NASA's Landsat satellite looks for a cloud-free view

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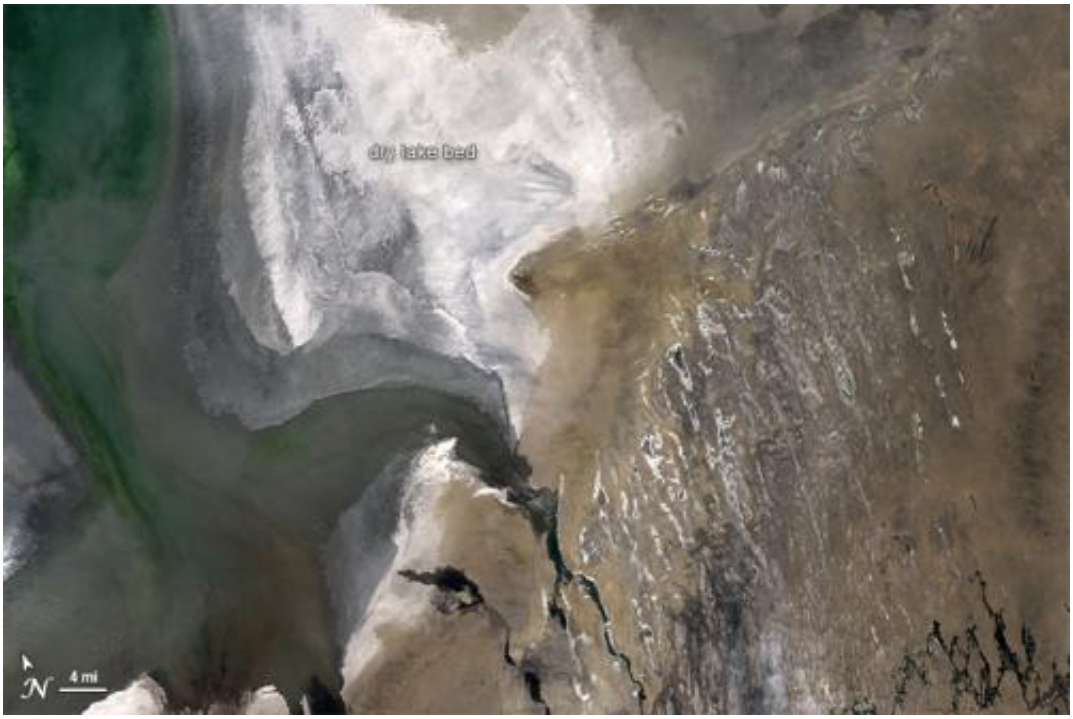


Clouds are hard to spot in this natural-color image of the Aral Sea in Central Asia, taken March 24, 2013. Credit: NASA Goddard/Landsat/Michael Taylor

