

Climatic Influences on Stratigraphy - Summary and Paths Forward

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Stratigraphic architecture at both the reservoir and basin scale is fundamentally controlled by climate & tectonics via their influence on accommodation and sediment supply. For decades stratigraphers have acknowledged that the climate system is important in the development of sedimentary systems, but most work has either ignored the effects of climate or focused on eustasy as the sole controlling mechanism. Classical geomorphologic studies showed the profound effect climatic conditions have on the characteristics of fluvial systems including nature and volume of sedimentary load, sinuosity, flooding profile, channel pattern & depth, and discharge. Recent work in describing sedimentary systems from a source-to-sink perspective has begun to acknowledge and define the significant influence climatic conditions have on the sedimentary systems responsible for basin evolution & fill. Studies tying the development of shallow marine and deepwater systems to documented climate events on the continent have illustrated that the impact of climate in these realms can be deconvolved from the eustatic signal, allowing for a greater understanding of the processes responsible for the sedimentary record. Results suggest that climate can vary the volume and type of sediment delivered to the basin as well as the timing of maximum sediment flux, both in and out of phase with the eustatic cycle. These studies have also begun to delineate possible paths forward for the field.

Despite these advances, many important questions still remain including, identifying which sedimentary characteristics can be specifically tied to climatic regimes, detecting the influences of climate system evolution on the evolution of sedimentary systems, defining the role vegetation plays in linking climate and sedimentary systems, how that is expressed through time, and establishing how climate forcing is manifest in the sequence stratigraphic framework. Continued work on the links between climate & tectonics may lead to deeper understanding of those processes and strengthen the predictability of sequence stratigraphy.