Lessons learned from volcanoes, floods and environmental hazards: preventing Ukrainian disaster's losses

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Key Development issues

- Gap between economic losses caused by ND and available financing for reconstruction and rehabilitation:
  - frequency and intensity of disasters are increasing
  - levels of vulnerability increase due to **insufficient planning** and prevention activities

- Economic estimated losses due to hydrometeorological related damage in Ukraine, is $275million (2005 prices)
- The investment in **prevention** is the key to these challenges

The HFA framework of action revised (GAR 2007-2009)

- ISDR 2009 reports on the decision of European governments to raise the priority of risk reduction
- Approach in DRM has been shifted-from purely **emergencial focus on saving lives when disaster strikes to reducing risks** that are causing massive damage and losses at disaster times

The problem in investing in prevention

- Emerging economies (SE Europe) do not **make annual budget appropriations for prevention, but for emergency expenditures**

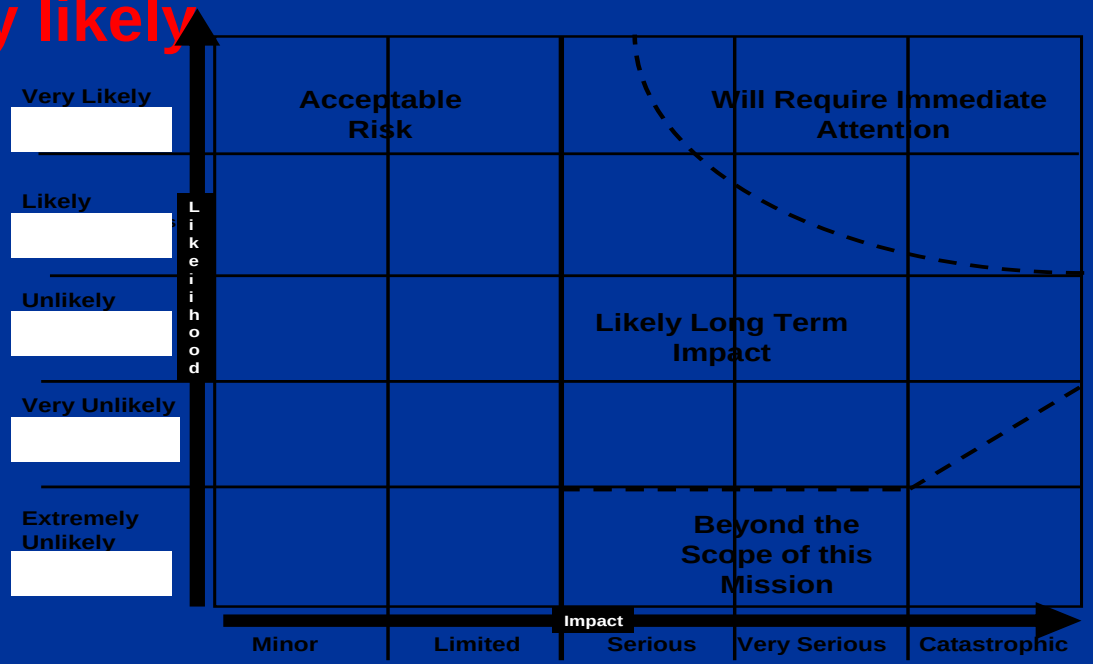
- Disaster losses are financed **by budgetary reallocations or, by increasing budget deficits through borrowing**

