NEW U-Pb ZIRCON AGE DATA FOR BASEMENT AND IMPACT MELT ROCKS FROM THE ROCHECHOUART IMPACT STRUCTURE, NW MASSIF CENTRAL, FRANCE.

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Introduction: The Rochechouart impact structure in the NW part of the French Massif Central (FMC) is characterized by deep erosion that, however, still allows the recognition of a complete suite of impact lithologies, the crater floor, and various target lithologies (e.g., [1]). We present the first results from a project that is aimed at U-Pb on zircon isotope analysis of a representative set of surface and core samples of impact melt rocks and basement lithologies. These results will help to constrain the age of the impact event and provide information about the dynamics of the impact melt formation process in terms of the protolith target rocks for the diverse impact melt rock types. The analysis of the basement samples will improve and complement the current understanding of the FMC evolution in the region of the impact structure.

Methodology: Zircons from a reddish impact melt rock from Montoume, a yellow impact melt rock from Recoudert, an amphibolite from Exideuil, and a gray foliated gneiss from Moulin de Laurière have so far been analyzed for U-Pb isotope data with a Neptune Plus Thermo Finnigan LA-MC-ICP-MS coupled with a Photon-Machines 193 nm laser system at the Laboratory of Isotope Geochemistry at the University of Ouro Preto, Brazil.

Results: The oldest ages registered in zircons from both basement rocks are Neoproterozoic. The youngest ages from zircons of the gneiss are Silurian (433 ± 15 Ma), and from zircons of the amphibolite we obtained Carboniferous ages (326 ± 5 Ma). The principal age peak recorded from the basement zircons is at ~362 Ma, registered in the amphibolite. Other minor basement age peaks are registered at ~327 and ~449 Ma for the amphibolite; and ~523 Ma and ~544 Ma for the gneiss. The impact melt rocks display a greater variety of ages, from the Neoproterozoic to the Triassic (203 ± 2 Ma) for the Recoudert sample, and from the Neoproterozoic to the Lower Jurassic (195 ± 3 Ma) for the Montoume impact melt rock. The most prominent age peak registered in these impactites is at ~388 Ma and is from the Montoume sample. The Permian ages are obtained principally from the Recoudert sample.

Discussion: The basement ages obtained in this study can be broadly correlated with different events of the evolution of the FMC (e.g., [2] and referred therein). Pre-Ordovician ages are probably related to protolith ages of the metamorphic basement. The ~362 Ma age peak is slightly older than the Variscan collision period, and similar ages have been obtained elsewhere in the NW FMC [3]. The ~327 Ma age is probably related to the Carboniferous exhumation period. The most prominent basement age peaks are not registered in the zircons from the two impact melts. Furthermore, these impactites display age peaks that are not found for the basement rocks analyzed to date. This is probably a result of different target rock lithologies involved in the formation of both impact melt rock samples. The age peaks observed for the impact melt rocks possibly record the exhumation of high-grade rocks at ~388 Ma [4] and a Permian granitization phase [5]. Finally, ~204 Ma ages recorded in zircon from both impact melt rocks are in agreement with recent U-Pb estimations of the age of the impact event (204 ± 2.2 and 207 ± 3.6 Ma; [5]). The youngest ~194 Ma ages obtained for the Montoume sample are similar to ~195 Ma ages previously reported for Babaudus impact melt rock [5]. Further textural characterization of these zircons will help in the interpretation of this apparent post-impact age.

Conclusions: U-Pb age data for zircon from an amphibolite and a gneiss from the basement of the Rochechouart impact structure show good agreement with known events in the evolution of the FMC. Impact melt rock samples from Montoume and Recoudert show a great diversity of ages, including age peaks not recorded in the basement lithologies analyzed to date, which probably relates to target rocks that still need to be analyzed. Furthermore, the age of the impact event and a younger Lower Jurassic age were obtained.

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