Geophysical Research Abstracts, Vol. 7, 01805, 2005
SRef-ID: 1607-7962/gra/EGU05-A-01805
© European Geosciences Union 2005

Rain and flood multifractal nowcasting using radar data

J. Macor (1), D. Schertzer (1), S. Lovejoy (2)

(1) CEREVE, Ecole Nationale des Ponts et Chaussées, 6-8 Avenue Blaise Pascal, 77455 Marne-la-Vallée, France (macor@cereve.enpc.fr / Fax: +33 1 64153764); (2) Physics Dept., McGill University, 3600 University St., Montreal, H3A 2T8, Canada

Rainfield forecast uncertainty is the main source of uncertainties for flood forecast. This is particularly true for flash floods. Weather forecast models are unable to adequately model the rainfield, since the physical processes at the meso-scale of the atmospheric motion that causes rain are mostly parameterised by rather ad-hoc sub-grid modelling. Furthermore, the long spin-up time of these models impede them to deliver short time term forecasts, which are indispensable in emergency situations. As an alternative, various statistical methods of treatment of satellite and/or radar images have been developed, because both of them are delivering much smaller scale information. However, they are not physically based and in particular do not take into account the strongly non-linear dynamics of the storm cells.

A more recent approach, which can be understood as both a broad compromise and a wide extension of the above mentioned approaches, is based on space-time cascade models. The latter take into account the hierarchy over a wide range of space-time scale, comprising the dynamical structures and processes that generate cloud developments and transport of water content, and the thermodynamic and micro-physical processes leading to water vapour condensation growth of cloud droplets and fall of raindrops.

This approach has become possible by the successive developments of multifractal cascade models with continuous scales, scaling anisotropy between space and time and causality. These models have the advantage to have a very limited number of parameters that has been evaluated for the rain field. We discuss the implementation of a rain and how to input the resulting rain forecast into hydrological models in order

to obtain flood forecasts.