

Cloud atlas: Scientist maps the meaning of mid-level clouds

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Clouds play a major role in the climate-change equation, but they are the least-understood variable in the sky, observes a Texas A&M University geoscientist, who says mid-level clouds are especially understudied. The professor, Shaima Nasiri, is making those "in-between" clouds the focus of her research, which is being funded by NASA.

Mid-level clouds are so understudied, Nasiri says, that scientists have yet to develop a common nomenclature for them. "We do not have a unified definition, so the scientific community can't look at the statistics with a shared level of understanding. Also, because mid-level clouds are formed either from water droplets or ice crystals or a combination of both, they can be more difficult to model.

"Only in the past few years have we focused on the physical properties of mid-level clouds. This means that previous climate models are incomplete," Nasiri says. "All cloud formations are important tracers in the [climate-change](#) equation. But we must accurately define and measure the middle layer before we can have a complete picture."

Nasiri credits recent satellite technology for being the vehicle that gives scientists the facts and figures needed to fold the essence of clouds into climate-change formulas.

"NASA satellites launched over the last few years have helped us identify height and base, and temperature and pressure of mid-level clouds. This has revolutionized atmospheric studies," she says. Called the

A Train, a formation of six satellites collects and relays an unprecedented amount of atmospheric data, giving scientists such as Nasiri the ability to see all the way through clouds around the globe.

The Texas A&M geoscientist notes the amount of data received from the satellites is so enormous, that part of her work the last two years has been number crunching, developing algorithms just so she and other scientists could process the information.

Sometimes, mid-level clouds can't be seen or identified from the ground. And the high-flying cirrus layer can obscure them from the air. Altostratus and altocumulus are the common mid-level clouds, Nasiri explains. But the line of demarcation between low, mid-level and high clouds is unclear, a problem for scientists because although clouds play a major role they are the least understood variable in climate change studies.

The NASA award of the type presented to Nasiri, assistant professor of atmospheric sciences at Texas A&M, is given to promising young researchers to further their studies in Earth's systems. Her three-year grant is for \$324,000. The NASA New Investigator Program award acknowledges scientists and engineers who integrate research and education in Earth system sciences in the beginning stages of their professional careers.

In addition to defining a common language for studying mid-level clouds and assessing their role in climate studies, Nasiri will also use part of the grant to help schoolteachers supplement their curriculum. "I plan to make it easier for high school teachers to use NASA data to engage students in Earth science and climate studies," she says.

"Every school child learns about billowy cumulus and high, thin cirrus clouds, but middle [clouds](#) are often ignored. " If you see a cloud that

looks like a space ship, it's probably a type of mid-level cloud called lenticular," says Nasiri.

Provided by Texas A&M University

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