Smartphones, Tablets Help UW Researchers Improve Storm Forecasts

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The next advance in weather forecasting may not come from a new satellite or supercomputer, but from a device in your pocket. University of Washington [1] atmospheric scientists are using pressure sensors included in the newest smartphones to develop better weather forecasting techniques.

“With this approach we could potentially have tens or hundreds of thousands of additional surface pressure observations, which could significantly improve short-term weather forecasts,” said Cliff Mass, a UW professor of atmospheric sciences.

PressureNet is a free app for Android devices that contain pressure sensors.

Owners of certain new Android smartphones and tablet computers can now download the PressureNet app, which measures atmospheric pressure and provides the data to UW researchers.

When some smartphone manufacturers recently added pressure sensors, to estimate the phone’s elevation and help pinpoint its location, Mass saw an opportunity to enhance weather prediction. In the autumn he approached Cumulonimbus, a Canadian app company that developed a barometer application for smartphones that collects all the data and shares it back with users.

The PressureNet app this week collected about 4,000 observations per hour, with users clustered in the northeastern United States and around some major cities.

“We need more density,” Mass said. “Right now it’s a matter of getting more people to contribute.”

Android devices equipped with pressure sensors include Samsung’s Galaxy S3, Galaxy Nexus, Galaxy Note and Nexus 4 smartphones, and the Nexus 10 and Motorola Xoom tablet computers.

Atmospheric pressure is the weight of the air above, and includes information about what is happening as air masses collide. Precise tracking of pressure readings and pressure changes could help weather forecasters to pinpoint exactly where and when a major storm will strike.

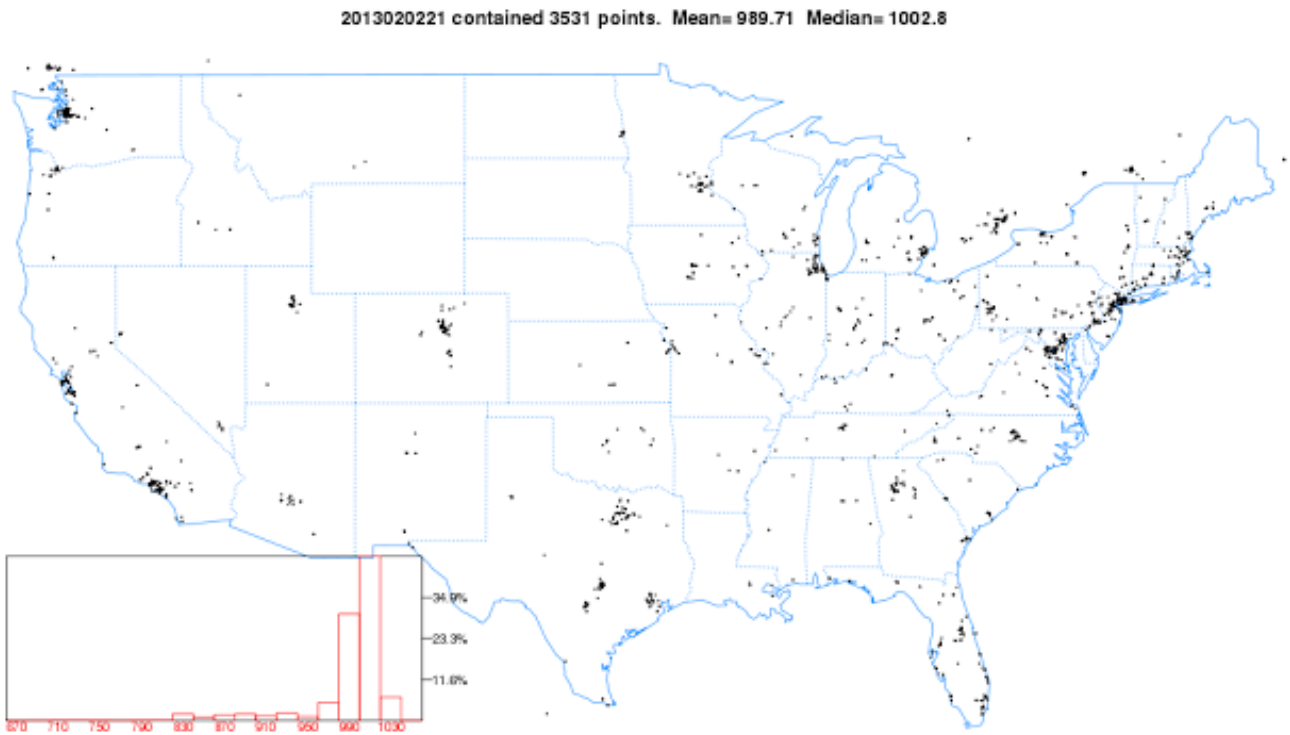
Mass is particularly interested in the center of the country, which is prone to severe storms but includes fewer weather observation stations.

“Thunderstorms are one of the areas of weakest skill for forecasting,” Mass said. “I think thunderstorms in the middle part of the country could potentially be the biggest positive for this approach. They are relatively small-scale, they develop over a few hours, they can be severe and can affect people significantly.”

Tracking storms a few hours out could help people better protect themselves and their property. In the Seattle area, the tool could improve short-term forecasts for wind and rain.

“I think this could be one of the next major revolutions in weather forecasting, really enhancing our ability to forecast at zero to four hours,” Mass said.

UW researchers are the first scientists to have access to the smartphone pressure data. They are plotting the observations and preparing them for use in weather-prediction models.



Cumulonimbus updated the app's privacy settings last week so users could allow access to the data by scientific researchers. Since then, the UW group has been uploading the pressure data each hour and preparing it for use in weather forecasting models. The data will soon be available to all researchers who want to incorporate it in weather-prediction tools.

A project begun in 2010 by Mass and Gregory Hakim, a UW professor of atmospheric sciences, has explored ways to improve weather forecasts by taking advantage of surface pressure measurements. The current network of U.S. weather stations offers about one thousand air-pressure readings. Adding observations collected by small-scale weather networks and hobbyists, the UW team found, improves the forecasts. A weather station in every pocket would offer an unprecedented wealth of data.

A recent blog post by Mass explains more about the UW group's approach. Luke Madaus, a UW graduate student in atmospheric sciences, will load the smartphone data into a weather-forecasting system. At first the tool will use only stationary data points, but eventually it may include data from devices in motion.

Building the system will take a few months, Mass said. By this summer's thunderstorm season he hopes the UW team will be using smartphone data to forecast storms and compare their results against traditional forecasts.

If the technique is successful, the researchers hope to supply it to the National Weather Service and the weather bureaus of other countries.

The technique could be particularly useful, Mass noted, in countries that have little weather-forecasting infrastructure but where smartphones are becoming more common.

The research has been funded by Microsoft Corp. and the National Weather Service.

For more information visit http://www.washington.edu [1].

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