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Mapping and forecasting soil moisture deficit over Australia

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Soil moisture information is of interest to a wide range of stakeholders and is crucial for making informed decisions on land and water resources management. At present Australia has no publicly available information on nation-wide soil moisture condition or forecasts of likely soil moisture state. This study presents a 'proof of concept' that useful nation-wide soil moisture and related products for Australia can be derived using a simple soil moisture modelling framework, driven by readily available forcing data and hydrological models. For demonstration purposes, a simple model of the surface water balance is used in combination with data from the Bureau of Meteorology to compute soil moisture on a daily basis at a spatial resolution of 25 x 25 km across the whole of Australia. The method provides information on the present state of soil moisture, comparison with the previous year, comparison with long-term average, and in combination with precipitation forecasts, probabilistic forecast of likely conditions in the coming months. In addition, an historical time series of soil moisture (including runoff and actual evapotranspiration) estimated for any point in Australia is produced. This is useful for placing current or expected conditions in a historical context. It is envisaged that the demonstration from this study will lead to a real-time provision of soil moisture and related products for Australia by appropriate agencies.