

January, 2014

NTHMP

Warning Coordination
Subcommittee Meeting

Agenda

- Introductions
- 2013-Action Item Review
- EAS Activation for Advisories – Update
- TWC Products
- Post-warning survey
- Exercises
- WCS Strategic Plan Tasks
- TWS training
- TWC IT Mod.
- Meteotsunamis
- USCG
- PR/VI Procedures
- New Action Items

Action Item Review

EAS Activation for Advisories

1. EAS Activation for Advisories

2. EAS Activation for Advisories

3. EAS Activation for Advisories

4. EAS Activation for Advisories

5. EAS Activation for Advisories

6. EAS Activation for Advisories

7. EAS Activation for Advisories

8. EAS Activation for Advisories

Tsunami Products

- International and PTWC Domestic Products
- Translating threat to EMOs
- WFO Auto-activation of EAS
- NOAA Social Sci. Recs.
- Complex Coastline Team Recs.
- Spanish Messages
- Forecast Point update

PTWC Product Update

PTWC is pleased to announce the release of our new product line, designed to meet the needs of our customers and provide a more efficient and effective solution.

The new product line includes a range of innovative features and improvements, including enhanced performance, increased durability, and a more user-friendly interface.

We are confident that this new product line will provide a significant improvement in performance and efficiency, and we are excited to see the positive impact it will have on our customers.

We are committed to providing the highest quality products and services, and we are confident that this new product line will be a valuable addition to our portfolio.

We are looking forward to the positive feedback and success of this new product line, and we are committed to continuing to provide the best possible experience for our customers.

We are grateful for the support and feedback of our customers, and we are committed to providing the best possible products and services to meet their needs.

We are excited to see the positive impact this new product line will have on our customers, and we are committed to providing the best possible experience for all of our customers.

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We are grateful for the support and feedback of our customers, and we are committed to providing the best possible products and services to meet their needs.



**National Tsunami Hazard Mitigation Program
Annual Meeting, January 28-31, 2014, Menlo Park, CA**



PTWC International and Domestic Products Update

Charles S. McCreery
Director, Pacific Tsunami Warning Center
January 28, 2014

Upcoming Product Changes

- New Domestic Product for American Samoa
March 2014
- New Domestic Product for Guam and CNMI
August 2014
- Enhanced International Product for the PTWS
October 2014
- Revised Domestic Product for Hawaii
Late-2014
- Enhanced International Products for the CARIBE-EWS
Mid-2015

Why a Domestic Am. Samoa Product?

- American Samoa is currently covered by PTWC's international product for the PTWS, but
- The September 2009 Samoa tsunami disaster demonstrated a need for a special product for American Samoa with more customized information
- The enhanced products for the PTWS coming in October 2014 will no longer provide alert levels, only a forecast of expected tsunami amplitudes

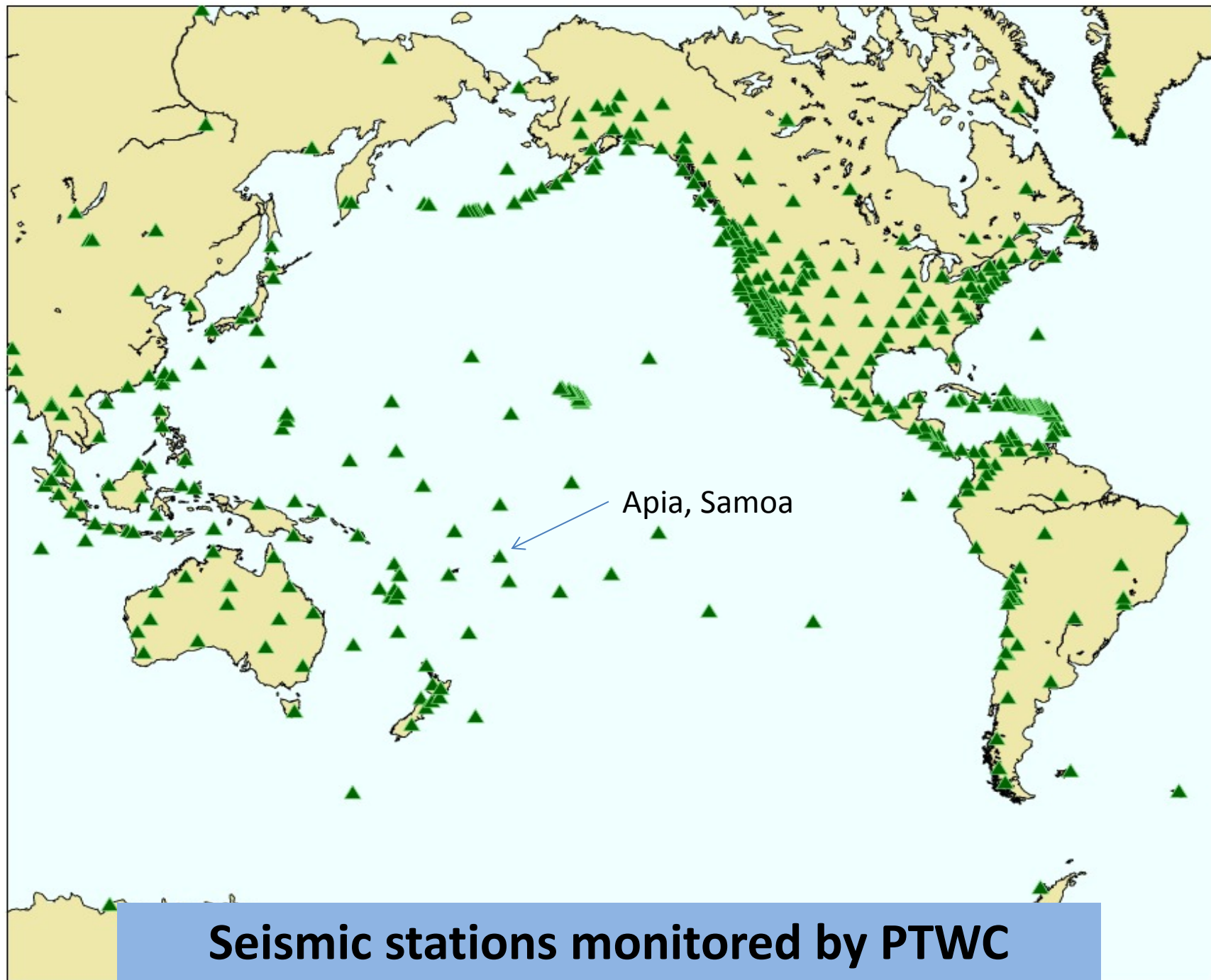
Challenges with an Am. Samoa Product

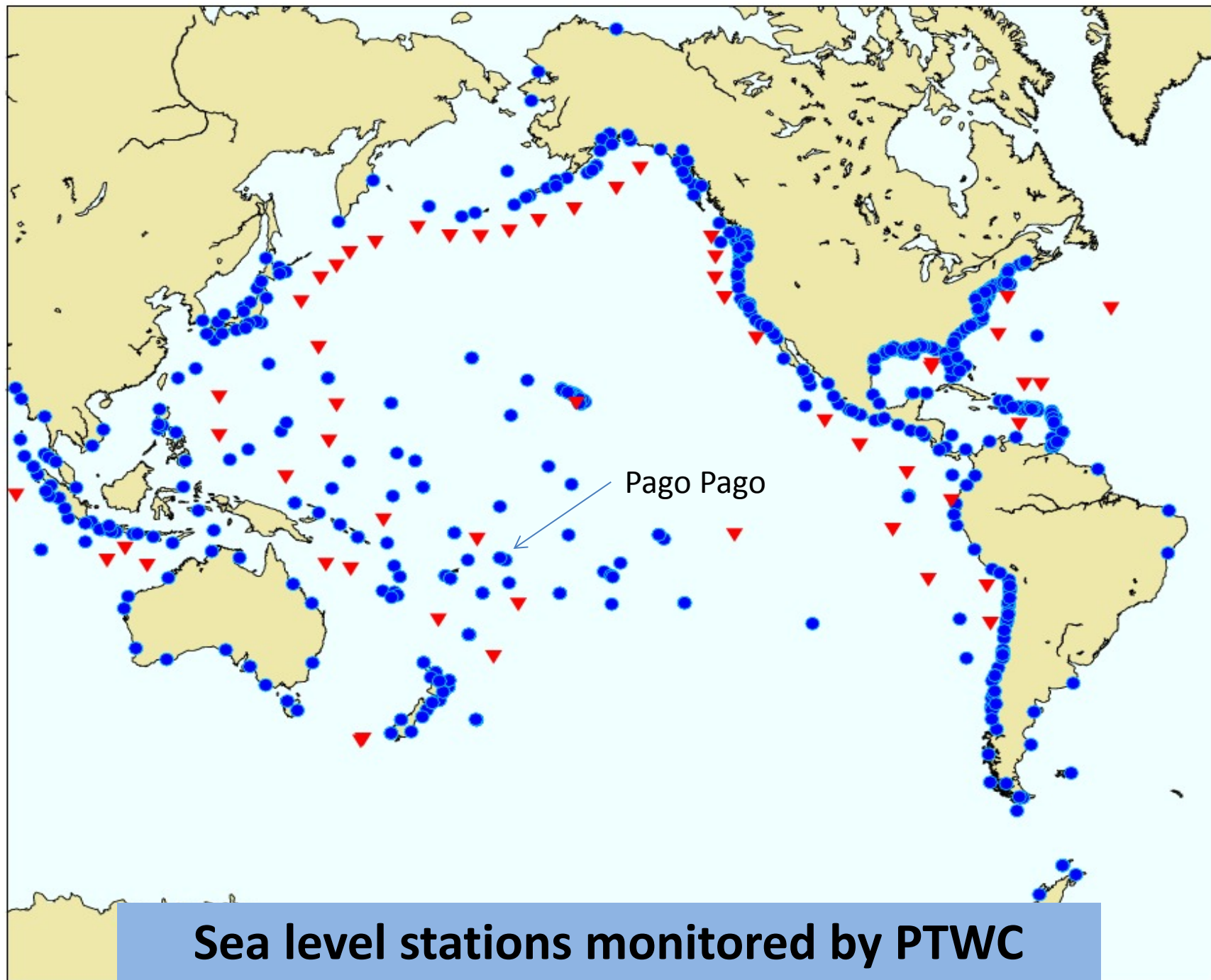
Evaluating the Local Tsunami Threat

- Sparse seismic data – no stations in Am. Samoa
- Sparse sea level network
- Complex local tsunami threat with curving subduction zone – no simple criteria for warning

Evaluating the Distant Tsunami Threat

- Less density of seismic stations in the southern Pacific
- Source zones far from denser continental networks
- Fewer deep-ocean sea level gauges

