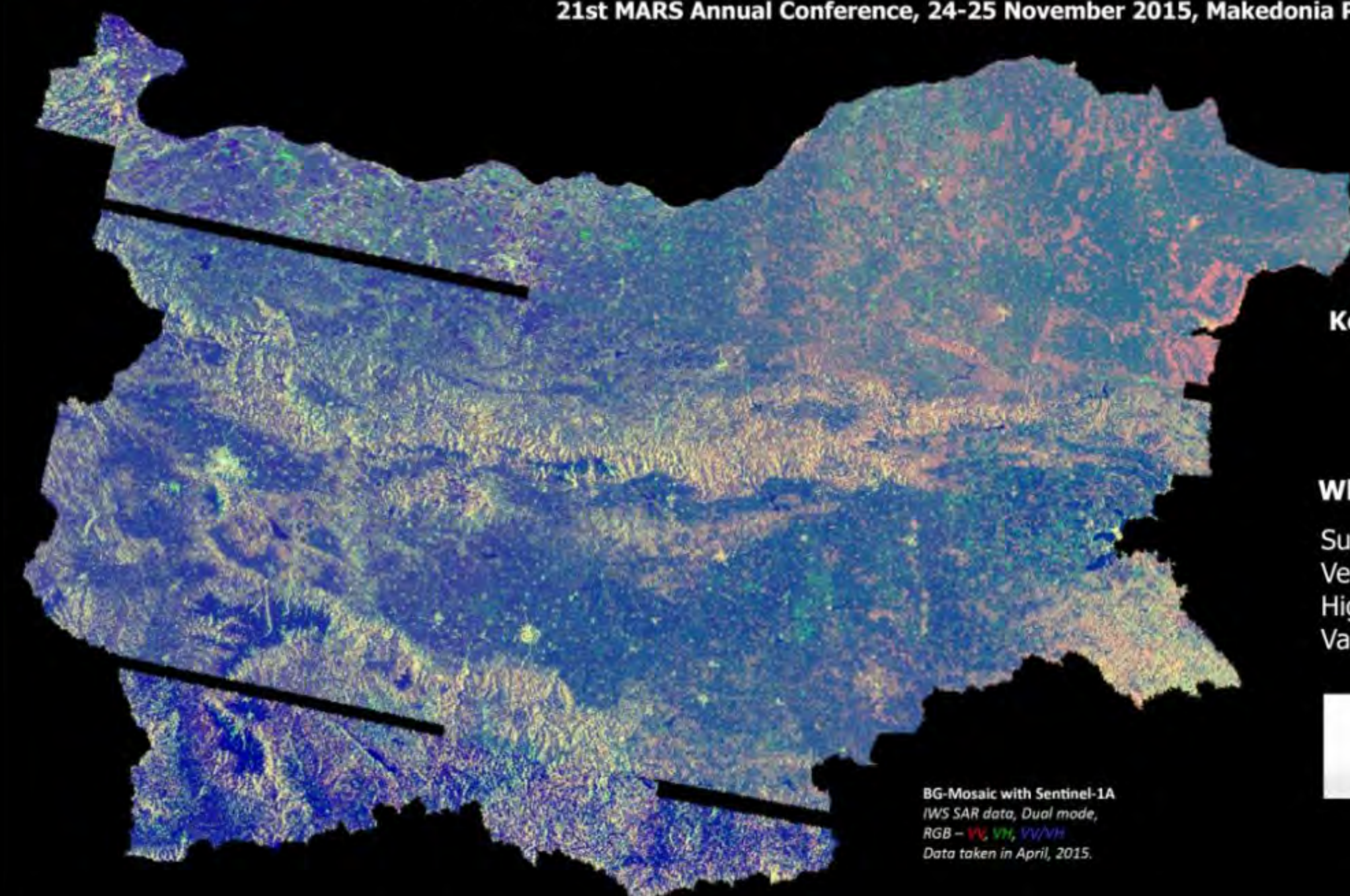


Application of SAR data in ReSAC

21st MARS Annual Conference, 24-25 November 2015, Makedonia Palace, Thessaloniki - Greece



BG-Mosaic with Sentinel-1A
IWS SAR data, Dual mode,
RGB - VV, VH, VV/VH
Data taken in April, 2015.

