218-7 INTERPRETING TECTONIC, CLIMATE AND AUTOGENIC SIGNALS FROM ALLUVIAL PACKAGES IN NORTHERN SICILY, INITIAL RESULTS AND PROJECTIONS OF ESPRESSO

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A rich sedimentary archive of tectonic processes is being recorded in a unique source-to-sink natural experiment in the Peloritani Mountains of NE Sicily where the production, transport, and deposition of sediment follows the beat of earthquakes, as well as changes in climate, sea level, and autogenic geomorphic processes. Here uplifted fan deltas of the the Pagliara River expose thick packages (~200m) of sand and gravel containing fluvial (F), distributary mouth channel (DMC), and distributary mouth bar (DMB) facies. Results from infrared-stimulated luminescence (IRSL) dating show that the basal fluvial facies has an age of 150±25 ka and are sharply, but conformably overlain by 142±19 ka to 131±19 ka marine DMB facies. This allostratigraphic package is inset by a younger, fluvial deposit dated to 125±17 ka. Collectively, this sequence represents deposition through a glacial to interglacial climatic and eustatic half-cycle. Preliminary paleoerosion rates from TCN 10Be inventories of shielded sediment in the IRSL-dated sections are 1.93±1.16 and 1.33±0.2 mm/yr, both of which are greater than the modern basin-wide erosion rate (0.97±0.11 mm/yr). These results argue for glacial-interglacial exogenic climate forcing that modulates sediment production in the source and accommodation space in the sink. But depositional cycles are also evident in the fan-delta at much smaller time and space scales, and here the exogenic forcing vs. autogenic processes is ambiguous. The DMC and DMB facies are stacked in coarsening-up meter-scale bed sets with opposing dips perhaps related to delta lobe switching and/or channel avulsions. We measured the magnetic susceptibility of 24 m of DMB section at 20 cm intervals. Spectral analysis of the resulting time series suggests that there are several short-period (decadal to centennial) cycles that rise to or above the 95% confidence interval of the red noise model consistent with earthquake temporal clustering or deltaic autogenic processes. Our goal is to model cyclicity using a novel coupled source to sink landscape evolution model (LEM) that we are developing in Landlab. Preliminary results indicate that the model will allow us to deconvolve the exogenic tectonic signal from the other factors that contribute to the assembly of stratigraphic architectures.

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