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## Quantifying environmental signal propagation and preservation in ancient sediment routing systems using field data

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The assertion that stratigraphy will store environmental signals, such as sediment flux signals related to paleoclimate and tectonics, is debatable because that same stratigraphy can also store signals of autogenic processes that overprint and replace allogenic signals (“shred”). To establish the likelihood that strata will contain allogenic signals, the focus should be on quantifying autogenic processes. Models show that stratigraphic storage of allogenic sediment flux signals will only take place if it exceeds a threshold condition set by autogenic processes. This is supported by experimental and numerical models but its validation is hindered by low spatio-temporal resolution of stratigraphic datasets. We address this by reformulating a theoretical framework that dispenses with the need for exquisite temporal resolution. To demonstrate the applicability of our approach we explore the potential for environmental signal propagation and preservation in two ancient field systems: a small Pleistocene delta in Greece and a larger Eocene sediment routing system in the Spanish Pyrenees. This work demonstrates how short-term system dynamics can be integrated with long-term basin dynamics to provide a framework that assesses the capacity of sedimentary systems to store environmental signals.