DELICE – major milestone for Atmospheric Remote Sensing in Romania

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SEVENTH FRAMEWORK PROGRAMME

Interest

Air quality

Climate change

Facts

Air quality

- In the period 1997-2007 (http://www.eea.europa.eu):
  - **20-50 %** of the urban population was potentially exposed to ambient air concentrations of **PM_{10} > EU limit** value set for the protection of human health (50 microgram/m³ daily mean not be exceeded more than 35 days a calendar year)
  - **13-41 %** of the urban population was potentially exposed to ambient air **NO_2 concentrations > EU limit value** set for the protection of human health (40 microgram NO_2/m³ annual mean).
  - **14-62 %** of the urban population in Europe was exposed to ambient **ozone concentrations > EU target value** set for the protection of human health (120 microgram O_3/m³ daily maximum 8-hourly average, not to be exceeded more than 25 times a calendar year by 2010)
- **Air Pollutants From Abroad A Growing Concern**. Although degraded air quality is nearly always dominated by local emissions, the influence of non-domestic pollution sources may grow as emissions from developing countries increase (ScienceDaily, Sep. 30, 2009)

Climate change

- **Changes In The Sun** Are Not Causing Global Warming (ScienceDaily, May. 12, 2009)
- **Ice is melting** worldwide, especially at the Earth's poles. Arctic Could Face Warmer and Ice-Free Conditions. The West Antarctic Ice Sheet, could become unstable as the world warms (ScienceDaily, Jan. 18, 2010)
- Almost all of the **300 large glaciers** worldwide are shrinking (Geophysical Research Letters, October 2006)
- **Precipitation** (rain and snowfall) has increased across the globe, on average. Water Vapor Feedback Loop Will Cause Accelerated Global Warming (ScienceDaily, Feb. 20, 2009)
- **Higher Temperatures** Can Worsen Climate Change by stimulating the emission of CO2 (ScienceDaily, Jan. 16, 2010)
- **Some Particles Cool Climate**, Others Add To Global Warming. Until now particles have masked part of the global warming, but they will not do this to the same extent in the future (ScienceDaily, July 9, 2009)

