Fluvial Research Group

UNIVERSITY OF LEEDS

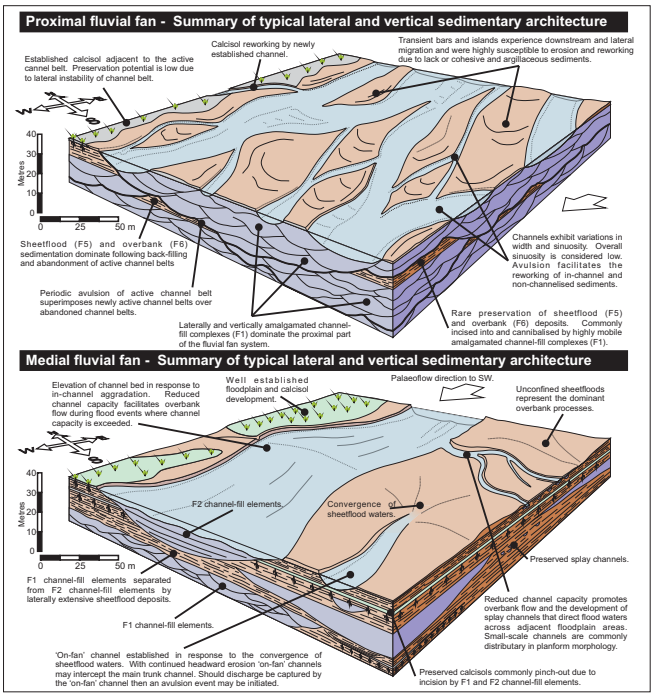
Deciphering the Effects of Climate Change from Autocyclic (Intrinsic) Behaviour in Fluvial Successions: Insights from Field Observation and Numerical Modelling

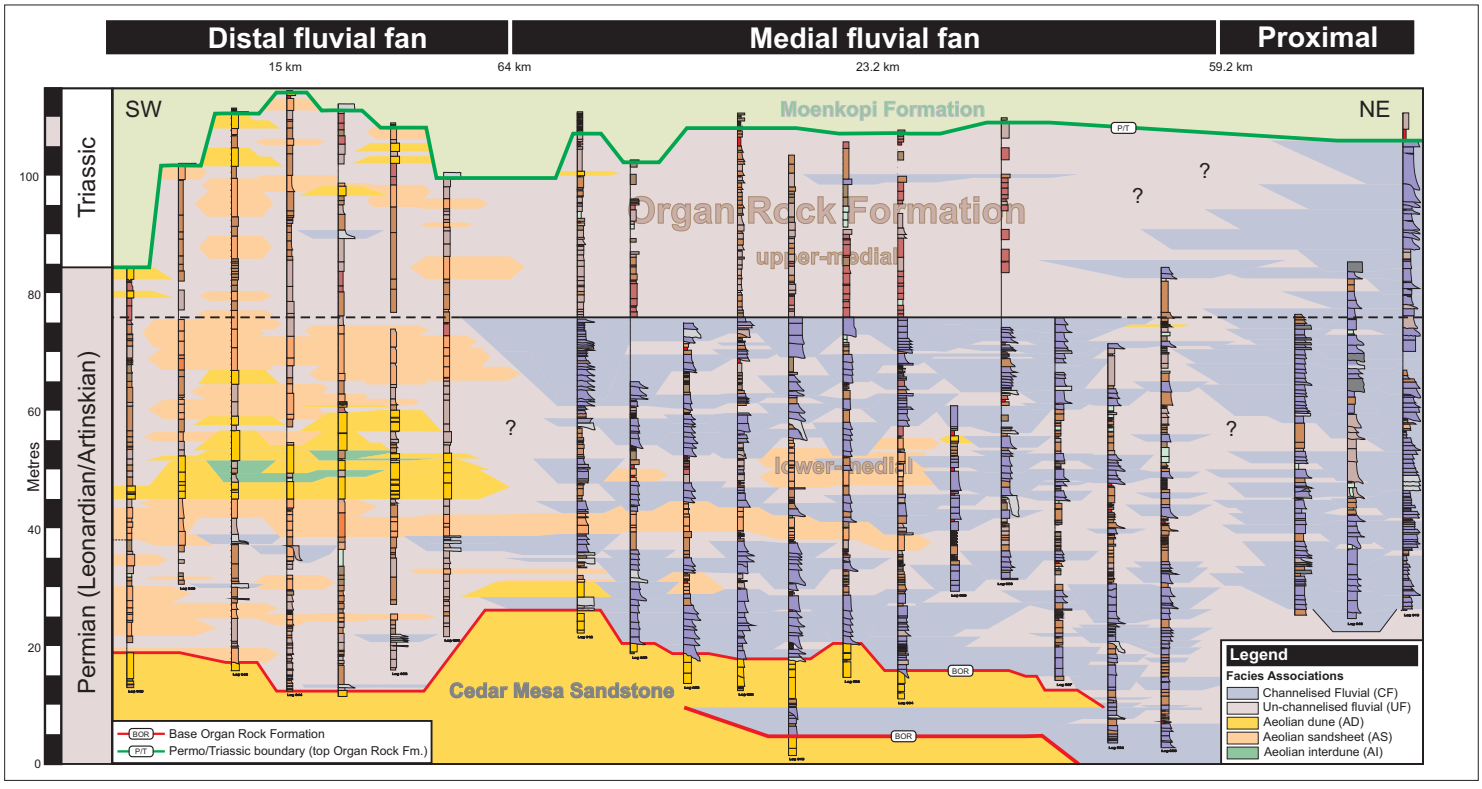
Nigel Mountney, Stephen Cain, Bill McCaffrey & Jeff Peakall

