

ESA Space Capabilities for Space Security

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Purpose of ESA



Article 2 of ESA Convention

“To provide for and promote, for exclusively peaceful purposes, cooperation among European states in **space research** and **technology** and their **space applications**.”

- a) *by **elaborating and implementing a long-term European space policy**, by recommending space objectives to the Member States, and by concerting the policies of the Member States with respect to other national and international organisations and institutions;*
- b) *by **elaborating and implementing activities and programmes in the space field**;*
- c) *by **coordinating the European space programme and national programmes**, and by integrating the latter progressively and as completely as possible into the European space programme, in particular as regards the development of applications satellites;*
- d) *by **elaborating and implementing the industrial policy** appropriate to its programme and by recommending a coherent industrial policy to the Member States.”*

ESA And Space Security and Defence

- ***“Exclusively peaceful purposes”***. In line with the generally accepted legal interpretation of the UN Charter and Article IV of the UN Outer Space Treaty, the term of ‘peaceful purposes’ is meant to cover all non-aggressive activities. Any cooperation on space activities among European States for exclusively peaceful purposes, as defined above, is then within the mandate of ESA.
- ESA Long Term Plan (LTP) 2007-2016 included security activities in particular in EO, TELECOM, NAV, IAP and SSA.
- The Agency has set up a comprehensive regulatory framework in order to be able to cope with security-related requirements.
- Main features include the Security Agreement and Security Regulations and implementing procedures and facilities. This entails the capability to receive, store, and produce ESA classified information and exchange classified information with third parties such as the EU Council (supported by dedicated Security Agreements).
- Relevant activities led by the ESA Security Office are regularly reported to the ESA Security Committee and Council.

Space for Security and Defence in Europe

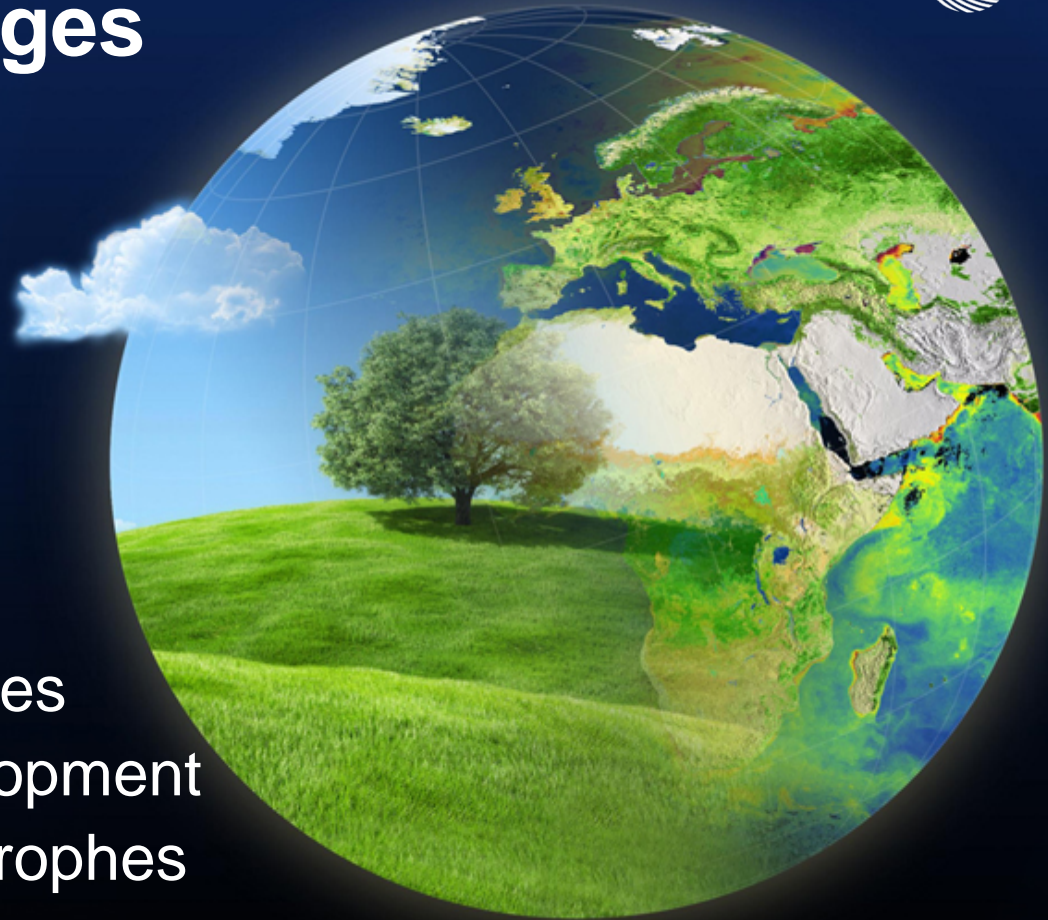
- In 2007, **4th Space Council** on a joint resolution on ESP the “**European Space Policy**” there is reference to “*meet Europe’s security and defence needs*” and “*secure access to technologies, systems and capabilities for independence and cooperation*”.
- In 2008, **5th Space Council** on “**Taking forward the European Space Policy**” there is reference to the need to “define the way and means to improve the coordination between civilian and defense space programmes in long-term arrangements”, “develop a capacity to meet European user needs for comprehensive situational awareness of the space environment through a coordinated activity within Europe, and possibly with other partners”, “recognise Europe’s dependence on overseas suppliers for selected critical space technologies and components, establish mitigation strategies to ensure guaranteed European access, and take practical steps to pursue reduction of Europe’s dependence”.

Space for Security and Defence in Europe

- In 2010, the **7th Space Council** on “**Global Challenges: talking full benefit of European space systems**” in relation to space for security recommends that “consideration should be given on how to meet the specific needs of security policies and the services dedicated notably to maritime surveillance, border control and support for EU external actions;” and in relation to security for space acknowledged “the increasing dependence of the European economy and policies, in particular the Common Foreign and Security Policy, on space assets and the critical nature of space infrastructures for autonomous European decision-making, and the need to define and introduce appropriate measures to monitor and protect these assets, including at the outset of their development. ”

Global Challenges

- climate change
- migration
- mobility
- communication
- energy
- shortage of resources
- demographic development
- conflicts and catastrophes
- health
- ...curiosity



Security and Defence

→ change of global security demands and risks:

- Terrorism Worldwide
- Regional Military Conflicts
- Piracy
- Asymmetric Conflicts
- Cyber-Crime
- Natural and Man Made Disasters
- Migration
- Food Security



Bilateral cooperation

- ESA/EU Framework Agreement (2004, renewed in 2016)
 - Eight Space Councils
 - ESA/EU Security Agreement (2008)
- ESA/EDA Administrative Arrangement (2011)
 - Arrangements on specific projects
 - Security arrangement (2012)

Framework for coordination of research activities

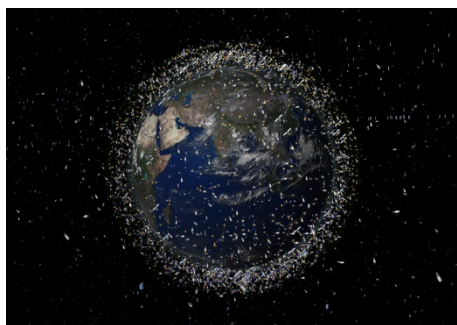
- ESA/EDA/EC “European Framework Cooperation for Defence Civilian Security and Space-related Research” (EFC) (2009)

Security and Defence

- Communication
- Observation
- Navigation (Galileo PRS...)
- Electronic Intelligence
- Space Traffic Management
- Air Traffic Monitoring
- Cyber-Security
- ...

