sextant

Geospatial intelligence in support of EU External Action

SCENARIO: NATURAL RESOURCES

JUNE 2013

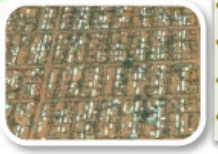
MAIN OBJECTIVES

sextant
Geospatial intelligence
in support of EU External Action

- Preparation and delivery of pre-operational services developed in the context of user-driven Support to External Action scenarios;
- Enhancement of mature products and services (as requested by users);
- Development of standardised portfolio of products and services.

INITIAL PORTFOLIO

Initial Products



- Camp situation map
- Camp monitoring map
- Indicators for repatriation
- Settlement characterization map

HUMANITARIAN CRISIS

- Mining map
- Oil field map

NATURAL RESOURCES

- Conditioned land use map
- Qualified directional change map
- Integrated spatial indicators map

LAND CONFLICT SITUTATION AWARENESS

- Extent and location of potential illicit crop
- Illicit crop warning service

ILLICIT CROPS

- Border permeability
- Border crossing point

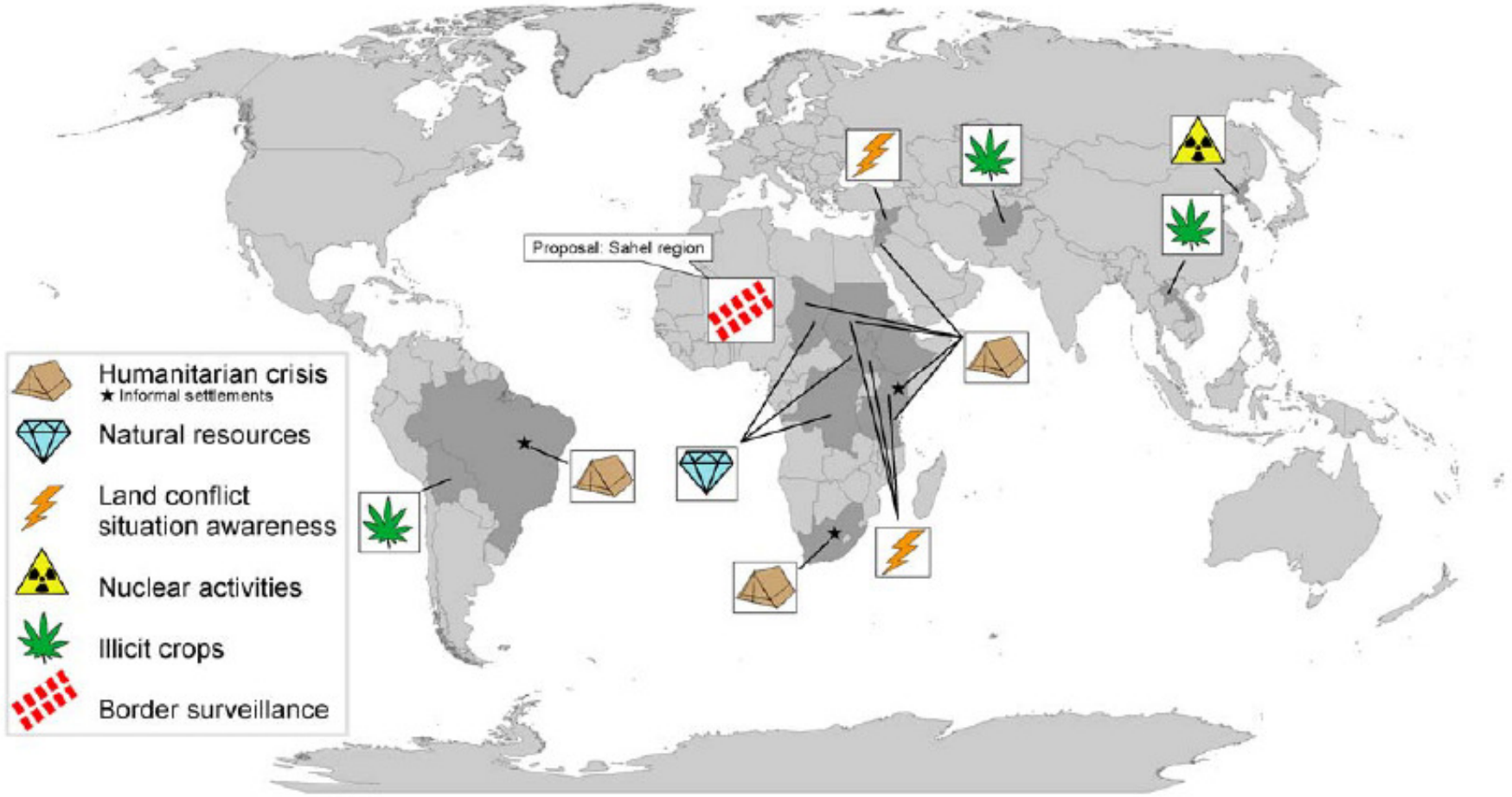
BORDER SURVEILLANCE

- Tools for monitoring nuclear sites and activities

NUCLEAR SITES AND ACTIVITIES

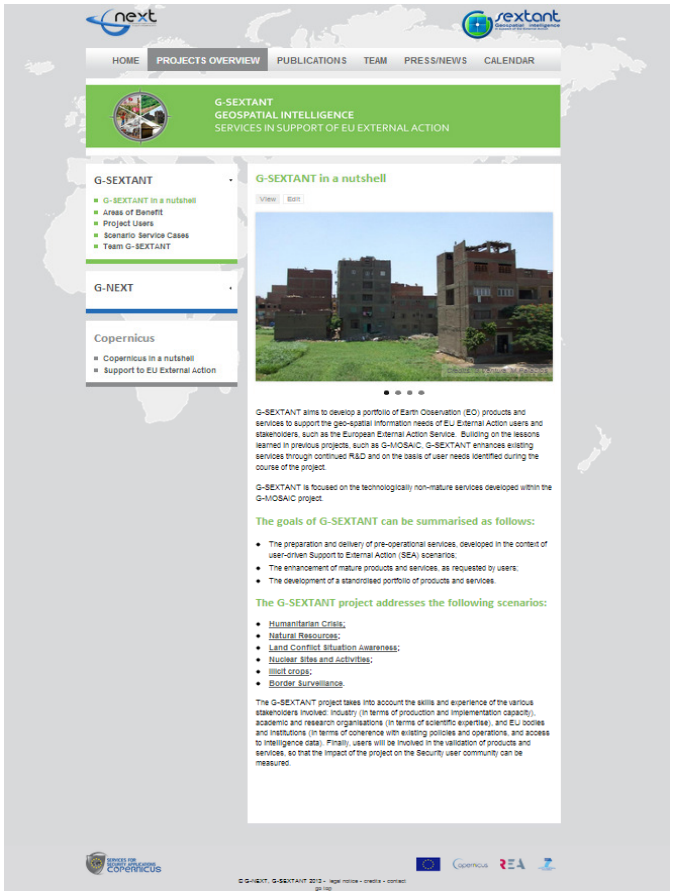
Scenarios

GEOGRAPHIC AREAS OF INTEREST



PROJECTS WEBSITE

Online by the end of June 2013



NATURAL RESOURCES

Purpose

To better estimate the ramifications of extraction of natural resources in conflict regions and high-risk areas

Key elements

- **Mining of minerals**: Provision of information of mining activities (intensity; volume of the extracted material, etc.)
- **Oil exploitation**: Detection of newly implemented infrastructures for oil exploitation and risk analysis linking this information with the companies' contractual and legal obligations

