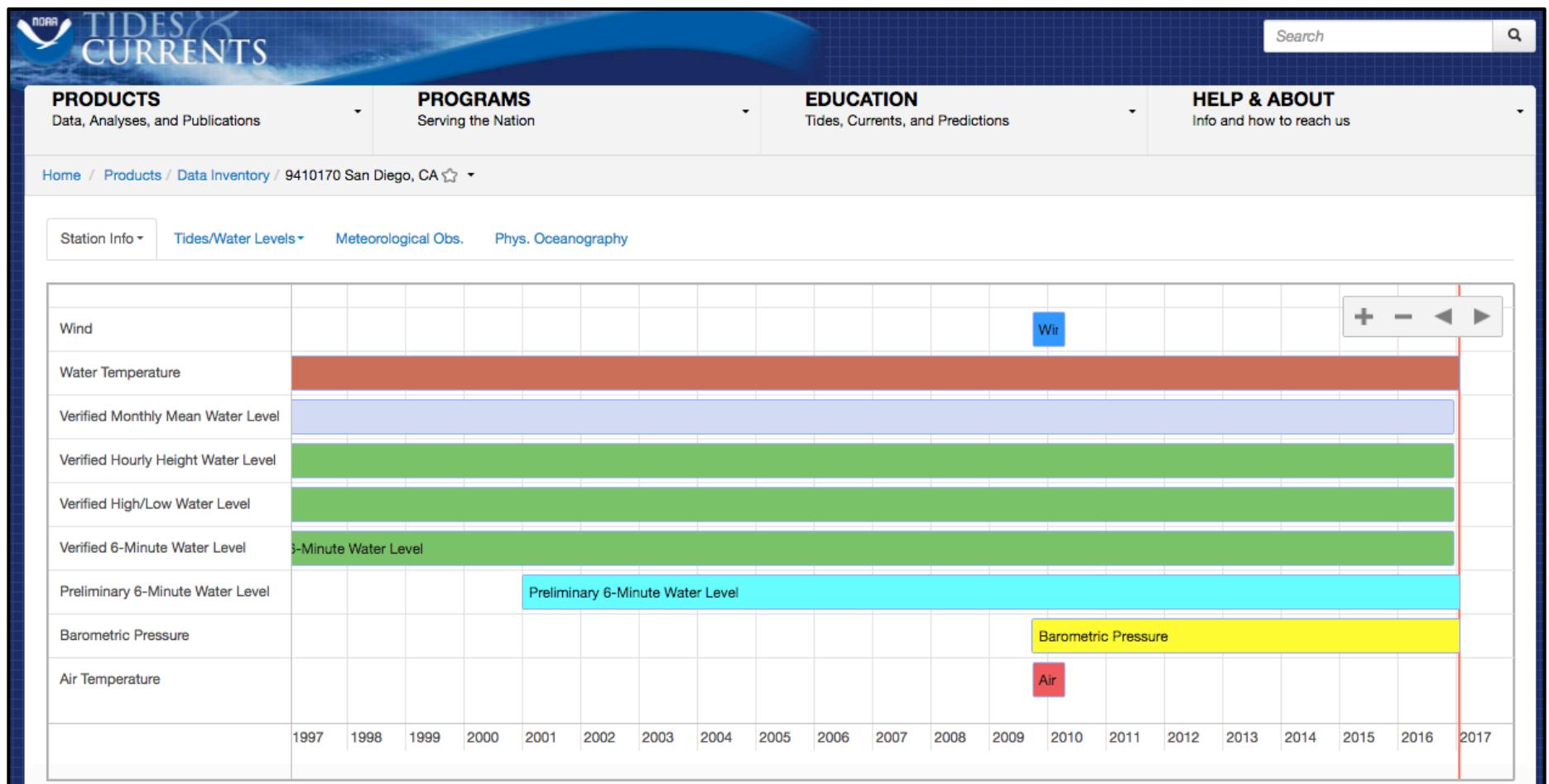
Is there a better way?



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Using Timelines to Show Inventory



<https://tidesandcurrents.noaa.gov/inventory.html?id=9410170>

Credit: Robert Aspinall

Thoughts



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Thoughts

This is a cool way to view data!



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Thoughts

This is a cool way to view data.

What if we looked at other data this way?



