

Space and Security

An Evolving Commitment

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0 – ESA

I – The European Space Policy

- ESA-EU cooperation adding a new dimension to European space
- Strategic objectives in support of Europe's global role in space
- Security highlights and related key issues in the European Space Policy

II – ESA security related programs and initiatives

- GMES
- Galileo
- EDRS
- Space Situational Awareness
- the Gianus concept

III Candidate topics for ESA contributions to EFC

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



- **Article 2 of
ESA Convention**

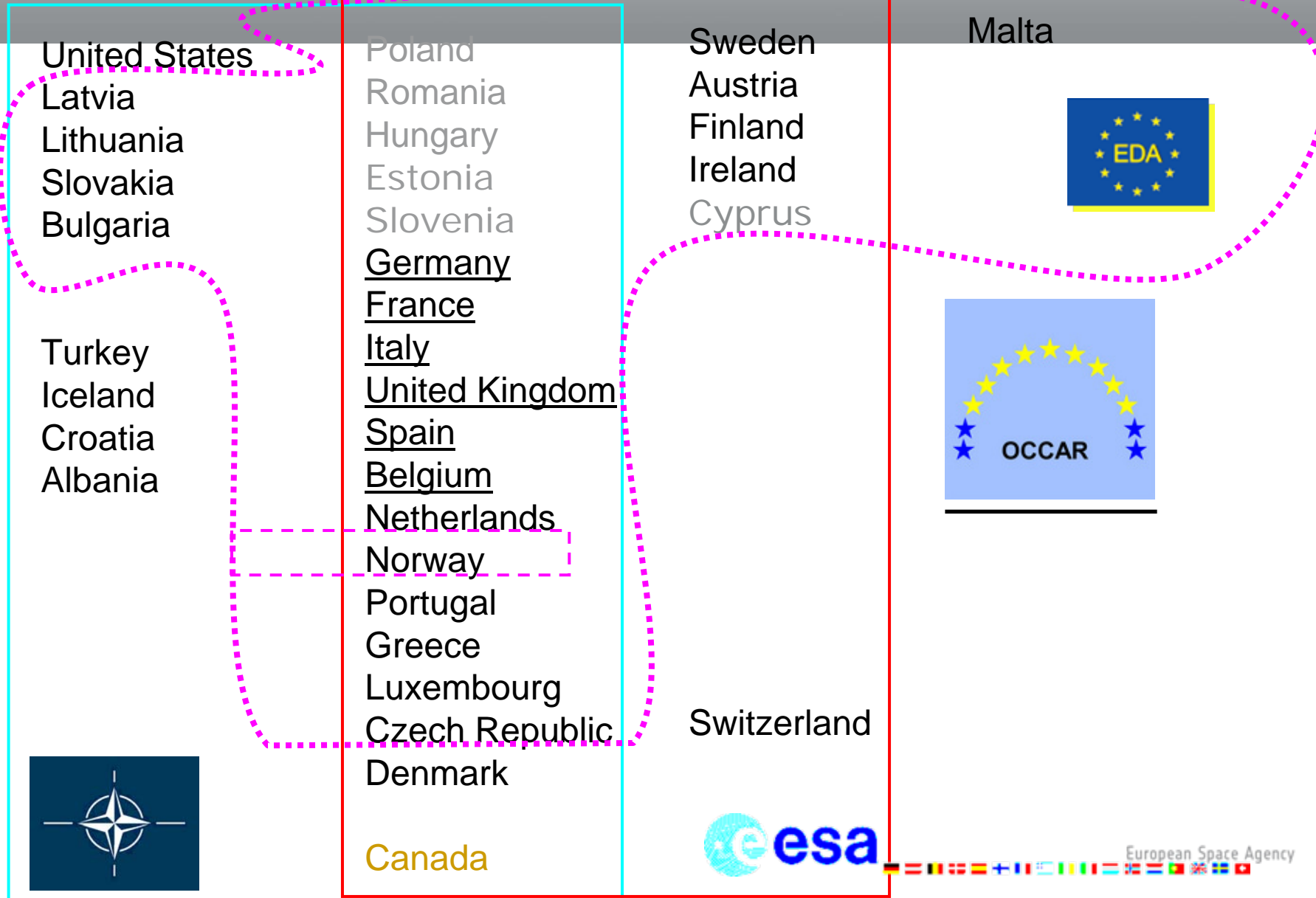
ESA FACTS AND FIGURES



- **Over 30 years of experience**
- **18 Member States**
- **Five establishments, about 2000 staff**
- **3 600 million Euro annual budget (2009)**
- **Over 60 satellites designed and tested**
- **Five types of launcher developed**



ESA – NATO – EDA member states



Strategic objectives of space for Europe:

- develop space applications to serve Europe's public policies, enterprises and citizens;
- meet Europe's security and defense needs;
- foster competitive and innovative industries;
- contribute to the knowledge-based society;
- secure access to technologies, systems and capabilities for independence and cooperation.

In May 2007, 29 European countries (17 Member States of ESA and 27 Member States of the EU) adopted a Resolution on the **European Space Policy**, adding a new dimension to European space activities.



- The Structured Dialogue among European stakeholders – stemming from the 2007 and 2008 Space Councils – sets our policy cooperation framework.

- Objectives include need to:
 - Improve coordination civil/defence
 - Develop SSA in a European context
 - Reduce dependence on non-European critical space technologies

- Nature of ESA:
 - The Convention does not say that ESA is exclusively a civil agency
 - The convention provides that activities must be for “peaceful purposes”, interpreted in the light of international space law as non-aggressive
