



Tsunami Coastal Assessment Tool (TsuCAT): A Tool for Rapid Initial Tsunami Assessment

Christopher Moore², Laura Kong¹, Marie Eble², Edison Gica², Diego Arcas²

¹ NOAA Center for Tsunami Research (NCTR), Pacific Marine Environmental Laboratory

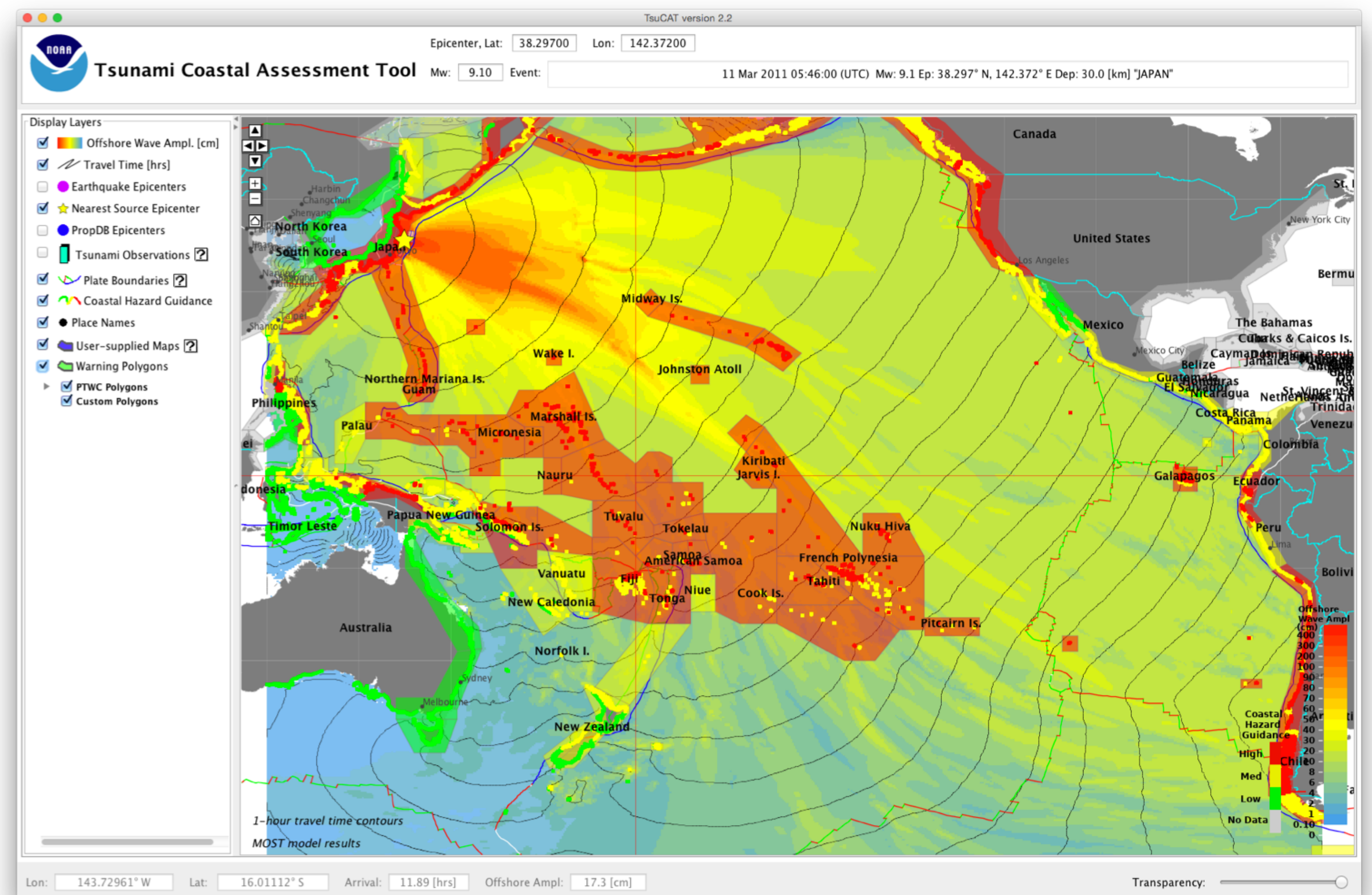
² UNESCO/IOC – NOAA International Tsunami Information Center (ITIC)



TsuCAT: a stand-alone early assessment tool

The Tsunami Coastal Assessment Tool (TsuCAT) is a simple and quick, yet powerful tool for exploring the impact from many different tsunamis. It was developed by the NOAA Center for Tsunami Research (NCTR) to support the International Tsunami Information Center's (ITIC) effort to provide countries with tsunami decision support tools.

