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# ASTER satellite imagery for geological exploration in Deception Island (Antarctica)

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Multi-spectral satellite imagery, particularly if including bands in the Short-Wave Infrared part of the spectrum, is of great help for mapping exposed geological materials by taking advantage of spectral properties beyond those observed on the ground or from imagery in the visible part of the spectrum. We are processing an ASTER surface reflectance product for Deception Island with minimum snow and cloud cover to (i) assist on the sampling design for ground campaigns and (ii) map surface materials by integrating satellite and sample-derived information within a supervised machine learning approach. We have performed geometric refinement, masking of cloud, snow and water areas, and correction of topographic effects. After this pre-processing, we calculated the Principal Components to generate a color composite image that emphasizes color contrast among different surface materials. The heterogeneity shown by this image is much larger than in the case of the panchromatic orto-photo (Quick Bird satellite) that has been used in the past to design field studies and for photo-interpretation. We also plotted pixel values of ground sampled areas on the plane of the first two Principal Components, color coding by geochemical type (according to the TAS diagram). This results in consistent pattern and puts in evidence that at least part of the variability in the image is associated to lithological variability, indicating that the Principal Components image a useful source of information to design future field campaigns. A more comprehensive study of the relationship between geochemical and mineralogical types on one hand, and image spectral values on the other is currently being undergone involving more comprehensive geochemical information and spectrometric analysis of samples. This research was partially funded by the funded by the POSVOLDEC project (CTM2016-79617-P)(AEI/FEDER-UE) and Ramón y Cajal contract (RYC-2012-11024).