

IPRC Governing Committee Meets

The IPRC Governing Committee held its annual meeting at the IPRC from April 15 to 17, 2009. **Shiro Imawaki**, Executive Director of the Japan Agency for Marine-Earth Science and Technology (JAMSTEC), who joined the Governing

Committee this spring, served as Japanese co-chair; NASA Program Scientist **Eric Lindstrom** continued as US co-chair. The meeting reviewed governance issues and overall progress at the IPRC. For the first time it was extended to three full days to allow the members to hear extensive presentations from IPRC scientists on their recent research results.



Governing Committee participants from left: Eric Lindstrom (NASA), Hidetoshi Nakamura (JAMSTEC), Shiro Matsugaura (JAMSTEC), Howard Diamond (NOAA), Kevin Hamilton (IPRC), Yukio Masumoto (JAMSTEC), Masao Fukasawa (JAMSTEC), Brian Taylor (SOEST), Shiro Imawaki (JAMSTEC).

Interim Director Visits JAMSTEC Headquarters

Interim IPRC Director **Kevin Hamilton** visited JAMSTEC headquarters in Yokosuka on August 25, 2009, to review the progress in research conducted under the partnership between the IPRC and JAMSTEC (JAMSTEC-IPRC Initiative or JII). He met with Executive Director **Shiro Imawaki**, Research Director of the Research Institute for Global Change **Masao Fukasawa**, International Affairs Division (IAD) Manager **Eiichi Kikawa**, International Cooperation Coordinator **Hidetoshi Nakamura** and **Shiro Matsugaura** of IAD. The visit also set the stage for the face-to-face meeting of the JII partnership's research-theme leaders scheduled for November in Yokohama.

Components waiting to be assembled into the new IPRC computer *Kuroshio*. Inset. IPRC Computer System Manager Ronald Merrill with the assembled *Kuroshio*.

Kuroshio - IPRC's New Supercomputer

IPRC has purchased and installed a new 488 core Dell Linux cluster. Appropriately named after the swift Kuroshio current, the new cluster provides nearly an order of magnitude upgrade of IPRC's computing capability.



IPRC Scientists Active in the Climate Research Community

IPRC Interim Director **Kevin Hamilton** participated in the Western Regional Workshop for the National Climate Change and Wildlife Science Center, a new program of the US Geological Survey (USGS) geared toward providing information on climate change relevant to wildlife management. Held June 4–5 in Seattle, the workshop brought together USGS managers with a broad group of potential stakeholders in the new program, including scientists from universities in the western US, Alaska and Hawai'i. The workshop focused on hearing stakeholders' views and their priorities for the new National Center. A meeting summary is at http://nccw.usgs.gov/documents/NCCWSC_Western_Workshop_Summary.pdf

Hamilton also made a presentation at the NOAA Pacific Islands Fisheries Science Center (PIFSC) Climate Workshop held August 5–6 in Honolulu. PIFSC sought input at the workshop for integrating climate-change research into their program over the next three years. With over 200 employees, the PIFSC has the mandate to administer scientific research and monitoring programs that support the conservation and management of living marine resources.



At the NOAA Pacific Island Fisheries Science Center Climate Workshop from left: Eileen Shea (Chief of Climate Monitoring and Services Division, NOAA National Climatic Data Center), Laura Hamilton (NOAA Pacific Regional Coordinator), and Kevin Hamilton.

Kaoru Sato, Professor of Earth and Planetary Science at the University of Tokyo, and **Toru Sato**, Professor of Communications and Computer Engineering at Kyoto University, kindly invited Kevin Hamilton to visit the world-renowned MU Radar Observatory near Shigaraki, Japan. Consisting of

a phased array of 475 antennas operating at 1 megawatt power, the MU radar can profile three-dimensional wind, temperature and turbulence in the troposphere and lower stratosphere with very high temporal and vertical resolution. By far the most capable instrument of its kind in the world, it not only measures variables related to climate, but has also been applied to track the space debris in low Earth orbit. While at the observatory, Hamilton enjoyed interacting with graduate students from the University of Tokyo and Kyoto University who are using the MU radar for their thesis projects.