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Thoughts

This is a cool way to view data.

What if we looked at other data this way?

What will we learn?



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Thoughts

This is a cool way to view data.

What if we looked at other data this way?

What will we learn?

Let's do it.

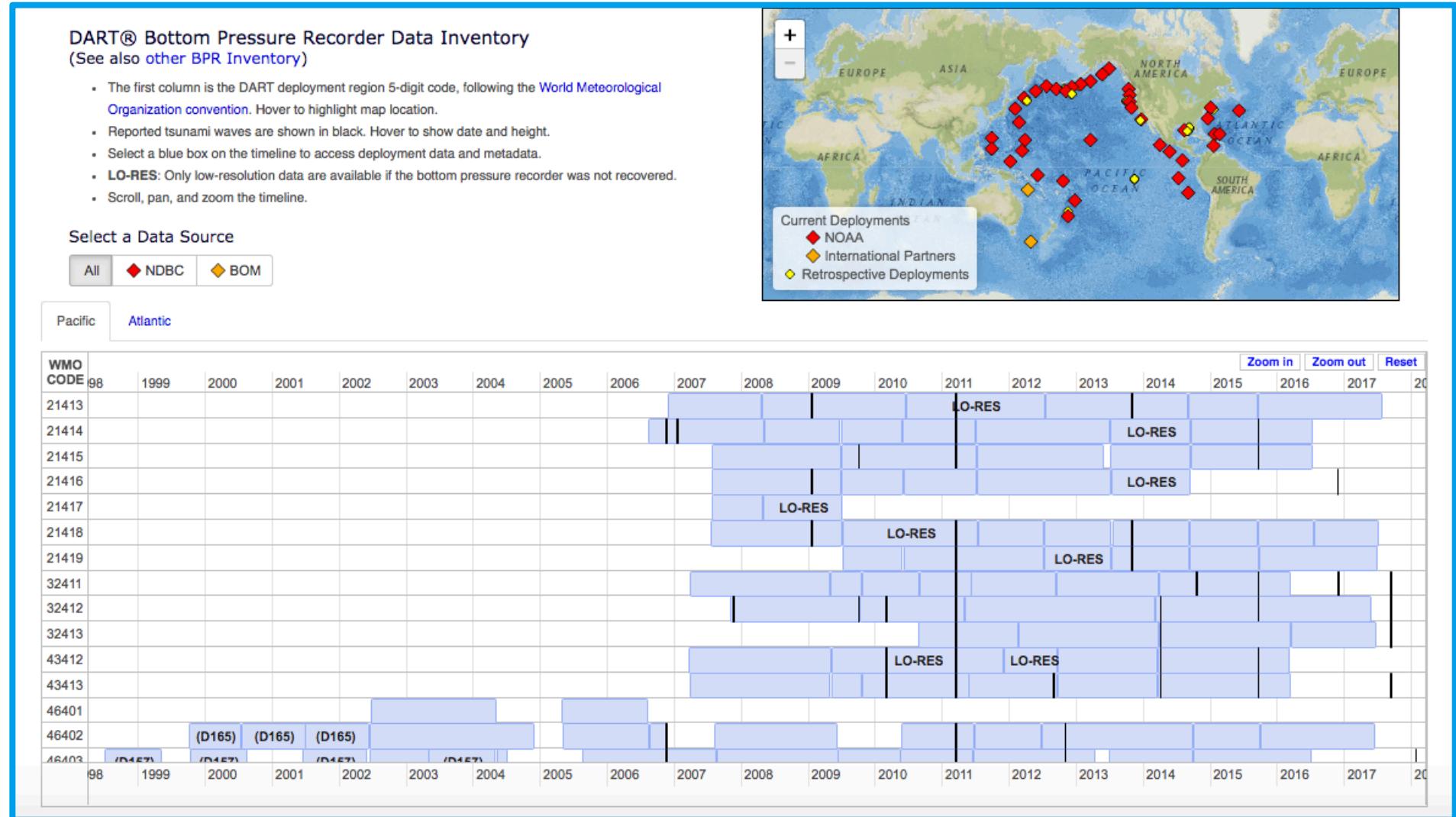


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DEMO

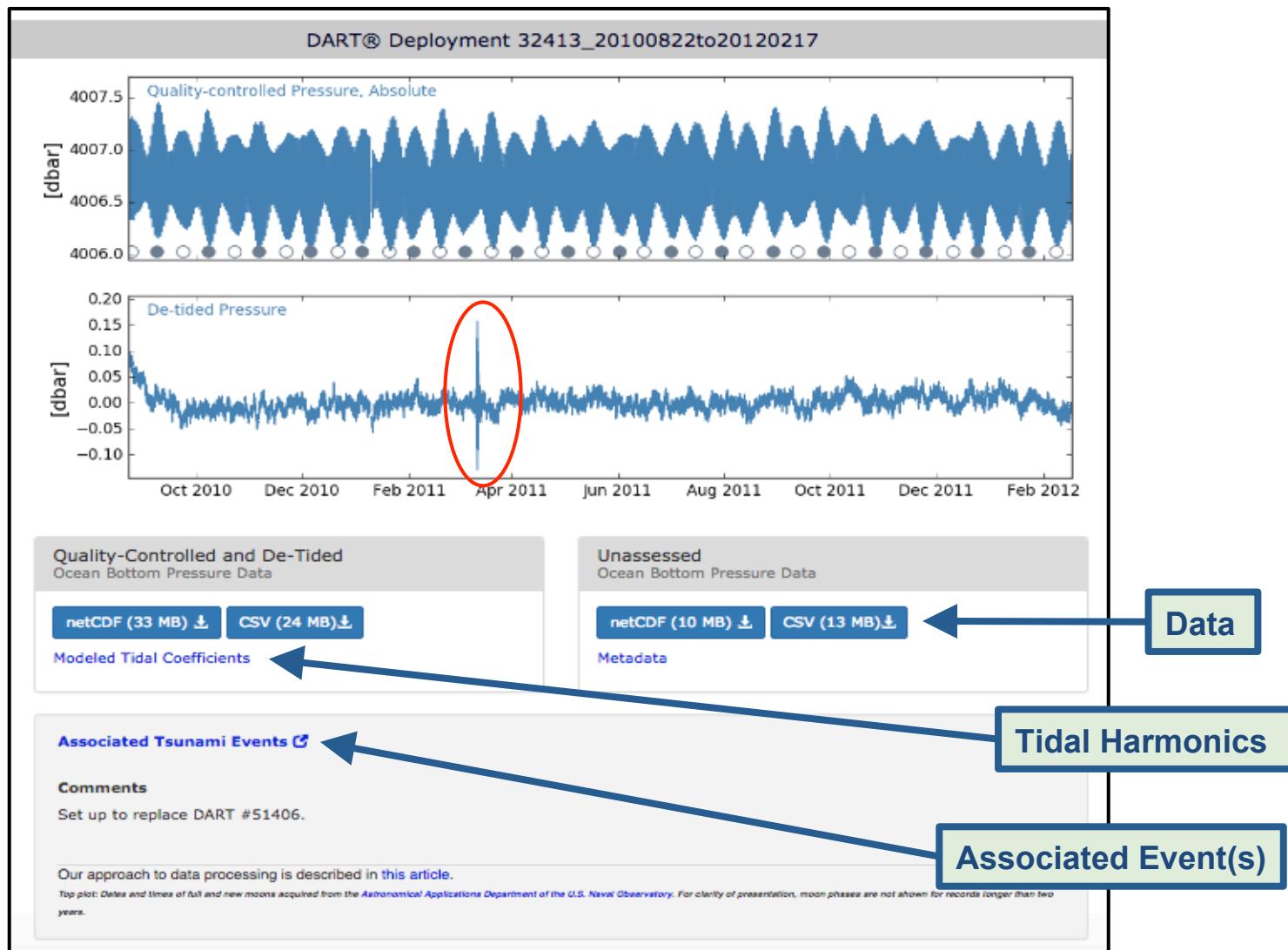
DART Data Inventory Timeline



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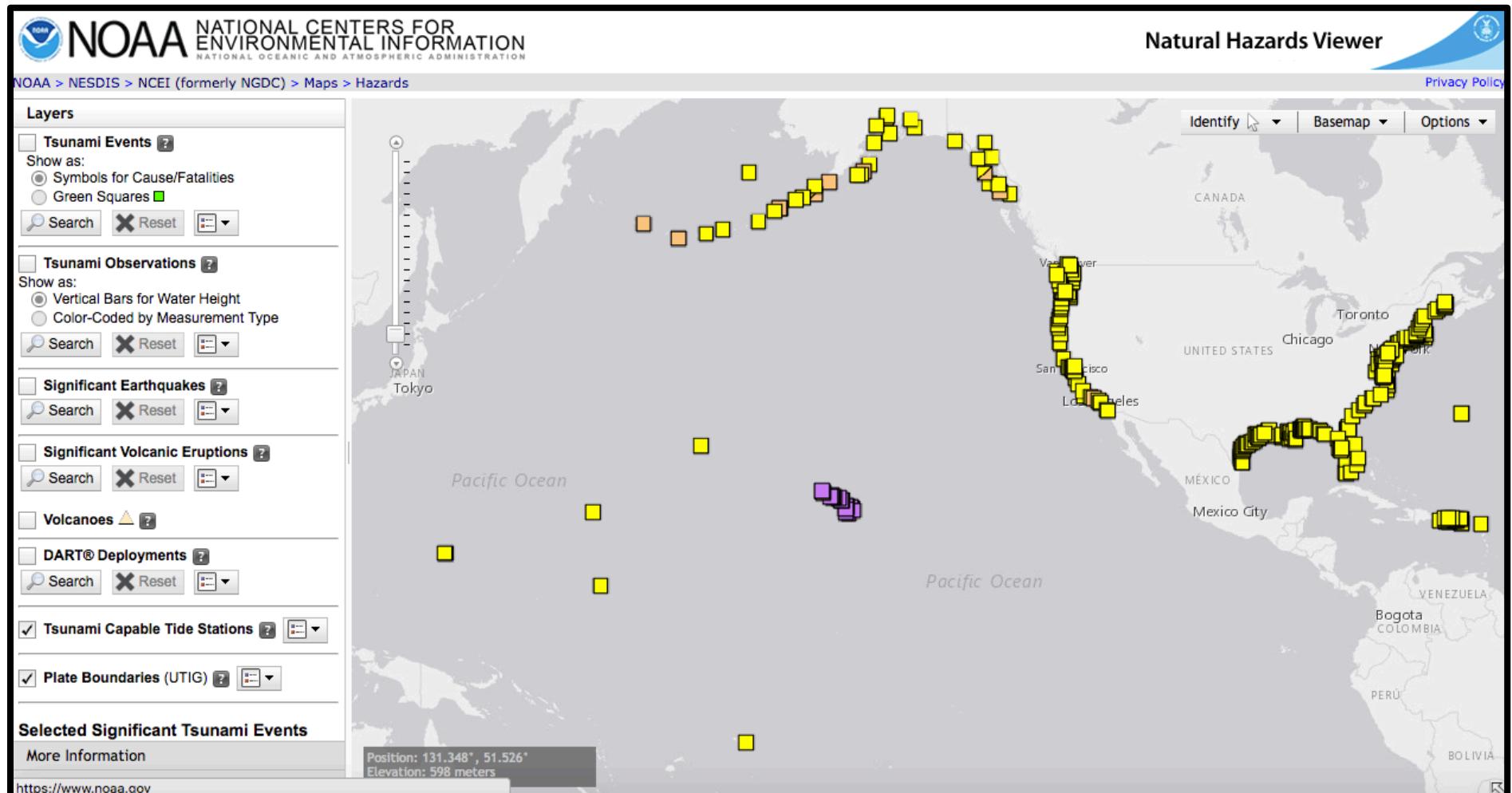
Access to DART Data & Products



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Locations of U.S. Coastal Tide Gauges



<https://maps.ngdc.noaa.gov/viewers/hazards/?layers=5>



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Tide Gauge Data Inventory Timeline

