Regional mapping of aerosol population and surface albedo of Titan by the massive inversion of the Cassini/VIMS dataset. S. Rodriguez[1], M. Es-sayeh[1], T. Cornet[2], L. Maltagliati[1,3], T. Appéré[1,4], P. Rannou[5], S. Le Mouélic[6], C. Sotin[6,7], J.W. Barnes[8], R.H. Brown[9]. [1] Université de Paris, Institut de physique du globe de Paris, CNRS, F-75005 Paris, France. [2] European Space Agency (ESA), European Space Astronomy Center (ESAC), Villanueva de la Cañada, Madrid, Spain. [3] Nature Publishing Group, London, United Kingdom. [4] Institut de Planétologie et d'Astrophysique de Grenoble, Université J. Fourier, CNRS/INSU, Grenoble, France. [5] Groupe de Spectrométrie Moléculaire et Atmosphérique, UMR CNRS 7331 Campus Moulin de la Housse, BP 1039 Université de Reims Champagne-Ardenne, 51687, Reims, France. [6] LPG Nantes, UMR 6112 CNRS, Université de Nantes, Nantes, France. [7] Jet Propulsion Laboratory (JPL), Pasadena, CA, USA. [8] University of Idaho, Moscow, ID, USA. [9] University of Arizona, Tucson, AZ, USA.

Mapping Titan's surface albedo is a necessary step to give reliable constraints on its composition. However, even after the end of the Cassini mission, surface albedo maps of Titan, especially over large regions, are still very rare, the surface windows being strongly affected by atmospheric contributions (absorption, scattering). A full radiative transfer model is an essential tool to remove these effects, but too time-consuming to treat systematically the ~50000 hyperspectral images VIMS acquired since the beginning of the mission.

We developed a massive inversion of VIMS data based on lookup tables computed from a state-of-the-art radiative transfer model in pseudo-spherical geometry, updated with new aerosol properties coming from our analysis of observations acquired recently by VIMS (solar occultations and emission phase curves). Once the physical properties of gases, aerosols and surface are fixed, the lookup tables are built for the remaining free parameters: the incidence, emergence and azimuth angles, given by navigation; and two products (the aerosol opacity and the surface albedo at all wavelengths). The lookup table grid was carefully selected after thorough testing. The data inversion on these pre-computed spectra (opportunely interpolated) is more than 1000 times faster than recalling the full radiative transfer at each minimization step.

We present here the results from selected flybys. We invert mosaics composed by couples of flybys observing the same area at two different times. The composite albedo maps do not show significant discontinuities in any of the surface windows, suggesting a robust correction of the effects of the geometry (and thus the aerosols) on the observations. Maps of aerosol and albedo uncertainties are also provided, along with absolute errors. We are thus able to provide reliable surface albedo maps at pixel scale for entire regions of Titan and for the whole VIMS spectral range.