TsuCAT provides access to a database of tsunami modeling results from NOAA's pre-computed catalog of sources (Propagation Database) to assist a country in its tsunami hazard assessment, tsunami exercise and response planning, and warning decision-making. The pre-run models have been combined to represent earthquakes of larger magnitudes, and the wave amplitude for any magnitude can be shown to the user to allow assessment of wave amplitude at any given location in the ocean basin. The standard 100km-by-50km fault plane works well for forecasting larger magnitudes using MOST, but for magnitudes below 8.0 TsuCAT uses RIFT model results with fault lengths decreasing appropriately with magnitude. This allows accurate results over a range from Mw 6.5 up to the theoretical maximum of 9.6 (spaced every 0.3).



TsuCAT displaying maximum offshore wave amplitude, costal amplitude, arrival times, and warning polygons colored by maximum wave within the region.

TsuCAT Workflow

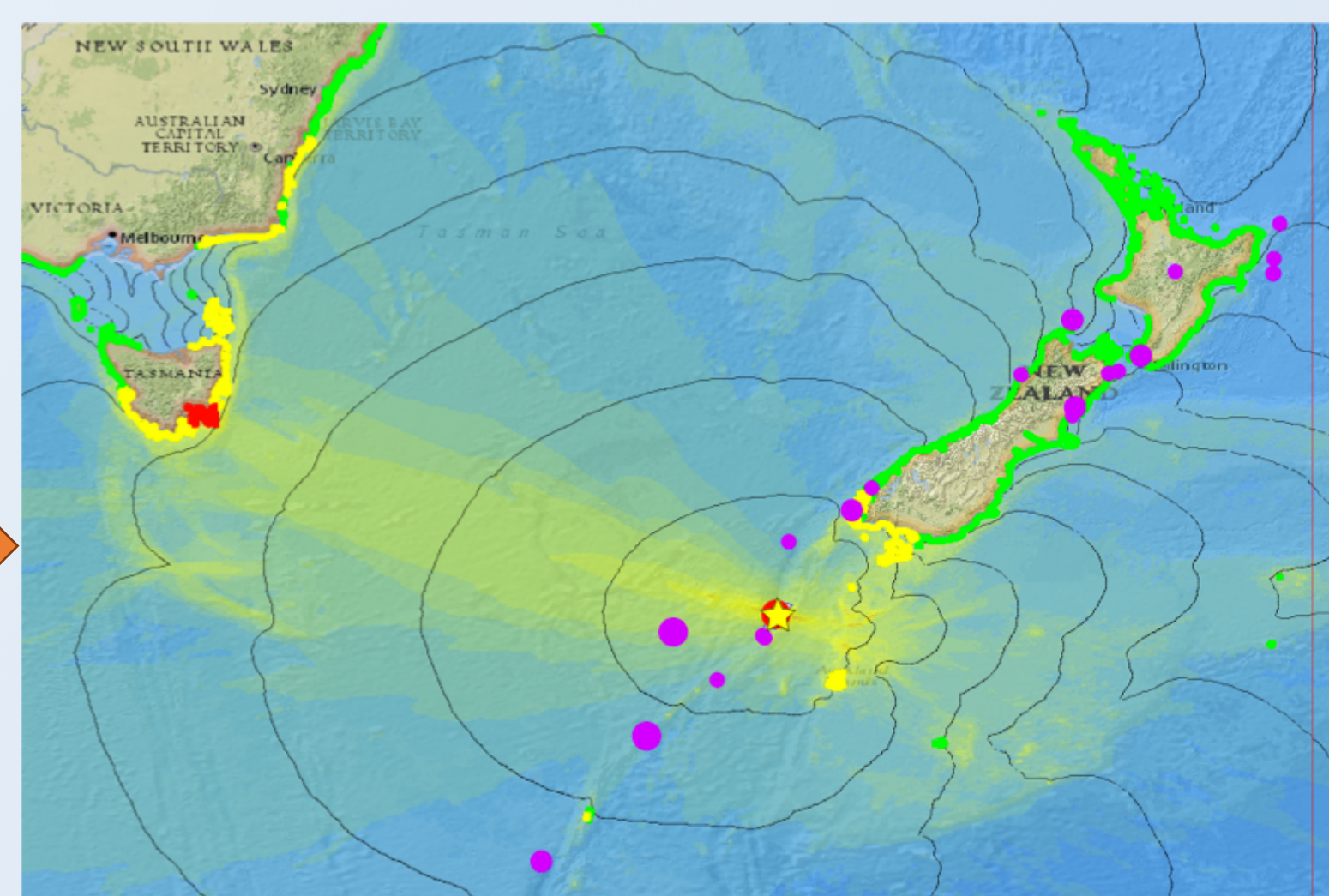
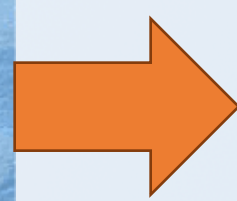
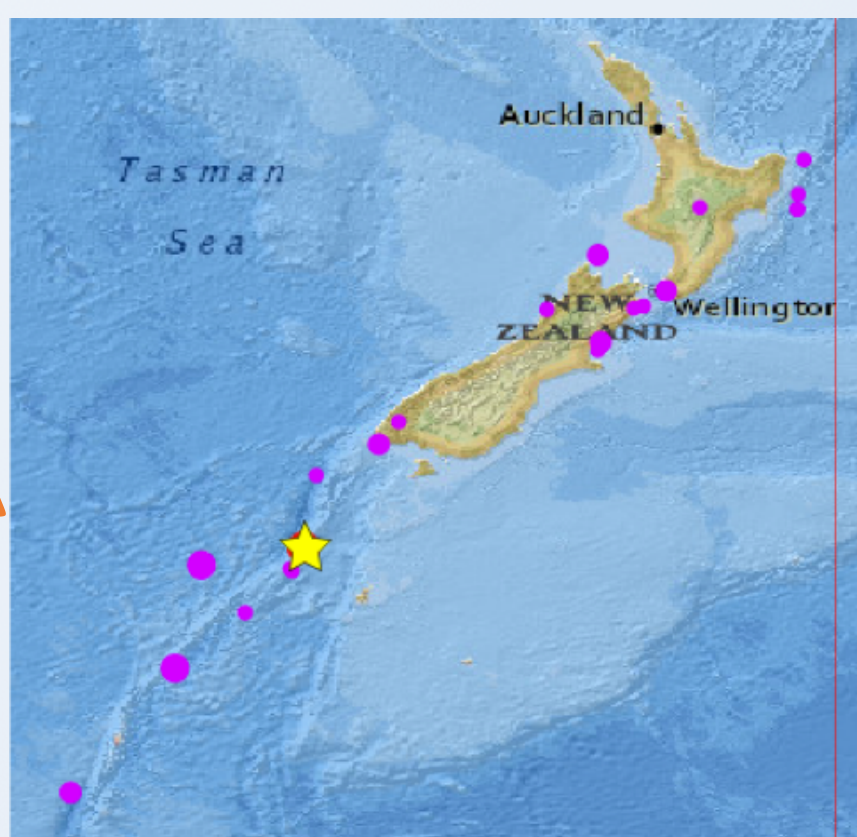
TsuCAT gives offshore wave amplitude, arrival time, and extrapolated values along the coastline for any epicenter in the global subduction zones, and at any magnitude. To use TsuCAT the user must choose an epicenter and magnitude: this is done by dragging the yellow epicenter "star" and editing Mw. TsuCAT then chooses the closest epicenter from its database of 5400 runs, and scales it up or down to match the requested magnitude.