Risk driver I: Inappropriate development

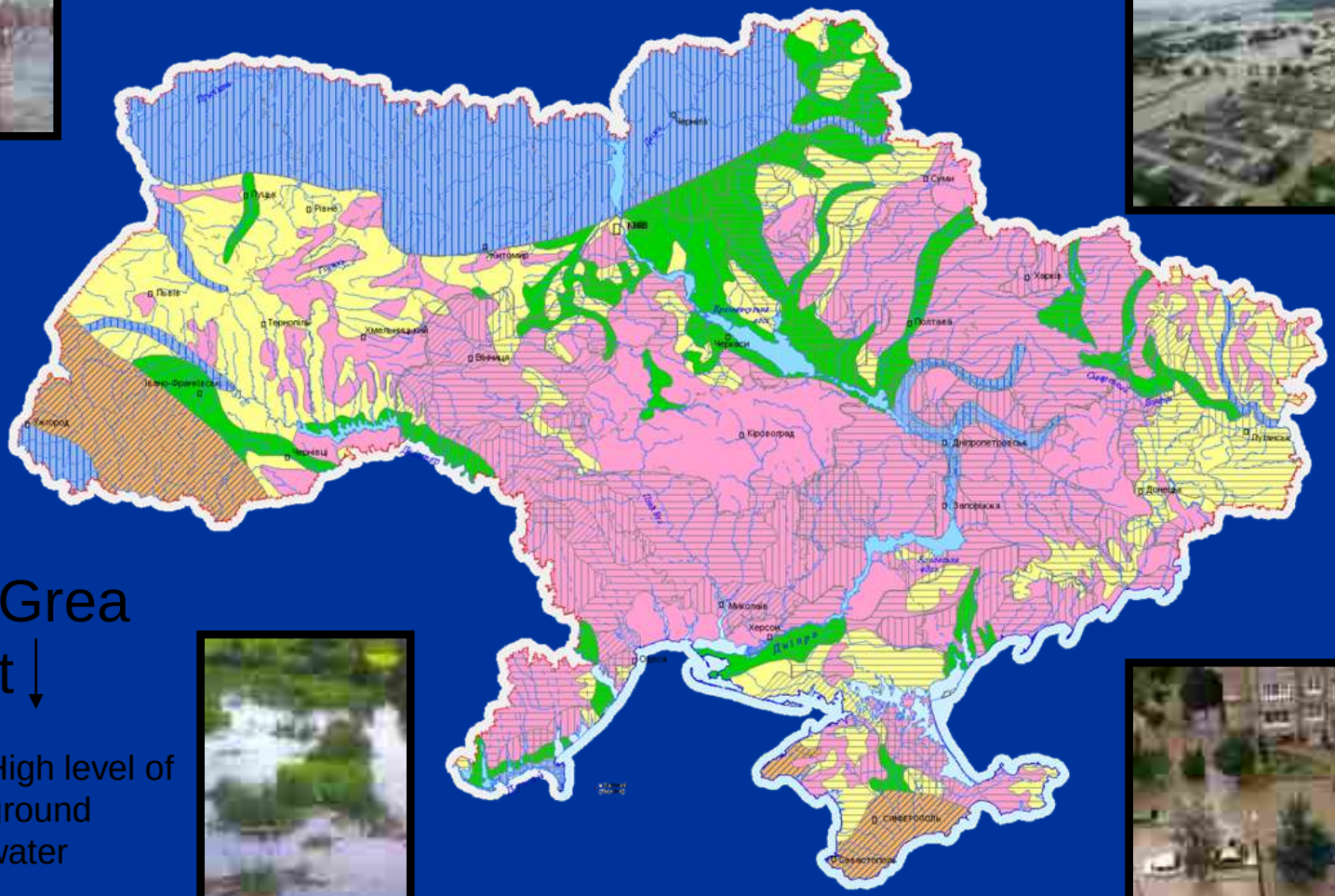
- Over much of Europe one in 100 years floods will occur every 20 years
- Flood risk and CC at EC Joint Research centre: potential of 100-year flood will rise 19-40% & people affected will increase by 6-11%

Risk Probability : Very likely

- Soviet economy depleted the environment



27% of the Ukrainian territory is subjected of harmful water activity



Grea
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High level of ground water

- The effects of the 2008 floods in Ukraine

- Destruction of public infrastructure and agriculture **US$ 650-870 million according to the Government of Ukraine).**

- From baseline of 700 ground activation events, now Ukraine has 1700 recorded landslides, mainly due to saturation of water; soil composition & deforestation

- Need for proactive measures (river embankments and

- Societal impact in the housing sector is major

Chornoguzy

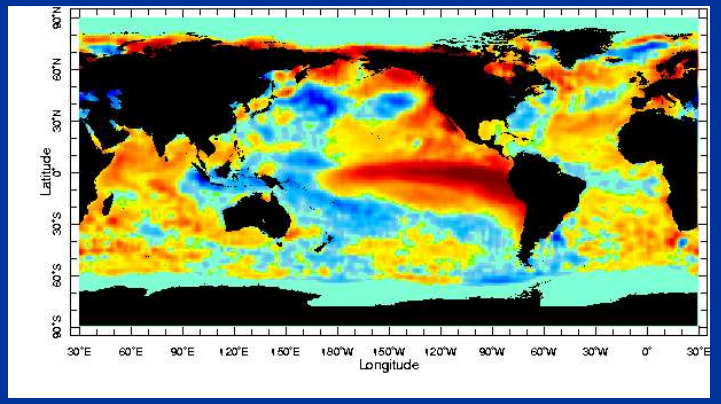
How then to predict *seasonal climate anomalies*?

- Predictions of rainfall, frontal passages, etc. for a particular day and location months ahead have no usable advantage

  However, there is some use in predicting anomalies in the **seasonal average** of the weather.

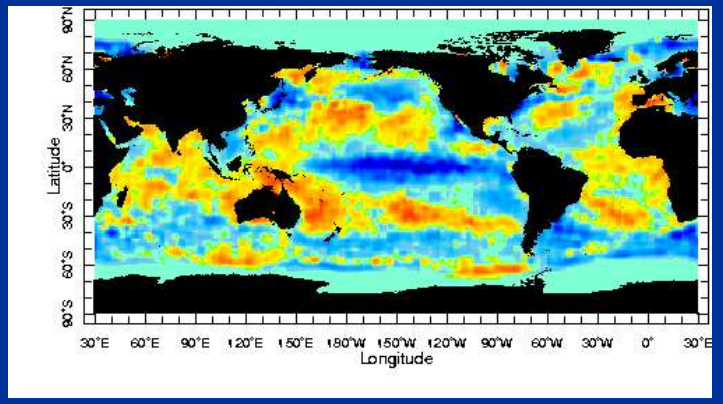
  This predictability results primarily from the influence of **slowly evolving boundary conditions**, like El Niño and La Niña, on the atmospheric circulation

Source: Landman & Engelbrecht, March 2010, CSIR



Sea-surface temperature (SST) anomalies of September 1997 (El Niño of 1997/98)

Anomaly: departure from the mean or average



Sea-surface temperature (SST) anomalies of November 1988 (La Niña of 1988/89)