The SAR technologies in high-resolution mapping of the terrestrial and marine domains are considered to be of great importance; by the launch of Sentinel-1 on 3th of April 2014, developed in the frame of COPERNICUS Programme of the EU, the access and availability of SAR data increased, which provided scientists, researchers and value added providers with the possibility for exploration and regular monitoring on low cost.

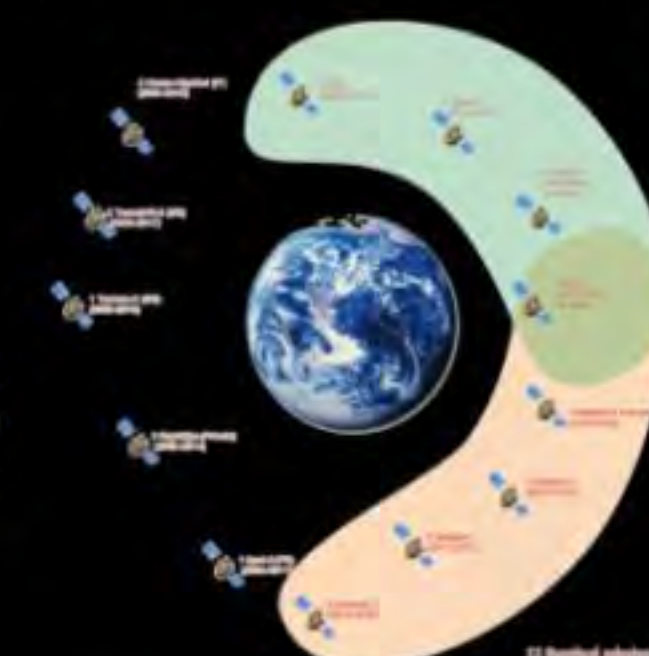
Key features of SAR:

- See through clouds → thus, weather independent !
- Use Phase information → thus, various height/displacement applications !
- Use Polarimetric information → thus, more information for objects !

Why Using Sentinel-1 SAR in Bulgaria?

Support regular monitoring methods
Very mountainous/rough terrain
High disasters occurrences
Variable weather conditions

GMES Space Component



In the past two years in ReSAC an efforts for SAR data processing brought some results with overview over possible SAR applications for the territory of Bulgaria, comprising basic SAR processing, Interferometry (InSAR) and Polarimetry (dual pol PolSAR) processing.

Application of SAR data is tested on various use cases, which represents the following:

- Monitoring of the land cover changes of agriculture lands;
- Crop detection;
- Monitoring of the forest areas;
- Surveillance and monitoring of marine traffic;
- Land cover changes monitoring in the mine complexes;
- Monitoring of urban environment;

