



Exploitation of middle to very high resolution SAR data for emergency flood mapping and monitoring: 2010 gained experience from the Pakistan, Central China, Poland and North Eastern France floods event.

Nadine Tholey, Hervé Yesou, Stephanie Battiston, Stephen Clandillon, Bernard Allenbach, Samir Belabbes, Carlos Uribe, Mathilde Caspard, Myldred Montabond, Paul De Fraipont, and the Hervé Yesou (1) Team
Strasbourg University, SERTIT, SERTIT, Illkirch CEDEX, France (herve@sertit.u-strasbg.fr)

Civil protection authorities and humanitarian agencies have been requesting the services of dedicated Rapid Mapping Services since at least 2000 with the aim of obtaining geographical information on flood affected area, dynamics and impact and this as fast as possible. Such rapid mapping actions are provided through different mechanisms, such as the renowned International Charter "Space and Major Disasters" (Charter) in terms of activation management and raw satellite data provision, knowing an important development through European Commission FP7 research program framework of the SAFER project. In addition, some R&D, such as the Sino-European, DRAGON between ESA and MOST, or demonstration projects like the ASI Cosmo Skymed projects supported by CNES ORFEO program can allow some rush programming of EO data.

During all 2010 years major floods events occurred all around the world, from South East Asia, Pakistan and China, to Europe, Poland, Germany, Moldavia, Croatia, France, in relation with monsoon or coastal storms, oceanic rainfalls, but also fast snow melting. For those cases, in order to obtain geographical information on flood affected area, dynamics and impact and this as fast as possible, rapid mapping actions have been triggered exploiting the different presented mechanisms.

One characteristic of part of those cases, it is the exploitation of SAR data, ranging from middle resolution i.e. pixel spacing of 75m, to very high resolution ones, 3m with an important increase of the exploitation of these recently available VHR SAR data.

For the China cases, for which the situation was near to be as dramatic as during the historical 1998 floods, it is only middle resolution data that has been exploited which was imposed in fact by the size of the monitored water body. By this way, based mostly on a long term scheme of acquisition rather than a fast programming of the satellite, a monitoring from June to September 2010 of the Poyang lake has been done thanks to WSM ENVISAT data.

The Pakistan case presents an intermediate approach, as based on the exploiting of both optical and SAR images, ranging both from middle resolution to high resolution. The Pakistan case, is a very long period event, which began at the end of July 2010 especially along the Kabul River in the north-western part of the country and then days after days the flooded waters move to the South affecting more than 20 millions of persons over more than 1300 km. It is the high resolution and very high resolution data, respectively SAR and optical which has been exploited in combination with a systematic exploitation of middle resolution Modis optical image.

An opposite case, for the May 2010 Poland case, if the flood mapping began with the exploitation of an ERS2 image, satellite of ESA first SAR generation still valid 15 years after its launch, most of the 35 floods products were generated based on the exploitation of VHR images, from Cosmo Skymed, TerraSAR and Radarsat2. Same approach of exploiting quasi only VHR SAR data was done during the winter 2010 floods in Alsace, Belgium, exploiting Cosmo Stripmap data for mapping the mid-December flood in Sauer River, and Mid-January flood after snow melting in January 2011 in NE France, Belgium and Luxembourg.

Based on this experience, the desirable and minimum requirements can be described. The limits of the different approaches can be discussed. In terms of coverage and thematic accuracy. This also will influence the capability of SAR data for model constraints.