



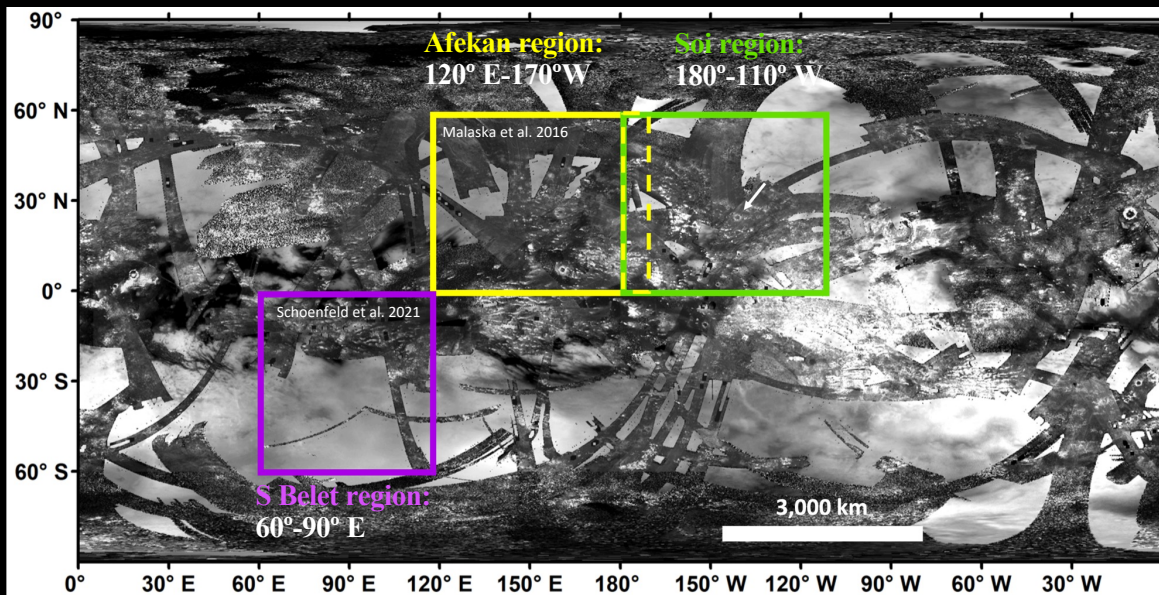
Caltech

JPL



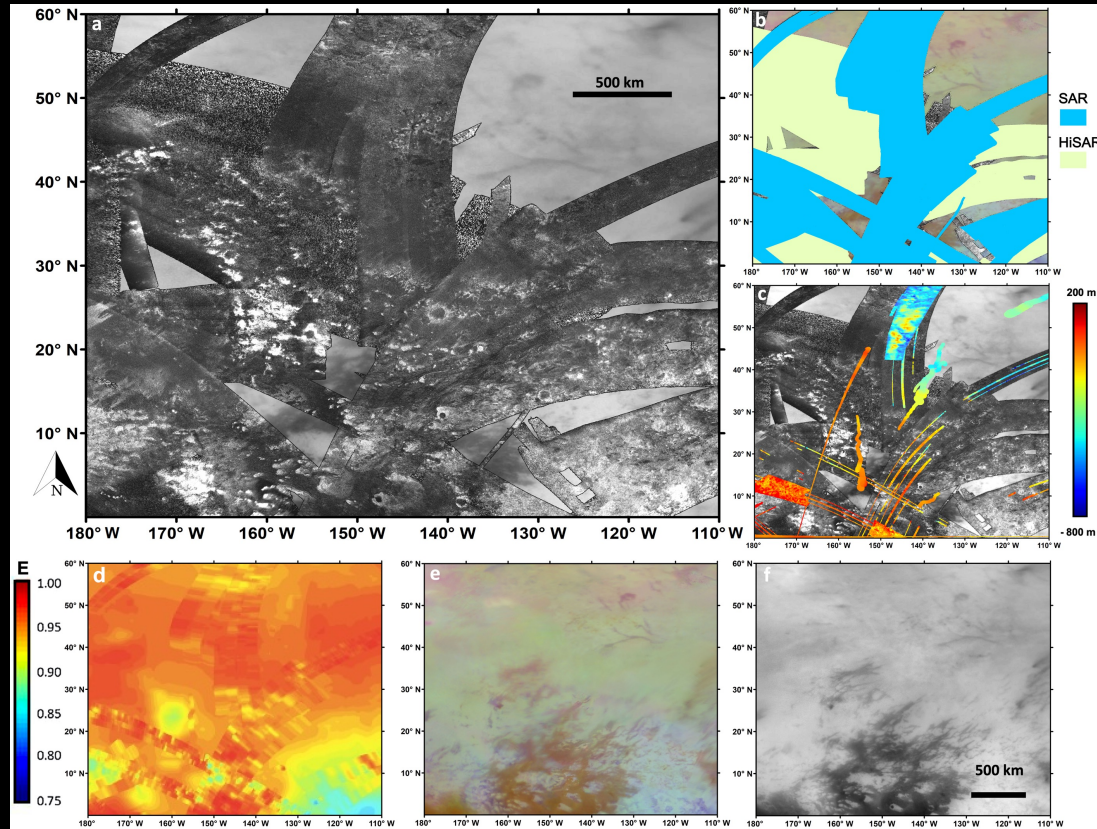
The Soi crater region on Titan: Detailed geomorphological and compositional maps

