**Abstract**

Soil erosion modelling is a valuable tool for decision-makers as it can be tested under a wide range of conditions. Prediction models for wind and water erosion assessment differ in the complexity of the processes examined and the type of input data required. Therefore, we need detailed data and access to high spatio-temporal datasets to give the best assessment of soil losses and identify regions at risk of erosion in the future. In low rainfall zones, erosion rates may be affected by the combined impact of wind and water erosion. However, these two processes are still widely assessed separately. Dryland ecosystems are highly sensitive to environmental disturbances (e.g. droughts, overgrazing, fires) which can dramatically increase erosion susceptibility. Unfortunately, these threats are likely to be more frequent in the future due to climate change, land management practices and planning.

This paper aims to demonstrate the benefits of a joint wind-water-erosion modelling approach to identify the spatio-temporal variability of extreme erosion events in the South Australian agricultural zone and the likely increase of variability in the face of climate change. The identification of the inter- and intra-regional variability in erosion severity can help management authorities to focus on problem areas and set specific control targets for each NRM region tailored to their unique landscape and sub-regional conditions.

The integrated modelling approach presented in this paper is automated and could be easily modified to test a variety of future scenarios (e.g. changes in land management, extended droughts, extreme storm events). This flexibility also allows for the adjustment of major contributing factors such as inherent soil and landscape properties, land management practices, and weather events, to test their contribution towards regional wind and water erosion rates. This knowledge could then be used by management authorities to inform corrective measures for future land management.

**Keywords:** Erosion modelling, Soil security, Land management, Future climate