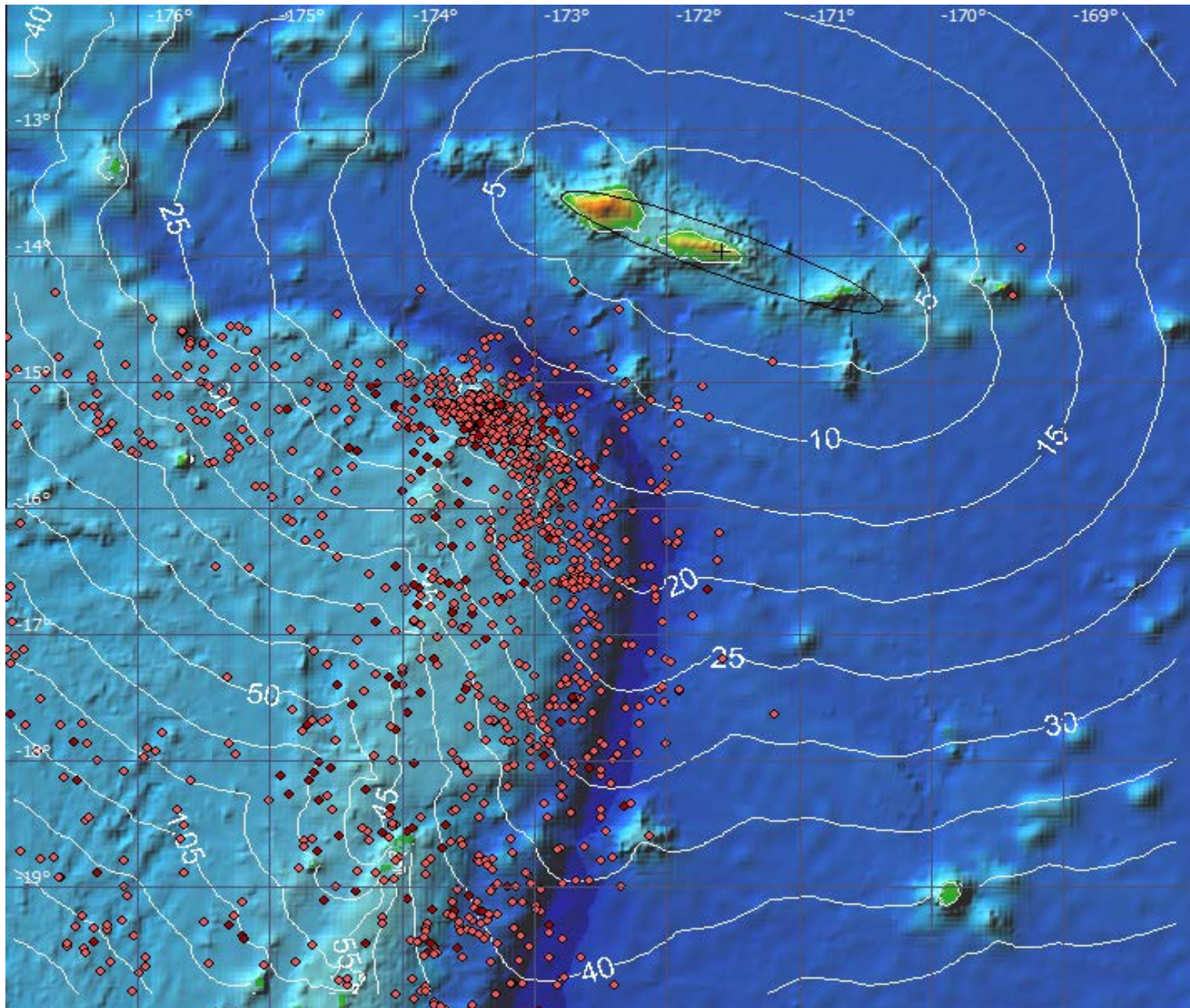




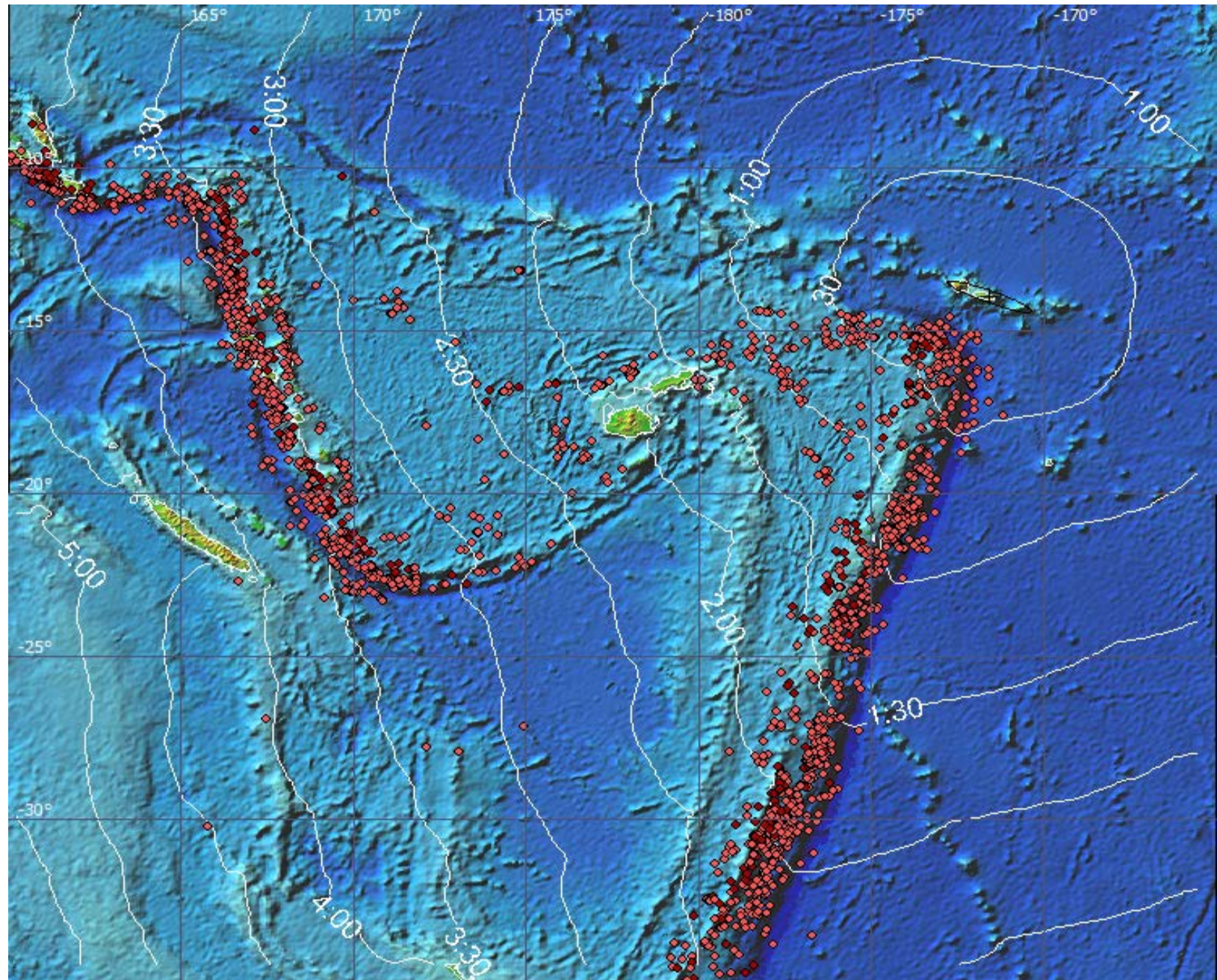
Samoan Tsunami Hazard

- **Local Tsunamis** (10-min lead time, largest waves)
 - Northernmost Tonga Trench
- **Regional Tsunamis** (1-3 hours lead time)
 - Tonga – Fiji – Vanuatu
- **Distant Tsunamis** (several hours lead time but more potential sources)
 - Central America - South America
 - Marianas – Japan – Kuril – Kamchatka
 - Aleutian Islands - Alaska

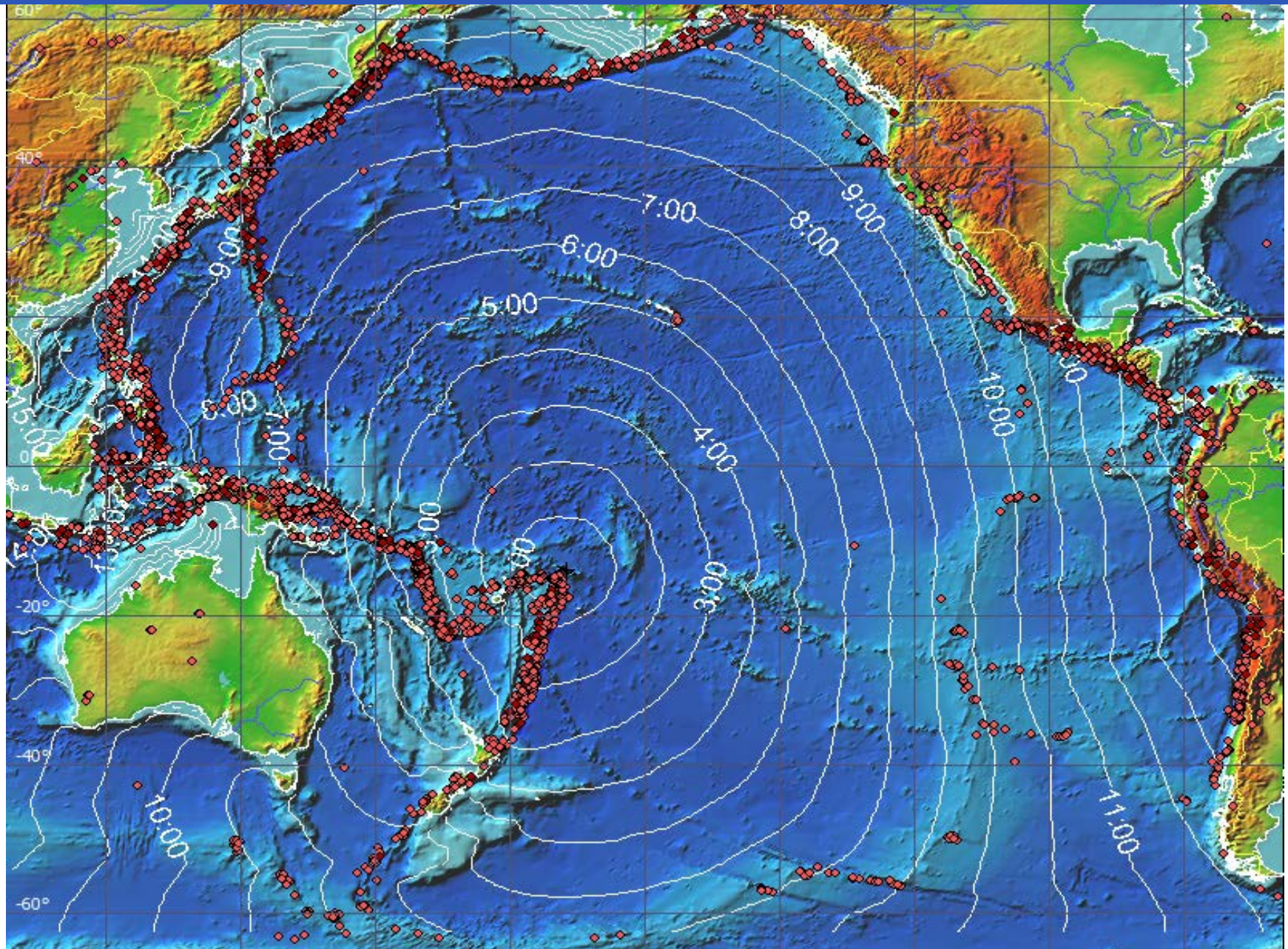
Nearby Seismic Zones and Tsunami Travel Times to Samoa



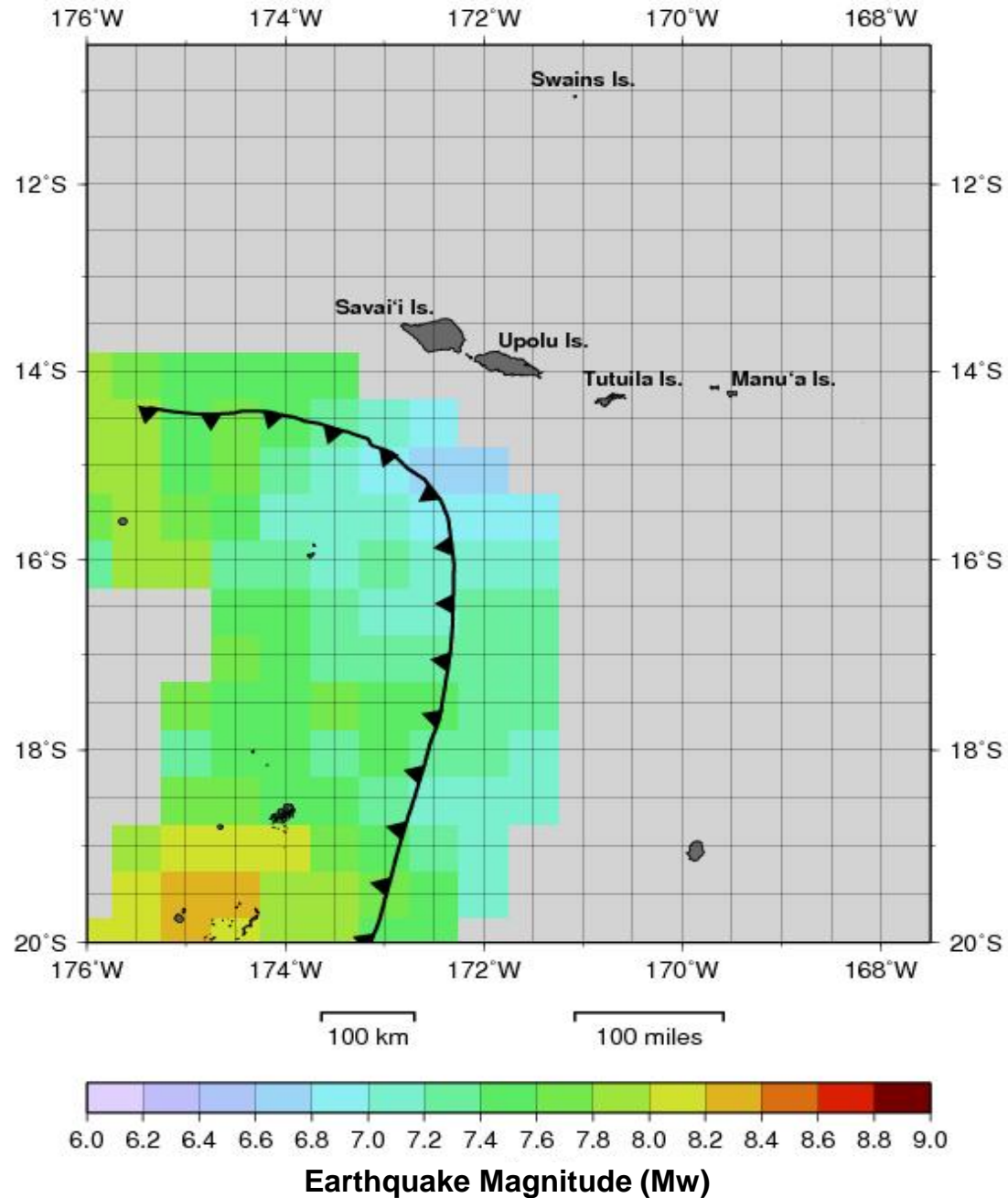
Regional Seismic Zones and Tsunami Travel Times to Samoa



