SURFACE TEMPERATURE DECREASE AT BRIGHT EPHEMERAL FEATURE SITE ON TITAN'S NORTH POLE. R. D. Dhingra[1], D. E. Jennings[2], J. W. Barnes[3], and Valeria Cottini[4], [1]Jet Propulsion Laboratory, California Institute of Technology (*rajani.dhingra@jpl.nasa.gov), [2]Science Systems and Applications, Inc (SSAI), Lanham, Maryland, [3]Dept. of Physics, University of Idaho, Moscow, Idaho, [4]University of Maryland, College Park, Maryland.

Introduction: Coincident with the onset of north polar storm cloud activity [1] on Titan, *Cassini* Visual and Infrared Mapping Spectrometer (VIMS) started to see unexpected brightened areas that appear, disappear, and shift from flyby to flyby. [2,3] attribute the events to specular reflection from a wetted Titan surface or near surface fog coverage.

Cassini's Composite Infrared Spectrometer (CIRS) [4] one of 12 instruments carried on board, observed Titan in the thermal infrared (7-1000 μm). Previously [5] and [6] used CIRS to determine surface temperature variation indicating seasonal changes.

We looked at the CIRS data for the T120 discovery observation of Bright Ephemeral Feature (BEF) but couldn't find any verifiable temperature variation. After we established more BEFs [3] on the north pole using the VIMS data, we looked at flybys where CIRS had observed the same region. T121, July 25, 2016 is the only other flyby where CIRS looked at the same region as VIMS looked at with good number of spectra to establish a noise-free average temperature variation.

Observation & Data: The T121 flyby was observed on 25 July, 2016 from an altitude of 975 km. Out of the BEFs observed on Titan's north pole by VIMS, CIRS happened to look at all those areas too. However, for other BEF observations there are too few spectra for temperature determination. Moreover, the T121 data (25 Jul 2016) turned out quite interesting because for CIRS it is a rare instance in which both sea and off-sea areas were observed at similar latitudes during the same flyby.

The latitude and longitude at closest approach are -6.4° and 129.2°. The phase at closest approach is 101.2°. The CIRS data corresponding to the BEF location is 81°N, 268°W and the non BEF location is 80°N, 178°W with a footprint on the surface of about 140 km.

Analysis & Results: The only region in the CIRS spectrum where thermal emission from the surface is transmitted through the atmosphere and is detectable from space is in the 410-560 cm^{-1} window. All other parts of the spectrum originate in the atmosphere. The spectra on and off the BEF location should match in the region outside this window owing to similar atmospheric signatures but a difference in surface temperature will show up as a deviation within the spectral window.

To find a guaranteed temperature difference we need to have enough number of spectra on the same flyby, both on and off BEF to limit the signal-to-noise. The proximity in time means that the atmospheric conditions were the same and the observing geometry (emission angle as seen by the spacecraft) was very similar.

We measure a 1.2+/-0.2 K lowering of the surface temperature at Titan's north pole (81°N, 268°W) in the same region and at the same time as the BEF in the T121 flyby. The 'on' location of the CIRS temperature drop (81°N, 268°W) overlays the Ligeia Mare and the BEF region identified by [3]. The 'off' location is 80°N, 178°W that overlays the land surface.

Implication: Temperature changes are hard to determine on Titan. It is important to note that the CIRS observation was a single-day measurement. We have not previously detected a temperature difference between sea and land because the averages were over much longer periods which would have hidden transient cooling. The temperature drop we report might have caused due to precipitative cooling of a rainfall event.

Acknowledgments: We acknowledge the Planetary Data System, ring nodes for making available the CIRS data. (https://pds-rings.seti.org/cassini/cirs/index.html)

The research described in this abstract was carried out in part at the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

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