421

CLASSIFICATION OF SUBANTARCTIC VEGETATION ON HEARD ISLAND BASED ON HIGH-RESOLUTION SATELLITE IMAGERY

A Lucieer[2]

[1]University of Tasmania, Hobart, Tasmania, Australia, [2]Australian Antarctic Division, Kingston, Tasmania, Australia

Heard Island is a pristine and remote volcanic subantarctic island in the Southern Ocean, south of the Antarctic Polar Frontal Zone (APFZ). Its location, climate conditions, and pristine nature make Heard Island an ideal site to study the effects of global climate change. Up-to-date and accurate spatial information is of crucial importance for sustainable management of the island. Field surveys are expensive, labour intensive, intrusive and often only cover small areas. Because of the island's remoteness and harsh environment, satellite imagery provides advanced and cost-effective means to map its land cover and to quantify vegetation changes. The use of classification techniques, based on satellite imagery, can provide accurate and up-to-date information on the location and spatial extent of vegetation types. Quantification of uncertainty related to vegetation transition zones is crucial for a solid understanding of the effects of climate change on vegetation types, as transition zones are most sensitive to environmental changes.

This paper presents the first study that applies fuzzy classification based on high-resolution satellite imagery for subantarctic vegetation mapping on Heard Island. The paper starts with a description of the study site and a thorough numeric and visual analysis (in 3D feature space) of the spectral separability of Heard's subantarctic vegetation types. Unsupervised and supervised fuzzy classification techniques are then compared and their classification accuracies are assessed based on field observations. Finally, vegetation transition zones are identified and analysed by using fuzzy membership layers and derived confusion and entropy measures as a quantification of spatial and thematic uncertainty. This study shows that a combination of high-resolution satellite imagery and fuzzy classification techniques is extremely valuable for mapping subantarctic vegetation and for quantifying uncertainty related to vegetation transition zones.