

# The proof is in the clouds

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A stratocumulus cloud deck over the South Pacific Ocean, as seen by NASA's Moderate Resolution Imaging Spectroradiometer (MODIS). Image courtesy of the National Aeronautics and Space Administration Earth Observatory and obtained from the NASA Terra satellite.

For most people, clouds are just an indication of whether it's a "good" or "bad" day. A team of scientists from Pacific Northwest National Laboratory found that certain clouds hold the key to climate behavior prediction. The researchers improved the modeling system to simulate the way clouds interact with particles in the air. The team assessed the state-of-the-art model's ability to simulate clouds and their interaction with fine particles in the air and pollution.

Accurate prediction of how heavy pollution will influence [climate](#) is one of the best ways to protect the future of the planet. Scientists can help by

creating models of how the climate responds to many different variables. Projecting how clouds over oceans may be influenced by pollution, tiny bits of smoke, or chemicals is important because these clouds are part of a cycle that influences temperatures and precipitation in many areas of the world. Researchers showed the value of a model to predict complex interactions between atmospheric [pollution](#) and clouds.

It is important to study the accuracy of different climate modeling systems so scientists can determine the minimum level of complexity necessary to produce meaningful climate prediction.

A research team assessed simulations produced by WRF-Chem coupled with a new module, using observations from the VAMOS Ocean-Cloud-Atmosphere-Land Study Regional Experiment (VOCALS). They analyzed VOCALS data, as well as satellite images and data.

The team performed comprehensive evaluations of the models in simulating aerosols, [clouds](#), and their interactions. Aerosols and aerosol-cloud interactions not only influence cloudiness and precipitation, but also lowers and modifies the cloud-top height, and a mean subsidence above the cloud top. They showed that WRF-Chem was accurate down to a very a small time scale in predicting aerosol interactions with cloud properties.

WRF-Chem is a regional meteorological model, with major improvements in aerosol and chemistry modules supplied by PNNL.

Validating the WRF-Chem model predictions of the regional climate and energy budget was the first step. Scientists can now use WRF-Chem to quantify and evaluate many other issues, such as quantifying the impacts of human-caused and natural emissions on the regional climate.

**More information:** Yang Q, et al. 2011. "[Assessing Regional Scale](#)

[Predictions of Aerosols, Marine Stratocumulus, and Their Interactions During VOCALS-Rex Using WRF-Chem." \*Atmospheric Chemistry and Physics\*, 11:22663-22718. \[DOI:10.5194/acpd-11-22663-2011\]\(https://doi.org/10.5194/acpd-11-22663-2011\)](#)

Provided by Pacific Northwest National Laboratory

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