

Focus Activity

- Hands-on Activity

Sea Level Change

- Examples & Causes
- Classification

Recent History

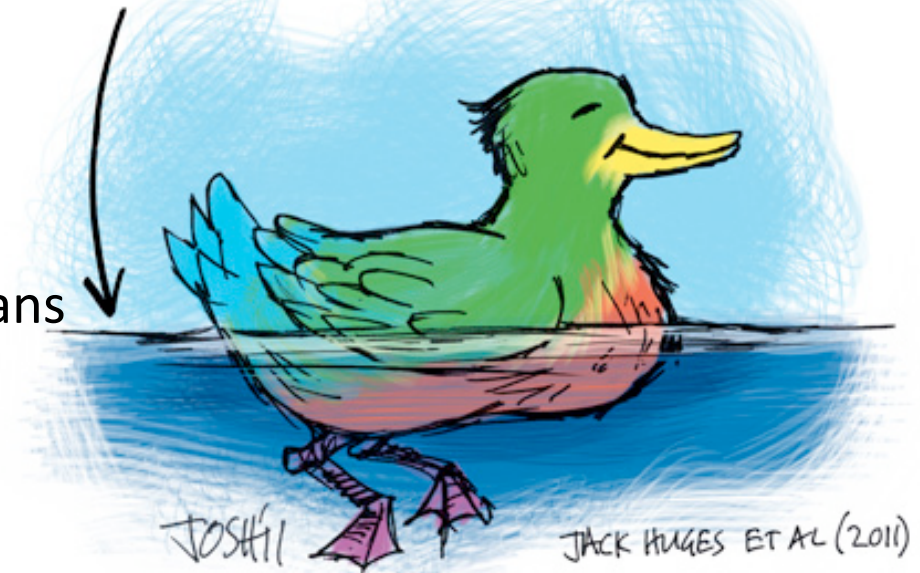
Spatial Variability (i.e. geographically)

- Satellite Evidence

Impacts of Sea Level Change on Humans

CONCLUSIVE PROOF OF STABLE SEA LEVELS

STILL ONLY COMES
HALF-WAY UP A DUCK



Focus Activity

- Hands-on Sea Level Change Activity



The line drawn around the cup represents a reference sea level or “datum”

Fill cup with water to level of the line.

- 1) List how many ways can you get the water level to change.
- 2) Note direction of water level change
(i.e., up, down, or depends)
- 3) Note how the new water level departs from the original.
(i.e., same everywhere or variable)
- 4) Note how long the water level change persists.
(i.e., temporary, maintained, depends)

- Hands-on Sea Level Change Activity

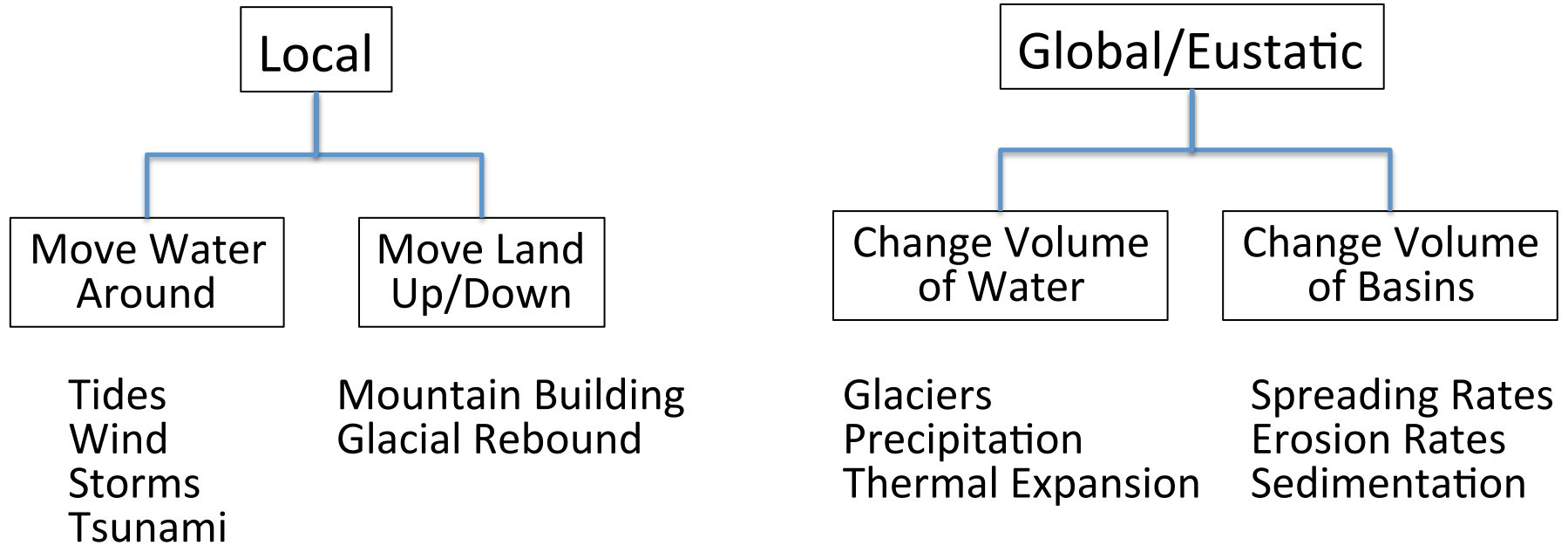
[illegible]

Focus Activity

- Hands-on Sea Level Change Activity



Event or Action (What did you do?)	Water Level Change (Above, Below, Other)	Region Affected (all-sides, 1-side, middle)	Duration, Timing (maintained, temporary)
Add/Remove water	Up/Down	Whole Cup	Persists until ...
Tilt Cup	Variable, depends on tilt	Varies across cup	Persists until ...
Squeeze Cup	Up	Whole Cup	Persists until ...
Swirl Cup	Variable	Varies round cup	Temporary
Blow Across Cup	Variable, depends on blow direction	Varies round cup	Temporary
Add Rock	Up	Whole Cup	Persists until ...
Heat/Cool water	Up/Down	Whole Cup	Persists until ...



Think-Pair-Share

Which sea level change examples should we be worried about ??

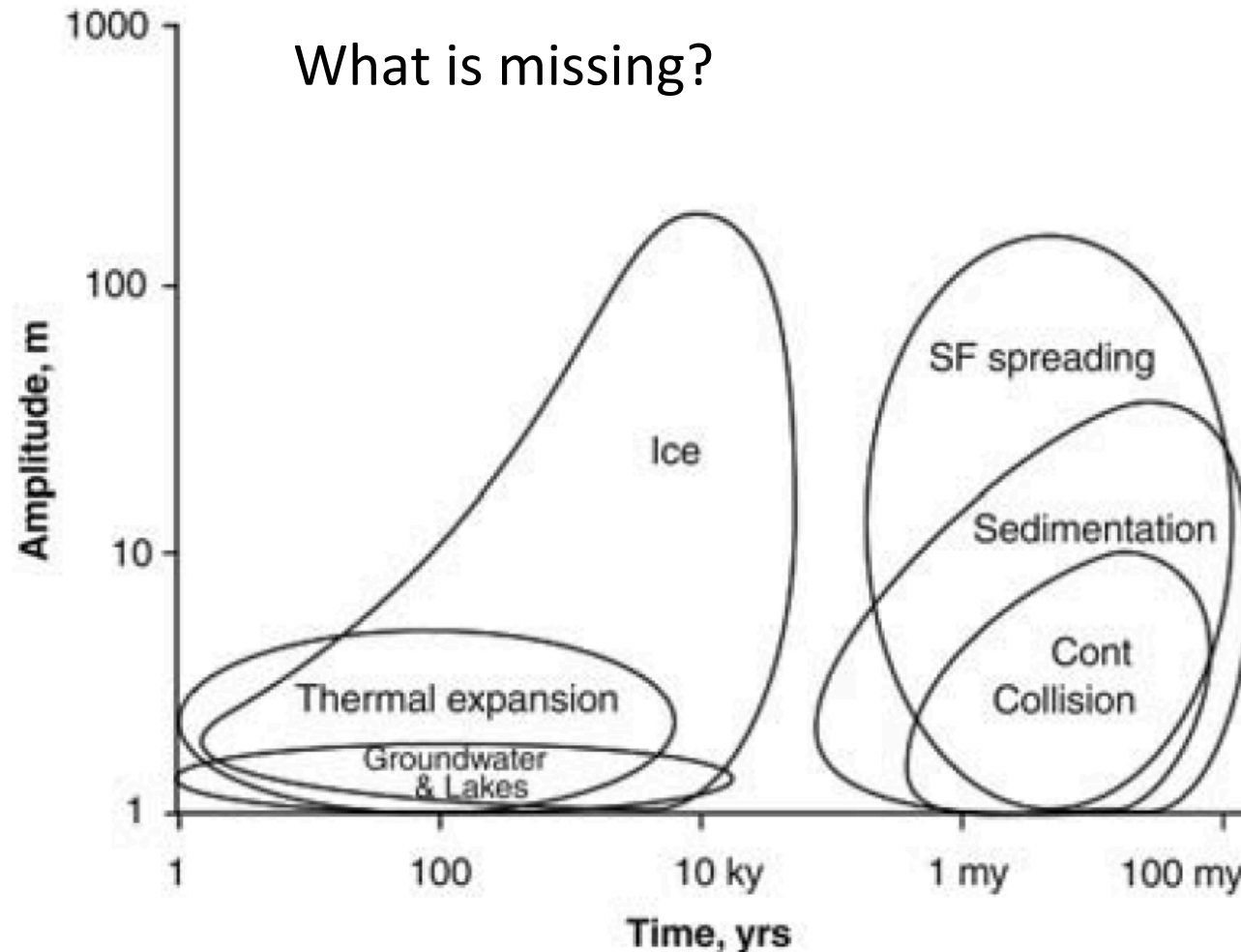
- Think Rate of Change
- Think Magnitude

Sea Level Change - Types

Which ones should we be worried about ??