Research Aim

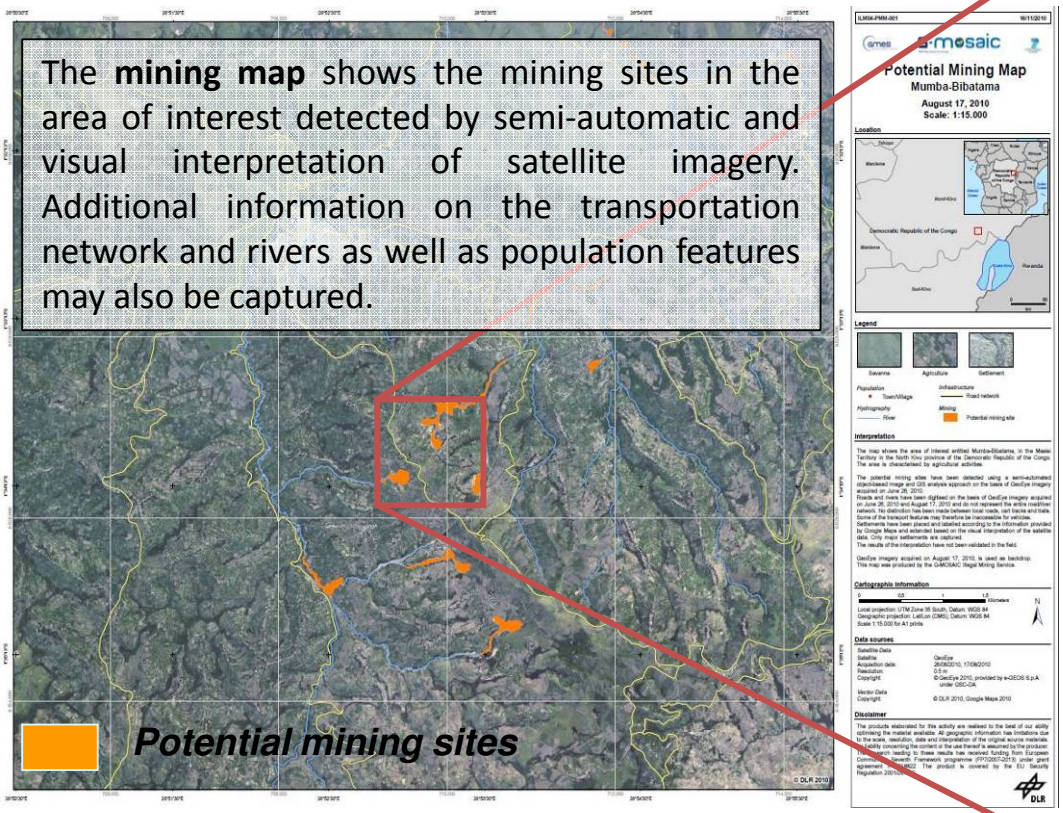
Development of improved methods for the monitoring of small scale mining sites, to better quantify activities related to the extraction of natural resources by integrating additional information such as socio-economic and socio-political information

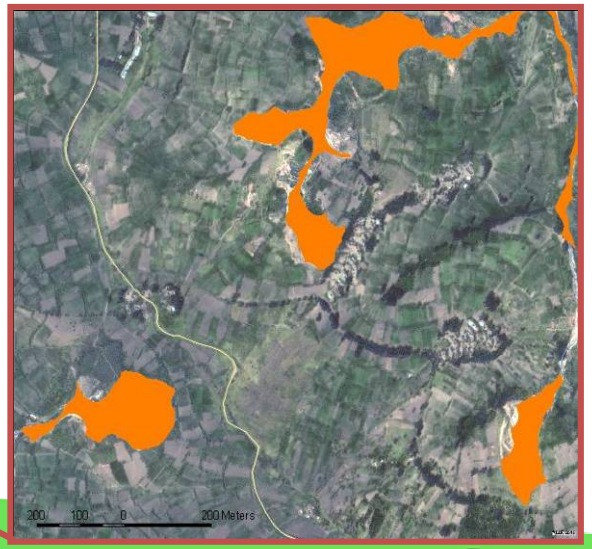
Artisanal gold mining in DR Congo
Credits: BICC/A. Täubert

