Geophysical Research Abstracts, Vol. 7, 09222, 2005
SRef-ID: 1607-7962/gra/EGU05-A-09222

Downscaling of Extremes for Precipitation: A Stochasic Algorithm based on a "Potential Precipitation Circulation Index" ("ppci") defined using Large Scale Circulation Fields. Application to a set of Alpine and Iberian stations

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The objective of the EC contract STARDEX was to provide likely scenarios of the expected changes in frequency and intensity of extreme events at the local or sub-regional scale. In this purpose a number of seasonal extreme temperature and precipitation indices were defined.

In the particular case of the french Maritimes Alps, we observed that **Intense Precipitation Events** (**IPE**) mostly occur with one of a few types of **Large Scale Circulation** (**LSC**) patterns. Station precipitation series more or less behave like the Maritimes Alps one in that there always exists some (more or less pronounced) link between LSC and precipitation. That is this link which we use as a clue for building a stochastic **Downscaling** (**DS**) scheme.

The construction of our **DS** algorithm may be split into 3 main steps: we first look for the so-called (a naming we introduced!) **Precipitation Regimes** (**PR**) which are fundamentally the main circulation patterns responsible for local **IPE**s; we then tentatively introduce a linear precipitation index, (the **ppci**), the value of which on a particular day depends on the similarity between this day circulation and the **PR**s. Finally we use this index (and precipitation archives) to (stochastically) generate a precipitation forecast for this particular day. Once precipitation series have been generated, statistics may be performed on the future of extreme events *according to our **DS** scheme.*

We compare the performances of our algorithm for different stations, different sea-

sons, and different indices.

We finally suggest a direct investigation of Climate Change consequences over precipitation extremes using our index (the ppci) **without performing** the **DS** step which, in certain cases, mostly darkens the prospects.