ESA: active role in building Europe's space capabilities in security and defence

in Space



Space Traffic Management

from Space



Maritime



Border Control



Food

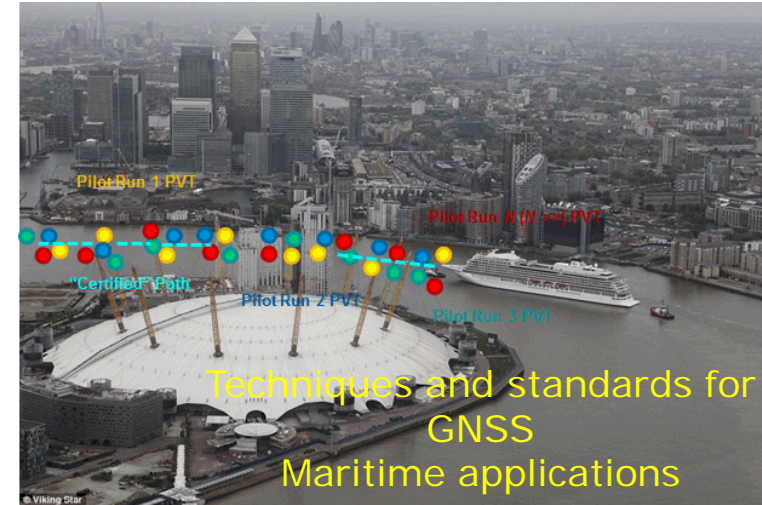
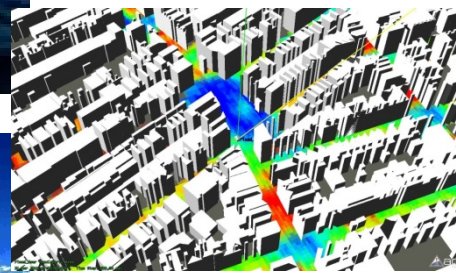


Disaster Management

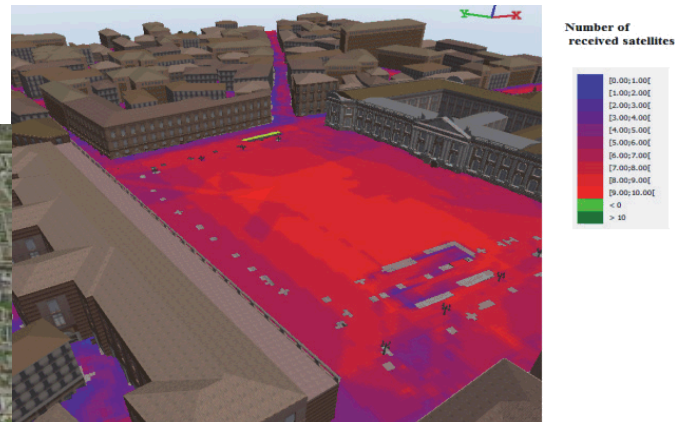
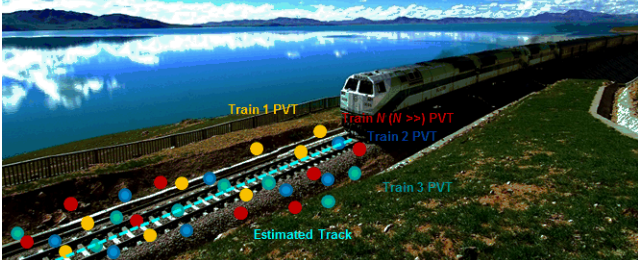


Migration

More and more application relying on Space based Positioning GPS, GALILEO



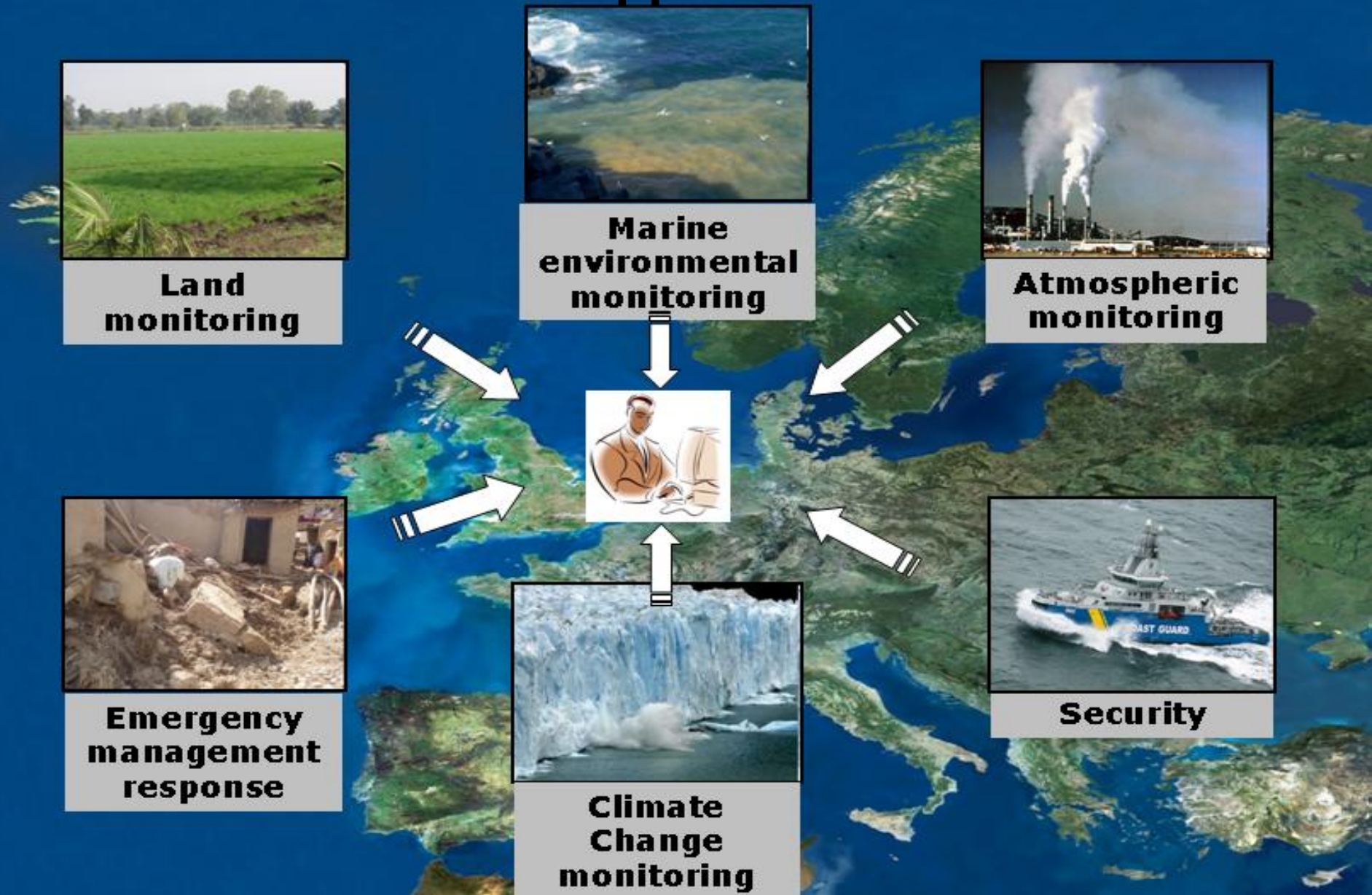
Techniques and standards for GNSS Rail applications