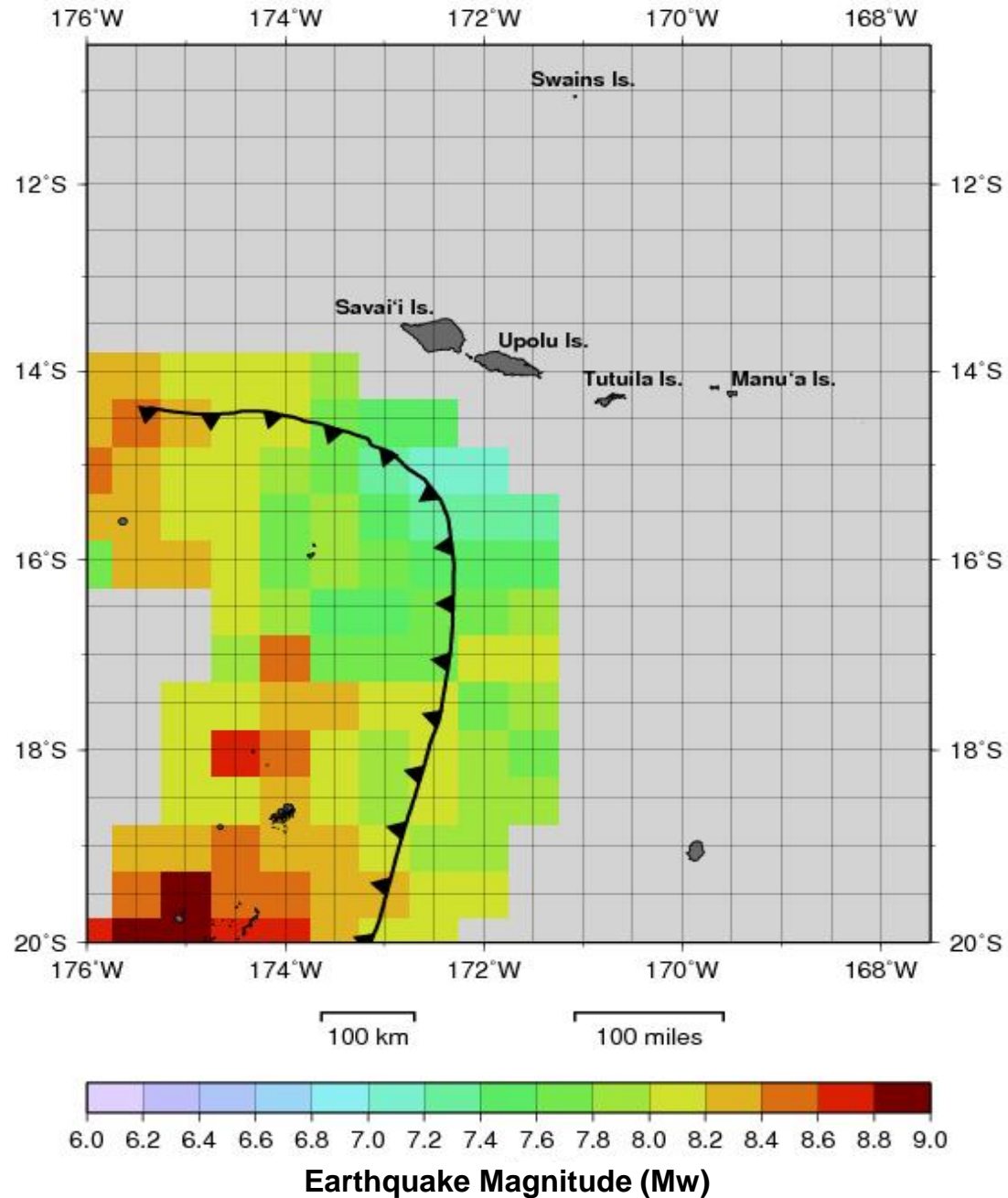
Pacific Seismic Zones and Tsunami Travel Times to Samoa



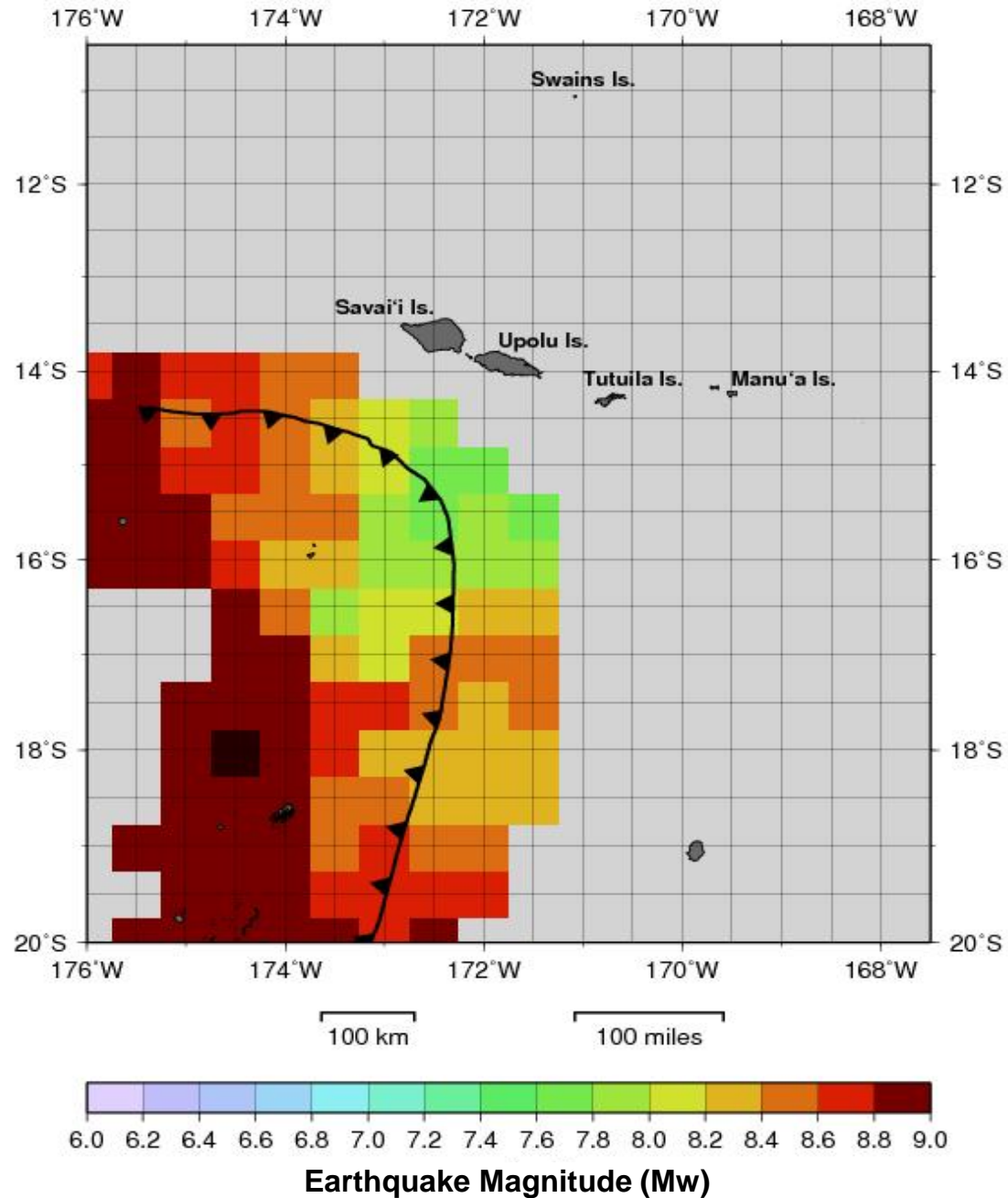
Earthquake Magnitude (Mw) Necessary to Produce A Tsunami Amplitude $\geq 0.3\text{m}$ Anywhere in American Samoa



Earthquake Magnitude (Mw) Necessary to Produce A Tsunami Amplitude $\geq 1.0\text{m}$ Anywhere in American Samoa



Earthquake Magnitude (Mw) Necessary to Produce A Tsunami Amplitude $\geq 3.0\text{m}$ Anywhere in American Samoa



Benefits of a Domestic Product

- 4 Levels of Alert
 - **Information** – No Threat
 - **Watch** – Potential Threat
 - **Advisory** – Marine Threat
 - **Warning** – Inundation Threat
- Information on smaller non-threat “felt” events
- Expected Arrival Times at many more locations around American Samoa
- Tailored Instructions for the Public
- Potential to Subdivide Threat to Islands / Coasts
- Easier to Accommodate Changes

Text Product Structure / Content

- Based upon Recommendations of NWS Tsunami Products Tiger Team and Social Science Study
- Aligned with NTWC Products
- Section Headers with Bulleted Content
 - AUDIENCE
 - EVALUATION
 - IMPACTS
 - RECOMMENDED ACTIONS
 - FORECASTS
 - OBSERVATIONS
 - PRELIMINARY EARTHQUAKE PARAMETERS
 - ADDITIONAL INFORMATION AND NEXT UPDATE

Domestic Product for Guam/CNMI

- Expected Implementation in August 2014
- Similar Threats – Local, Regional, Distant
- Similar Criteria and Procedures
- Similar Format and Content

PTWC Enhanced International Product for the PTWS

- Implementation in 4th quarter of 2014
- Advice provided to countries of the UNESCO/IOC Pacific Tsunami Warning and Mitigation System
- Covers the Pacific Ocean and Marginal Seas
- Forecast Amplitudes replace Watch/Warning Alert Levels
- Includes Text and Graphical Products
 - Standard WMO Text Product
 - 3 Maps
 - Table of forecast statistics
 - Kml file

