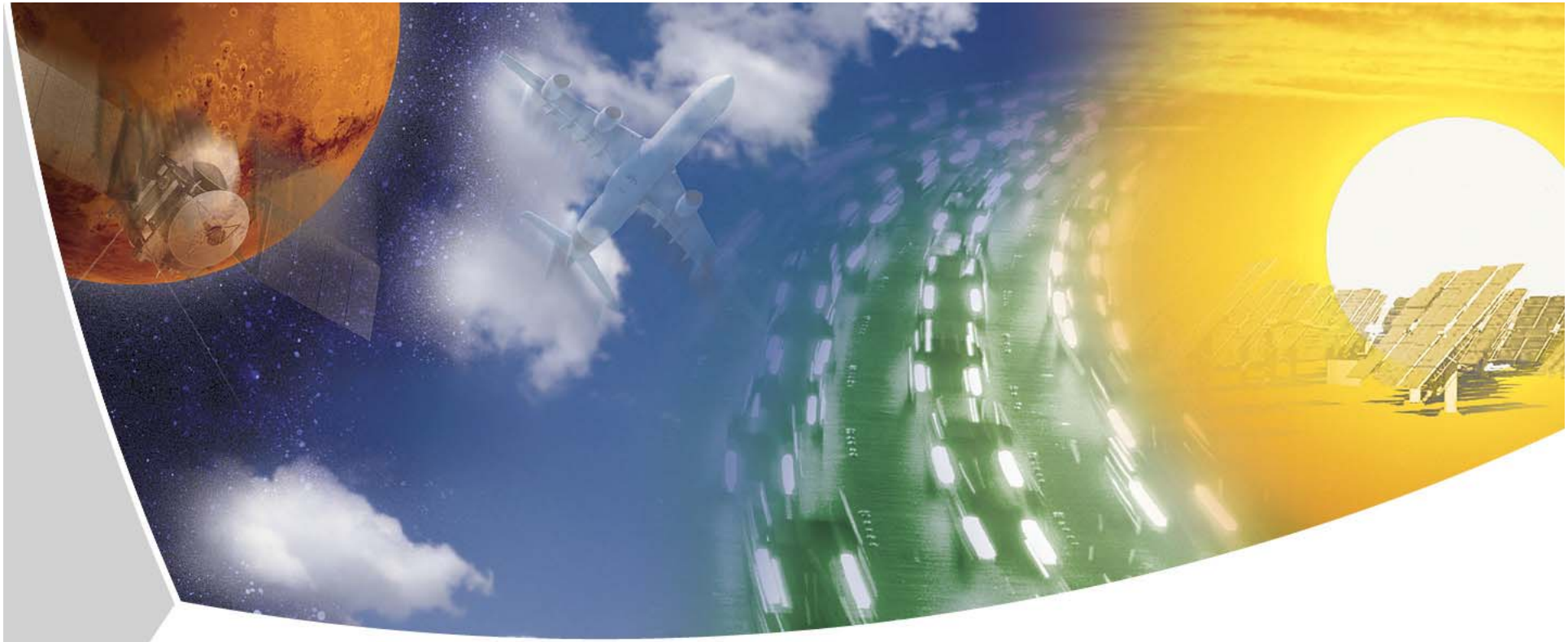

Coherent Scatterers (CSs)
Detection and Characterization with ALOS-PalSAR

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Coherent Scatterers
(CSs)