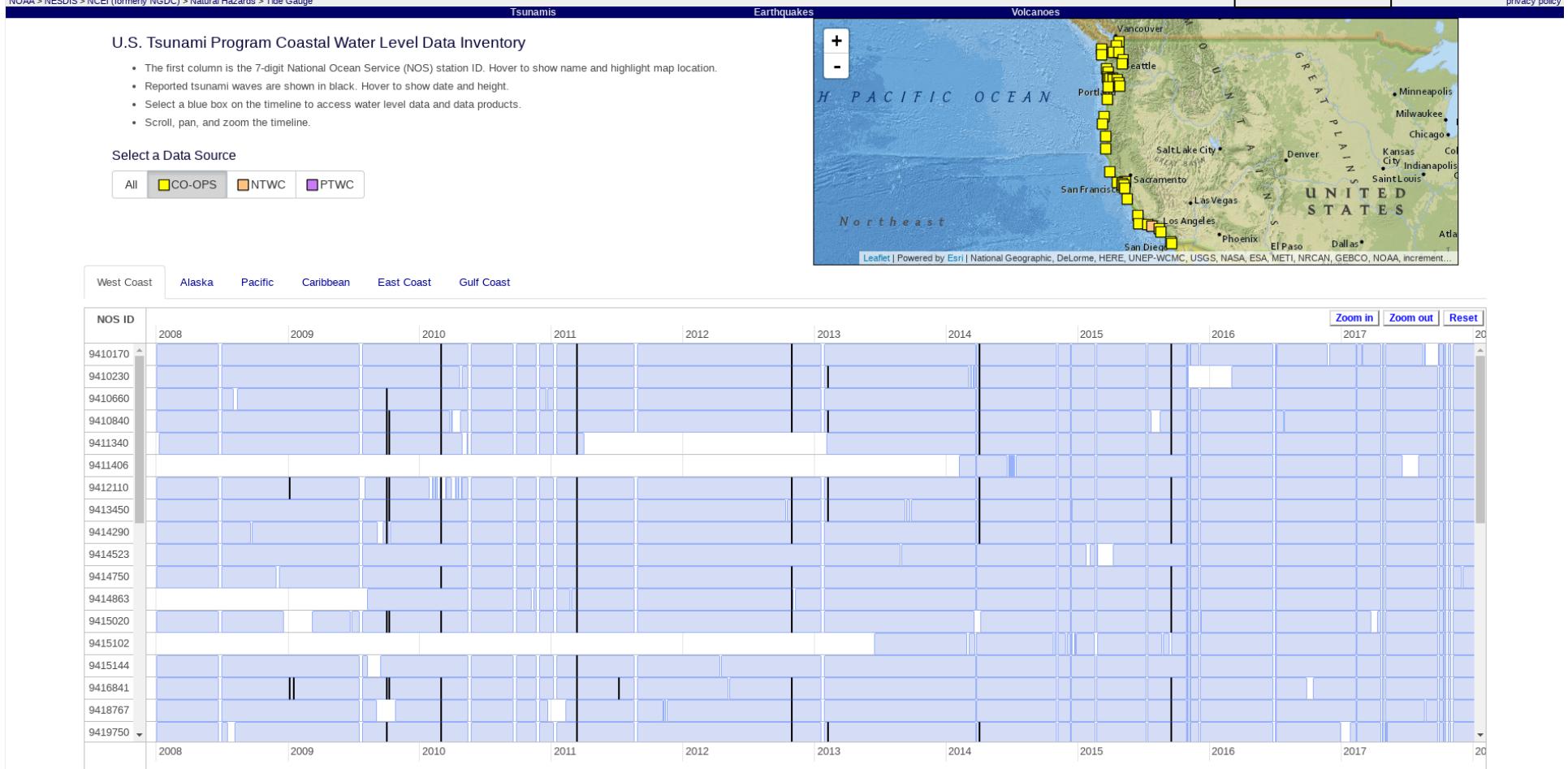


NOAA > NESDIS > NCEI (formerly NGDC) > Natural Hazards > Tide Gauge

DEMO

Search

privacy policy



