Tips from space give long-range warning of flood risk

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A truck drives along a flooded highway on the Mississippi River on May 23, 2011 in Vicksburg, Mississippi

Satellite monitoring of tiny changes in the gravitational field of river basins may give up to 11 months' warning of disastrous floods, a study published on Sunday said.

Researchers at the University of California at Irvine drew up a map of

the Mississippi River basin combining knowledge about land use and data from a NASA gravity-monitoring satellite called GRACE.

Minute increases in the gravitational pull pointed to higher "wetness" of the land, they found.

This is an early pointer to how a river will respond when the basin is suddenly hit by exceptional rain or snowmelt.

The drier the land is, the more able it is to soak up and store the water—but if it is already quite moist, the water will run off quickly into the river and pump its level.

The scientists tested their technique retroactively on the May-June 2011 flooding of the Missouri River—a disaster that statistically occurs only once ever 500 years.

The model can give a broad but useful predictor of flood risk from six to 11 months ahead, they said.

In contrast, field measurements of snow water and soil moisture are only useful indicators up to two months of a flood event, and weather forecasts are generally accurate only three to 10 days ahead.

"Saturation-driven events have greater potential for widespread and damaging regional flooding because of the need for the basin to relieve its saturated states by discharging a greater volume of stored waters into the river," warned the study, published in *Nature Geoscience*.

The team sounded a word of caution: their technique depends on having an accurate picture how the basin behaves hydrologically—knowing how land is used and irrigated and where and how water runs off into the river.

More information: *Nature Geoscience*, dx.doi.org/10.1038/ngeo2203