Use Cases

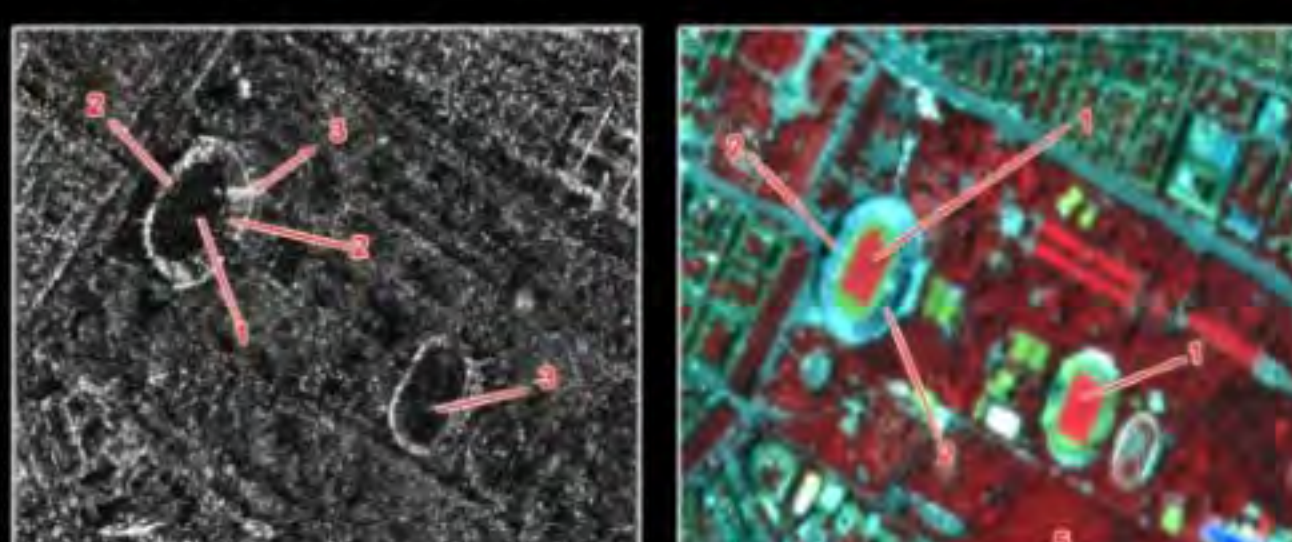
Basic SAR Applications

Sofia Use Case

Survey of Land Cover/Land Use for Urban and Agriculture, combining both SAR and Optical data; with field-check to collect in-situ / GPS-data



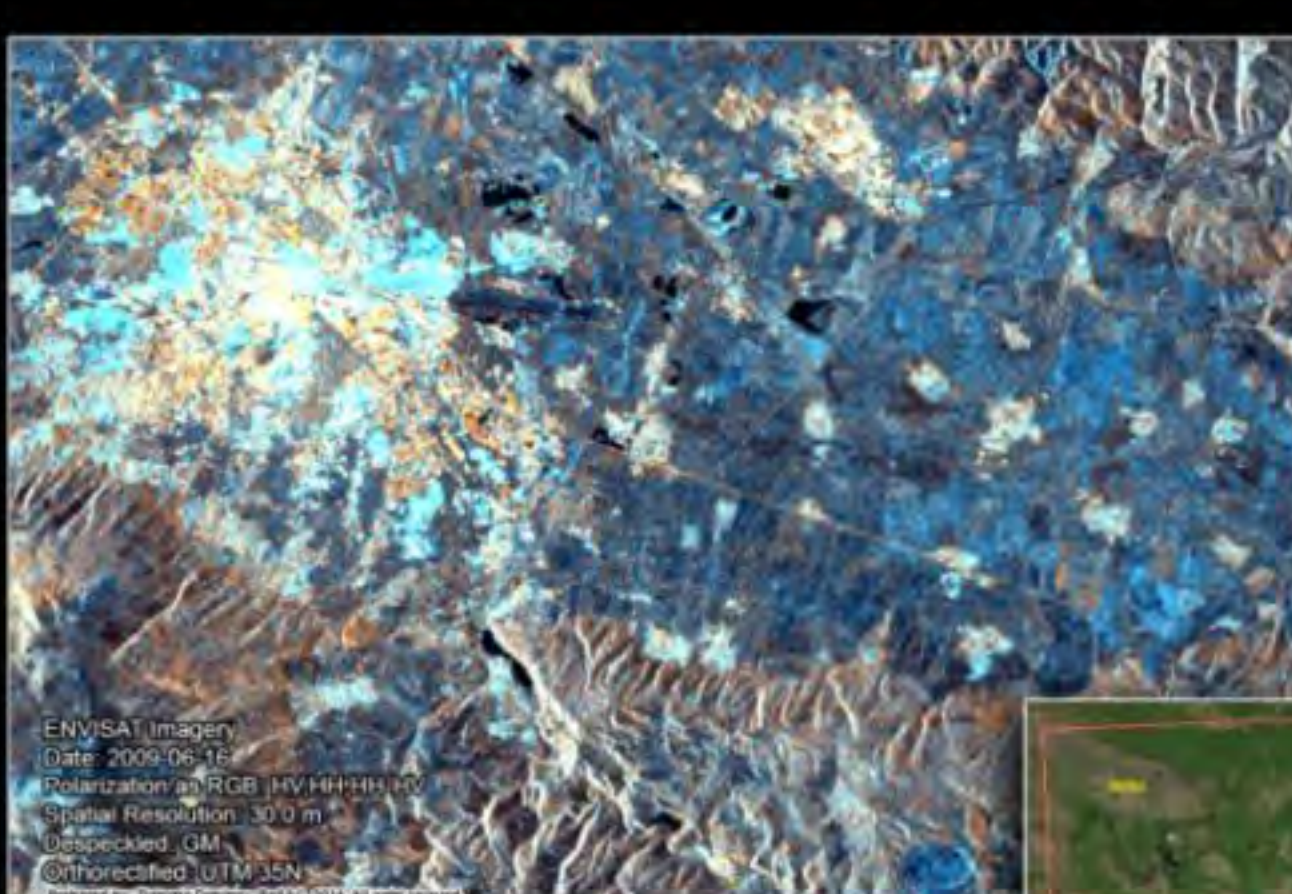
In 2009 a pilot project for investigation Land cover/Land use in Sofia suburbs, with VHR SAR from TerraSAR-X and ENVISAT imagery. Examine visual interpretation against SAR-one.



