The Geological record of environmental change

Utah: Explaining incision valleys

Voice Over

The observations that have been made in the field can be used to interpret a mechanism for valley development driven by changes in relative sea level. During stable and rising sea level a shoreline parasequence progrades. Once sea level starts to fall the distributory channel that used to feed sediment to the shoreline starts to incise. Now the sediment is forced out into the basin. Once sea level stops falling and starts to rise. The valley is flooded as accommodation is recreated, the valley becomes an estuary. Tidal conditions prevail because the tidal wave is amplified by the erosional topography. Flooding continues and a complex series of estuarine sub-environments exist. Eventually the rising sea level floods over the edges of the valley and onto the former shelf. Once sea level stops rising a new parasequence will prograde over the former valley fill. As we have seen from the outcrop examples incised valleys, and the sediments that fill them, are complicated. They include a variety of facies, often tidally influenced. These facies include fluvial deposits near the base, tidal point bars, tidal flats, sub-tidal shoals, peat swamps, tidal deltas and shell banks. Imagine the complexity of a modern estuary. The correct interpretation of such a succession as the fill of an incise valley is very important as it implies that there has been a relative sea level fall.