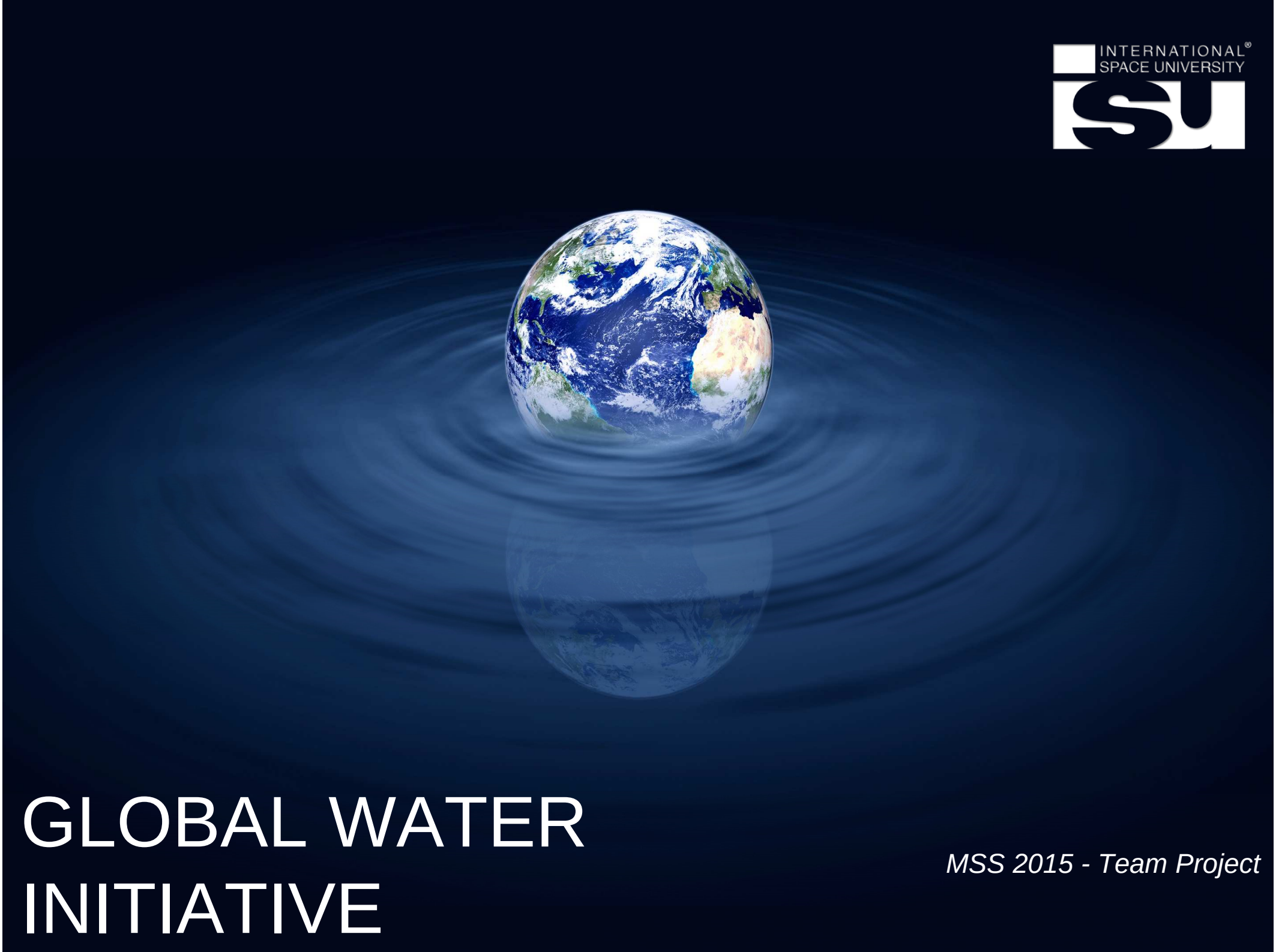
Global Water Initiative Team Project

International Space University
International, Intercultural, interdisciplinary (3Is) since 1987

UNCOPUOS
Scientific and Technical Subcommittee
3 February 2015



GLOBAL WATER INITIATIVE

MSS 2015 - Team Project

OUR MISSION

- To improve the management of fresh water resources
- Identify areas where space can improve practices
- Facilitate knowledge transfer between water management and communities.

