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Mapping monthly rainfall data in Galicia (NW Spain) using inverse distances and geostatistical methods

J.M. Mirás-Avalos (1), A. Paz-González (1), E. Vidal-Vázquez (2) and P. Sande-Fouz (1)

(1) Facultad de Ciencias, Universidad de Coruña, 15071 Coruña, Spain

(2) EPS Lugo, Universidad de Santiago de Compostela, 27002 Lugo, Spain

Rainfall data are punctual values whose extrapolation to a larger area is long-studied mathematical and physical problem. In this paper, results from three different interpolation techniques based on geostatistics (ordinary kriging, universal kriging and conditional simulation) and one deterministic method, the inverse distances, are compared. The study data set was total monthly precipitation from 1998 till 2001, i.e. 48 months, corresponding to 121 meteorological stations irregularly distributed in Galicia. Moreover, a raster GIS, PCRaster, was used for spatial interpolation with a 500x500 m grid digital elevation model of Galicia as a mask map.

Annual rainfall varies from 700 mm to more than 2000 mm and is concentrated in late autumn, winter and spring. There is a summer drought of three to five months. Variation coefficients of the different monthly data oscillated between 20 and 146%, demonstrating the high heterogeneity of the rainfall. Generally, the highest variability was observed during the dry season.

Inverse distance technique was used for mapping monthly rainfall in Galicia in all the studied months. This method was appropriate for a rapid estimation of the rainfall at the studied scale. Maps obtained by this technique showed a discontinuous appearance; however, a rainfall distribution pattern was distinguished and limited area inclusions superimposed around extreme value stations were observed.

In order to use geostatistical interpolation techniques, a spatial dependence analysis was performed. Spatial dependence was characterised in 33 out of 48 months, so geostatistical interpolation was carried out for those 33 months. The different values of

the semivariogram parameters caused the smoothing in the maps obtained by ordinary kriging. Universal kriging results were reasonable according to former studies; a high influence of the topography was observed. Taking into account that mountainous areas, with higher precipitations, are not well represented in the sample population, conditional simulation is supposed to give more realistic results; however, this consideration must be confirmed with new experimental data.

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