

V I S I T I N G S C H O L A R S

Extended Visits by JAMSTEC Experts in Atmospheric Chemistry and Climate Modeling

In recent years, the IPRC has hosted several scientists from the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) for extended periods through a special JAMSTEC fund for such exchanges. During the previous two years, seven scientists from the Research Institute for Global Change (RIGC) and the Earth Simulator Center spent a total of 22 months at the IPRC. In continuing this program, which has the interest and support of JAMSTEC Executive Director **Yoshihisa Shirayama**, IPRC hosted this year two outstanding young atmospheric scientists from RIGC.

Kazuyuki Miyazaki, during his stay from October 2012 through March 2013, worked with IPRC's **Yuqing Wang** on model parameterizations of the vertical transfer of air associated with moist convection and parameterizations of the chemical changes induced by lightning in deep convection. Miyazaki analyzed results of cloud-resolving model simulations conducted at the IPRC and assessed the uncertainties stemming from the use of current cumulus-convection parameterizations in global models. This joint JAMSTEC-IPRC work should help to improve parameterizations of lightning-induced chemical processes in climate models.

Tomoe Nasuno, visiting the IPRC from December 2012 through March 2013, worked with IPRC's **Tim Li** on finding what triggered the strong Madden-Julian Oscillation (MJO) during the CINDY/DYNAMO field campaign (October 2011–January 2012). Finding the triggers for deep convection associated with the beginnings of MJO events in



From left, **Tim Li**, **Tomoe Nasuno**, **Kazuyuki Miyazaki**, and **Yuqing Wang**.

the western Indian Ocean remains a formidable challenge. The CINDY/DYNAMO field campaign, led by JAMSTEC and US agencies, exemplifies the kind of large-scale international collaborative effort that is needed to understand the MJO more fully: an effort that combines in-situ observations, high-resolution reanalysis, and global cloud-resolving models.



From left, **Takuya Hasegawa**, **Chunxi Zhang**, **Yuqing Wang**, and **Toru Miyama**.

Expanding IPRC Regional Climate Modeling Efforts

Toru Miyama, a former IPRC visiting assistant researcher, and his colleague **Takuya Hasegawa**, both now at RIGC, worked extensively with **Yuqing Wang** on the development and applications of the IPRC regional climate model, which has been used in various JAMSTEC projects to study atmospheric climate features from the tropics to the midlatitudes. In one such project, Miyama and Hasegawa are using the IPRC regional atmospheric model to understand how the sharp sea surface temperature gradient, stemming from upwelling along the New Guinea coast, strengthens the westerly surface winds in the western equatorial Pacific. Such winds are possible El Niño triggers.

The IPRC and JAMSTEC scientists are also developing a new version of the regional ocean-atmosphere coupled model (iROAM), combining the IPRC regional atmospheric model and the ocean model HYCOM.

Developing Regional Ocean Models for “Ocean Weather” Prediction

Yasumasa Miyazawa, Leader of the Ocean Downscaled Prediction Research Team at JAMSTEC, visited the IPRC in March 2013 to discuss opportunities for joint research on ocean modeling. During his seminar, Miyazawa presented impressive results of his work with other scientists of the Japan Coastal Ocean Predictability Experiment (JCOPE) group. The group is developing a system for predicting shifts in the Kuroshio path and in mesoscale eddies, which greatly influence Japan’s coastal ocean and regional climate. The downscaled model simulations now include internal-tide processes and their complex interaction with the Kuroshio and with mesoscale eddies, yielding realistic wave-induced mass fluxes. An outcome of the visit is that Miyazawa and IPRC’s **Nikolai Maximenko** and **Oleg Melnichenko** have started exchanging ideas in order to formulate research tasks as part of future JAMSTEC–IPRC collaboration.



Nikolai Maximenko with Yasumasa Miyazawa.



Tracking Marine Debris on Coastlines with Cameras

Tomoya Kataoka from the National Institute for Land and Infrastructure Management in Ibaraki, Japan, visited the IPRC in February 2013 to discuss with **Nikolai Maximenko** the movement of marine debris washing onto shorelines. Kataoka gave a seminar on his study on coastline monitoring of remote beaches in Japan with high-resolution webcams. In close partnership with **Atsuhiko Isobe**, professor at Ehime University, he has developed the technology to identify, count, and trace how objects move along a shoreline. First results show that even in places known for marine debris to pile up, objects may float in and out many times—pushed and pulled by high waves, tides, or winds—before staying on shore or floating back into the ocean again. The study shows that no simple model will describe the complexity of debris movement along shorelines.

Kataoka’s talk was broadcast by the WebEx system to the “marine debris” community. With the help of Hawai’i State International Coastal Cleanup Coordinator **Chris Woolaway**, Campbell Wildlife Refuge Manager **David Ellis**, and Hanauma Bay Manager **Tara Hirohata**, Kataoka had the opportunity to survey with Maximenko marine debris and possible tsunami driftage on the windward shores of Oahu. The visit is expected to start a long partnership between the scientists in Japan and the IPRC.



Tomoya Kataoka, inspecting oyster buoys very likely from the 2011 tsunami, with Nikolai Maximenko and the oyster buoy “owner” on windward Oahu.