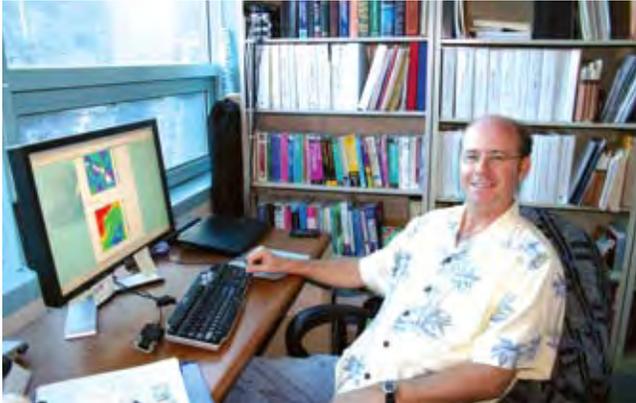
Kevin Hamilton with Professor Kaoru Sato (right) and students at the MU Radar Observatory.

The CLIVAR Asian-Australian Monsoon Panel (AAMP) has asked IPRC scientists **Xiouhua Fu** and **Bin Wang** to include the IPRC Hybrid-Coupled Model in the multi-model hindcasts of the intraseasonal weather disturbances that are the focus of AAMP and Asian Monsoon Year projects. The Panel was impressed with the fact that the model was able to “forecast” beyond one month the eastward movement and associated rainfall of the leading tropical disturbance, the Madden-Julian Oscillation, as it was observed during the TOGA-COARE field experiment.

IPRC faculty member **Yuqing Wang** has accepted the invitation to become an associate editor of *Advances in Atmospheric Sciences* (AAS), a Springer-published journal of the Institute of Atmospheric Physics of the Chinese Academy. AAS is an international scientific journal with papers dealing with a full range of the atmospheric sciences including the dynamics, physics, and chemistry of the atmosphere and ocean.

James Potemra Receives AGU Award

James Potemra, Assistant Manager of IPRC's Asia-Pacific Data-Research Center, was among the recipients of the American Geophysical Union (AGU) 2008 Editors' Citations for Excellence in Refereeing. The awardees are commended by the editors of AGU journals for "consistently providing constructive and thoughtful reviews" of manuscripts.



IPRC Scientists Participate in Aquarius Mission

Our understanding of ocean processes has benefited for many years from global satellite observations of sea surface temperature and sea surface height, but no comparable satellite observations of ocean salinity have been available. This situation will change in 2010 with the launch of the Aquarius/SAC-D satellite mission. The satellite will measure sea surface salinity and provide a global view of salinity variability at space and time scales not resolved by other parts of the Global Ocean Observing System. As with all measurement systems, the quality of the new Aquarius data must be evaluated, and IPRC scientists will be contributing to such evaluation.

In October, IPRC Senior Researcher **Nikolai Maximenko** joined the NASA Ocean Salinity Science Team. He is also the principal investigator (with **Jim Potemra** and **Peter Hacker** co-principal investigators) on a four-year NASA contract recently awarded to the IPRC for the project *Aquarius salinity calibration, error quantification, signal-to-noise analyses, and resolution studies using historical and concurrent data to study salinity structure and variability at ocean fronts and due to air-sea interaction*.

The IPRC team will focus on producing the best possible satellite-derived ocean salinity data sets by validating the data with in situ and complementary satellite data products;

they will use these new data sets to analyze and characterize the space-time variability of sea surface salinity fronts.

IPRC Senior Researcher **Tangdong Qu** is participating as co-principal investigator on another part of the Aquarius Mission that is being led by **Ichiro Fukumori** at the NASA Jet Propulsion Laboratory. Under this contract, Qu will be assessing the quality of Aquarius sea surface salinity measurements using an "Ocean State Estimation System." The use of this system for comparison with the Aquarius data will bring significantly more observations to bear on assessing the Aquarius-data quality than would otherwise be possible.



Aquarius Mission Satellite. Photo courtesy of NASA.

IPRC Publications Have Impact

The work of IPRC's **Yuqing Wang** and **Hironori Fudeyasu** and their JAMSTEC colleagues on predicting tropical cyclones with the powerful, global cloud-system-resolving Non-hydrostatic Icosahedral Atmospheric Model (NICAM) was featured in *Kaunana*, a magazine that publishes research conducted at the University of Hawai'i for a general audience.