TerraSAR-X Imagery,
Ascending pass;
Spatial Resolution:
3 meters
Spot Light Mode
Speckle filtered

Recognized land cover types:
1. Terrain - low&fresh grass
2. Tribunes - plastic, metal
3. Light tower - concrete, metal

SPOT-5 Imagery
Spatial Resolution
5 meters
Spectral Combination in RGB:
NIR, GREEN, BLUE



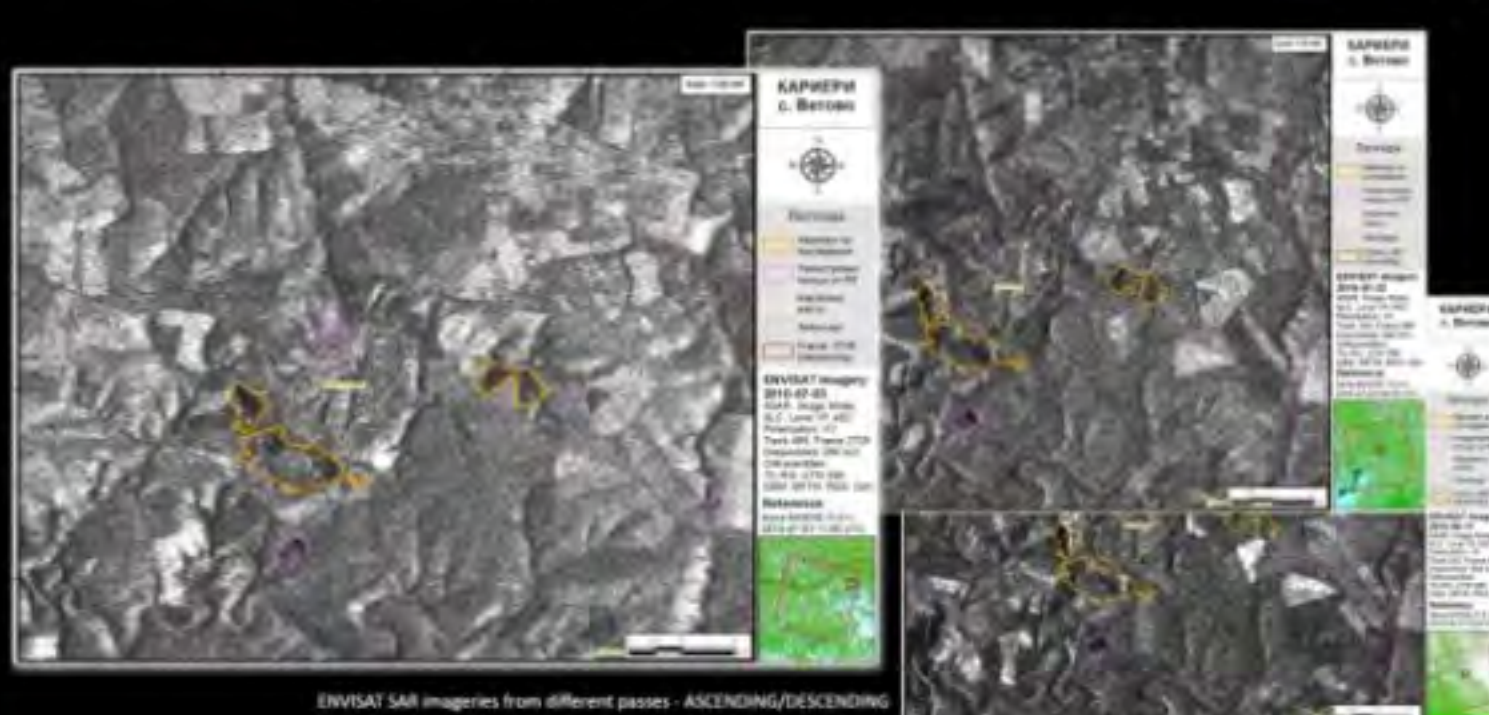
Overview of large territory with ENVISAT ASAR imagery

