



# FLOOD MONITORING

## Introduction

Floodings are one of the natural disasters that produce more victims in the world. In the twentieth century more than 3 million people died for this reason, this represents more than half of casualties by natural disasters in the world.

Floodings are the natural disaster with greatest impact on lives and properties. In the Iberian Peninsula there are 1400 points suffering periodical floodings.

Public Administrations must have tools for the detection of these events, but also to improve the understanding of the relationship between flow and flooded area.

The estimate of the geographical area affected by a flood is one of the most interesting information, both from the point of view of the Civil Protection and for models of basin hydraulic management.



Earth Observation techniques may help in the different stages of the flood management, from prevention to the normalization of the situation once the event has happened.

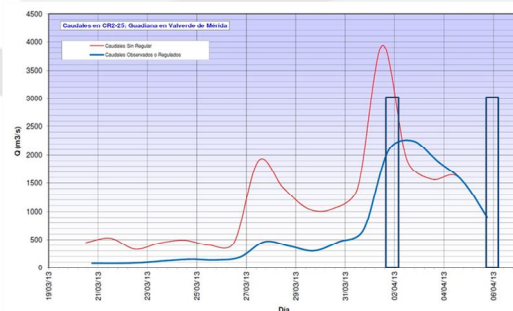
Space Remote Sensing is an interesting data source for the mapping of damages caused by floods.

The main characteristics of this technique are:

- *Global coverage.* It is possible to obtain information of anywhere in the world.
- *Data availability.* There are many satellites currently in orbit capturing images regularly. This data availability increases if, in anticipation of the event, image acquisition is programmed.

The main problem of Remote Sensing in monitoring flooded areas is that, because of the cloudiness associated with these events, captured images may not be useful. This problem occurs in optical imagery and can be solved with the use of radar images.

However, if we have not planned the acquisition of images, we will have only data acquired by satellites according to their orbital model, drastically reducing the number of images available and therefore the multitemporary and multiscale ability of the technique.



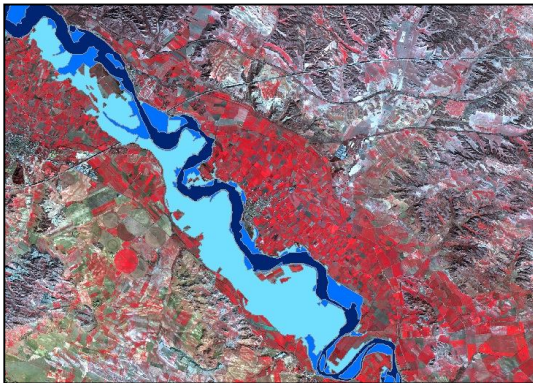
Hydrograph of a flood and location of the dates of the available satellite images used for the flooding monitoring.

## Our experience

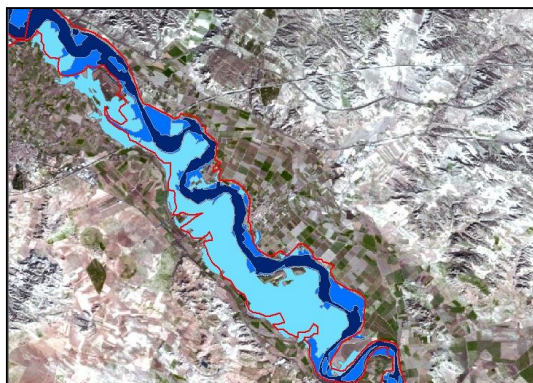
### Ebro floodings 2003 y 2013

During the first days of February 2003 there was a major flooding in the Ebro Axis, as a result of the abundant runoff caused by the combined action of heavy rain and the subsequent and rapid melting of snow on header during storms in late January, reaching peak flows of 3,320 m<sup>3</sup>/s on the early morning of February 6th in Castejón (Navarra), and of 2,988 m<sup>3</sup>/s on the early morning of the 9th in the city of Zaragoza.

The combination of images from several satellites allowed following the diachrony of the flooding, during days 6, 8, 10 and 13 February.

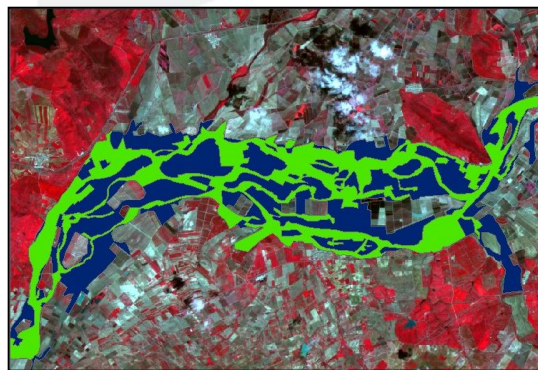
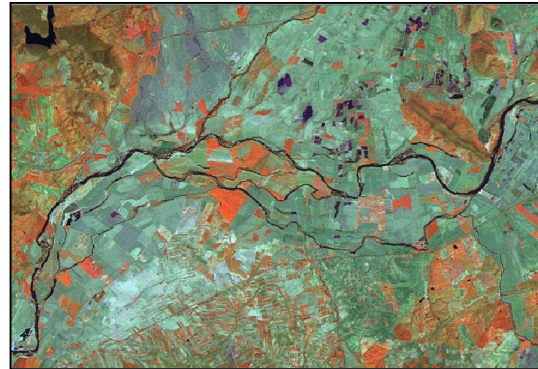


In 2013, there has been a new event with peak flows between 16 and 25 January. Remote Sensing allowed us to track the event, but also the comparison with the flows and flooded surfaces in 2003.



FLOOD MONITORING v. 2013

### Guadiana floodings 2013



Contact with:  
Dr. Salomón Montesinos Aranda  
[smontesinos@geodim.es](mailto:smontesinos@geodim.es)