Geophysical Research Abstracts
Vol. 13, EGU2011-10243-2, 2011
EGU General Assembly 2011

TNOs are Cool: A Survey of the Transneptunian Region - Physical Characterization of 15 Scattered Disk and Extended Scattered Disk Objects observed with Herschel/PACS

Pablo Santos-Sanz and the TNOs are Cool-SDO Team

Observatoire de Paris, Laboratoire d'Etudes Spatiales et d'Instrumentation en Astrophysique (LESIA)/CNRS, Paris, France (pablo.santos@obspm.fr)

Since the detection in 1992 of the first Transneptunian Object (TNO), besides Pluto, by Jewitt and Luu [1], we know 1453 TNOs/Centaurs as of December 2010. Different dynamical classes, according to their orbital parameters, have been identified within this icy population. One of these dynamical classes is the so-called "Scattered Disk Objects" (SDOs). SDOs have perihelia greater than 30 AU, eccentricities as high as 0.8, and orbital inclinations as high as 40 degrees. These orbits are believed to be the result of gravitational scattering by Neptune and are highly unstable. The SDOs are thought to be dynamically related to Jupiter Family Comets and also to Centaurs, a population of objects with orbits between those of Jupiter and Neptune [2]. Other dynamical class is the so-called Detached objects, also known as "Extended Scattered Disk Objects" (ESDOs). ESDOs have orbits with perihelion distances that are unaffected by Neptune and the other Giant Planets. ESDOs may also be inner Oort cloud bodies or perhaps transitional objects between SDOs and inner Oort cloud objects.

Adopting the Gladman et al. (2008) scheme [3], we present the physical characterization of 14 SDOs (including the dwarf planet Eris) and 1 ESDO (Sedna) using PACS observations as part of the Herschel Open Time Key Programme "TNOs are Cool!" [4]. This project was awarded 370 h of Herschel observing time for the investigation of about 140 TNOs and Centaurs with well known orbits. The goal is to characterize individual SDOs and ESDOs, and the full sample, using radiometric techniques on the thermal fluxes observed with the PACS instrument in scan-map mode [5]. Our techniques allow diameters and albedos to be derived, using a Monte-Carlo approach to estimate uncertainties, and also some physical properties of the surfaces on the basis of thermal modelling. We also search for correlations between diameters/albedos and physical parameters, orbital parameters, colors, etc. The SDO/ESDO sample was selected on the basis of its expected fluxes and Herschel visibility; as it covers a wide range of dynamical properties in the SDOs population, it might serve as a probe for the whole population. We discuss our results and compare them to already published results for SDOs and ESDOs.

[1] Jewitt, D.; Luu, J.; Marsden, B. G., IAU Circ., 5611, 1 (1992). Edited by Marsden, B. G.
[2] Horner, J.; Evans, N.W.; Bailey, M. E., 2004, MNRAS, Vol 354, Issue 3, pp. 798-810
[3] Gladman, B.; Marsden, B. G.; Vanlaerhoven, C., 2008, The Solar System Beyond Neptune, M. A. Barucci, H. Boehnhardt, D. P. Cruikshank, and A. Morbidelli (eds.), University of Arizona Press, Tucson, 592 pp., p.43-57
[4] Müller, T. G. and the "TNOs are Cool"-Team 2009, EM&P, Vol 105, Issue 2-4, pp. 209-219
[5] Müller, T. G. and the "TNOs are Cool"-Team 2010, A&A, 518, L146