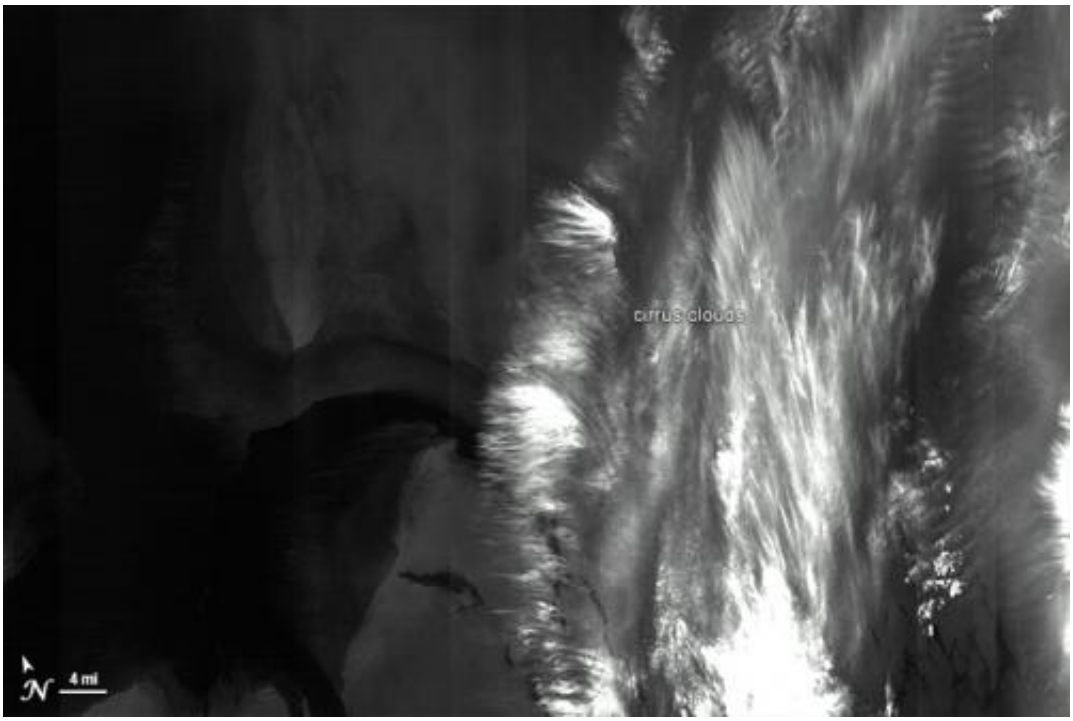
For decades, Landsat satellites have documented the desiccation of the Aral Sea in Central Asia. Once one of the largest seas in the world, it shrunk to a tenth of its original volume after Russia diverted its feeder rivers in the 1960s. Scientists studying the Aral Sea's changing ecology and retreating shoreline have looked to Landsat—and a new feature of

the Landsat Data Continuity Mission will help ensure they get a clear, cloud-free view.

One of two new spectral bands identifies high-altitude, wispy cirrus clouds that are not apparent in the images from any of the other spectral bands. The March 24, 2013, natural color image of the Aral Sea, for example, appears to be from a relatively clear day. But when viewed in the cirrus-detecting band, bright white clouds appear.

"Cirrus clouds are popping out," said Pat Scaramuzza, a senior scientist with the U.S. Geological Survey in Sioux Falls, S.D. "Cirrus clouds can be so thin, they won't be visible in a typical image. But the cirrus band will see it, and it will tell users: There's a thin cloud layer and it can affect your results."

Landsat picks up different wavelengths of light reflected off Earth's surface, and clouds can obscure the view. Because of this, scientists will often disregard images or pixels gathered on cloudy days. That's easy to do when big, puffy cumulus clouds appear like popcorn strewn across a landscape—but harder when the thin, almost transparent cirrus clouds move in.



A new band on the Landsat Data Continuity Mission satellite detects cirrus clouds, making these high-altitude clouds visible over the Aral Sea region on March 24, 2013. Credit: NASA Goddard/Landsat/Michael Taylor

To identify cirrus-covered areas, LDCM's Operational Land Imager instrument has detectors for a specific wavelength of light—1.38 microns—that bounces off of ice crystals of the high altitude clouds, but is absorbed by the water vapor in the air closer to the ground.

"Cirrus clouds are composed of ice crystals. So, at this wavelength they are reflecting sunlight, very high up in the atmosphere," said Lawrence Ong, a research scientist with NASA's Goddard Space Flight Center in Greenbelt, Md. "Below that, the energy is being absorbed by the water vapor in the air."

The cirrus band's key job will be to alert scientists and other Landsat users to the presence of cirrus clouds, so they know the data in the pixels

under the high-altitude clouds could be slightly askew. Scientists could instead use images taken on a cloud-free day, or correct data from the other spectral bands to account for any cirrus clouds detected in the new band.

"The science people are still looking to how they can best use this, since it's a new band," Ong said. "It's like roads, you build them and people will find a better use for them."

LDCM, the newest spacecraft in the Landsat family, was launched on Feb. 11, 2013. When the on-orbit calibration and checkout phase of LDCM is over, scheduled for late May 2013, the satellite will be renamed Landsat 8 and handed over for operation by the U.S. Geological Survey.

Provided by NASA's Goddard Space Flight Center