Risk driver II: lack of risk perception

Ukrainian Airlines lost about 6 million USD in revenues, while global losses were about 1,8 billion USD **Risk Probability : ALMOST CERTAIN**

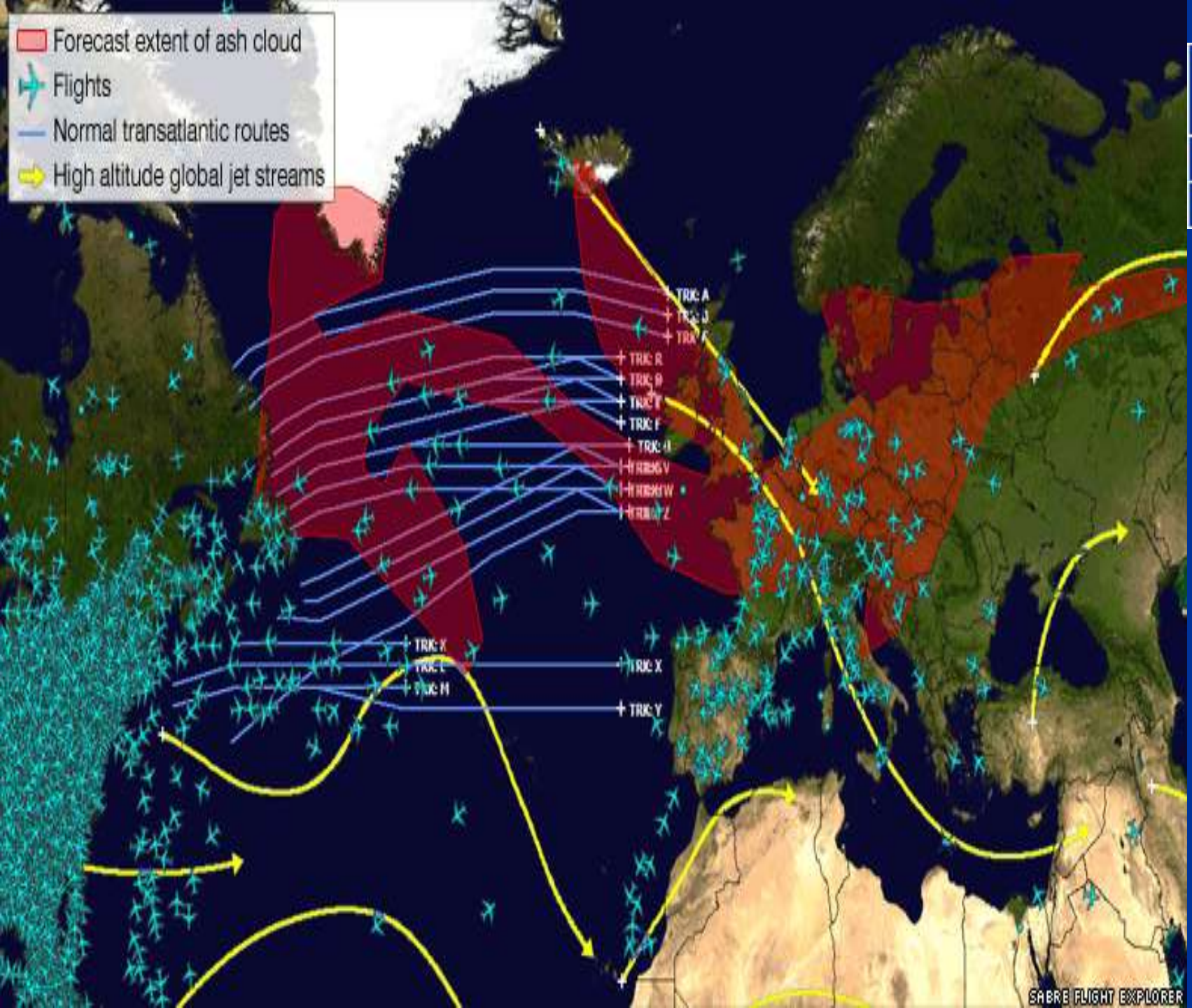
(Sources: IATA, 2010; University of London Institute of Risk and Disaster Management, June 2010)

Icelandic Volcano

- The meteorological conditions of N-NW flow (not so exceptional), **happen only 6% of** the time

- So, authorities did not see a statistical risk demanding heavy preparedness and risk planning (UCL, page 17)

- Eruption effects on regional air space **could have been predicted** but:
- they were not given attention by the authorities as a high-probability hazard
- response was reactive & less effective, preparedness was absent


Forecast extent of ash cloud
Flights
Normal transatlantic routes
High altitude global jet streams
TRK: A
TRK: R
TRK: F
TRK: X
TRK: X
TRK: Y
SABRE FLIGHT EXPLORER

Risk driver III: declining ecosystems

- The Kalush are was declared by the Government of Ukraine as a “emergency ecological situation zone”. The existing threats if not contained, will spread contamination to the Kalush town and its residents.