OUR FOCU

Countries experienc urces, particularly in situations where:

- Upstream states eam states.
- Multiple countrie urce due to lack of other available s
- Current water sh r substandard water measurem
- Countries lack th eir shared resources in a su

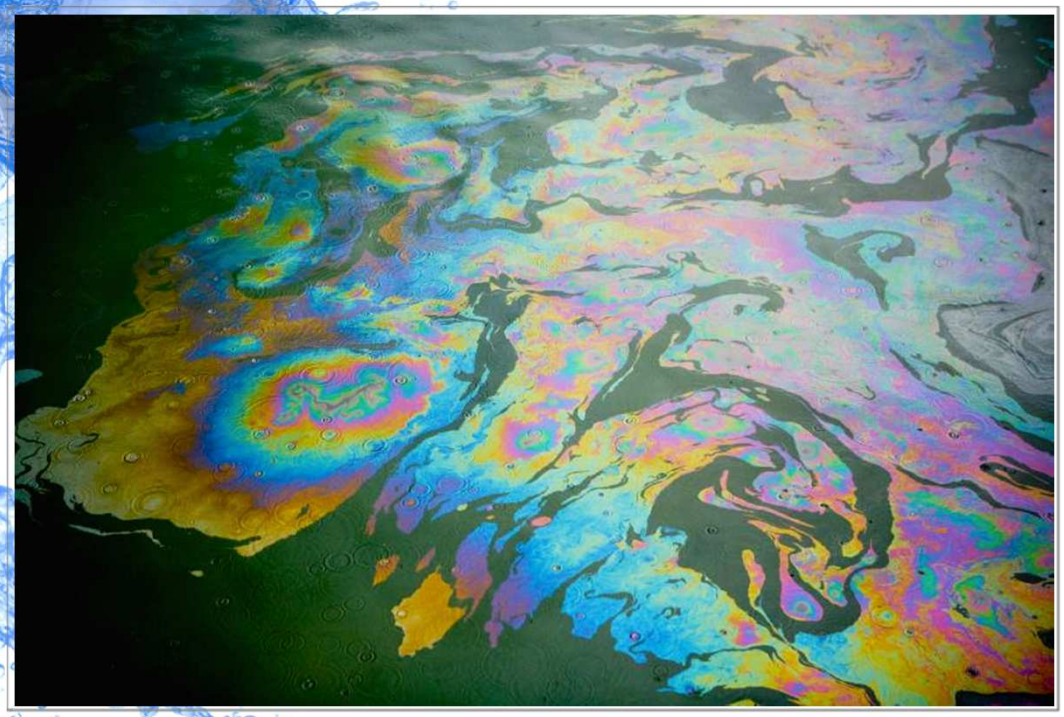
WATER & DEVELOPMENT

The 7th UN Millennium Development Goal is to ensure environmental sustainability

- By 2015: *halve the proportion of the population without sustainable access to safe drinking water and basic sanitation*

All our oceans are saline, freshwater accounts for only 2.5% of all water on Earth

- Some of this water is too polluted for human consumption
- Locked in glaciers and ice-caps



