FLOODING DETECTION SYSTEM

The Flooding detection system is able to detect areas temporarily covered by water as effect of floods. During flood events it is very important to have under control not only a specific site but also a wide overview of the affected areas in any weather condition. It is often very difficult to analyse situation outside the urban area because of the lack of infrastructure and on site personnel; but with the use of this system it is possible to check also situations in remote areas to better understand the dangerousness and the extent of the phenomenon occurred. The method is based on the SAR image differencing technique called Delta Index (DI, Thoma, et al., *Comparison of four models to determine surface soil moisture from C-band radar imagery in a sparsely vegetated semiarid landscape*, Water Resour. Res., 42 W01418 2006) that allows extracting information about the soil cover changes, in particular from non-water to water cover status. It processes two images taken in different periods, pre-event and during the event, in order to detect changes in backscattered signal and thus in water coverage. Other key points of the system are:

- the use of SAR data that permits to work either in clear sky or cloudy conditions
- the possibility to use the application also with future missions (e.g. Sentinel 1) that will provide images and with a re-visiting time up to 1-3 days
- available SAR data are high resolution images and thus permitting to the system to operate at local, regional and national scale.

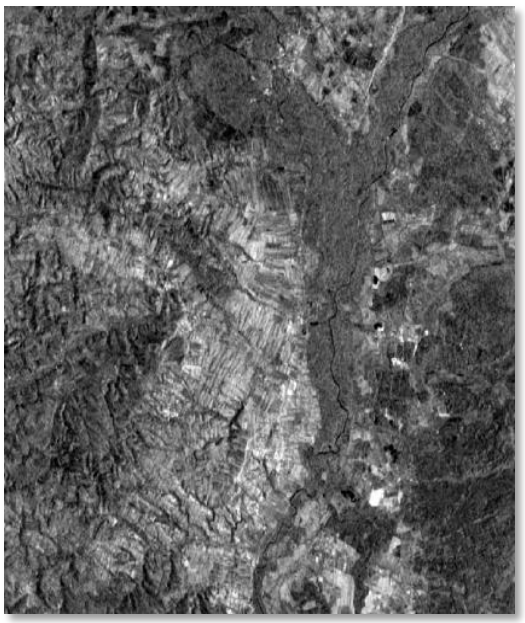
This is a powerful tool for emergencies and management decision makers.

INPUT

➢ Two SAR images with same scene, same incidence angle, same polarization and same sensor frequencies (example March River, Austria, event occurred on March, 26th 2006)

- One Pre-event (Example below left, ASAR as ”Dry image”, March 16th ,2006)
- One Post-event (Example below right, ASAR as “Wet image, April 1st , 2006)

➢ Detailed digital elevation model of the area (if available)