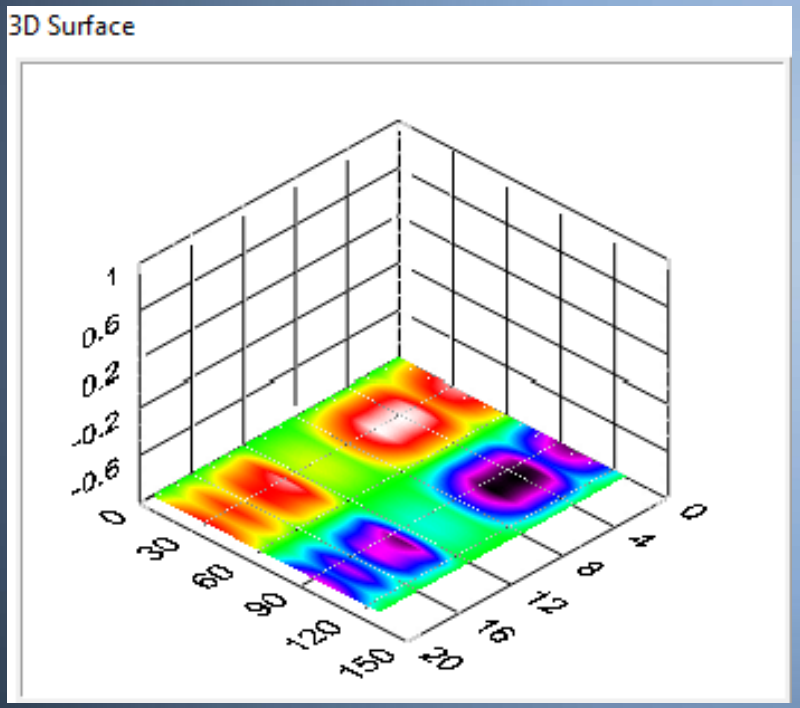
Method

Classical Analytical Techniques

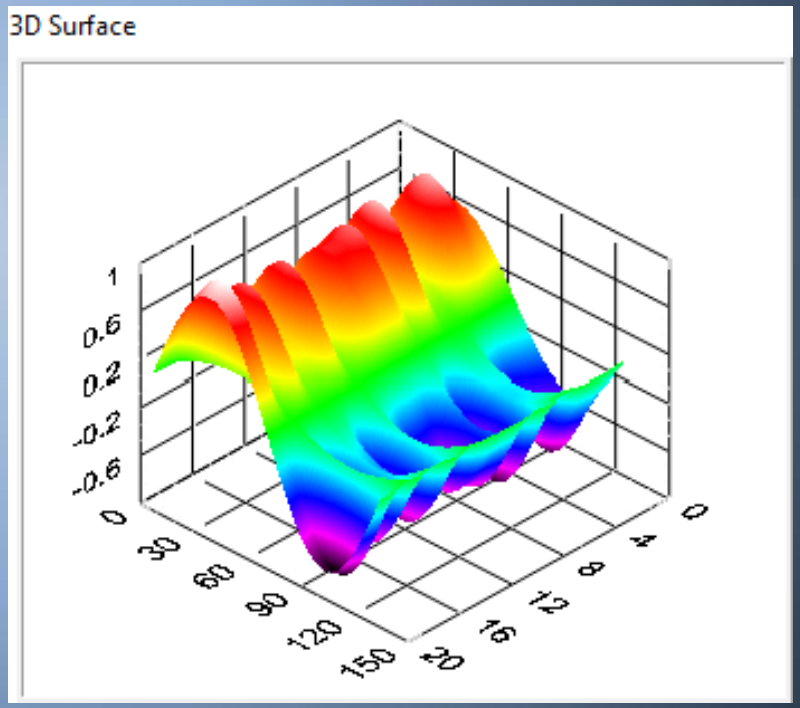
List of instruments: http://inoe.inoe.ro/RADO/pages/on-infrastructure.html