TsuCAT also comes with a catalog of historical events. Users can choose earthquake epicenters and magnitudes from a list:

Date	Mw	Latitude	Longitude	Country
2017-11-01 02:23	6.6	21.648° S	168.858° E	NEW CALEDONIA
2017-11-19 09:25	6.3	21.638° S	168.673° E	NEW CALEDONIA
2017-11-01 00:09	6.1	21.728° S	168.934° E	NEW CALEDONIA
2003-12-27 04:55	6.1	22.107° S	169.350° E	NEW CALEDONIA
2017-11-20 00:09	6.0	21.485° S	168.809° E	NEW CALEDONIA
2004-12-23 14:59	8.1	49.312° S	161.345° E	NEW ZEALAND
1855-01-23 09:00	8.0	41.250° S	175.000° E	NEW ZEALAND
2016-11-13 11:02	7.8	42.757° S	173.077° E	NEW ZEALAND
2009-07-15 09:22	7.8	45.762° S	166.562° E	NEW ZEALAND
1981-05-25 05:25	7.6	48.786° S	164.357° E	NEW ZEALAND
1868-10-18 12:35	7.6	40.200° S	173.000° E	NEW ZEALAND
2007-09-30 05:23	7.4	49.418° S	163.954° E	NEW ZEALAND
2003-08-21 12:12	7.2	45.104° S	167.144° E	NEW ZEALAND
2016-09-01 16:37	7.1	37.401° S	179.055° E	NEW ZEALAND
2004-11-22 20:26	7.1	46.676° S	164.721° E	NEW ZEALAND

Or select from the map:

