

## METEOROLOGY

# Science Overrides Politics for East Asian Monsoon Study

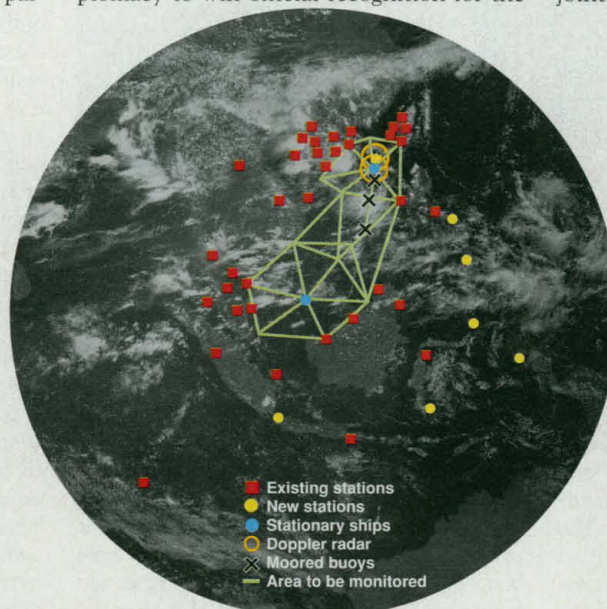
BEIJING—Two springs ago, the run-up to Taiwan's first direct presidential elections triggered a major political standoff with China, which views the island as a breakaway province. The focal point was the Taiwan Strait, as People's Liberation Army troops and missiles were pitted against the intimidating presence of the U.S. Pacific Fleet. This year, the 150-kilometer-wide body of water at the northern tip of the South China Sea is once again attracting attention. But this time the participants are scientists, not massed armies, and the exchanges involve information, not munitions.

During the next 4 months, scientists from nine countries and regions that border the sea will measure rainfall, sea temperatures, and wind and ocean currents in an effort to better understand the timing, intensity, and duration of the East Asian summer monsoon. The South China Sea Monsoon Experiment (SCSMEX) is expected to fill what C. Y. Lam, a meteorologist at the Hong Kong Observatory, calls "a data void" about this important phenomenon. SCSMEX may also be the region's most ambitious attempt at scientific cooperation. "For the success of the experiment, all participating countries have agreed to put aside any political issues involved," says Yihui Ding, a meteorologist at the China Meteorological Administration's National Climate Center in Beijing and chair of the scientific steering committee.

The experiment grew out of a long-standing China-U.S. cooperative effort to study the monsoon. Events in the South China Sea are thought to be major contributors to the Asian monsoon, says William Lau, head of the Climate and Radiation Branch of NASA's Goddard Space Flight Center in Greenbelt, Maryland, and vice chair of the organizing committee. But because most countries in the region have modest scientific resources for ocean monitoring, those events are not well understood. "The South China Sea is a large part of the world's oceans, but it has never been well studied," says Wen-Ssn Chuang, an oceanographer at National Taiwan University's Institute of Oceanography in Taipei. Air-sea interface data currently used in models are based on estimates, says Junyue Yan, a marine climate researcher at China's National Climate Center, who notes that actual data will help "to better understand the pro-

cess of the Asian monsoon and [improve] prediction modeling."

Scientists involved in the China-U.S. monsoon effort began discussing plans to gather South China Sea data in the early 1990s, says Lau, "but we decided this had to be multinational because it involved all the East Asian and Southeast Asian countries." Although meteorologists and researchers embraced the idea, it took years of quiet diplomacy to win official recognition for the



**Science in motion.** The first image from a Chinese geostationary weather satellite reveals convective activity last June over the South China Sea, which will host a network of air and water monitoring stations, ships, and radar facilities.

project. Jough-Tai Wang, chair of the Department of Atmospheric Sciences at Taiwan's National Central University in Chungli, says there were some political objections to collaborating with the mainland. In other countries and regions, the hurdle was the perceived threat to national security due to locating observation equipment on islands seen as strategic military outposts. The success of the negotiations has meant that the seven participating research vessels can, for the first time, traverse the disputed regions freely, gathering data and deploying instrumented buoys.

Although the intent of SCSMEX is similar to that of other large-scale, multinational efforts to study weather and climate variability, its reliance on funding and personnel from the region rather than from the big international science powers makes it un-

usual. Scientists from the Philippines, Vietnam, Thailand, Malaysia, Singapore, Indonesia, and Brunei, in addition to China and Taiwan, will participate in the experiment, which includes two intensive, 3-week periods of investigation in May and June. Vietnam will also contribute a research vessel, and China will deploy four ships and provide space in Guangzhou for operations. Taiwan will operate two research vessels and deploy a number of instrumented buoys.

Some high-tech help is also coming from outside the region. The United States is lending a Doppler radar, while Australia will provide another Doppler radar and several aerosondes, miniature robotic aircraft that can stay aloft for up to 36 hours. Satellite data will also be made available from the joint U.S.-Japan Tropical Rainfall Measuring Mission, a remote-sensing satellite launched by a Japanese rocket last November.

Australia's radar will be set up on Dongsha Island, and the U.S. instrument will be placed on a ship about 50 kilometers away. Using them in tandem should allow scientists to get a more detailed picture of thunderstorm-scale processes than is possible using individual radars. "Together, you can determine in great detail the structure of the [convection] motions around a thunderstorm," says meteorologist Tom Keenan of Australia's Bureau of Meteorology Research Center. Understanding the dynamics of these storms and their role in propagating the monsoon should improve monsoon forecasting, he adds.

The pilot phase of the experiment has already yielded important results from buoys deployed last year, says Chuang. One finding is the surprising importance of the Kuroshio current, one of the major currents of the western Pacific, which flows northward from off the coast of the Philippines past Taiwan toward Japan. "Our data show that a branch of the Kuroshio comes in [to the South China Sea] year-round," he says, in contrast to the prevailing wisdom that it flowed into the sea only during the winter. "It brings [with it] a lot of mass as well as heat flux." This closer coupling between the South China Sea and the Pacific could force scientists to revise ocean circulation patterns and regional climate and weather models.

Meteorologists hope that SCSMEX will stimulate further interest in climate studies at home as well as continued regional cooperation. "Meteorologists are born collaborators," says Lam, "because the weather affects everybody."

—Dennis Normile and Li Hui

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