

# **The Challenges of Access to Earth Observation Data for Disaster Management**

Professor Ray Harris

IISL/ECSL

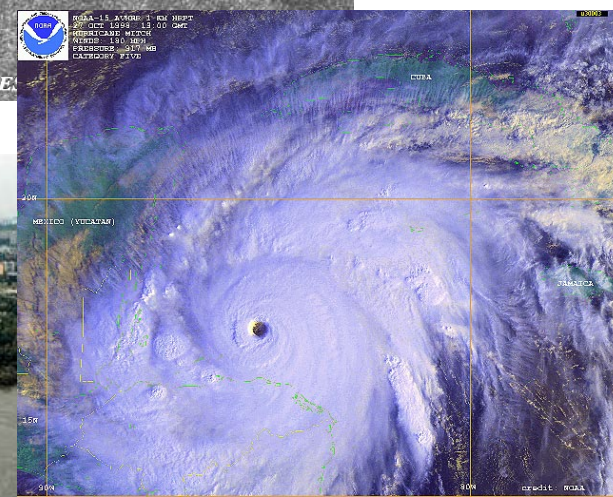
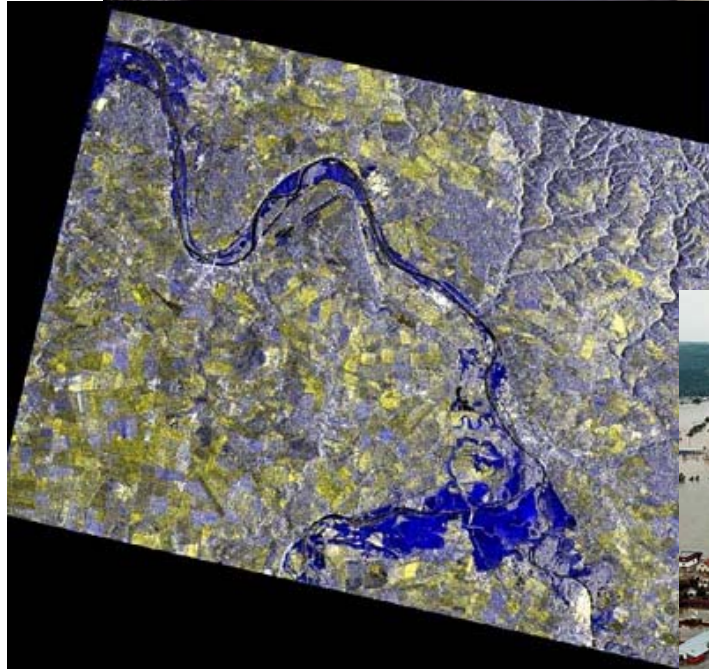
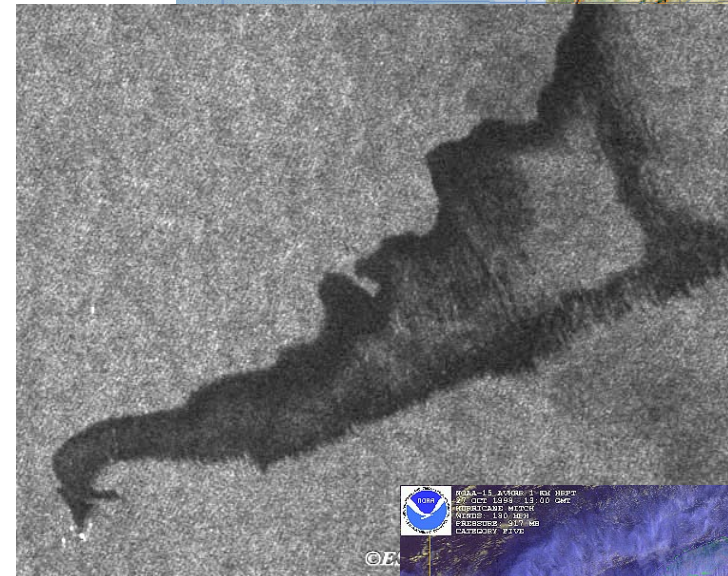
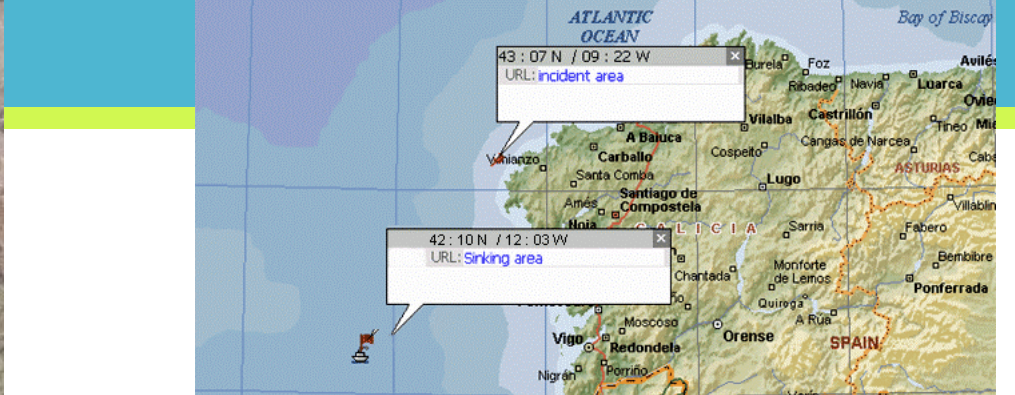
Space Law Symposium