OR

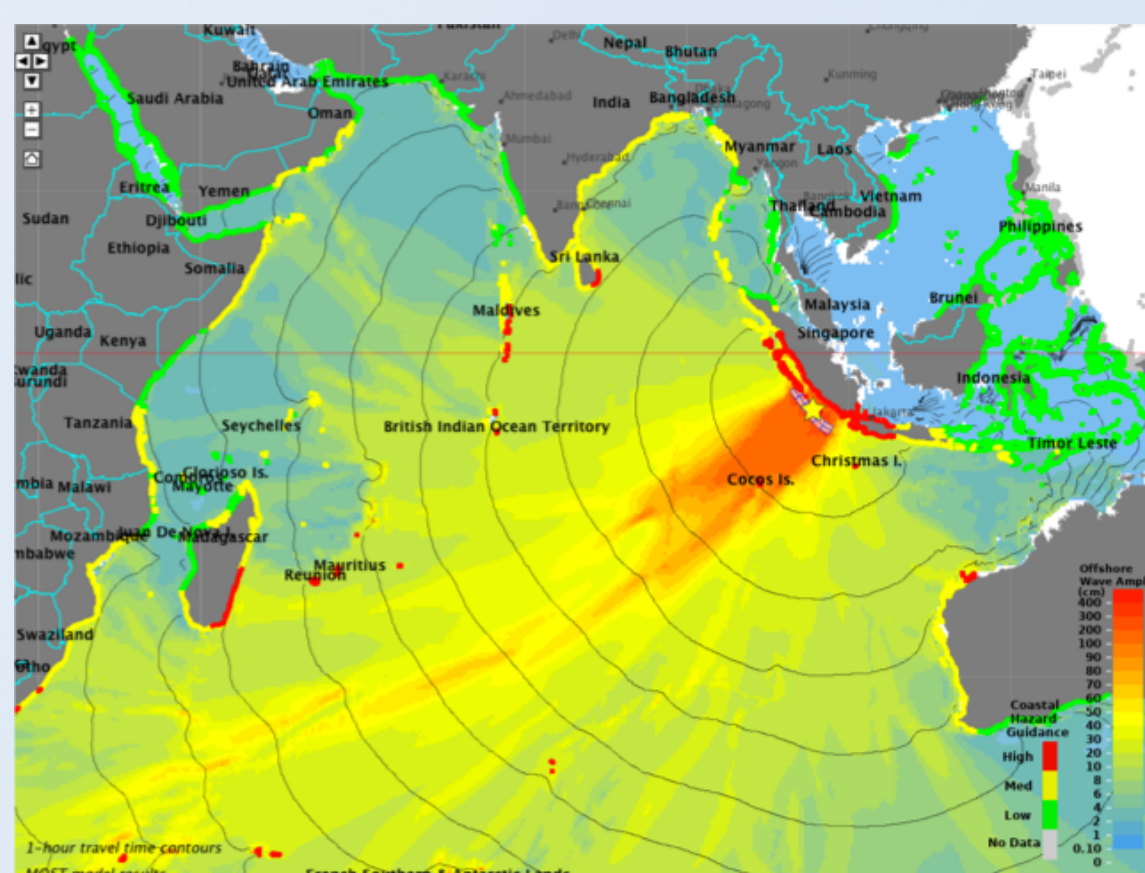