SERVICES FOR SECURITY APPLICATIONS COPERNICUS

EXAMPLE: MINING MAP

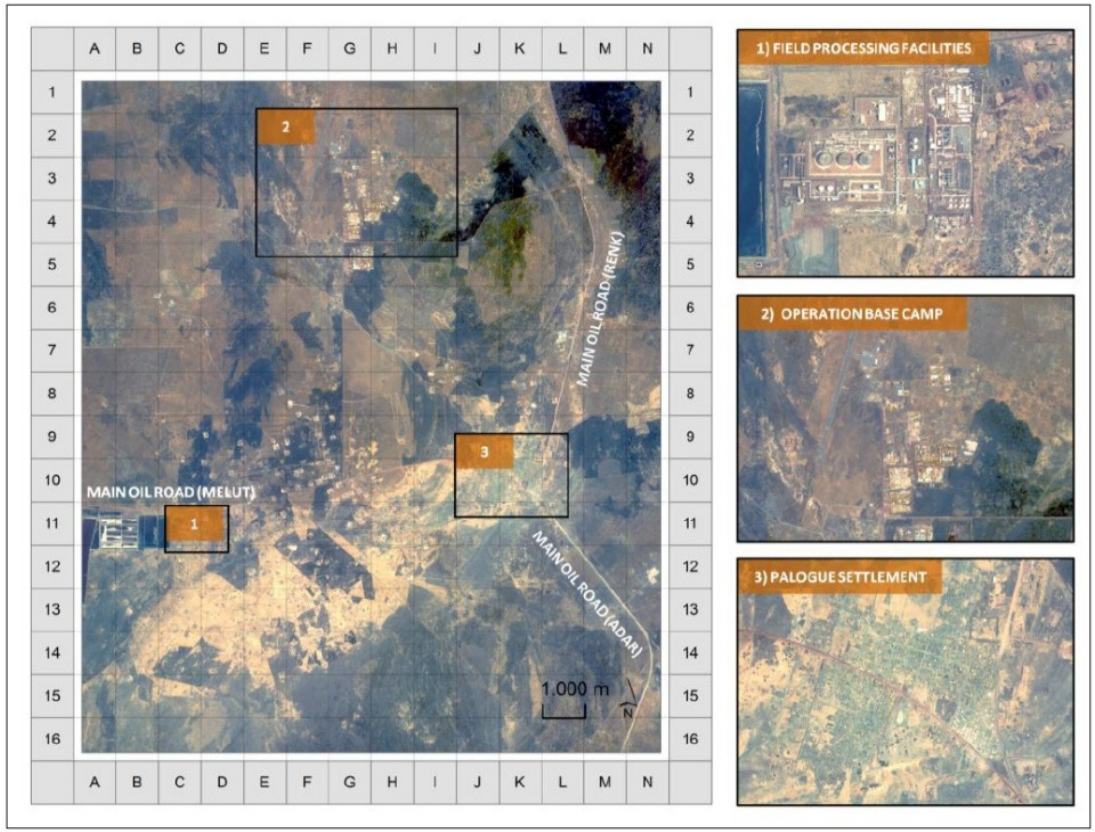
The **mining map** shows the mining sites in the area of interest detected by semi-automatic and visual interpretation of satellite imagery. Additional information on the transportation network and rivers as well as population features may also be captured.





Example of mining map. Source: G-MOSAIC (DLR)