A. Solomonidou, A. M. Schoenfeld, M. J. Malaska, R. M. C. Lopes, A. Coustenis, S. P. D. Birch, A. Le Gall, B. Schmitt



The Soi crater region from Cassini instruments

SAR



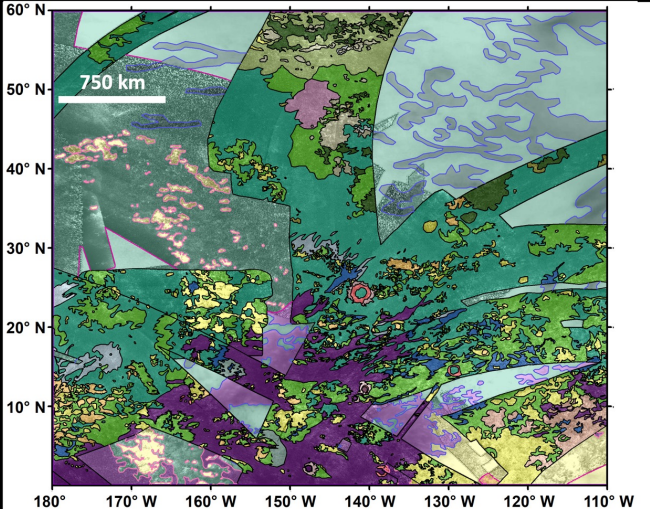
SAR and HiSAR

SARTopo and DTM
(Stiles et al. 2009; Kirk et al. 2012; Corlies et al. 2017)

Emissivity
(Janssen et al. 2016)