- Think Rate of Change
- Think Magnitude

What is missing?



Sea Level Change - History

7

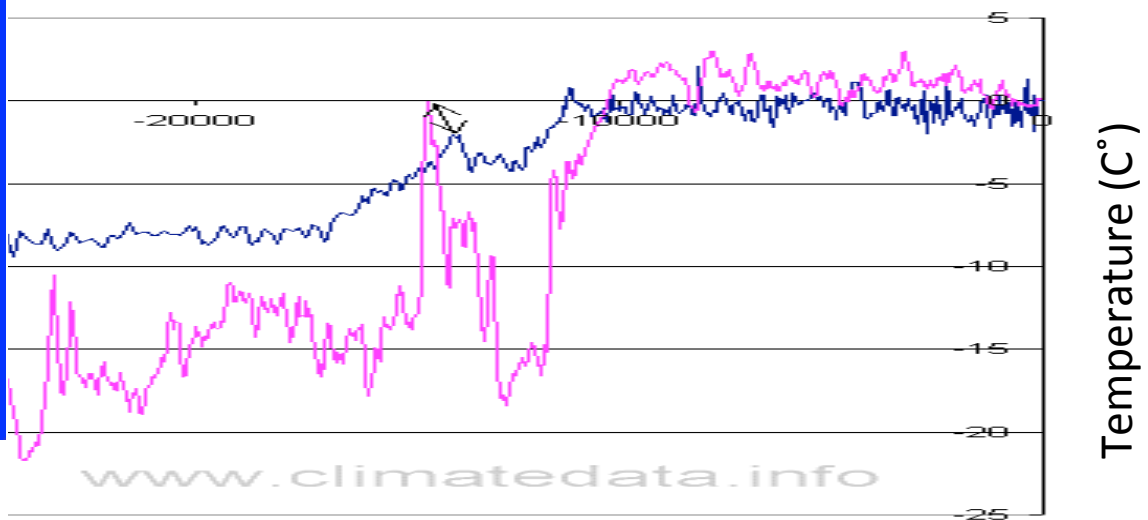
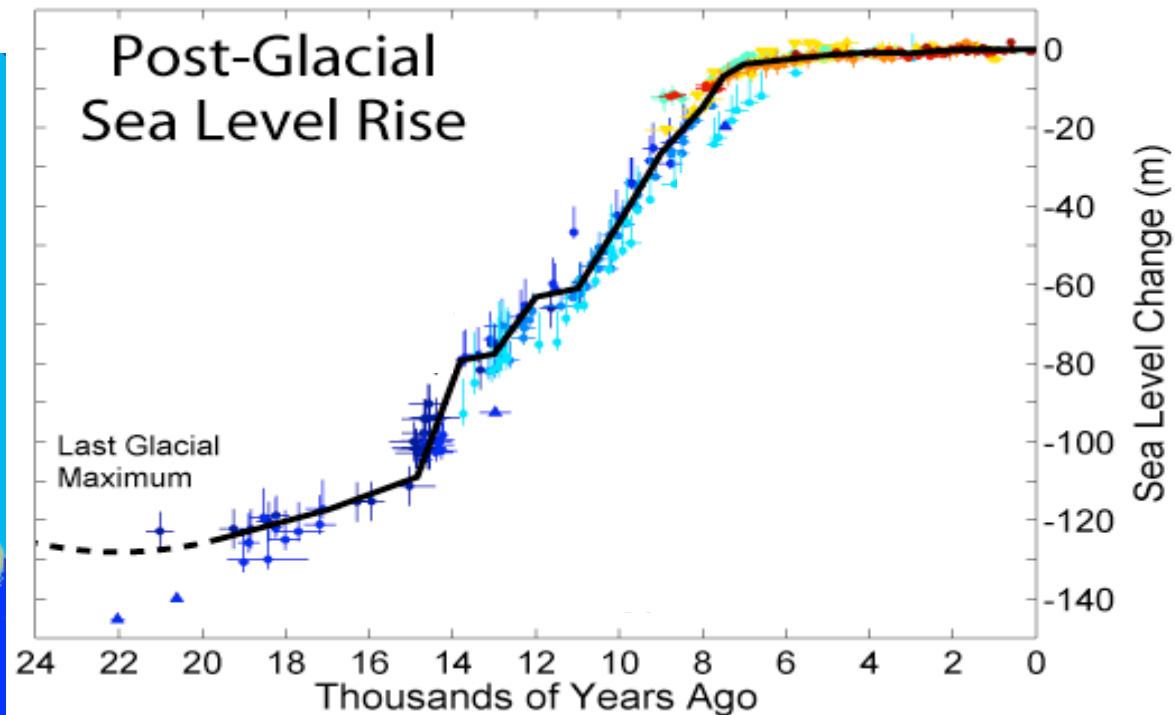


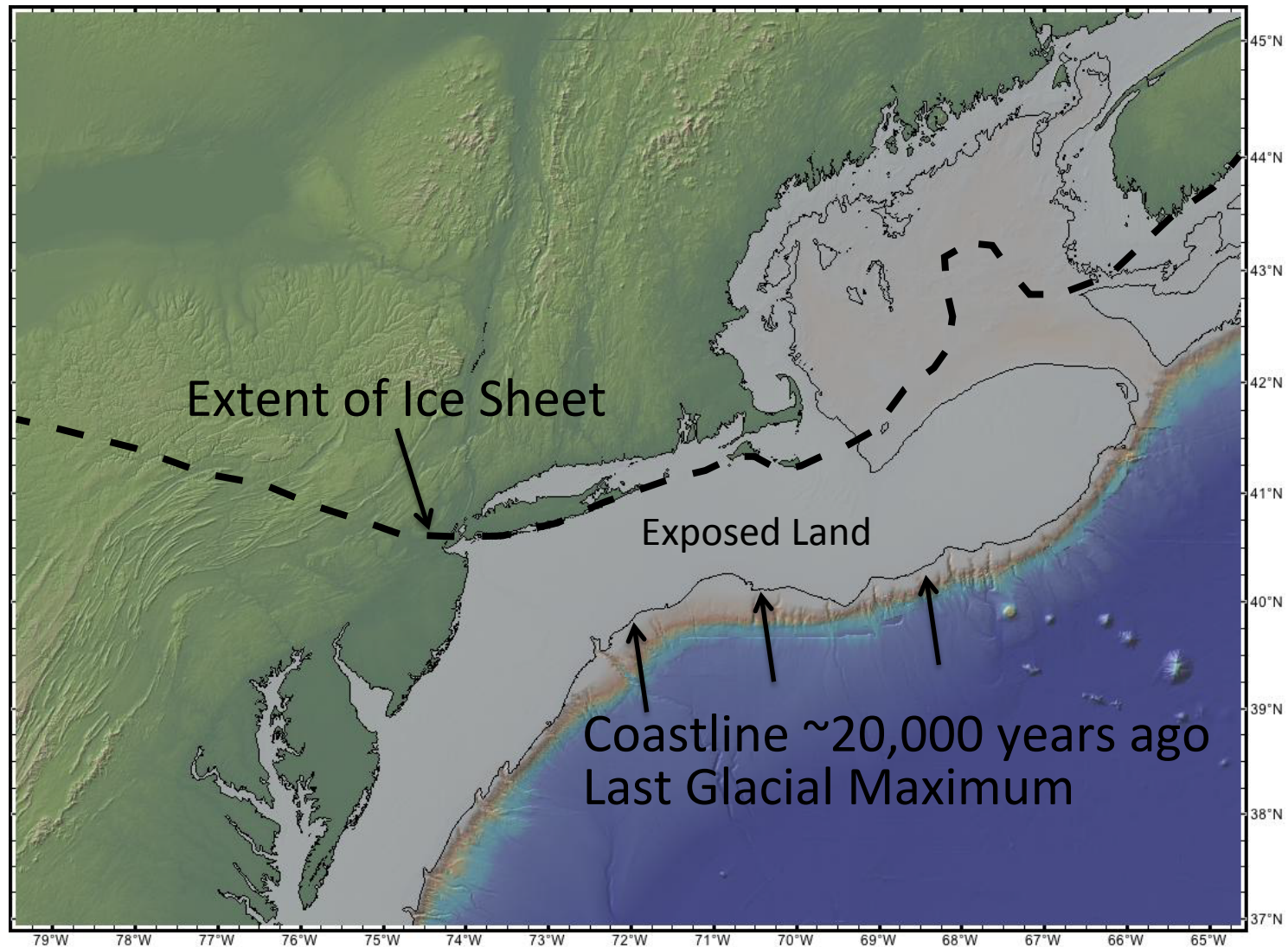
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat
Image IBCAO