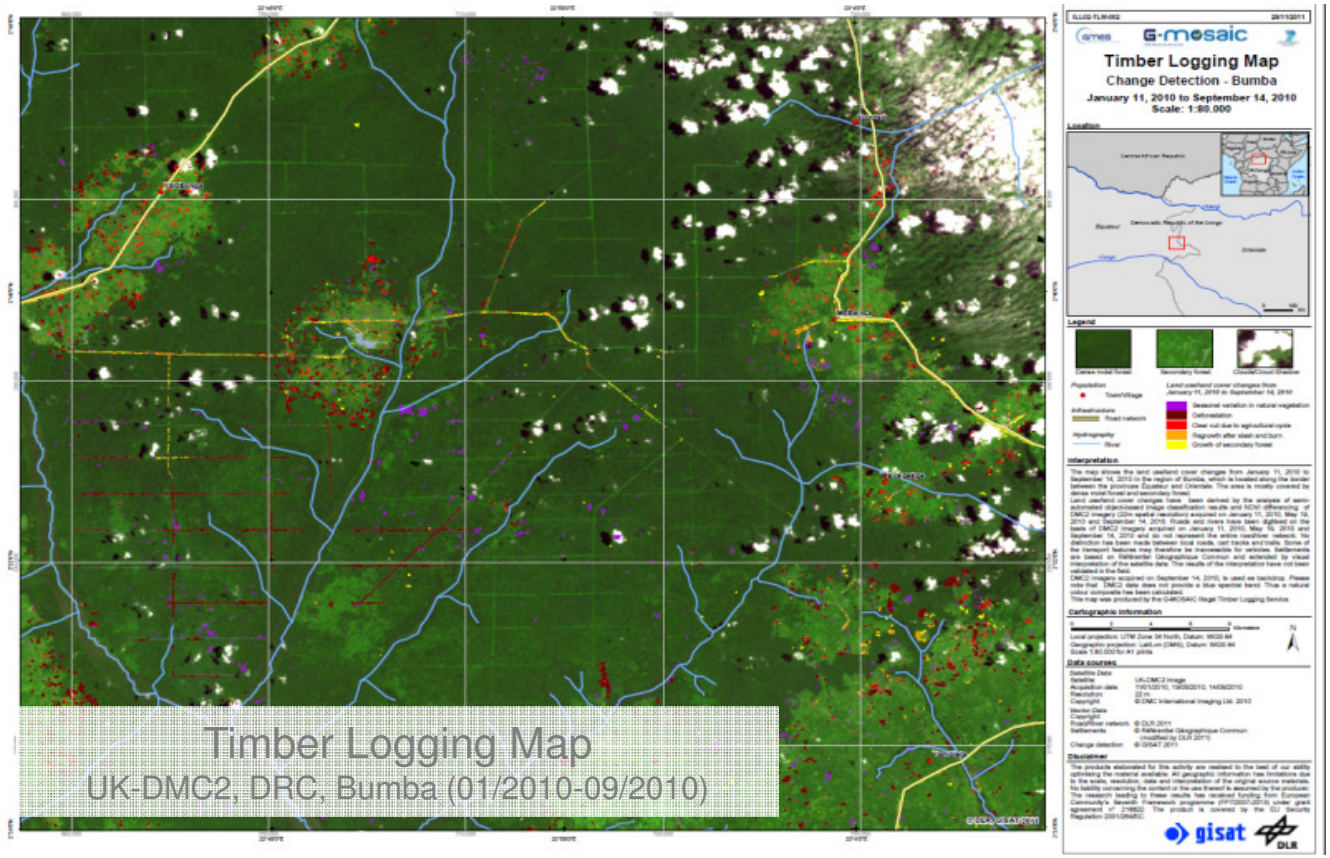
EXAMPLE: OIL FIELD MAP



Oil field overview. Source: F. Selg (2013), unpublished Master Thesis

The oil field map shows oil fields and their infrastructure (wells) in the area of interest detected by semi-automatic and visual interpretation of satellite imagery. Additional information on the transportation network and rivers as well as population features may also be captured.

EXAMPLE: TIMBER LOGGING MAP



Example of mining map. Source: G-MOSAIC (DLR)

Timber Logging in the Democratic Republic of Congo:

Industrial selective logging - Priority reform agenda in 2002 promoting sustainable forest management, however illegal logging remains a significant concern

- **Large-scale shifting cultivation** (*slash and burn*) - subsistence activities on a local level by people (agricultural expansion)

GAFAG

symin

system for monitoring law enforcement of informal mining

Out of Europe Timely Situation Awareness for Law Enforcement and Intelligence Application

2013

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Overview:

- Partners:
  - Lead GAF, Germany
  - German Aerospace Center, Germany
  - Institute for Environmental Security, Netherlands
  - Bonn International Center for Conversion

- Funding: ESA/ESRIN

Potential End Users Worldwide:

- Geological Surveys
- Ministries of Mines
- Environmental Protection Agencies

Background:

- Artisanal and Small Scale Mining (ASM) worldwide activity; 13 mio actively engaged, 80-100 mio dependent on ASM
- Small operations in remote areas
- High impact on the enviroment
- Much of actual economic impact lost due to
  - Missing legal and fiscal framework
  - Poor mining, processing and marketing
  - Miners exposed to serious health risks