Risk Probability: Very Likely & Catastrophic

Kalush's ecological problems

- Salinization of ground and surface water, and its threat to the drinking-water supply

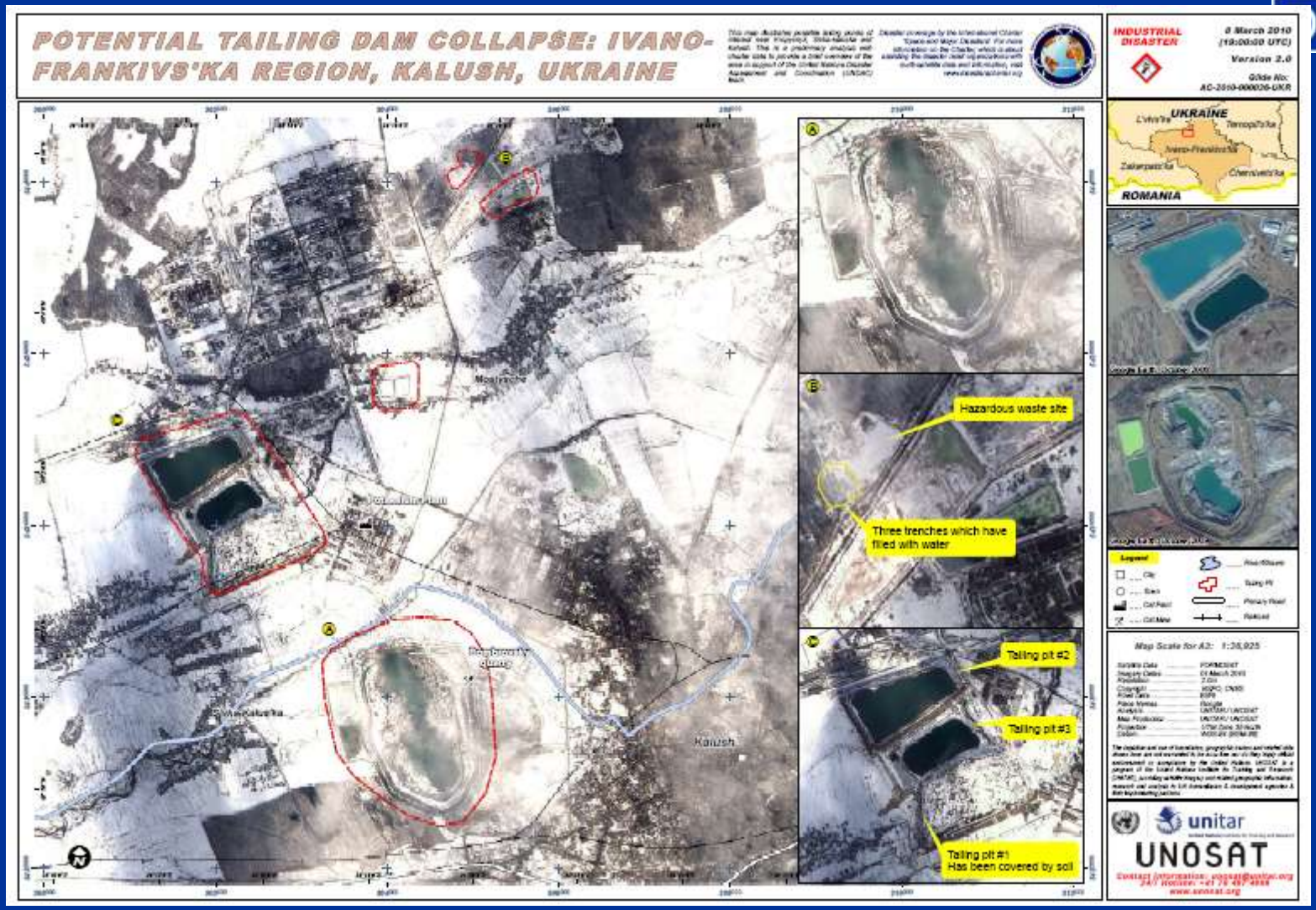
- Design safety levels in the tailings dams should be respected as they form the single most important risk reduction measure

- Concentrations in water at the storage facility are a factor of 100 higher than the Ukraine standard (and in some places far more)
-
- HCB is extremely toxic: for water environments is a persistent organic pollutant. The long-term risks of spreading are therefore high

- Locations of HCB are very near the river basin that suffers periodic massive floods as in 2008 (successive floods can be dangerous)

- A breakthrough of the Dombrovski Open-Cast Mine into the Sivka River is **very likely,** with serious consequences at the storage site pouring contminants into the Sagopiv stream and further downstream

Satellite Imagery Support



Kalush risk assessment: Dombrowiski open-cast mine

Issue	Likelihood	Consequence	Risk
Slope failure	Very likely	Serious	15
Karstification	Very likely	Serious	15
Subsidence	Very likely	Serious	15
Surface erosion	Very likely	Limited	10
Surface water into ring channel/mine pit	Very likely	Serious	15
Hazardous waste deposited	Likely	Limited	8

Source: UN-EC Technical Scoping Mission Report, Geneve April 16 2010

Subsidence

- Caused by extensive underground salt-mining
- 6 main zones
- Affecting houses and critical infrastructure
- Social issues: resettlement of 4,000+ people

Risk driver IV: severe space weather events

Sun spots, sun explosions and solar winds affecting communications, any services using magnetism and electrical grids in Europe and North America