Google earth

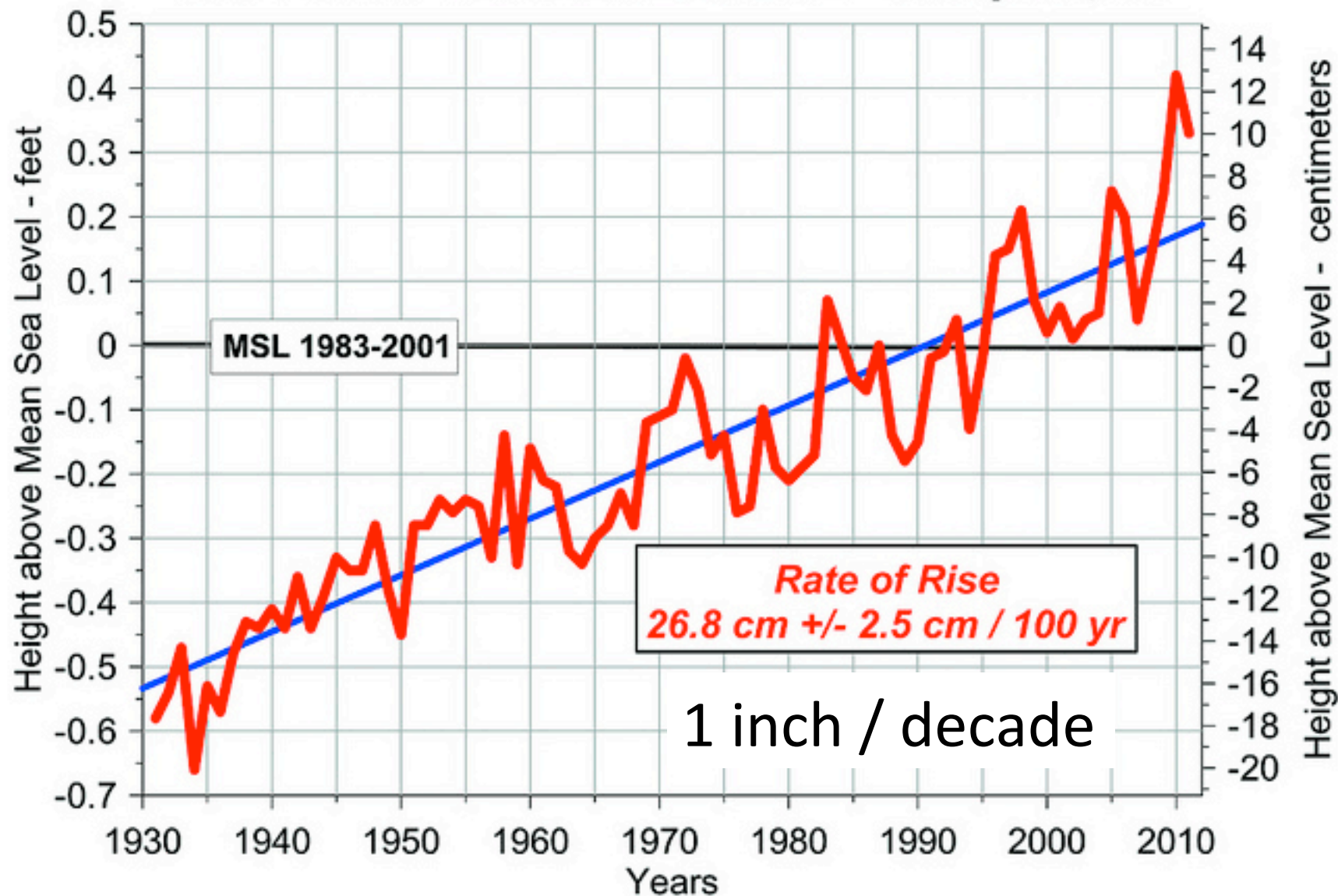
Sea Level Change - History

8





HISTORIC SEA-LEVEL RISE - Newport, RI

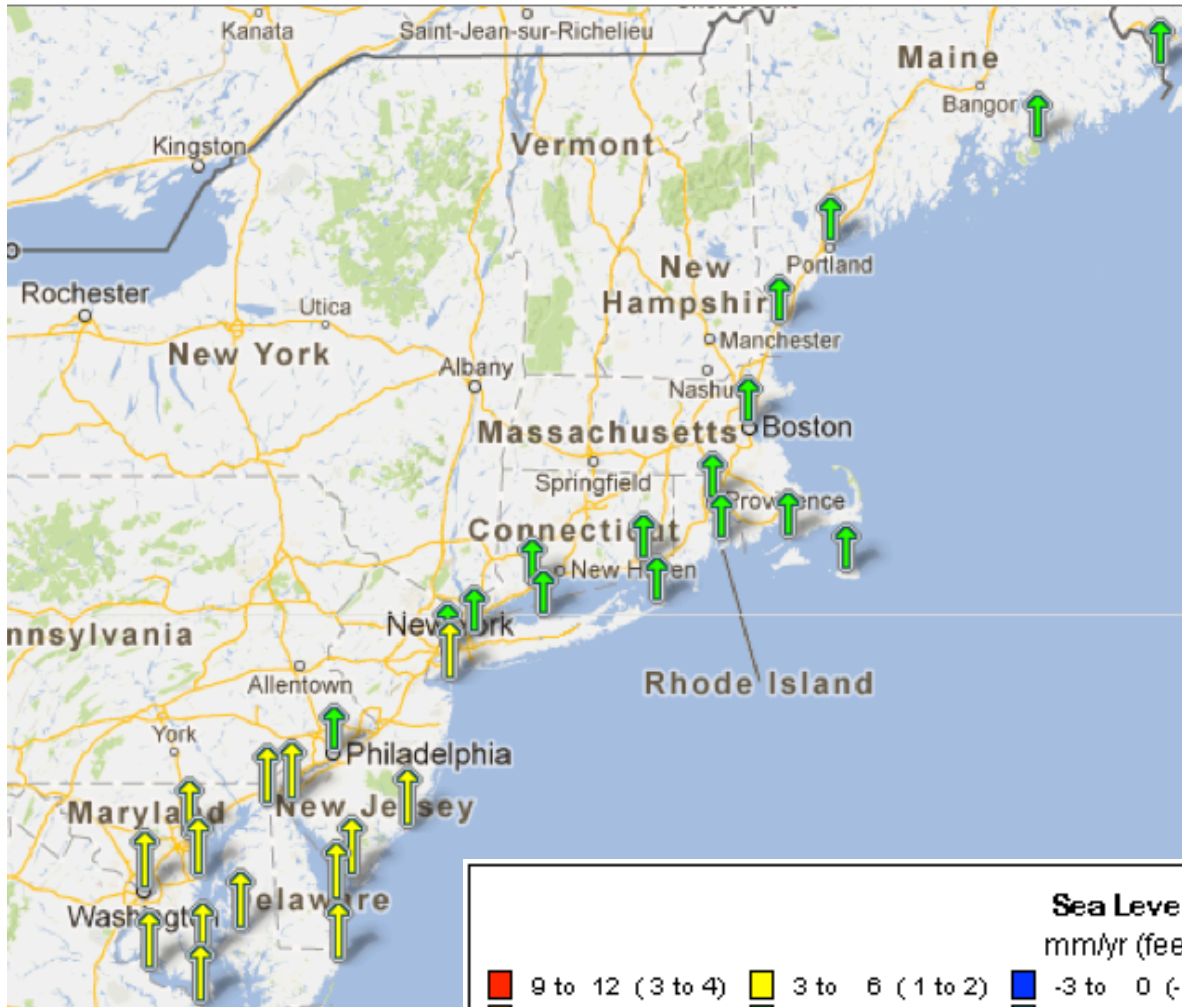


Sea Level Change – Regional View

Sea Levels Online

<http://tidesandcurrents.noaa.gov/sltrends/sltrends.shtml>

East Coast West Coast Gulf Coast Alaska Hawaii Global



Portland, ME => 1.82 mm/yr

Boston, MA => 2.63 mm/yr

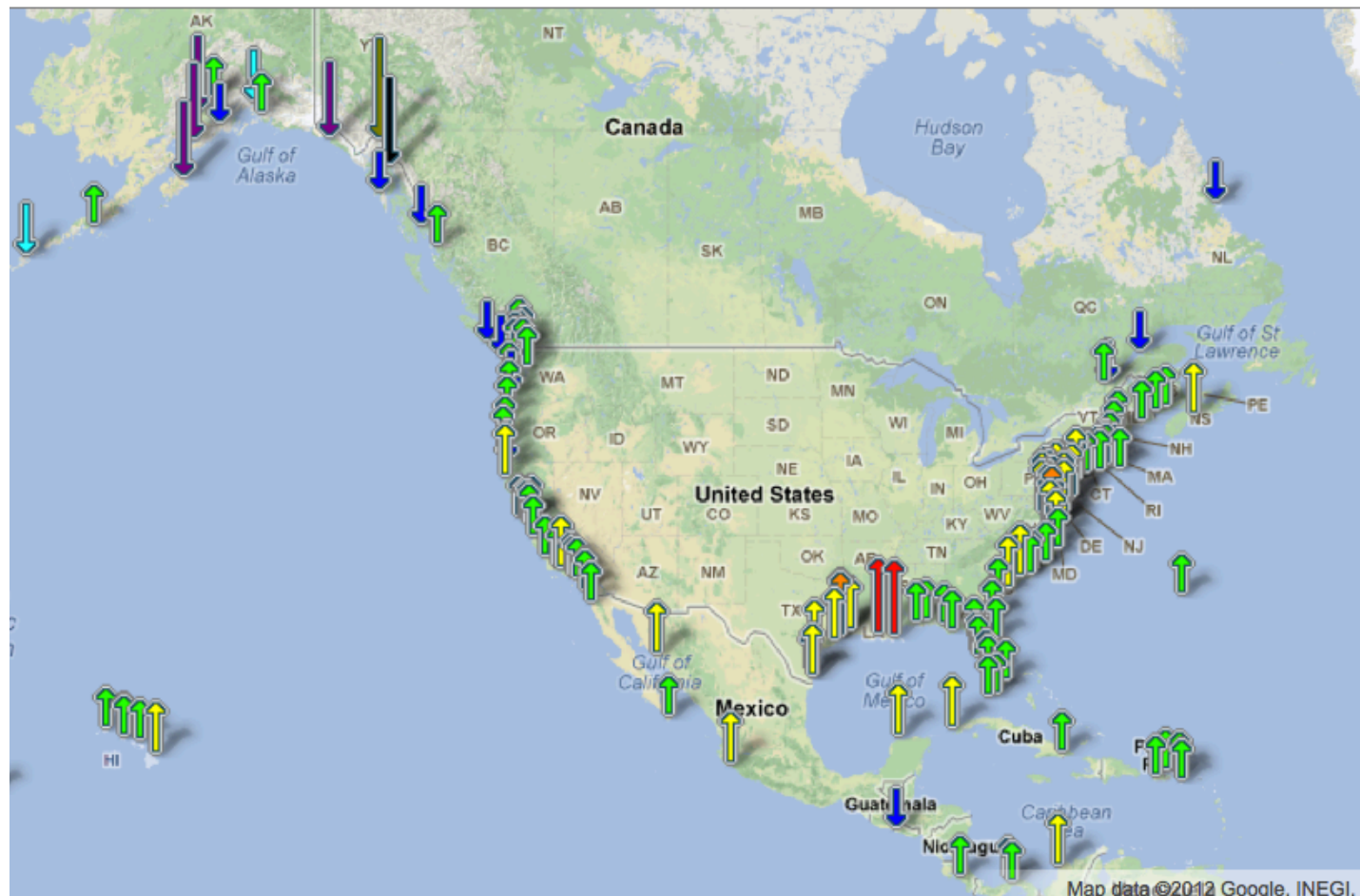
Providence, RI => 1.95 mm/yr

Newport, RI => 2.58 mm/yr

New York => 2.35 mm/yr