3 April 2006

Vienna International Conference Centre

# Agenda

- Massive volume of data
- Concerns over access to data
- Generic spatial data access
- Selected recommendations
  - Control
  - Quality
  - Data dissemination
- Ethical dimension

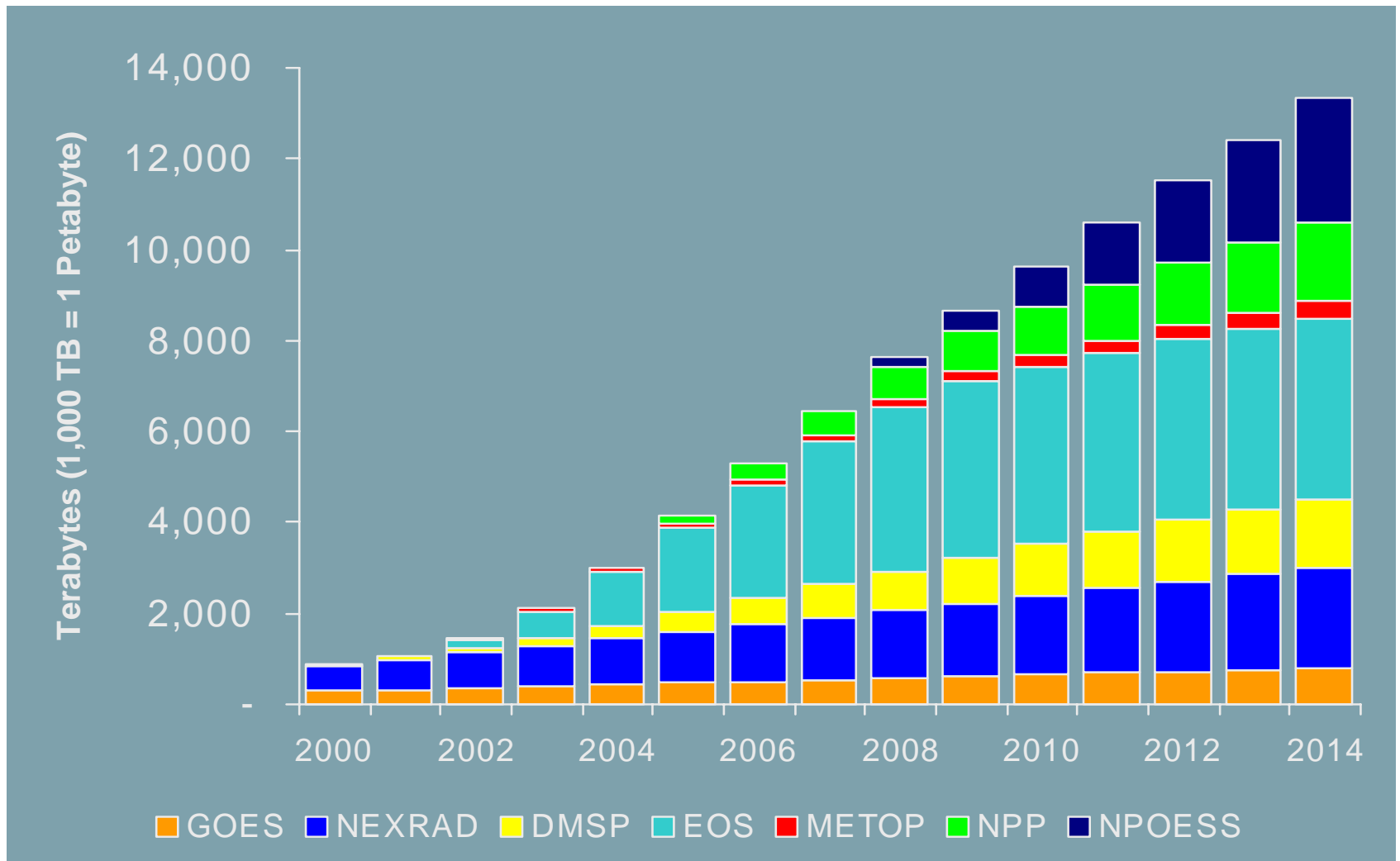


# Massive volume of Earth observation activity

## Global Monitoring for Environment and Security (GMES) Newsletter 5

- 1. Integration of the new EU Member States into the GMES Programme, conclusions of the Conference held in Warsaw on 12-14 December 2005 (9 January 2006)
- 2. **MSG-2** entered into the commissioning phase (2 January 2006)
- 3. Satellites contribute to regional rebuilding in tsunami-affected areas (23 December 2005)
- 4. **Grace** reported significant decrease in the mass of the Greenland ice cap (20 December 2005)
- 5. **TopSat** transmitted its first images (19 December 2005)
- 6. Austria and France signed two co-operation agreements in the field of Space Research (16 December 2005)
- 7. GÉANT2 power to create a global weather forecasting system (16 December 2005)
- 8. The development of **POLAR VIEW** - Interview with Dr Charles Randell (15 December 2005)
- 9. **MERIS** Image showed smoke blanketing London during Buncefield Oil Depot blaze (12 December 2005)
- 10. New findings on Albedo derivation: impact on satellite **archives** (9 December 2005)
- 11. Maps designed from satellite data reveal how and why Antarctic ice sheets are changing (5 December 2005)
- 12. **GMES** Space Component Programme discussed at ESA Council at Ministerial Level (5 December 2005)
