D. BEREHULAK/GETTY

Farmers in Niger must plant when the rains come — but will they last?

Meteorologists pour into west Africa

The equipment list is impressive: several hundred researchers, five satellites and six research aircraft, including a converted Russian spy plane. In an unprecedented study of African weather patterns, atmospheric scientists from around the world have decamped this summer to the west of the continent. Their goal is to deliver the first truly useful forecasts of the region's violent monsoon storms.

If successful, the €50-million (US$64-million) African Monsoon Multidisciplinary Analysis (AMMA) project will spawn hundreds of research papers and reshape thinking on west Africa's climate. But it should also help west Africans to cope with the destabilizing effects of unpredictable storms.

The monsoon rains not only dictate agricultural success or failure, but also bring floods that can damage roads and bridges, and encourage malaria-carrying mosquitoes. If these storms could be predicted weeks or months in advance, people in the region could plan ahead with far greater confidence.

"To have that would be a huge help," says Lauren Gelfand, who works on development projects for the charity Oxfam in Dakar, Senegal. "This is one of the driest regions in the world. People rely on one season of rain."

To develop their forecasting tools, AMMA has first had to plug holes in the region's meteorological networks (see *Nature* **435,** 862–863; 2005). "There are precious few observations over the Sahara," says Doug Parker, an atmospheric physicist at the University of Leeds, who heads the British AMMA team.

European funding agencies have already spent around €2.5 million to upgrade west Africa's weather-balloon capability, particularly in five of the countries most involved in the project: Niger, Benin, Burkina Faso, Mali and Senegal. But this August's push is the heaviest data-gathering period planned in the roughly decade-long AMMA project, which began in 2002.

Last week, Parker said his team were still recovering from a series of bumpy four-hour data-collection flights around west African storms, which are some of the most intense on the planet. His group will team up with four other aircraft to fly coordinated missions until 21 August. British and French teams plan to drop curtains of radiosondes — meteorological devices that record and transmit data on temperature and pressure — in front of and behind storms. German and French teams using converted executive jets may fly right through the middle of the storms, at heights of around 15 kilometres. A former spy plane operated by Russian researchers will monitor the storms from above, at heights of around 25 kilometres.

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Researchers hope that the flights will help them to understand the generation and movement of thunderstorms. The data gathered should also allow modellers to refine their predictions of everything from daily weather forecasts to long-term climate change.

But the most useful result for local people will be more accurate rainfall forecasts, says Thierry Lebel, a member of the French AMMA team at the Grenoble Institute of Technology. At the start of the monsoon, for example, early rainfall can be followed by weeks of drought that can kill young plants, as Gelfand says has happened this year. If such events could be predicted, farmers could be warned to delay planting.

Results from AMMA could also help much farther away. Some 550 kilometres west of Senegal, a US team based in the Cape Verde Islands in the Atlantic Ocean will complement the European operations. The researchers will make 10 to 12 flights on a DC-8 aircraft owned by NASA, gathering data on cloud particles, wind speed and direction, rainfall rates and more. They hope to help understand how the Atlantic hurricanes that strike North America form, something that one team member, hurricane consultant Jeff Halverson, formerly of NASA's Goddard Space Flight Center, calls "one of the great unsolved mysteries of atmospheric science".

Monsoon storms can develop into hurricanes off the west African coast, if the right factors are present. But not all do: even given those factors only 10% of storms become hurricanes, and researchers struggle to predict which ones could go on to devastate the US east coast. ■

Jim Giles

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