

VII Simposio de Doctorandos de la UAH en Investigación con Tecnologías de la  
Información Geográfica (SITIG-UAH)

Doctoranda: Claudia Giménez Poblador

Directores: Thomas Schmid, Juan Pablo Corella Aznar

Tutor académico: Francisco Javier Escobar

**Title:** Monitoring of periglacial surface processes on Deception Island, South Shetland Islands (Northern Antarctica Peninsula) using high resolution photogrammetric and Synthetic Aperture Radar data

**Abstract:** The Northern Antarctic Peninsula region has experienced the greatest increase of warming in Antarctica over the last 60 years. Deception Island is one of the most active volcanoes in Antarctica, but is also affected by retreating glaciers, reduced snowfields and thawing permafrost, which affects the surface hydrology and influences the land surface morphology of the ice-free areas. The objectives are as follows: 1) to determine periglacial surface features and processes of selected catchment basins using high-resolution photogrammetry data and 2) to monitor surface processes influenced by climate and cryospheric variables using Synthetic Aperture Radar (SAR) satellite time-series data. The material used are high resolution RGB, multispectral and thermal images acquired with drones and GNSS Station. The results obtained include two DEM's with a 3 cm approx. spatial resolution for comparison between 2022 and 2024 with low RMSE (0.06 m and 0.03 m, respectively) showing areas of erosion and accumulation. Multispectral images were mosaicked to obtain indices such as the Normalised Difference Vegetation Index. In addition, a PCA (Principal Component Analysis) was applied to 31 Sentinel-1 C-band SAR images with a 10 m spatial resolution for a one-year time series (2023-2024), integrating temperature data from the Spanish Meteorological Agency (AEMET) at the Gabriel de Castilla base and the Juan Carlos I base and tide data provided the University of Cádiz, in order to evaluate the relationship between SAR images and these environmental variables. Preliminary results show an acceptable correlation between SAR backscatter intensity and temperature variations, suggesting a relationship between thermal conditions and surface characteristics detected by SAR. The results obtained with these different data sources allows to determine and classify the periglacial surface features and processes such as pattern grounds, solifluction, slumping due to permafrost melting and areas of soil stability due to vegetation settling.