(Transcontinental risk) **Risk Probability : LIKELY**

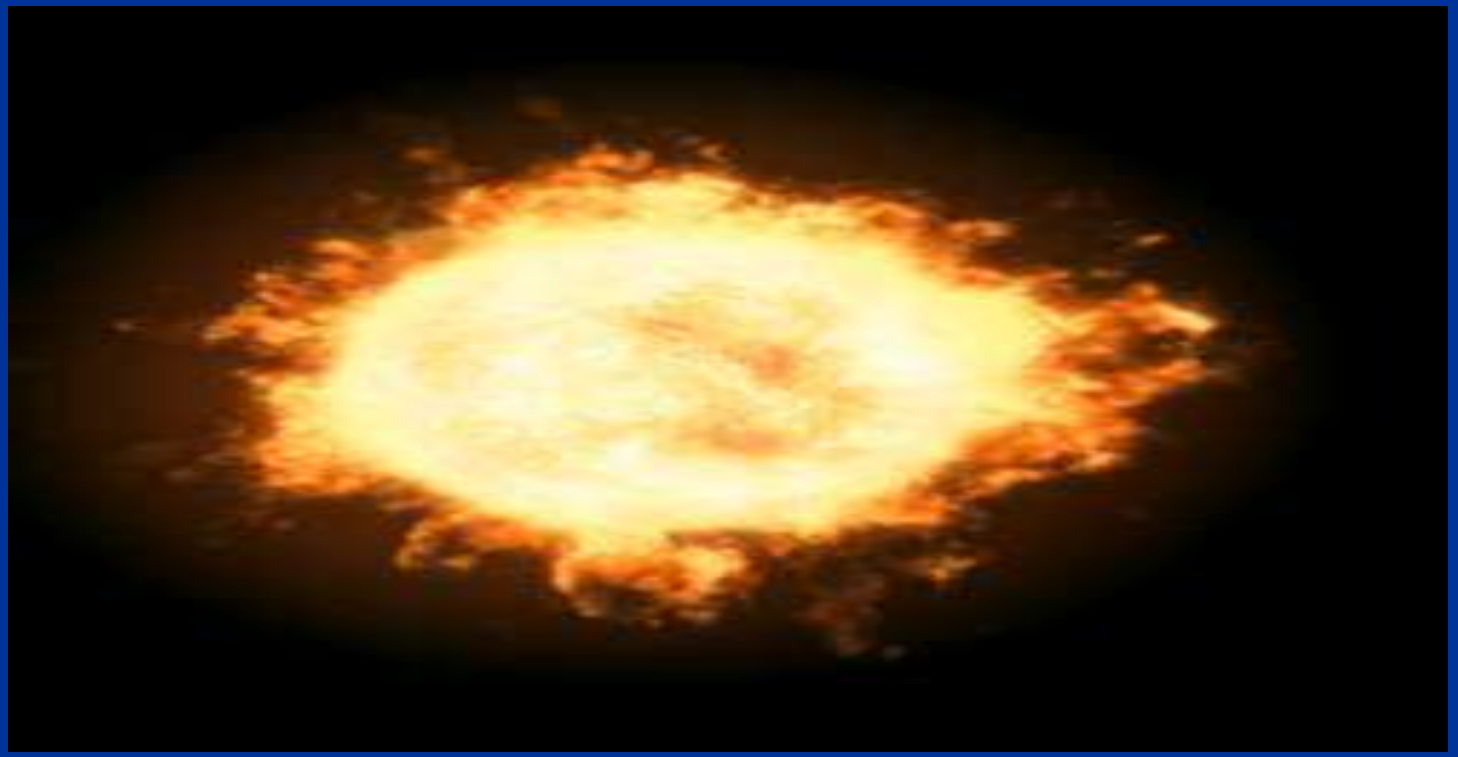
Sun spots, storms and winds

- If directed to Earth, ejected material will penetrate its magnetic field affecting critical infrastructure

