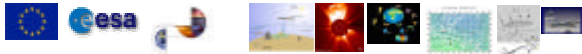


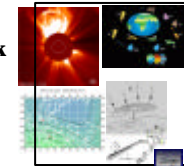
SPACE WEATHER PROPOSAL for the EU-FP6 GMES-Call

Hanna Lappalainen, Kirsti Kauristie, Risto Pirjola
Finnish Meteorological Institute
Vuorikatu 15A, P.O.Box 503
FIN-00101 HELSINKI



Contents

- EU & ESA -GMES Program
- Space Weather & GMES Risk Management
- SW-RISK-Proposal "Space Weather - Risk Indices from Scientific Know-How"



ESA and EU program Global Monitoring for Environment and Security (GMES)



Objective

" to establish European capacity for the provision and use of *operational* information for global monitoring of environment and *security*"

EU-FP6

- GMES is a subarea in the Aeronautics and Space Priority of the 6th Framework Programme
- *the only place where Space Weather is explicitly mentioned in FP6*



GMES Priority Themes...

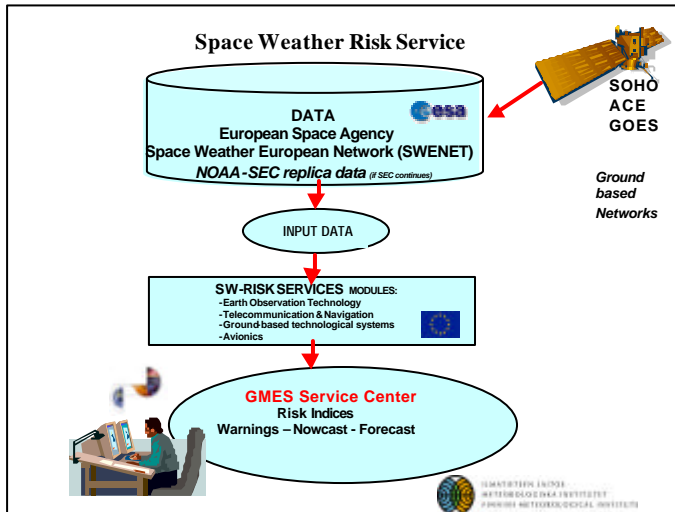
.....

- **SYSTEMS FOR RISK MANAGEMENT**To deliver operational support to risk management (early warning, impact assessment and reaction) in European sensitive areas for: floods, forest fires, oil spills, stability of man made structures.
-

Space Weather Risk Categories

- (1) **Generic Risks** to the society through disturbing satellite operations and telecommunication used for e.g. monitoring and warning of forest fires, floods, other natural and man-made disasters or other security-related issues
- (2) **Direct Risks** to the functionality and reliability of man-made technological systems.





SW- Risk Management

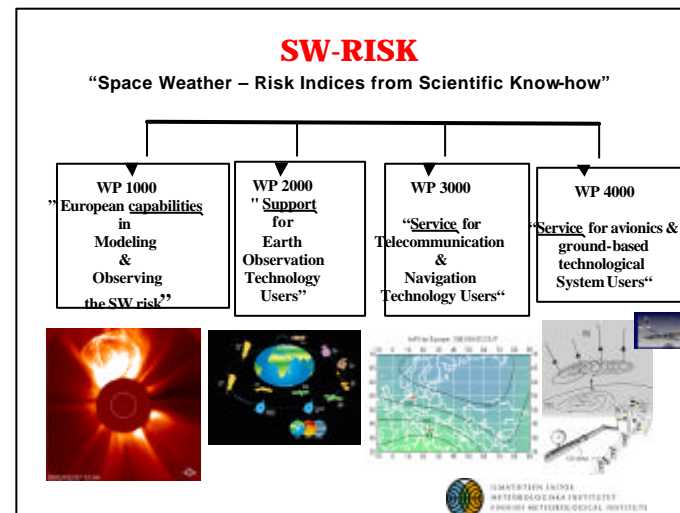
GMES Risk Services
=
GMES Risk Indices

- quantify the disturbance level
- can be forecast or is used as input when forecasting other indices
- meet certain standardised criteria in availability and reliability