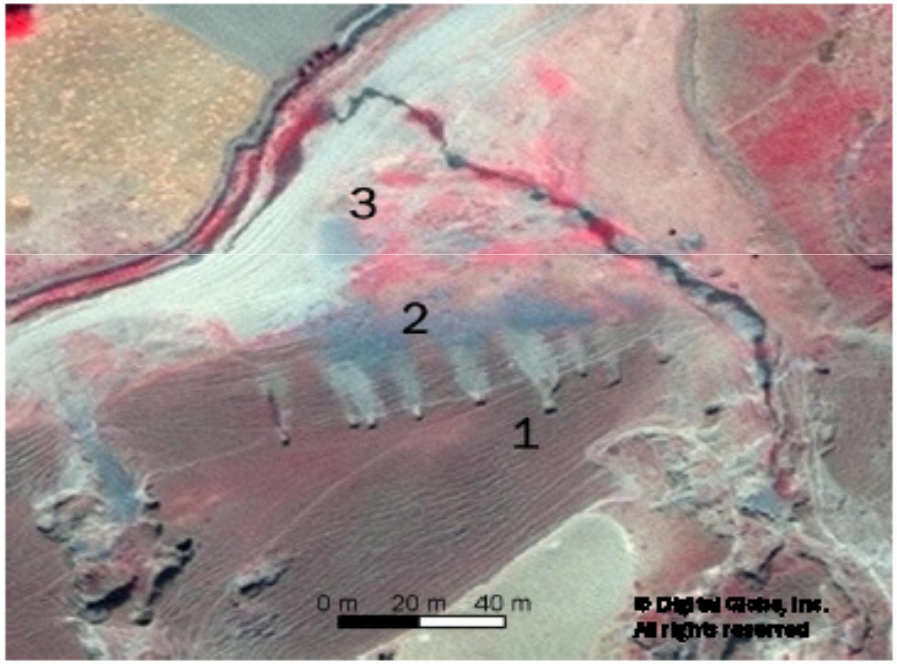
Goals:

- Detecting ASM activities with Earth Observation data and Remote Sensing Methods
- Preparation of:
  1. Map products providing information on:
     - Mining activities and development
     - Basic geo-information (e.g. infrastructure, hydrology, population)
  2. User dossiers:
     - Providing a better understanding of satellite data interpretation
     - Showing potential applications/use of products and analysis results
- Enabling end users to
  1. Monitor and inspect technical, environmental and social compliance
  2. Assist Miners through training
  3. Prevent smuggling of raw materials

Approach:

- Very High Resolution (VHR) imagery, to detect mining operations
- Stereo imagery, to estimate material extracted
- Ancilliary data, e.g. topographic and/or geological enhancing the EO Data
- Radar Coherence enabling to distinguish between:
  - Active and non-active operations
  - Possible transportation routes
  - Informal border crossings
- Multitemporal approach shows development of the area

