Japan Earthquake and Tsunami (11-Mar-2011)

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ENVISAT ASAR Data used:

Track	Swath	Products	Date
desc 347	IS6	RAW	20101121
desc 347	IS6	RAW	20110219
desc 347	IS6	RAW	20110321

Baselines and time intervals relative to one common reference scene

Nr	Pair		Bperp	dtime
1	20101121	20110219	-23m	90days
2	20110219	20110321	306m	30days

DInSAR Processing:

For each pair differential interferometric processing was done to derive (1) a differential interferogram, (2) coherence.

The following processing steps were used:
- raw data processing with range extension using GAMMA MSP
- co-registration of SLCs to common geometry
- differential interferometry using
  - oversampled SRTM as initial height reference
  - slope adaptive common band filtering

The results were geocoded to geographic coordinates.

The Figures show:

1) Coherence loss between a comparable pre-seismic pair (20101121_20110219, -23m, 90days) and a co-seismic pair (20110219 20110321, 306m, 30days). For 30 day and longer interval pairs over this site the coherence is mainly high (> 0.5) for urban area. Damage from the earthquake and the tsunami cause decorrelation in the co-seismic pair. In severely damaged urban areas the coherence reduces from a high coherence (> 0.5) in the pre-seismic pair to a low value which results in large coherence loss values (>0.3). Damage over vegetated areas is not well recognized in the coherence loss between the coherence is already low in the pre-seismic pair. To display the coherence loss a color scale between 0.1 (green) and 0.5 red) is used. The image brightness is the backscattering of 20110219. Red color is a clear indication of damage in urban areas.

2) RGB color composite of the backscatter before (20110219, red channel) and after the 11-Mar-2011 earthquake and tsunami (20110321, green and blue channels). In damage urban areas the backscattering remains high after the earthquake and tsunami. In non-urban areas the effect of the tsunami is often clearly visible through a strong decrease of the backscattering (smoothing of the surface) which results in reddish colors in the RGB composite.