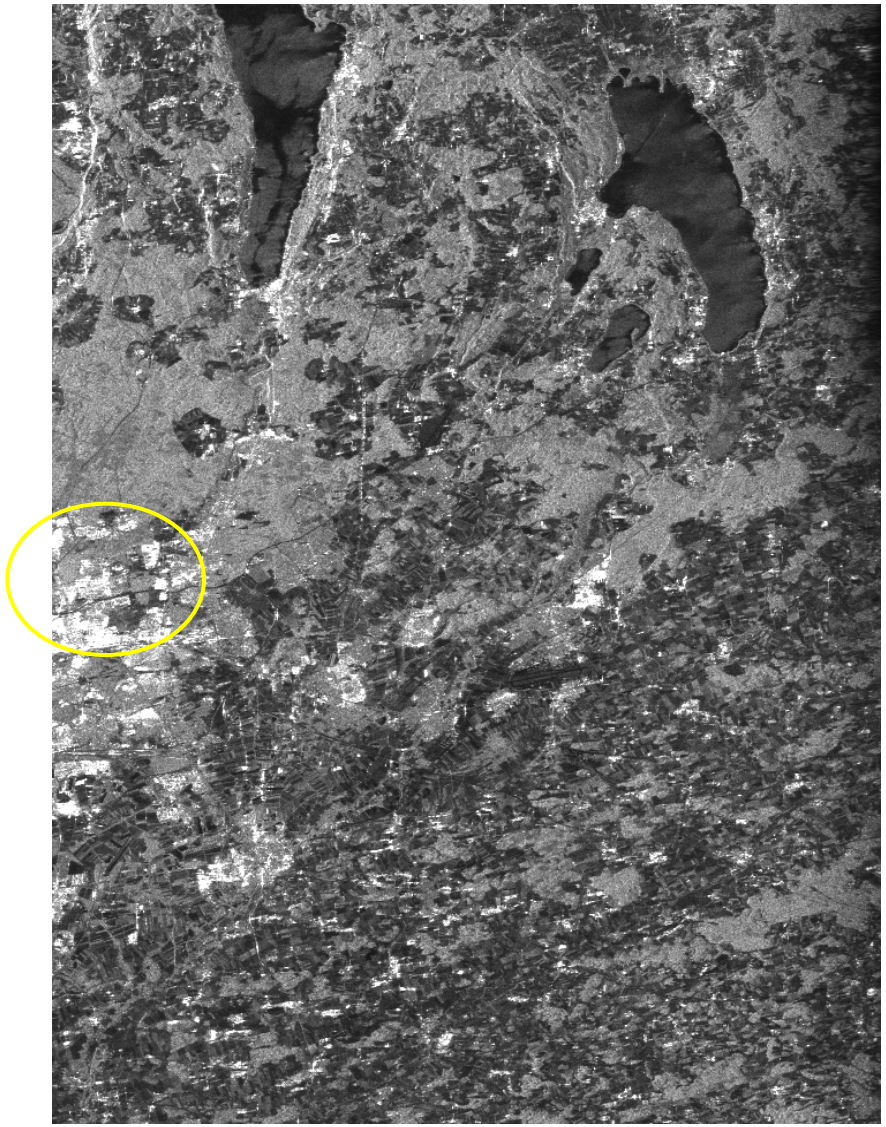
↓

Point-like scattering behavior

High spectral correlation

↓

Detection already realized with data acquired by the E-SAR airborne system over the cities of Munich and Dresden.



-ALOS-PalSAR First Polarimetric Satellite;

-Allows the acquisition of long time series of data in repeat pass mode;

-Repeat-pass Time 46 Days;

-Pol-InSAR application on large areas;

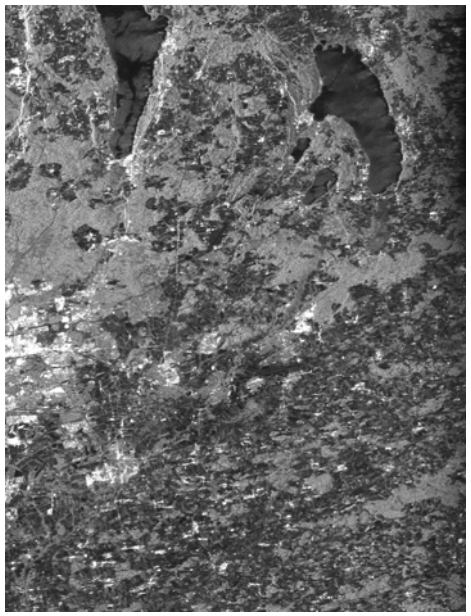
-Main problem: temporal decorrelation.

-Can we detect CS by means of ALOS?

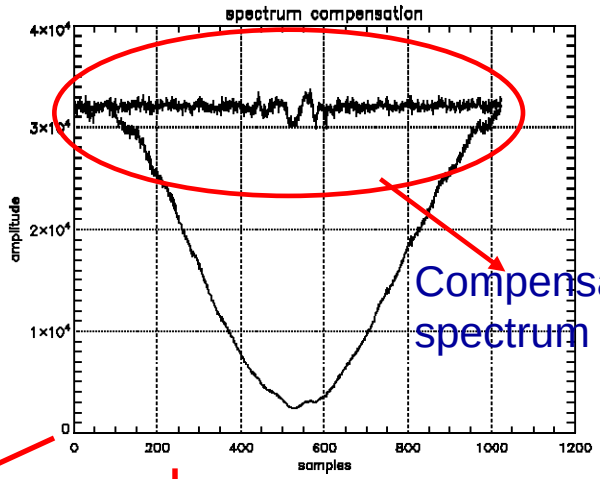
-What is their temporal Behaviour?

-How their polarimetric characteristics change in time?

