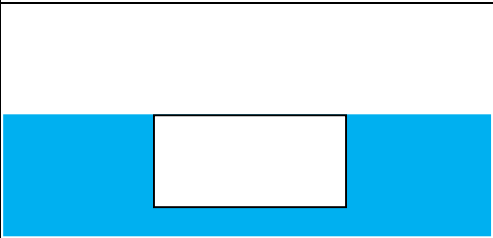
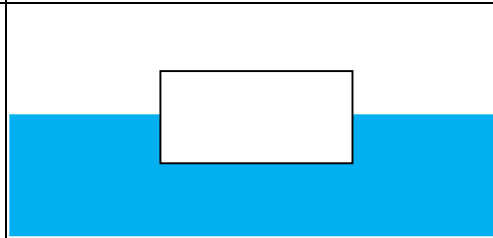
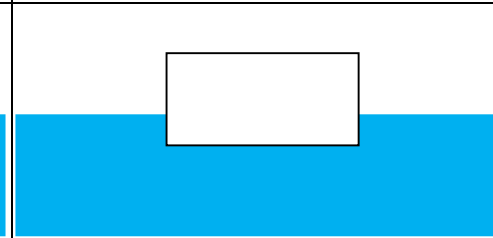
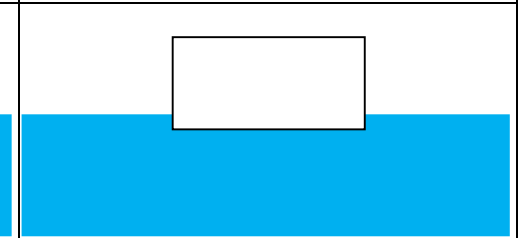


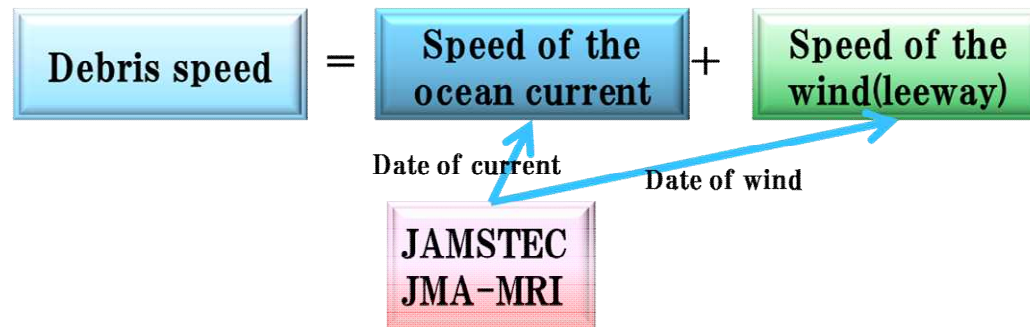
Attachment 1 . Forecasting method of marine debris

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.

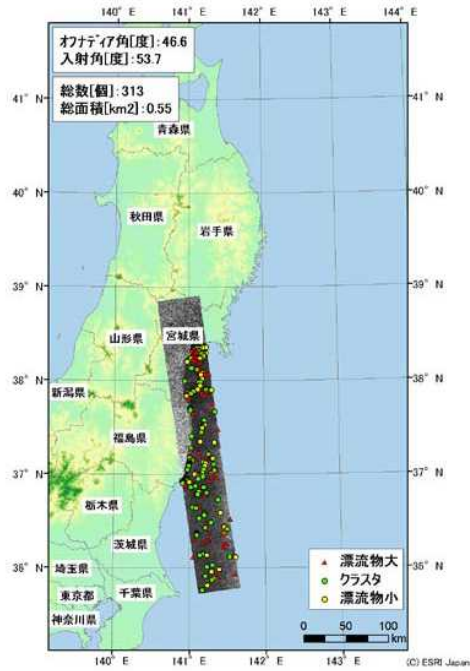
Due to the influence by both surface winds and surface ocean currents, debris excursion largely depends on the ratio of above- and beneath- sea surface portions of debris. Thus, a simulation was carried out for the following 4 cases, in which we took into account the effect of windage based on the experimental information of Japan Coast Guard.

