171-16 - Booth No. 145: INSIGHTS INTO THE SIZE AND FREQUENCY OF MAGMATIC INCREMENTS EMPLACED INTO UPPER-CRUSTAL SILICIC MAGMATIC SYSTEMS

Tuesday, 11 October 2022

9:00 AM - 1:00 PM

Exhibit Hall F (Colorado Convention Center)

Booth No. 145

Abstract

Sediment accumulation rates are inversely related to the timescales over which they are calculated. This relationship, known as the Sadler effect, can be explained by the unsteady nature of sediment accumulation with brief periods of sediment accumulation followed by long periods of quiescence or even erosion. High-precision geochronologic studies of upper-crustal silicic plutons over the past 25 years have demonstrated that these igneous bodies are built incrementally via periods of magmatic addition interspersed with quiescence. Similar to studies of the Sadler effect in sedimentary sections, we have compared apparent magmatic areal addition rates to observed durations of magmatism by compiling U-Pb zircon CA-ID-TIMS geochronologic data for upper-crustal silicic plutons of Cretaceous age or younger. The resulting plot of apparent areal addition rate vs. time shows an inverse power law relationship for timescales < 1 Myr and a constant apparent areal addition rate for timescales > 1 Myr. To better understand these relationships, we utilize a simple model that tracks the apparent emplacement rate as we vary increment size and periods of quiescence. Our model suggests that: 1) increment size must vary over several orders of magnitude and that only the largest increments significantly impact the calculated areal addition rate, 2) quiescence dominates the system such that the apparent areal addition rate decays when the observed period is <1 Myr, and 3) enough large increments are added to these systems at timescales >1 Myr for the apparent addition rate to converge towards a long-term average.

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