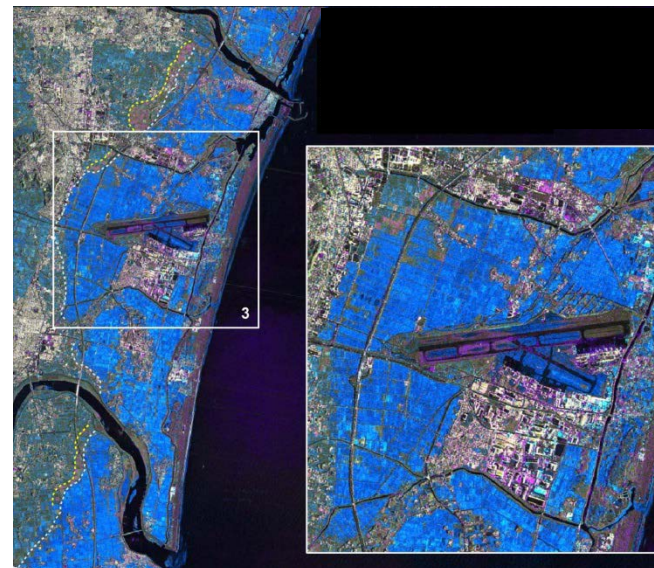
COPERNICUS



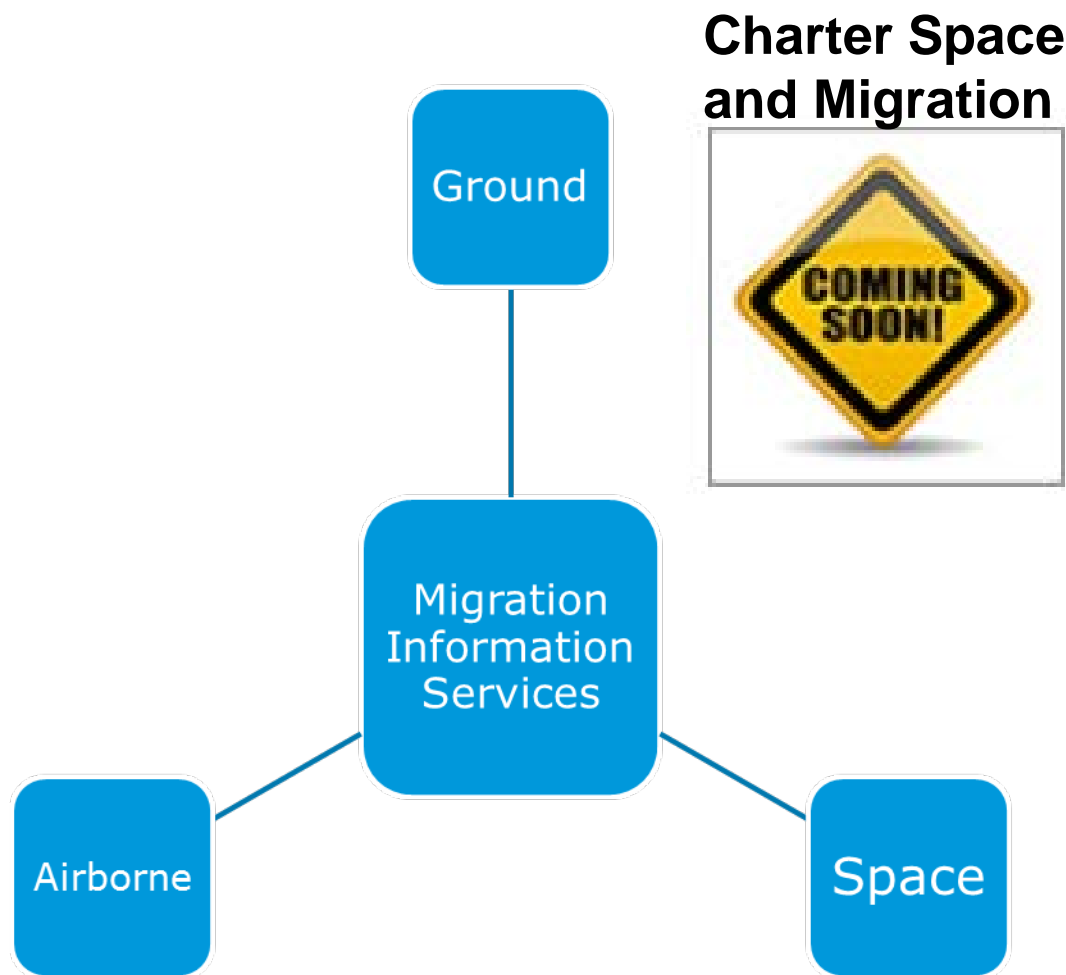
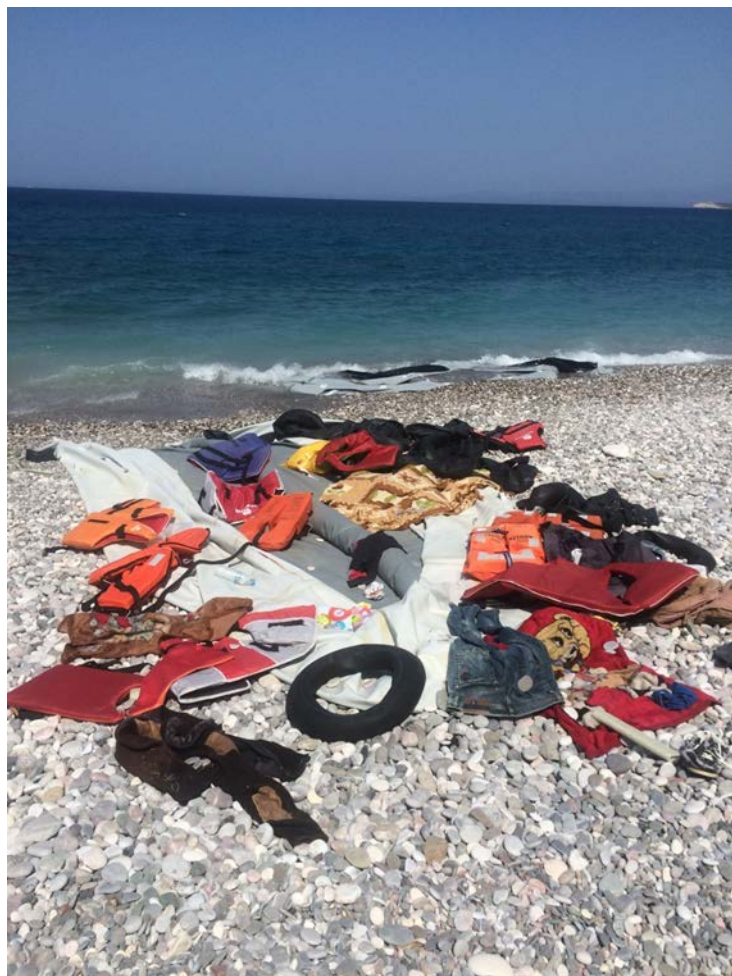
Service domains and applications