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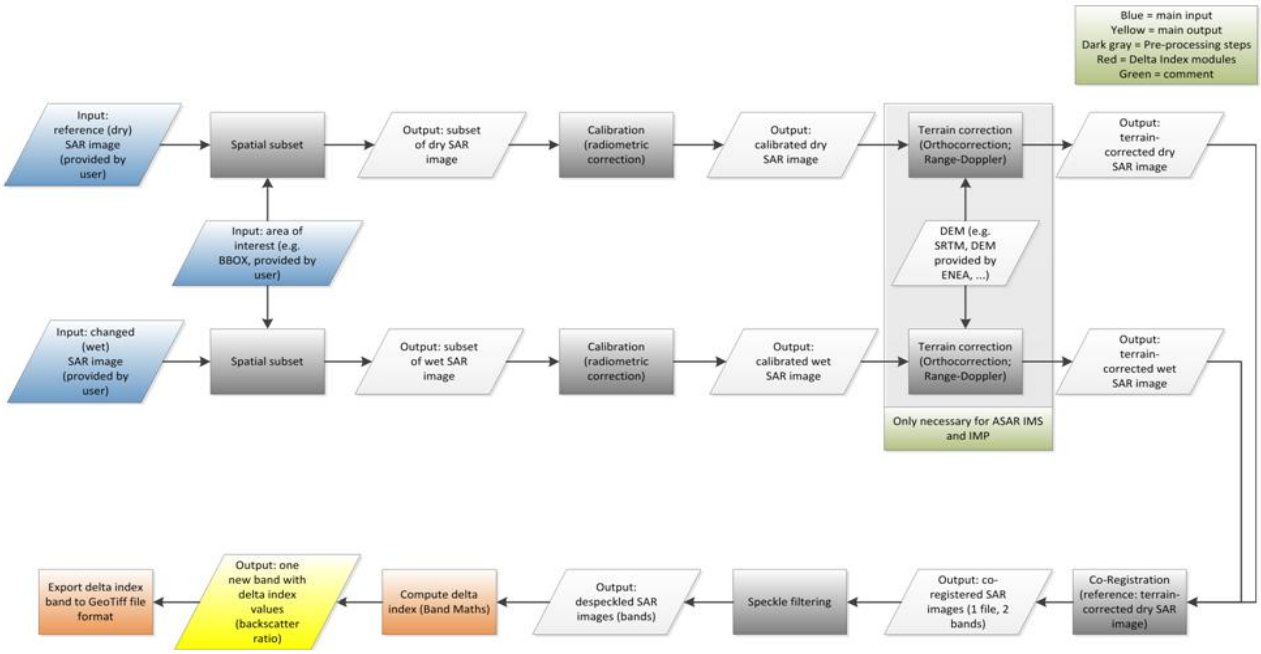
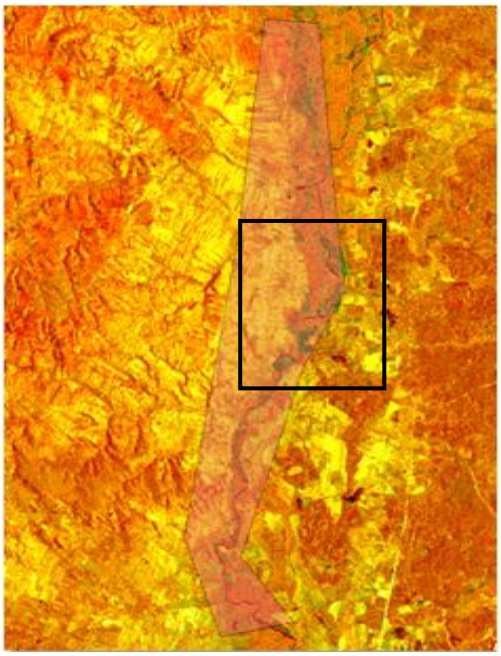
Processing

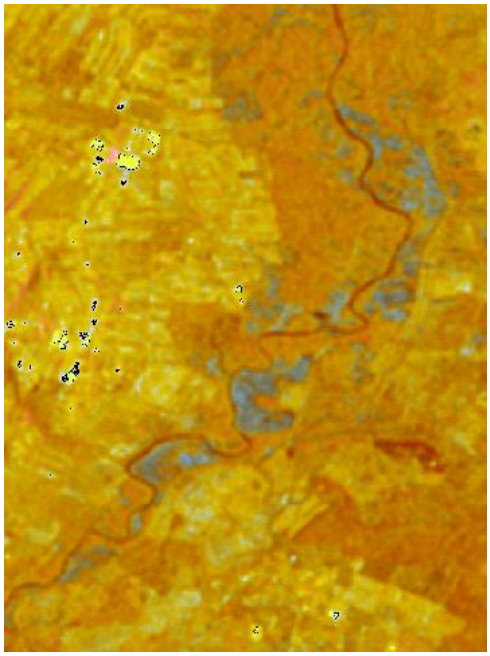
The main pre-processing steps proposed for the system are: Subset, Calibration, Terrain correction, Co-registration, Speckle filter and finally the DI computation.



Output

Raster geo-referenced map in which a DI value that represents the changing in soil moisture/wet conditions is assigned to each pixel.
In dark red the areas in which no changes in water level have been detected such as lakes and main normal flow river. In bright green and bright red the area in which the differences are negligible; in bright blue the flooded areas
In the surroundings of meanders, due to the hydraulic changes of the river system, it is possible to see the flooded areas spread on the plan and tilled lands (March river, Lower Austria).





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