Artisanal Placer Gold Mining

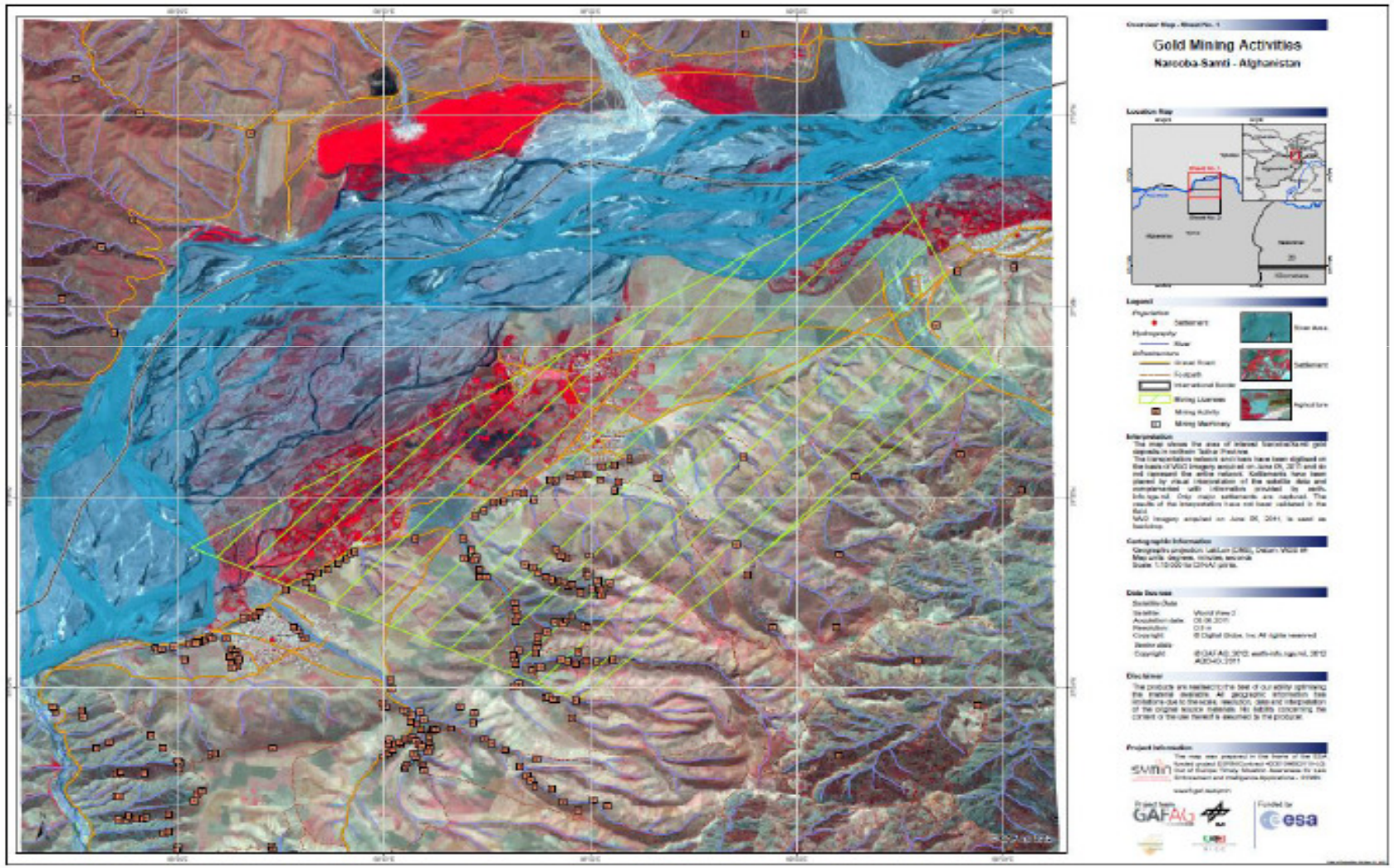


1. Diggings
2. Tailing cones
3. Road, vehicle tracks

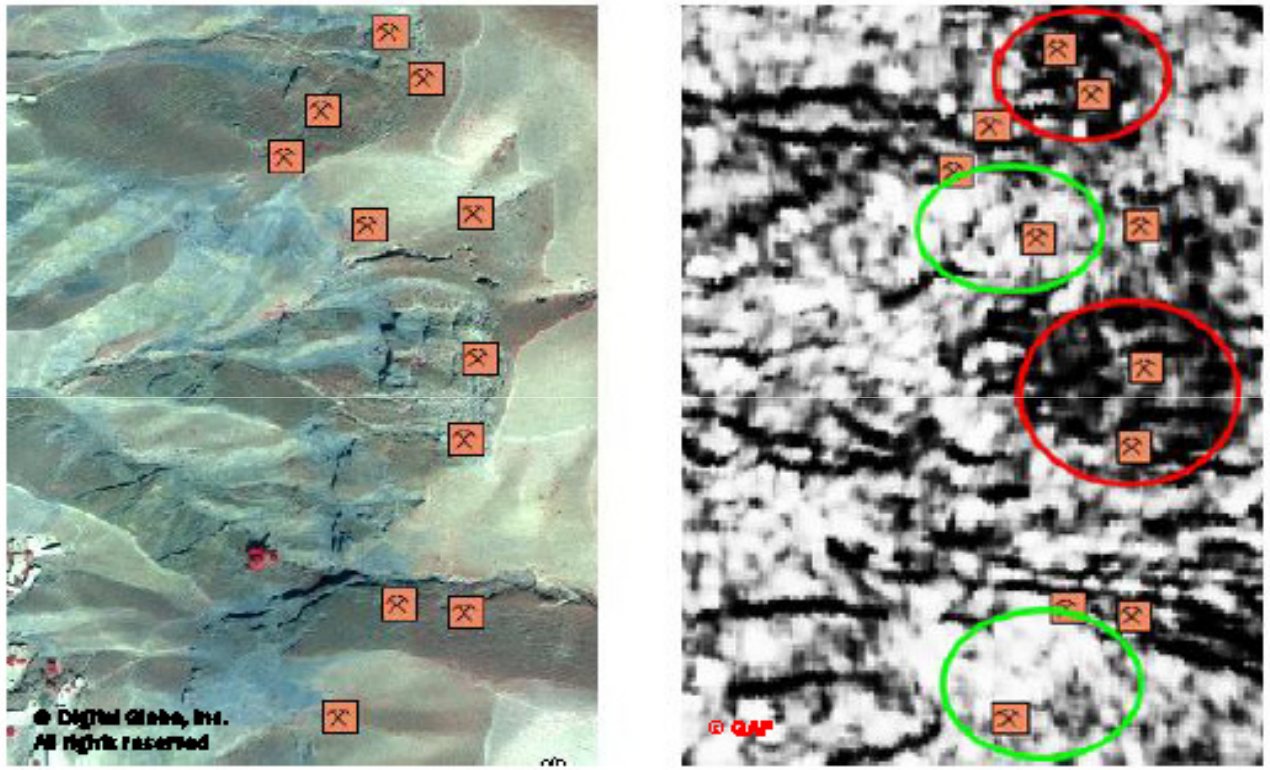
Diggings and tailings cones as seen in the field