Techniques

Passive remote sensing



Active remote sensing



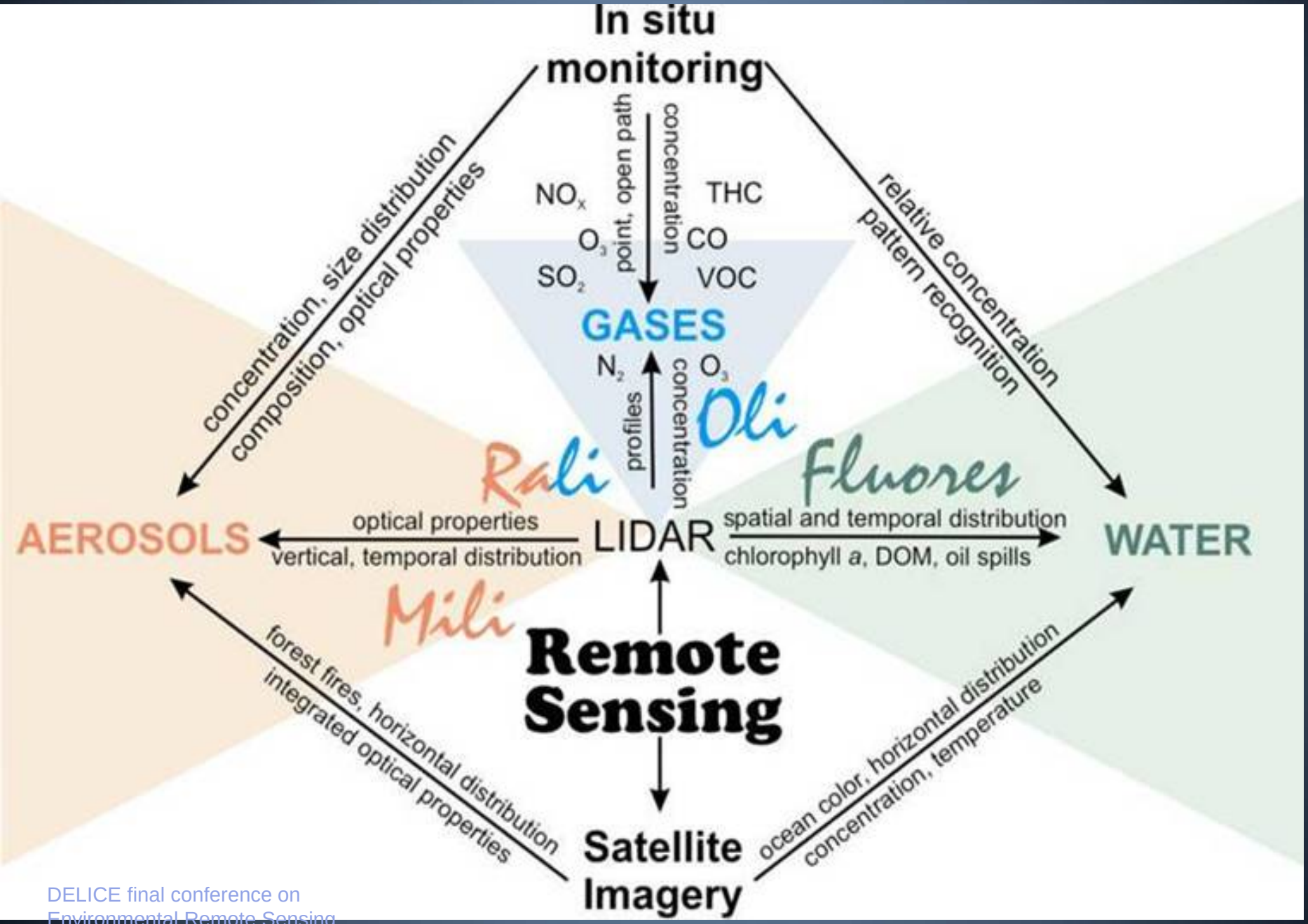
Projects for the development of remote sensing

at INOE

- **EARLINET-ASOS** - 2007
  - FP6 Networking
  - Associated partner since 2007
  - Budget: 0 €
  - Objective: to attend and contribute to workshops, meetings, networking activities
    - knowledge transfer from EU
    - international recognition
- **DELICE - 2008**
  - FP7 REGPOT-2008-1
  - Single partner
  - Budget: 948,460 €
  - Objective: to increase research capacities of INOE by developing remote sensing activities
    - new and upgraded instruments at INOE
    - training of human resources
    - promotion and cooperation