Space Weather Proposal EU FP6 – GMES Call

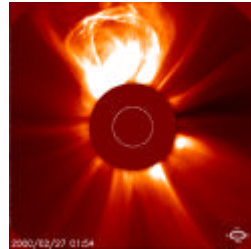
SW-RISK “Space Weather – Risk Indices from Scientific Know-how”
STREP-Proposal

- The proposal will follow the above described GMES philosophy
- To be submitted to FP6 – Aeronautics & Space Priority GMES in March 2004
- Estimated budget 2,5 Meuros
- Duration 24 months, June 2005-Dec 2006
- Consortium:**
 - FMI, Finland (Co-ordinator)
 - LPCE, France
 - RAL, UK
 - DLR, Germany
 - end-users, other partners TBD



WP 1000
"European capabilities in modelling and observing the space weather risk"

- **GMES Space Weather Service support**
 - evaluation of the input data for risk services
 - End-Users: SW-RISK-project (WP 2000-4000)
- **Future service development beyond the state-of-art**
 - improved modeling (MHD simulations, particle codes) -> improvement in the time span (from hours to days) of the predictions
 - European SW monitor specification
 - End-Users: Future GMES SW-RISK service users, scientific community, satellite industry



Providing infrastructure for GMES SW services / implementation to GMES Risk Center TBD



WP 2000
"Support for Earth Observation Technology Users"

- **Risks**
 - erosion, single event effect
- **State-of-art**
 - ESA-SDA GEISHA
 - prototype for satellite anomaly analysis
- **SW-RISK Objective**
 - Tailored risk indices for the geostationary satellites having key role in EarthObservation system
- **End-user**
 - Meteorological based services (e.g. forest fires) via GMES
 - others e.g. EUMETSAT ?

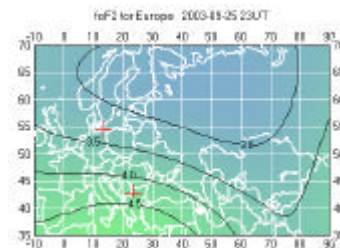


(Figure by ILWS)



WP 3000
"Services for Telecommunication and Navigation Technology Users"

- **Risks**
 - fadeouts, loss of lock, signal-to noise problems
- **State-of-art**
 - ESA SWIPPA-SDA
 - TEC-maps, TEC-gradients, TEC-forecasts
 - GPS differential phase fluctuations
- **SW-RISK Objective**
 - Alert services for GMES Center
 - Risk indices for radio based communication and navigation systems
- **End-users**
 - GMES, Galileo, GPS etc.

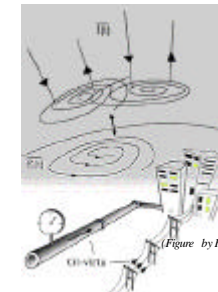


(Figure by ISES/RWC Warsaw)



WP 4000
"Service for avionics & ground-based technological systems users"