Image processing via ERDAS IMAGINE 2010, ESA NEST 5.1, STBX 1.1, ArcGIS.

Vetovo Use Case

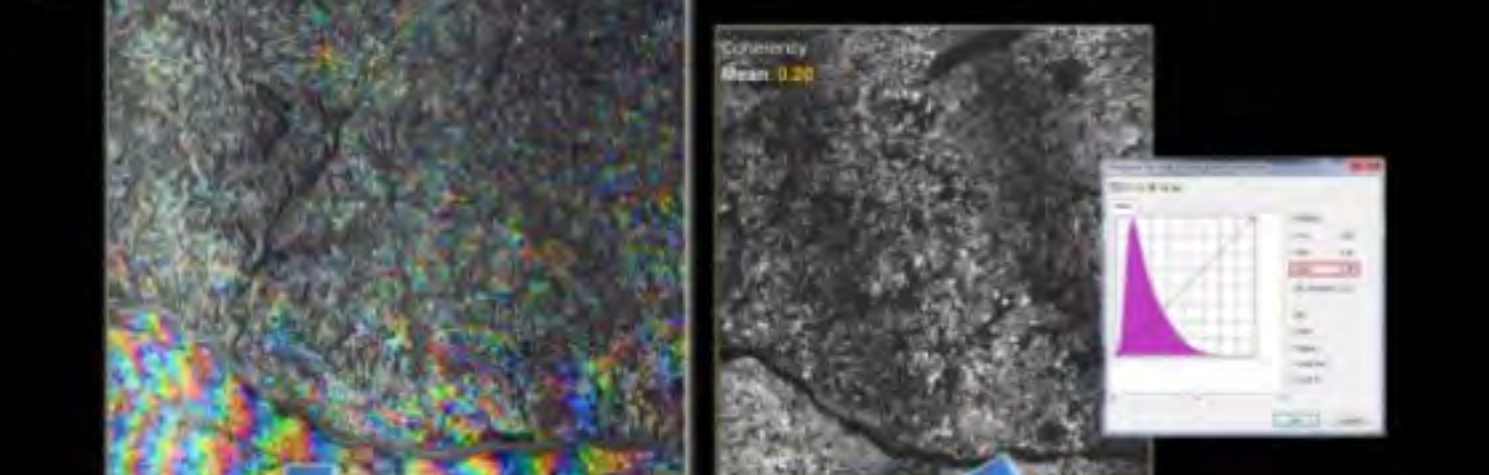
Investigation of Land Cover/Land Use for Quarries

In 2014 a pilot investigation of the Quarries near by village of Vetovo, NE-Bulgaria, close to Ruse, were initiated. The imagery are provided from ESA, of ENVISAT and ERS as basis for the investigation.