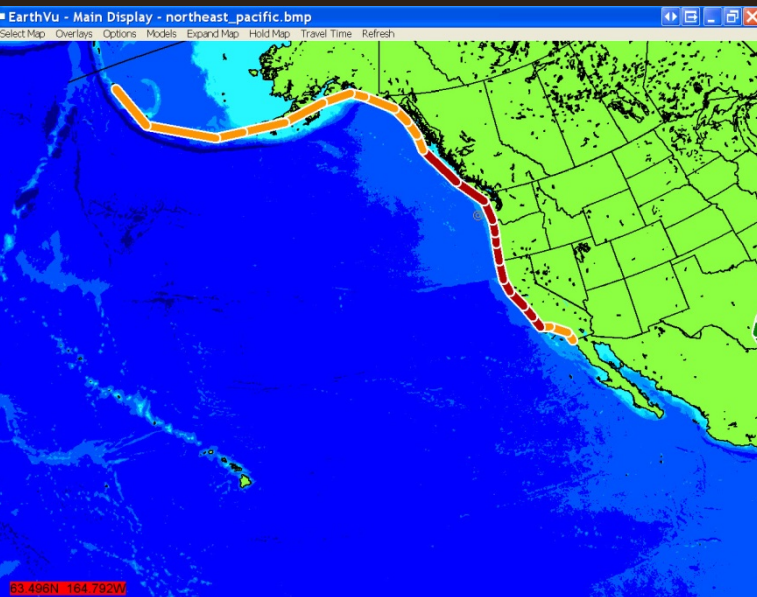


PTWC/ITIC American Samoa Outreach Visit January 23-26, 2012

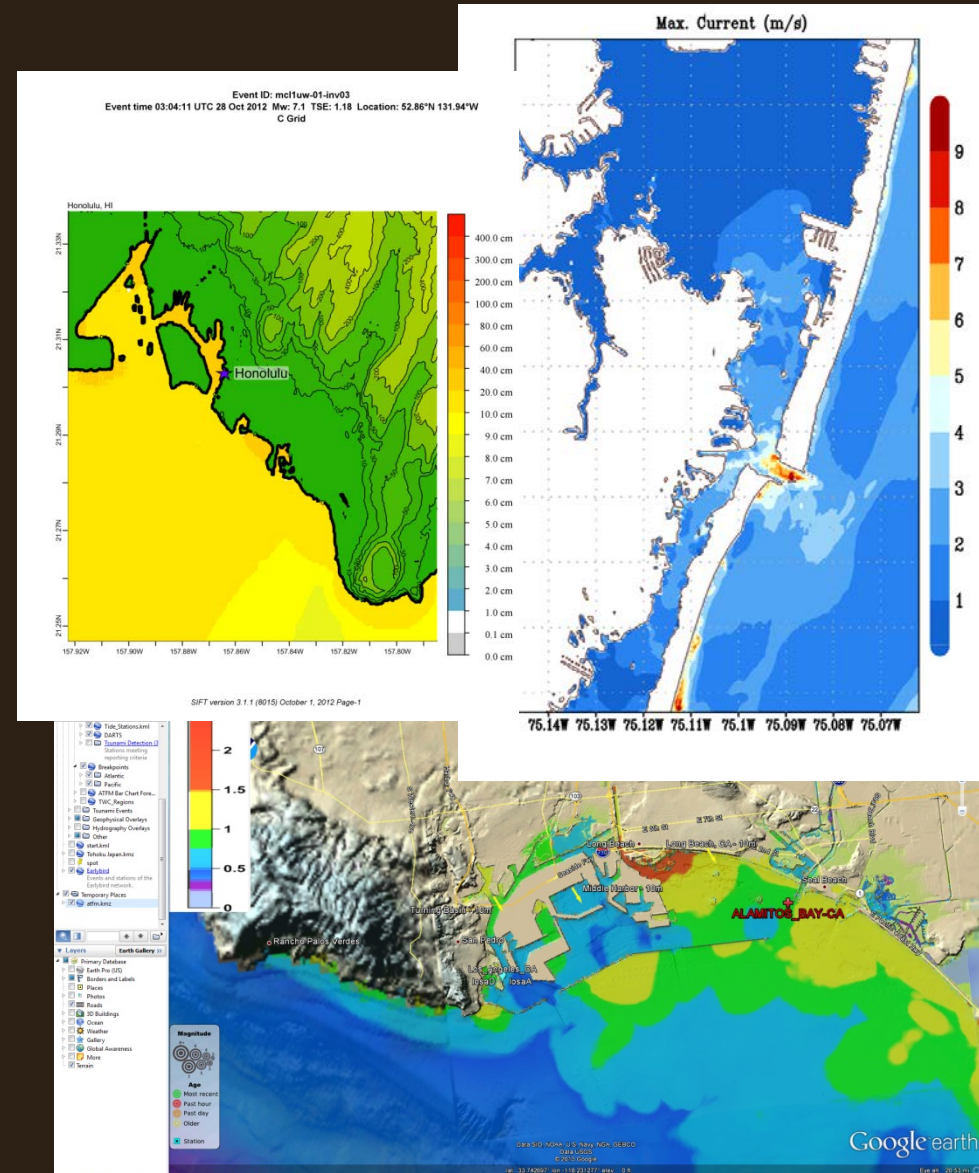


Thank You

Translating Threat to EMOs

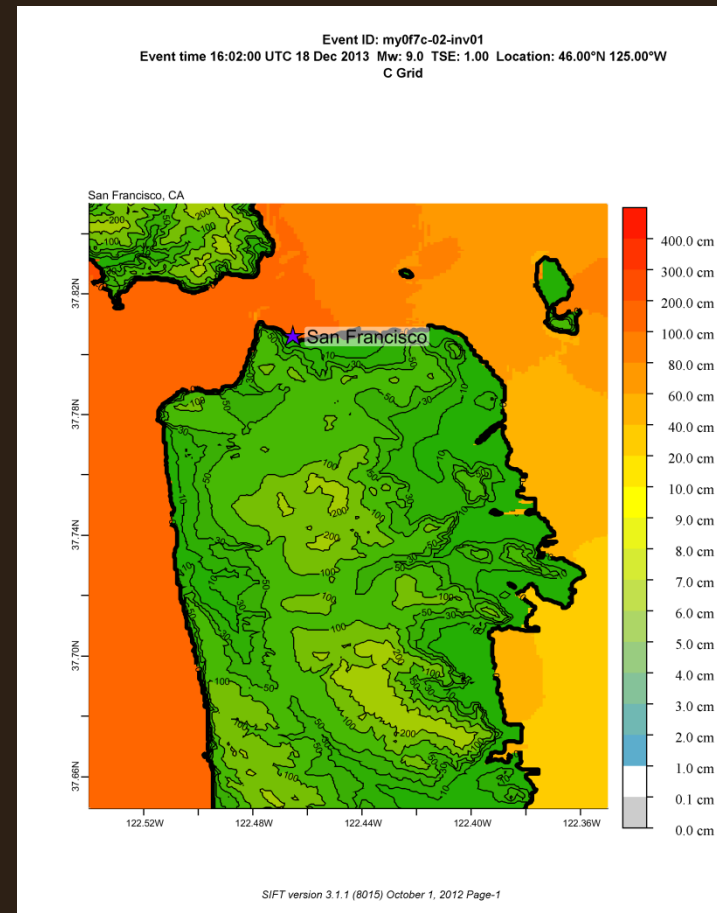
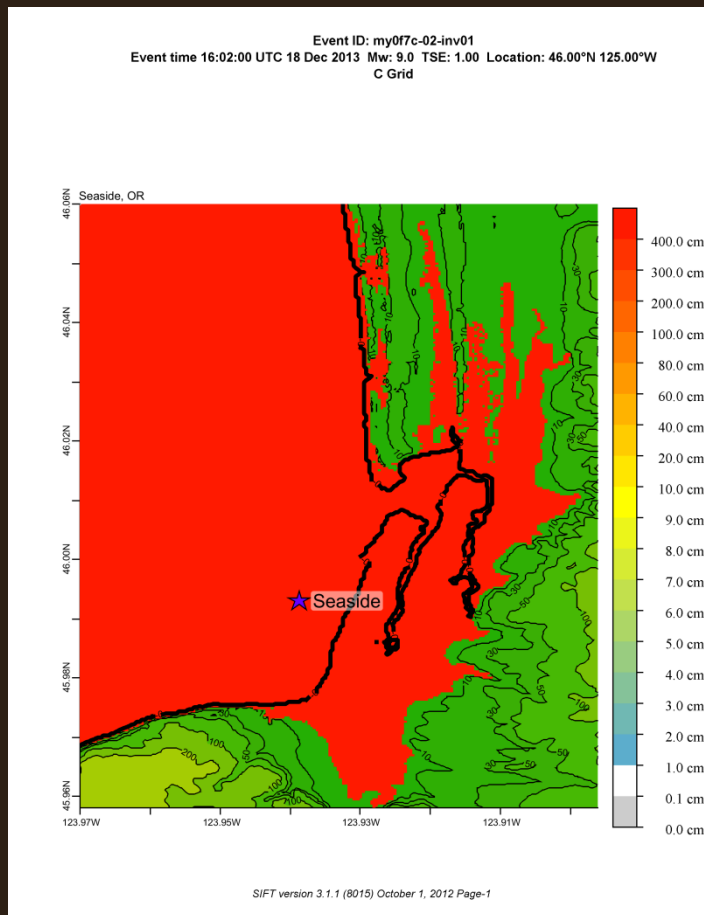


TO



Translating Threat to EMOs

- Should these two cases have the same alert level?



Translating Threat to EMOs

- Need way to better translate threat to EMOs
 - New level of alert?
 - $<.3\text{m}$ – No danger
 - $.3\text{m}-1\text{m}$ – Advisory
 - $1\text{m}-3\text{m}$ – Warning
 - $>3\text{m}$ – Major Warning???
 - No Alert level?
- Other Ideas?
 - Refine impact response
 - Refine spatial response

Translating Threat to EMOs

- Action:
 - Related to Complex Coast Team mission
 - Dependent on advances through super computer center
 - Assuming the products shown today are available a few years down the line, how do we want alerts delivered?
 - Task Team???

NWR/EAS Activation at WFOs

NOAA Social Science Study

- Recommendations to improve TWC products

Recommendations for Tsunami Warning Center Message Products

Chris E. Gregg

East Tennessee State University, Johnson City, TN USA

Annual NTHMP Meeting, Warning Coordination Subcommittee Meeting,
USGS Western Region, Menlo Park, CA
January 29, 2013

Funding: NWS Award: NA10NWS4670015

NWS Project Goal & Objectives

Goal:

- Use social science to improve TWC message products

Objectives:

- evaluate* current warning products using focus group input (2011)
- develop* a tsunami **Warning Message Metric (WMM)** from the warning systems literature (2012)
- revise* prototype messages (2012-2014)

Current Work 1-2

Current Work:

- working with NTWC & PTWC to agree on message:
 - format, content & specificity
- domestic messages only

Current Work 2-2

Synthesizing messages across TWCs involves:

1. agreement on standard format/structure for
 - Section Headers
 - Forecasts & Observations of Tsunami Activity
2. Content and specificity of:
 - Impacts and Recommended Actions
 - Additional information and next updates
3. Tailored versus regional territorial products
 - Tailoring is good (adds to personalization and belief)
 - but still requires consistency
 - e.g., for Hawaii: Rec Actions = refer to the Hawaii telephone book for emergency information...
4. Evaluation of text only messages as appropriate for text to speech
5. Consistency in growing Translations

Current Message Prototype Structure

Description	New Message Prototype Headers
1. Standard	WMO Header
	Audience and Message Number
	Source
	Time/Date stamp
	message header ...Tsunami Warning Now in Effect...
2. Standard	Audience
3. Standard (BLUF: <i>Bottom Line Up Front</i>)	Update *
	Evaluation
4. Standard, but specific	Impacts
	Recommended Actions
5. Forecasted *	Forecasts of Tsunami Activity
6. Observed **	Observations of Tsunami Activity
	Preliminary *** Earthquake Parameters
7. Standard	Additional Information and Next Update

* Updates and “Observed” only for 2nd and later messages

** provide forecast arrival times in Message Number 1?

*** when does it cease to be Preliminary? Add language about uncertainty, esp. M >7.9?

Some Current Specific Changes 1-3

- Clearly distinguished differences in Impacts & Recommended Actions for alert areas:
 1. Tsunami Advisory Areas
 2. Tsunami Warning Areas
 3. Both Tsunami Warning and Tsunami Advisory Areas
- Need to consider for Watch and Both Watch and Advisory Areas?
 - e.g., PTWC language for Watch area: “prepare in case upgraded to Advisory”

Some Current Specific Changes 2-3

- Reporting of “Forecasted” and “Observed” wave heights (content & format)
 1. First message(s).....*Forecasted* only because no *Observations* available
 2. Middle messages.....Forecasted and Observed (?)
 3. Last message.....Observed only?
- for 2 & 3, specify reason(s) why Forecasted and Observed Heights may be different.
 - e.g., the locations may be different
- Report Forecasts of tsunami Activity as:
 1. a range 2-10 ft
 2. rather than: 6 ft (+- 4 ft)
 3. ft and m?

Some Current Specific Changes- 3-3

- Evaluation:
 - THE FOLLOWING WARNING/ADVISORY AREAS ARE IDENTIFIED BECAUSE AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 7.7 OCCURRED NEAR SOUTHERN CALIFORNIA AT 0903 PST ON FEBRUARY 03 2013.
- Observations of Tsunami Activity
 - THE PRESENCE OF A TSUNAMI IS BASED ON THE FOLLOWING OBSERVATIONS OF TSUNAMI WAVES ?
 - Or stronger: WE KNOW A TSUNAMI HAS OCCURRED BASED UPON THE FOLLOWING OBSERVATIONS OF TSUNAMI ACTIVITY
 - Must balance this language in time with main stream media and informal reports of tsunami (video and photo, blogs...)
- Additional Information and Next Update :
 - BE ALERT TO AND FOLLOW INSTRUCTIONS FROM YOUR LOCAL EMERGENCY OFFICIALS BECAUSE THEY MAY HAVE MORE DETAILED OR SPECIFIC INFORMATION FOR YOUR LOCATION.
 - Added language about

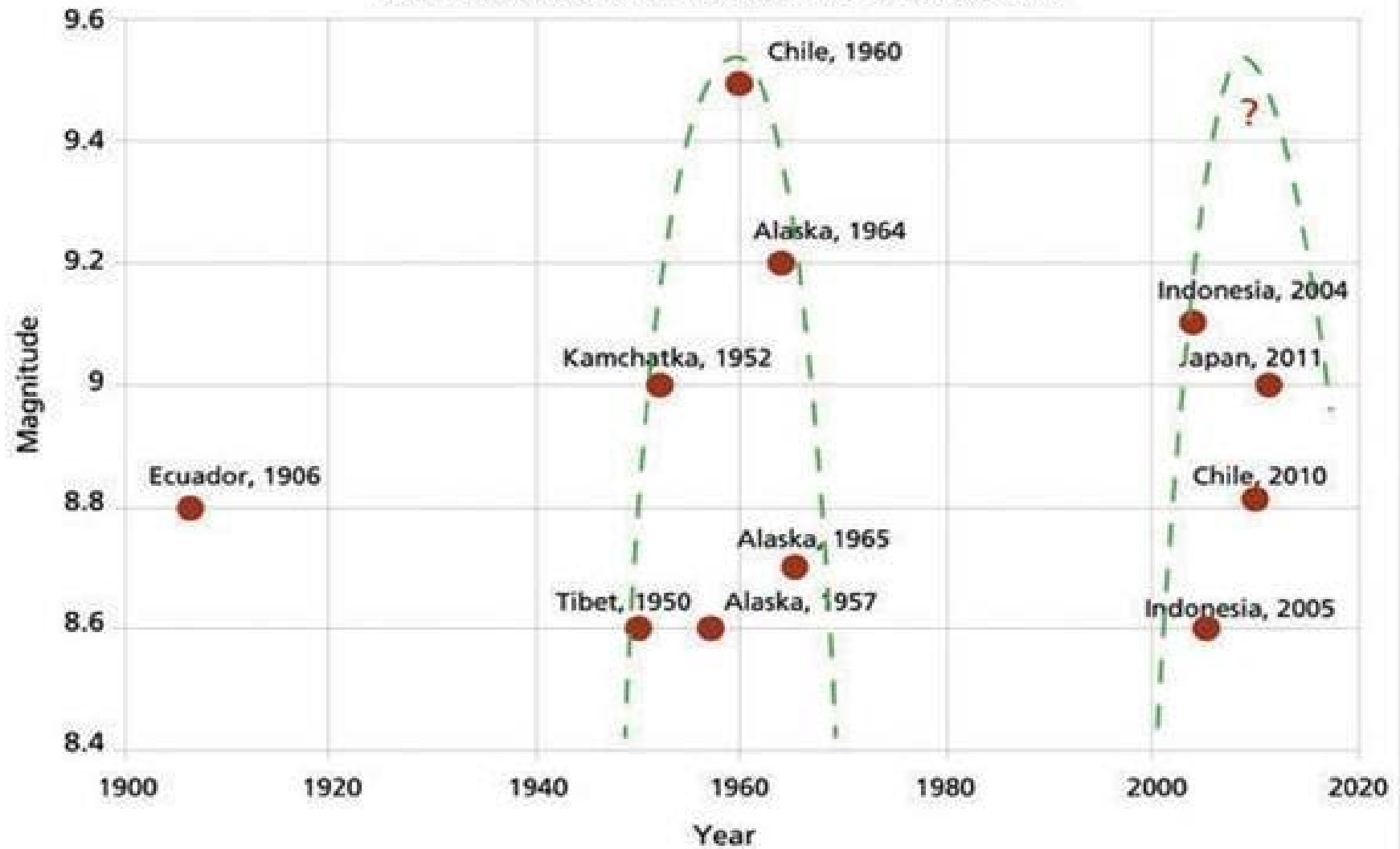
Complex coast team update

The coastline is complex....