VIMS

ISS



Legend

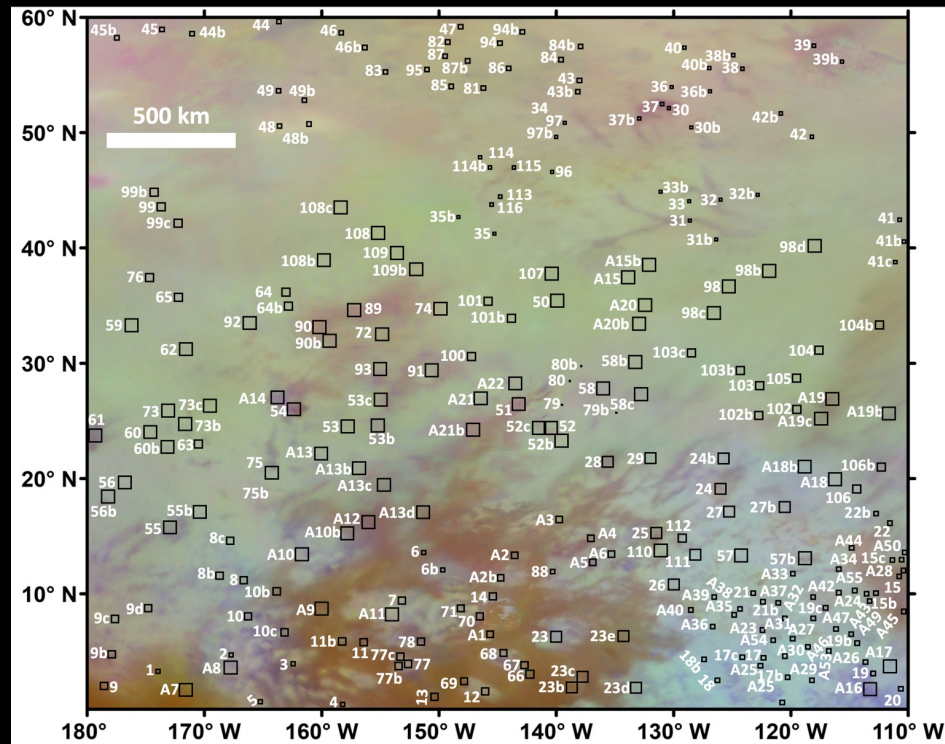
Terrain Units

- mountains (*hm*)
- hummocky (*hh*)
- degraded hummocky (*hdm*)
- pitted hummocky (*hph*)
- sharpened-edged depressions (*bse*)
- ramparts (*brh*)
- crater rim (*crh*)
- crater ejecta (*ceh*)
- crater fill 3 (*cf3*)
- finely dissected labyrinths (*lbf*)

- scalloped plains (*psv*)
- variable featured plains (*pfv*)
- undifferentiated plains (*pu*)
- dark irregular plains (*pil*)
- bright gradational plains (*pgh*)
- streak-like plains (*psh*)
- featureless sand sheets (*ds*)
- dark linear dunes (*dl*)
- undivided hummocky/mountains (*hu*)
- undivided dark plains (*pdu*)
- undivided plains (*pu*)
- undivided dunes (*du*)

Contact Types

- certain — inferred
 - - - gradational — map boundary
 — HiSAR boundary — approximate

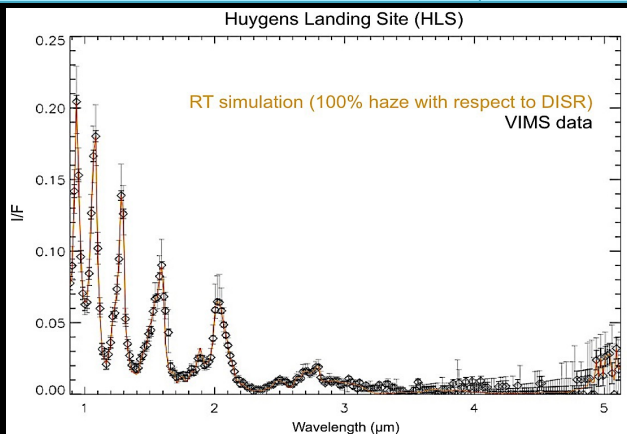


Radiative transfer on VIMS

Hirtzig et al. 2013, Icarus; ; Lopes et al. 2016, Icarus; Solomonidou et al. 2014, JGR; Solomonidou et al. 2016, 2018, 2020a;b

Code Plane-parallel (1D)

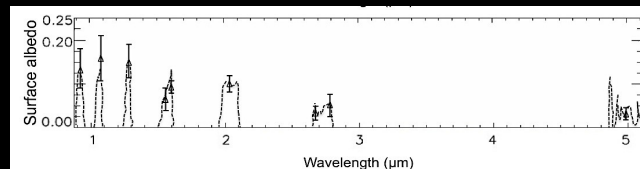
Temperature profile	HASI (Fulchignoni et al. 2005)
CH ₄ mixing ratio	GCMS (Neimann et al. 2010)
Haze parameters	DISR (Tomasko et al. 2008, de Bergh et al. 2011)
Atmospheric gases	¹² CH ₄ , ¹³ CH ₄ , ¹² CH ₃ D, CO, and collisions N ₂ -N ₂ & N ₂ -H ₂ (de Kok et al. 2007; Lafferty et al. 1996, McKellar et al. 1989)
CH ₄ NEW UPDATED absorption coefficients	(Boudon et al., 2006; Campargue et al. 2012, 2015 & Rey et al., 2017, HITRAN, GEISA, etc)
Surface component candidates	ices and tholins (Bernard et al. 2006; Coll et al. 2006; Brassie et al. 2015; B. Schmitt & S. Philippe private communications)

