

Satellite spectral, climatic and biophysical data for warning purposes for European agriculture

L. Toullos¹, F. M. Danson², Z. Dunkel³, J. Mika³, G. Stancalie⁴ and P. Struzik⁵

(1) National Agricultural Research Foundation, Greece

(2) University of Salford, UK

(3) Hungarian Meteorological Service, Hungary

(4) National Meteorological Administration, Romania

(5) Inst. of Meteorology and Water Management, Poland

CONTRIBUTION OF EARTH OBSERVATION DATA

- In order to describe the status of satellite climatic and biophysical data that are used for warning purposes for agriculture, in Europe, an inventory was created through a questionnaire disseminated to the national delegates of COST 734 member countries.

SATELLITE-DERIVED VARIABLES IN MONITORING OF CROP PRODUCTION

- The most relevant variables measured over land are: solar radiation, daily global albedo, vegetation indices, LAI, land surface temperature, rainfall, cloud cover, fires and burnt areas, snow cover, digital elevation maps of the ice sheet surfaces, glaciers evolution and land cover.
- Some of these variables are required as inputs to give an immediate view of climate change impact for example
 - Vegetation Indices (VI)
 - Maximum greenness during the growing season
 - Total greenness during the growing season
 - Fraction of Photosynthetically Active Radiation (FPAR)
 - Absorbed Photosynthetically Active Radiation (APAR)
 - Leaf area index (LAI)

INITIAL RESULTS

Among European countries there is a great **heterogeneity** concerning climatic and biophysical data received from satellite sensors or collected as satellite-derived ready products. Some of them have been collecting satellite data systematically for several years and these data records could be useful for models for climate change impact studies.

INITIAL RESULTS

- From the responses returned it was clear that the main variables of interest were the **normalised difference vegetation index** (NDVI – 12 countries) and **land surface temperature** (11 countries). Snow cover (5), radiation (5), variation in land cover change (4) and precipitation estimation (4) were also important in a number of countries. Further 12 different parameters are derived in 1-2 European countries.

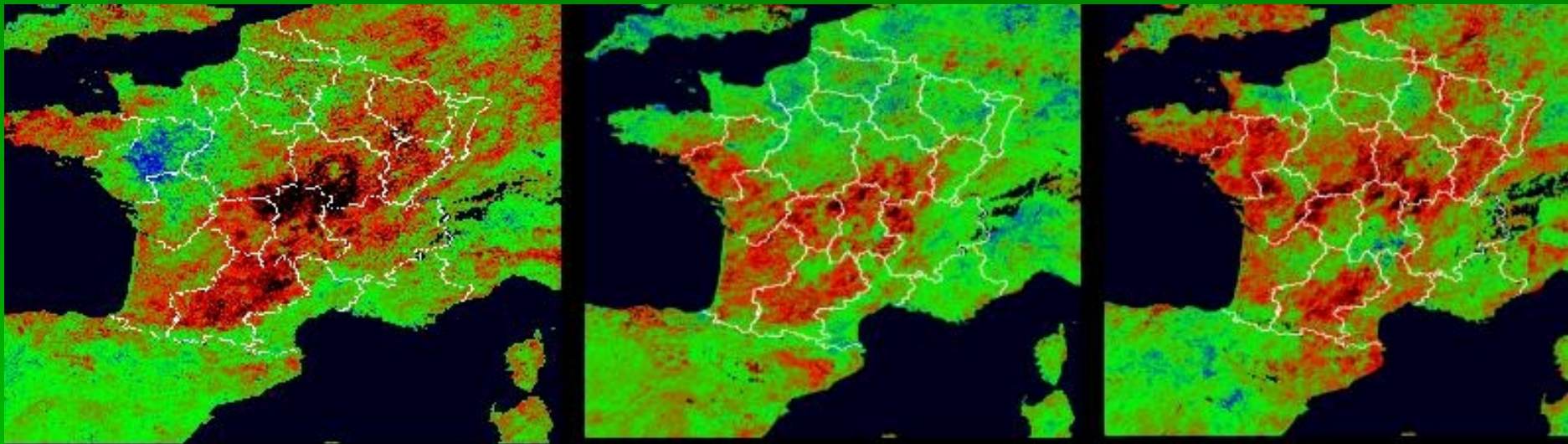
Type of variable / number of countries surveyed