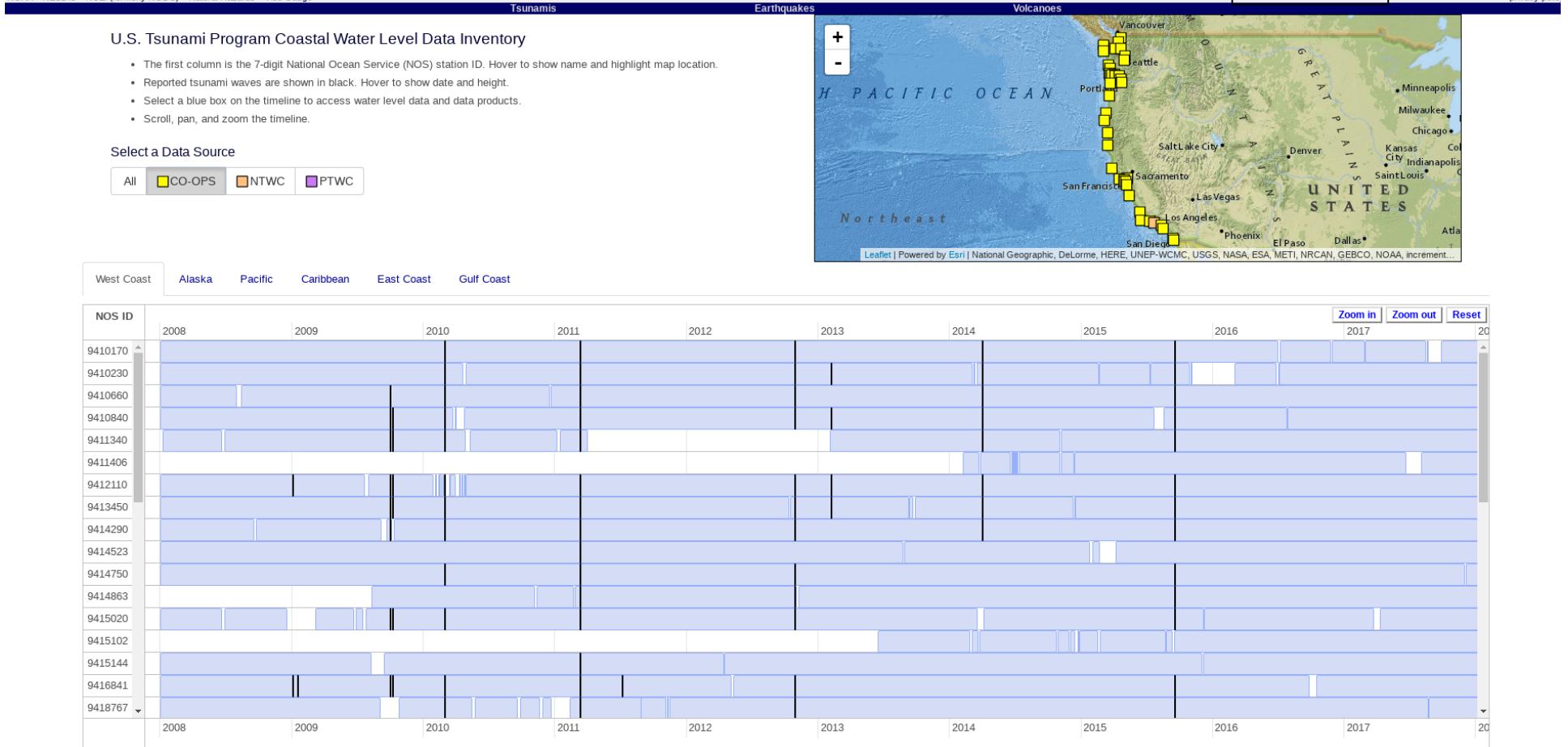
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Tide Gauge Data Inventory Timeline