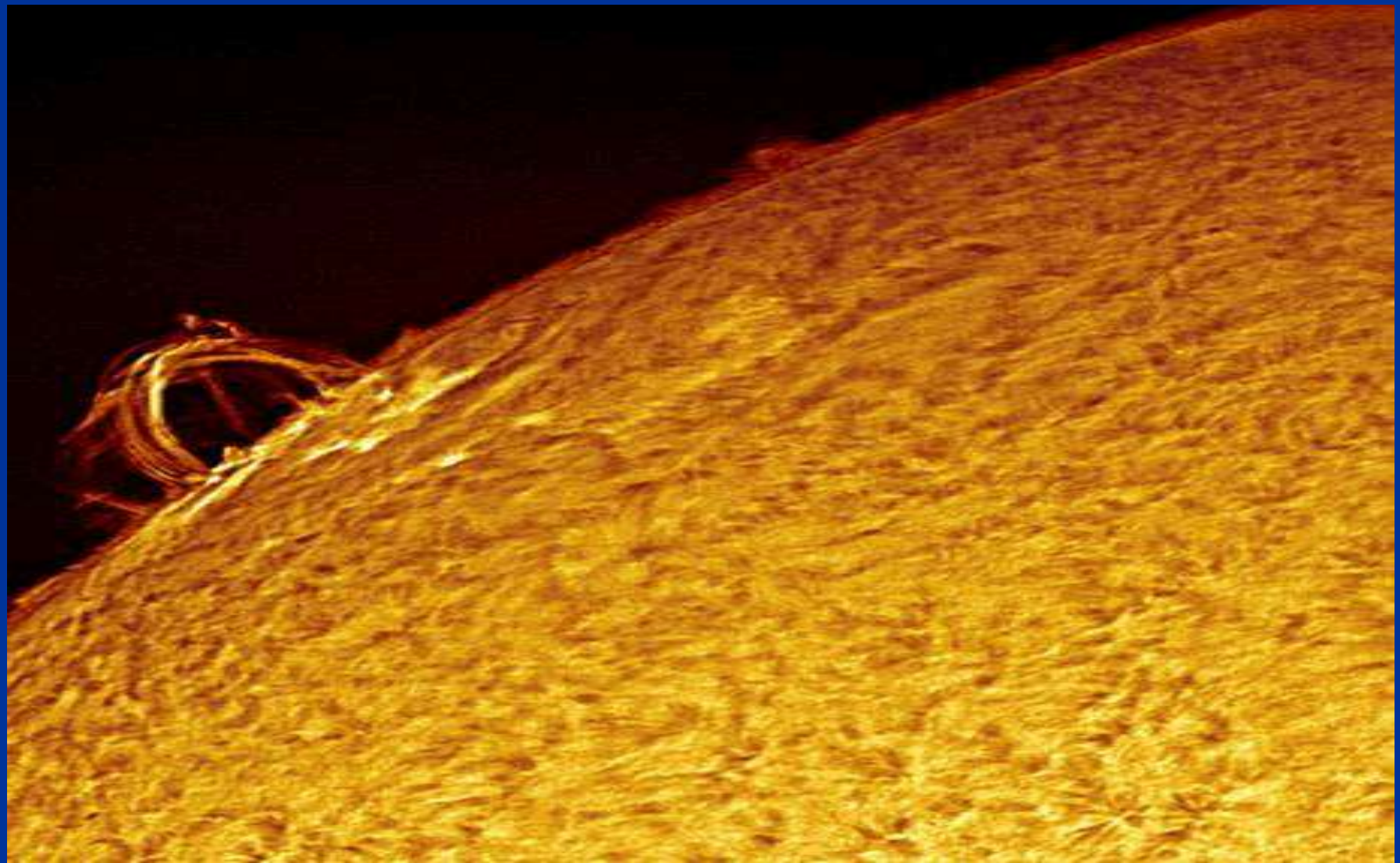
- (http://www.nap.edu/openbook.php?record_id=12507)

- EWS of a geomagnetic storm by NOAA's Space Weather Prediction Center (SWPC) & monitoring ground currents in real-time

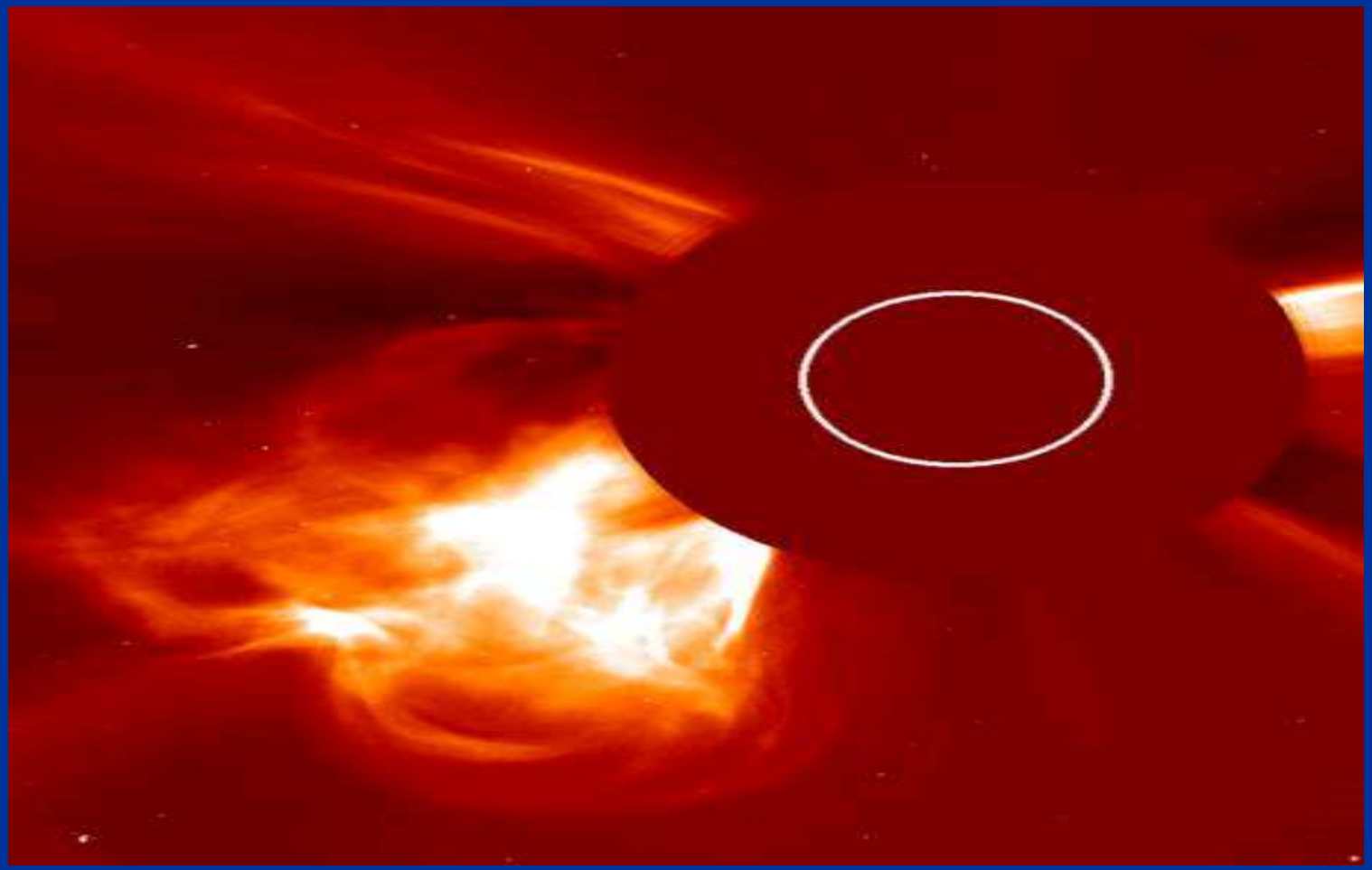
- Power grid operators will need a minimum of 15 min to shut it down against geomagnetically induced currents (GICs).



