

Basin Evolution of a Pre-Vegetated Syn-Rift Depositional System, Australia

Khalid Almalki¹ and Syed Mahmud²

¹King Abdulaziz City for Science and Technology

²Monash University

Abstract

The Early Palaeozoic siliciclastics exposed in the western Tasmania, Australia, provides excellent analogue for studying the role of climate and vegetation state on the depositional styles in syn-rift settings. This paper presents the results of extensive field mapping, stratigraphy, sedimentological features, and geochemical studies. These results were combined to understand the basin development, and to ascertain the affects of climate and vegetation state on the depositional settings. The Middle Cambrian Tyennan Orogeny (synonymous with the Delamerian Orogeny) was followed by the accumulation of volcanic sequences in a narrow trough in western Tasmania, where continuing extension and related uplift lead to more widespread development of fault bounded, north-south trending troughs that were filled with sediments derived from adjacent Proterozoic basement. Palaeozoic palaeogeographical reconstructions suggest that Tasmania was located at the eastern margins of Gondwana landmass. Palaeoclimate reconstructions of Early Palaeozoic is complex due to several uncertainties, but regional modelling reflects that the climate through Late Cambrian to much of the Ordovician was tropical with warm sea waters, and was influenced by an extended greenhouse period, and high sea level. In this study four facies associations and depositional environments have been identified, including proximal to medial alluvial, braided fluvial and wave and tide dominated near shore to shallow marine. The overall stratigraphy is subdivided into two identical fining upwards sequences separated by a widespread unconformity. Stratigraphic build-ups and depositional styles reflects a strong influence of palaeoclimate, specially, with the sediments deposited in a pre-vegetation (VS2 vegetation state), warm, humid climatic setting resulting in the development of extensive, sheet braided geometries.