Subsurface type above-:beneath- sea surface = 0:1	Lumber(standard) type above-:beneath- sea surface = 1:1	Float type① above-: beneath-sea surface = 2:1	Float type② above-:beneath-sea surface = 4:1
<ul style="list-style-type: none"> ● Most part is under water ● Driftwoods, waterlogged lumbers, etc. ● Less effect from westerlies 	<ul style="list-style-type: none"> ● Nearly half is under water ● Lumbers derived from broken houses, flooded vessels, etc. 	<ul style="list-style-type: none"> ● A third is under water ● Large effect from westerlies 	<ul style="list-style-type: none"> ● A fourth is under water floats or buoys for fishery farm or fixed-net fisheries, unbroken floating vessels, etc. ● Much larger effect from westerlies
			

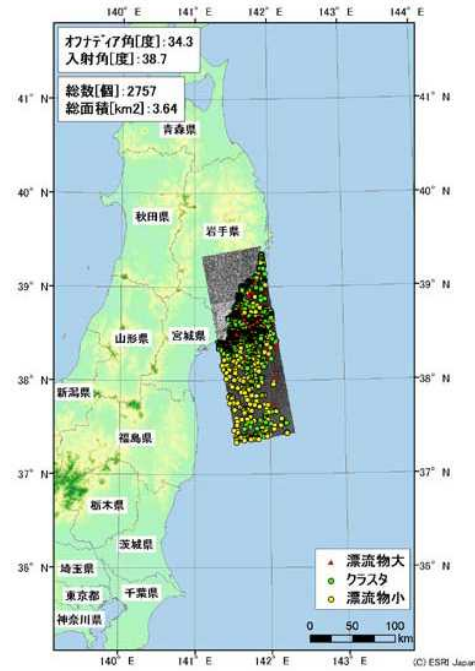
※estimation method of debris speed



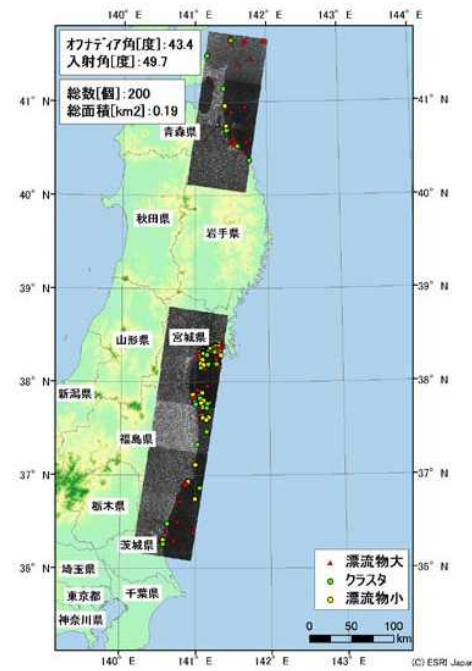
For initial conditions, satellite images obtained from ALOS (Advanced Land Observing Satellite)/PALSAR (phased array L-band synthetic Aperture Radar) from March 13 to 26, 2011, were analyzed to estimate location clouds of debris flashed out from Iwate to Fukushima Prefectures associated with the earthquake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



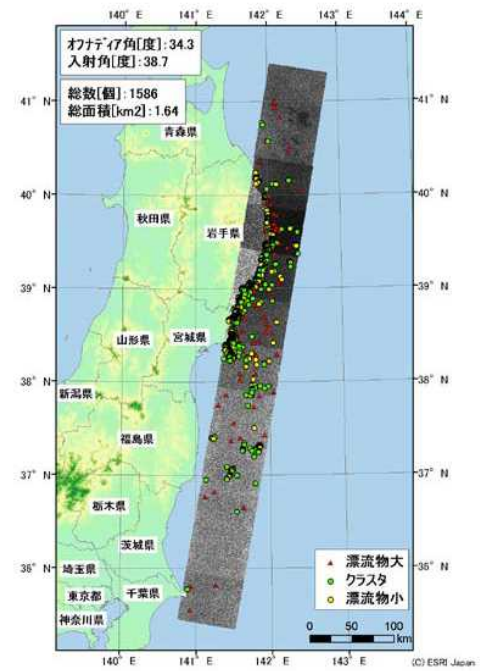
3/13/2011



3/15/2011



3/16/2011



3/21/2011

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.

Attachment 2. Forecast results