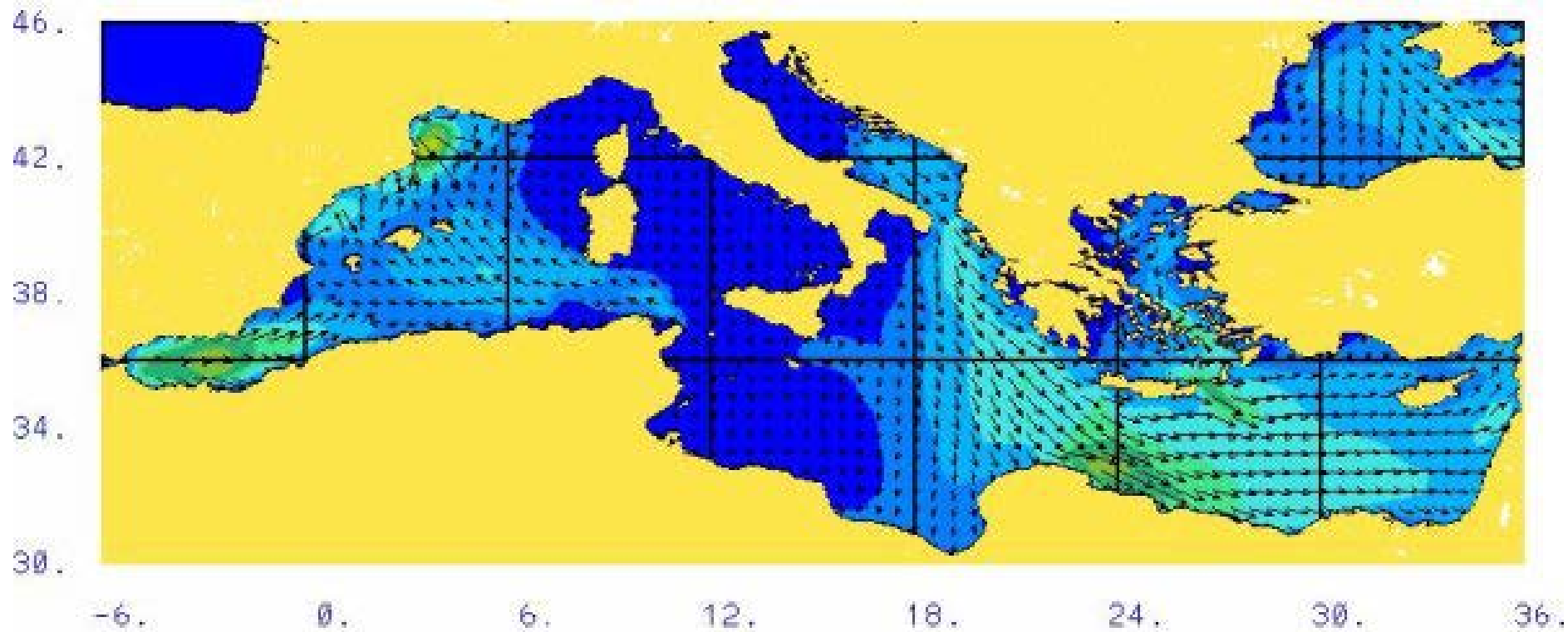
International Charter Space and Major Disasters



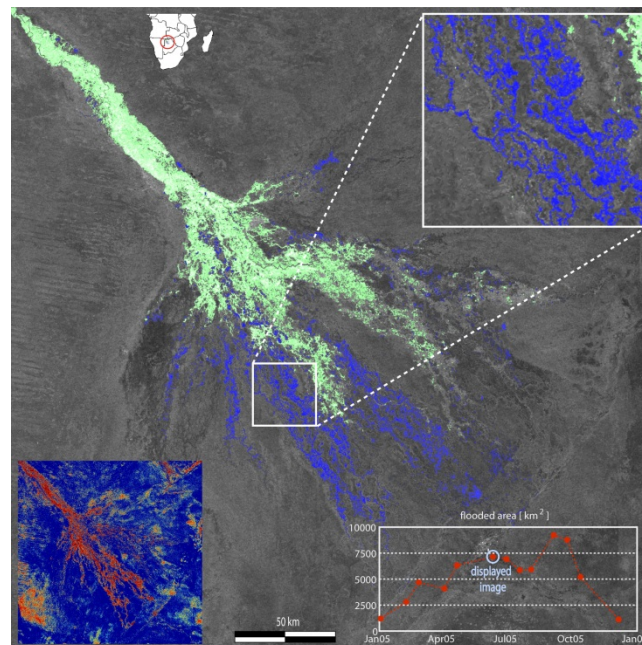
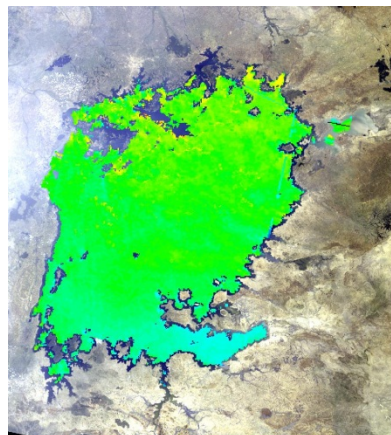
Space and migration



Meteorological information

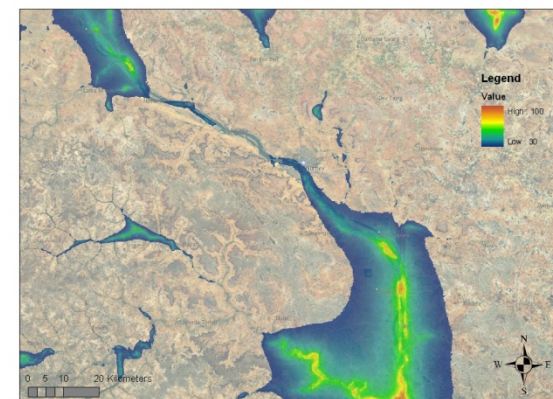


Development Policy: Water Monitoring in Africa

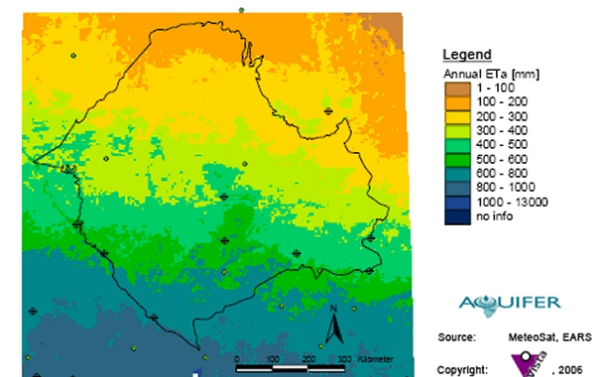


- Water supply
- Water quality
- Water surface temperature
- Water balance, precipitation, evapotranspiration