DEFINITION AND DETECTION METOD



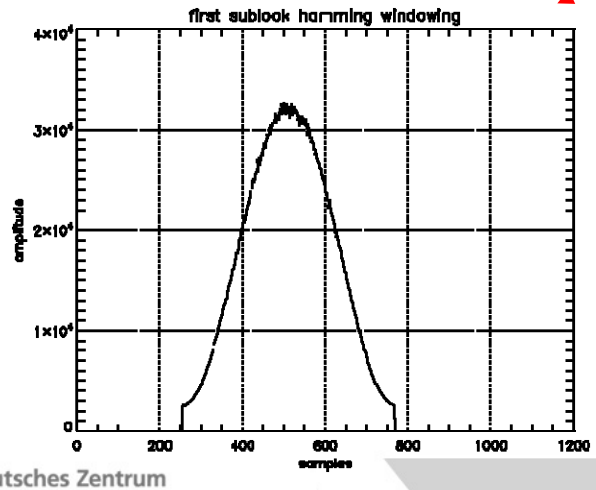
Range direction
Fourier transform

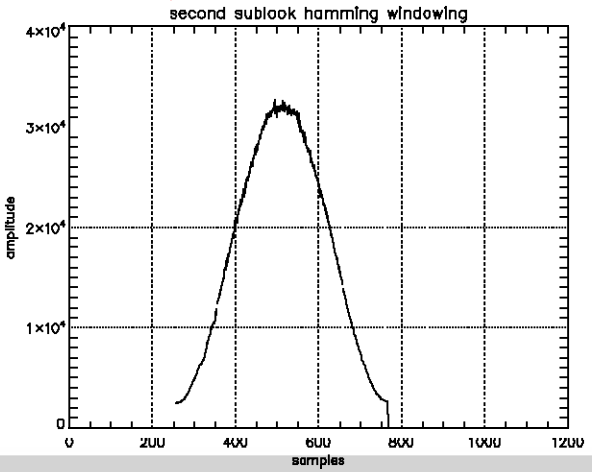


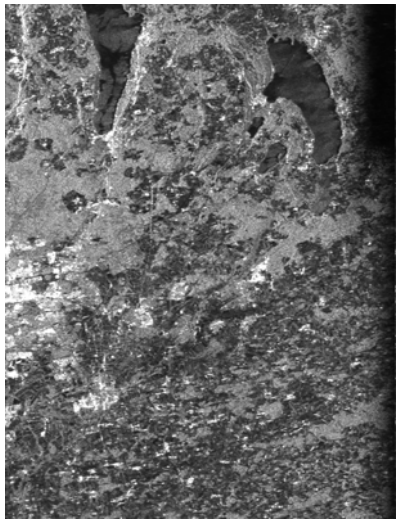
Compensated
spectrum profile

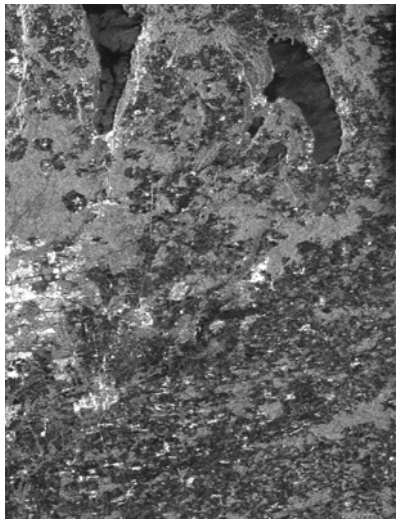
