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Progradation and development of a distributive fluvial system in the Jurassic Morrison Formation, Colorado Plateau, USA.

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Analysis of a variety of modern day continental sedimentary basins indicates that sedimentation patterns are often dominated by distributive fluvial systems (DFS) in aggradational settings. Characteristics of DFSs include a radial pattern of channels which radiate from an apex situated where flow enters a basin and a decrease in both channel size and grain size downstream as a result of a decrease in transport capacity which may be attributed to channel bifurcation, infiltration and evapotranspiration.

It is believed that there may be many examples of DFS that occur within the continental rock record, one such example is believed to be the Salt Wash Member of the Morrison Formation which covers an area of more than 150,000 km2 of the Colorado Plateau, USA. Previous work has already established the Salt Wash Member as the product of a radial, distributive fluvial system with proximal facies being seen in areas near the source in the South-central Utah to more distal parts of the system to the north and east into Western Colorado. This current study seeks to establish the development of the fluvial system, by documenting the transition from underlying fluvial and lacustrine deposits and changes in the patterns of fluvial channel deposits at locations across the area.

The underlying unit, the Tidwell Member of the Morrison Formation, is variable in thickness and facies displaying characteristics of fluvial channels and alluvial plains, but was predominately a lacustrine environment. The onset of Salt Wash fluvial conditions is marked by the presence of much larger scale, more amalgamated channelized sandstone bodies with deeply scoured bases. They are predominately medium to very coarse cross-bedded sands with local pebbly layers and are associated with thinly interbedded floodplain sandstones and mudstones which show palaeosol development.

An abrupt appearance of fluvial channel sandbodies is only observed at one locality whilst at other locations there is a more gradual transition from smaller channel bodies within the Tidwell Member. Within the Morrison Formation there is therefore a progradation of fluvial channels of the Salt Wash member over the fluvio-lacustrine faceis of the Tidwell Member. Changes in the stacking pattern of the fluvial deposits were also observed both vertically and spatially: in the most proximal location the sandstone bodies are highly amalgamated whereas the distal successions are slightly less amalgamated. In one location there is an increase in amalgamation from the base to the top of the section. These changes may be due to the effects of avulsion, changes in accommodation or may be related to the position of the deposits within the distributive system.