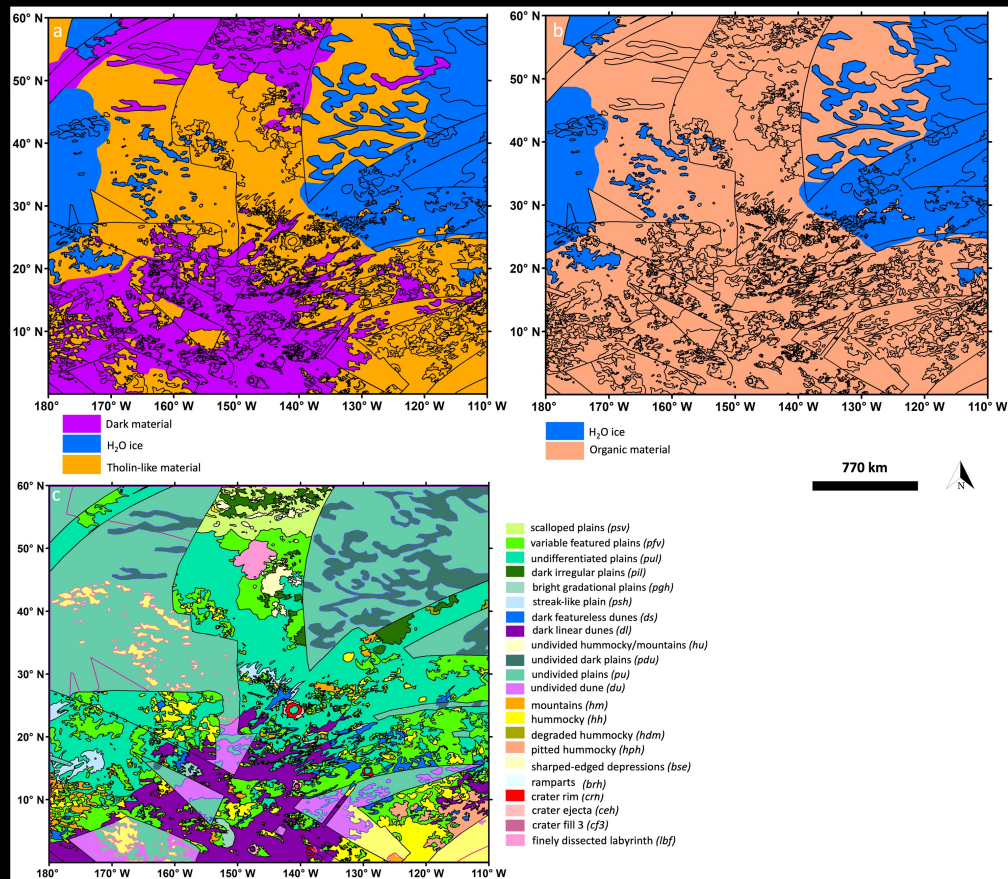
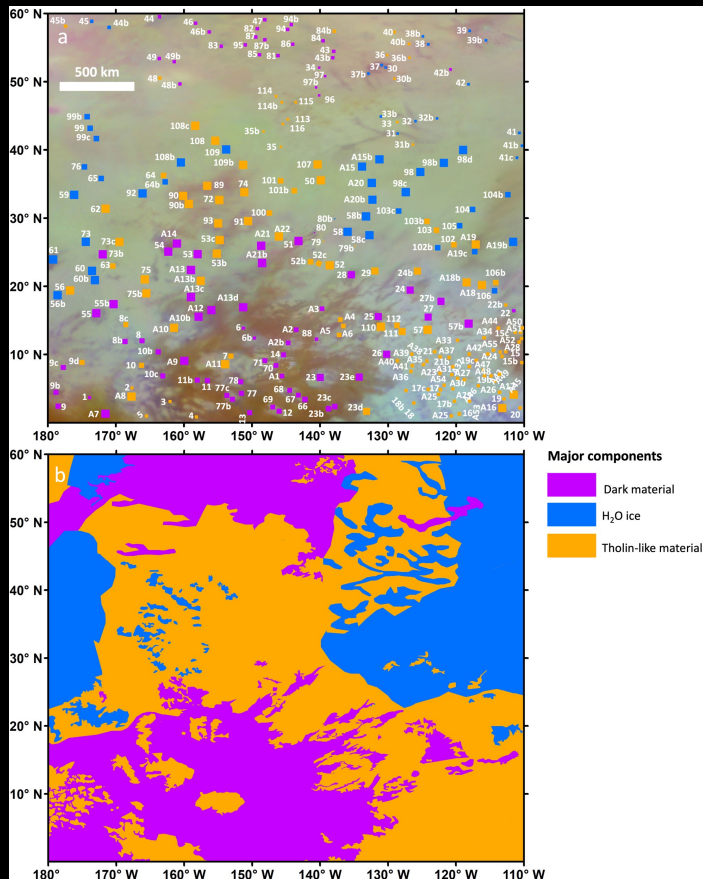