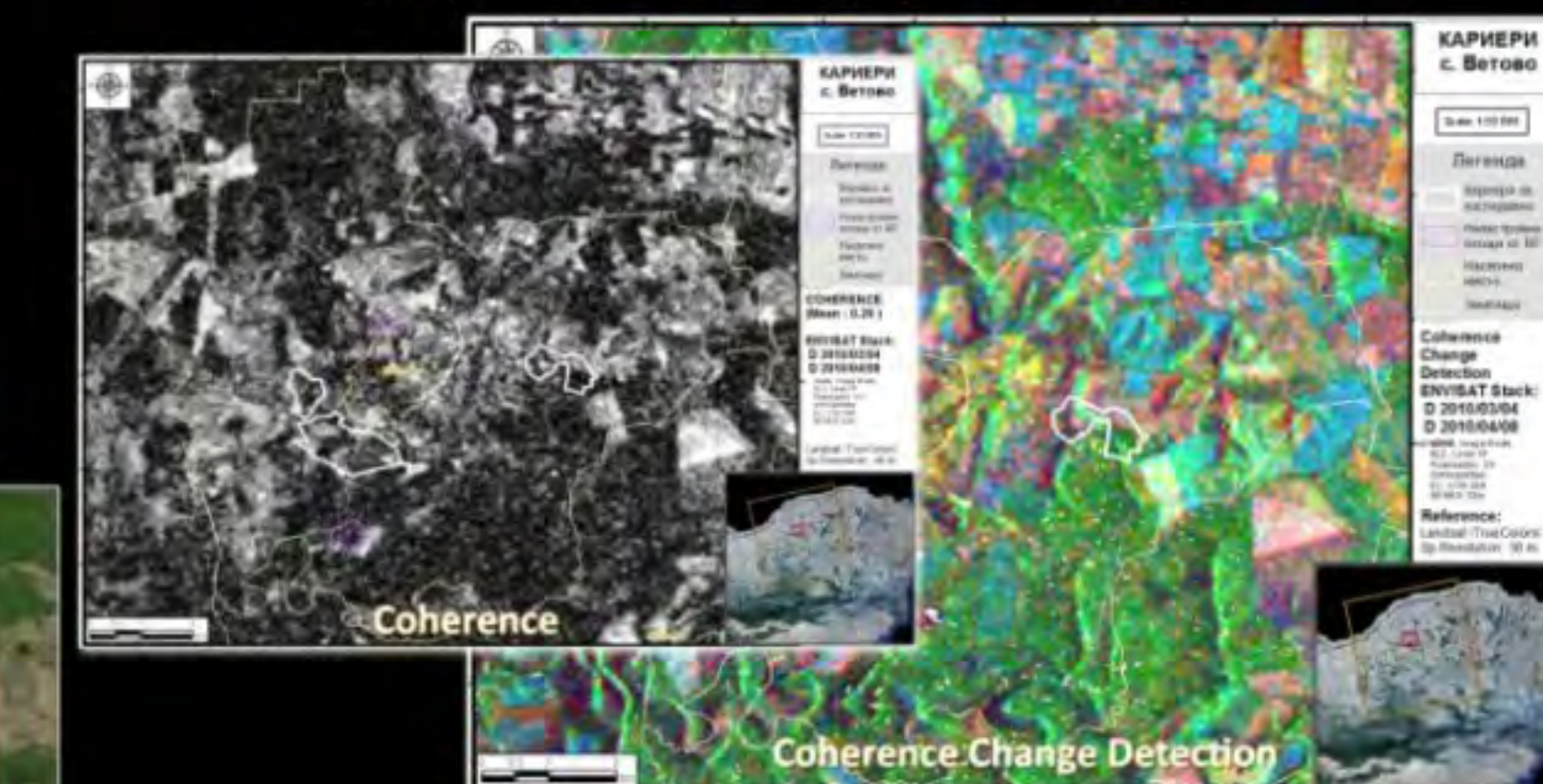


First In-SAR Approach - with Limitations:
While processing ENVISAT/ERS tandem pairs.
Interferometric processing **FAILED**,
due to lack of coherence of the
available datasets.
REASON: orbital parameters; summertime;

Second InSAR Approach
with Envisat - stack is successfull
Colorized filtered phase on
Match image (slave) Intensity
ASAR-2010-04-08
ASAR-2010-03-04
B-temporal 35 days



Analysis of Land Cover nearby Vetovo - Quarry:

