Introduction. Understanding drought severity and extent is of great importance, but is often complicated by the number of techniques available to quantify it. To assess the range and variability in drought prediction, a number of commonly used drought indices were derived using output from a regional climate model simulation of Australia’s Murray Darling Basin (MDB). Temporal and spatial analyses were conducted to compare these indices across regional scales and to characterize the extent and severity of drought events across south-eastern Australia over the last few decades.

Drought Indices and Forcing Data. WRF-NOAH coupled model data were used to provide forcing for the period 1985-2010 at 3-hourly time steps and 10 km resolution (Evans and McCabe, 2010). Figure 1 provides an overview of the study region. WRF-NOAH output, including 2m air temperature, soil moisture, surface runoff and precipitation, were used to drive four different indices at a monthly resolution, capturing hydrological, agricultural and meteorological drought descriptions.

Drought indices were derived using the: Standard Runoff Index (SRI-3) [hydrological drought]; Soil Moisture Percentiles (SMP) (Andreadis et al., 2005) [agricultural drought]; Reconnaissance Drought Index (RDI-3) (Tsakiris and Vangelis, 2005) and Palmer Drought Severity Index (PDSI) (Palmer, 1965) [meteorological drought]. A 3-month “smoothing” time scale was applied to the SRI and RDI approach, to focus on agricultural impacts.

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Drought Duration and Extent. The duration of a region under drought has an impact on its severity. Figure 3 identifies the longest period of drought occurrence in each of 26 major sub-catchments of the MDB (as defined by the Bureau of Meteorology). As can be seen, there is considerable variation between each of the indices during the major drought periods, both in terms of duration, spatial extent and contiguous pattern. RDI3 and SRI3 seem most consistent at these times.

Research Overview. a) drought indices responded similarly to precipitation anomalies and captured the major droughts over the 25+ years of simulation; b) the recent Australian drought (2002-2008) was shown to be the most severe; c) the Murray Darling Basin experienced contiguous moderate to extreme drought conditions for long periods, covering almost 100% of the study region; d) the duration of droughts varied greatly between indices; e) drought assessments using soil moisture parameters tended to recover in response to precipitation at a much slower rate.