**NEAR-INFRARED SPECTRA OF TNOs: FIRST RESULTS OF THE NEW ESO-LARGE PROGRAM AND IMPLICATIONS.** A. Guilbert[1], M.A. Barucci[1], A. Alvarez-Candal[1], F. Merlin[1], A. Coradini[2], C. DeBergh[1], C. Dumas[3], O.R. Hainaut[3]. [1]LESIA, Observatoire de Paris-Meudon, 5 place Jules Janssen, 92195 Meudon Principal Cedex, France, e-mail: aurelie.guilbert@obspm.fr. [2]INAF-IFSI, Via del Fosso del Cavaliere, 00133 Roma, Italy. [3]ESO, Alonso de Cordova 3107, Vitacura, casilla 19001, Santiago 19, Chile.

**Introduction:** Trans-Neptunian Objects (TNOs) are believed to be the most pristine remnants of solar system formation. Because of their large heliocentric distance and their resulting faintness of these bodies, their composition is still difficult to assess, and only few spectra are available. Centaurs may be a transition population between TNOs and Jupiter family comets [1]: they are much easier to study than TNOs because they are closer to the Sun.

Some ices' signatures have been detected: methane ice [2-3], crystalline and amorphous water ice [4-5] or methanol [6]. Ammonia even may have been detected [7-8-9], which raises questions on possible internal activity of such objects. Indeed, the presence of either crystalline water ice or ammonia on the surface suggests recent surface renewal mechanisms, since they should have been depleted from the surface within $10^{7-8}$ years [10]. Therefore, our current knowledge of TNOs seems to indicate a very complicated picture that needs to be further studied.

An ESO-Large Program (PI: M.A. Barucci) has consequently been undertaken with the aim of collecting both photometric and spectroscopic information on about 40 objects.

**Discussion:** We will consider the results of one year of observations (from October 2006 to September 2007) carried out with the ESO-instrument SINFONI. SINFONI is an integral field spectrometer [11-12] that, while choosing the H+K grating, allows the observations of both H and K bands simultaneously, with a spectral resolution of about 1500. We chose to use the 8" field of view, and did not use any correction by adaptive optics during the observational runs. The data were reduced using the SINFONI pipeline provided by ESO. The signal to noise ratio of each spectrum has been improved by rebinning it, thus achieving a lower spectral resolution. 21 objects were observed: the spectra will be presented, along with relevant physical properties of the ices identified.

Methane is detected on the surface of Eris [13]. The spectra of objects such as Typhon, Thereus, Bienor or 2003 AZ84 show the presence of water ice (absorption band at 2.0 microns). Some other objects seem to have a featureless spectrum (Ixion, 1999 TC36, 2002 KX14, 2004GV9 or 2005 RN43). A radiative transfer model has been run to provide an upper limit on the amount of water ice that can be present on the surface. The case of Chariklo will also be discussed, since the spectrum we obtained is unambiguously featureless: this is in contradiction with previous results [14-15] where water ice was detected.

Crystalline water ice is unambiguously detected -due to the 1.65 microns absorption band- on the spectra of Orcus and Quaoar. Some other small absorption bands are detected on those two spectra: a 2.2 microns band is detected in both, while a 1.73 microns band is detected (within the noise) in the spectrum of Quaoar only. In the case of Quaoar, we can attribute those features to the presence of methane and ethane ices on the surface, as suggested by [16]. The case of Orcus will be discussed extensively. Indeed, the 2.2 microns absorption band can be attributed to either ammonia or methane [9]. If such volatile ices are indeed present, this most likely implies resurfacing mechanisms induced by internal activity, since Schaller & Brown [17] predicted that no volatile ice would survive on the surface of Orcus.

Thermal evolution models have shown that some TNOs can remain partly or entirely pristine, while some others can be completely depleted of volatile ices [18-19-20]. A fully 3D thermal model is under development in our group, and its application would help to better understand the formation and evolution of such curious bodies.

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