June 11 2010 Friday
Source: NASA Stereo spacecraft (Solar Terrestrial Relations Observatory) is even able to observe 90% of the solar surface.



Focus on a solar flare



Connection & interdependency across the economy

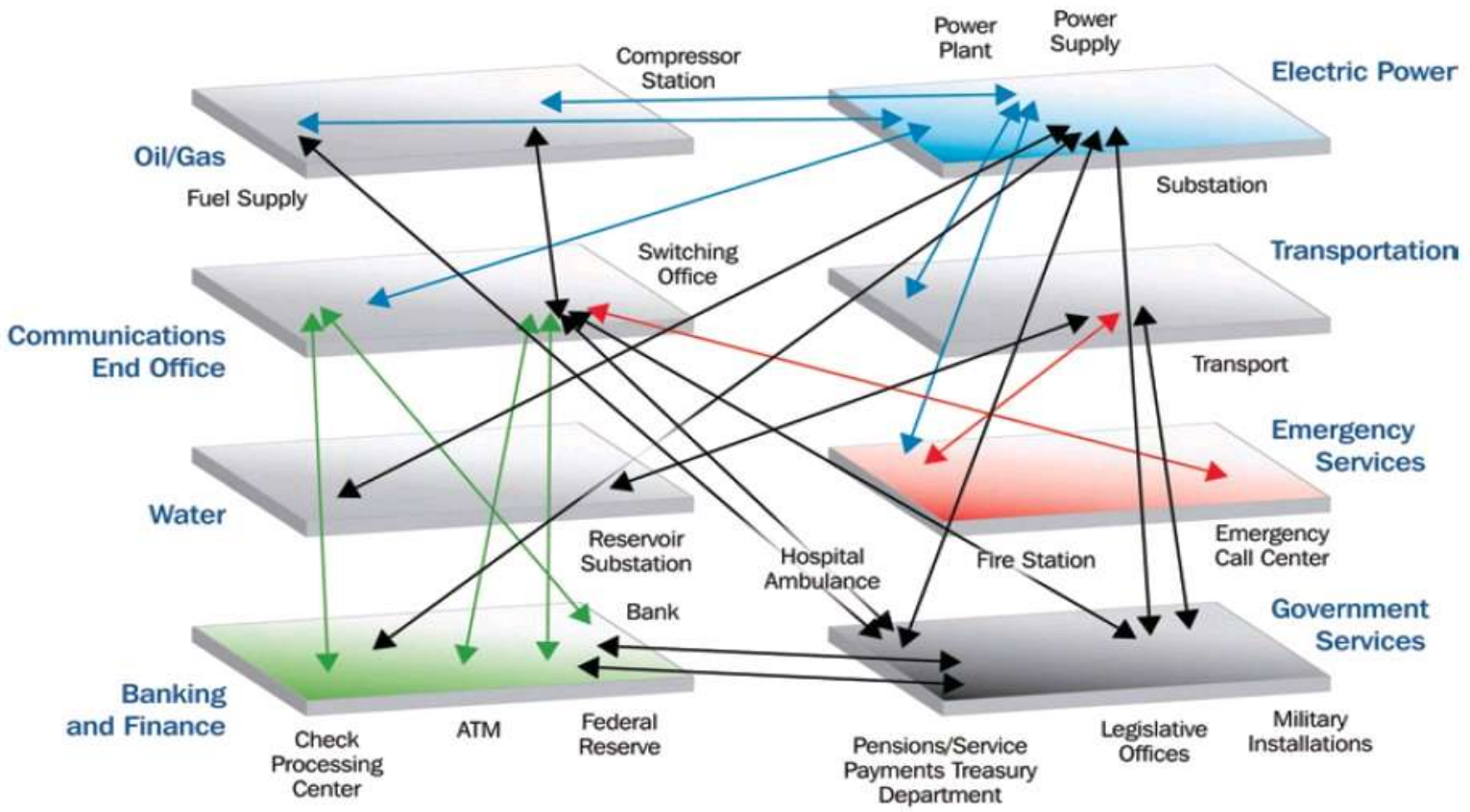
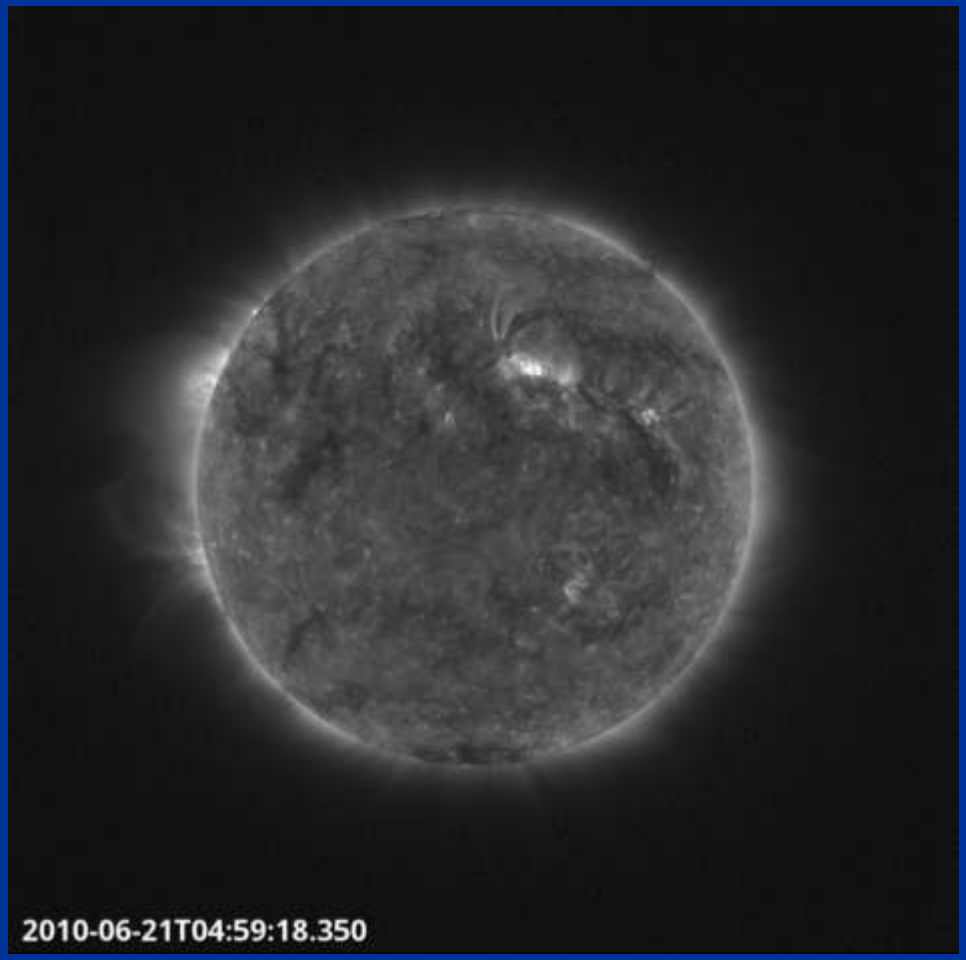