Small Scale Placer Gold Mining

Example of a finalized Map:

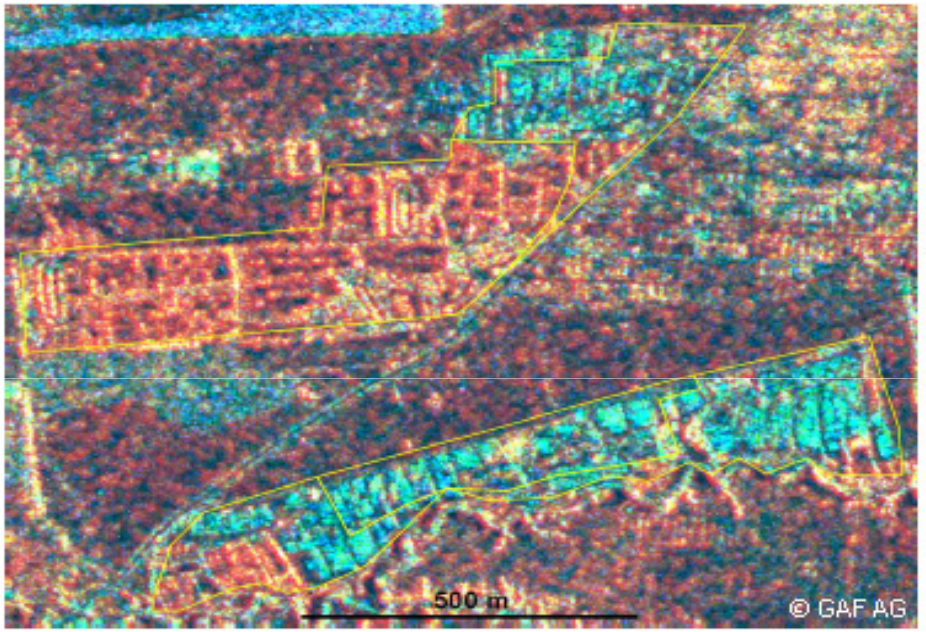


ASM Gold Diggings



The VHR image (left) shows ASM activities east of Sah-i-Mastan village (lower left corner of the image). The single band coherence image (right) shows the same detail. Dark areas (red circles) indicate activity and light areas (green circles) indicate inactivity during the observation period. Subparallel black streaks result from topographic errors. Scale 1:5000

Example 2



Left: Cartosat-1 IRS-P5 orthoimage (acquisition date: 24.05.2010) shows areas of clay brick production in northern Kabul. The yellow outlines delineate areas with clay pits and kilns. Right: coherence-combination image of the same scene with the same yellow outlines. Blue areas within the outlines show activity within the acquisition interval (04. and 20.06.2012). Areas of high activity can be distinguished from areas of low to absent activity (red colors).

www3.gaf.de/symin/