First sub-look

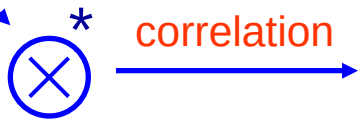
Second sub-look

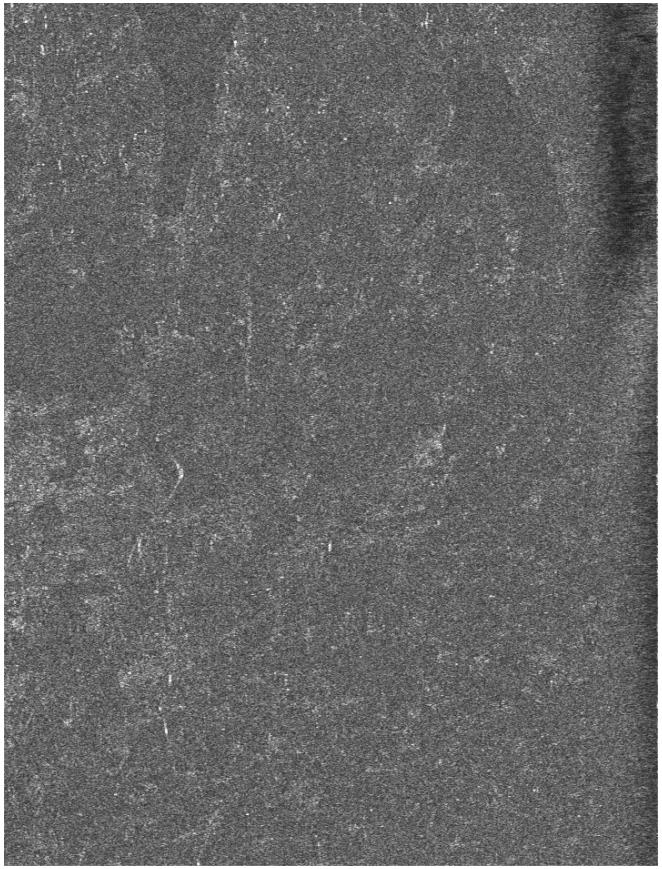






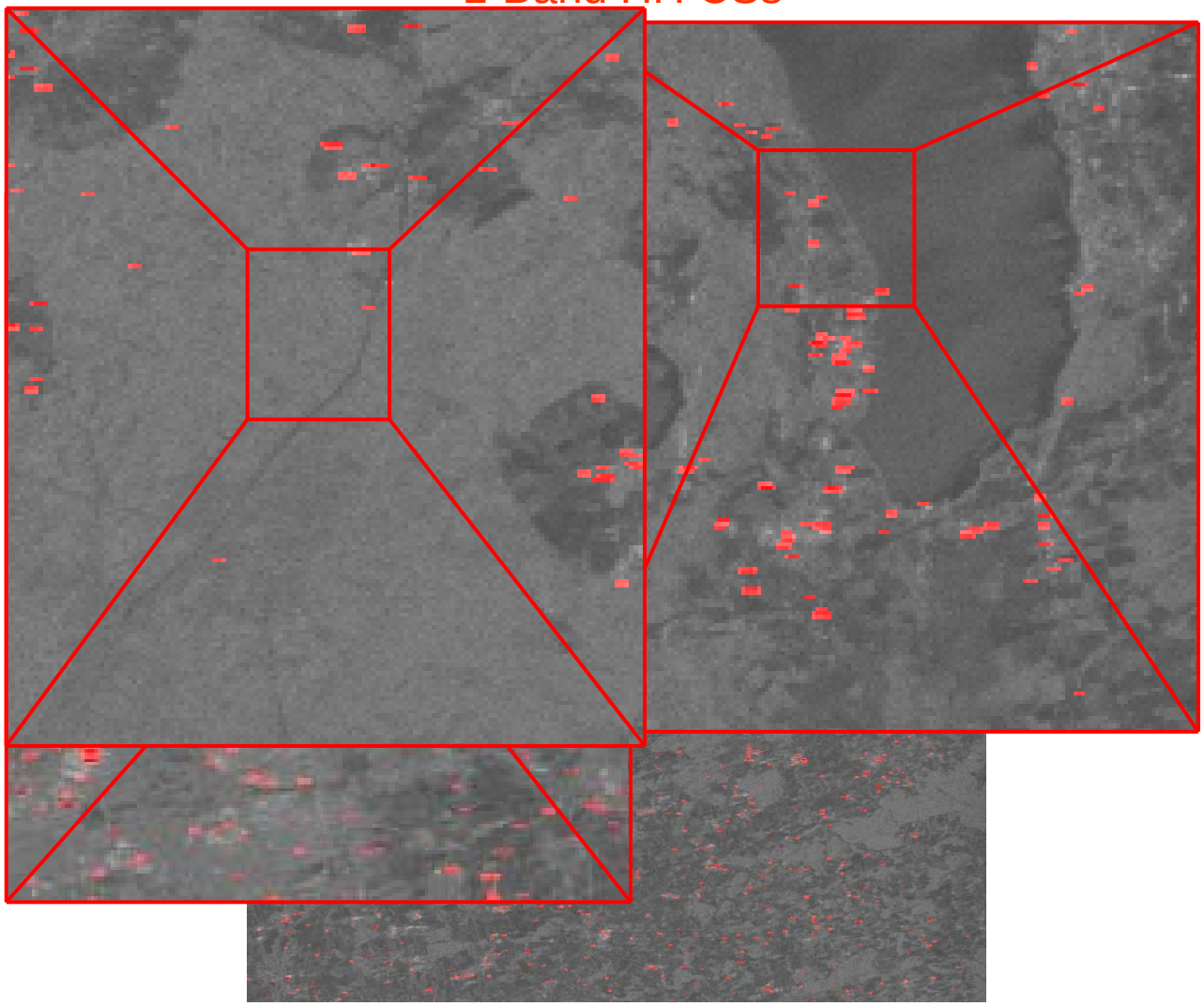




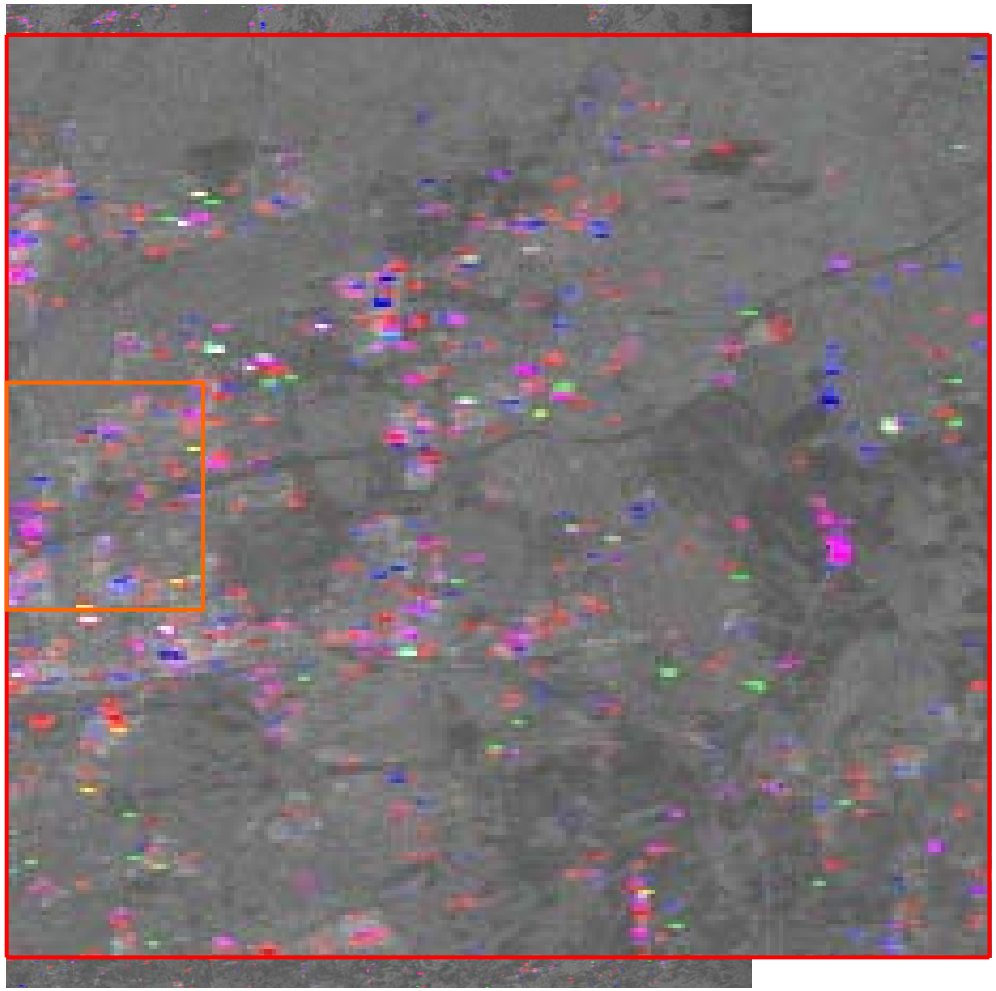


-A window of 3 x 7 is used.