 - The only element making ESA de facto civil is the source of its funding, today entirely civil*; military funding not being excluded, and technology may serve dual purposes

* The SSA programme benefits of a 4% contribution from the MOD of one MS

ESA areas of involvement



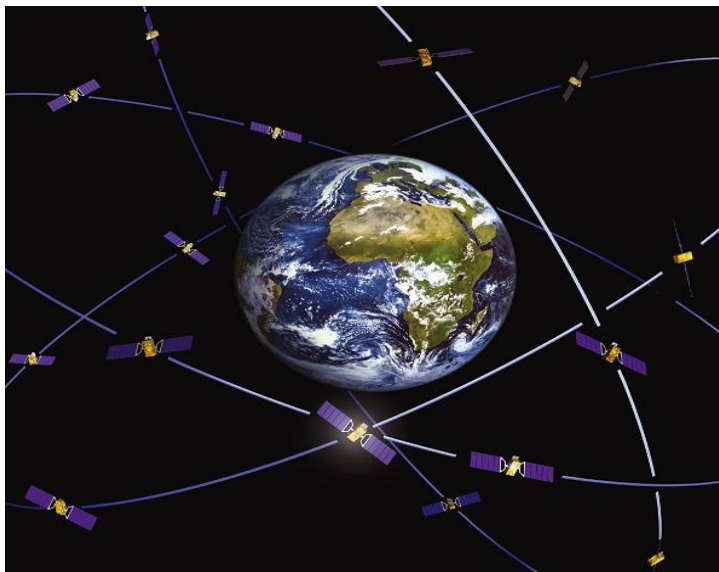
Security on Earth	Maritime surveillance	<ul style="list-style-type: none"> oTransport security (including sensitive cargo and harbours) oEarly warning (natural disaster and detection of illegal trafficking) oProtection of critical infrastructure (protection of shipping routes from piracy/hijack, protection of sea lanes and vessels) oExclusive Economic Zone control (fisheries protection, detection of illegal activities) and sea border surveillance
	Land surveillance	<ul style="list-style-type: none"> oLand border surveillance and associated treaty verification oProtection of critical infrastructures (pipelines, electric power supplies, railways, nuclear plants, etc.), oTransport security (sensitive goods, fleet management) oAdvanced alert (natural disaster)
	Humanitarian crisis support and rescue tasks	<ul style="list-style-type: none"> oDamage assessment oReconstruction planning and monitoring oEarly warning (environmental and health) oRefugee camp monitoring
	Public Safety (incl. Civil Protection)	<ul style="list-style-type: none"> oFire and flooding interventions oIndustrial accidents/Pollution of natural resources oTransport safety oPublic health
	Other Emergent security threats	<ul style="list-style-type: none"> oEnvironmental/climate changes monitoring oSupport to peace keeping operations oProliferation of weapons of mass destruction monitoring oTerrorism and organised crime oMan-induced disaster oBCRNE (Biological, Chemical, Radiological, Nuclear, Explosives.) and environment-dependent communicable diseases oIllegal logging, mining and illicit crop cultivation
Security in space	Space situational awareness	<ul style="list-style-type: none"> oSpace surveillance (including debris) oSpace weather

