

October 1999 Tsunami Inundation Mapping Progress Report

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ALASKA

I. SUMMARY OF INUNDATION MAPPING STATUS

The UAFGI has implemented and tested the numerical simulation code. Propagation has been tested for the 1964 source scenario. Numerical grids have been interactively connected, with the coarsest grid having 6 min spacing and the finest grid currently implemented being 24 arc seconds spacing (740 m x 406 m). The next finer resolution grid (8 arc seconds) was provided by TIME and is being connected into the model. Additional data requirements are being reviewed.

Due to the proximity of the three study areas (**City of Kodiak** , **USCG Base**, and **Women s Bay**), all are presently included in the same numerical grid. Therefore, progress at all three sites is at the same stage. As grid refinement continues, the communities will be treated individually.

FUTURE WORK:

ADES (Gary Brown) will convene a meeting / teleconference including ADES personnel and the scientific community in Alaska to refine the 'short list' of communities for future work. Future work will be supported by the Alaska Science and Technology Foundation (ASTF). The preliminary 'short list' follows. No priorities have been assigned. This list will be further refined in the near future.

Cold Bay	Petersburg	Unalaska
Cordova	Sand Point	Valdez
Homer	Seldovia	Whittier
Ketchikan	Seward	Wrangell
King Cove	Sitka	Yakutat

II. EVACUATION MAP STATUS

III. ADDITIONAL INFORMATION

UAF GI Report (Roger Hansen and Elena Suleimani)

1. 1964 earthquake source model will be used as worst case scenario for Kodiak area.
2. ADGGS has prepared base maps (georeferenced USGS 1:25,000 topo images) for the Kodiak project. Inundation limits and evacuation routes will be plotted on them once the modeling is completed.
3. Code being parallelized to run on CRAY T3E supercomputer.
4. The current status of the project can be found at: <http://www.aeic.alaska.edu/tsunami/index.html>

CALIFORNIA

I. SUMMARY OF INUNDATION MAPPING STATUS

1. **San Francisco Area** - TIME has provided 3 arc second grids of combined bathymetry and topography this area ([GIF image of data](#)). Additional improvements to the topography data in a small area on the east side of the bay are needed; however, this small problem area is not presently considered a target study area for inundation mapping. The numerical code has been implemented and uses a nested grid structure. Presently, a 30 arc second spacing coarse grid combined with a 10 arc second fine grid along the target shoreline are being used. Numerous hypothetical seismic sources have been run; presently landslide generated tsunami source similar to the one at Papua New Guniea are being implemented.
2. **Santa Barbara Area** - TIME also provided 3 arc second grids of combined bathymetry and topography for this study area. Additional refinements in the topography data in the immediate area of City of Santa Barbara are needed. Presently simulations are being run on an 18 arc second grid (roughly 500 m spacing). More than 45 runs from various seismic sources have been completed; presently working with landslide generated tsunami sources as described above. Additional earthquake and landslide sources will be discussed by at a meeting of seismologists to be convened.
3. **Los Angeles / Long Beach Area** - Preliminary course grid completed and initial model runs completed. Further grid refinement and additional source mechanisms required. TIME will expand the Santa Barbara 3 arc second data grids to include these study areas; improvement of topography will be necessary.
4. **San Diego Area** - Bathymetry and topography data sets for this area have been identified; additional sources of deep water bathymetry must be located. Once data is located, TIME will process the data to produce a combined grid of bathymetry and topography.

FUTURE WORK:

- **Eureka and Crescent City** - (comparison of finite element and finite difference modeling techniques)

II. EVACUATION MAP STATUS

III. ADDITIONAL INFORMATION

USC Report (Jose Borrero and Utku Kanoglu)

1. PNG and Turkey events raised possibility of coseismic submarine landslides. Investigating several potential submarine landslide hazards in California.
2. Meeting of seismologists with expertise in the southern California area still pending; hopefully scheduled before end of CY 99. Will identify potential tsunamigenic faults system, and source parameters.

HAWAII

I. SUMMARY OF INUNDATION MAPPING STATUS

Initial one-dimensional inundation modeling and mapping was performed in 1989-1991 using state funds; evacuation maps were published in 1991. Some maps in Oahu were updated in 1997 using federal funds; entry into the county GIS system was initiated in 1997. Additional modeling will update and refine the published inundation maps.

Hawaii has issued two contracts for tsunami modeling--one for distant tsunami modeling and one for local tsunami modeling. In addition, another contract will go out for bid within the next few months for the purchase of tsunami coastal recorders.

- **Distant Tsunami Modeling** -- Contract awarded to University of Hawaii (UH) team led by Dr. Kwok Fai Cheung, P.E. in the Department of Ocean Resource Engineering. Dr. Cheung will leverage an existing UH Sea Grant tsunami project with the Civil Defense contract. Project is entitled "Generation of a Database of Synthetic Mareographic Data Representative of Tsunamis Recorded at Selected Water Level Measurement Stations Located in the General Vicinity of Regions of Historical Tsunami Generation." The completion date of the contract is Fall 2000.
- **Local Tsunami Modeling** -- Contract awarded to University of Hawaii and Applied Fluids Engineering of California. Principal Investigator is Dr. Gerard Fryer of UH, Hawaii Institute of Geophysics and Planetology. Dr. Fryer will leverage an approved NASA/Pacific Disaster Center (PDC) project on modeling local Hawaii tsunamis. The project will provide computer programs and associated tools to develop scenarios for use in forecasting of tsunami run-ups and corresponding tide station measurement from a Big Island tsunami source. The completion date of this contract is also Fall 2000.