VARIABLE	COUNTRIES
NDVI	12 (A, BG, F, DE, GR, HU, I, PL, RO, SL, SP, CH)
Surface temperature	11 (BG, FR, DE, GR, HU, I, NO, PL, RO, SL, SP)
Cloud products	6 (I, NO, PL, RO, SK, SL)
Snow cover	5 (CZ, HU, RO, SL, SP)
Radiation	5 (HU, PL, RO, SL, SP)
Vegetation cover, land cover	4 (A, BG, DE, SL)
Precipitation	4 (I, NO, PL, RO)
SAF products	3 (DE, PL, SP)
Albedo	2 (NO, SP)
Evapotranspiration	2 (DE, GR)
Air- stability	1 (PL)
Storm detection	1 (PL)
Ozone content	1 (PL)
VCI	1 (GR)
TCI	1 (GR)
Soil moisture	1 (A)
MSAVI	1 (RO)
LAI	1 (DE)
Degree days	1 (GR)
Sea wind and ice	1 (NO)

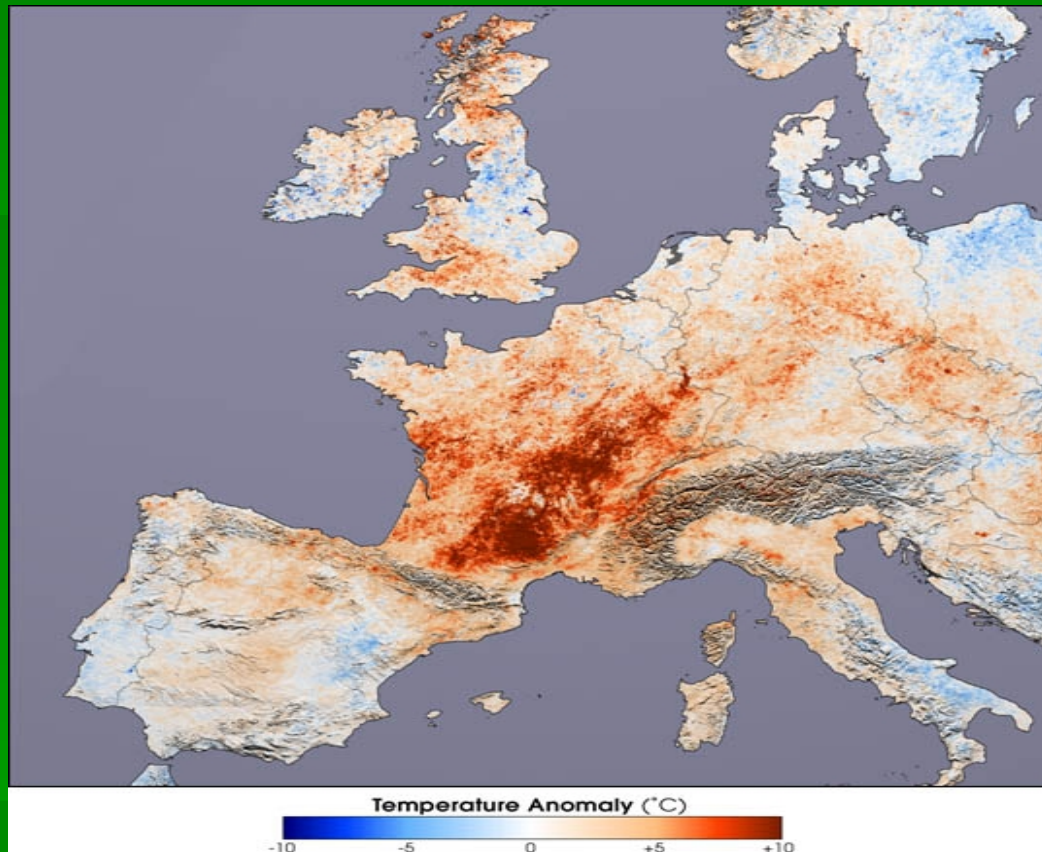
Type of instrument per product

Climate and biophysical product	Type of satellite / instrument
NDVI	MODIS/TERRA-AQUA, AVHRR/NOAA, VEGETATION/SPOT, TM/LANDSAT, SEVIRI/METEOSAT
Surface temperature	AVHRR /NOAA, TM/LANDSAT, ASTER/TERRA, MODIS / TERRA-AQUA, SEVIRI / METEOSAT
LAI	MODIS / TERRA
MSAVI	VEGETATION / SPOT
Cloud products	SEVIRI / METEOSAT, NOAA / AVHRR
Snow cover	MODIS / TERRA, SEVIRI / METEOSAT
Radiation	SEVIRI / METEOSAT
Vegetation / land cover	TM-ETM/LANDSAT, ASTER /TERRA, SEVIRI / METEOSAT
Precipitation	SEVIRI / METEOSAT, GEO / LEO satellites, TOVS/NOAA
SAF products	METEOSAT, NOAA, AQUA
Air-stability	SEVIRI / METEOSAT
Storm detection	SEVIRI / METEOSAT
Ozone	TOVS / NOAA
Evapotranspiration	TM/LANDSAT, ASTER/TERRA, AVHRR/NOAA
Soil moisture	ASCAT / METOP
VCI , TCI	AVHRR / NOAA
Degree days	AVHRR / NOAA
Albedo	SEVIRI / METEOSAT, AVHRR / NOAA
Sea ice	AVHRR / NOAA
Sea wind	METOP