L-Band HH CSs



LEXICOGRAPHIC BASIS



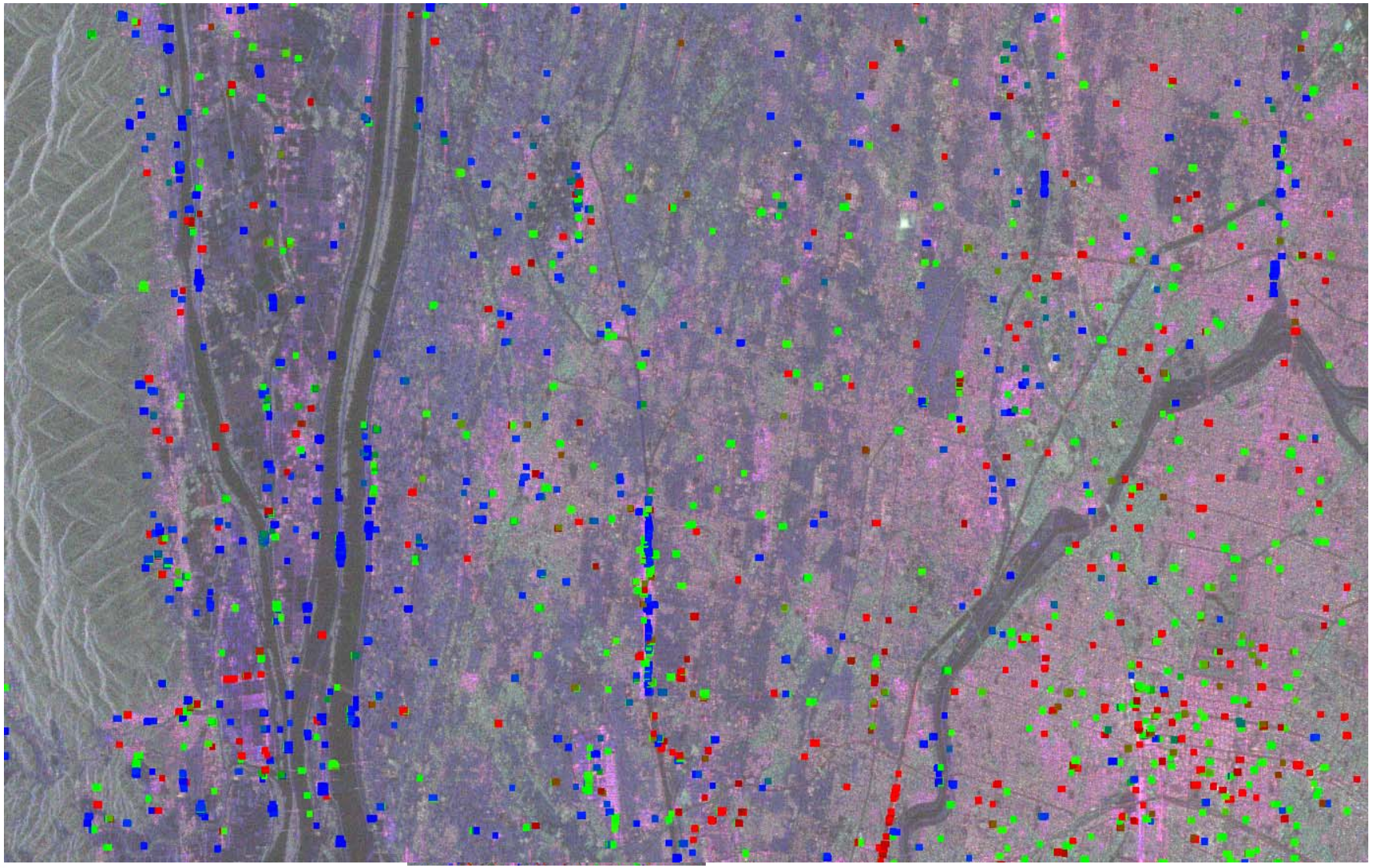
-With polarimetry we can increase the number of points detected;

-New CSs are detected in different resolution cells;

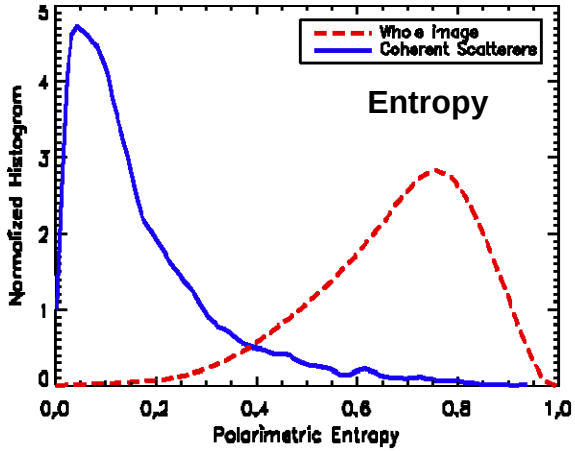
-Different CSs with different scattering behavior can be detected even if located within the same resolution cell.

