

A plan for monitoring Africa's weather

As climate change makes the developing world even more vulnerable to natural disasters, developed countries extend a global partnership for sharing satellite images.

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Cape Town, South Africa - When a massive earthquake shakes some corner of the Pacific Ocean, sensors alert Pacific Rim nations of possible tsunamis. When massive downpours converge on the nations of Central America, satellite imagery and computer modeling helps those nations to prepare for possible floods.

But what about Africa? This vast continent of 53 nations has been struck so often by natural disasters – from drought to flood to disease – that the continent is all-too-often synonymous with cataclysm.

While such disasters will continue, technological help from the Group on Earth Observations (GEO) – a partnership of 72 nations that share satellite imagery and other remote sensing information – will soon give African nations a leg up when it comes to managing natural emergencies. At a meeting here on Nov. 30, GEO members agreed to expand the group's operations from the

Americas and Europe into Africa.

The expansion comes at a critical time. As climate change makes itself felt around the world, no one is more affected than Africa's 800 million citizens. Any opportunity to prepare for and mitigate the effects of extreme changes in climate can help nations prevent droughts from becoming famines, heavy rains from becoming floods, and an outbreak of disease from becoming an epidemic.

"We are at the confluence of a number of events," says Vice Adm. (ret.) Conrad Lautenbacher (ret.), the US undersecretary of Commerce for oceans and atmosphere, and one of GEO's co-chairs. "We have computing capabilities to produce worldwide models," he says. "We can



Looking ahead: Schoolchildren watched the effects of global warming through three-dimensional lenses at an exhibition in Cape Town on Thursday during the GEO meeting. Karin Schermbrucker/AP

observe what's happening with sensors on the ground and in space. And communication technology has opened up the world, so that we can move this information around quickly."

With the expansion of GEO, the US and other developed countries have agreed to share satellite imagery and computer modeling to suggest what may happen up to three months into the future. The data and computer models would cover not just weather patterns, but also likely conditions for the spread of diseases such as malaria, for shifts in human population, and even for changes in air quality.

Africa's contribution, for the time being, will be to share ground data with GEO member countries while they build their capacity to conduct more sophisticated weather forecasting and analysis.

"Capacity building is so crucial," says Daniel Irwin, a NASA scientist and project director of SERVIR (the Spanish acronym for Regional Visualization and Monitoring System). Satellites cannot do the work alone, he adds. "This is a genuine partnership. We provide satellite data, and they go out and collect field data, and we create a value-added product. Now we get information to be part of the decision-making process."

Building on a successful model

For all its potential wealth in minerals, oil, and other natural resources, Africa remains a continent highly dependent on subsistence agriculture. In many countries, more than half of citizens survive literally on what they grow. Any extreme change in weather can be devastating. In the two decades before 2000, according to GEO, more than 2 million people died because of drought in three countries alone: Ethiopia, Sudan, and Mozambique.

"We in the US lose about \$6 to \$8 billion a year because of drought," says Admiral Lautenbacher. Improved use of satellite imagery and computer models for tracking weather patterns are helping farmers and state governments to prepare for dry seasons and wet seasons.

A model for helping developing countries benefit from the same technology to prepare for changing weather patterns already exists. The US, Canada, and Mexico already share weather data through their North American Drought Monitor, and in February 2005, they expanded operations to include Central America.

In November 2006, after just one year of the system being in place, Central American meteorologists were able to use satellite imagery and ground observations to predict the effects of major a tropical storm in northern Panama. The system allowed Panama's president to intervene early by issuing an alert, which helped avert a wider disaster.

Competition from China and Brazil

While the GEO process is motivated by the spirit of scientific information-sharing and partnership, there is also a touch of cold war-style competition for African hearts and minds – and their attendant deals for natural resources.

On Wednesday, China and Brazil announced a separate contribution to the GEO effort, which they call the Chinese Brazilian Earth Resources Satellite (CBERS). They are offering real-time, high-resolution satellite imagery to developing countries for free. The two countries will also offer on-demand geographic information system tools and training for those who need it.

"This new service forms a major contribution to international efforts to build the Global Earth Observation System of Systems," said Zheng Guoguang, head of the China Meteorological Administration at a press conference in Cape Town. "It will strengthen sustainable development and risk management throughout Africa."

Phil Mjwara, director general of the South African Department of Science and Technology, insists that African nations have no intention of merely taking handouts. They have the capacity and will to contribute their own data and analysis to the GEO process. On the planning boards right now is a continent-wide "constellation" of low-orbit microsatellites that will allow African member nations to provide nearly 24-hour coverage, at a fraction of the cost of geostationary satellites.

"I think everyone realizes that environmental changes are happening, and affecting everyone," says Dr. Mjwara. "There is not a single nation that can live alone.... People are realizing it's through a collective that we can solve our problems."