

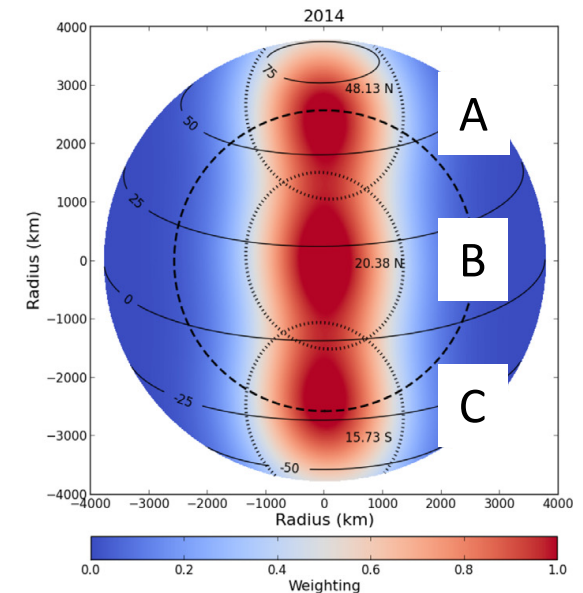
Mapping Titan After Cassini

What is the science question? How does the atmosphere (including gases and haze) of Saturn's moon, Titan, respond to seasonal changes in sunlight?

What were your findings? Using the ALMA radio telescope array in Chile (above right), we were able to make temperature maps of Titan from the Earth for the first time. This new capability allows us to later determine the amount of each gas that is present and the chemical processes that are occurring on Titan.

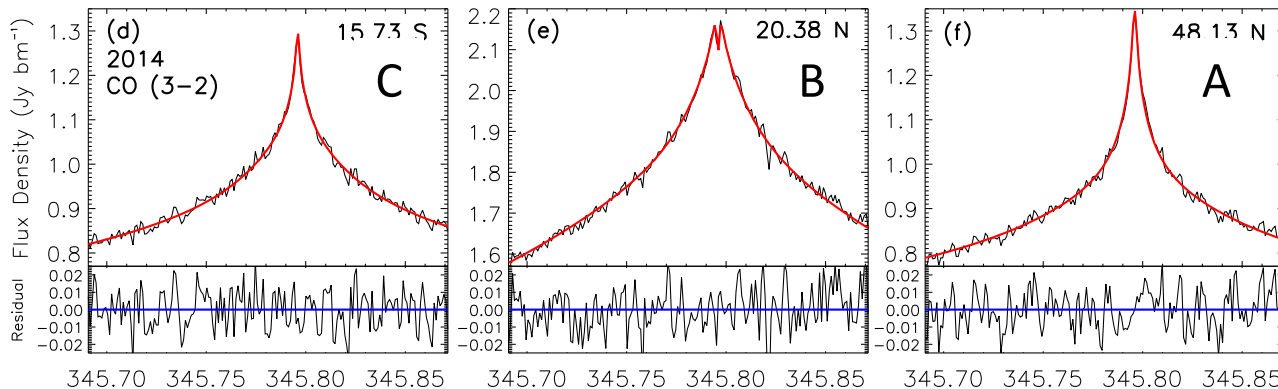
What was the impact? Since the end of the Cassini mission, our ability to monitor Titan up close has been lost. We have now shown that we can map Titan from the Earth, providing continuity for this dataset. Over time, will use increasingly higher spatial resolution to see more details and to observe seasonal changes.

Why does it matter to non-scientists? Titan has been compared to the early Earth, with a chemically reducing, hazy atmosphere. By studying Titan, we may learn more about our planet's origins. The data will also be useful for planning future missions to Titan.



Top: The ALMA radio telescope array in Chile is composed of 66 antennae.

Above: The blue disk indicates the size of Titan (dashed line) plus its atmosphere. The orange ovals are the telescope beams.



Above: Spectral lines of carbon monoxide (CO) corresponding to the beam positions on the center right figure. These are modeled to infer atmospheric temperatures.

A. E. Thelen, C.A. Nixon, N.J. Chanover, E.M. Molter, M.A. Cordiner, R.K. Achterberg, J. Serigano, P.G.J. Irwin, N. Teanby, S.B. Chamley, (2017), <https://doi.org/10.1016/j.icarus.2017.10.042>