John Schelling (Washington EM), Paul Whitmore (NTWC), cindi preller (TPM AR), Erv Petty (Alaska EM), Sam Albanese (WCM Anchorage), Joel Curtis (WCM Juneau), Teron Moore (BC), Anne McCarthy (BC weather), Ted Beuhner (WCM Seattle)

outliers: Tyree Wilde (WCM Portland), Althea Rizzo (Oregon EM), Jeff Lorens (WR), Kevin Miller (CA EM)

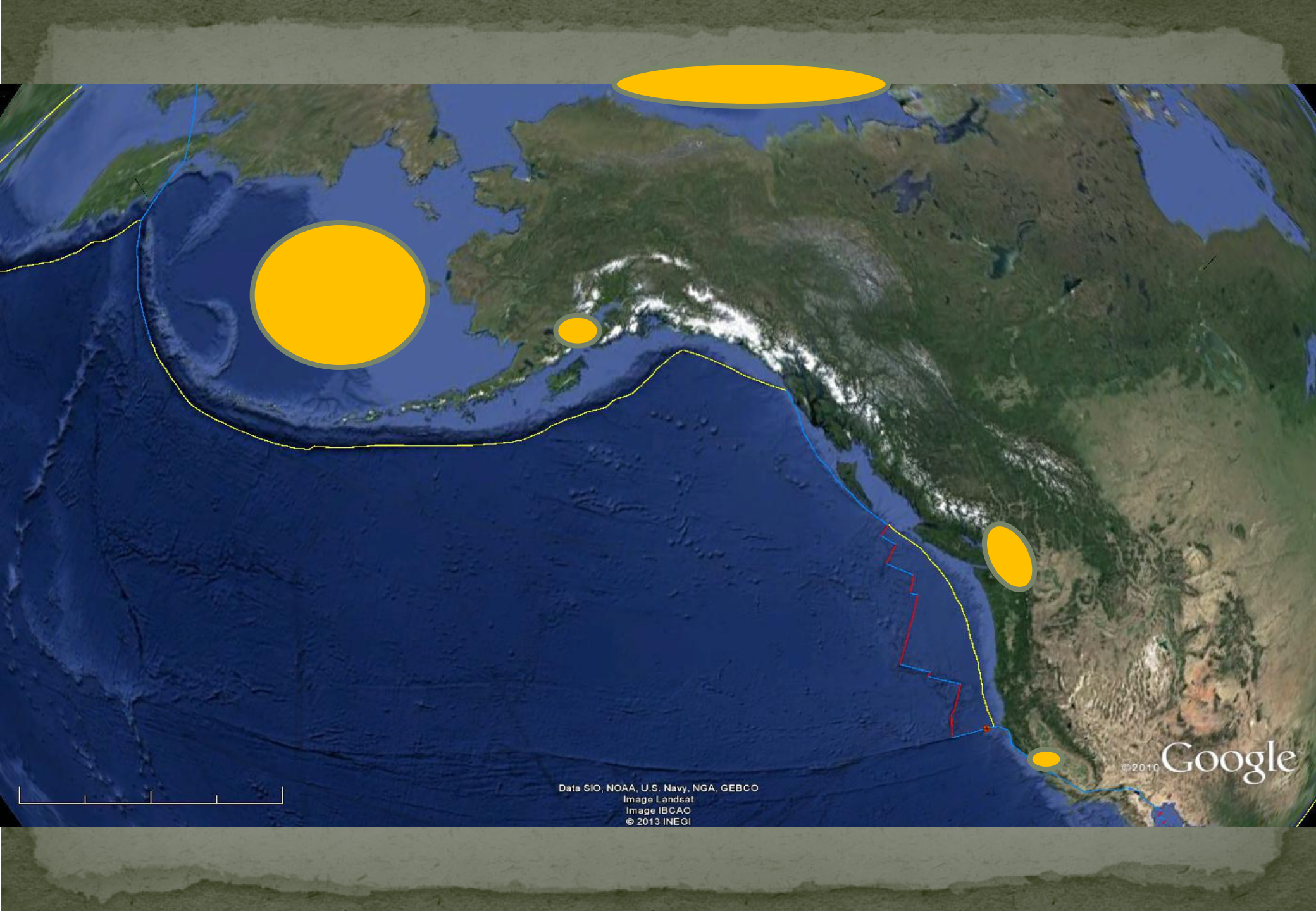
The World's Largest Earthquakes Since 1900 (≥ 8.6 Mw)



Source: Bufe, C.G., and D.M. Perkins (2005). "Evidence for a Global Seismic-Moment Release Sequence", *Bulletin of the Seismological Society of America*, Vol. 95, pp. 833-843.

Which Washington Coast?





Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat
Image IBCAO
© 2013 INEGI

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THIS MESSAGE IS UPDATED WITH NEW OBSERVATIONS.

...THE TSUNAMI WARNING REMAINS IN EFFECT...

...THE TSUNAMI ADVISORY REMAINS IN EFFECT...

WARNINGS/ADVISORIES/WATCHES

TSUNAMI WARNING IN EFFECT FOR...

- * ALEUTIAN ISLANDS - ATTU TO NIKOLSKI INCLUDING PRIBILOF ISLANDS.
- * BRITISH COLUMBIA - OUTER WEST COAST OF VANCOUVER ISLAND.
- * WASHINGTON - OUTER COAST FROM NEAY BAY TO THE OREGON/WASHINGTON BORDER.
- * OREGON - OREGON/WASHINGTON BORDER TO THE CALIFORNIA OREGON BORDER.
- * CALIFORNIA - THE CALIFORNIA/OREGON BORDER TO SAN ONOFRE STATE BEACH/WHICH IS 60 MILES SE OF L.A./.

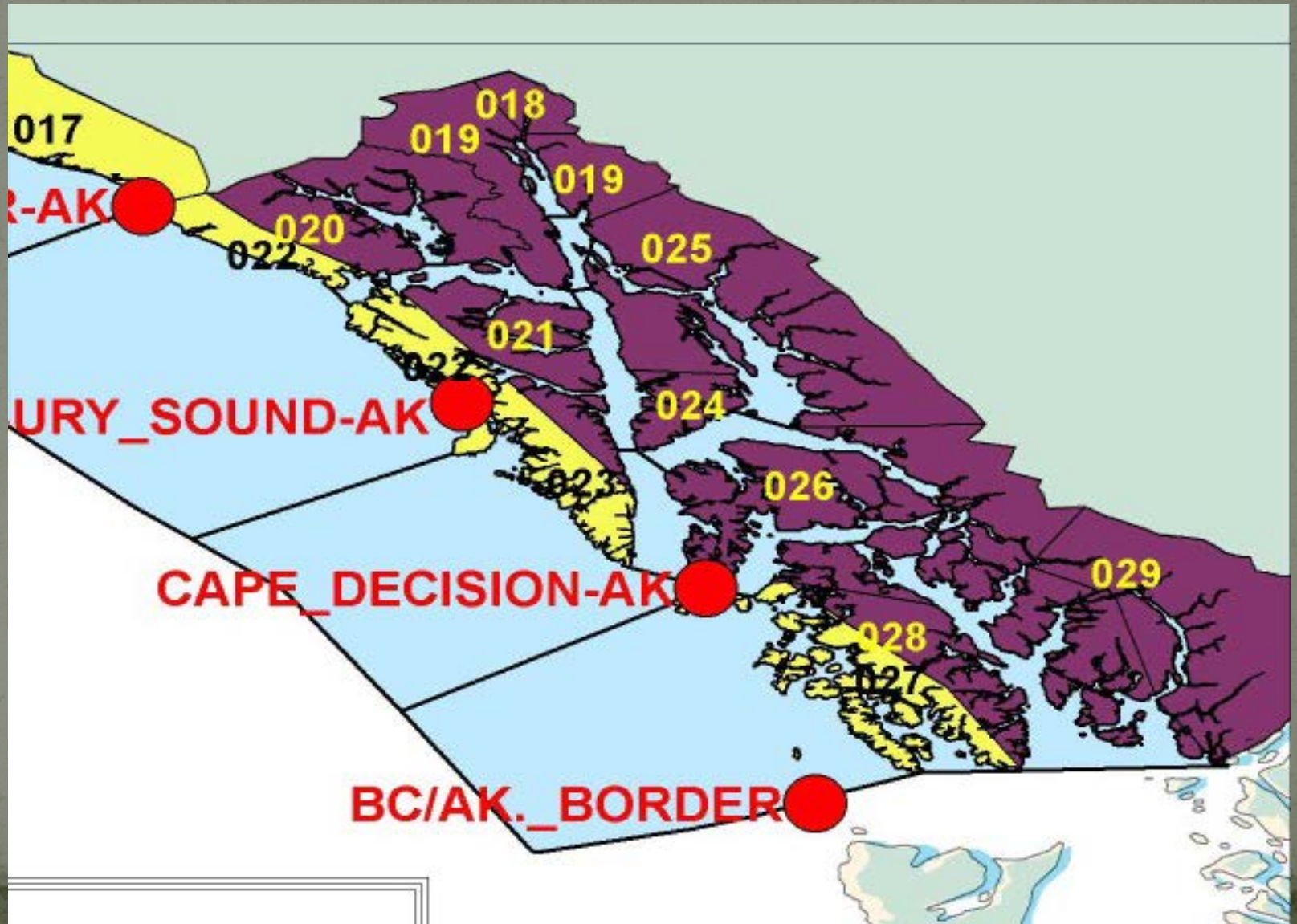
TSUNAMI ADVISORY IN EFFECT FOR...

- * ALEUTIAN ISLANDS - NIKOLSKI TO UNIMAK PASS /WHICH IS 80 MILES NE OF DUTCH HARBOR/.
- * SOUTH ALASKA AND ALASKA PENINSULA - PACIFIC COASTS FROM UNIMAK PASS /WHICH IS 80 MILES NE OF DUTCH HARBOR/ TO CAPE SUCLKING /WHICH IS 75 MILES SE OF CORDOVA/ INCLUDING COOK INLET.
- * SOUTHEAST ALASKA - OUTER COASTS FROM CAPE SUCKLING /WHICH IS 75 MILES SE OF CORDOVA/ TO THE ALASKA/BRITISH COLUMBIA BORDER.
- * BRITISH COLUMBIA - NORTH COAST AND HAIDA GWAII... CENTRAL COAST AND NORTHEAST VANCOUVER ISLAND COAST... AND JUAN DE FUCA STRAIT.
- * WASHINGTON - THE JUAN DE FUCA STRAIT AND COLUMBIA RIVER ESTUARY.
- * OREGON - COLUMBIA RIVER ESTUARY.
- * CALIFORNIA - SAN ONOFRE STATE BEACH/WHICH IS 60 MILES SE OF L.A./ TO THE MEXICO/CALIFORNIA BORDER AND SAN FRANCISCO BAY.
- * FOR OTHER US AND CANADIAN PACIFIC COASTS IN NORTH AMERICA - THIS IS FOR INFORMATION ONLY.

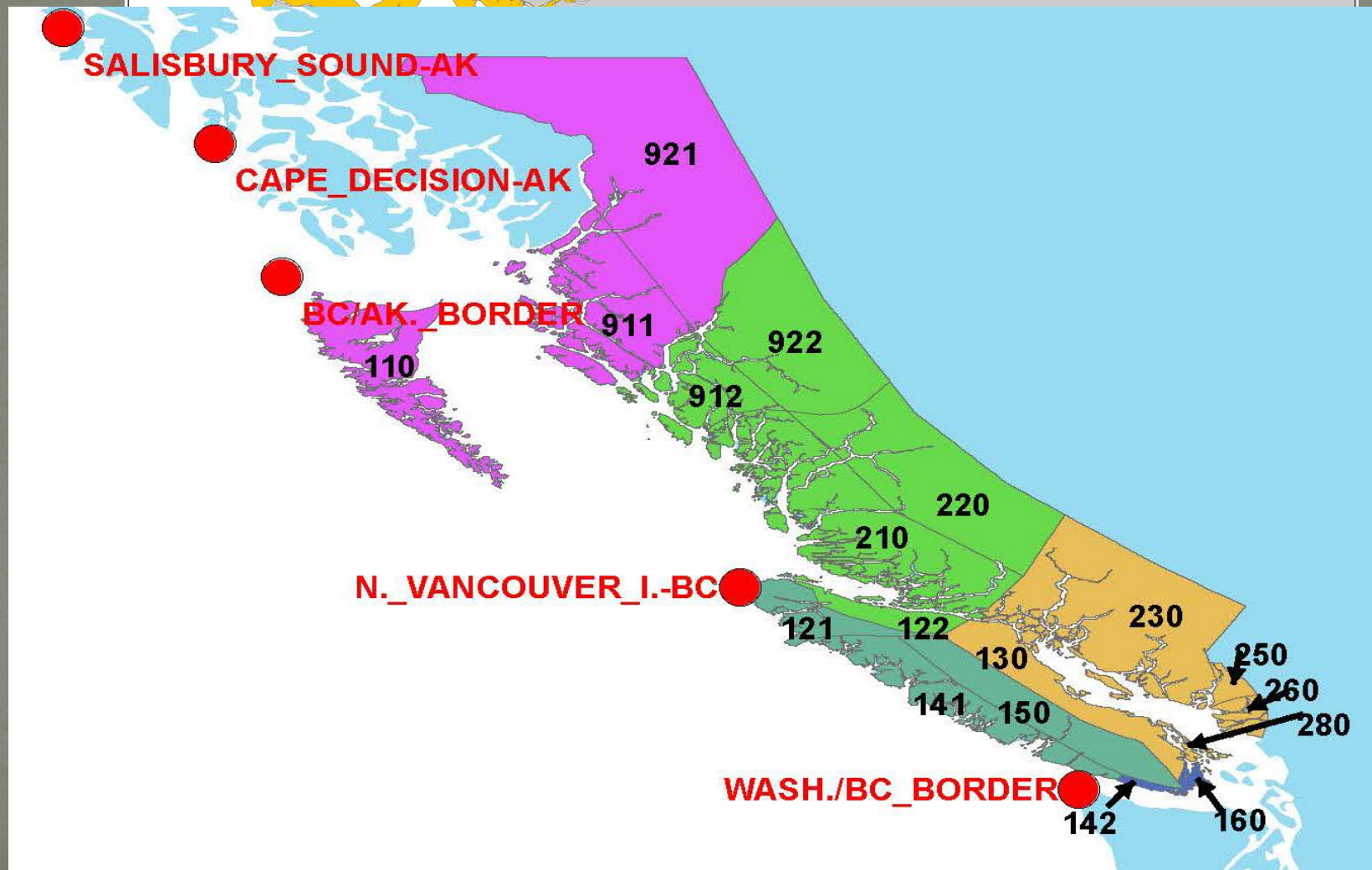
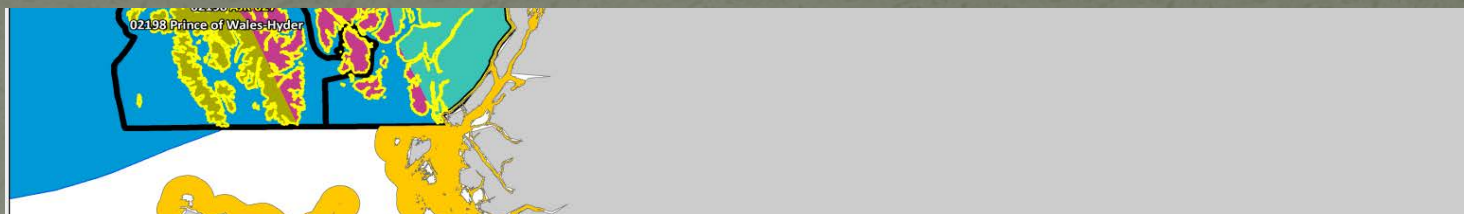
IMPACTS FOR TSUNAMI WARNING AREAS