GMES

Independent capability for global monitoring

Vital information on the global environment

Supporting Europe's needs for security (e.g. disaster monitoring, crisis management)

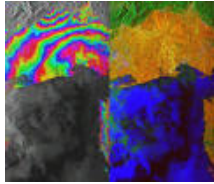


Galileo

The first joint ESA/EU programme , providing independent capability for Positioning, Timing, Navigation services

Significant strategic importance

Civil programme under civilian control



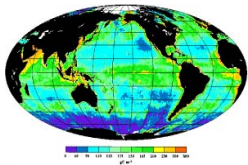
Sentinel 1 – SAR imaging

All weather, day/night applications, interferometry



Sentinel 2 – Superspectral imaging

Continuity of Landsat, SPOT & Vegetation-type data



Sentinel 3 – Ocean monitoring

Wide-swath ocean color and surface temperature sensors, altimeter



Sentinel 4 – Geostationary atmospheric

Atmospheric composition monitoring, trans-boundary pollution

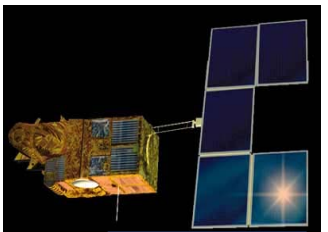
Sentinel 5 – Low-orbit atmospheric

Atmospheric composition monitoring

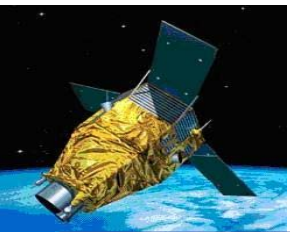
National, Eumetsat and Third Party Missions for GMES (excerpt)