Climate is widely cited as a primary control on the morphology and behaviour of a broad range of fluvial systems and the effects of past climatic changes are commonly considered to be expressed as distinctive stratigraphic signatures within resultant preserved deposits. However, unequivocally demonstrating a climatic origin for many of these preserved stratigraphic trends is not straightforward and alternative explanations are possible in many cases. For example, facies arrangements indicative of fluvial system shutdown and abandonment and which show an apparently drying-upward trend can sometimes be alternatively interpreted in terms of autocyclic (intrinsic) fluvial behaviour, whereby meander loop cut-off, lobe switching or nodal avulsion can result in abandonment of a fluvial reach without the need for a change in an external controlling parameter such as climate. Many fluvial sedimentary successions are known to record the preserved stratigraphic signature of a mix of both autocyclic and allocyclic controls (including climate) and these can be shown to operate on a variety of spatial and temporal scales, such that together they account for the complex stratigraphic architectures typical of most fluvial successions.

This studentship will combine outcrop-based field data collection (e.g. Utah and Arizona) with numerical stratigraphic modelling techniques to develop a suite of quantitative predictive facies and sequence stratigraphic models that account for the combined effects of climatic and autocyclic controls on fluvial system evolution and preservation. Field data will be collected from a range of fluvial successions that accumulated under the influence of a varied semi-arid climate regime. Field methods will include high-resolution sedimentary logging, facies and architectural element analysis, and sequence stratigraphic correlation. Field results will be used to guide development of a numerical (computer) model for the prediction of fluvial stratigraphic architecture. Modelling results will be employed to assess the likely significance of competing climatic versus autocyclic controls on sedimentation. Such models are important for better understanding fluvial system behaviour and for predicting subsurface fluvial stratigraphic architectures in hydrocarbon reservoirs and in saline aquifers currently being considered as sites for long-term underground CO_2 storage.

Interested applicants should have experience of field-based data collection and should be willing to learn a computer programming language such as C++ or Java. The successful applicant will join a dynamic and active team of researchers within the Fluvial Research Group at Leeds.





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