Atlantic City, NJ => 3.99 mm/yr

Sea Level Change – Regional View

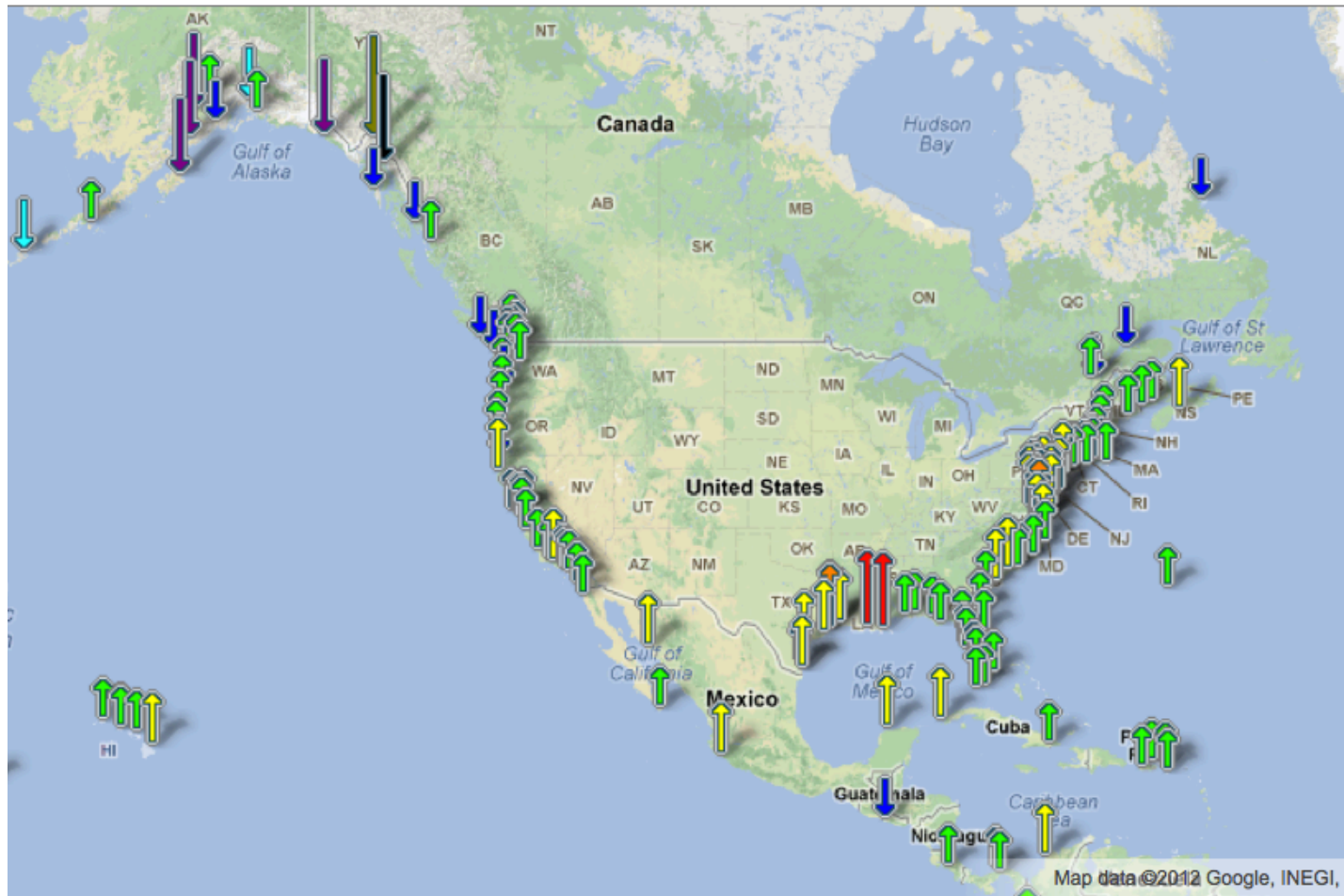


Sea Level Trends

mm/yr (feet/century)

9 to 12 (3 to 4)	3 to 6 (1 to 2)	-3 to 0 (-1 to 0)	-9 to -6 (-3 to -2)	-15 to -12 (-5 to -4)
6 to 9 (2 to 3)	0 to 3 (0 to 1)	-6 to -3 (-2 to -1)	-12 to -9 (-4 to -3)	-18 to -15 (-6 to -5)

Sea Level Change – Regional View



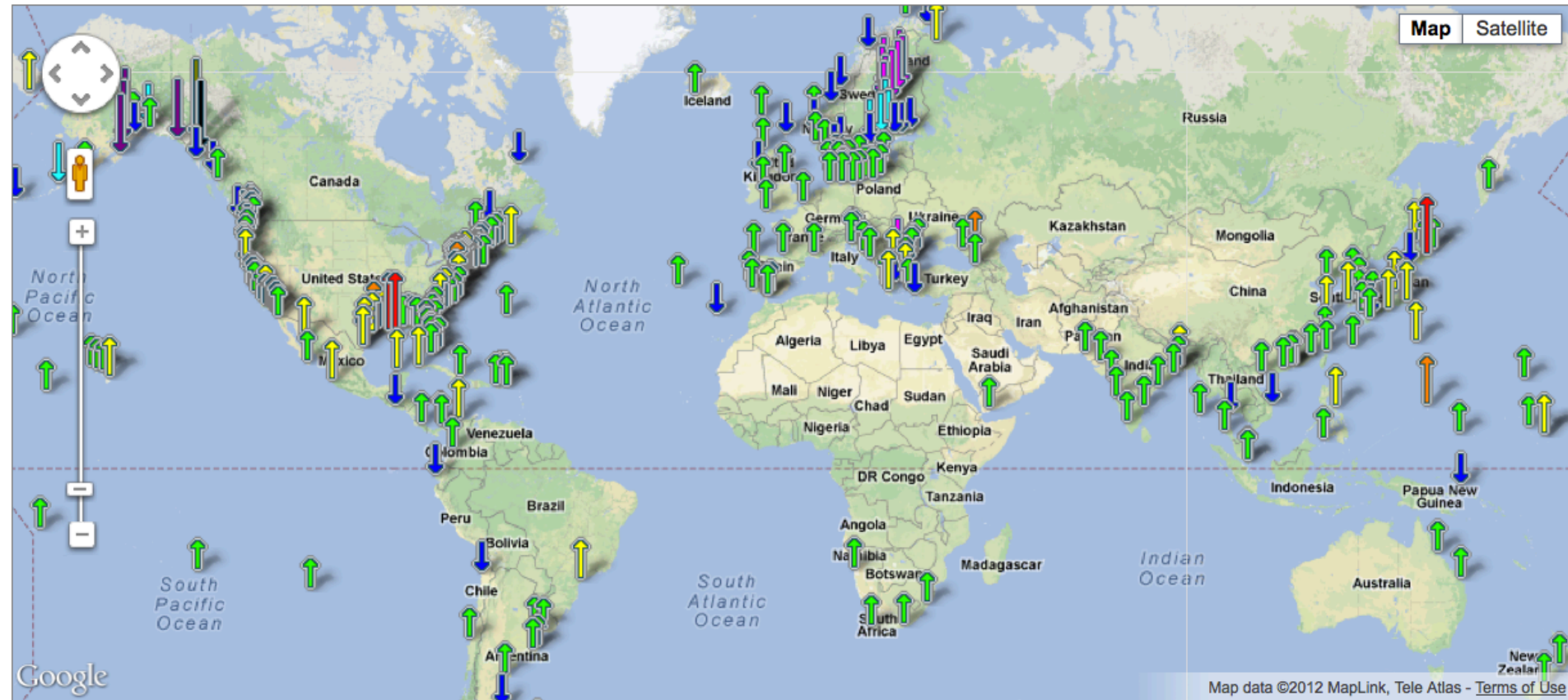
Think-Pair-Share

Why does it appear that sea level rising in some regions and falling in others?