DIRECT HUMAN SOURCES: POLLUTION

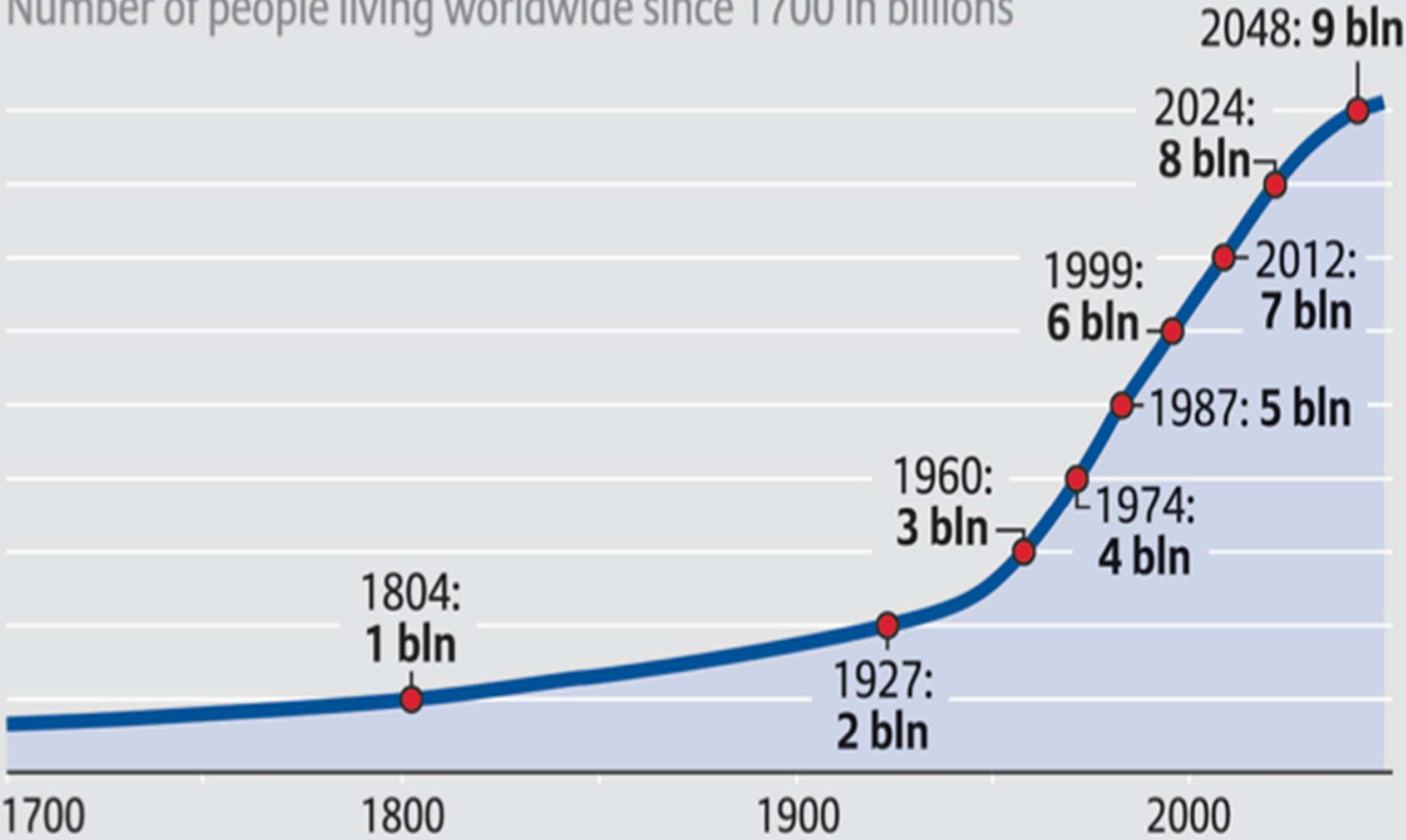
- Untreated sewage has both a direct and an indirect effect on water quality

- Ex: Radioactive waste pollution

POPULATION OF THE EARTH

Allianz

Number of people living worldwide since 1700 in billions



Source: United Nations World Population Prospects, Deutsche Stiftung Weltbevölkerung