-
- * WIDESPREAD DANGEROUS COASTAL FLOODING ACCOMPANIED BY POWERFUL

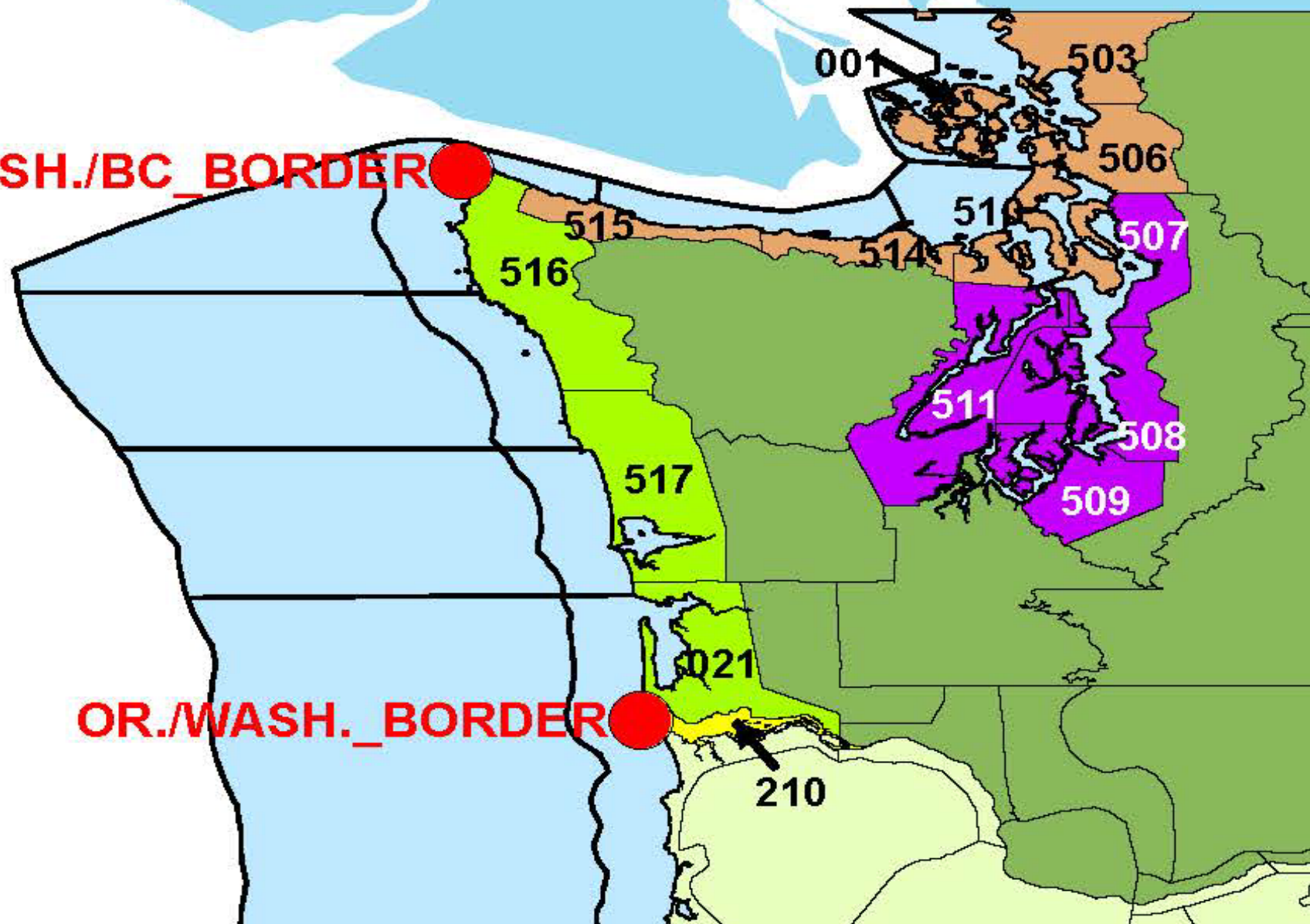
southeast alaska



bc



WASH./BC_BORDER



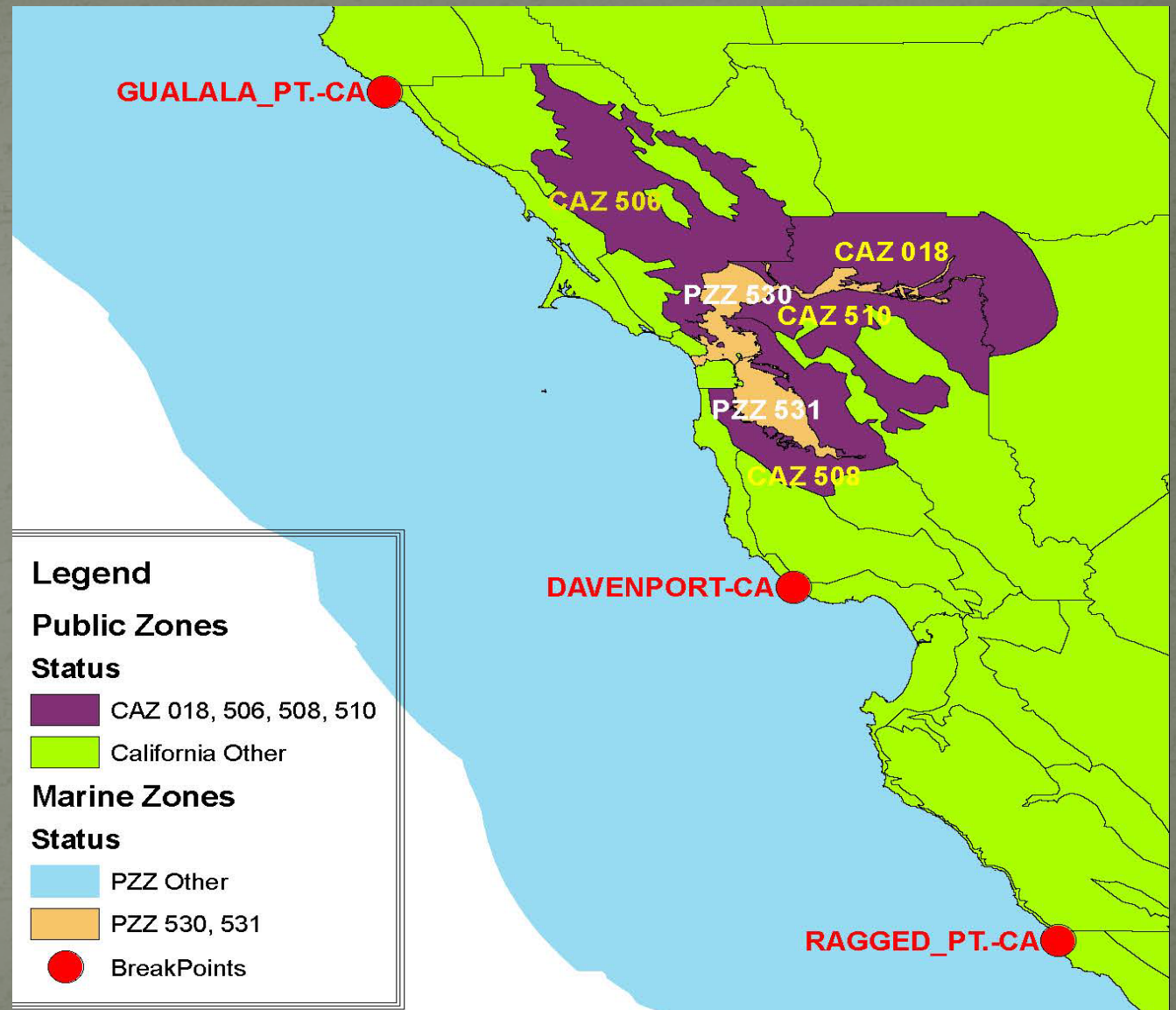
OR./WASH._BORDER

210

oregon

British Columbia - the North Coast and <u>Haida Gwaii</u>	BCZ 110, 911, and 921	Using Canadian pseudo-codes
British Columbia - the Central Coast and Northeast Vancouver Is.	BCZ 912, 922, 210, 220, and 122	Using Canadian pseudo-codes
British Columbia - the Outer West Coast of Vancouver Island	BCZ 121, 150, and 141	Using Canadian pseudo-codes
British Columbia - the Juan de Fuca Strait	BCZ 142 and 160	Using Canadian pseudo-codes
British Columbia - the Strait of Georgia	BCZ 280, 260, 250, 230, and 130	Using Canadian pseudo-codes
Washington - the Juan de Fuca Strait	WAZ 001, 503, 506, 510, 514, and 515	
Washington - Puget Sound	WAZ 507, 508, 509, and 511	
Washington - Outer coast	WAZ 021, 516, and 517	
Washington - Columbia River Estuary	PZZ 210	Note that for both Oregon and Washington the public zones cover both outer coast and the estuary. Using the Marine Zone is one solution.
Oregon - Columbia River Estuary	PZZ 210	ditto

california



concerns

- Breakpoints in water bodies
- Breakpoints in centers of population
- Breakpoints on international and state borders
- Differences in notification levels and who hears it
- Where does the outer vs. inner water bodies start / end
- Inside side water north vs. south
- Education for over-warning
- EAS activation
- FIPS codes

Complex coast team update

- Next steps...

Spanish Messages

- Convert from Experimental to Production?
- Extend to Pacific?

BOLETIN INFORMATIVO SISMICO DE TSUNAMI ESPANOL
NWS WEST COAST/ALASKA TSUNAMI WARNING CENTER PALMER AK
650 PM AST MON JUN 3 2013

...ESTE ES UN BOLETIN INFORMATIVO DE TSUNAMI...

EVALUACION

* HA OCURRIDO UN TERREMOTO - NO HAY PELIGRO DE TSUNAMI.

PARAMETROS PRELIMINARES DEL TERREMOTO

- * MAGNITUD 4.4
- * TIEMPO ORIGEN 1844 EDT JUN 03 2013
 - 1844 AST JUN 03 2013
 - 1744 CDT JUN 03 2013
 - 2244 UTC JUN 03 2013
- * COORDENADAS 19.1 NORTE 67.3 OESTE
- * PROFUNDIDAD 1 MILLAS
- * LOCALIZACION 65 MILLAS N DE MAYAGUEZ PUERTO RICO
 - 90 MILLAS NW DE SAN JUAN PUERTO RICO

Forecast point Update

- Based on input from last meeting, list of sites included in standard NTWC text messages increased as in Pacifex14 examples

- * ALASKA
- SAND POINT 1157 AKDT MAR 27 48 HRS 13.5FT+/- 4.0 11.6FT
- KODIAK 1213 AKDT MAR 27 24 HRS 3.2FT +/- 1.0 4.5FT
- UNALASKA 1215 AKDT MAR 27 20 HRS 2.3FT +/-0.7 1.4FT RENAMED
- COLD BAY 1232 AKDT MAR 27 20 HRS 2.4FT +/-0.7
- SEWARD 1239 AKDT MAR 27 15 HRS 2.0FT +/-0.6 3.2FT
- ADAK 1240 AKDT MAR 27 15 HRS 1.5FT +/-0.5 0.9FT
- ELFIN COVE 1240 AKDT MAR 27 15 HRS 1.5FT +/-0.5 1.3FT
- YAKUTAT 1248 AKDT MAR 27 20 HRS 2.3FT +/-0.7 1.7FT
- SITKA 1248 AKDT MAR 27 30 HRS 3.6FT +/-1.1 3.7FT
- VALDEZ 1258 AKDT MAR 27 12 HRS 1.2FT +/-0.4
- CORDOVA 1308 AKDT MAR 27 Less than 1 FT 0.9FT
- SHEMYA 1323 AKDT MAR 27 Less than 1 FT 0.3FT
- HOMER 1332 AKDT MAR 27 20 HRS 2.5FT +/-0.8
- SAINT PAUL 1333 AKDT MAR 27 Less than 1 FT
- CRAIG 1351 AKDT MAR 27 2.8FT NEW
-
- * BRITISH COLUMBIA
- LANGARA 1400 PDT MAR 27 20 HRS 1.3FT +/- 0.4
- TOFINO 1527 PDT MAR 27 20 HRS 2.6FT +/- 0.8

-
- * WASHINGTON
- NEAH BAY 1540 PDT MAR 27 20 HRS 1.6FT +/- 0.5
- LONG BEACH 1538 PDT MAR 27 24 HRS 3.5FT +/- 1.2 NEW
- MOCLIPS 1541 PDT MAR 27 30 HRS 4.0FT +/- 1.3 NEW
- WESTPORT 1556 PDT MAR 27 20 HRS 1.9FT +/- 0.6
- PORT ANGELES 1610 PDT MAR 27 20 HRS 1.3FT +/- 0.4 NEW
- PORT TOWNSEND 1637 PDT MAR 27 20 HRS 2.0FT +/- 0.6 NEW
-
- * OREGON
- PORT ORFORD 1542 PDT MAR 27 36 HRS 4.5FT +/- 1.4 4.9FT NEW
- CHARLESTON 1547 PDT MAR 27 20 HRS 2.2FT +/- 0.6
- SEASIDE 1548 PDT MAR 27 36 HRS 4.6FT +/- 1.4
- NEWPORT 1552 PDT MAR 27 36 HRS 4.8FT +/- 1.5 NEW
- BROOKINGS 1554 PDT MAR 27 30 HRS 4.2FT +/- 1.4 NEW

- Puget Sound left out

- * CALIFORNIA

•	CRESCENT CITY	1606	PDT	MAR	27	40 HRS	5.4FT +/- 1.6	
•	FORT BRAGG	1602	PDT	MAR	27	24 HRS	3.1FT +/- 0.9	NEW
•	MONTEREY	1632	PDT	MAR	27	20 HRS	2.5FT +/- 0.8	NEW
•	SAN FRANCISCO	1702	PDT	MAR	27	20 HRS	2.4FT +/- 0.7	
•	PORT SAN LUIS	1656	PDT	MAR	27	30 HRS	3.7FT +/- 1.1	NEW
•	SANTA BARBARA	1718	PDT	MAR	27	15 HRS	2.1FT +/- 0.6	
•	LOS ANGELES HARB	1735	PDT	MAR	27	15 HRS	1.8FT +/- 0.5	RENAMED
•	NEWPORT BEACH	1733	PDT	MAR	27	15 HRS	1.6FT +/- 0.5	NEW
•	LA JOLLA	1746	PDT	MAR	27	20 HRS	2.8FT +/- 0.8	
•	OCEANSIDE	1738	PDT	MAR	27	20 HRS	2.6FT +/- 0.8	NEW

Post-Warning Survey

- Washington EMD has implemented survey – Thanks John!
- [Link to survey](#)

Exercises

- CaribeWave14 – 1000UTC March 26, 2014
- Lantex14 – 1400UTC March 26, 2014
- Pacifex14 – 1850UTC March 27, 2014
- Alaska Shield – March 27, 2014
 - [Link to Plans](#)
- PacWave Plans
- EAS/NWR Test Plans
- 2015 Exercises
 - Pacific – Wednesday March 25, 2015?
 - Atlantic – Wednesday March 25, 2015?