Bin Wang's study on the formation of annular hurricanes was chosen as an Editors' Highlight by the American Geophysical Union. The paper was co-authored with UH Meteorology graduate student **Xiaqiong Zhou**. Citation: Zhou, X., and B. Wang, 2009: From concentric eyewall to annular hurricane: A numerical study with the cloud-resolved WRF model. *Geophys. Res. Lett.*, **36**.

The review article on the Indian Ocean circulation and climate variability by **Fritz Schott**, **Shang-Ping Xie**, and **Jay McCreary** was ranked in *ScienceDirect* TOP25 Hottest Articles as second most weekly downloaded article among all journals of the American Geophysical Union. Citation: Schott, F.A., S.-P. Xie, and J.P. McCreary Jr., 2009: Indian Ocean circulation and climate variability. *Rev. Geophys.*, **47**.

IPRC Scientists Active in the Community

IPRC faculty member **Axel Timmermann** participated in a panel discussion following the showing of the film “A Sea Change,” which deals with acidification of our oceans due to high concentrations of atmospheric CO₂. Invited by Honolulu’s Bishop Museum, which hosted the July event, Timmermann was joined by 5 other panel members who came from the NOAA Pacific Islands Fisheries Science Center, the Bishop Museum, and the UH Hawai’i Institute of Marine Biology.

Timmermann was also featured on July 22, 2009, in a Hawai’i Public Radio news interview with **Ben Markus** about results from the ongoing climate model simulation on the Oak Ridge National Laboratory supercomputer. The climate



model provides an unprecedented view into the mechanisms of abrupt climate change in the past. The impetus for the Timmermann interview was a contribution by Timmermann and **Laurie Menviel** to *Perspectives* in the July 16, 2009, issue of *Science*. The interview can be heard at www.hawaiipublicradio.org/markus/climate_22.mp3.



A breakout group at the Leadership Summit, from left: Kevin Hamilton, ‘Aulani Wilhelm (Superintendent, Northwest Hawai’ian Islands Marine National Monument), Deanna Spooner (Executive Director, Hawai’i Conservation Alliance), Kenneth Kaneshiro (Director, UH Center for Conservation Research and Training), Tom Giambelluca (UH), Barry Stieglitz (Project Leader, Hawai’ian and Pacific Islands National Refuge Complex), Bill Thomas (Director, NOAA Pacific Services Center).

Interim Director **Kevin Hamilton** represented the IPRC at the *Hawai’i Climate Change Leadership Summit* on July 31, 2009, in Honolulu. The summit brought together leaders from academic centers, state and federal government agencies, and nonprofit private organizations that all have interest in climate-change adaptation in Hawai’i and other Pacific islands. The meeting provided a forum for exchange of concerns and information among climate researchers and officials with responsibility for natural resource management.

Hamilton was also invited as the keynote speaker at the 2009 Earth Day observances at Windward Community College (WCC) on Oahu. WCC students, administrators, and faculty, along with members of the general public came to hear Hamilton’s talk “Our Climate Dilemma: What We Know and What Options Remain” (<http://kaohana.windward.hawaii.edu/story.php?aID=434>).



Kevin Hamilton with WCC Vice-Chancellor Richard Fulton (left) and WCC Student Counselor Lokelani Kenolio, who organized the Earth Day event. They are standing beside a WCC innovation - a recycle bin for plastic bottles that itself is made from recycled plastic bottles!

IPRC Teams with Adventure Sailor

There is a long tradition in oceanography and meteorology of employing “ships of opportunity” whose crew take measurements incidentally as they pursue their course through the ocean. IPRC has now engaged its own very unusual ship of opportunity, one that will take novel measurements of solid pollution in the ocean. The adventure sailor **Jim Mackey** is attempting a solo circumnavigation of the globe and has volunteered to take samples of floating debris as he makes his way from his starting point in the North Atlantic through the South Atlantic, Indian, and South Pacific Oceans, back into the Atlantic. To collect the samples, he will use a trawl designed and built by **Markus Eriksen** (Algalita Marine Research Foundation) especially for use on his small sailboat. By trawling for debris samples in seldom visited regions, his voyage will contribute to several scientific programs.