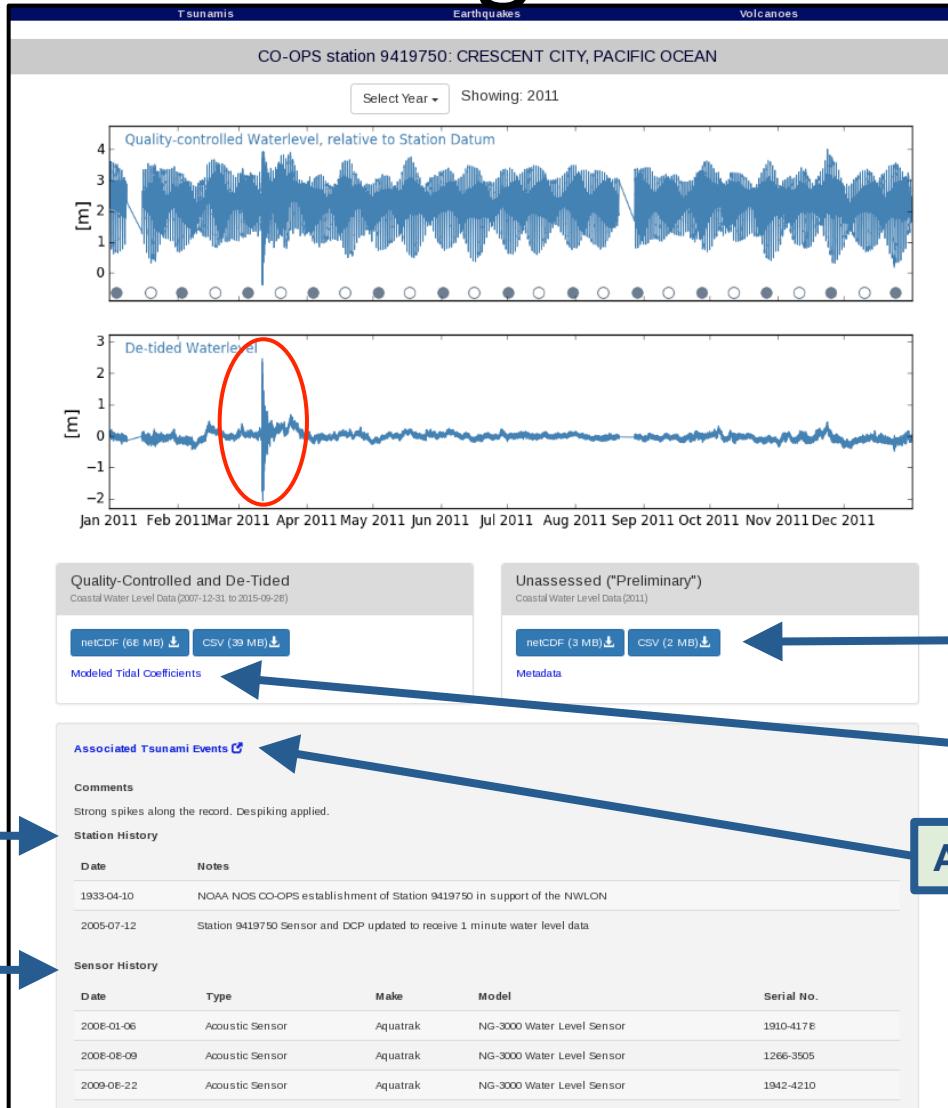
NOAA > NESDIS > NCEI (formerly NGDC) > Natural Hazards > Tide Gauge



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Access to Tide Gauge Data & Products



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VisJS Advantages

- Easy to use
- Good documentation
- Free and open source license
- Interactive UI
- Cross-browser compatible
- Responsive design



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HTML/Javascript

```
url = '/hazard/json/dart_inventory.json';
```

Data Source

```
// DOM element where the Timeline will be attached
```

```
var container = document.getElementById('inventory');
```

```
// Create DataSets for groups (rows) and items
```

```
var groups = new vis.DataSet(data["wmo_codes"]);  
var items = new vis.DataSet(data["deployments"]);
```

```
// Create a Timeline
```

```
var timeline = new vis.Timeline(container, null, options);  
timeline.setGroups(groups);  
timeline.setItems(items);
```

Container for
Timeline on Page

```
<div id="inventory"></div>
```



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Data Source (JSON)

```
{  
  "wmo_codes": [ ... ], // 49 items  
  "deployments": [ ... ] // 233 items  
}
```

Rows ("Groups")

Items in Rows

```
{  
  "wmo_codes": [  
    {  
      "content": "21413",  
      "id": "21413",  
      "lat": 30.559,  
      "lon": 152.126,  
      "name": "21413",  
      "status": "Y"  
    },  
    {  
      "content": "21413",  
      "id": "21413",  
      "lat": 30.559,  
      "lon": 152.126,  
      "name": "21413",  
      "status": "Y"  
    }  
  ],  
  "deployments": [  
    {  
      "content": "<span class=\\"bpr_caveat\\>&ampnbsp</span>",  
      "group": "21413",  
      "lat": 30.58,  
      "lon": 152.099,  
      "start": "2006-11-26",  
      "end": "2008-04-22",  
      "id": "21413_20061126to20080422"  
    }  
  ]  
}
```