WCS Task Prioritization

TWS Training Opportunities

- COMET courses
 - Update?
- ITIC/FEMA course
 - Recent offerings
- NTWC TWS training not offered last 2 years
 - Start again?
- TWC/ITIC remote visits?
- Others?

TWS Training Opportunities

Course	2010	2011	2012	2013	Total
Tsunamis	697	1825	1377	1539	5438
Tsunami Warning System	503	673	457	315	1948
Comm.Tsunami Prep.		993	1795	437	3225
Tsunami Strike! Pac		863	445	458	1766
Tsunami Strike! Carib.			1054	792	1846
Total					14223

TWC IT Mod. Project

- Status

NWS Satisfaction Survey

- Tsunami Warnings – ~28K samples

• Category	2012	2013
------------	------	------

- | | | |
|-------------------------|----|----|
| • Ease of Understanding | 84 | 87 |
| • Timeliness | 87 | 91 |
| • Accuracy | 79 | 77 |

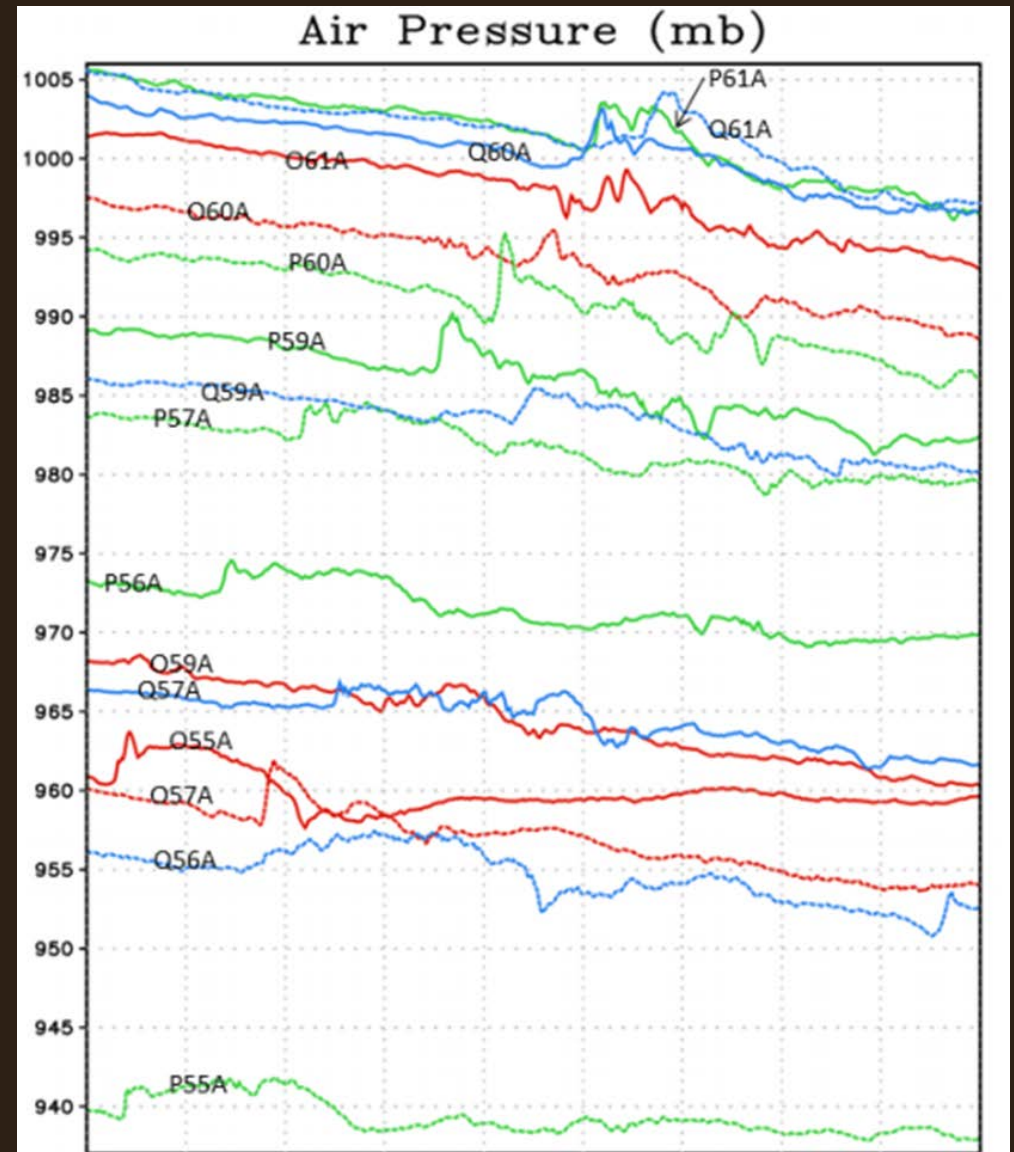
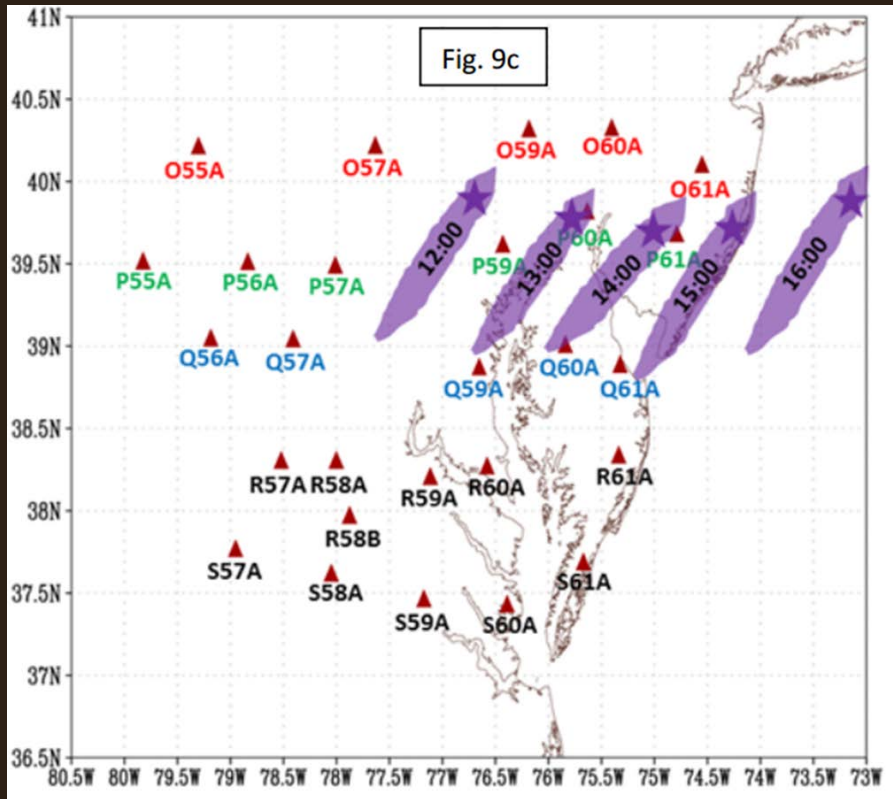
- Same overall rating (86) as Tornado Warning Satisfaction
- Hurricane Warnings received 88 in 2012 and 90 in 2013.

Meteotsunami Alerts

- East Coast:
 - 1992 Daytona Beach, FL – dozens injured
 - 2008 Boothbay, ME – some damage
 - 2013 East Coast – 2 injured, some damage
- NOAA Meteotsunami alert grant
- Threat is historically greater than traditional tsunamis for east coast
- NESEC request:
 - ...From an emergency management stand point, it is critical that we know a tsunami or tsunami-like wave is coming, regardless of whether it is caused by an earthquake, landslide, weather event, or other phenomena..."
 - ...we are requesting that you consider enhancing and expanding WCATWC capability to report any tsunami or tsunami-like wave, regardless of cause..."

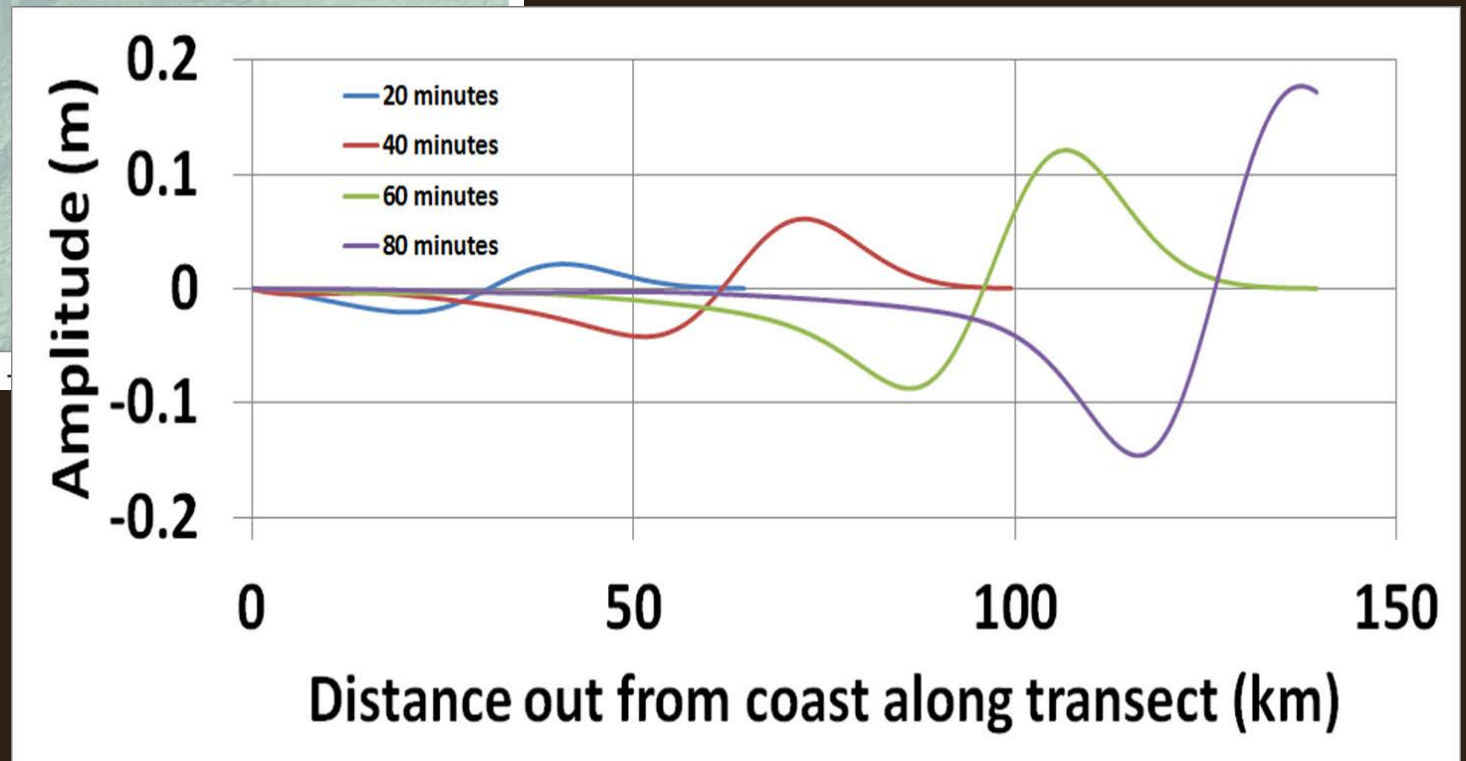
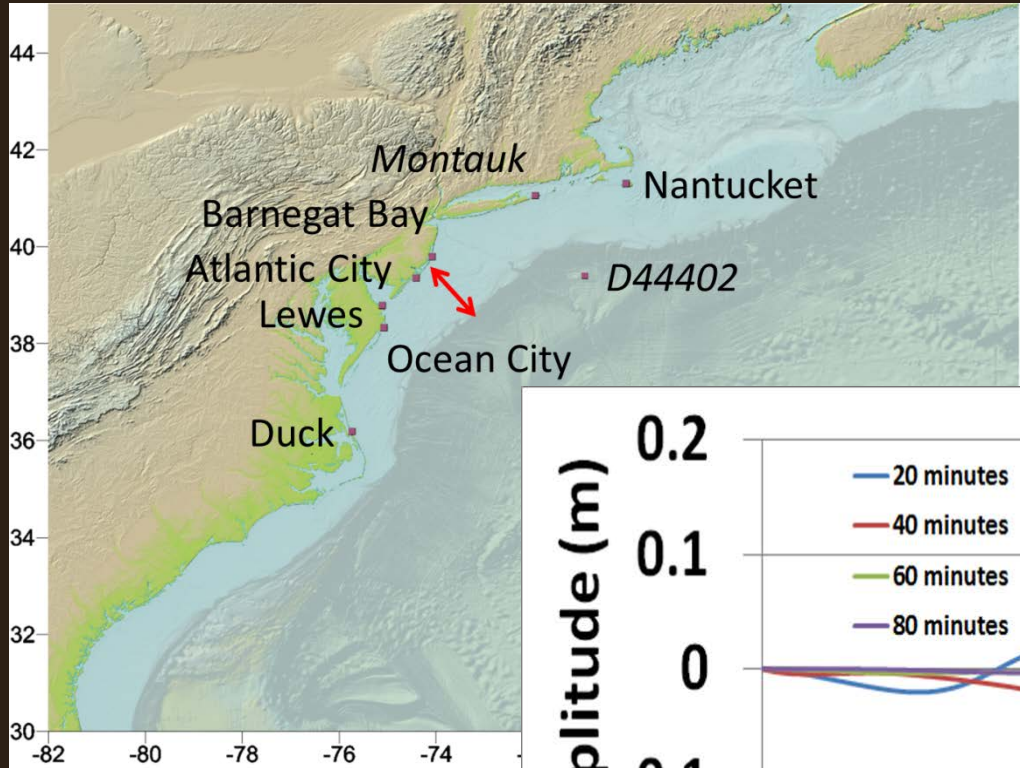
Meteotsunami Alerts