FIGURE 3.1 Connections and interdependencies across the economy. Schematic showing the interconnected infrastructures and their qualitative dependencies and interdependencies. SOURCE: Department of Homeland Security, National Infrastructure Protection Plan, available at http://www.dhs.gov/xprevprot/programs/editorial_0827.shtm.

Solar Influences Data Analysis Center (SIDC)



UPDATE FROM SIDC - RWC BELGIUM Mon Jun 21 2010, 0459 UT

A gradual return to quiet geomagnetic conditions is expected in the coming 24 hours. Flaring activity is not expected in the coming days

Source: http://sidc.oma.be/ SOHO solar influence

Investment in disaster risk reduction

- Investment in risk reduction:
  - **protects** economic and social development
  - **avoids** bigger damage and losses in crisis times
- Few countries in Europe can deal with BOTH recession and disaster recovery

Concluding remarks

- River embankments need to be planned in advance to contain erosive processes (Risk Drive I)
- **Scientific evidence on hazards, risk & use of advanced technologies in EWS exists (Risk drive I, II, III & IV)**
- The problem is assessing the real probability of the threat based on small % & unthinkable risk scenarios (e.g. Katrina cyclone 2008 and volcanic ash 2010)
- Safety codes to allow use of the air space must be drawn and tested well in advance by a team of interdisciplinary experts (Risk drive III)
- The worse came by the **inflexible nature of existing aviation protocols and the absence of pre-existing agreement on safe ash levels** (Risk drive III)

- Closing air space without updated safety codes is only a **precautionary** measure and impairs preparedness efforts (Risk Drive III)

- **Contingency plans for severe space weather events need to be in place prior to events**: ATM machines offline; no Internet or electricity dependent services (Risk drive IV)

- A wide array of risks & ongoing hazards exist in Kalush , **thus a complex response strategy should be in place**, linking local responses to regional, national and possibly international response mechanisms (Risk drive III)
- **Monitoring plans** (for dam stability, subsidence, contamination, etc) should be clearly linked to EWS (threshold levels for intervention) and response plans (Risk drive III)

This presentation has been produced within the implementation of UNDP-BCPR initiative in risk reduction dating back to 2008 support ing UNDP Ukraine risk management efforts. The views, findings and recommendations expressed in this presentation are those of the author alone. They do not necessarily represent the views of UNDP.

THANK YOU