II. EVACUATION MAP STATUS

III. ADDITIONAL INFORMATION

HI Civil Defense Report (Brian Yanagi)

1. State of Hawaii in process of implementing SEVEN (7) tsunami contracts; three (3) are funded using FY99 tsunami mapping/modeling funds

OREGON

I. SUMMARY OF MAPPING STATUS

1. **Siletz Bay** - Completed in 1995 by Priest et al. and published as *GMS-99* by DOGAMI. Note that this work was done pre-NTHMP support; it is included in this list simply for completeness.
2. **Newport** (Yaquina Bay) - Completed December 1997 and published as DOGAMI Report **IMS-2** and Open-file report **O-97-34**.
3. **Seaside** - Completed July 1998 and published as DOGAMI Report **IMS-3**.
4. **Gold Beach** - Model runs completed and reviewed. Draft inundation map submitted and reviewed by local officials. Final product delayed by numerical problems in the Hunter Creek area. Additional model runs to resolve these problems in progress.
5. **Warrenton-Astoria** - Model runs completed at OGI. Two separate maps drafted and reviewed with local officials. Maps should be *'hot off the press'* for display at the steering group meeting. Published by DOGAMI as **IMS-11** (Astoria) and **IMS-12** (Warrenton).

FUTURE WORK:

- **Coos Bay** - OGI has been awarded the modeling contract (5 May 99) for this area. The contract duration is approximately one year. [NOTE: This contract includes work in Washington also.] DOGAMI has put out a request for bids for aerial photogrammetry and development of a digital elevation model (DEM) of the area.
- **Priority Communities** - Oregon has ranked additional communities for future inundation mapping.

They are (highest priority at top):

Waldport (Alsea Bay)

Rockaway

Florence

Pacific City

Bandon

Winchester Bay-Reedsport

Brookings

II. EVACUATION MAP STATUS

1. Oregon Emergency Management (Darienzo) has worked with many coastal communities on preparing pamphlet-size **Tsunami Evacuation Maps**. In communities where detailed inundation mapping has not been completed, Priest's 1995 Tsunami Hazard Maps were used to construct the evacuation maps.

2. Evacuation maps have been completed for:

- | | |
|---------------------------------------|-------------------------|
| [1] Bandon (Coquille River) | [5] Waldport |
| [2] Manzanita | [6] Yachats |
| [3] Salmon Cove (Umpqua River) | [7] Lincoln City |
| [4] Cannon Beach. | [8] Florence |

3. Additional maps are being developed for:

- | | |
|----------------------|---------------------------|
| [1] Seaside | [6] Reedsport |
| [2] Warrenton | [7] Gardiner |
| [3] Astoria | [8] Winchester Bay |
| [4] Gearhart | [9] Cannon Beach |
| [5] Newport | |

III. ADDITIONAL INFORMATION

[DOGAMI Report](#) (George Priest)

- Issues not adequately addressed by current studies:
 1. Source coseismic deformation (theoretical and paleoseismic)
 2. Ground truth for tsunami run-up and inundation using various paleotsunami analysis techniques.

WASHINGTON

I. SUMMARY OF MAPPING STATUS

1. **Gray's Harbor** (Gray's Harbor County) - Model runs completed in tandem with Warrenton Astoria, OR and Willapa Bay / Long Beach, WA. 1:24,000 scale inundation maps completed and supplied to the county. The maps furnished cover the outer coast from **Moclips** to the county line south of **Grayland** and the inner harbor around the cities of **Aberdeen** and **Hoquiam**. They are the *7-1/2 minutes quadrangles* named: Moclips, Copalis Beach, Copalis Crossing, Westport, Hoquiam, Aberdeen, Point Brown, and Grayland.

A 1:100,000 scale map and report are in progress. They will be released in mid-November, 1999 at a series of community meetings.

2. **Willapa Bay / Long Beach Peninsula** (Pacific County) - Model runs completed in tandem with Warrenton Astoria, OR and Gray's Harbor, WA. 1:24,000 scale inundation maps completed and supplied to the county. The maps furnished cover the outer coast from the county line south of **Grayland** to **Ilwaco** and the inner harbor around the cities of **Raymond** and **South Bend**. They are the *7-1/2 minutes quadrangles* named: Grayland, North Cove, Bay Center, South Bend, Raymond, Oysterville, Ocean Park, and Cape Disappointment.

A 1:100,000 scale map and report are in progress. They will be released in mid-November, 1999 at a series of community meetings.

FUTURE WORK:

- **Port Angeles / Port Townsend** - OGI has been awarded the modeling contract (5 May 99) for this area. The contract duration is approximately one year. [NOTE: This contract includes work in Oregon also.] New bathymetry data collected in this area as a test project had serious errors and was determined to be unusable for this work. Additional bathymetry data will be needed.

II. EVACUATION MAP STATUS

1. Digital files of all maps have been supplied to **Grays Harbor County**, on behalf of **Pacific County**, to use for creation of evacuation maps in both counties.

III. ADDITIONAL INFORMATION

WA DNR report (Tim Walsh)

1. Series of workshops to release inundation products in four affected communities planned for mid-November, 1999.

IV. FY 2000 INUNDATION MAPPING PLANS