GROWTH MECHANISM AND DUNE ORIENTATION ON TITAN. A. Lucas[1], S. Rodriguez[1], C. Narteau[2], B. Charnay[3], S. Courrech du Pont[4], T. Tokano[5], A. Garcia[1], M. Thiriet[1], A.G. Hayes[6], R.D. Lorenz[7] and O. Aharonson[8].

[1] Laboratoire AIM - Université Paris 7, Planetology, Gif/Yvette, France (sebastien.rodriguez@cea.fr), [2] Institut de Physique du Globe de Paris, Sorbonne Paris Cité, University Paris Diderot, UMR 7154 CNRS, Paris, France, [3] LMD IPSL, Paris, France, [4] Laboratoire Matière et Systèmes Complexes, Sorbonne Paris Cité, Université Paris Diderot, CNRS UMR 7057, Paris, France, [5] Institut für Geophysik und Meteorologie Universität zu Köln, Cologne, Germany, [6] Astronomy Division, Cornell University, Ithaca, New York, USA, [7] Johns Hopkins University Applied Physics Lab, Laurel, Maryland, USA, [8] Weizmann Institute of Science, Rehovot, Israel.

Dune fields on Titan cover more than 17 % of the moon's surface, constituting the largest known surface reservoir of organics [1,2]. Their confinement to the equatorial belt, shape, and eastward direction of propagation offer crucial information regarding both the wind regime and sediment supply.

Herein, we present a comprehensive analysis of Titan's dune orientations [3] using automated detection techniques on non-local denoised Cassini radar images [4]. By coupling a new dune growth mechanism [5] with actual wind fields generated by climate modelling [6], we find that Titan's dunes grow by elongation on a non-mobile substratum.

To be fully consistent with both the local crestline orientations and the eastward propagation of Titan's dunes, the sediment should be predominantly transported by strong eastward winds, most likely generated by equinoctial storms [6] or occasional fast westerly gusts [7].

Additionally, convergence of the meridional transport predicted in models can explain why Titan's dunes are confined within plus or minus 30° latitudes, where sediment fluxes converge.

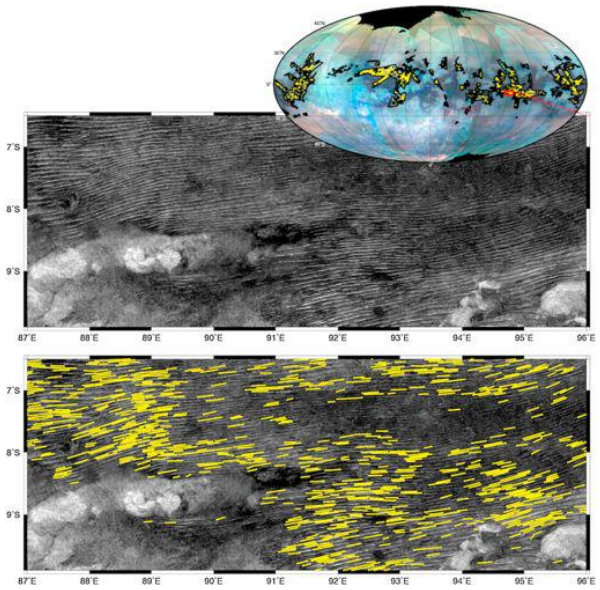

Figure: Linear segment detection over Titan's dune fields. (Inset) Visual and infrared mapping spectrometer (VIMS) global map with extracted segments in yellow. Black polygons contour the dune fields mapped from SAR images (including TA through T92). The red box indicates the location of the close-up of NLDSAR release of T8 shown below with and without the segment overlays (yellow lines). Note that as dunes can extend in some cases hundreds of kilometers continuously, they can incorporate multiple individual segments.

References: [1] Lorenz R.D. et al. (2006), *Science, 312, 724–727*. [2] Rodriguez S. et al. (2014), *Icarus, 230, 168–179*. [3] Lucas et al. (2014), *Geophys. Res. Lett., 41, doi:10.1002/2014GL060971*. [4] Lucas et al. (2014), *J. Geoph. Res.: Planets, 119, Issue 10, 2149–2166*. [5] Courrech du Pont S. (2014), *Geology, 42, no. 9, 743-746*. [6] Charnay et al. (2015), *Nat. Geosci., in press*. [7] Tokano et al. (2012), *Aeolian Res., 2(2-3), 113–127*.