WADE: Suitability for Ground Water 2007



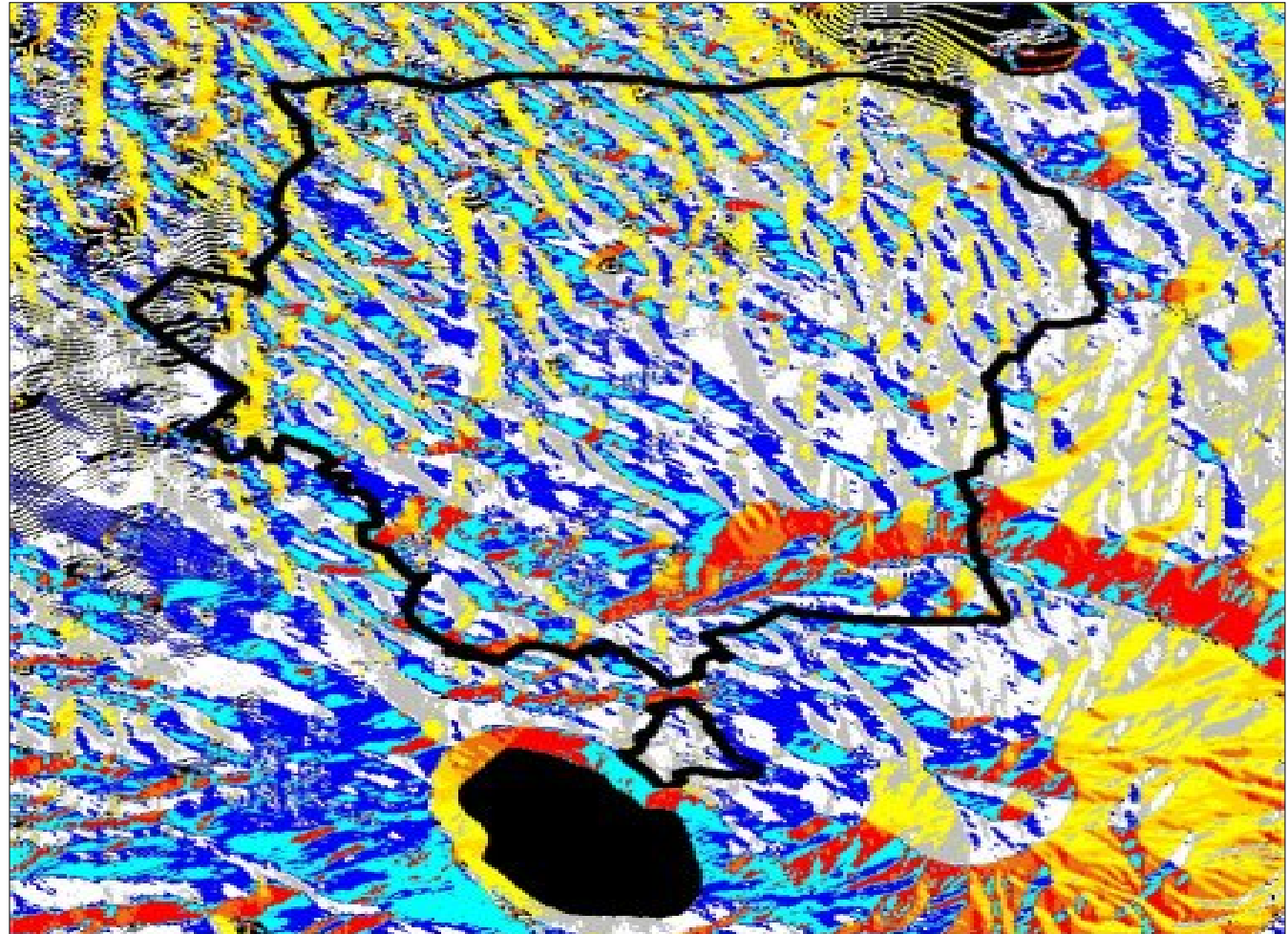
Annual actual evapotranspiration ETa map for SAI for the year 2005