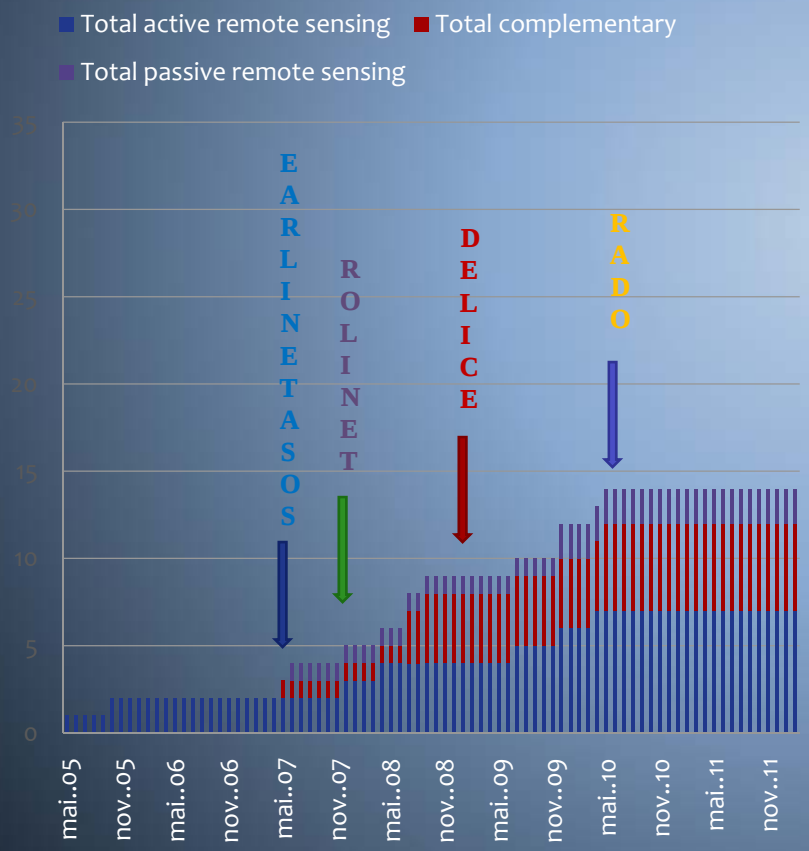
at national scale

- **ROLINET - 2007**
  - PNCDI2 Partnerships
  - Coordinator – 7 partners
  - Budget: ~34,000 €
  - Objective: to create the Romanian lidar network – nation wide
    - knowledge transfer from INOE to 4 new stations
    - design of Romanian lidar systems
- **RADO - 2008**
  - NO-RO Cooperation Programme
  - Coordinator – 9 partners
  - Budget: 2,870,000 €
  - Objective: to create the Romanian Atmospheric research 3D Observatory – nation wide
    - new and upgraded instruments at 5 stations
    - training of human resources
    - promotion and cooperation


In situ monitoring
concentration, size distribution
composition, optical properties
point, open path
concentration
NOx
THC
O3
CO
SO2
VOC
GASES
N2
O3
profiles
concentration
Rali
Oli
relative concentration
pattern recognition
Fluores
AEROSOLS
optical properties
vertical, temporal distribution
LIDAR
spatial and temporal distribution
chlorophyll a, DOM, oil spills
WATER
Mili
Remote Sensing
forest fires, horizontal distribution
integrated optical properties
Satellite Imagery
ocean color, horizontal distribution
concentration, temperature