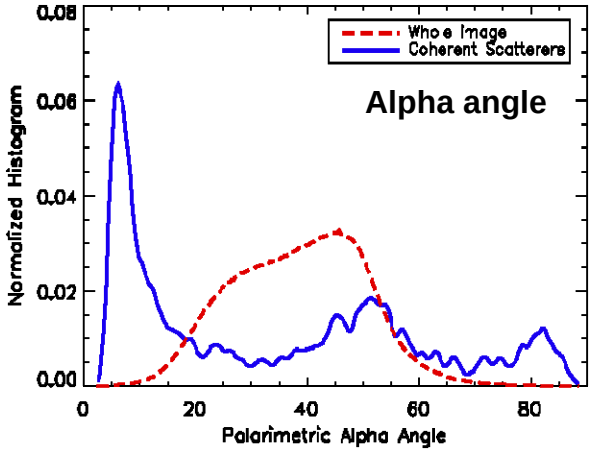
RGB-code Red: HH , Green: HV, Blue: VV

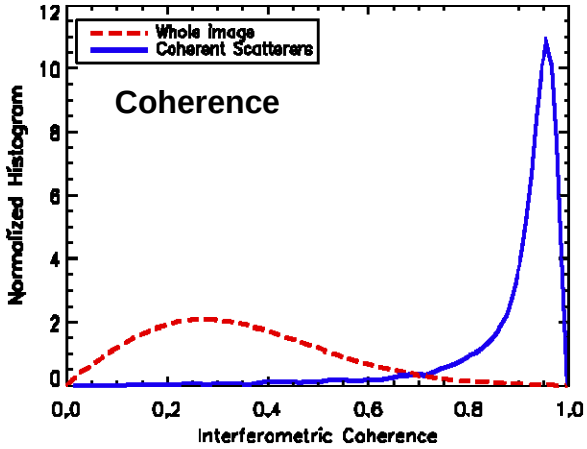
Gifu detected ALOS Coherent Scatterers



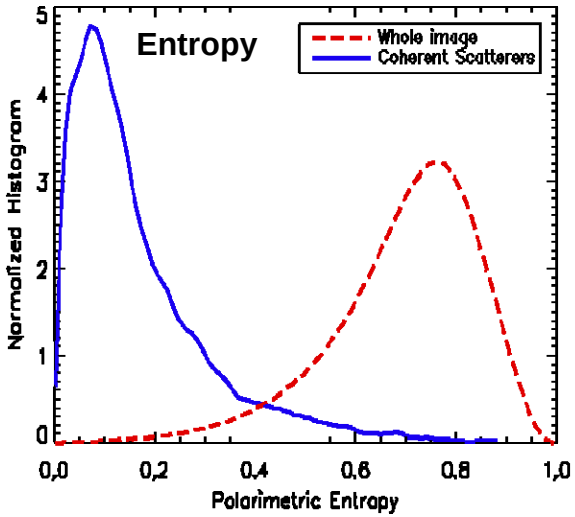
Polarimetric and Interferometric Characteristics of the ALOS CSs over Gifu