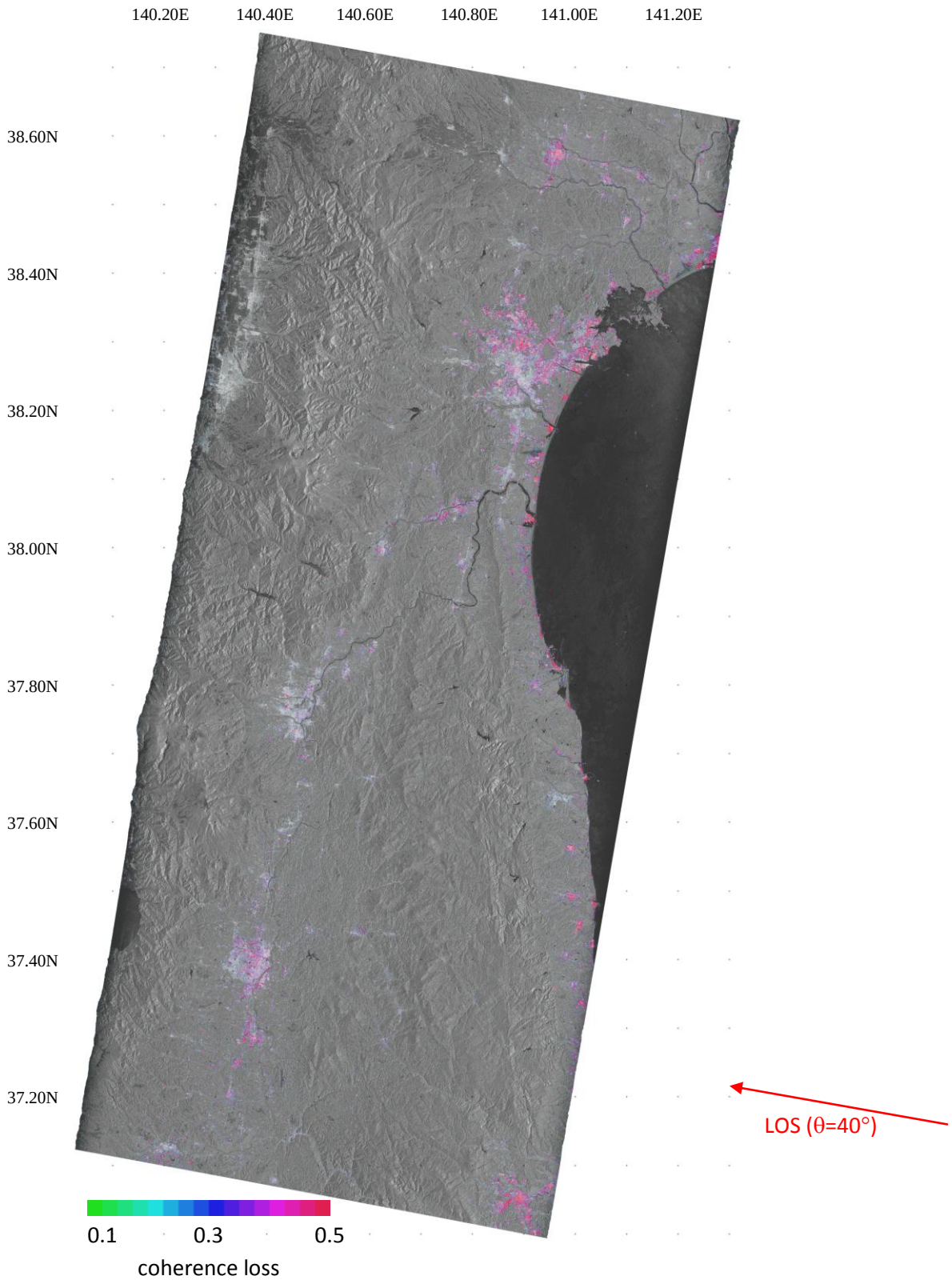

Figure 1 Japan Earthquake 11-Mar-2011 coherence loss between pre-seismic (20101121_20110219, -23m, 90days) and co-seismic pair (20110219 20110321, 306m, 30days). To display the coherence loss the indicated color scale is used. The saturation level changes between 0 for coherence loss< 0.1 and 0.9 for coherence loss > 0.5. Red color indicates high coherence loss and relates to damage in built up areas.

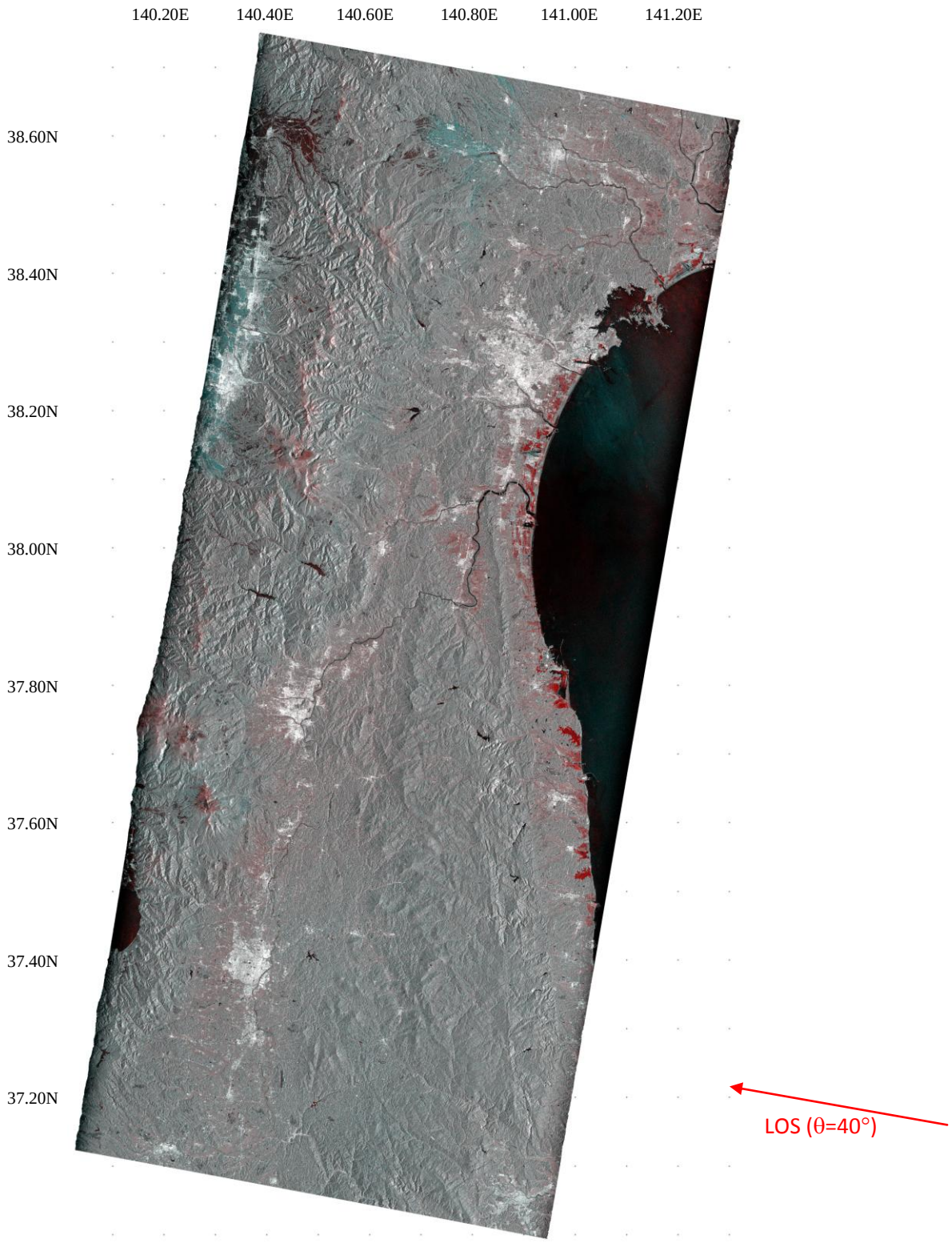

Figure 2 Japan Earthquake 11-Mar-2011 RGB color composite of the backscatter before (20110219, red channel) and after the 11-Mar-2011 earthquake and tsunami (20110321, green and blue channels). For the backscattering the same logarithmic scale is used for both dates. Red color correspond to reduced backscattering after the earthquake and tsunami and indicate "smoothed surfaces".