FAST BREAKING PAPERS - 2008

October 2008

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William G. Read talks with *ScienceWatch.com* and answers a few questions about this month's Fast Breaking Paper in the field of Geosciences.

Article Title: Aura Microwave Limb Sounder upper tropospheric and lower stratospheric H2O and relative humidity with respect to ice validation
Authors: Read, WG, *et al.*
Journal: J GEOPHYS RES-ATMOS
Volume: 112
Issue: D24
Page: art.
Year: no.-D24S35 DEC 28 2007
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(addresses have been truncated)

SW: Why do you think your paper is highly cited?

The paper describes an assessment of the accuracy and precision of a rather unique water vapor data measured by satellite in the atmosphere from 8km to 20km. At these altitudes, the atmosphere is very dry and cold. Water vapor concentrations are 100 to 1,000 times smaller than that near the surface, yet water vapors at these heights strongly affect the climate and stratospheric ozone layer stability.

Operational satellites that make regular water vapor measurements for weather forecasting purposes are not sensitive enough to make these measurements, while the few satellite instruments that have the sensitivity rely on solar occultation, but can only make 30 measurements per day because they use sunrises and sunsets which occur twice per satellite orbit.

The Microwave Limb Sounder on the Aura satellite, using a long path Earth limb-viewing geometry, observes passive thermal emission from the water molecules, with the sensitivity to measure the low concentrations. The MLS measures nearly 3,500 water vapor profiles every day. The data are being used in several scientific publications to answer questions regarding the Earth's climate, dynamics, and chemistry. The strength of any scientific conclusions must rest on the quality of the data used and this paper addresses this fundamental need.

"The biggest challenge with the new instrument is that of reducing the vertical sampling of the humidity measurement."

SW: Does it describe a new discovery, methodology, or synthesis of knowledge?

Not specifically in this paper, papers describing the instrumentation and data processing are cited by this paper.

SW: Would you summarize the significance of your paper in layman's terms?

It helps to provide confidence in future projections derived from climate models.

SW: How did you become involved in this research, and were there any problems along the way?

I joined the MLS team in 1985, originally trained as a spectroscopist. Spectroscopy is a fundamental part of the instrument signal analysis and I became involved in atmospheric signal modeling. On our first-generation instrument, which was launched in 1991, I developed a method for measuring water vapor in the upper troposphere down to 8 km. The importance of water vapor at these heights was great enough that our follow-up instrument, the subject of this paper, was specifically designed to make this measurement.

The biggest challenge with the new instrument is that of reducing the vertical sampling of the humidity measurement. With the previous instrument, and in the first data release from this instrument, the vertical measurements were separated every 2.7 km. The current data version has cut this in half, to 1.3 km.

SW: Where do you see your research leading in the future?

I would like to see our data become routinely used in real time by numerical weather forecasting models, in order to improve weather forecasts and future climate projections.

SW: Do you foresee any social or political implications for your research?

Hopefully, more accurate weather and climate forecasting will be the result.

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Keywords: microwave limb sounder, aura satellite, water vapor concentrations, climate, stratospheric ozone layer stability, operational satellites, water vapor measurements, weather forecasting purposes, solar occultation, long path earth limb-viewing geometry, passive thermal emission, water molecules, water vapor profiles, earth's climate, dynamics and chemistry.

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