

## U in phosphates from Central Jordan lithologies: sedimentary, metamorphic to supergene evolution

S. FLEURANCE<sup>1,2\*</sup> AND M. CUNEY<sup>2</sup>

<sup>1</sup>School of Geology and Geophysics, University of Adelaide, SA 5005, Australia.

(\*correspondence:stephanie.fleurance@adelaide.edu.au)

<sup>2</sup>GéoRessources, Université de Lorraine, CNRS, CREGU, 54506 Vandoeuvre-lès-Nancy, France.

Central Jordan offers a unique opportunity to follow the evolution of the composition of carbonate-fluorapatite (CFA) through a succession of processes leading to the ultimately formation of surficial uranyl vanadates mineralisation. The CFA were initially formed in marine sediments and phosphorite of the Belqa Group deposited during the great Late Cretaceous-Early Tertiary phosphogenic event which extends from Columbia to the Middle East forming the Tethyan phosphate belt [1]. Sediments of the Belqa Group were enriched in phosphate together with a large range of redox sensitive elements such as uranium [2]. U is essentially substituted to calcium in the apatite lattice. The initial sedimentary-diagenetic U-rich-CFA suffered local pyrometamorphism (high temperature-low pressure event by organic matter combustion) allowing the liberation of U from apatite structure to form micrometric uranium oxides and low-U CFA in marbles as shown by Laser Ablation ICP-MS analysis (Fig. 1). Then, the weathering of the uraniferous CFA, by meteoric and evaporitic waters, led to the new formation of fluorite, low-U Na-sulfato-phosphate, and the crystallisation of uranyl vanadates such as tyuyamunite and strelkinite.

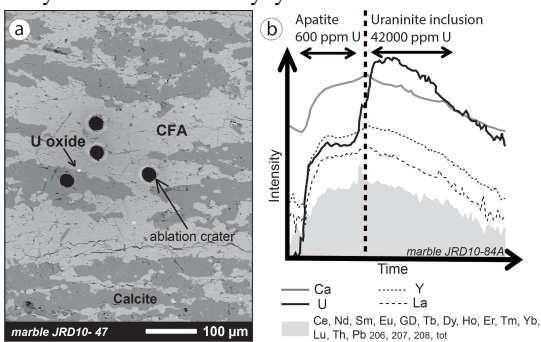


Figure 1. a) U oxide in marble CFA. b) LA-ICP-MS spectra of marble CFA.

[1] Pufahl *et al* 2003. *Sedimentary Geology* **161**, 175-205. [2] Fleurance *et al* 2013. *Palaeogeography, Palaeoclimatology, Palaeoecology* **369**, 201-219.