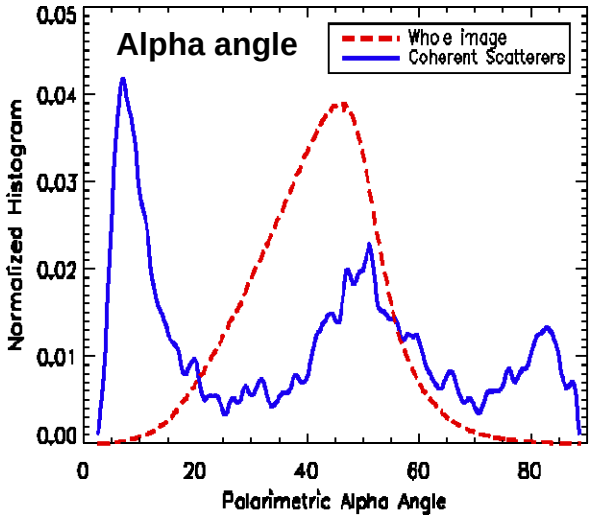




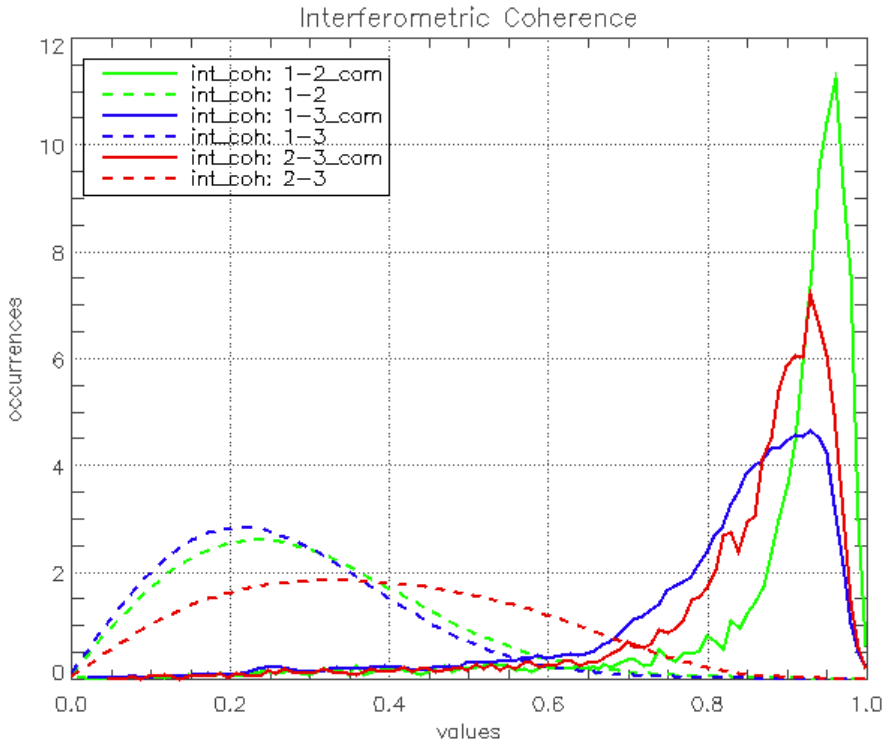


Second dataset, 46 days later …



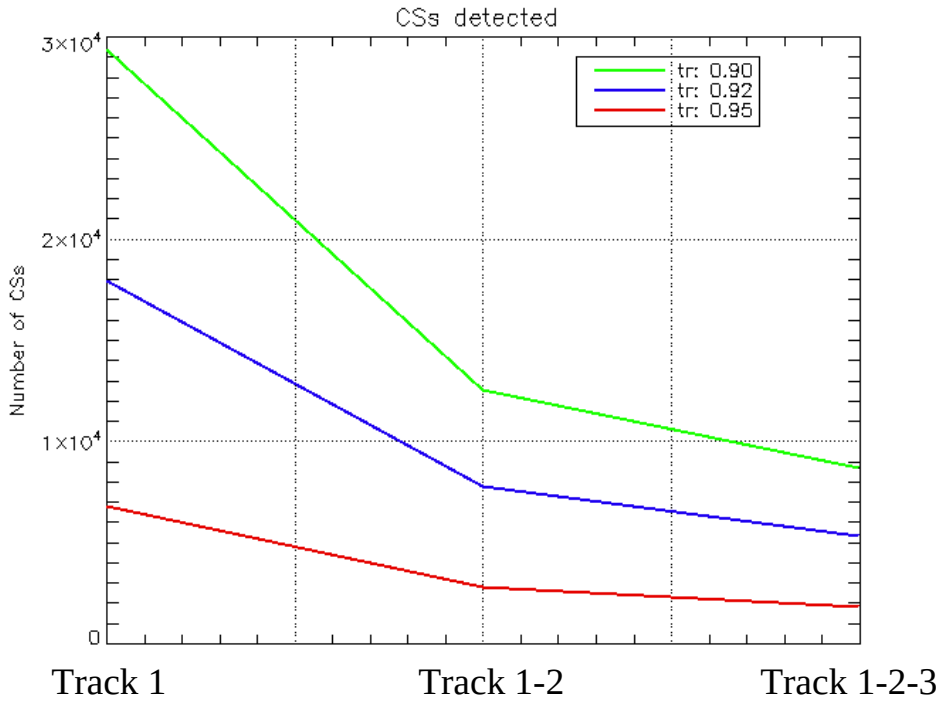


Interferometric coherence of the ALOS CSs over Munich



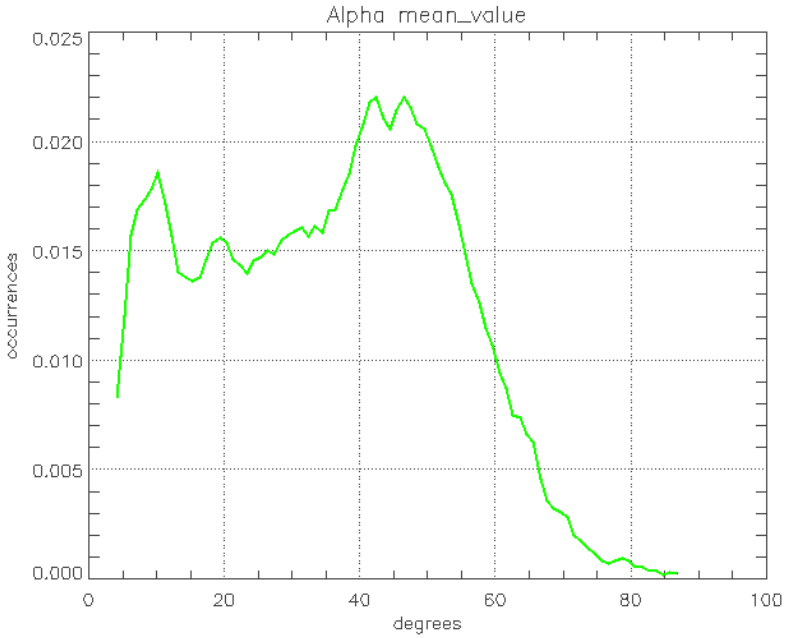
-CSs are characterized by high interferometric coherence playing an important role in interferometric applications.

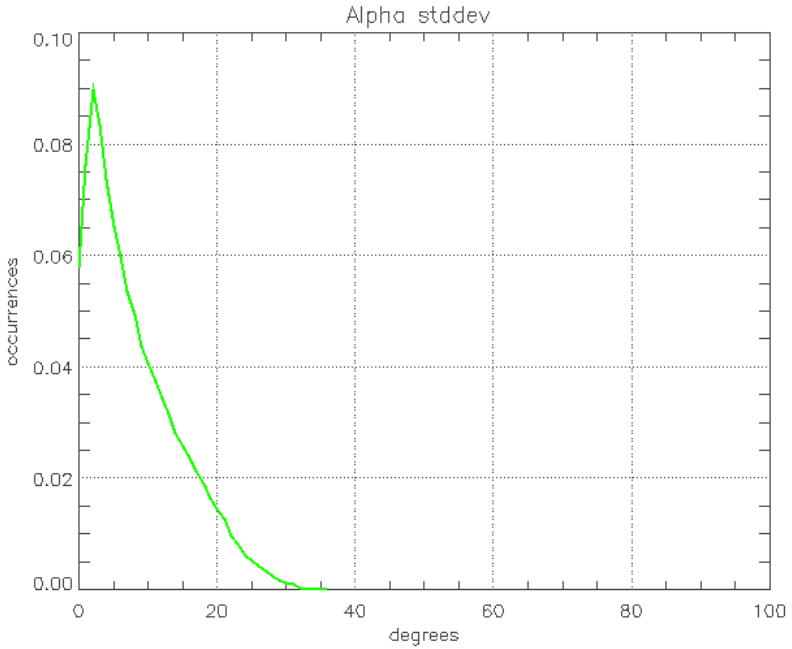
Number of detected CSs among different tracks using different threshold
Munich dataset



