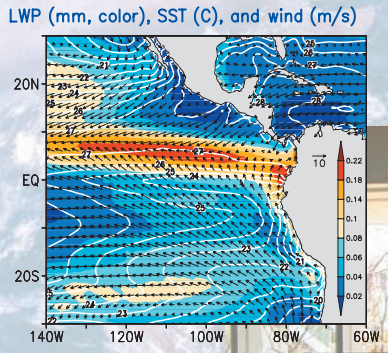
More Realistic Simulation of Eastern Pacific Climate



Kelvin Richards and Simon de Szoeke with Toru Miyama. Courtesy Toru Miyama.

The climate of the eastern Pacific plays an important role in the El Niño-Southern Oscillation and thus in global climate. This region, though, has been notoriously difficult to simulate realistically in climate models. IPRC researchers have developed a model, the iROAM (IPRC regional ocean-atmosphere model) that couples the IPRC regional atmospheric model (*IPRC Climate*, Vol. 2, No. 2) with the GFDL Modular Ocean Model. The ocean model covers the entire tropical Pacific, and the atmospheric model covers the eastern half of the Pacific as well as Central America and most of South America. In collaboration with the Kyousei-7 Project at the Frontier Research Center for Global Change (Frontier), the model has been adapted to run on Japan's Earth Simulator. The iROAM has successfully captured the salient features of eastern Pacific climate that have been so difficult to simulate, including the northward-displaced intertropical convergence zone (ITCZ) and the equatorial annual cycle. As in observations, the model ITCZ stays north of the equator most of the year except for a brief period in March and April when equatorial sea surface temperatures reach their annual maximum.

In March 2006, **Simon de Szoeke** and **Kelvin Richards** traveled to Frontier for further iROAM experiments. De Szoeke worked closely with **Toru Miyama**, a former scientist at IPRC and now at Frontier, on running new simulations with iROAM on the Earth Simulator. These simulations were designed to study the sensitivity of the eastern tropical Pacific climate to particular atmospheric and oceanic processes. The physics of these processes is uncertain, and their representation in coupled climate models is believed to cause the biases in the eastern tropical Pacific. For example, in one simulation, the shallow cumulus convection was decreased. This decrease in shallow convection increased stratiform cloudiness and changed the seasonal north-south migration of the ITCZ.

De Szoeke and Richards also participated in a mini-workshop with the K-7 scientists. They showed how insights on physical processes drawn from experiments with iROAM can improve the representation of tropical climate and constrain important physical parameters in coupled climate models.

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