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Towards the Improvement of the Earthquake Locations in the Australian Earthquake Catalogue

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Abstract

Geoscience Australia's National Earthquake Alerts Centre (NEAC) provides 24/7 earthquake monitoring and time critical earthquake bulletins to state and federal government stakeholders, and the Australian public via a publicly facing website. NEAC detects and locates earthquakes using SeisComp software, assuming a globally applicable velocity model. Prior to entering the Australian earthquake catalogue, earthquake solutions undergo a 'Final Review', generally completed on the next business day to ensure sufficient time for in-depth review using all available data. It is well known that earthquake solutions are estimates of real physical phenomena, derived from mathematical inversion of seismic wave observations, with best fit to earth models. In this study, we compare various location algorithms using deterministic and probabilistic approaches, together with a series of existing local and global velocity models with a view to improve the earthquake locations in the Australian earthquake catalogue. Several well-located events such as 2018 Lake Muir (WA) M_W 5.2 and 2019 Tennant Creek (NT) M_W 5.0 are used as "reference" events for this analysis. Earthquake locations will be assessed using different models and location methods. The outcome of this study will be presented to expert seismologists across Geoscience Australia (and externally if required) and, upon reaching consensus, implemented in future NEAC Operations as part of the 'Final Review' of the located events.

Keywords: Australian earthquake catalogue, Earthquake location, Location algorithm, velocity model