- 13. Kyoto Protocol: ESA presented Space solution to deforestation issues in Montreal (5 December 2005)
- 14. **Landsat 5** imaging operations suspended (30 November 2005)
- 15. The Future of Earth Observation in support to the development of Africa (30 November 2005)
- 16. INTERREG Conference on risk management and environmental hazards (29-30 November 2005)
- 17. Improvement achieved in the Mercator high resolution system (24 November 2005)

# NOAA data archive growth



## Context of change in environmental application possibilities

- Data acquisition capabilities
- Computational capacity and connectivity
- Distribution and management; data sharing
- Digitisation : data, publications, pictures, voices, art, traditional and indigenous knowledge
- New possibilities, e.g. monitoring the whole of planet Earth, immediate news coverage of disaster events using mobile phones/cameras

## **International concern over access to data**

- European Global Monitoring of Environmental and Security GMES
- Global Earth Observation System of Systems GEO - GEOSS
- International Council for Science ICSU
- International Polar Year IPY
- Electronic Geophysical Year eGY
- UN principles on Remote Sensing 1986

## UN Principles on Remote Sensing 1986

- Principles IV, XII and XIV important for EO
  - freedom of the sovereignty of nations to use space
  - conditions of access to EO data by a sensed state
  - control of private EO companies by their national governments through licences, e.g. very high resolution EO systems
- Special attention to the needs of Less Economically Developed Countries (LEDCs)
- Not legally binding - ‘soft law’ status, but ‘customary’ law status now?