IPRC’s **Nikolai Maximenko** and **Jan Hafner** have supplied Jim with equipment and key navigational data so that he can measure the levels of



A Rival 34, the type of sailboat on which Jim is sailing. Photo source <http://www.yachtsnet.co.uk/index.htm>

Trawl built by Markus Eriksen for measuring marine debris from Jim’s boat.

partially defragmented plastics in the eastern part of the South Pacific, where Maximenko’s model predicts is the world’s ocean strongest convergence of flows and where floating matter collects from the Southern Hemisphere (see story in *IPRC Climate*, Vol. 8, No. 2). Guided by the model results, Jim will also be looking for plastic fragments in

the subtropical convergences of the South Atlantic and South Pacific and along the Antarctic Circumpolar Current.



Projected route of Jim Mackey’s solo circumnavigation.

Visitors

Tetsuo Nakazawa (Japan Meteorological Research Institute), **Masaki Satoh** (University of Tokyo and JAMSTEC), and **Hiroyuki Yamada** (JAMSTEC) visited the IPRC in July. Nakazawa, who was a researcher at the University of Hawai'i in the early 1980s, discovered the nested hierarchy of cloud variability within the large-scale eastward propaga-

tion of the Madden-Julian Oscillation (MJO) and introduced the concept of the MJO supercluster. IPRC scientists took the opportunity to meet with the visitors for a lively and enlightening discussion on the space-time organization of tropical convection in observations and models.



Seated around the table from left: Ping Liu, Hiroyuki Yamada, Masaki Satoh, Tetsuo Nakazawa, Kevin Hamilton, Hironori Fudeyasu, Kazuyoshi Kikuchi, and (back left) Kazuyoshi Soma.

Qinghong Zhang from the Department of Atmospheric Sciences, Peking University, visited the IPRC from August 30 to September 29, 2009. Zhang is an expert in the areas of tropical cyclone and regional climate research and has collaborated in several projects with IPRC's **Yuqing Wang**. Their co-authored paper on hail trends in China was highlighted in *Geophysical Research Letters* and *Nature China* last year. During her visit, Zhang continued her collaboration with Wang on investigating whether observational data of hail stones show any changes in size that could be attributed to recent climate change.

The Director of the Indian Institute of Tropical Meteorology (IITM) **B.N. Goswami** visited the IPRC in July 2009. A member of the Joint Scientific Committee of the World Climate Research Programme, Goswami has contributed significantly to understanding monsoon dynamics and variability. In his meeting with the IPRC Monsoon Research Team, he stressed the urgency of more precise prediction of intraseasonal and year-to-year monsoon rainfall and of forecasting the monsoon behavior to be expected with the anticipated global warming. He also talked about events at the IITM and the exciting establishment of the new Center for Climate Change Research.



Qinghong Zhang (left) discusses hail sizes with Yuqing Wang.



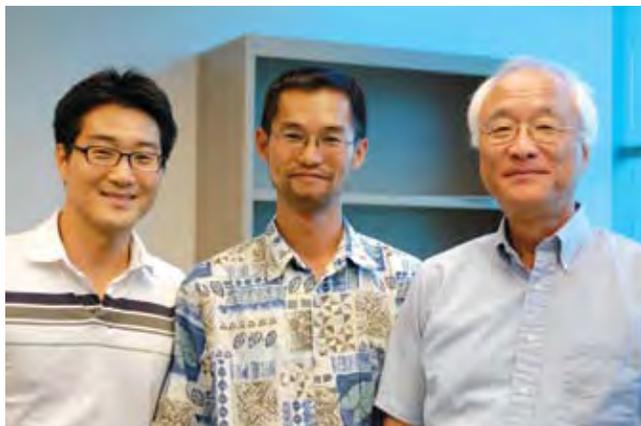
Senior Researcher H. Annamalai (left) with B.N. Goswami.

Scott Power, Co-director of the Pacific Climate Change Science Program (Centre for Australian Weather and Climate Research, Bureau of Meteorology) visited the IPRC in July. This new AUD \$20 million climate program will help the developing island-countries in the South Pacific to understand better how climate change will affect them and assist them with adapting to the change. The program intends to produce a report on climate change for the South Pacific using a similar framework as the 2007 Working Group 1 report of the Intergovernmental Panel on Climate Change. To discuss the work ahead and possible collaborations with the IPRC, particularly studying sea level changes, Power met his IPRC host **Axel Timmermann** and several other IPRC scientists.



From left, Niklas Schneider, Scott Power, Bo Qiu (UH Oceanography), and Bin Wang.

