Determining drivers of Primary Production on Marion Island, using Remote Sensing Technology

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Since the first studies on plant phenology and primary production on Marion Island were conducted from as early as the 1970s [1], often linked closely to work on nutrient flow and nutrient availability [2], a significant information base has been built on this aspect for the main plant communities on the Island [3]. This work suggests that vegetation on the island has a potentially long growing season, but that the rate of productivity is low in relation to other Arctic communities [3]. Measured productivity is also lower than is suggested by standard production models [3]. Reasons suggested for this discrepancy are low light use efficiencies, although this has been found not to be the likely cause, and the role of incessant high winds.

The role of incessantly high winds idea is difficult to establish, but recent advances in remote sensor technology open some new opportunities to do so. New robust radiation sensors that record plant canopy reflected radiation at precise wave lengths allows insights into leaf level photosynthetic activity on very short time scales (minutes). Together with sensors that monitor canopy temperatures, and simultaneous micrometeorological measurements, it is possible to piece together patterns of diurnal and seasonal instantaneous carbon uptake and transpiration behaviour. We aim to use this technology to better understand what short term and seasonal factors such as wind constrain primary production on Marion Island, and potentially more broadly in sub-Antarctic conditions.

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