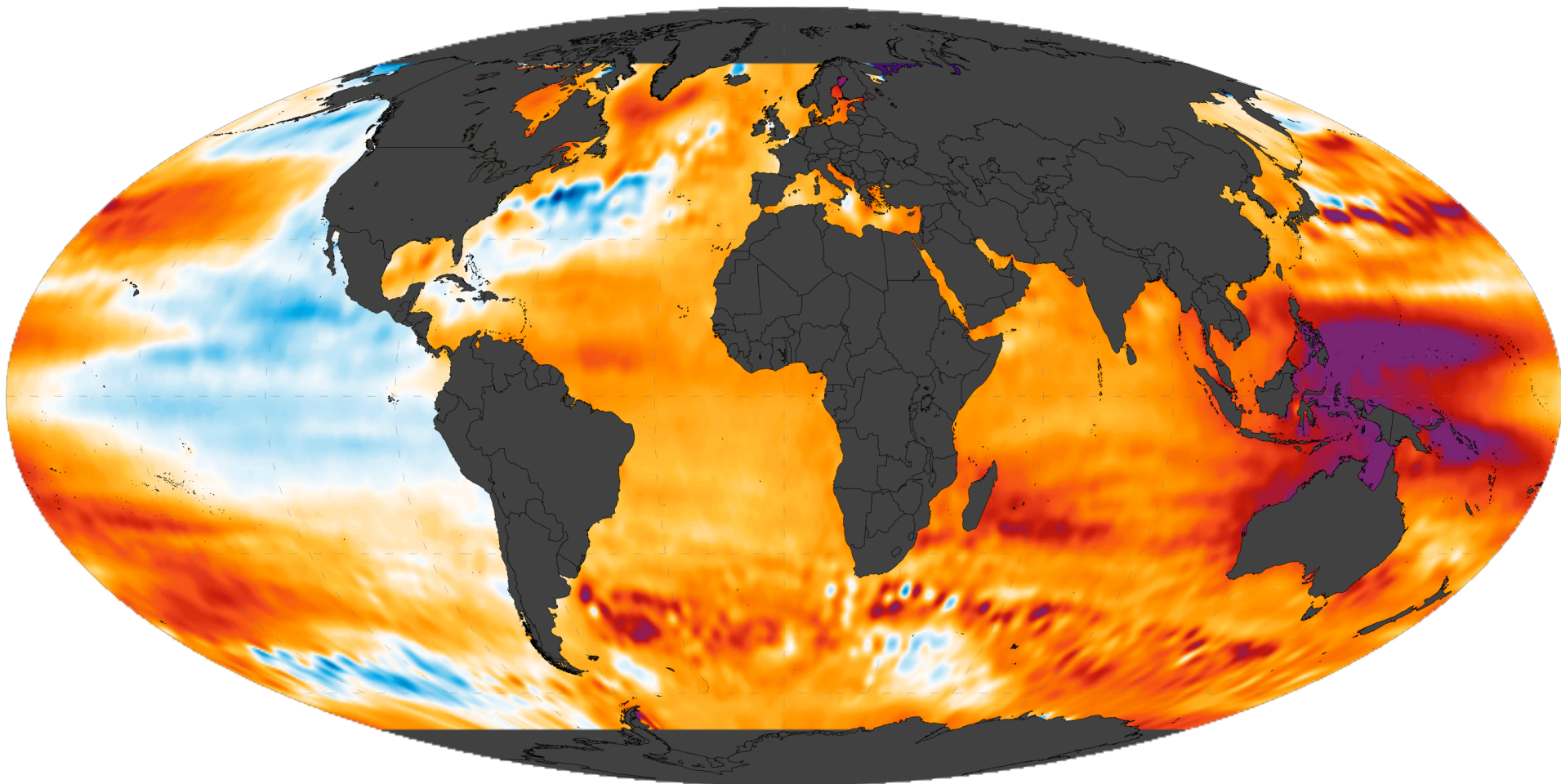
Sea Level Change – Regional View

Sea Levels Online

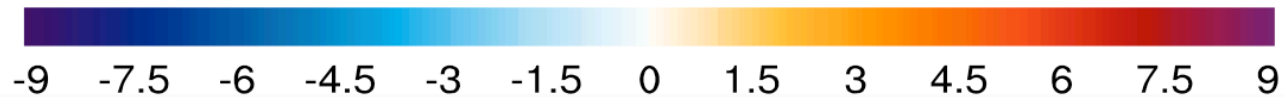
East Coast West Coast Gulf Coast Alaska Hawaii Global