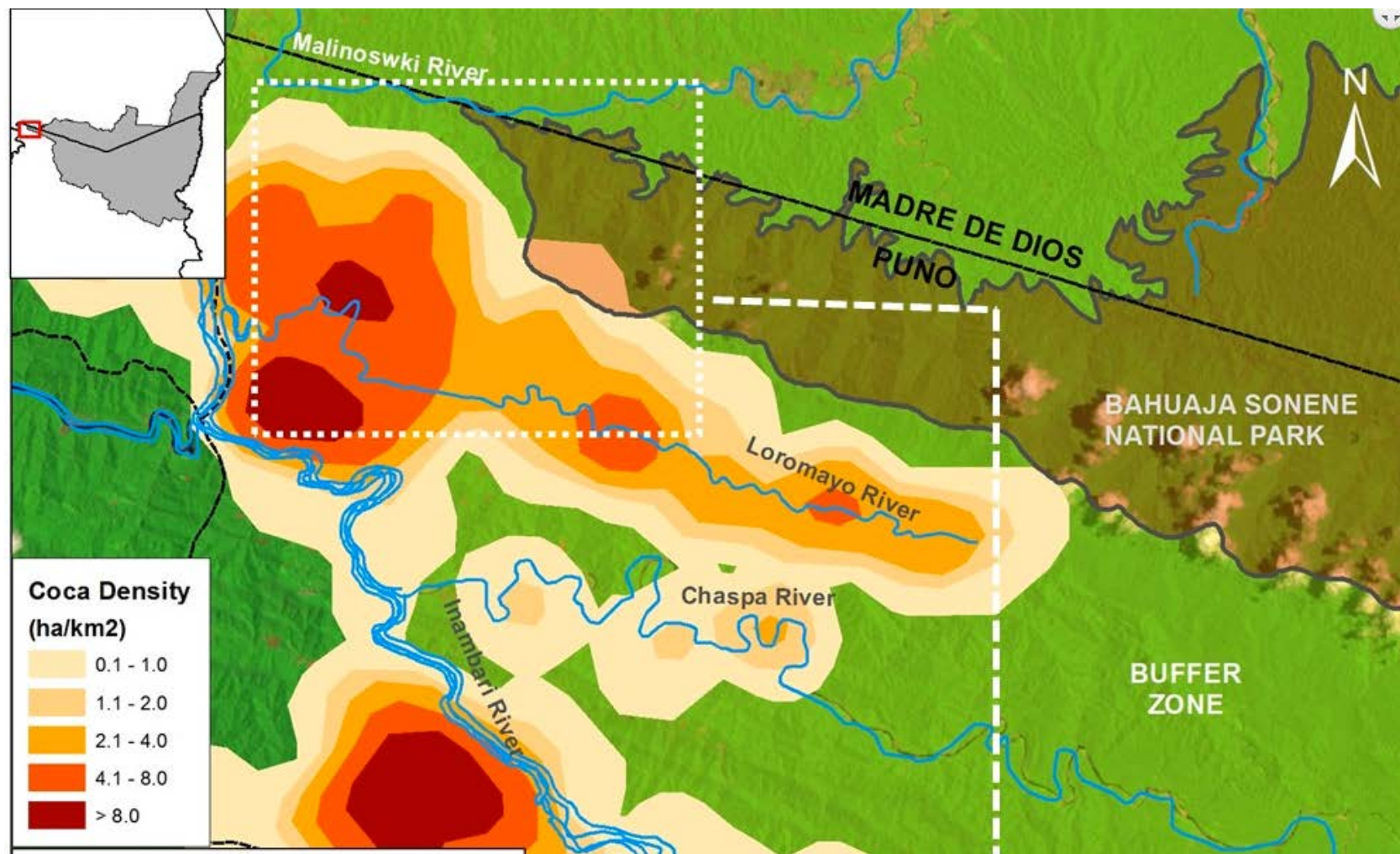
Resources

This satellite-derived image shows local slope face direction, overlaid with the limits of the Frascati Denominazione d'Origine Controllata. The 'hottest' reddish colours face the most south, and therefore get more Sun exposure, while 'cooler' colours face towards the north. Such information could be imported into the proposed Bacchus geographical information system to permit vinegrowers to estimate optimal sites to cultivate particular grape species.

Photo: ESA



ILLICIT CROP GROWTH DETECTION



REGIONAL DEVELOPMENT- LEGAL/ILLEGAL



Aerial photo 1975



Aerial photo 1980

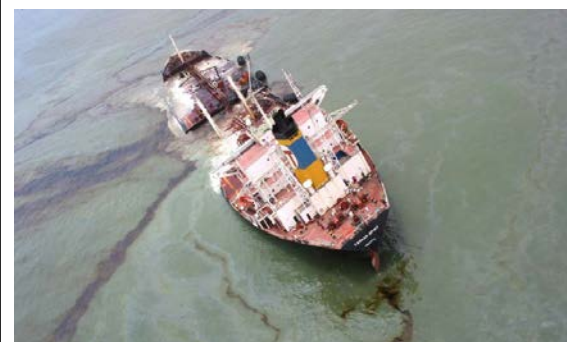
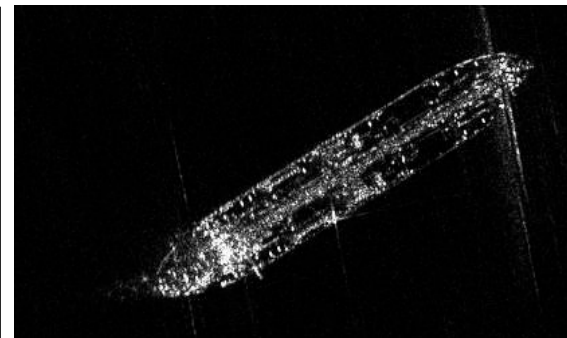
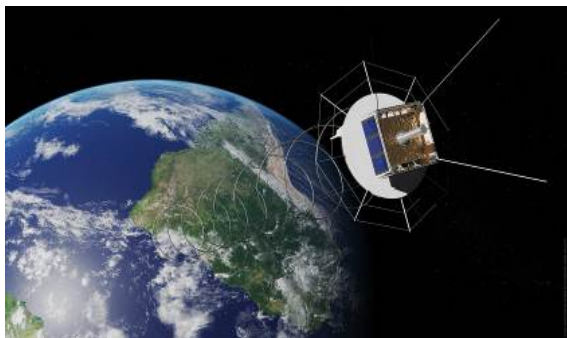


