COULD WE PLAY HYDROLOGY WITH RADARS?

Daniel Sempere-Torres and Rafael Sánchez-Diezma

Grup de Recerca Aplicada en Hidrometeorologia (GRAHI).
Universitat Politècnica de Catalunya, Barcelona, Spain

Address: Gran Capità, 2-4 (Ed. Nexus), 106. E-08034 Barcelona (Spain).

e_mail: sempere@grahi.upc.es. Tel: (+34) 934 054 195. Fax: (+34) 934 054 194

Since these first days, radar has been seen as a powerful tool to describe and understand the meteorological phenomena related to precipitation, and a promising technology for hydrology. Even nowadays, meteorological radar is still the unique instrument able to provide a description of the precipitation field with the resolution required in hydrological modeling (spatial resolution about 1 km^2 and temporal resolution of 5 to 10 minutes). Requirements that lies far out of the conventional raingauge networks densities (usually about 1 raingauge per 50-200 km^2 (Andrieu *et al.*, 1992; Sempere Torres, 2000).

This important role radars could play has been widely understood, and almost all countries around the world have carried out significant efforts to install radar networks. Although these operational networks have usually been designed from purely meteorological criteria and requirements, commonly they have been seen as tools to improve hydrological models and forecasting systems. Nevertheless, up to now they have essentially been used for qualitative applications and the quantitative applications are still rare, out of a few research developments. The present situation is that this promising tool has not been able to fulfill the hopes of the hydrologists as potential users, and radars are still seldom used on operational hydrology.

The main reason for this situation is that radar measures rainfall in an indirect way, which needs a sequence of very complex correction procedures. Procedures that only have been clearly established since the early 1990s, when hydrologists working on the problem of radar rainfall estimation have begun to take a physical approach to study the principle of radar measurements from a hydrological perspective, leading to what it is now known as 'radar hydrology'. Thus the advancements of the last 20 years (the work of Zawadzki, 1984 can be considered as the milestone showing this change of mentality) have allowed us to state that the hydrological applications of weather radar can be achieved if a systematic correction of the errors and inaccuracies, inherent to radar measurement in itself, are corrected.

This presentation will show through selected case studies several illustrations of the importance of taking into account these corrections and the need we still have to improve the quality of estimates.

The key question about if we could play hydrology with meteorological radars, and why radar still remains a "revolutionary promise" for hydrologists will be thus addressed.