

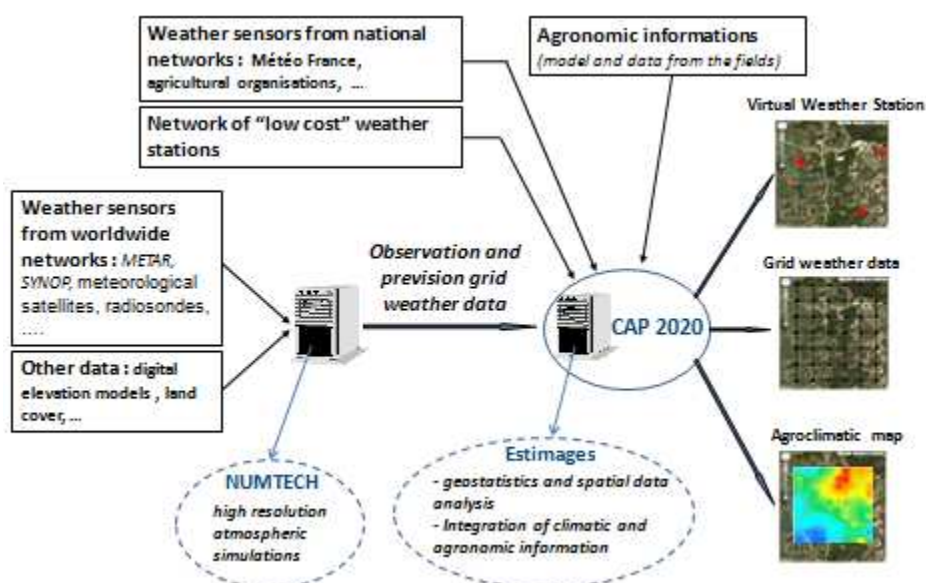
## A better taking into account of the climatic risk with new agrometeorological services and applications

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For the most part of fields of activity (industry, transport, leisure), it is unthinkable today to make some decision without taking into account the climatic risk. The agriculture does not escape this rule. To make the good decisions the farmer or the agricultural technician needs precise information. However today, there is a lack of precise weather information available. In France, the density of the weather stations is one for every 20 to 30 km and the meteorological forecasts are supplied on the scale of the canton (about 200 to 300 km<sup>2</sup>). Despite the different progress achieved during the few last years to enhance the precision of soil and plant related information no breakthrough has been made concerning meteorological data. Due to the lack of precise weather data, ie representative of the local climate of each field, the vast majority of farmers cannot valorize the latest research in the field of agronomic advice. For example, in the field of crop protection, various studies led by French technical institutes have shown that precise knowledge of climatic parameters at the scale of the agricultural field decreases the number of fungicide treatments from 3 to 8 per year for potato on a dozen annual treatments and from 2 to 4 per year for grape vine on 7 to 8 annual treatments.

To face this lack of precise weather data, CAP 2020 has developed the Precision Meteorology for Agriculture to provide climatic and agroclimatic data at a scale related to the field. To reach this objective, Precision Meteorology for Agriculture is based on the use of:

- existing meteorological data from :
  - ✓ worldwide networks : METAR, SYNOP, meteorological satellites, radiosondes, ...
  - ✓ national networks : Météo France, agricultural organizations, ...
- new technologies :
  - ✓ high resolution atmospheric simulations (*from NUMTECH*) : to generate observation and prevision grid weather data,
  - ✓ geostatistics and spatial data analysis (*from Estimages*) : to integrate optimally grid data with the weather stations data
  - ✓ network of "low cost" weather stations (*from Agriscope, ...*) : if a very high resolution is needed.



The CAP 2020 information system provides observation and prevision data at three resolutions: standard (grid of 5 x 5 km), high resolution (grid of 1,25 x 1,25 km) and very high resolution (grid of less than 1 km<sup>2</sup>). For this last resolution, a local network of weather stations is implemented with innovative weather stations, especially developed by Agriscope for an agricultural use (low cost, no Solar panel, ...). The data are available to agricultural actors according to 3 services: Virtual Weather Station, grid weather data and agroclimatic map. The Precision Meteorology for Agriculture received a Silver "SIMA Innovation Awards" in 2009 awarded by the international jury of the SIMA (Salon International du Machinisme Agricole).

One of the innovative technologies used for the Precision Meteorology for Agriculture is the Moving-GeoStatistics technology (M-GS®). M-GS® technology, developed by ESTIMAGES, is an innovative geostatistical technology which leads to better quality results by optimizing locally the parameters used in geostatistical models. Contrary to conventional approach, this technology enables to take into account of local characteristics in the spatial variability analysis process. M-GS® technology can be used in several weather issues for example:

- to determine how many and where to position new stations to increase the quality of a weather stations network,
- to estimate the contribution of the new stations to the quality improvement of weather mapping,
- to interpolate grid data with weather stations data through an optimal integrating process.

The potential of this technology has been approved by a first prize obtained at a technical congress dedicated to geostatistics for environmental applications: GeoENV 2008, Southampton, UK.