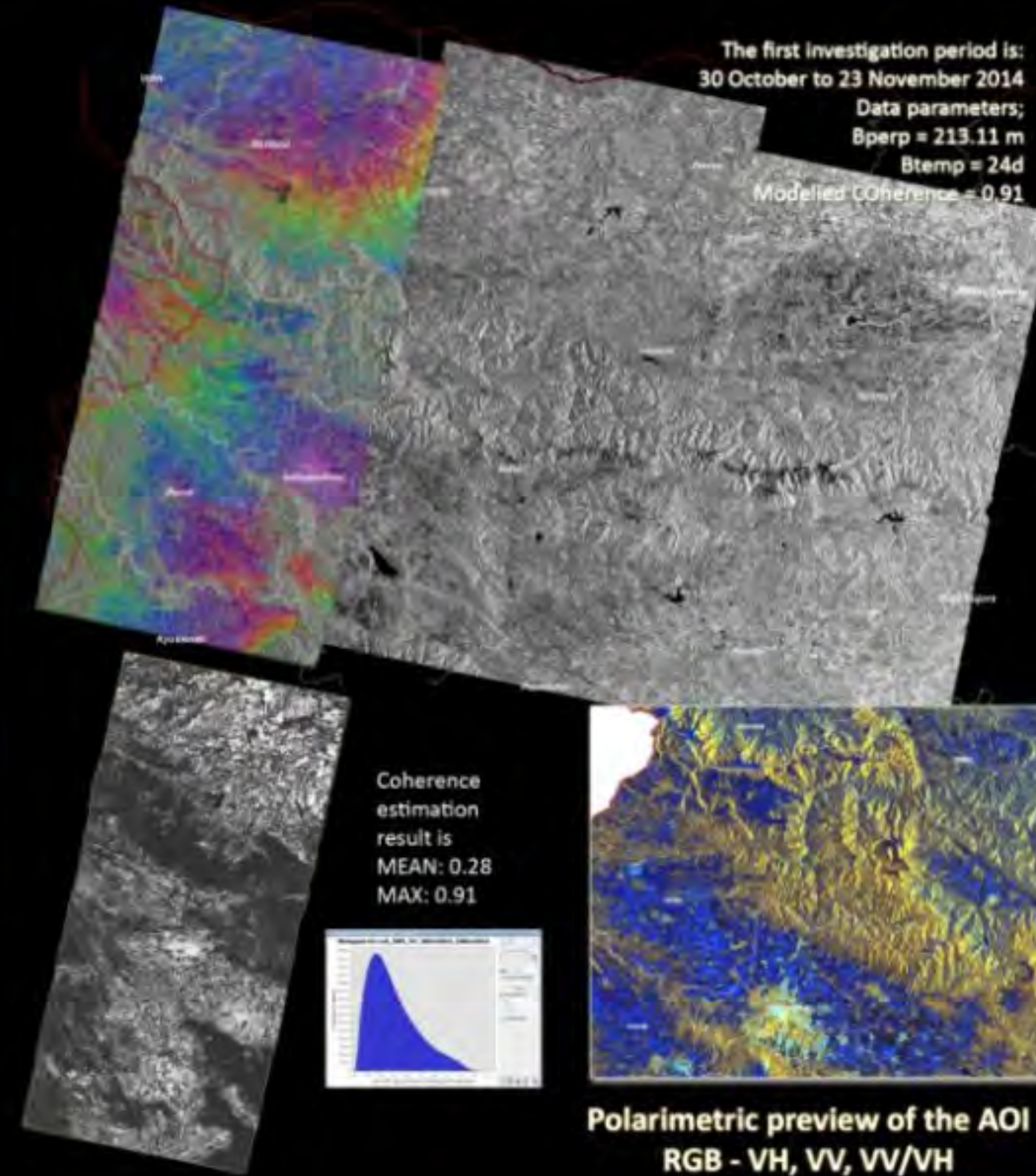


InSAR Applications

North-West Bulgaria Use Case

Investigation of Land Cover in North-West Bulgaria

In 2015 a pilot investigation of Land-Cover in North - western part of Bulgaria was initiated. The investigation is based on SENTINEL-1A IWS Data.



Marine Traffic Monitoring - Use Case

In 2015 a pilot investigation of Marine traffic of the Black Sea - Coast, along Burgas to Varna shore. The investigation is based on SENTINEL-1A IWS Data.

