Murray-Darling Basin Regional Hydroclimate Project

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The Murray-Darling Basin Hydroclimatology Project has been ongoing since 2003. The original focus was on modeling the basin water budget in an integrated fashion such that the knowledge of the current level of water storages throughout the watershed was consistent and detailed enough to be useful to water resource managers and other decision-makers. The Murray-Darling Basin Sustainable Yields Project explored the likely impacts of climate change and development on future water availability in the watershed using basin wide hydrological modeling. The Australian Water Availability Project developed a model - data fusion approach to simulating surface hydrology fields and producing weekly water budget quantities in near real time. The South Eastern Australian Climate Initiative investigated the climate drivers in South-east Australia including the influence of large scale teleconnection patterns such as El-Nino Southern Oscillation, the Southern Angular Mode and the Indian Ocean Dipole, as well as developing a seasonal streamflow prediction system now operationalized by the Australian Bureau of Meteorology. Field data collection is ongoing in the Murrumbidgee catchment with an extensive network of soil moisture and meteorological sensors, at Tumbarumba where a flux tower is measuring energy, water and CO2 fluxes, and now at a new observational "super-site" near Wellington NSW. The National Airborne Field Experiment also conducted several observational studies collecting airborne, flux tower and in-situ data. This has facilitated a series of research projects that connect satellite data, airborne data and in-situ data with a focus on soil moisture estimation. While the effort to produce research outcomes useful to decision makers continues, the RHP focus has shifted toward investigation of coupled water, energy and carbon cycles. The Water Resources Information Research and Development Agreement (WIRADA) is focused on this link with decision makers. It aims to develop an architecture for water information systems that provides open access to water related data as well as developing techniques for creating and maintaining hydrological information products to support water information management, reporting, forecasting, assessment and accounting. Another project with a strong link to decision makers is the NSW/ACT Regional Climate Modelling (NARCliM) project. In collaboration with state government agencies, ensemble regional climate projections at high resolution (~10km) will be produced for south-east Australia. The extensive dataset produced using this dynamical downscaling approach will e used to improve our understanding of the regions climate as well as feeding into climate impacts and adaptation studies. There is also a number of studies measuring stable water isotopes in precipitation, river flow, ground water and speleothems. These varied observations of stable isotopes, combined with satellite based isotopic composition derived from the Tropospheric Emission Spectrometer on-board the AURA satellite, provide the opportunity to understand the large scale transport of water through the system isotopically. This presentation provides an overview of previous and current work in the Murray-Darling Basin Regional Hydroclimate Project and discusses recent results.