June 13, 2013 Event



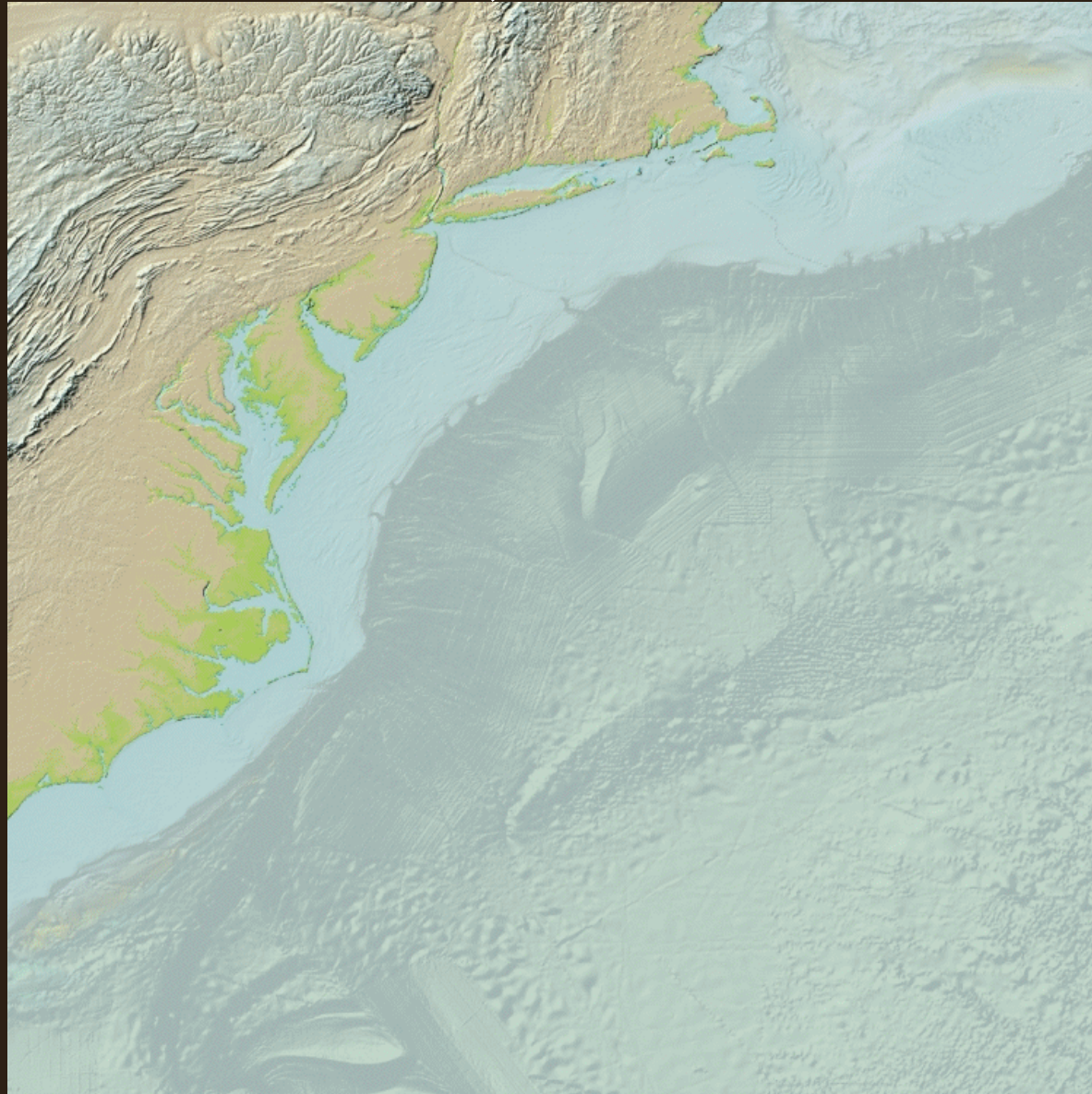
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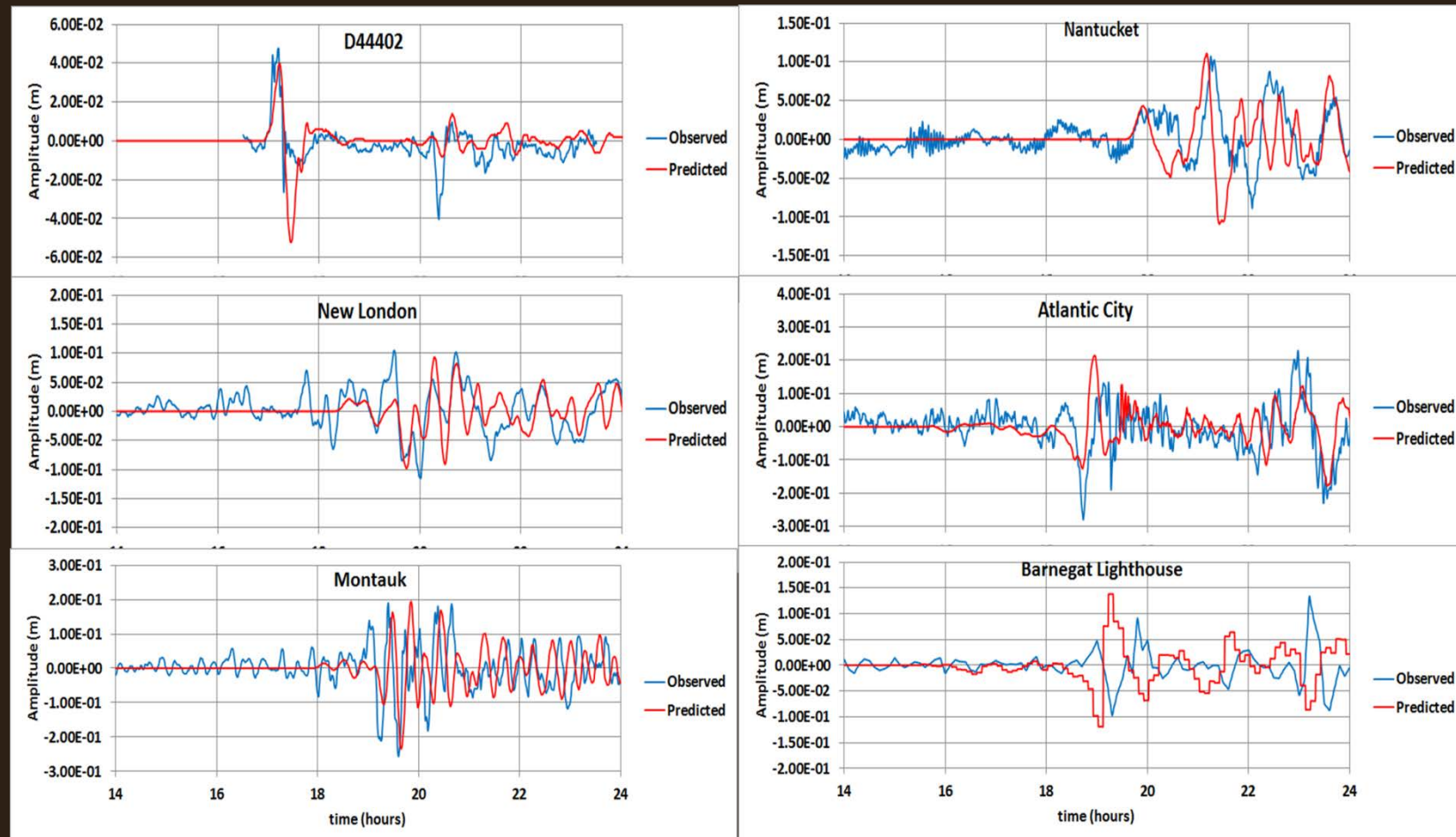
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Meteotsunami Alerts

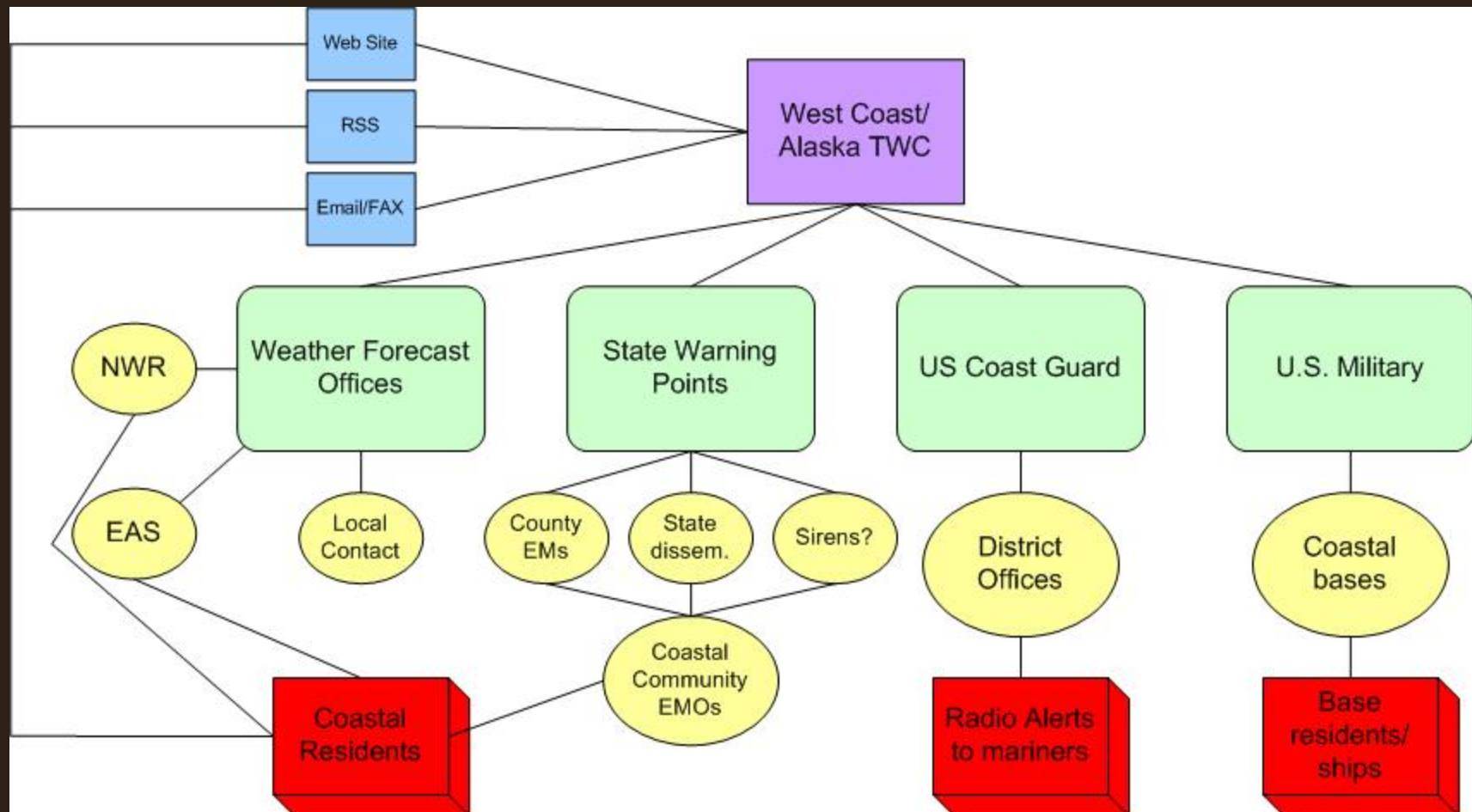
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Meteotsunami Alerts

- Brainstorming:
 - How do we proceed?
 - MT Forecast Examples from Med.
 - What type of alert?
 - Warning?
 - Advisory?...
 - Based on what phenomena?
 - Weather forecast?
 - Observed air pressure?
 - Tsunami Observations?
 - DART/Tide Gage/HF Radar

Inclusion of USCG in WCS



PR/VI Procedures

- Present warning threshold 6.5
 - Different than other similar tectonic regions
- 6.4 event in 1/2014 ALMOST triggered warning
- Should PR/VI warning threshold be raised to the level of other areas?

PR/VI Procedures

- Background statistics:
 - 0.75% of US/Canada events 6.5-7.0 trigger significant tsunamis historically ($>0.5\text{m}$)
 - Worldwide since 1980, $\sim 2\%$ have triggered significant tsunamis in this mag. Range
 - Higher apparently due to Indonesia stats.
 - In PR/VI AOR, since 1900 6 quakes have occurred and none have triggered observable tsunamis.
- Raise threshold?

New Actions

- EAS Activation for Advisories?
- Products
 - Action to better threat to response?
 - Implement Social Science recs.?
 - Complex Coast recs.?
 - Extend Spanish Messages?
- Establish date and scenario for 2015 Exercises
- Prioritize Strat. Plan tasks?
- Training?
- Meteotsunami alerts?
- USCG?
- PR/VI Procedures?