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Satellites could keep an eye out for floods

 Updated 14:48 15 February 2011 by [Wendy Zukerman](#)
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Another week, another serious flood – monsoonal rains in Sri Lanka have [displaced around 320,000 people](#) in recent days. The deluge comes in the wake of other floods in [Brazil](#), the [Philippines](#) and [Australia](#), all since the turn of the year. And as [La Niña](#) settles in for the decade, floods are expected more frequently.

Monitoring those floods may soon be much easier and more accurate, though, as meteorologists look to the skies to create a global early warning system.

There are already local flood early warning systems of sorts. Networks of water gauges on the ground monitor rainfall and water height, and transmit their data back to the lab where it is plugged into forecasting models. But this approach is problematic, says [Jeff Walker](#) at Monash University in Melbourne, Australia.

"Gauges get washed away during flooding," he says. "And you can't have sensors everywhere." Consequently, information from the surviving gauges is averaged out across a landscape, which might mean local inaccuracies in flood forecasts.

Political casualties

Worse, ground-based gauges can get mired in politics. Floodwaters do not respect international borders – and countries upstream of a flood may not pass on vital information to their neighbours downstream if political tensions are high. Shockingly, while only 10 per cent of river floods occur on rivers that pass through two or more countries, the casualties from these events account for [32 per cent of all river flood casualties](#).

These inaccuracies and problems can be ameliorated by developing an international monitoring system using satellites to augment the network of sensors on the ground – the seeds of that system are already in place

The [Tropical Rainfall Measuring Mission \(TRMM\)](#) is a joint mission between NASA and JAXA, the Japan Aerospace Exploration Agency. It orbits the tropics every 90 minutes, and has recently been providing data for a real-time river forecasting model, the TRMM-based Flood Detection System (TRMM FDS). The forecasting model has great potential, according to tests running in Bangladesh since 2006 ([International Journal of Applied Earth Observation and Geoinformation](#), DOI: 10.1016/j.jag.2010.11.003). In 2013, the mission will go global: NASA plans to replace TRMM with the [Global Precipitation Measurement Mission](#), able to track rainfall anywhere in the world.

But satellite data can do more than simply track rainfall. By monitoring soil moisture, satellites can predict when and where the rain is likely to fall – and the likelihood that a flood will develop. That's because wetter soil can release more water through evaporation which then turns into rain. But if soil is fully saturated, it absorbs no more water and so is more likely to flood.

Soil moisture

The [ASCAT sensor](#) on-board the European Space Agency's MetOp satellite system, launched in 2006, measures the moisture content of the soil by recording changes in the microwave radiation emitted naturally from the earth. It is an opportunity to improve the accuracy of flood forecasting, says [Wolfgang Wagner](#) of the Vienna University of Technology, Austria. Last year, his team managed to combine traditional forecast models with soil moisture data from ASCAT to improve run-off prediction in the flood planes of central Italy ([Hydrology and Earth System Sciences](#), DOI: 10.5194/hess-14-1881-2010).



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