



Orographic barriers GIS-based definition of the Campania-Lucanian Apennine Range (Southern Italy)

Albina Cuomo and Domenico Guida

Department of Civil Engineering, University of Salerno , Via Ponte Don Melillo , 84084 Fisciano(SA),
Italy(albina.cuomo@alice.it/Fax: 089964099)

The presence of mountains on the land surfaces plays a central role in the space-time dynamics of the hydrological, geomorphic and ecological systems (Roe G. H., 2005). The aim of this paper is to identify, delimitate and classify the orographic relief in the Campania – Lucanian Apennine (Southern Italy) to investigate the effects of large-scale orographic and small-scale windward-leeward phenomena on distribution, frequency and duration of rainfall. The scale-dependent effects derived from the topographic relief favor the utilization of a hierarchical and multi-scale approach. The approach is based on a GIS procedure applied on Digital Elevation Model (DEM) with 20 meters cell size and derived from Regional Technical Map (CTR) of Campania region (1:5000). The DEM has been smoothed from data spikes and pits and we have then proceed to: a) Identify the three basic landforms of the relief (summit, hillslope and plain) by generalizing a previous 10-type landforms using the TPI method (Weiss A. 2001) and by simplifying the established rules of the differential geometry on topographic surface; b) Delimitate the mountain relief by modifying the method proposed by O. Z. Chaudhry and W. A. Mackaness (2008). It is based on three concepts: prominence , morphological variability and parent-child relationship. Graphical results have shown a good spatial correspondence between the digital definition of mountains and their morpho-tectonic structure derived from tectonic geomorphological studies; c) Classify, by using a set rules of spatial statistics (Cluster analysis) on geomorphometric parameters (elevation, curvature, slope, aspect, relative relief and form factor).

Finally, we have recognized three prototypal orographic barriers shapes: cone, tableland and ridge, which are fundamental to improve the models of orographic rainfall in the Southern Apennines.

References

- Chaudhry O. Z.and Mackaness W. A. (2008). Creating Mountains out of Mole Hills: Automatic Identification of Hills and Ranges Using Morphometric Analysis. *Transactions in GIS*. 12(5), pp. 567-589
- Roe Gerard H. 2005. Orographic precipitation. *Annual Review of Earth and Planetary Sciences*. Vol. 33: 645-671.
- Weiss A., 2001. Topographic position and landform analysis. Poster Presentation. ESRI User Conference. San Diego, CA.