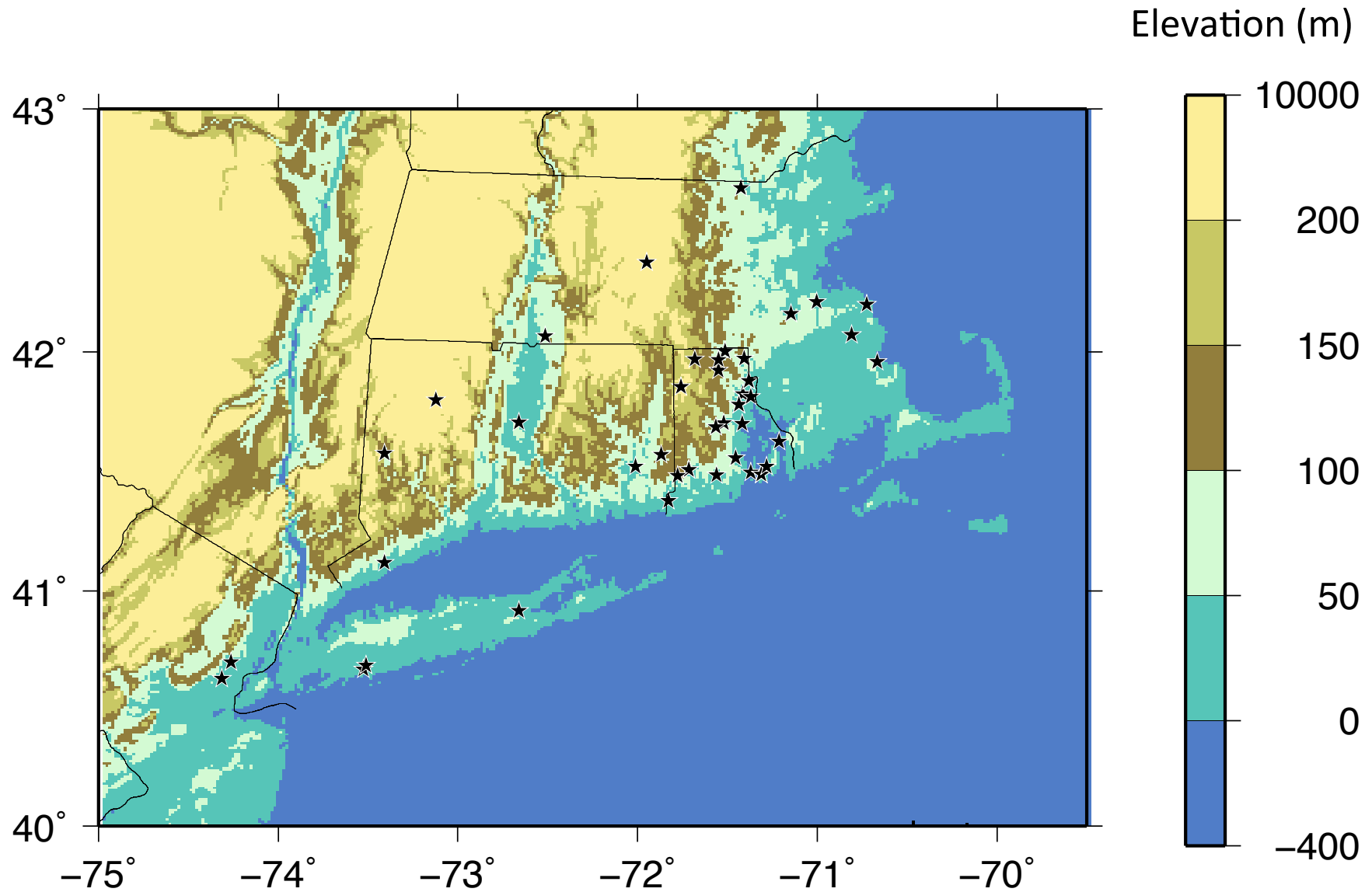


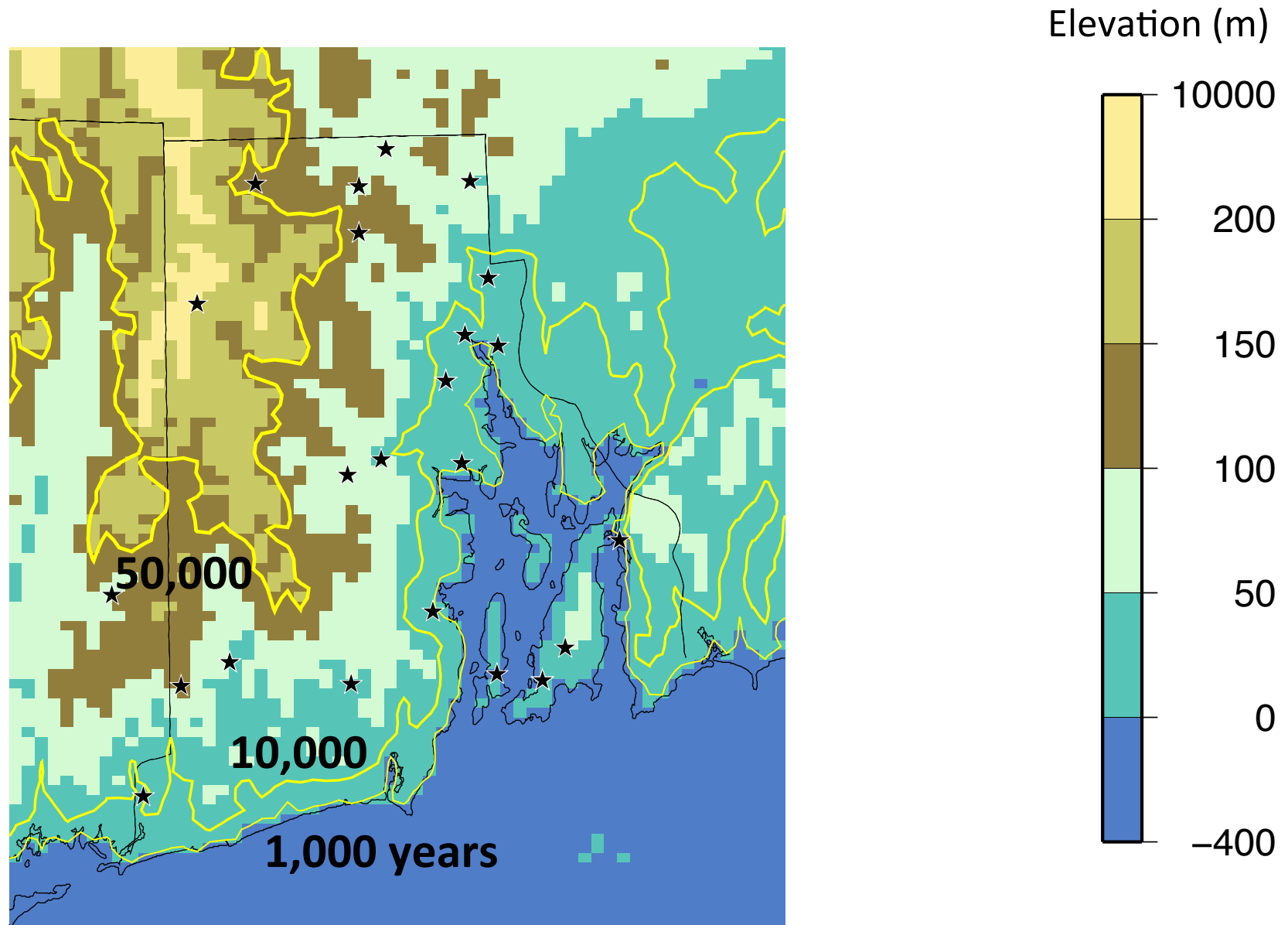
Map data ©2012 MapLink, Tele Atlas - [Terms of Use](#)



Sea Level Trend 1993-01/2012-01 (mm/Year)







Surging Seas: Risk Finder

Surging Seas **RISK ZONE MAP**

English (US)



Enter a global coastal place



Download map image
Washington County stats

Water level



Show current coast

-  Below water level
-  Below but isolated
-  Levee
-  Tide gauges

- See projections
- Legend
- Social vulnerability
- Population
- Ethnicity
- Income
- Property
- Landmarks

<http://sealevel.climatecentral.org/>

Surging Seas RISK ZONE MAP

English (US)



Enter a global coastal place



Download map image

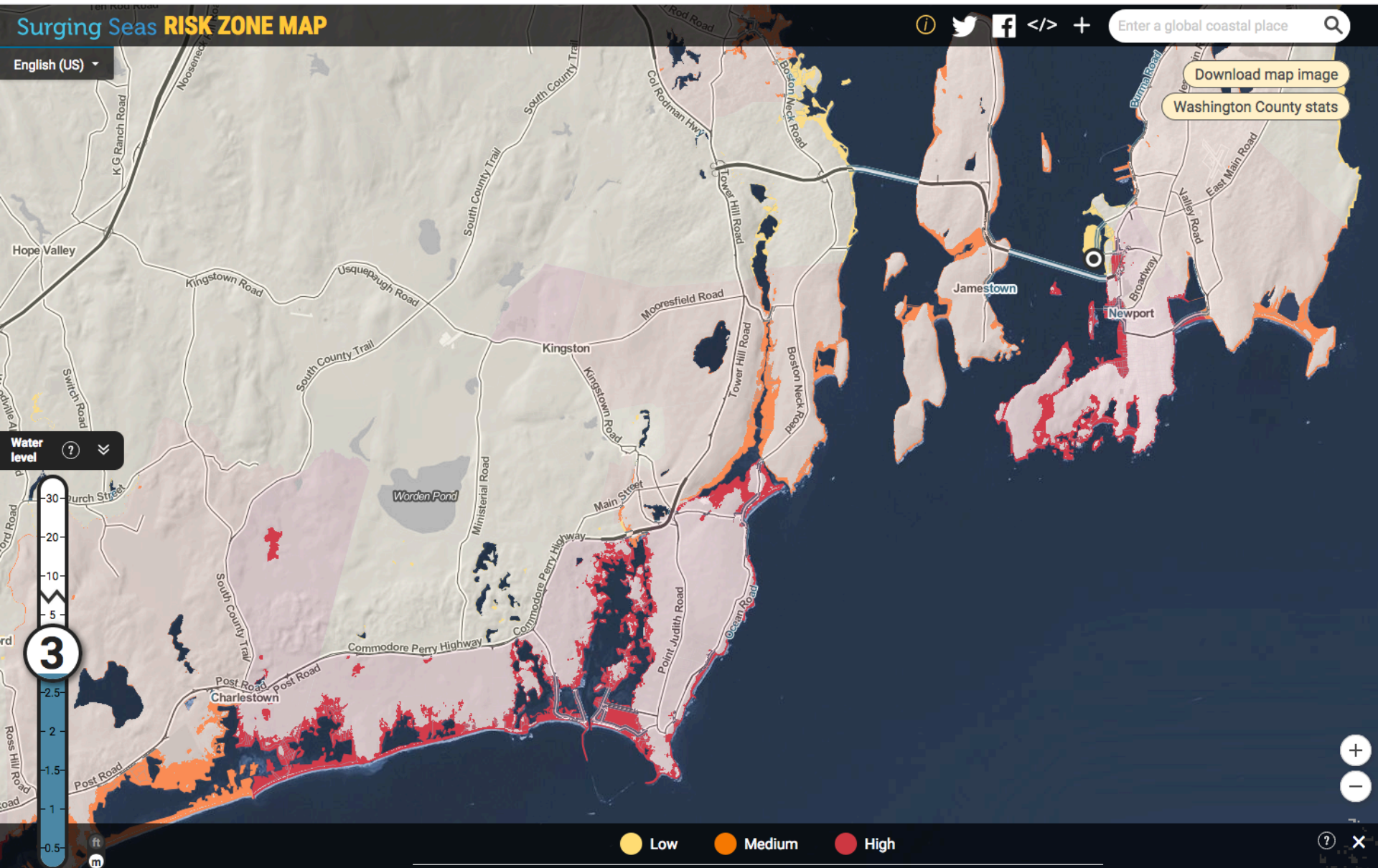
Washington County stats

Water level



Show current coast

Low Medium High



Surging Seas RISK ZONE MAP

English (US)

Enter a global coastal place

Download map image
Washington County stats

Water level



People per square mile: Below 100 100-999 1000-9,999 10,000-99,999 Over 100,000

Vulnerable population exposure: Compare Counties in Rhode Island ZIPs in Washington County

See projections Legend Social vulnerability Population Ethnicity Income Property Landmarks

Elevation data courtesy of NOAA

Surging Seas RISK ZONE MAP

English (US)



Enter a global coastal place



Download map image

Washington County stats

Water level



Show current coast

One dot per person: White Asian Hispanic Black Native American

Ethnic exposure: Compare [Counties in Rhode Island](#) | [ZIPs in Washington County](#)

- See projections
- Legend
- Social vulnerability
- Population
- Ethnicity
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- Property
- Landmarks

Surging Seas RISK ZONE MAP

English (US)



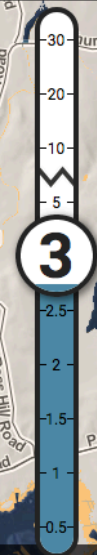
Enter a global coastal place



Download map image

Washington County stats

Water level



Show current coast

Percentile: 80-100% 60-80% 40-60% 20-40% 0-20%

See projections | Legend | Social vulnerability | Population | Ethnicity | Income | Property | Landmarks

