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Rank-Ordering of Topographic Variables Correlated with Temperature

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ABSTRACT

Spatial variations in temperature may be ascribed to many variables. Among these, variables pertaining to topography are prominent. Thus various topographic variables were calculated from 50 m-resolution digital terrain models (DTMs) for three study areas in France and for Slovenia. The "classic" geomatic variables (altitude, aspect, gradient, etc.) are supplemented by the description of landforms (amplitude of humps and hollows). Special care is taken in managing collinearity among variables and building windows with different dimensions. Statistical processing involves linear regressions of daily temperatures taken as the response variables and six topographic variables (explanatory variables). Altitude accounts significantly for the spatial variation in temperatures in 90% of cases, except in the Gironde, a lowlying area (50%). The scale of landforms also appears to be highly correlated to the measured temperature. Variations in the frequency with which topographic descriptors account for temperatures are examined from several standpoints. Altitude is less frequently taken as an explanatory variable for spatial variation of temperatures in winter (75%) than in spring (80%) and late summer (85%). Minimum temperatures are influenced on average much more by the amplitude of humps and hollows (56%) than maximum temperatures (38%) are. The frequency with which these two landforms account for the spatial variation of temperature is reversed between the minima and maxima.

KEYWORDS

Explanatory Variables; Temperature; Topography; Collinearity; Linear Regression

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