✓ Test simulations with various haze opacities

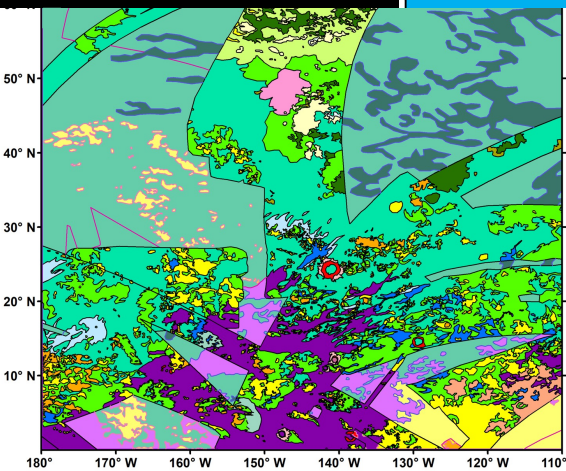
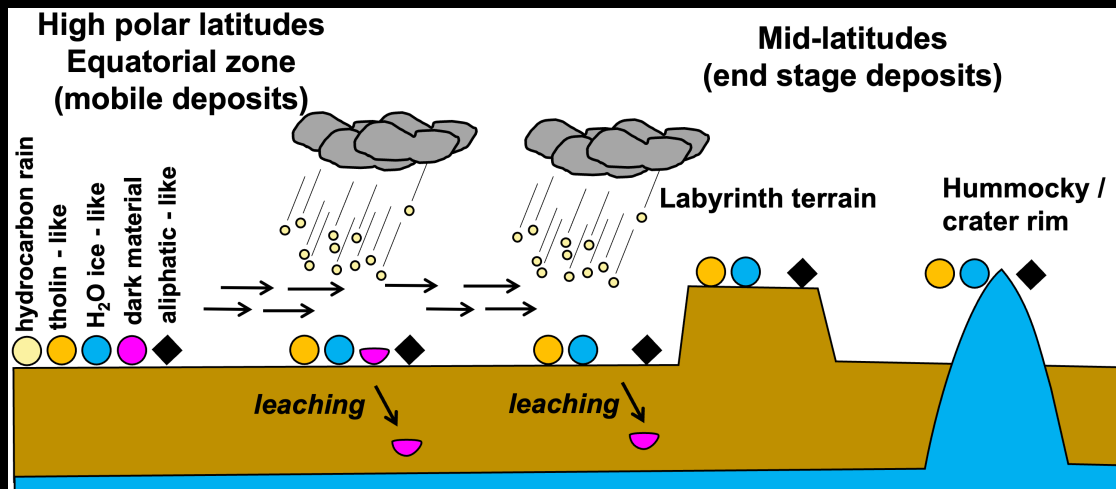
✓ Correlation between simulations and data

✓ Best fit between VIMS and simulation





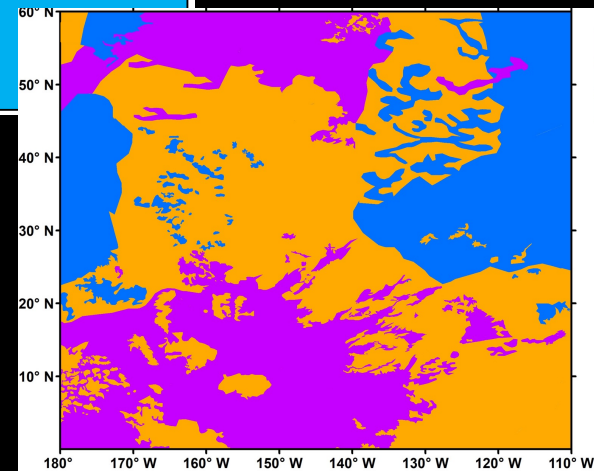
Scheme showing midlatitude leaching of dark material from episodic rainfall on Titan



Convert dune materials and
polar plains materials =

addition of tholin components:
density-selective transport of 3
materials

OR
removal of dark material:
leaching



Titan Compositional map