CosmoSkymed



SPOT



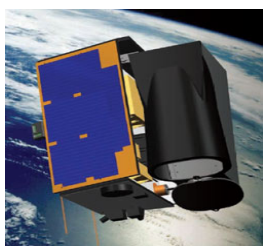
Pleiades



Jason-2



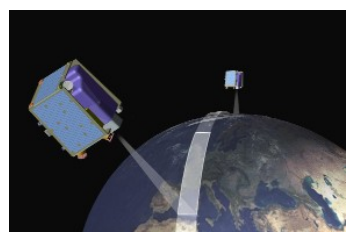
Radarsat



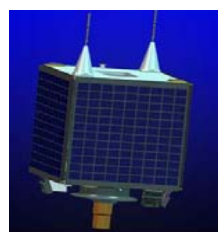
TopSat



Terrasar-X



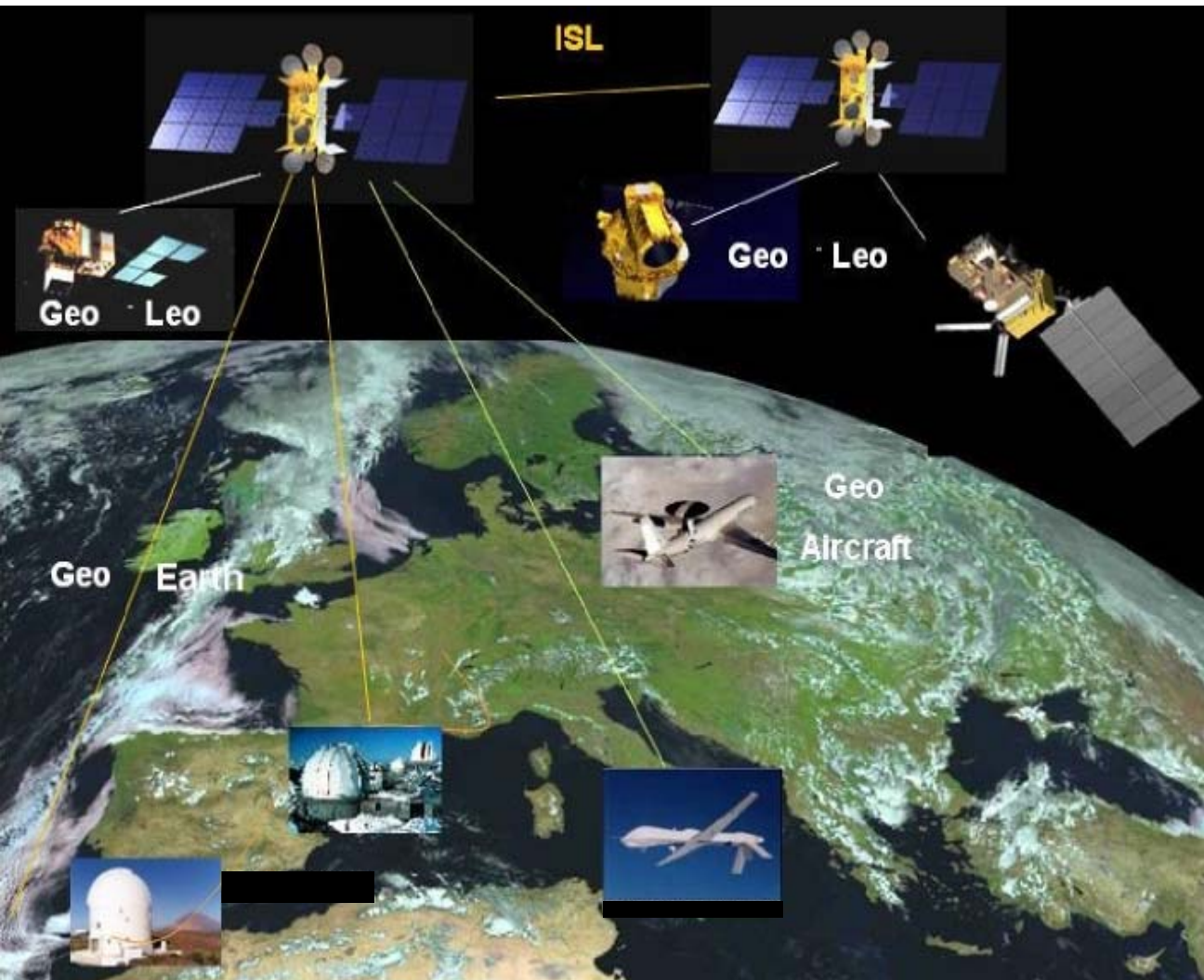
Rapideye



UK-DMC



METOP

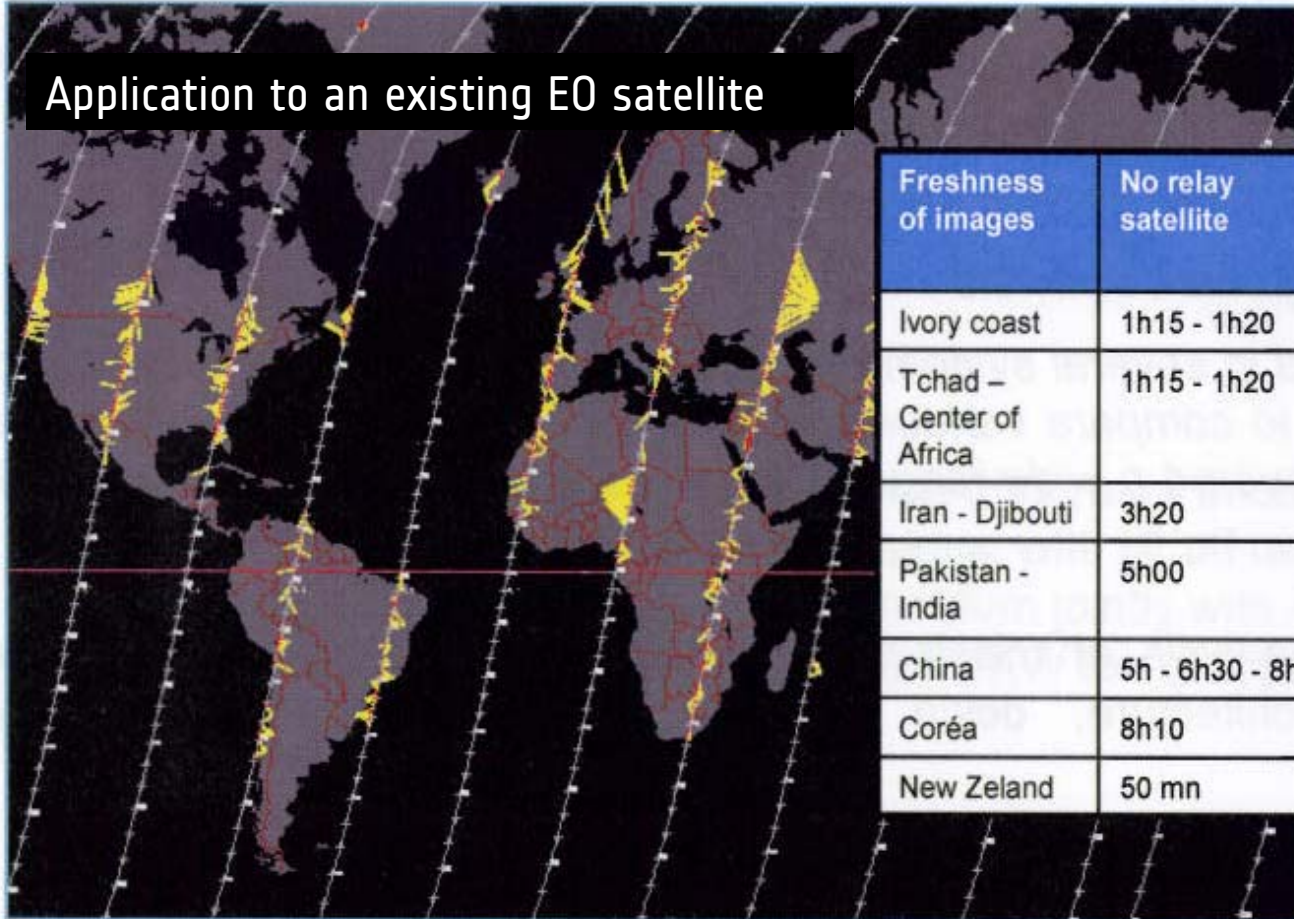


EDRS user focus

- ➔ Satellites
- ➔ Launchers
- ➔ Manned Spacecraft
- ➔ Navigation
- ➔ Aircraft
- ➔ UAVs
- ➔ Vessels