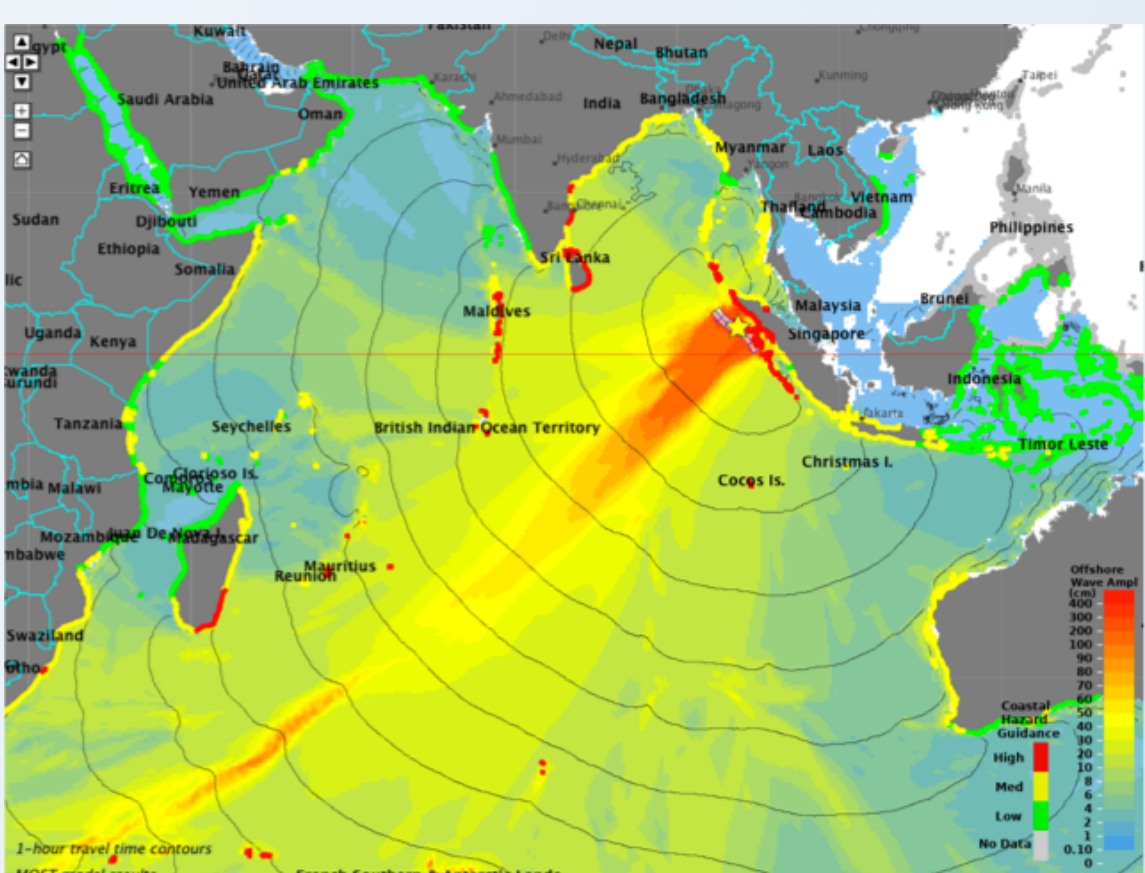
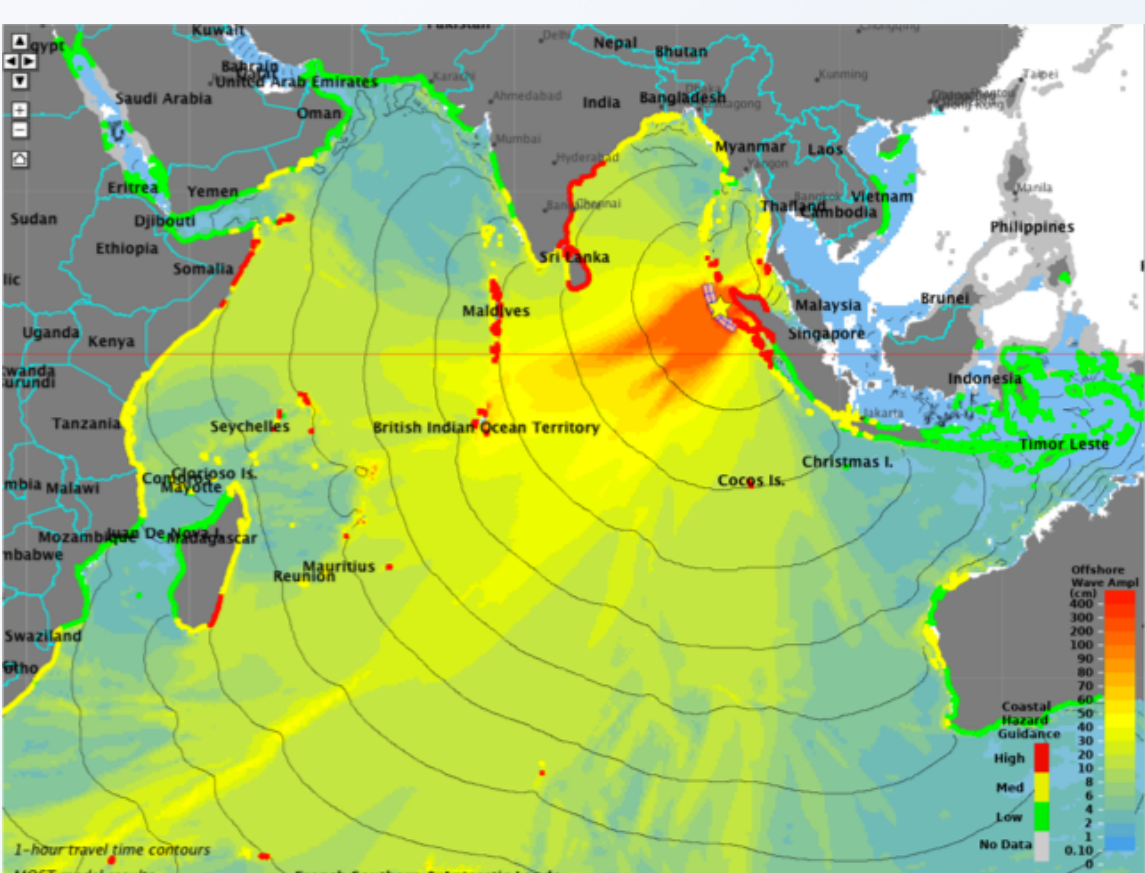