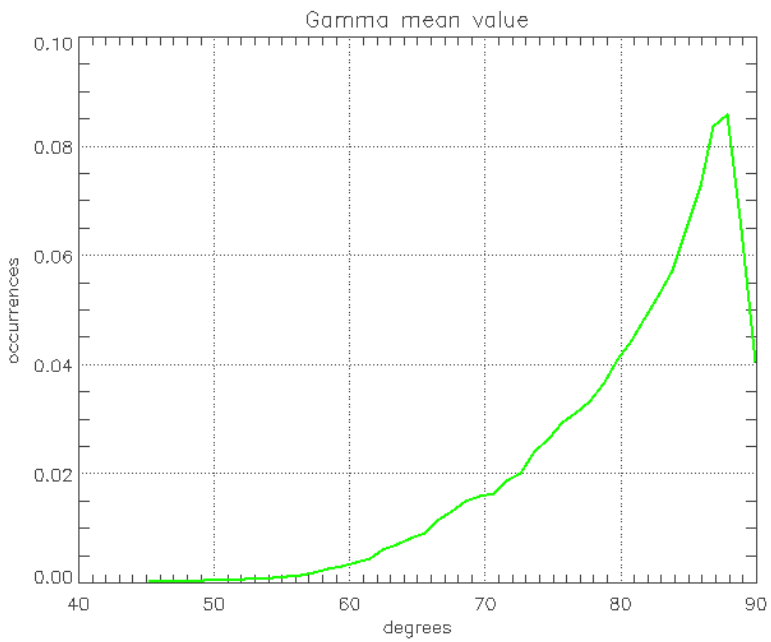
-CSs commonly detected among different tracks are always more independent on the threshold value;
-High threshold values allow the detection of high percentage of stable CSs.

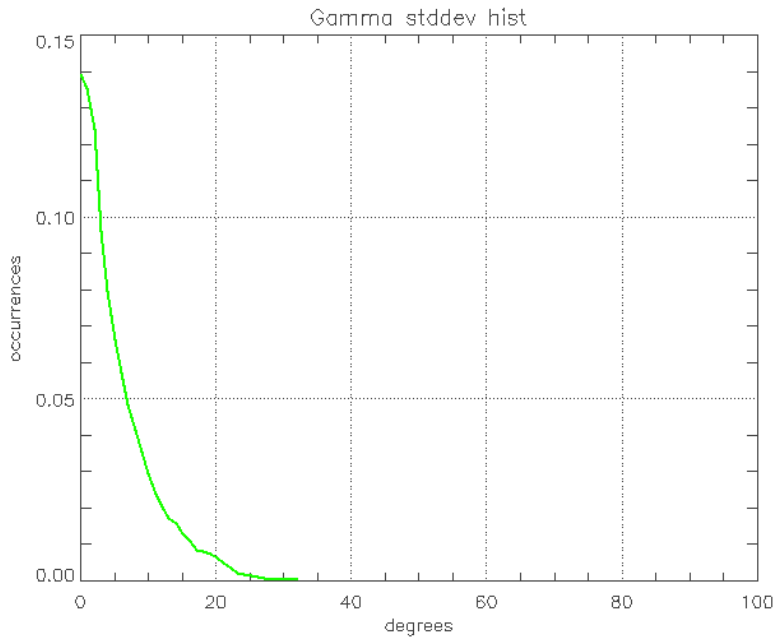
Degree of rotation symmetry (Alpha angle)



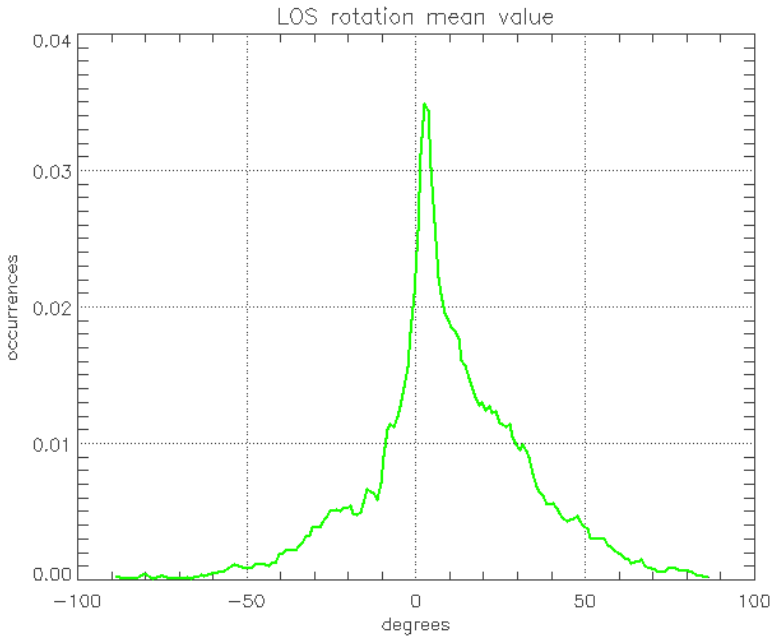


Degree of reflection asymmetry





LOS rotation angle extimation along the time



-CSs are principally horizontal oriented;
-Their orientation can change in time due to a movement of the scatterer itself or to a variation of the aspect angle.

CONCLUSIONS

-The potential of ALOS-PALSAR data for the estimation of point-like scatterers, or Coherent Scatterers (CSs), using spectral correlation, although

the narrow PALSAR bandwidth in full-pol mode, has been demonstrated;

- CSs were found to be characterized by high interferometric coherence a foundamental requirement for interferometric application;

- Some variations of the polarimetric parameters of Coherent Scatterers were verified. The cause of that is still difficult to determine. Possible origins: polarimetric miss-calibration, Faraday rotation, different aspect angle of scatterers illumination (big baseline), a non-optimal detection of CSs;

-The acquirement of a time series will be of most importance for the determination of the sources of polarimetric variations of deterministic and distributed scatterers.