Geoscience Australia is custodian of ship-track magnetic and gravity data from close to 700 marine surveys conducted between 1960 and 2009. These data were last combined and levelled in the late 1990s. New levelling has been motivated by specific requirements within projects being conducted as part of the Australian Government’s Energy Security Program (2006–2011). These projects rely on marine potential-field datasets to help constrain sediment thickness and basement architecture in remote offshore basins. Recently-levelled datasets cover: 1) the Capel and Faust basins, deepwater basins about 800 km off the east coast, and 2) the southwest margin of the Australian continent. The levelling involved the following steps: consistent computation of gravity anomalies; splitting lines into straight-line segments to facilitate cross-over computations; low-pass line filtering where necessary; editing to remove problematic ship-tracks; and levelling to minimise cross-over misties. Using methods developed for the late-1990s Australia-wide work, magnetic data were levelled by minimising misclosures around loops and then gridded and merged with aeromagnetic data in onshore and near-shore areas. Gravity data were levelled using a polynomial technique and satellite-altimeter-derived gravity data as a reference surface. The resulting levelled datasets provide information at a higher-resolution than is available from satellite-derived gravity measurements or from global compilations of magnetic data. Despite this, the levelled datasets are limited to areas of specific scientific or exploration interest, which highlights the need for levelled datasets that cover the whole of Australia’s marine jurisdiction.