See focused impact of 1981 Peysegur event on Tasmania

Example: Assessing Directionality

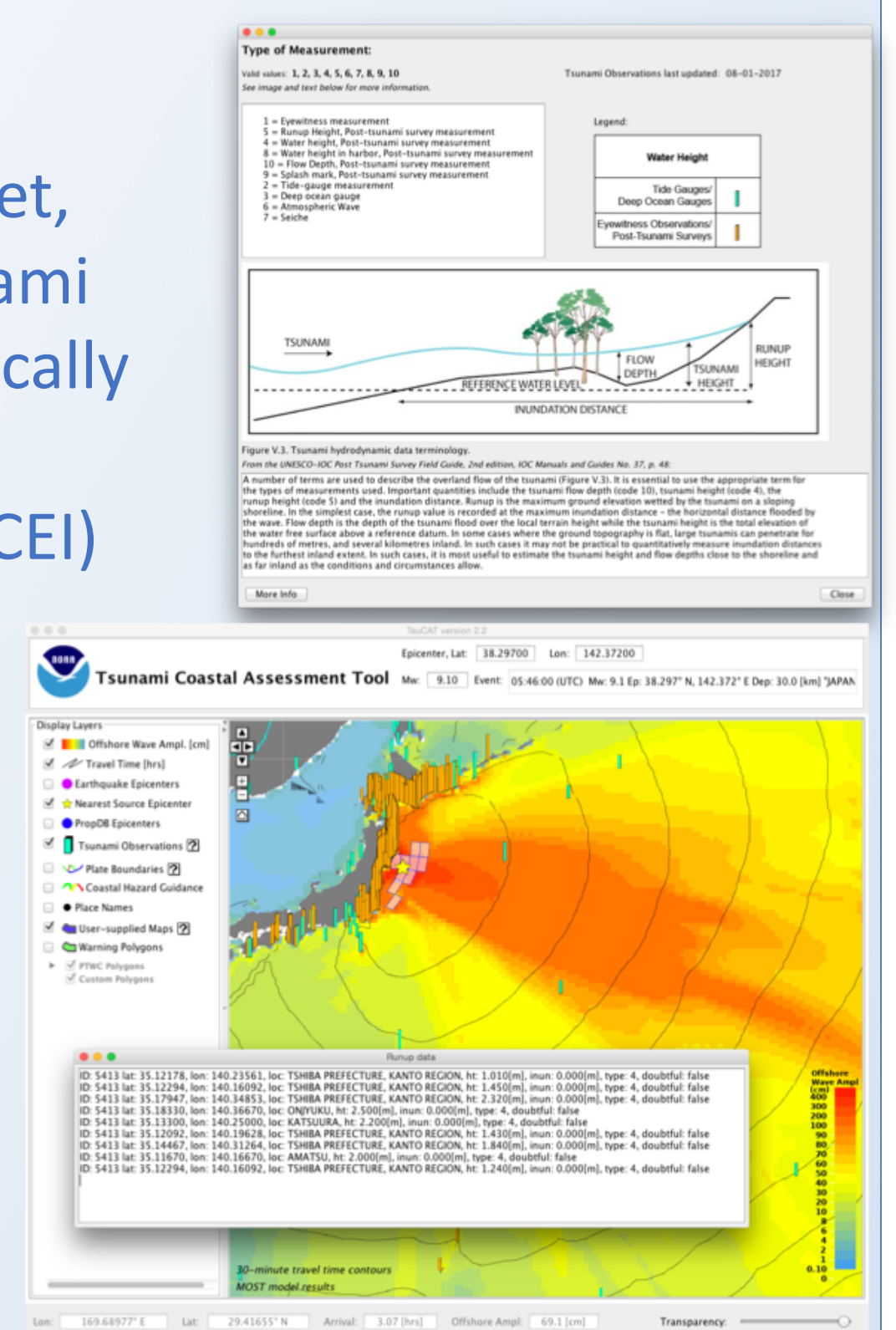
TsuCAT can be used to quickly get a visual impact of increasing magnitude, and this is useful to fully appreciate the logarithmic nature of moment magnitude, but since tsunami dynamics depend so heavily on bathymetry, exploring directionality can also be very useful.

Here we see the effect of keeping magnitude constant, but moving the epicenter just a few hundred kilometers: not only does the maximum amplitude change, but TsuCAT shows the drastic effect on coastal values regionally.



More Use Cases

When connected to the internet, TsuCAT's earthquake and tsunami database will update automatically from the NOAA Center for Environmental Information (NCEI) Global Historical Tsunami Database and the US Geological Survey (USGS) earthquake catalog. The NCEI tsunami observation database includes tide gauge, DART buoy, and post-event survey data for a given event.



Contact and Info

ITIC: Laura.Kong@noaa.gov
<http://itic.ioc-unesco.org>
NCTR: Marie.C.Eble@noaa.gov
Christopher.Moore@noaa.gov
<http://nctr.pmel.noaa.gov/TsuCAT>

