## U/Pb dating and $\Delta_{47}$ temperature determination of Jurassic carbonates: implications for early and burial diagenesis within intracratonic sedimentary basins

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It is difficult to determine the temperatures of short-lived paleo-circulation from conventional geothermometers in limestones or sandstones because of sample size since these events are often only recorded by microscopic cements (quartz, calcite, etc., smaller than 200 µm) that fill the intergranular space. In addition, the difficulty in dating the main minerals that cause cementation often prevents the identification of a clear chronology of events that drastically impact the reservoir qualities of rocks. This difficulty in dating cements is a barrier to many diagenetic studies, particularly burial diagenesis where very fine cements (< 200 µm) occlude spaces between sedimentary grains.
The objective of this presentation is to demonstrate the potential of coupling clumped isotope thermometry (Δ47) and in situ U-Pb dating on early (isopachous or non-isopachous dogtooth cements) and blocky calcite (sparite) filling the intergranular space of Jurassic limestones of the Paris and Aquitaine basins in France. The first stage filling the inter-granular space give in situ U-Pb ages not incompatible with the age of deposition considering the uncertainties. These ages also indicate that these cements can resist, since the Middle Jurassic, to dissolution and recrystallization processes during burial. The coupling of Δ47 temperatures and U/Pb ages obtained on later blocky calcites from the Paris Basin suggests that cementation occurred during two diagenetic stages associated with major tectonic events: (1) Early Cretaceous and (2) Eocene/Oligocene. We report unexpectedly hot brines in thermal disequilibrium with the host-rock, up to 60°C, contrasting with the lower temperatures predicted by conventional thermochronometers. We suggest that the kinetics of mineralization events prevented the recording of short-lived hot fluid flows, resulting in the failure to record atypical circulation in intracratonic sedimentary basins by conventional methods. It appears that these new data allow reconsidering the hypotheses made until now concerning the history of paleo-fluid flows of these basins, and open new perspectives to understand diagenesis and past fluid flow events in many sedimentary basins.