Row Label

Row ID

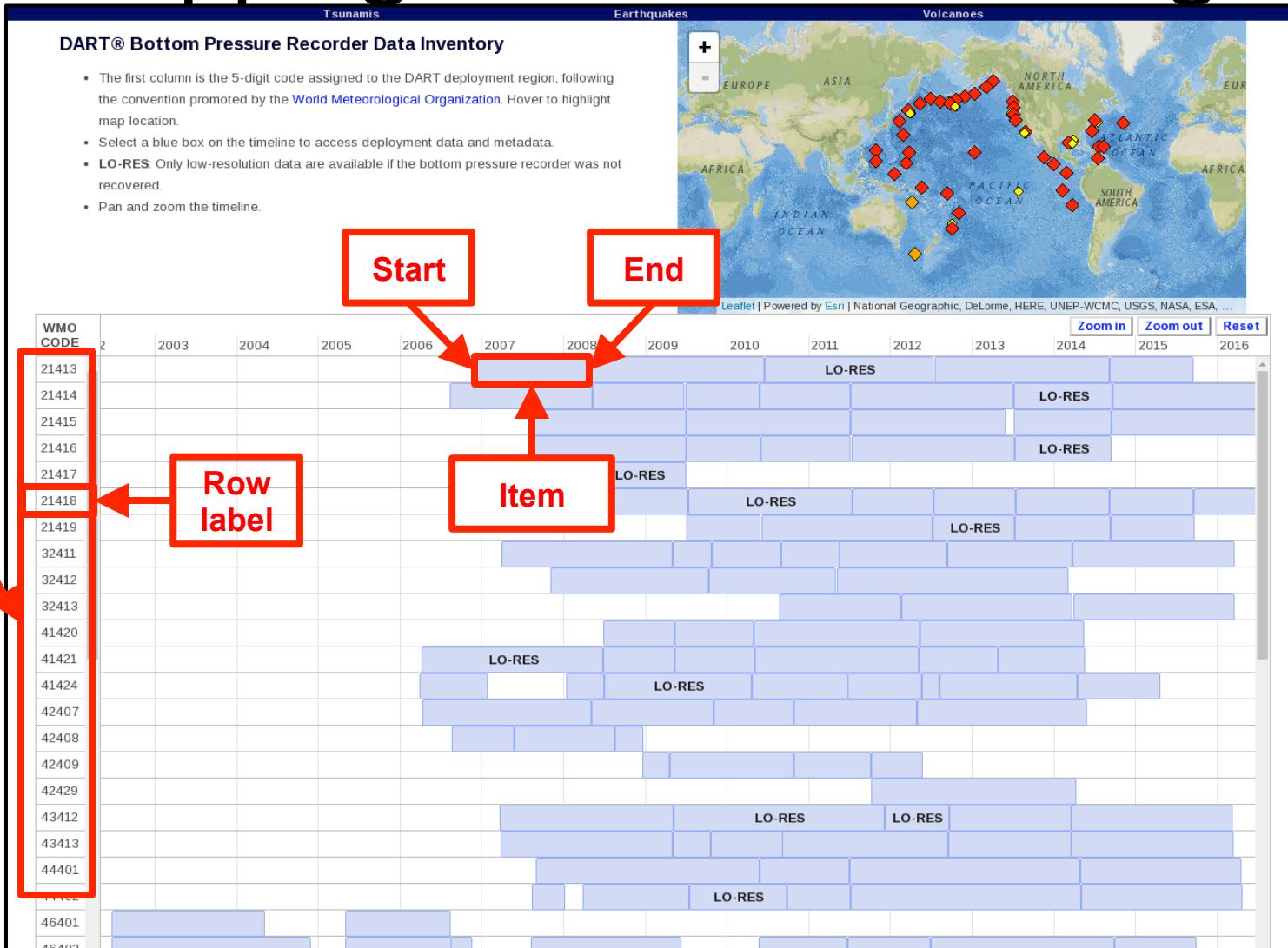
Start/End of Segment



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Mapping Data Source to Page



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Tips

- Decide what the segments will represent (entire deployment? or part of a series?)
- If part of a series, decide on the gap size
- Determine the segments offline and persist this information separately



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Outcomes

- Gaps in the archive are exposed
- Patterns emerge (systematic gaps across a network)
- Curators can take corrective action
 - 17 at-risk DART data packages were identified and archived (*five million dollars*)
- Users can now see when data was collected



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Thanks!

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