# Concerns on access to data from the DPAG project

- Control of data and information
  - Legal obligations
  - Licences
- Accessibility
  - Map access
  - Standards and metadata
- European spatial data infrastructure
  - INSPIRE progress

# Concerns on access to data from the DPAG project

- Costs and funding
  - Pricing
  - Public good
  - Internet is changing access
- Archiving
  - Long term stewardship beyond a research project's life time
  - Who is responsible?
  - No legal basis in Europe while there is in the USA

# Humanitarian aid

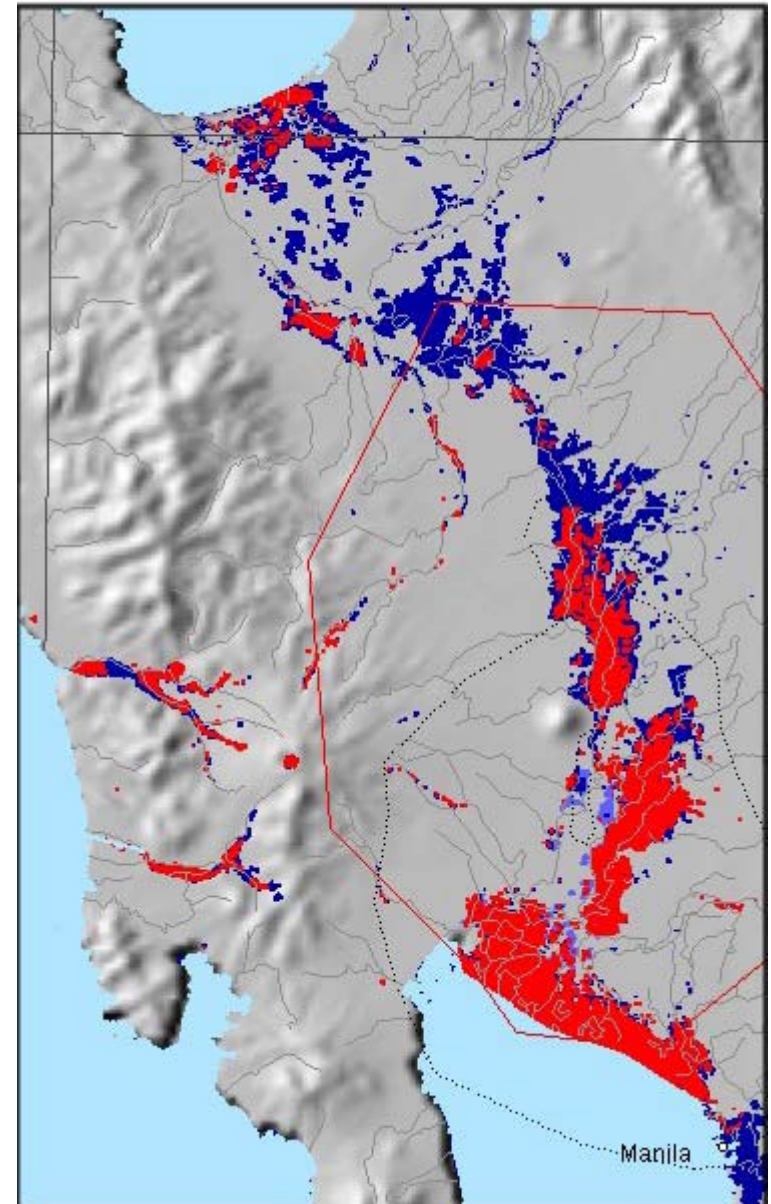
- Satellite Earth observation data are useful
- What about other data that are needed for humanitarian aid?



# Reuters AlertNet



Affected area  Flooded Lands in: 2003   
Area covered by flood map  2002   
Flooded extents on: 12 August 2003  2001 



# Data requirements

Information layer	Map characteristics
Topographic layer	Topographic maps for the target areas at a map scale of 1:50,000, supported by map scales of 1:100,000, 1:25,000 and 1:10,000 in a structured hierarchy.
Settlement layer	Identification of all settlements with their local names.
Communications layer	Major communication routes, including airfields, roads, tracks, railways and water routes.
Environmental hazard layer	Areas of known environmental hazard, for example areas that are prone to flooding or landslides.
Capacity layer	Humanitarian aid capacity in an area, for example which organisations are in a target area, what activities they are carrying out and what resources they have available.
Status layer	Latest <i>in situ</i> status information, for example minefields, bridges blown up, volcanic explosions, flood extent.