Aerial photo 1989

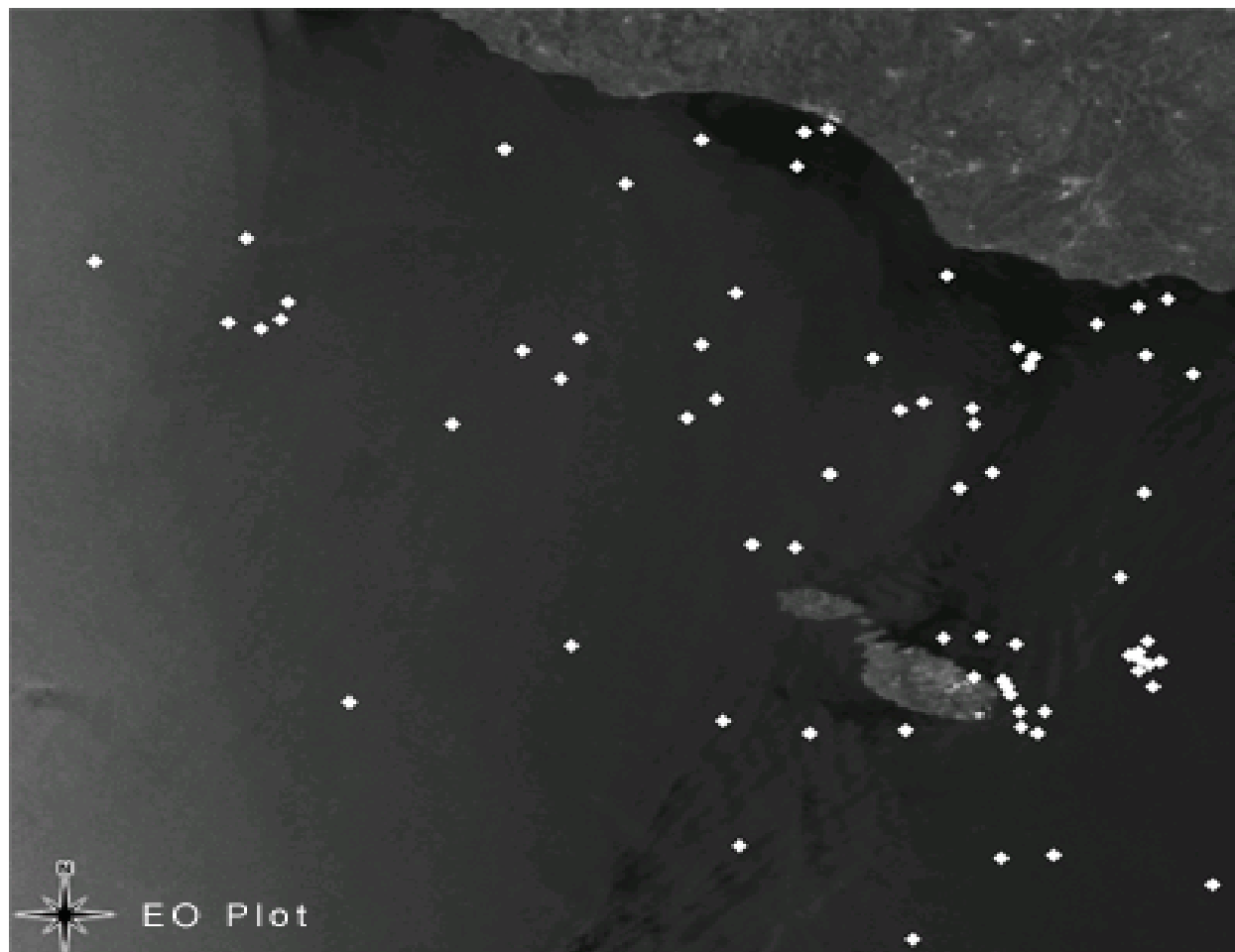


Satellite IKONOS 2001

Maritime Security



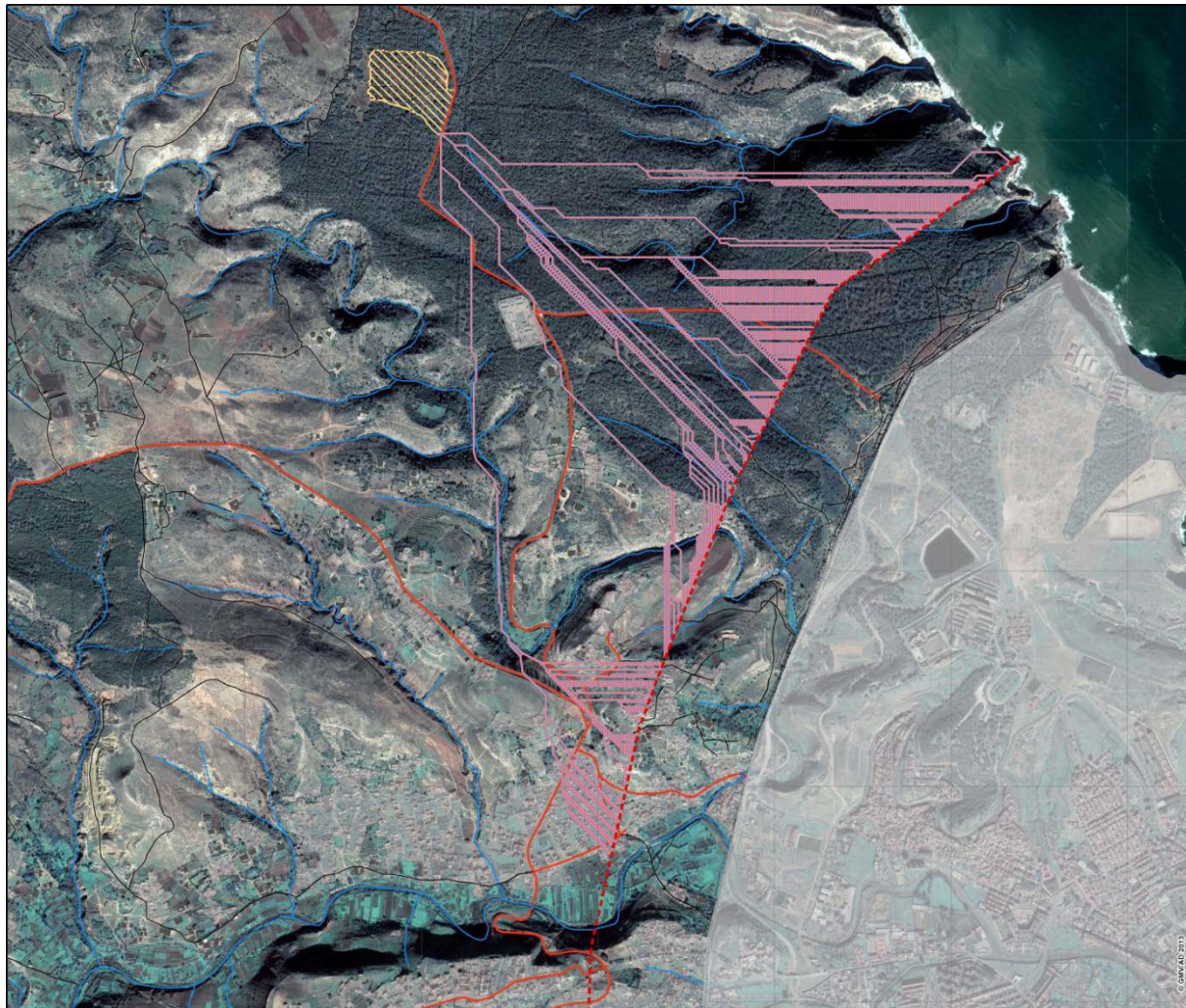
Vessel detection and monitoring



The white dots in the animation are all of the vessels detected by the SAR instrument aboard ERS-2. Green dots represent vessels equipped with a transponder and identified by the Automatic Identification System (AIS). (Green circles represent the vessel location, while green lines represent the track of the vessel). Red dots are unidentified, potentially suspect vessels.