Elevation data courtesy of NOAA

Surging Seas RISK ZONE MAP

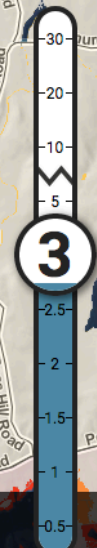
English (US)



Enter a global coastal place

Download map image
Washington County stats

Water level



Show current coast

Price per acre: Below \$100K \$100K-\$999K \$1M-\$10M \$10M-\$100M Over \$100M

Property exposure: Compare Counties in Rhode Island ZIPs in Washington County

See projections Legend Social vulnerability Population Ethnicity Income Property Landmarks

Elevation data courtesy of NOAA

Surging Seas RISK ZONE MAP

English (US)



Enter a global coastal place



Download map image

Plymouth County stats

Water level



Show current coast

Surging Seas RISK ZONE MAP

English (US)

Enter a global coastal place

Download map image
Plymouth County stats

Water level

3

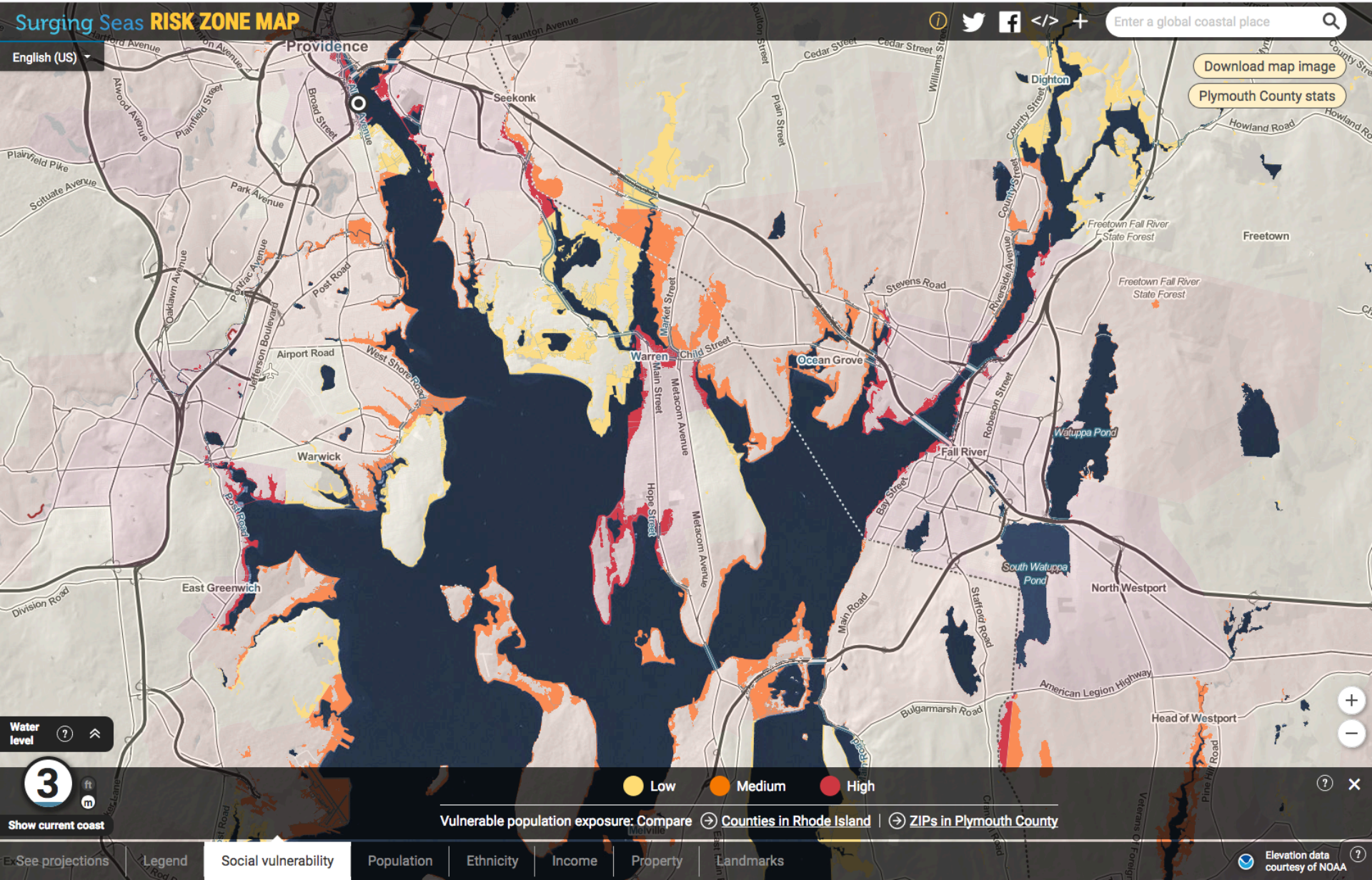
Show current coast

Low Medium High

Vulnerable population exposure: Compare Counties in Rhode Island ZIPs in Plymouth County

See projections Legend Social vulnerability Population Ethnicity Income Property Landmarks

Elevation data courtesy of NOAA



Surging Seas RISK ZONE MAP

English (US)

Enter a global coastal place

Download map image

Plymouth County stats

Water level

3 ft

Show current coast

People per square mile:

Below 100

100-999

1000-9,999

10,000-99,999

Over 100,000

Vulnerable population exposure: Compare

Counties in Rhode Island

ZIPs in Plymouth County

See projections

Legend

Social vulnerability

Population

Ethnicity

Income

Property

Landmarks

Elevation data courtesy of NOAA

Surging Seas RISK ZONE MAP

English (US)

Enter a global coastal place

Download map image
Plymouth County stats

Water level

3 ft

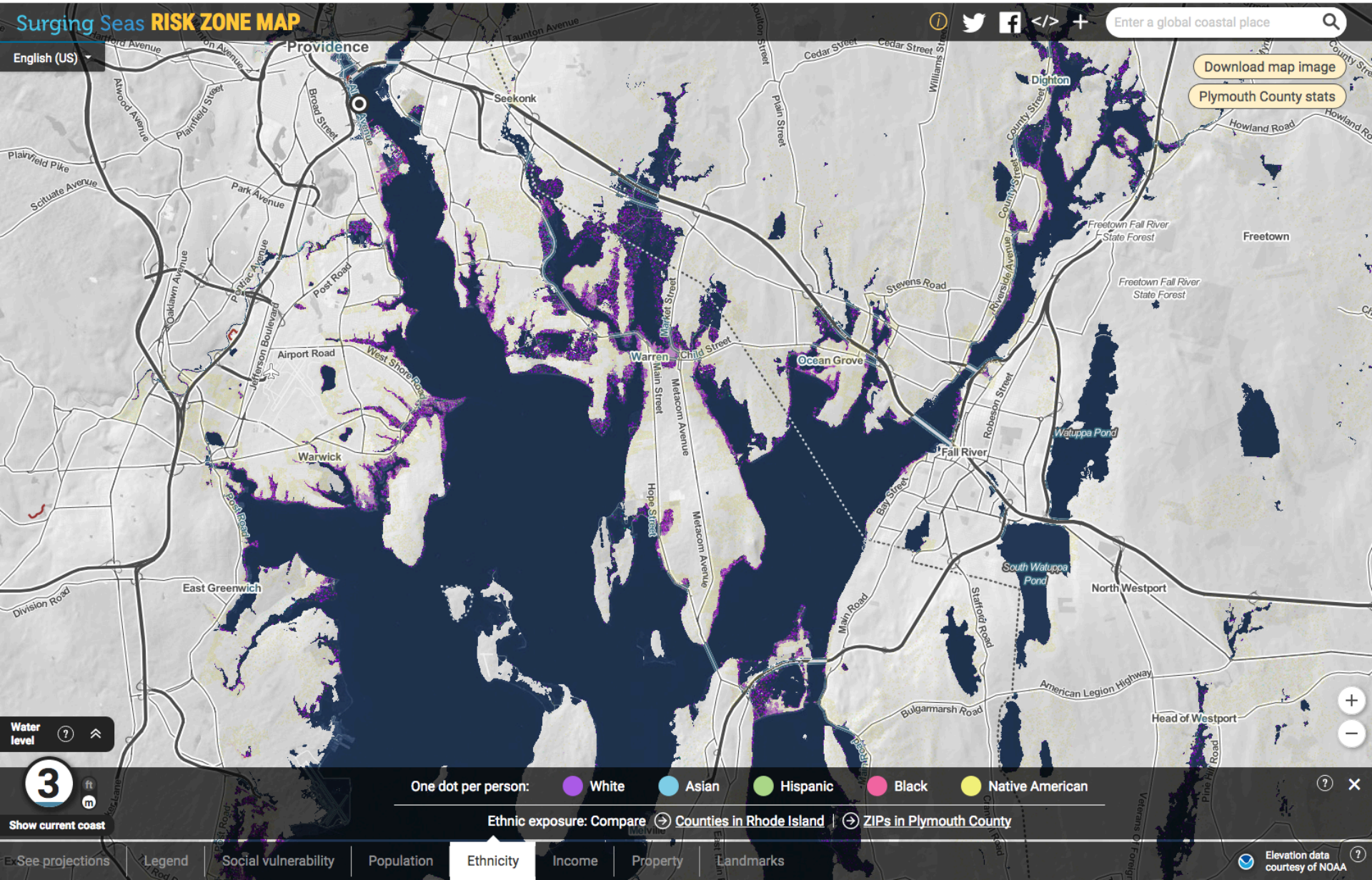
Show current coast

One dot per person: White Asian Hispanic Black Native American

Ethnic exposure: Compare Counties in Rhode Island ZIPs in Plymouth County

See projections Legend Social vulnerability Population Ethnicity Income Property Landmarks

