Flood mapping by combining the strengths of optical and active radar remote sensing

**Scope**

NASA GOF and Dartmouth Flood Observatory (DFO) are preparing flood maps with global coverage in near real-time from MODIS optical satellite images. These flood maps are suffering from cloud coverage.

The Global Flood Observation Initiative (GFO) prepares global NRT flood maps using ASAR imagery. GFO is preparing for the Sentinel mission, but currently tests its operation with EnviSAT data. ASAR images do not suffer from cloud cover but have currently a low revisit frequency and have trouble classifying water over desert and mountainous areas. GFO also computes a quality indicator to show the reliability of the classification.

Combining DFO and GFO

The two global flood mapping techniques are clearly complementary. Therefore, we, from DFO and GFO are testing combinations of our products, in order to profit from each other’s merits. In this poster, we demonstrate this combination by showing two case studies in which we have both our products available.

**Case studies**

**Thailand, Chao Phraya basin, October 2011**

A dramatic flood event occurred, causing enormous damage and fatalities. Both our observatories captured the flood on 13 October. We combined our products by classifying a GFO pixel as flooded, when the probability of water exceeded 0.7 and the quality of our classification exceeded 0.5. When either DFO or GFO indicated water, a pixel was classified as water.

**Northern Queensland, Australia, March 2012**

On 18 and 19 March, two revisits of EnviSAT show that a flood is emerging in Northern Queensland. DFO is fully obscured by clouds. On 21 March, the cloud cover dissolves and the flood become visible in DFO as well and the extent seems to grow. On 28 March, finally, an EnviSAT revisit becomes available, showing similar extents as the DFO map.

**Conclusions**

In both case studies, the two techniques clearly complement each other. In the Thailand case, we demonstrated during partly clouded conditions, that DFO provides continuous data, while GFO complements these data during EnviSAT overpasses, when clouds obscure optical imagery. In the Queensland case, the use of both techniques completed the storyline. During the onset of the flood (18 March), there was a tropical storm passing over the region, causing a great deal of cloud cover. GFO could show the first flood patterns. As the floods progressed, the cloud cover dissolved and MODIS was able to take over, after the overpasses of EnviSAT.

**Outlook**

GFO is preparing for the Sentinel-1 satellite mission. This means that ASAR data will be used with a much higher spatial resolution and revisit frequency. We are currently automating the systematic combination of our products into one global coverage flood mapping product.