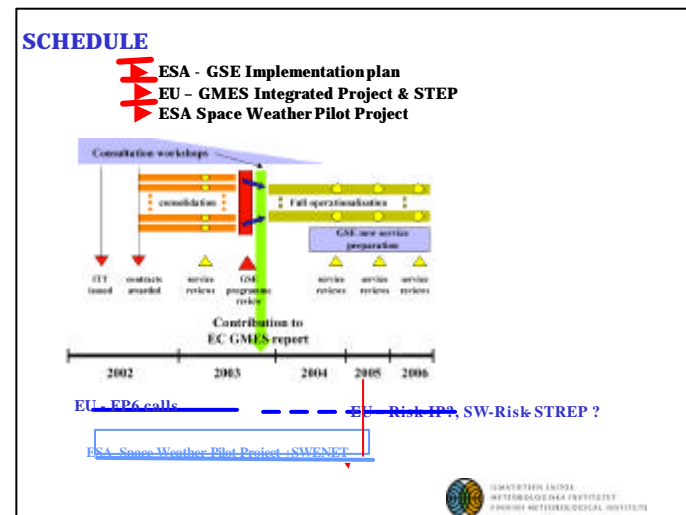
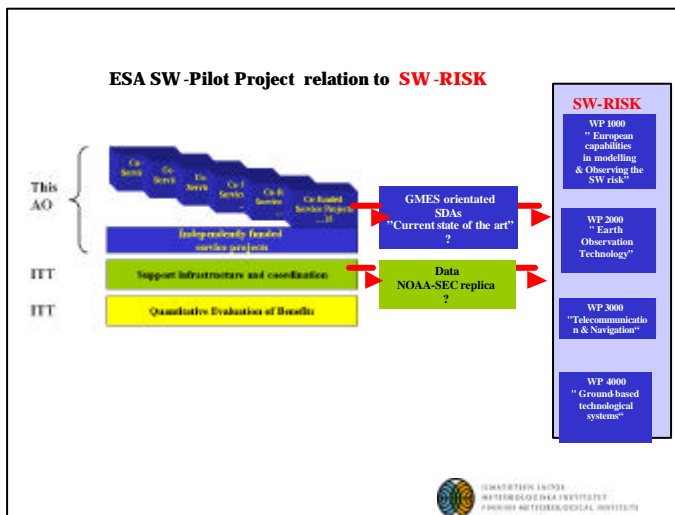
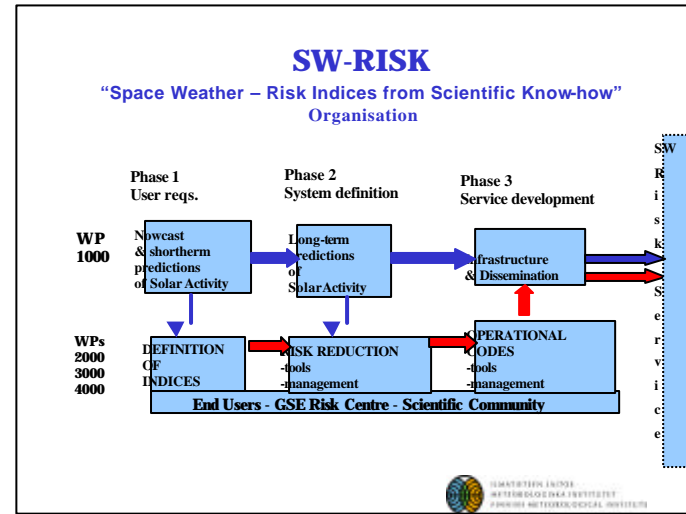
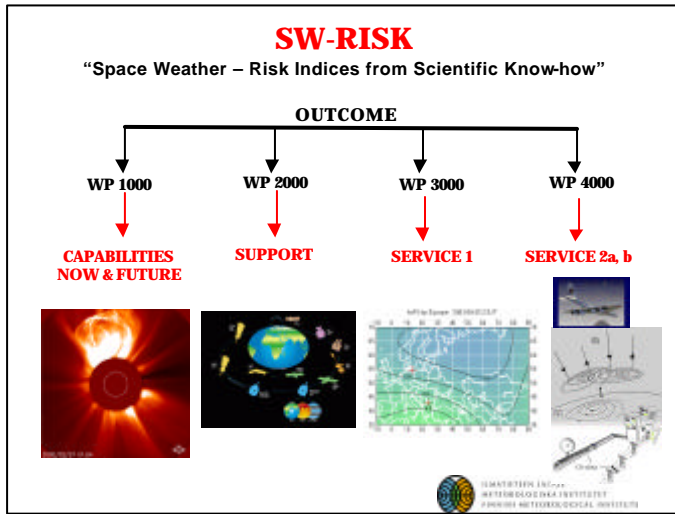
- **WP 4000 a GIC**
- **Risk**
 - harmful currents in power transmission lines
- **State-of-art**
 - Several ESA GICSDAs
 - Modelling & monitoring & forecasting tailored GIC-indices for specific customers / networks
- **SW-RISK objective**
 - Geomagnetic induction index -> general index for geomagnetic induction effects
- **End-User**
 - GMES Risk Center: "stability of man made structures"



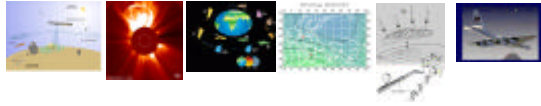
(Figure by FMI)

WP 4000 b AVIONICS
 • TBD





Motivation for the SW-RISK



- **Traditional risks**
 - Standardised risk indices, nowcasts and forecasts for
 - Enhanced radiation
 - GIC
- **Breakdown of the Information society**
 - Risk indices, nowcasts and forecasts for
 - fadeouts in the communication and navigation
- **European leadership in Know-How of SW effects control**
 - Improved know-how in European satellite operation and design (e.g. Galileo, Earth Observation missions)

