KARAKUL DEPRESSION, TADJIKISATAN – A YOUNG IMPACT CRATER ? D. Baratoux[1], S. Bouley[2,9], L. Baratoux[3], D., F. Colas[2], F., J.L. Dauvergne[4], J. Vaubaillon[2], H. Chennaoui-Aoudjehane[5], A. Jambon[6], J. Gattacceca[7], A. Losiak[8], C. Bourdeille[9], A. Jullien[9], K. Ibadinov[10].[1]Université de Toulouse, UPS-OMP; IRAP; Toulouse, France (david.baratoux@irap.omp.eu).[2]Observatoire de Paris, IMCCE, Paris, France.[3]Université de Toulouse, UPS-OMP; GET; Toulouse, France. [4]Ciel et Espace, Paris, France. [5]Hassan II University Casablanca Faculty of Sciences - Department of Earth Sciences. [6]Laboratoire ISTeP, Université Pierre et Marie Curie, Paris, France. [7]Cerege, Aix-en-Provence, France. [8]University of Vienna, Department of Lithospheric Research, Vienna, Austria. [9]Uranoscope de France, Paris, France. [10]Astrophysical Institute of Dushanbe, Tajikistan.

Introduction: A fascinating controversy has been recently renewed about the origin of the Karakul depression in the Pamir (39°1'N, 73°27'E). The depression lies 4000 m above sea level and at the northeast of the mountain range of Tajikistan and comprises an internally drained lake. Following the work of Eugene Gurov[1,2] reporting breccia and shock features in minerals, the circular fearture is mentioned in the Earth Impact Database[3] as one of the largest complex craters, (50 km in diameter). Its age is unknown, but necessarily younger than the India-Asia collision, 55 – 60 My ago and has been tentatively attributed to Neogene, or Pliocene[1,2]. More recent studies have suggested that the basin is actually an extensional rift currently experiencing NW-SE transtensional deformation[4,5]. These authors interpret the presence of a peninsula and an island at the center of the depression as a graben[4,5]. A new expedition took place in June 2011. The southern rim, the northern rim, the peninsula and the central island were explored and sampled.

Field observations: Different types of rocks have been observed: metamorphosed sediments, granite, limestone, and rare occurrence. The most exciting preliminary result is the finding of shatter cones in metamorphosed sediments in the northern part of the peninsula (Fig. 1). Breccias occur as floats on the central island, and were also found in the northern part of the rim. We could not find any evidence for normal faults and horst structure for the island and peninsula.

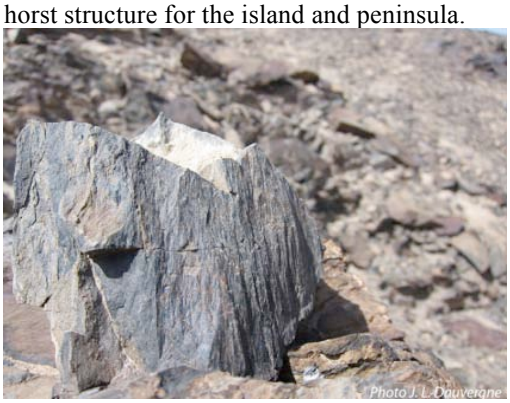

Fig.1 - Shatter cones in metasediment (peninsula).

Search for shock metamorphism: Thin sections of granite and breccias have been examined under the microscope. A few quartz grains exhibit planar features that evocate PFs or PDFs depending on their spacing (Fig. 2). High-pressure silica phases in these samples are also searched with an approach combining Raman spectroscopy and cathodoluminescence[6].

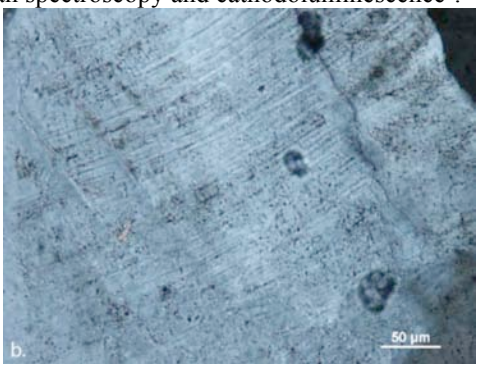

Fig. 2 - Closely spaced planar features in a quartz grain evocating PDFs (XPL).

Exceptional twinning has been observed in calcite grains (Fig. 3), with strong resemblance with observations reported for other impact structures in calcite[7]. The conditions of formation of these twins will be analyzed from Electron Paramagnetic Resonnance[8].

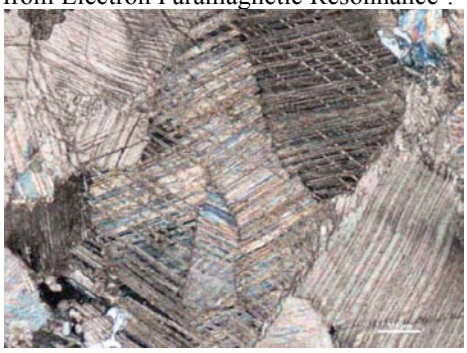

Fig. 3 - Closely spaced twins observed in calcite(XPL).

References: [1]Gurov and Gurova (1993) *Geologicheskii zhurnal*, 6, 53-64. [2]Gurov et al. (1993). *XXIV Lunar Plan. Sci. Conf.*, 591-592. [3]http://www.passc.net/EarthImpactDatabase. [4]Amidon and Hynek (2010), *Tectonics*, TC5017. [5]Robinson et al. (2004). *Geol. Soc. of Am. Bull.*, 116, 953-73. [6]Chennaoui-Aoudjehane et al. (2005) *Meteor. Plan. Sc.*, 40, 967 – 979. [7]Burt et al. (2005) *Met. Plan. Sc.*, 40, 297. [8]Polanskey and Ahrens (1994), JGR, 99, 5621-5638.