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SW AAPG ABSTRACT- Poster Session

Bias in cyclic sedimentation toward deposition during sea level turn around points, an example from the Late Pennsylvanian (Missourian Beeman Formation) of the Sacramento Mountains, south-central New Mexico

Late Pennsylvanian mixed carbonate/clastic deposits in the Sacramento Mountains record high amplitude, high frequency eustatic sea level changes. The stratigraphic record, however, is far from complete. Rather than recording a continuum of transgressive, maximum flooding, regressive, and lowstand units, the actual record is heavily biased toward lowstand (early transgression) and maximum flooding deposits, with little or no intervening transitional facies preserved. The resulting vertical facies relationships for the Missourian in the Sacramento Mountains are: Basin- thick lowstand/early transgressive peritidal units with subaerial exposure interbedded with thin maximum flooding diastemic dark shales; Shelf- thick maximum flooding open marine skeletal carbonates bounded by lowstand caliches and soils. The interpreted explanation for this stacking pattern relies on an understanding that during Late Pennsylvanian transgressive and regressive episodes sea level changed rapidly, creating disequilibria between organisms and environments that resulted in sediment starvation and unfilled accommodation space. As sea levels approached lowstand and maximum flooding positions, however, rates of change decreased until zero at the sea level turn around points, creating periods of environmental stability during which the bulk of preserved sediment was deposited. For Missourian strata in the Orogrande basin, the stable sea level turn around points corresponded with alternating peritidal and offshore dysoxic environments, whereas on the shelf these same points corresponded to exposure and open-marine environments. Thick basin peritidal deposits correlate updip to exposure, and the thin diastemic offshore dark shales correlate updip to thick open marine carbonates. An artifact of this relationship is that the downdip basin area is volumetrically dominated by restricted peritidal deposits whereas the updip shelf area is dominated by open marine deposits. In less studied areas it is conceivable that the entire basin geometry could be misinterpreted. The key to a proper interpretation rests with recognizing the significance of thin diastemic offshore shales and unconformity surfaces, as well as understanding the nature of cyclic deposition and its tendency to deposit the greatest volume of sediment during select, environmentally stable sea level turn around periods.