High-Resolution Satellite Oceanography for Monitoring the Tohoku Coastal Seas (Understanding for each and integrated ecosystem using remote sensing, 6th International Symposium on Integrated Field Science)

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Through the intensive Research and Development (R&D) of earth observation satellites in the last decade, the satellite-based observational functions for the global open oceans are highly enhanced. Using the established satellite components of earth monitoring, a challenge is to develop advanced observing systems for the coastal zones, where inputs from land, sea, air and people converge. It is well recognized that the ongoing global changes are increasing threats against the vulnerability of coastal zone.

Since ‘80s, we have been developing the high-resolution satellite products for ocean monitoring, i.e., visible, infrared, and active microwave sensors which all have spatial resolutions better than 1km. The A-Highers (Advanced High Spatial Resolution Sea Surface Temperature maps) are 0.01-degree grided satellite-based SST products generated from the AVHRR sensors. A detection method of high-resolution SST front has been developed using the Jensen-Shannon divergence filter. SST fronts of the Sendai bay are detected by the developed method, which shows the bay-scale river fronts, thermohaline fronts and shelf fronts.

Advanced high-resolution ocean color products can be used for monitoring marine environments and material circulations in the coastal seas. Flesh water inputs from four major rivers to the Sendai bay are considered to be important for the bay ecosystem. A case study shows that the ocean color fronts show significant agreements with the SST fronts in summertime.

Ultra high-resolution surface winds and surface wave fields can be obtained from Synthetic Aperture Radars (SARs). The surface winds drive the coastal circulation, which controls the material circulation in the coastal seas. Combining the numerical ocean and atmosphere models, the SAR high-resolution winds and waves provide new information of dynamical features.

In the presentation, I am going to introduce these application results and a future coastal monitoring system combining them.