Reduced delays for the availability of Earth Observation images with EDRS

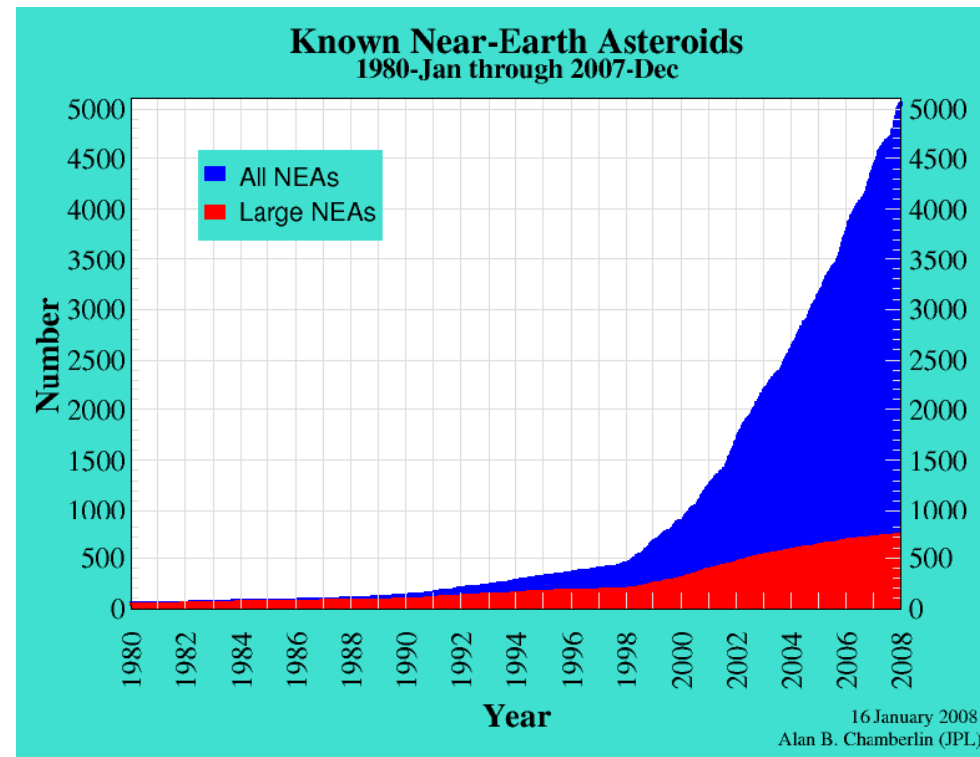
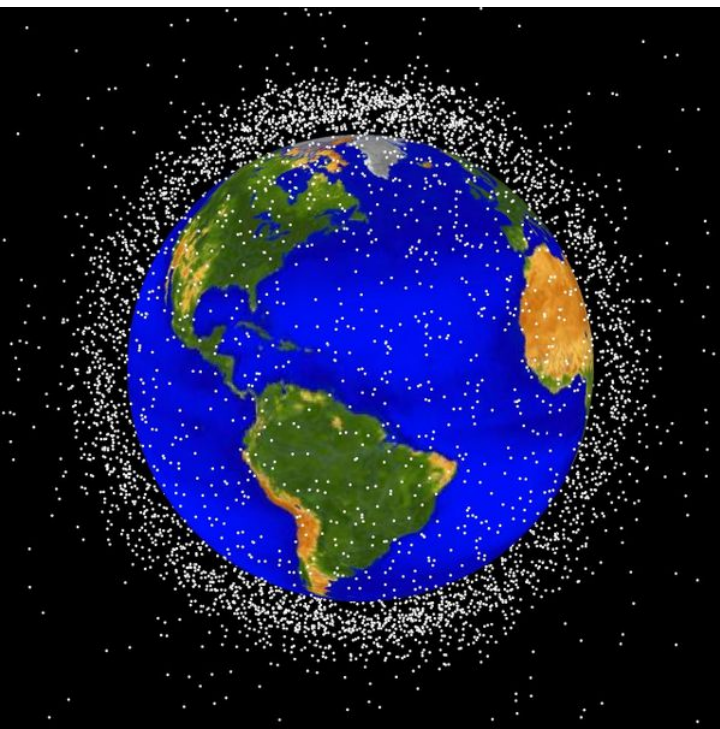
Application to an existing EO satellite



Freshness of images	No relay satellite	With a relay satellite
Ivory coast	1h15 - 1h20	< 5 mn
Tchad – Center of Africa	1h15 - 1h20	10 - 15 mn
Iran - Djibouti	3h20	5 - 15 mn
Pakistan - India	5h00	5 - 10 mn
China	5h - 6h30 - 8h10	5 - 15 mn
Coréa	8h10	5 mn
New Zeland	50 mn	10 - 15 mn