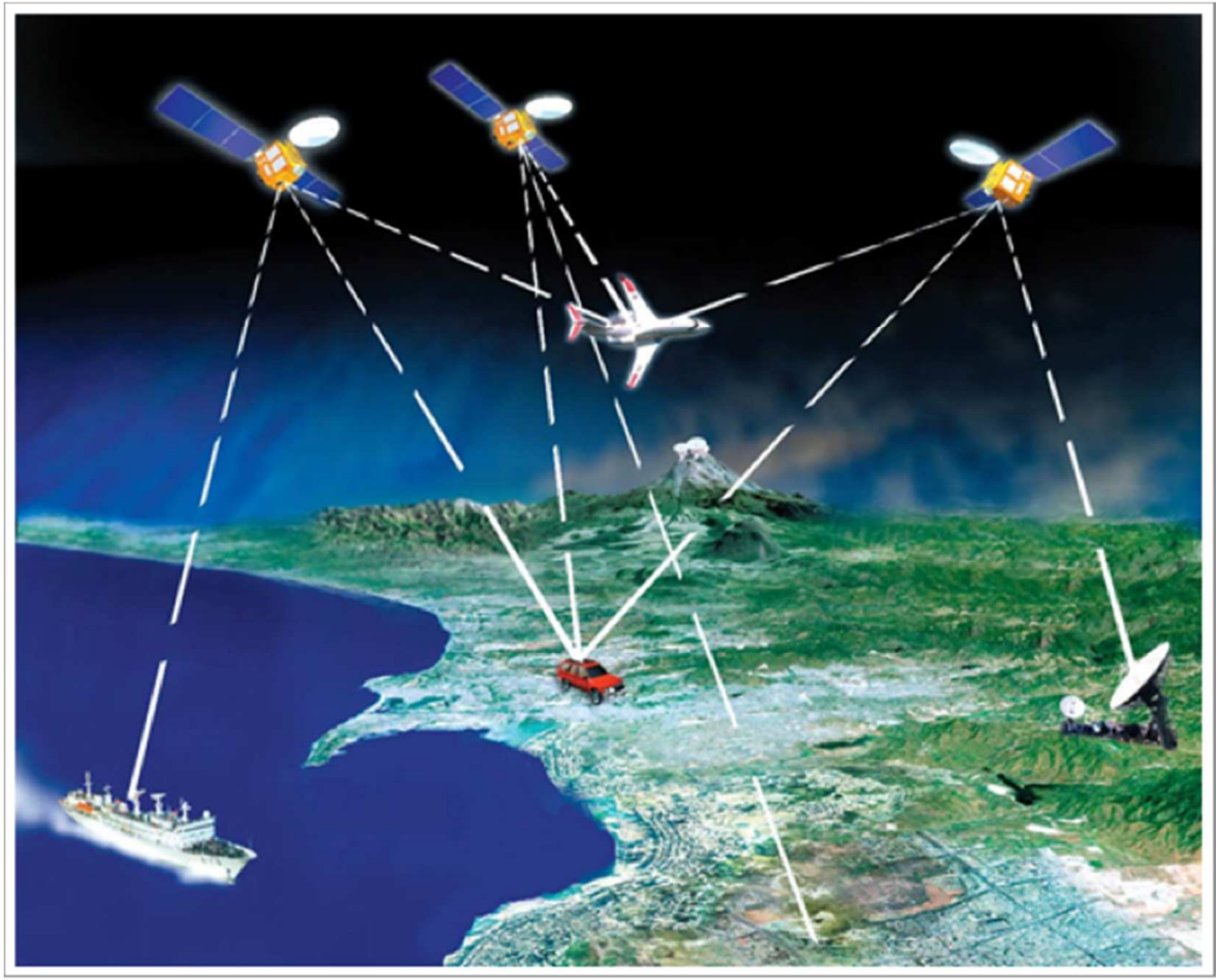
For further information please visit: www.knowledge.allianz.com

WATER AS « BLUE GOLD »

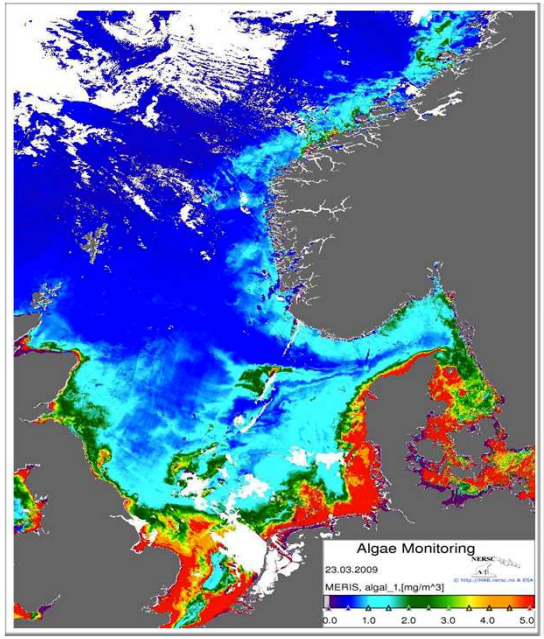
MUCH HAS BEEN DONE, BUT…

… there still remains a long way to go:

- **1.2 billion** people live in water-stressed situation
- **500 million** more are reaching this status in the near future
- **1.6 billion** are going to face economic water problems



