

A report on forecasts of tsunami debris location

15th, March, 2013

Ministry of the Environment, Government of Japan

Issues on marine debris generated by the Great East Japan Earthquake are addressed through cooperation among relevant ministries under the coordination of the Secretariat of Headquarters for Ocean Policy.

MOEJ has been conducting forecasts of tsunami debris location since 2011 to ascertain the status of the debris. The result for this year is provided below.

1 . Prediction method

- Simulations are conducted by using drifting speed obtained by adding the speed of the ocean current and the speed of the wind(leeway).
- Ensemble forecasts are conducted for Lumber(standard) type (above : beneath sea surface=1 : 1) .
- The initial conditions were established by analyzing images obtained by JAXA ' s Advanced Land Observing Satellite(ALOS), " Daichi. "

(Major change from the last simulation)

By conducting ensemble forecasts with actual data obtained until June 2012, deviations in forecasts cancel each other and the precision of averaged states is improved.

* Please see attached 1 for details of the basic prediction method.

2 . Summary

Comparatively high density part for Lumber(standard) type is predicted to start to reach the west coast of the U.S. around April 2013, after remaining between the Hawaiian Islands and the North American Continent from October in 2012 to February in 2013.

* Please see attached 2 for details of the prediction result.

3 . Future response

We will continue to improve the accuracy of the prediction model and keep updating its term as we accumulate more data, based on the simulation results obtained this time.

Furthermore, we will consider necessary measures to take as the government of Japan by sharing information and having discussions with relevant governments and institutes under the coordination of the Secretariat of Headquarters for Ocean Policy, and taking into account the result obtained this time and future result.

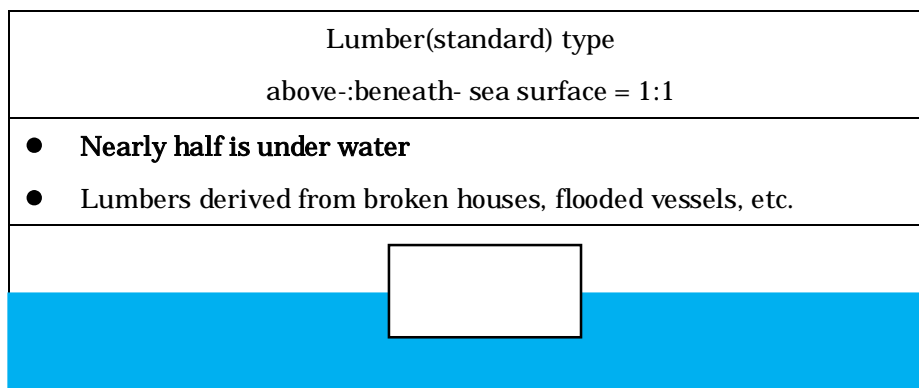
Attachment 1 . Forecasting method of marine debris

<prediction model>

Marine debris locations were simulated using the following hybrid system model on the Earth Simulator at JAMSTEC: the JMA-MRI 3D-Var ocean data assimilation systems (MOVE-WNP for the energetic western North Pacific with 10km horizontal resolutions and MOVE-NP for the entire North Pacific with 50km horizontal resolutions), JAMSTEC 4D-Var coupled atmosphere-ocean data assimilation system (K7 for the global atmospheric and oceanic general circulation with 100km horizontal resolutions), and the JAEA particle-tracking model (SEA-GEARN). In the debris location forecasting, a 6-hourly mean atmospheric reanalysis data (JCDAS: JMA Climate Data Assimilation System) were used for the atmospheric fields from the earthquake to June 30, 2011 and subsequently the K7 forecasted field was adopted for the atmospheric fields after June 30, 2011.

<calculation scheme>

A simulation was carried out for the Lumber type (see below) influenced by both surface winds and surface ocean currents, in which we took into account the effect of windage based on the experimental information of Japan Coast Guard.



<initial conditions>

For initial conditions, satellite images obtained from ALOS (Advanced Land Observing Satellite)/PALSAR (phased array L-band synthetic Aperture Radar) from March 13 to 26, 2011, were analyzed to estimate location clouds of debris flashed out from Iwate to Fukushima Prefectures associated with the earthquake (See the following page for the results from March 13 to 21, 2011)

Based on observational information, particles were released from the coastal seas of Iwate, Miyagi, and Fukushima Prefecture after the earthquake and the spread is calculated using our hybrid system model. Satellite-image analyses exhibited that the debris tended to remain near the coastline as the initial phase. Thus, the release of particles was continued during the period of 20 days from March 12 to 31, 2011.

From the earthquake to June 30, 2011, particle tracking was made using the hybrid system model.

<others>

Influence of material degradation and e.t.c. is confirmed to be extremely small.

Attachment 2. Forecast results

	above-: beneath-sea surface = 1:1		above-: beneath-sea surface = 1:1		above-: beneath-sea surface = 1:1
August 2012	<p>Model Forecast Tsunami Marine Debris Date: 2012/08/15</p>	February 2013	<p>Model Forecast Tsunami Marine Debris Date: 2013/02/15</p>	August 2013	<p>Model Forecast Tsunami Marine Debris Date: 2013/08/15</p>
October 2012	<p>Model Forecast Tsunami Marine Debris Date: 2012/10/15</p>	April 2013	<p>Model Forecast Tsunami Marine Debris Date: 2013/04/15</p>	October 2013	<p>Model Forecast Tsunami Marine Debris Date: 2013/10/15</p>
December 2012	<p>Model Forecast Tsunami Marine Debris Date: 2012/12/15</p>	June 2013	<p>Model Forecast Tsunami Marine Debris Date: 2013/06/15</p>		