The ESA program is articulated around dedicated **Projects** :

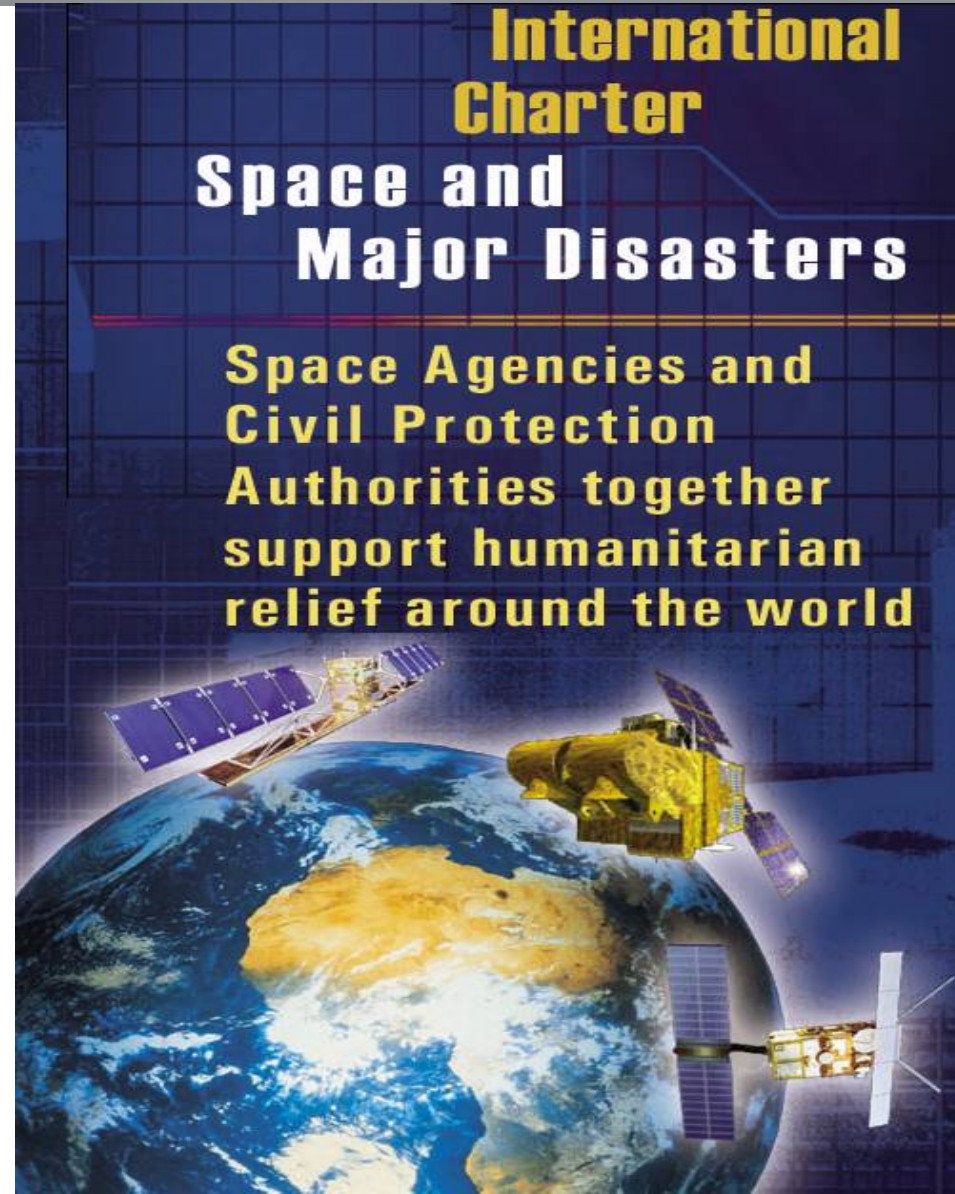
- Survey and Tracking
- Space weather
- Near Earth Objects (NEO)
- Networking and Data Centre



The International Charter aims at providing a unified system of space data acquisition and delivery to those affected by natural or man-made disasters through Authorized Users.

