Following the water in flat, dry landscapes: what works and what needs work in the northern Murray-Darling Basin, Australia

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* **This abstract is for an Oral presentation**
* **Indicate the Proposed Session – GIS/Remote Sensing of connectivity and geomorphic change**
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# ABSTRACT

The northern Murray-Darling Basin in Southeast Australia drains a flat, semi-arid landscape that contains an array of low energy fluvial landscapes: meandering and anastomosing channels, vast floodplains, semi-terminal wetlands and flood out channels that you cannot see in the dry. Finding and following the water as it moves across this landscape is vital for agricultural management and the efficient use of water for the environment. Traditional flow-inundation models do not work well as the landscape is too flat and flow is prone to diversion from land management practices. Satellite imagery, particularly the latest generation of Sentinel 2 imagery, provides a tool with the potential to map and monitor water movement and persistence across vast regions with almost weekly temporal frequency. This presentation compares water mapping and data processing approaches for application in the Darling-Baaka River, Warrego River channel and floodplain and the Gwydir River Wetlands. We also compare multiple water mapping indices such as the Normalised Difference Water Index (NDWI, McFeeters 1996), Modified Normalised Difference Water Index (MNDWI, Xu, 2006), Tasseled Cap Wetness (Kauth and Thomas 1976) and the Fisher Index (Fisher et al. 2016) for effectiveness in a range or landscape condition (wet, dry, variable turbidity).

The relatively fine pixel size (10 m optical range and 20 m shortwave infrared) combined with approximately twice per week capture time means that useful imagery (cloud and error free) is available approximately 40 times per year. This temporal and spatial resolution allows for the creation of data relating to pool persistence, flow path patterns, inundation duration and connection at levels valuable for understanding the ecological and agricultural landscape. Comparison of indices shows that the inclusion of the shortwave infrared band improves accuracy where flood waters are highly turbid and that the relatively simple MNDWI performs consistently the best. However, for assessment of smaller disconnected features the NDWI can provide greater resolution as is uses only bands in the optical range. In the Gwydir Wetlands it seems that we still cannot see through the dense reed beds and ancillary data are required to augment our water mapping data.

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