Masao Kanamitsu, researcher at Scripps Institution of Oceanography, visited the IPRC in August 2009. Kanamitsu has made notable contributions to global atmospheric modeling and aspects of weather and climate forecasting. Most recently, he has been leading efforts at Scripps on regional atmospheric modeling. At the IPRC he presented a seminar titled “Dynamical Downscaling for Climate Study: Basic Concepts, Misunderstandings, and Possible Solutions.”



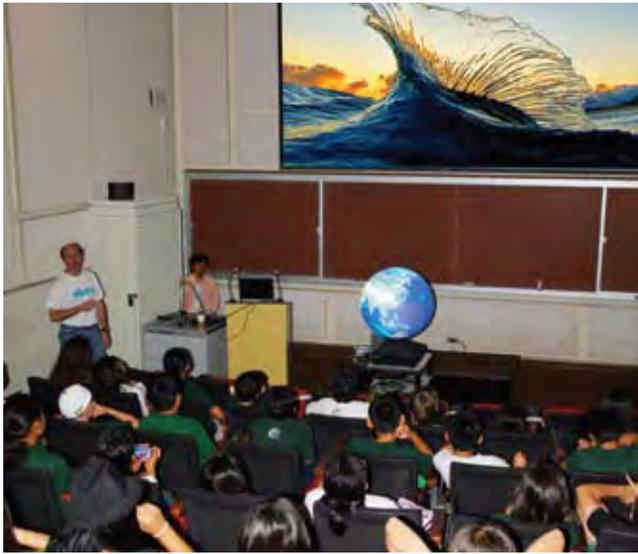
Masao Kanamitsu with IPRC postdoctoral fellows Hyodae Seo and Yoshiyuki Kajikawa.

Anne Mouchet from the University of Liege, Belgium, visited the IPRC for a week in October 2009. During her visit she gave a joint Oceanography - IPRC seminar on climate interactions with the carbon cycle. She is collaborating with **Laurie Menviel** and **Axel Timmermann** on the response of carbon isotope tracers to glacial circulation changes. Carbon isotopes (^{13}C and ^{14}C) are frequently measured in ocean sediment cores and have become one of the main paleo-proxies for ocean circulation changes. With the new version of the earth system model LOVECLIM, a model frequently used by Timmermann’s research team, this paleo-proxy can be simulated, and model results can be directly compared with paleo-oceanographic data. Mouchet also helped in developing a carbon isotope module for the vegetation model in LOVECLIM, and as a result of her visit, a new series of climate-change simulations is now being configured to elucidate the origin of CO_2 changes during periods of weakened Atlantic Meridional Overturning Circulation. Together with new ice core data of $^{13}\text{CO}_2$ and the new LOVECLIM model simulations that predict $^{13}\text{CO}_2$, Menviel and Timmermann will be able to test a hypothesis to explain the CO_2 increase in paleo-records during so-called Heinrich events.



Anne Mouchet with postdoctoral fellow Laurie Menviel.

IPRC Takes Part in SOEST Open House



Over 4000 students and community members filled the halls and grounds of SOEST for its 10th Biennial Open House on October 16 and 17. IPRC scientists put on five different shows for the occasion: **Oliver Timm** and **Axel Lauer** focused on climate change; **Jim Potemra** illustrated how wind drives ocean currents; **Tobias Friedrich**, in his description on ocean acidification, delighted students with demonstrations on how corals dissolve in vinegar; **Yanli Jia** created a show on the annual cycle of ocean surface temperatures around Hawai'i; and **Jan Hafner** used animations of Niko-



Iai Maximenko's ocean circulation model on tracer movements to describe how garbage collects in two great patches in the Pacific: the North Pacific patch, which is already well known and the one in the South Pacific, which still needs to be found. The recently acquired Magic Planet, which allows animations to be shown on a glowing 24-inch-diameter sphere, took center stage in the demonstrations.

Konstantin Lebedev and **Oleg Melnichenko** helped with preparations, and **Ryo Furue**, **Nat Johnson**, **Sachiko Yoshida**, **Tony Ma**, **Jing Xu**, **Francois Ascani**, **K.P. Sooraj**, **Hyodae Seo**, and **Jasti Chowdary** ensured that everything ran smoothly.



Photos by Tony Ma.

Aloha and Welcome to the IPRC



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