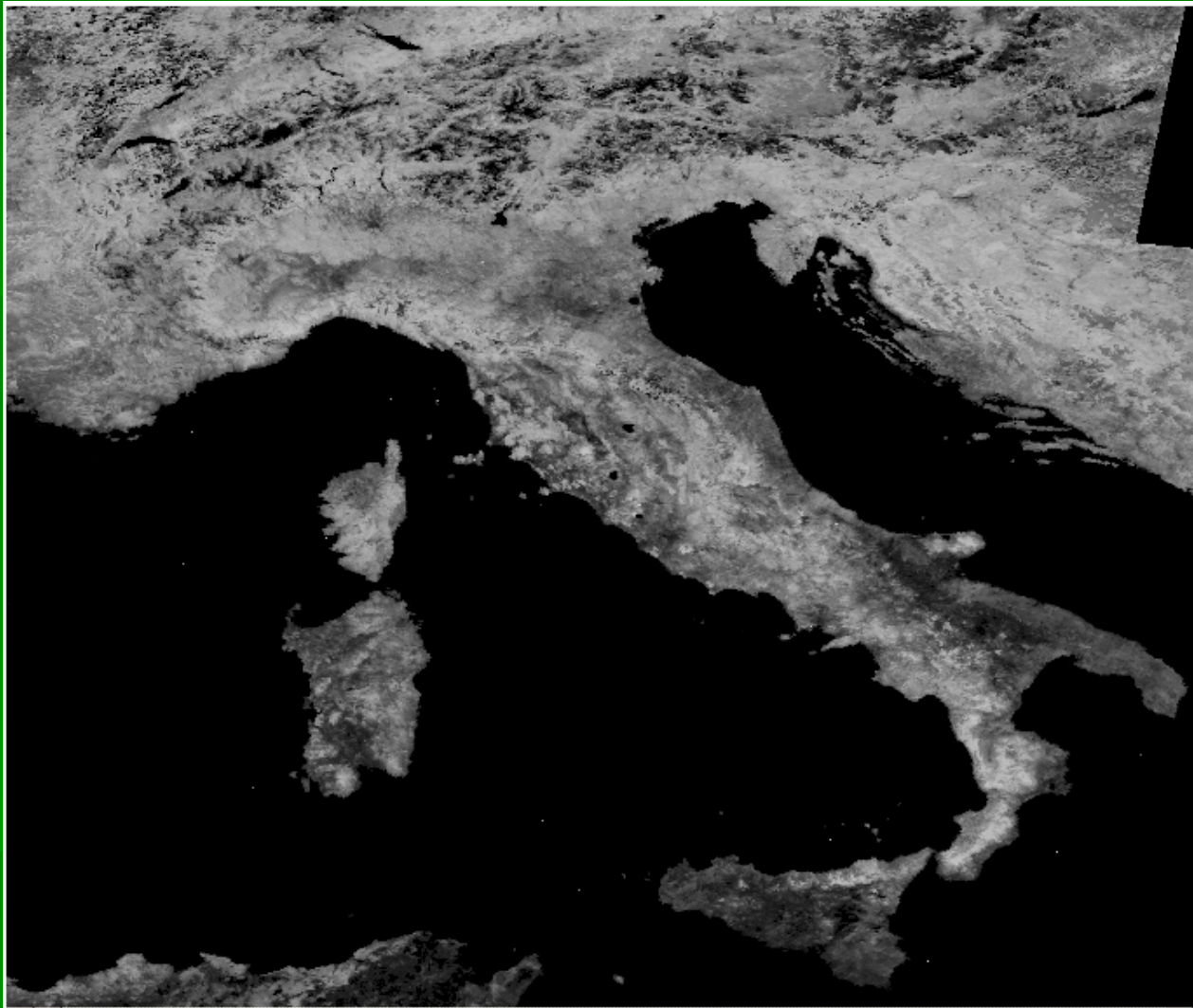
examples



Summer droughts of 2003, 2005 and 2006 in France. NDVI deviations (1 August/mean 2002-2004)
based on VEGETATION/SPOT 5 data (by CNES, processed by O. Hagolle).



The 2003 Heatwave at the European scale (July 2003/July 2002).
Temperature map based on MODIS data
(by NASA Earth Observatory - VISIBLE EARTH).



- NDVI map of Italy (NOAA/AVHRR data).

conclusion

- Initial results of the inventory show an incomplete snapshot of the situation in the different countries across Europe. The gaps show the importance of pan-European collaboration on the collection, archiving and analysis of satellite derived data on variables related to climate change and agriculture.

- Thank you