



## **Homogenization of soil properties map by Principal Component Analysis**

Omar Valverde Arias (1,2), Alberto Garrido (1,3), Maria Villeta (4), Ana Maria Tarquis (1,5,6)

(1) CEIGRAM, E.T.S.I. Agrónomos Universidad Politécnica de Madrid, Madrid-Spain., (2) T.A.P.A.S. Ph.D. program, E.T.S.I. Agrónomos, Universidad Politécnica de Madrid, Madrid-Spain., (3) Dept. of Agricultural Economics and Social Sciences ETSIA, UPM, Madrid, Spain., (4) Dpto Estadística e Investigación Operativa III, Escuela Universitaria de Estadística, UCM, Madrid, Spain., (5) Dept. Matemática Aplicada, ETSIA, UPM, Madrid, Spain., (6) Grupo de Sistemas Complejos, UPM, Madrid, Spain. (anamaria.tarquis@upm.es)

It is widely known that extreme climatic phenomena occur with more intensity and frequency. This fact has put more pressure over farming, becoming very important to implement agriculture risk management policies by governments and institutions.

One of the main strategies is transfer risk by agriculture insurance. Agriculture insurance based in indexes has gained importance in the last decade. And consist in a comparison between measured index values with a defined threshold that triggers damage losses. However, based index insurance could not be based on an isolated measurement. It is necessary to be integrated in a complete monitoring system that uses many sources of information and tools. For example, index influence areas, crop production risk maps, crop yields, claim statistics, and so on.

To establish index influence area is necessary to have a secondary information that show us homogeneous climatic and soil areas, which inside of each homogeneous classes, index measurements on crops of interest are going to be similar, and in this way reduce basis risk.

But it is necessary an efficient method to accomplish this aim, to get homogeneous areas that not depends on only in expert criteria and that could be widely used, for this reason this study asses two conventional agricultural and geographic methods (control and climatic maps) based in expert criteria, and one classical statistical method of multi-factorial analysis (factorial map), all of them to homogenize soil and climatic characteristics. Resulting maps were validated by agricultural and spatial analysis, obtaining very good results in statistical method (Factorial map) that proves to be an efficient and accuracy method that could be used for similar porpoises.