



## **Evolution of vegetation activity on well-vegetated and degraded areas in the central Spanish Pyrenees, using multitemporal Landsat imagery**

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The temporal evolution of vegetation activity on various land cover classes in the Spanish Pyrenees was analyzed. The study area is located at 620-2,149 m altitude approximately 23 km north of the Barasona Reservoir, is an integrated badlands landscape orientated northwest–southeast and developed on Eocene marls. The objectives of this study were: i) to obtain time series of vegetation activity during two contrasting periods of the growth cycle (early spring and the end of summer) for various land cover classes, including both well-vegetated and degraded areas (badlands and erosion risk areas); ii) to determine the extent by which climate controls vegetation activity in the various land cover classes, and to define temporal trends; and, iii) to analyze the spatial distribution of trends in vegetation activity on erosion risk areas, as indicators of recovery and degradation, and to quantify the effects of various topographical factors on such trends. Two time series of the normalized difference vegetation index (NDVI) were used, corresponding to March (early spring) and August (the end of summer). The series were generated from Landsat TM and Landsat ETM+ images for the period 1984-2007. An increase in the NDVI in March was found for vegetated areas, and the opposite trend was found in both March and August for degraded areas (badlands and erosion risk areas). The rise in minimum temperature during the study period appears to be the most important factor explaining the increased NDVI in the vegetated areas. In degraded areas, no climatic or topographic variable was associated with the negative trend in the NDVI, which may be related to erosion processes taking place in these regions.