Photo: Telespazio Spa

CHARACTERISATION OF CROSS-BORDER TRAFFICKING ROUTE

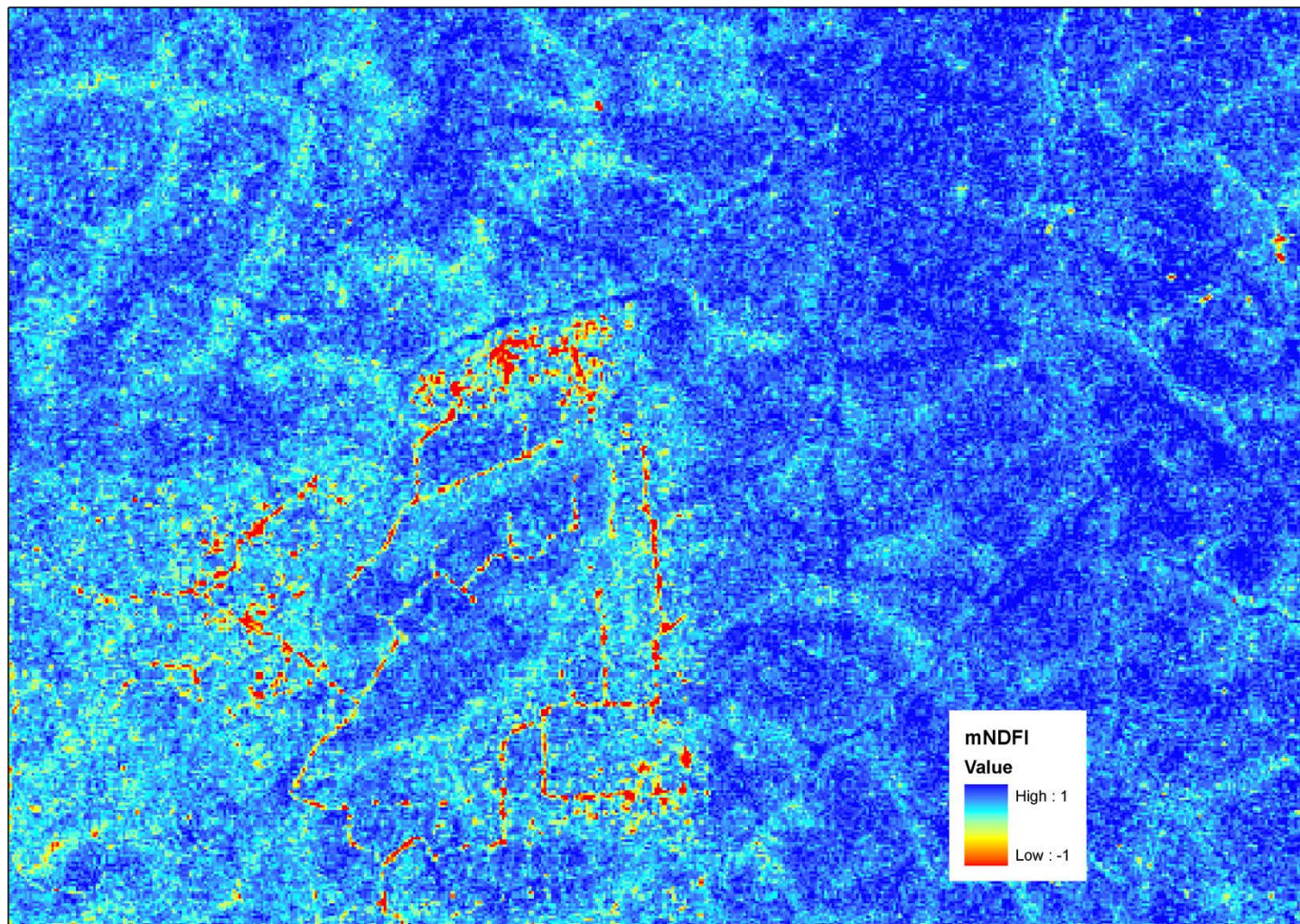


Terrorist/fighter training camp detection



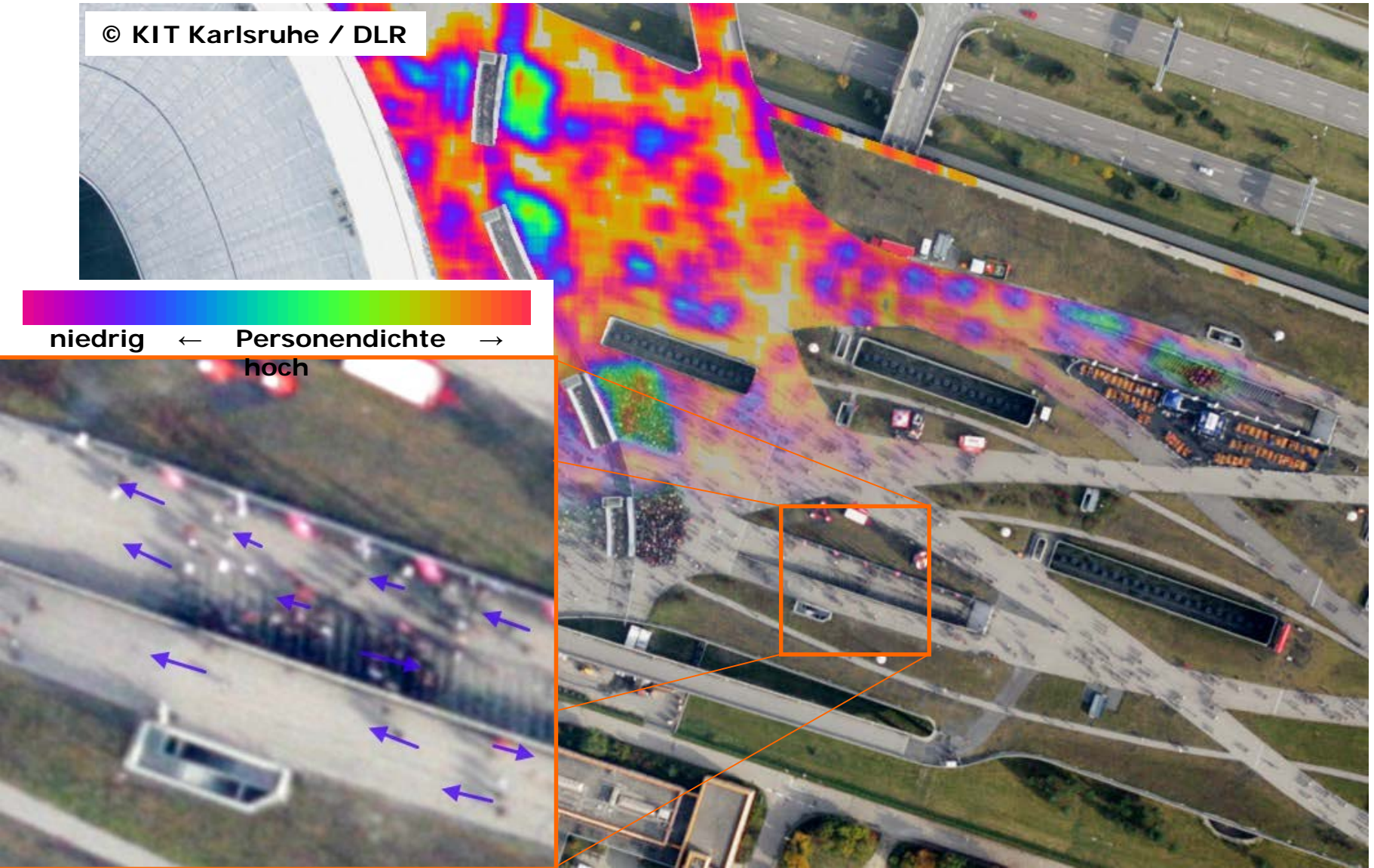


ILLICIT LOGGING DETECTION



Crowd Monitoring

© KIT Karlsruhe / DLR



Security Screening




Digital Barriers





security

Develop a comprehensive European space policy for Europe that:

- a. ESA is the Space Agency of choice to provide decision and policy makers with a space as a tool for decision and policy making for developing, implementing and monitoring sectorial policies including security and defence matters;
- b. reflects the dual use of space technology and applications in ESA programmes;
- c. provides its infrastructure as appropriate for security-related space R&D developments and activities;
- d. ensures European non-dependence in critical technologies, infrastructure and applications;
- e. supports the secure operations and service of space activities.

The main policy outcomes expected are:

- elaboration and implementation of a long-term space security policy, though exchanging with Member States as well as national, international organisations and institutions
- elaboration and implementation of activities and programmes in the space security field
- create an appropriate framework for regular exchange on national, European and international needs on space security
- improve the understanding of space security risks and dependencies
- ensure the protection of space assets for risks
- ensure the continuation of services and adequacy of infrastructures
- enhance the resilience of essential services from threats (e.g. cybersecurity)
- support decision and policy makers on the use of space as a tool for security policies on Earth.



security