Tsunami-WebGIS – Displaying Tsunami Simulations for Indonesia to a Broader Audience

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Tsunami Modelling for Indonesia

Timeline

- **2004**: Indian Ocean Tsunami
- **2005 – 2011**: Project GITEWS*
- **2008**: GITEWS inaugurated at BMKG
- **2011**: InaTEWS handed over to Indonesia
- **2011 – 2014**: Project PROTECTS*
- **2015 – 2017**: Tsunami database extension**
- **Since 2014**: Maintenance and Support

(*) funded by German Federal Ministry of Education and Research
(**) funded by Australian government

Efforts made

- 17,300 tsunami simulations
- 12 trainings (8 exchange trips)
- 8 workshops (4 visits to Indonesia)

BMKG: Indonesian Agency for Meteorology, Climatology and Geophysics
GITEWS: German-Indonesian Tsunami Early Warning System
InaTEWS: Indonesia Tsunami Early Warning System
TsunAWI – Tsunami Model by AWI

Properties

• Non-linear shallow water equations
• Unstructured triangular mesh
• Initialisation with different source models
• Suitable for pre-computed scenario database

Simulations in Indonesia

• Mesh: ~12.7 Mio nodes
• Resolution: 50 m – 20 km
• Coverage: ~17300 simulations in 15 trenches
• Magnitudes: 7.0 - 9.0
• Source model providers:
  • GFZ (RuptGen)
  • GeoScience Australia
• Simulation time: ~12 h
TsunAWI – Data Products

- Estimated time of arrival
- Maximum wave heights
- Wave propagation
- Time series
- Isochrones
- Inundation

... in different data formats
Capacity Building & Developments

Trainings
- Install, maintain, troubleshoot simulation interfaces and databases

Workshops
- Calculate, understand and evaluate tsunami simulation data
- Import data products into database
- Investigate decision support and modelling approaches

Developments
- Scenario calculation with TsunAWI
- Database with data products from simulated wave propagation
- Simulation interface to decision support system

Outreach
- Interviews and talks
- Tsunami-GIS
Tsunami-WebGIS

Interactive WebGIS application presenting maximum wave heights and arrival time isochrones of tsunami simulations for the Sunda Arc

Motivation

• Provide insight into research results of tsunami modelling group
• Facilitate understanding of tsunami concepts
• Increase awareness of tsunami research
• Provide easily accessible platform for interested target groups
• Platform to display simulation products for historical events

Target Groups

• Scientists
• Non-expert audience
• Media
• Students
Tsunami-WebGIS - Features

http://MAPS.awi.de

Developed within the project Earth System Knowledge Platform (ESKP)
Tsunami WebGIS – Functionality

Estimated Time of Arrival
Tsunami waves travel with an average speed of 700 km/h in the deep ocean. Having a forecast of the expected arrival times is crucial for an evacuation of the potentially affected population in time. The lines (isochrones) depicted here visualize the travel time of the selected tsunami. Isochrones are drawn every 30 min.

Legend
Time passed after earthquake
- 30 min
- 60 min (1 h)
- 90 min
- 120 min (2 h)
- 150 min
- 180 min (3 h)
- 210 min
- 240 min (4 h)
- 270 min
- 300 min (5 h)
- 330 min (5.5 h)
- 360 min (6 h)
- 390 min
- 420 min (7 h)
- 450 min
- 480 min (8 h)
- 510 min
- 540 min (9 h)
- 570 min
- 600 min (10 h)
- 630 min
- 660 min (11 h)
- 690 min
- 720 min (12 h)

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Tsunami WebGIS – Functionality
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Hosting Architecture

GIS-GDI@AWI
- GIS-based Geodata Infrastructure of AWI
- ArcGIS for Server 10.x
- File storage or PostgreSQL DBMS 9.x incl. SDE
- OGC-Standardized web services: WMS, WFS
- ESRI Image Service

maps@awi ([http://MAPS.awi.de](http://MAPS.awi.de))

AWI WebGIS-Viewer
- JavaScript application based on leaflet.js
- Platform independent visualisation of geospatial data
- Meta data display, configurable filters
- Customizable interactive features

GIS Maps Portal
- Portal to available WebGIS-Projects at AWI

(*) Icon made by Freepik from www.flaticon.com
Tsunami-WebGIS – Data Structure

Vector Data
• Arrival time isochrones, trenches, epicenters*
• Source data format: SHP
• Data structure: feature dataset
• Storage: PostgreSQL database
• Service: published as WMS or WFS*

Raster Data
• Maximum wave heights
• Source data format: GeoTIFF
• Data structure: image mosaic
• Storage: file geodatabase
• Service: published as ESRI Image Service
Outlook

Planned to include

• Simulations for
  • North-East Indonesia
  • Historical tsunami events
  • Recent tsunami events
  • Chile and Peru
• Tide gauge data
Questions?

Acknowledgements to our former student assistants

• Felix Freiberger
• Matthias Hardner
• Franziska Hoppe
• Saghi Yousefi

... who contributed substantially to the process of visualising our data products