Elevation data courtesy of NOAA



Surging Seas RISK ZONE MAP

English (US)

Enter a global coastal place

Download map image
Plymouth County stats

Water level

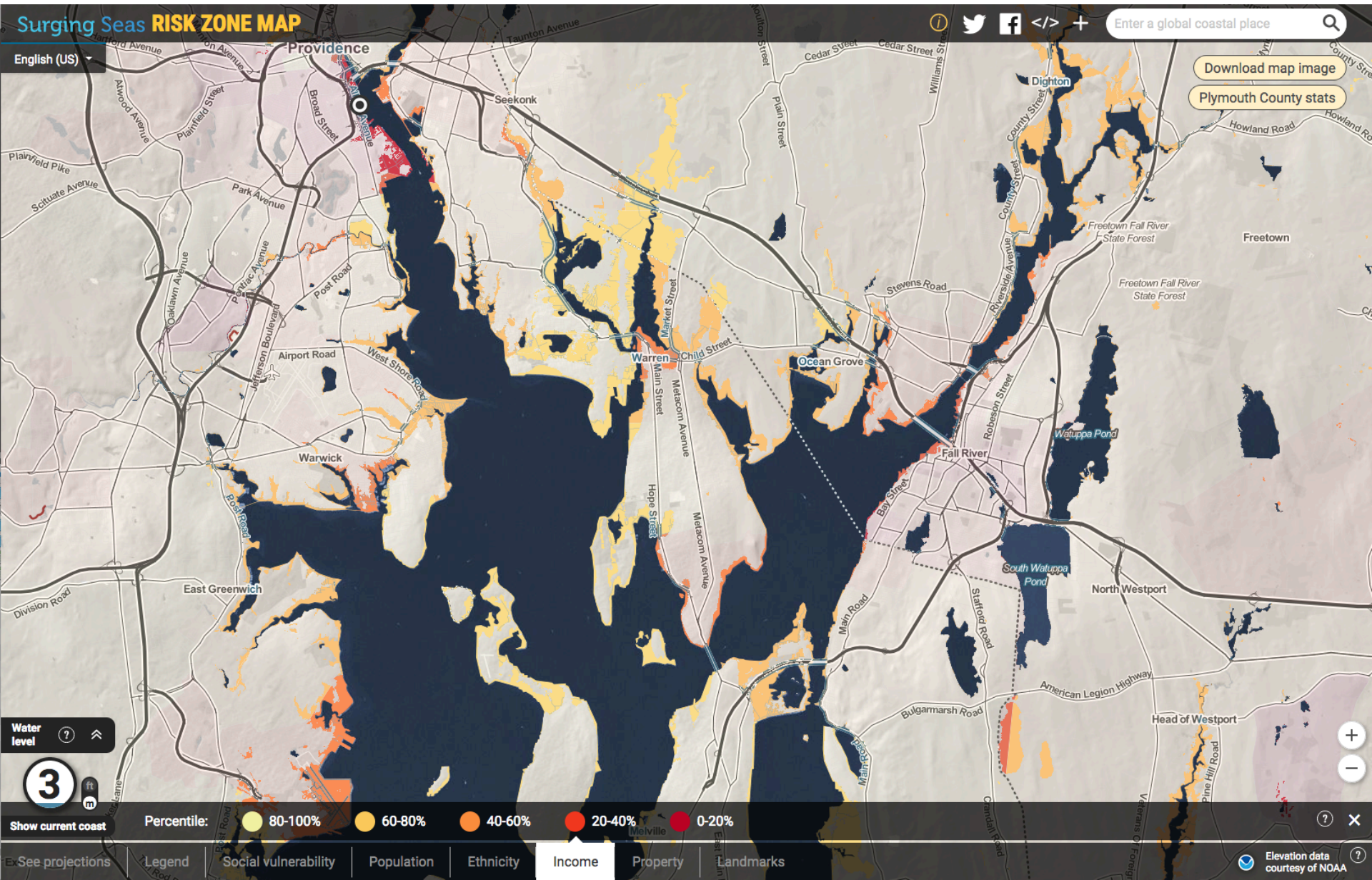
3 ft

Show current coast

Percentile: 80-100% 60-80% 40-60% 20-40% 0-20%

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Surging Seas RISK ZONE MAP

English (US)

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Plymouth County stats

Water level

3 ft

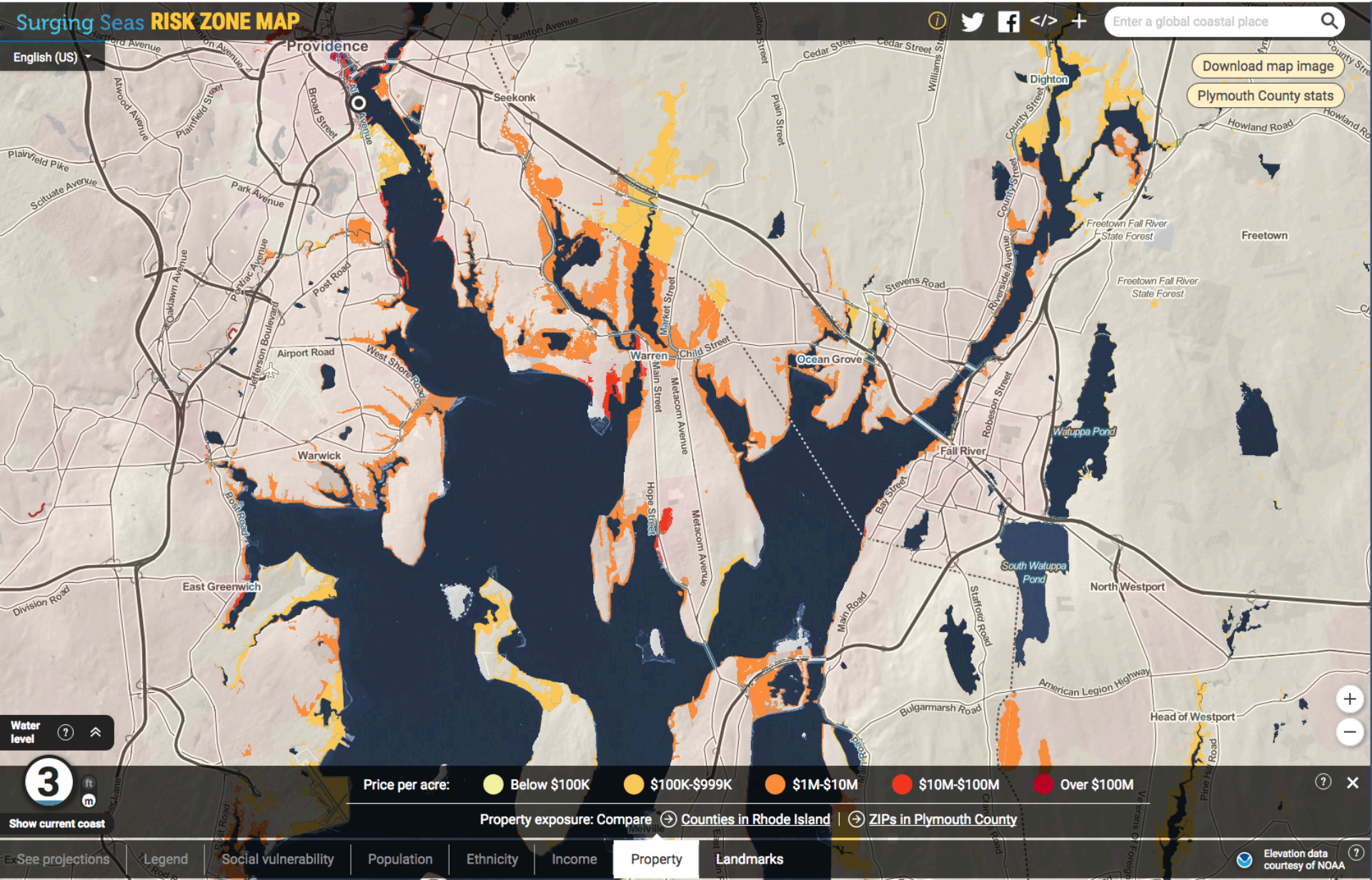
Show current coast

Price per acre: Below \$100K \$100K-\$999K \$1M-\$10M \$10M-\$100M Over \$100M

Property exposure: Compare Counties in Rhode Island ZIPs in Plymouth County

See projections Legend Social vulnerability Population Ethnicity Income Property Landmarks

Elevation data courtesy of NOAA



Focus Activity

- Conceptual examples of sea level change

Sea Level Change

- Examples & Causes
- Classification
 - (local vs global)

Sea Level Change Temporal Variability (i.e., history)

- Geologic – varies by about 300 meters
- Glacial – sea level 120 m lower ~ 20,000 years ago.
- Recent – mostly rising, but variable

Sea Level Change Spatial Variability

- local examples (rising 2-3 mm/yr)
- satellite evidence (overall rising, but quite variable)