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A review of the volcanology and sedimentation of the Mid Permian southern Sydney Basin; with reference to convergence and subduction along the Gondwanan Panthallassan margin.

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This research focuses on the volcanology and sedimentation of the Mid-Permian Shoalhaven Group of the southern Sydney Basin. A number of newly identified tuffs that erupted into the shallow marine sediments are described. These predominantly felsic tuffs appear to be laterally extensive, hence chronostratigraphic markers. Trace and body invertebrate marine fossils are associated with these tuffs, including death assemblages. At least one reworked tuff containing abundant augite crystals in pristine condition has travelled a minimal distance before deposition and burial.

The dykes along the coast south of Sydney have been reported as being generally Jurassic to Tertiary in age. However, a number of dykes which have intruded unconsolidated wet (Permian) sediments, hence penecontemporaneous with sedimentation, are described. At least one of these Permian dykes contains xenoliths, of which at least two different metasedimentary types have originated from underlying sedimentary units, in addition to a rarer syenitic type from a lower crustal source beneath the Sydney Basin. These dykes are associated with the proximal volcanoes responsible for the early latite eruptions of the Permian Gerringong Volcanics (GV).

Dropstones, probably transported from sea ice, of extrusive igneous material, both mafic and felsic, from eruptions prior to the first flows of the GV are also described. These dropstones, which sometimes exceed 1 metre in cross-section, usually occur in horizons, likely due to short term climatic cycles, such as high latitude seasons. They can be found in the sediments along the coast in addition to the westerly boundary, indicating proximal and distal transportation across the basin. They are also found throughout the Shoalhaven Group, indicating extended frigid conditions.

The numerous intercalated glendonite and concretion horizons which occur throughout the sedimentary units of the Shoalhaven Group often exhibit very different morphologies, which may be associated with the local heat regime consequent to the regional volcanism. Glendonites at a number of localities are also associated with fossils, body and trace, and it appears that the fossil has acted as the nucleus for its formation.

Evidence suggests that the sources for these eruptions and intrusions were from volcanoes initially situated off the present-day coastline to the south-east, followed by at least one island volcano at Jervis Bay, with later development of a volcanic arc to the north-east, also off the present-day coastline, which

was responsible for the extensive latite flows of the GV. A small island composed predominantly of (Carboniferous?) granite probably existed in the south of the basin. It is likely that these volcanoes were associated with subduction and convergence stress related to foreland loading from the Currarong Orogen to the east, the south-easterly extension of the New England Orogen.