Each member agency has committed resources to support the provisions of the Charter and thus is helping to mitigate the effects of disasters on human life and property.

ESA is a founding member of the Charter, which has been in operation since 2000 and which has been activated more than 200 times.



Space for Crisis Response Analysis (1/2)



- A variety of space-based security services are available to European security actors but the majority are not under European control
 - ⇒ **Demand for guaranteed European access to data**
- Existing/currently planned European space-based security services are usually developed in a monothematic framework (e.g. Earth Observation, telecommunications or navigation)
- Even if existing or currently planned programmes could progressively evolve to serve multi-sectoral applications, a large margin for improvement remains with respect to the potential effectiveness of an approach truly integrated from the *early conceptual phase*.
 - ⇒ **Demand for a more integrated approach**

Space for Crisis Response Analysis (2/2)



- Based on European existing and available resources, a capability gap exists.¹
- More responsive services are needed, in particular during the crisis response phase.

⇒ **Demand for more responsiveness**

The Contribution of Space

To provide European and national security actors with a comprehensive set of space-based services for their missions within and outside EU borders, focusing on support to crisis response with the objective to bring the right information and services to the right people when they need it

⇒ **Space can fulfill an important set of user needs**

[1] See e.g. presentations by EUSC, French Civil Protection, EU Military Staff and UNOSAT at the “Space and Security” Workshop, jointly organised by EC, EDA and ESA, 16 September 2009, Brussels; PIRASAT project conclusions; LIMES project conclusions; ESRIF report.

Towards a European Integrated Approach to Crisis Response



- ESA has begun to reflect on a European integrated space architecture able to support the management of European operations, providing better responsiveness during the crisis response phase
- This architectural concept is based on an integrated space solution within a system-of-systems (SoS) configuration (Earth Observation, Telecom, Navigation), based on the subsidiarity principle, complementing the available infrastructures and services, preparing the relevant enabling technologies, while moving towards future European infrastructures and services

Users

- EU institutions, services and agencies active in these domains include: EEAS SitCen, EMSA, EuroPol, MIC and EUSC.
- Aimed at satisfying primarily civilian needs collected in existing user fora
- Potentially interested *national* institutions include: Civil Protections, Fire Brigades, Police, Customs, Coast Guards, and officers from Ministries of Defence and Foreign Affairs

CDF (concurrent Design facility) assessment and test case scenario



- The concurrent engineering (<http://www.esa.int/SPECIALS/CDF/index.html>) approach is based on five key elements:
 - a process
 - a multidisciplinary team
 - an integrated design model
 - a facility
 - a software infrastructure
- Independent assessment of architectural options (space infrastructure and service provision) through a concurrent engineering design process
- Based on a first set of requirements that focuses on the provision of a limited set of representative services at two different horizons (2015 and 2025)
- Aim is to have a simulation tool to study the impact of user requirements on the infrastructure gaps.



On top of Galileo and GMES:

- Critical technologies (EC – EDA – ESA)
- Civil/military synergies in Earth Observation (EC – EDA – ESA)
- SSA (EC – EDA – ESA)
- UAS (EDA - ESA)
- Maritime Surveillance (EC – EDA – ESA)

* ESA takes part in the EFC with EC and EDA and is currently negotiating an Administrative Arrangement with EDA

The Seventh Space Council, scheduled in November 2010 under the Belgian Presidency of the EU will be a further opportunity to make progress on space and security cooperation

Timeframe till 2014

- 2010-2011: preparatory phase (definition of perimeter, identification of user requirements, assessment of potential architectural solutions, identification of existing capabilities and of the corresponding technological gaps)
- Next ESA Council at Ministerial Level (C/M): technology developments – governance, data policy, architecture studies, building initial capacity based on existing assets
- New EU financial perspectives & ESA C/M after the next: system developments