1 : 50,000 scale



1 km

## Map data

- China 1 : 1 million map scale is the best openly available in China
- Turkey 1 : 250,000 map scale is the best openly available in Turkey
- The Russian Federal Security Service and Roskartografia reviews and controls all cartography at map scales better than 1:200,000
- Global data at 1 : 1 million scale VMAP0 by US NIMA

# Map scales



1 : 1 million scale



1 : 50,000 scale



## Selected recommendations

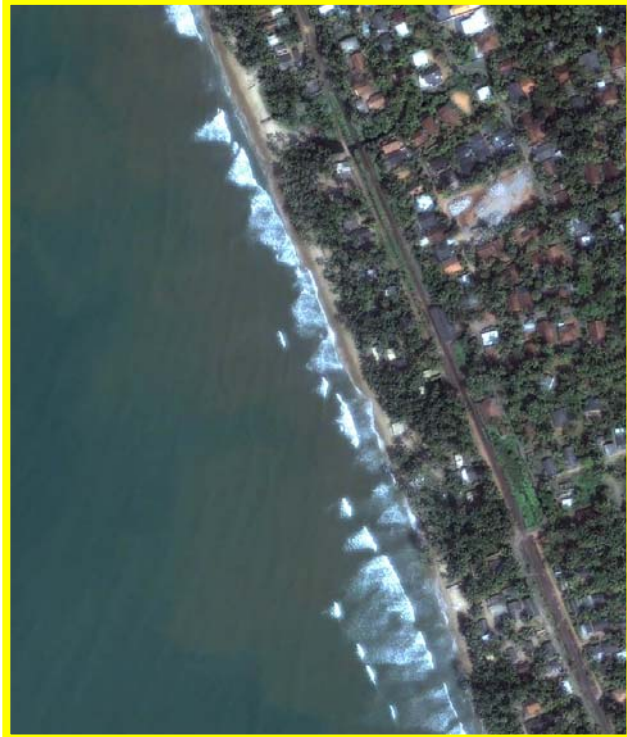
- **Control of data and information**
  - Encryption/decryption should be used in GMES as a technical means of achieving control of data and information.
- **Quality approval**
  - The GMES partnership should use appropriate mechanisms to protect the quality of data and products
- **Data dissemination improvements**

## Control by encryption

- Encryption/decryption could be used as a technical means of achieving control of data and information, *cf* Galileo navigation
  - Open service. Free of all charges but no guarantees.
  - Commercial service. Fee payable, but with guarantees on service availability. Encrypted
  - Safety of life. High availability. Encrypted.
  - Public-regulated service. Secure, closed access. Encrypted.
- Decryption keys could be used in times of humanitarian crisis, e.g. South Asian tsunami 26 December 2004, Hurricane Katrina August 2005
- Satellite Digital Video Broadcast technology



