Using high precision CA-IDTIMS zircon age determinations to interpret correlation and depositional rates in Permian coal sediments of the Sydney, Gunnedah and Bowen basins

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The chronostratigraphic framework of the Sydney, Gunnedah and Bowen basins using CA-IDTIMS geochronology is enhancing correlation of stratigraphic units and providing a better understanding of local and regional sedimentation patterns. Ages range from 271.45 Ma (Rowan Formation) to 247.71 Ma (Garie Formation). Two examples demonstrate these studies.

Firstly, depositional rates in coal sequences are demonstrated. In the Ulan Coal (Sydney Basin), both the C Ply (256.05 Ma) and the F Ply (257.03 Ma) tuffs have been dated and are separated by about 5 m, giving a depositional rate of about 5.1 m/my. In the Yebna 1 well (Bowen Basin) tuff beds from the top and bottom of a coal interval of the Kaloola Member of the Bandanna Formation, separated by 8.9 m, were dated as 252.49 Ma and 252.97 Ma indicating a depositional rate of 18.6 m/my. The Trinkey Formation (Gunnedah Basin), with 2 thin coal beds, has a maximum thickness of 258 m. Tuff beds near the top and bottom have ages of 253.27 Ma (Blackville 1) and 255.57 Ma (Brawboy 1), a depositional rate of 255 m/my.

Secondly, precise local and regional stratigraphic correlation can be demonstrated. Examples are the Awaba Tuff and the Nalleen Tuff; the Hoskinsons Formation of the Gunnedah Basin with the Ulan Coal of the Western Sydney Basin and the Woonona Coal Member of the Wilton Formation of the Southern Sydney Basin. A previously suggested correlation that we can demonstrate as incorrect is that of the Watermark Formation with the Nowra Sandstone.