



Synoptic weather systems and the landscape of sub-Antarctic Marion Island: Current knowledge and future impacts

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Marion Island a sub-Antarctic island in the Southern Ocean has a hyper-maritime climate and an environment which is sensitive to climate change. The interaction between climate and landscape occur at a higher resolution than for seasonal and permafrost environments and needs investigation at the diurnal time scale. Results from automated and manual experiments on a variety of landscape elements show that the landscape on Marion Island is dominated by the passage of synoptic scale weather systems. Synoptic air circulation influences the thermal characteristics of soil, river dynamics, intensity of rainfall, frequency and magnitude of snowfall, soil frost dynamics, needle ice development, aeolian erosion and a host of other abiotic processes and its direct and indirect interactions with the ecosystem. This paper reviews the current knowledge on the recent changes in the synoptic air circulation patterns in the Indian Ocean sector of the Southern Ocean, the interaction between synoptic air circulation and the landscape, the current methodologies employed to investigate these interactions and specifically addresses the possible landscape responses under a future climate.