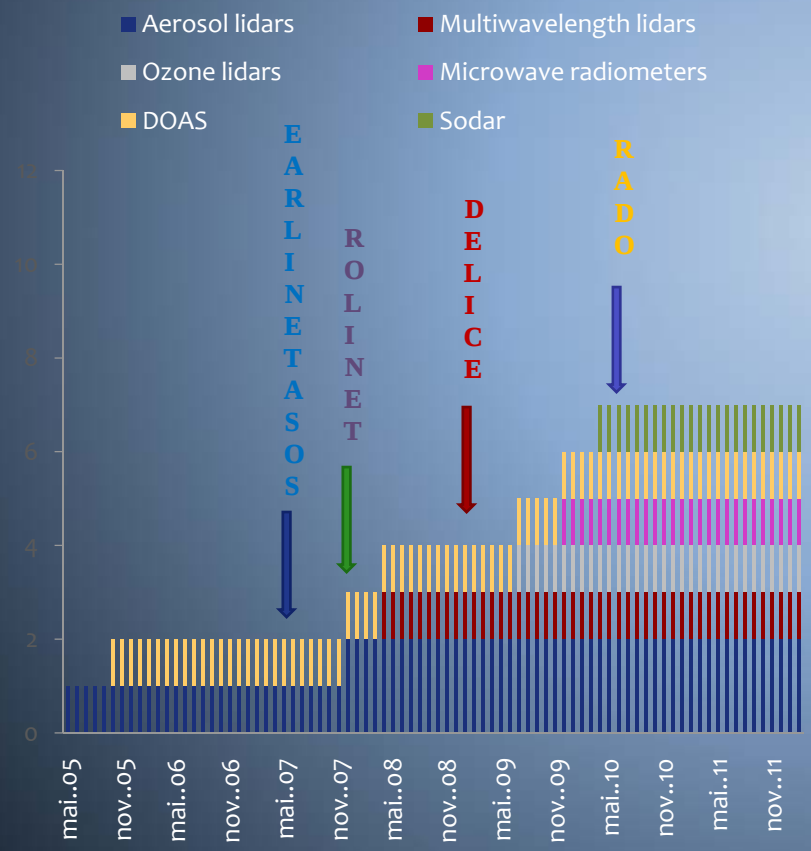
Impact of important projects

No. of instruments at ROLICE - time evolution



Impact of important projects

No. of active remote sensing instruments at ROLICE



Applications

Air quality

- Monitoring of ground-level concentration for PM10, PM2.5, O3, CO2, SO2, … - particle counters, gas analysers
- Lab-based analysis of particles composition and size – AMS, APS
- Local and regional modeling and forecast of pollution levels – MAP3D
- Remote identification of pollution source (plumes, SO2) – IR and UV cameras

Climate change

- PBL, free troposphere layers and clouds' dynamics – lidar, ceilometers
- Vertical profiles of
  - aerosols - lidar
  - ozone - lidar
  - water vapor – lidar and microwave radiometer
  - temperature - microwave radiometer
  - wind - sodar
- Long-range transport of aerosols (source identification, transformation processes) – FLEXPART, HYSPLIT
- Radiative properties – sun photometer
- Regional (Europe) distribution of atmospheric parameters - EUMETCAST
  - optical (AOT)
  - concentration (NO2, ozone, …)
  - meteorological

List of measured parameters: http://inoe.inoe.ro/RADO/pages/data.html

Currently offering: …

- Remote sensing data:
  - On-line data visualization (graphs)
    - http://inoe.inoe.ro/Quicklooks
  - Access to row data for specific cases (on request)
  - Advanced data analysis for specific cases (on request)
- Access to infrastructure (based on submitted project idea)
- Hands-on training for active remote sensing

Soon (next project?) offering: …

- Remote sensing data:
  - On-line data visualization (graphs)
    - http://inoe.inoe.ro/Quicklooks
  - On-line access to row data (for registered users)
  - Advanced data analysis for specific cases (on request)
- Access to infrastructure (based on submitted project idea)
- Hands-on training for active remote sensing
- Demonstration and educational programmes at the new Science Center:
  - **ATMOSFEERIA** – a place where everybody can play with atmospheric processes: generate hurricanes, rain, fog, clouds, wind, dust storms and thunderstorms
  - **Science for all** – video or life lectures about science and environment for children and students, small environmental and scientific projects for schools
  - **Real time atmosphere** – display of real time atmospheric parameters (air quality, weather, dynamics)
  - **Science café** – a place where scientists can meet, discuss, and have a coffee (or tea) watching the night sky by telescopes and lidar laser beams screening the atmosphere

Plans for the future – our vision

- **Short-term strategy**
  - extend the network: 2 more stations needed (Brasov?, Eforie?) + at least 1 background statio
  - support new stati and global networ (EARLINET, AERONET)
  - implement coherent measurement and data processing procedures
  - create an advanced data center for:
    - collection of data from all the stations
    - data validation, analysis and correlation
    - elaboration of v studies, statistic

Norway Cooperation Programme for Romania

Swiss-Romanian Cooperation Programme

- **Mid-term strategy**
  - bring closer:
    - active + passive remot
    - measurements + mod
  - define the remote sensing community in Romania it active at national sca coherent way
  - define the data users area, provide them necessary tools to access and use the information for their own purposes
  - identify a frame to support / fund continuous operation of the infrastructures
  - extend the partnership to South-East Europe

