



Interest of the Hess-Brezowsky classification of circulation patterns in the analysis of rainy winters in Brittany (France)

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In intensive agricultural regions, short-term land use and cover changes represent an important key indicator of water transfer processes. In Brittany, the presence of fields with no or little vegetation during rainy winters increases pollutant fluxes (nitrogen, pesticide...) towards the rivers. The Scorff watershed, located in western Brittany, is subjected to a typical temperate oceanic precipitation regime with spatial variations that can locally influence the land cover implantation. An accurate assessment of the space-time variation of the winter vegetation cover is then essential for controlling land management and helping in local decision making. Local managers especially focussed on land use and land cover during winter because it represents an intermediary period for main crops in this region. The climate impact on the Scorff watershed was first analysed through the study of the rainfall space-time variability during four winters between 2000 and 2003, which were representative of different land cover conditions. For accurate knowledge of rainy circulation types, the Hess-Brezowsky classification of circulation patterns was applied to the 2000-2004 period. Precipitation amounts and percentages were calculated for each group and individual circulation type (GWL) at the coastal station of Lorient over the period 2000-2004 and for each year of this period, in order to identify the rainiest circulation types during the cold season. More detailed observations and analysis using the Hess-Brezowsky classification were made in order to study the connection between the GWL and the daily precipitation during remarkable cold seasons at the three stations of Lorient, Plouay and Plouray.

About three quarters of the daily precipitation at Lorient station for the 2000-2004 period were associated with the southerly (40 %) and the westerly circulations (32 %), which included the most frequently rainy major circulation types throughout the year in Western Europe (southwesterly and westerly circulation patterns). The southerly and westerly circulation types caused the highest precipitation amounts in the cold season months. Several durable periods of SW circulation were observed during the remarkable wet winter 2000-2001. The station of Lorient was clearly less rainy than the two other (inland) stations. Topographical effects and especially the roughness of the hilly area cause higher precipitation amounts at the inland stations. The difference between the precipitation amounts of the coastal and the inland stations was clearly shown during the wettest days. The southern or south-western exposure of the catchment enhances the heavy precipitation due to the S, SW and W circulation types in the hilly inland area. The daily rainfall of more than 10 mm were at first associated with the southerly circulation types (especially the SW circulation types: 56.1 % of the southerly circulation types) and secondly associated with the westerly circulation types.

The comparison between the two wet cold seasons of 2000-2001 and 2002-2003 showed in winter 2002-2003 a stronger difference between the monthly precipitation amounts of Lorient and the two inland stations. While 63.2 % of the precipitation was due to the southerly circulations types during the winter 2000-2001, 62.2 % of the precipitation of the winter 2002-2003 was due to the zonal circulation types. Because of the exposure of the catchment, the precipitation due to the high occurrence of SW circulation types in winter 2000-2001 was enhanced on the inland stations. On the other hand, in winter 2002-2003 the exposure of the catchment was less favourable to a contrasted spatial distribution of the precipitation.