

Daytime storms more likely to develop over drier soils

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Arrival of a squall line (some storms sometimes form a front that can be hundreds of kilometers long, called a squall line). Credit: Françoise Guichard and Laurent Kergoat / CNRS

During the day, storms develop more frequently over drier land surfaces surrounded by wetter areas than elsewhere. This is the result of a study carried out by a European team represented in France by the National Center for Meteorological Research, using a statistical analysis of ten years' worth of satellite data covering every continent. According to the study, published on 12 September 2012 on the *Nature* website, current climate models do not reflect this phenomenon well and even frequently

give opposite results, which is likely to flaw their scenarios for the development of drought. It would therefore seem important to take greater account of this phenomenon in models, so as to improve understanding of continental climate change at the regional scale.

Soil humidity affects the properties of the lower layers of the atmosphere, where clouds form. However, its role in triggering daytime storms is poorly understood. Now, a European team has discovered that there is a connection between soil humidity variations in a region and the storms that affect it. The researchers reached this conclusion by carrying out a highly detailed analysis of ten years' worth of [satellite data](#) for precipitation and soil humidity over the entire planet.



Storms developing. Credit: Françoise Guichard et Laurent Kergoat / CNRS

For each 150 km x 150 km area studied, the scientists first searched their high spatial (a few tens of kilometers) and temporal (a few hours) resolution [datasets](#) for regions and dates where storms had developed.

For these same places, they then noted the soil humidity in the hours preceding the storms and compared these values with those measured at the same time several tens of kilometers away.

By using a statistical processing system that corrects for characteristics specific to local climate, they observed that in continental regions, daytime storms develop more frequently over drier land surfaces surrounded by wetter areas than elsewhere. This trend is especially marked for the semi-arid soils of the Sahel and of Australia.



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In addition, the researchers tested several [climate models](#) used by the IPCC on a global scale. They discovered that the simulations carried out cannot reproduce the phenomenon observed by satellites. This defect is likely to flaw scenarios for the development of [drought](#) obtained using such models. In order to shed light on continental [climate change](#) at the regional scale, it would therefore be important to take greater account of

this phenomenon in models.

More information: Afternoon rain more likely over drier soils. Taylor C. M., de Jeu R. A. M., Guichard F., Harris P. P., Dorigo W. A., *Nature*, on line 12 September 2012.

Provided by CNRS

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