Maritime forecast products research and development

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The 2011 Japan Tsunami

Forecast based on 2 DART measurements

Tsunami Energy Map
Global Propagation – 2011 Japan Tsunami

DART stations

- Observation
- Forecast (MOST)
Japan Tsunami
2011 03 11 05:46:23 UTC
07h23m31s
Coastal gages forecast accuracy (max amplitude)

All: 68% (0.2 m average error)
>1.0m: 74%
>1.5m: 87%
Kahului (2.1 m): 95%
Crescent City (2.5 m): 98%
Kahului, Hawaii

Flooded by the 2011 Japan tsunami

Survey data

Inundation forecast

ADCP current meter

Observation

Forecast (MOST)

Kahului Tide Gage

578 m
Estimated accuracy:
71% for all
76% for high-resolution grids

Maximum observed and forecast current speeds
at 18 ADCP current stations in Hawaii
2011 Japan Tsunami

Harbors

Channels and bays

ADCP current data at bays, harbors and channels in Hawaii
2011 Japan Tsunami

Kahului Harbor

Maximum current speeds and directions
Hilo Harbor, Maximum current speeds and directions
Figure 4 (a and b) Maximum fluid speed in Kahului and Hilo Harbors. Colors represent time of the maximum current. (c and d) Snapshots of fluid speed with whirlpools/vortices in the Kahului Harbor at 8.25 hour and Hilo Harbor at 9.05 hour. (e and f) Snapshots of sea surface elevation at the same time as (c and d). Arrows indicate speed direction. Distance between two adjacent arrows is about 60 m (2 arc-sec).

Whirlpools modeled inside harbors
Snapshots of model simulations
Summary

- Future tsunami forecast products for maritime safety applications