# Plain flood dynamic characterization exploiting CSK VHR SAR data:

## The case of the Alsatian rivers (France)

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The aim of this work was to assess the duality of optical and Radar systems data, and their synergy with Pleiades HR data for water elements and hydrological features recognition in case of flood events. It is realized with two objectives, potential flood mapping in rush conditions, monitoring plain flood with middle term programming schedule. Thanks to the quota of image allowed by ASI, it was possible to assess the potential for water bodies description of the different modes of CSK, from HR, to VHR SpotLight and also to compare it with routine mode of ENVISAT and with the future Sentinel 'ones.

For the flooding season 2010-2011, three near real time actions were carried out, two in December 2010 one in January 2011, and this over three Alsatian watersheds, the Ill River, the Moder and Zorn Rivers one and the Sarre River . During the 08 - 10th of January 2011 flood event, it is a total of 6 CSK data that have been acquired with in addition 2 extra ENVISAT WSM allowing to monitor the flood events.

The second part of the project was focused on Plain flood surveillance over the Ried Centre Alsace, a plain area frequently flooded during winter periods by watertable rising and/or river over flow. Thanks to ASI, the monitoring of this plain is possible with COSMO-SkyMed acquisitions every 10 or 15 days from November 2010 to May 2011 with finally 23 CSK images were, acquired in different modes. If at the beginning it was the ScanSar mode would have been a principal resource mode, therefore after the reception of the first images, allowing the comparison of the different modes, more StripMap were ordered as their resolution is better adapted to the size of the observed phenomenon. With these 23 water extents, analysis products were generated to understand the hydrological behavior of this flood plain.  From these data a submersion time estimation map over a 2 months period was established. This highlights the flooded areas during major events and to understand the draw off mechanisms and the water paths. Then the relationship between flood extent and areas susceptible to groundwater flooding were analysed.

This work highlights the capability of COSMO-SkyMed for providing data with a good re-visiting period. CSK different resolution modes are well adapted to the analyzed objects, even during major flood events. Thus, synergy between MR, HR, optical and Radar data confirms the future complementarily between the Pleiades and Sentinel systems for flood risk management.