PREPARING THE 2017 DRILLING CAMPAIGN AT ROCHECHOUART IMPACT STUCTURE.

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Introduction: The Rochechouart impact structure [1], dated at ~203 Ma (recalc.) [2], is among the most accessible large impact sites on Earth [3-4]. Only the center of the crater is still preserved [1, 3-4]. The initial diameter estimated between 30-50 km, remains undetermined [3-4]. The full sequence of crater deposits, including fine grained impactoclatites at the top, is exposed in the center of the structure [3, 4]. The rivers cut through the crater deposits intersecting the flat structural crater floor over the entire zone [3, 4]. Rochechouart has never been drilled for impact research. The 2017 drilling programme funded by the National Natural Reserve will deliver samples available to the scientific community in 2018 and after.

Objectives: Beyond specific issues (initial crater size and morphology, age, projectile, composition, etc…), major scientific objectives are similar to that of 2016 drilling programme at Chicxulub [5]. This includes large crater formation mechanics, characterization of impact-induced alteration processes, and the evaluation of possible effects of large impacts on the habitability of planets and the emergence of life. Although different in size, both Chicxulub and Rochechouart triggered impact-induced hydrothermal systems and projectile-derived chemical signatures are preserved in the impact deposits [6-7]. In addition, the Rochechouart drilling results are expected to aid understanding the conditions and mechanisms of crater deposits, including the abundance of the unmelted fraction material [3]. They should also enable characterizing the faith of siderophile element patterns (projectile contamination) as related to cooling and alteration of impact deposits [3 and references theirein] and the implications for meteorite studies [4].

Programme: Over 20 shallow drill holes intersecting the complete range and the full sequence of preserved impactite deposits will be distributed over 8 sites (see table). The latter spread along two 10 km radial traverses across the center of the structure. Drill holes are projected to cross and to stop 30 m beneath the structural crater floor at 7 sites. Lateral and vertical gradients of shock, temperature, alteration, etc.., should be then accessible as well as deconvolving and interpreting the multiple stages of fracturing (including the formation of pseudotachylite and breccia dikes [8-9]) and the multiple stages of alteration [3].

SITES	LITHOLOGY		Drilling	
	Crater fill	Underlying target (damages)	Reference	Depth (m)
n°1: Chassenon	Top suevite with impactoclastites Polymict lithic beneath	Gneiss (local cataclasis, no or few pdf)	D1 D2-3	125 1 each
n°2 : Champonger	Polymict lithic	Gneiss (local cataclasis, no or few pdf), Microgranite (shatter cones, no or few pdf)	D4 D5-6	10 3-1
n°3: Valette	Mostly yellow basal melt, locally vesicular, locally red	Gneiss and granitic gneiss (variable, up to partial melting)	D7 D8 to D11	40 1 each
n°4: Recoudert	Vesicular yellow basal melt (similar to Babaudus impact melt rocks ?)	Gneiss and granitic gneiss (damages?)	D12 D13-D14	40 1 each
n°5 : Montoume	Massive red basal melt clast rich particulate melt	Mostly granitic gneiss (local cataclasis and brecciation)	D15 D16 to D20	40 1 each
n°6: Puy de Chiraud (Videix)	Massive red basal melt Polymict lithic beneath ?	Granite/gneiss (variable, local cataclasis and brecciation up to almost local melting near Videix)	D20 D21 to D23	40 1 each
n°7: Rochechouart castle	Polymict lithic Basal impact melt beneath ?	Granitic gneiss (cataclasis, no or few pdf)	D24 D25-D26	40 1-3
n°8: Champagnac quarry	Polymict lithic (monomict ?)	Mafic gneiss, diorite, amphibolite, variscan hydrothermal veins (impact hydrothermal veins, pseudotachylites, local cataclasis and brecciation)	D27	40

Conclusions: The 2017 drilling campaign is an important step towards a better understanding of 1) the Rochechouart impact structure; and 2) large impacts and collateral effects (habitability of early Earth and planets/emergence and evolution of life). Those interested in drilling outcomes, participating in the research or in the organization of the drilling, the initial examination of cores and sample distribution, please **contact us!**

References: [1] Kraut F. (1969) *Geologica Bavarica* 61: 428–450. [2] Schmieder et al. (2010) *Meteoritics & Planetary Science* 45: 1225–1242. [3] Lambert P. (2010) GSA Special Paper 465, 505–541. [4] Lambert P. (2015) Abstract #1915, 46th Lunar & Planetary Science Conference, Abst. #1915. [5] Gulick S. et al. 2016. *International Ocean Discovery Program Expedition 364 Scientific Prospectus Chicxulub: drilling the K-Pg impact crater*, 21 p. doi:10.14379/iodp.sp.364.2016. [6] Lambert P. (1982), *Geological Society of America Special Paper* 190: 57–68. [7] Trinquier A. et al. 2006. *Earth & Planetary Science Letters* 241: 780–788. [8] Lambert P. (1981) Proceedings Multi-ring Basins, LPS, Schultz P. H. and Merrill R. B. eds.: 59-78. [9] Reimold W. U. et al. (1987) *Journal of Geophysical Research* 92: 737–748.