

## Contributors

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## Research Highlight

Recently, scientists from the ARM Program published a paper that highlighted both the radiative importance of clouds containing small amounts of liquid water as well as the challenge that faces the atmospheric science community to quantitatively characterize these clouds (Turner et al, 2007). This paper was ranked as a "hot paper" by ISI's Essential Science Indicators in March 2008. This designation is given to a paper if it has received a large and significant number of citations within two years of its publication date. Less than 0.01% of all papers achieve this designation.

Clouds that contain small amounts of liquid water (less than 100 g/m<sup>2</sup>) are considered to be 'thin' liquid clouds. These thin clouds occur very frequently in nature, and thus are an important cloud classification. Furthermore, as shown in the attached image, small changes in the amount of liquid water in these thin clouds can have profound impacts on both the longwave (wavelengths longer than 4 microns) and shortwave radiative flux.

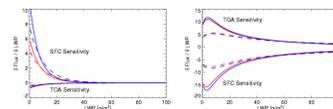
At the time of the publication of this paper, there was general consensus that the atmospheric science community knew how to quantify the amount of liquid in these clouds, because the scattering properties of spherical liquid droplets is well described by theory. However, this paper highlighted significant (factor of 2) disagreements between often-used techniques to determine the amount of liquid water in these clouds. Therefore, this paper directly challenged the notion that the quantification of thin liquid water clouds is a "solved problem", which also has ramifications on the scientific conclusions that use these data from these types of clouds. The paper ends by issuing a rallying cry to the community to reexamine the accuracy of their methods that are used to quantify the amount of liquid in these clouds (as well as the characteristic size of the cloud particles), and included the need for improved field measurement techniques.

## Reference(s)

Turner, DD, and 21 coauthors. 2007. "Thin liquid water clouds: Their importance and our challenge." *Bulletin of the American Meteorological Society* 88: 177-190.

## Working Group(s)

Radiative Processes



The sensitivity to the longwave (left) and shortwave (right) radiative flux at both the surface (SFC) and top of the atmosphere (TOA). The solid (dotted) lines are for clouds with an effective radius of the droplets of 6 (12) microns, whereas the red (blue) lines are for mid-latitude summer (winter) atmospheric conditions.