# Kalutara, Sri Lanka



1 January 2004

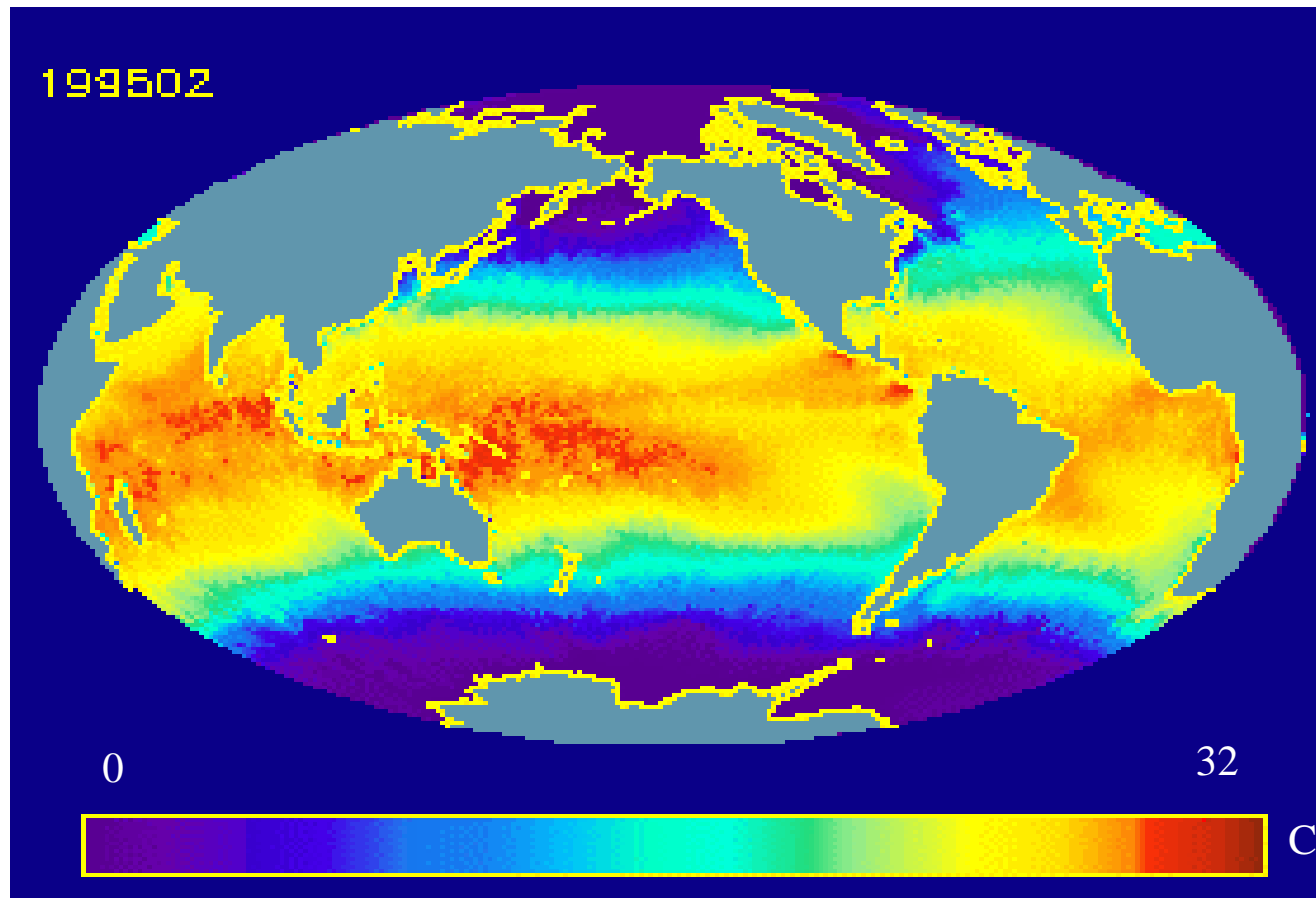


26 December 2004

## Branding of quality

- Quality approval
  - Global monitoring programmes (e.g. GMES and GEO) could use appropriate mechanisms to protect the quality of data and products, i.e. as a brand rather than as a burden
  - Licences become important, including for information derived from the raw or processed data
  - Intellectual property rights increasingly important in a digital era

# Sea surface temperature



# Data dissemination improvements

- GEO Netcast
- Google Earth

# Google Earth and data access



Landsat data  
at 15 and  
30m

DigitalGlobe  
data at up to  
0.61m

## Google Earth conditions

- Total Earth coverage (+/- polar regions)
- Needs a broadband connection and a computer; 500kbps and a laptop
- Software free of charge
- Data are free of charge to users