FP7 INFRASTRUCTURES ACTRIS

National Programme for Research

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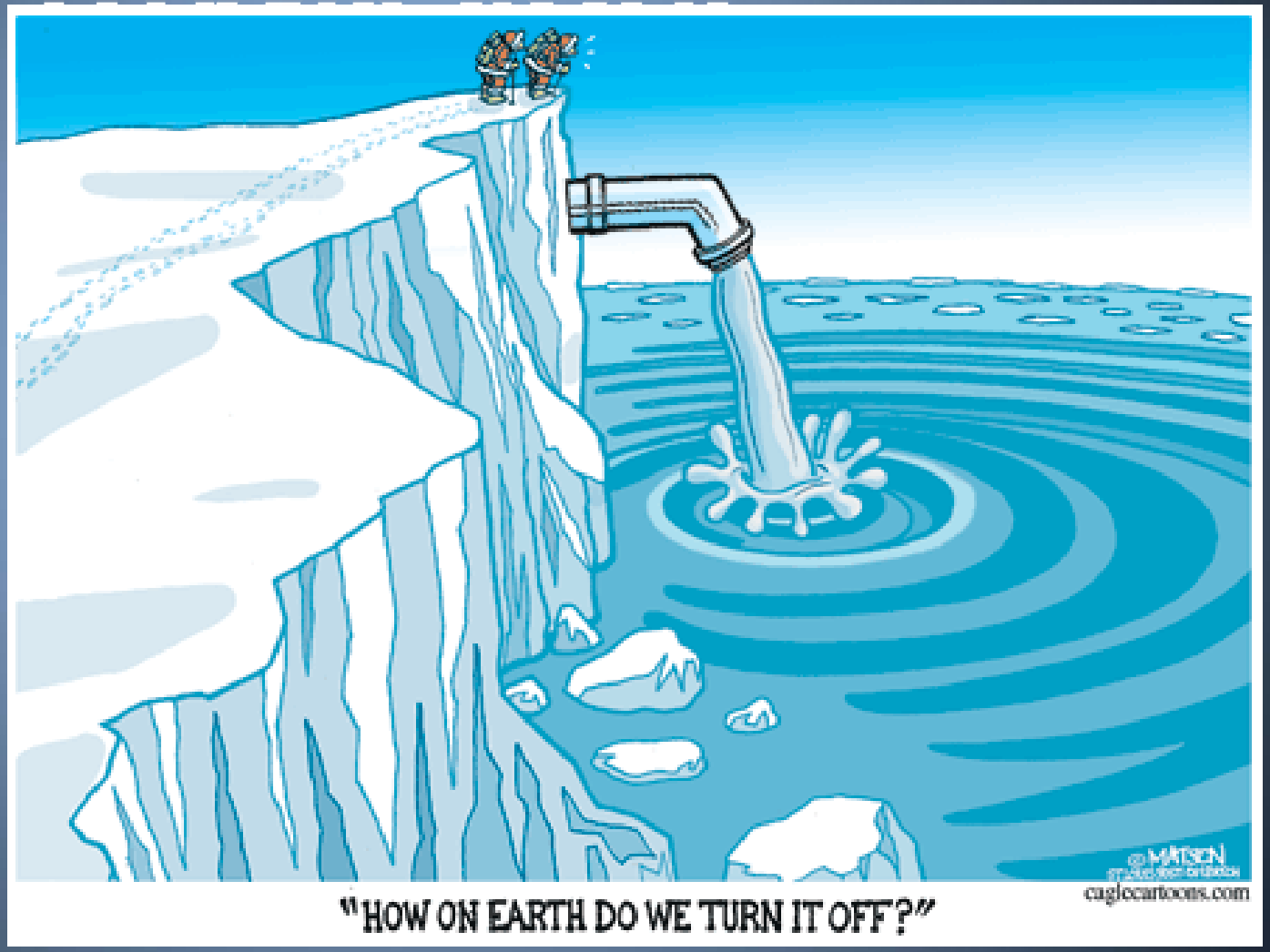
THANK YOU!

And let's hope we will find the answer to the "big" question: