



## Assessing catchment connectivity using hysteretic loops

Saskia Keesstra (1), Rens Masselink (1), Mikel Goni (2), Miguel Angel Campo (2), Rafael Gimenez (2), Javier Casali (2), and Manuel Seeger (3)

(1) Wageningen University, Soil Physics and Land Management Group, The Netherlands, (2) Public University of Navarre (UPNA), Spain, (3) University of Trier, Germany

Sediment connectivity is a concept which can explain the origin, pathways and sinks of sediments within landscapes. This information is valuable for land managers to be able to take appropriate action at the correct place. Hysteresis between sediment and water discharge can give important information about the sources, pathways and conditions of sediment that arrives at the outlet of a catchment. “Hysteresis” happens when the sediment concentration associated with a certain flow rate is different depending on the direction in which the analysis is performed –towards the increase or towards the diminution of the flow. This phenomenon to some extent reflects the way in which the runoff generation processes are conjugated with those of the production and transport of sediments, hence the usefulness of hysteresis as a diagnostic hydrological parameter. However, the complexity of the phenomena and factors which determine hysteresis make its interpretation uncertain or, at the very least, problematic.

Many types of hysteretic loops have been described as well as the cause for the shape of the loop, mainly describing the origin of the sediments. In this study, several measures to objectively classify hysteretic loops in an automated way were developed. These were consecutively used to classify several hundreds of loops from several agricultural catchments in Northern Spain.

The data set for this study comes from four experimental watersheds in Navarre (Spain), owned and maintained by the Government of Navarre. These experimental watersheds have been monitored and studied since 1996 (La Tejería and Latxaga) and 2001 (Oskotz “principal”, Op, and Oskotz “woodland”, Ow). La Tejería and Latxaga watersheds, located in the Central Western part of Navarre, are roughly similar to each other regarding size (approximately 200 ha), geology (marls and sandstones), soils (fine texture topsoil), climate (humid sub Mediterranean) and land use (80-90% cultivated with winter grain crops). On the other hand, Op (ca.1,700 ha) is covered with forest and pasture (cattle-breeding); while Ow (ca. 500 ha), a sub-watershed of the Op, is almost completely covered with forest. The predominant climate in Op/Ow is sub-Atlantic.

Furthermore, antecedent conditions and event characteristics were analysed. The loops were compared quantitatively and qualitatively between catchments for similar events and within the catchments for events with different characteristics.