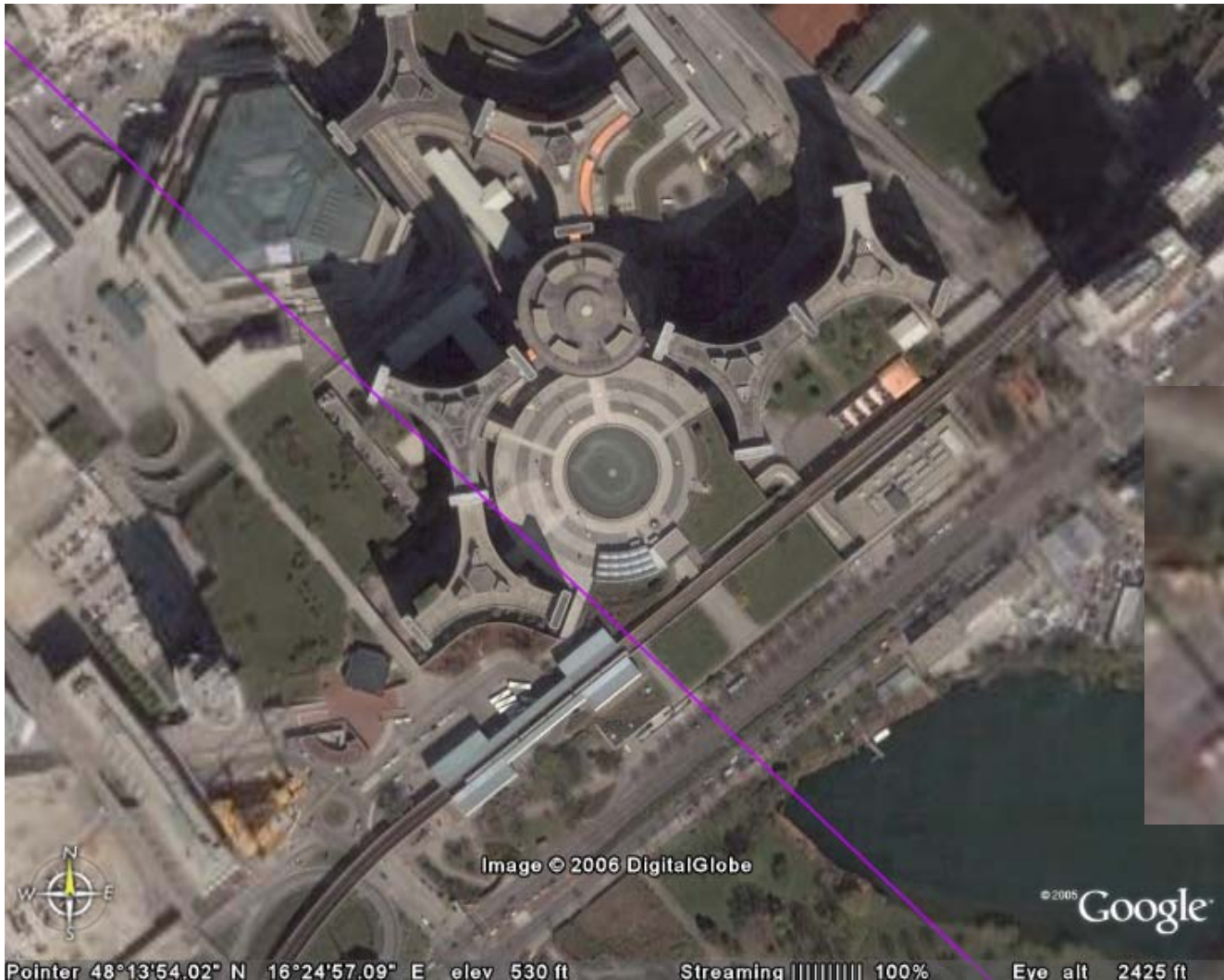
# Goggle Earth of Vienna



Landsat data at  
15 and 30m

DigitalGlobe  
data at 0.61m

# We are here



## Ethical dimensions

- A set of principles of right conduct
- The science of human duty; the body of rules of duty drawn from this science
- Ethics, in philosophy, the study and evaluation of human conduct in the light of moral principles
- “Ethics, too, are nothing but reverence for life” Albert Schweitzer, *Civilization and Ethics*, 1949
- ***But who, when, how?***

## Ethical questions

- Who controls Earth observation data?
- Who controls access to the data?
- Should the driver of access be only technology or should it be legal/policy?
- Is society served by greater or by lesser transparency of information, e.g. Google Earth and India or China?
- What about privacy laws for individuals?

# Conclusions

- Earth observation data are collected
- The key questions are those of access
- Access is not just technical but revolves around policies of access