CryoSat 2 [ESA]



Alguea Monitoring in Northern Sea [ESA]

SPACE & WATER

SPACE FOR CLIMATE

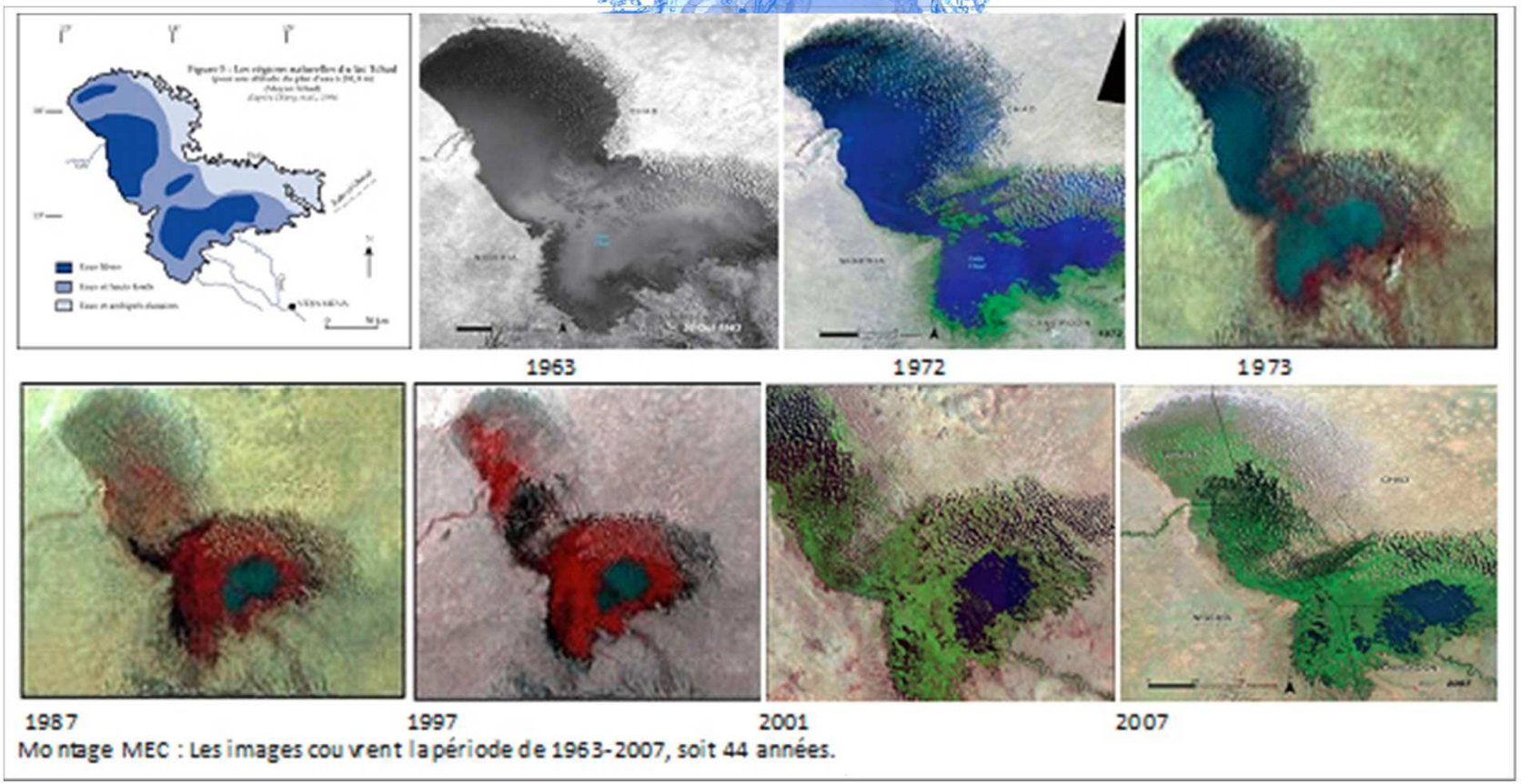
WATER SUSTAINABILITY: RECYCLING

- Environmental Control and Life Support System
  - Recycling system of the International Space Station

ISS Life Support Systems [NASA]

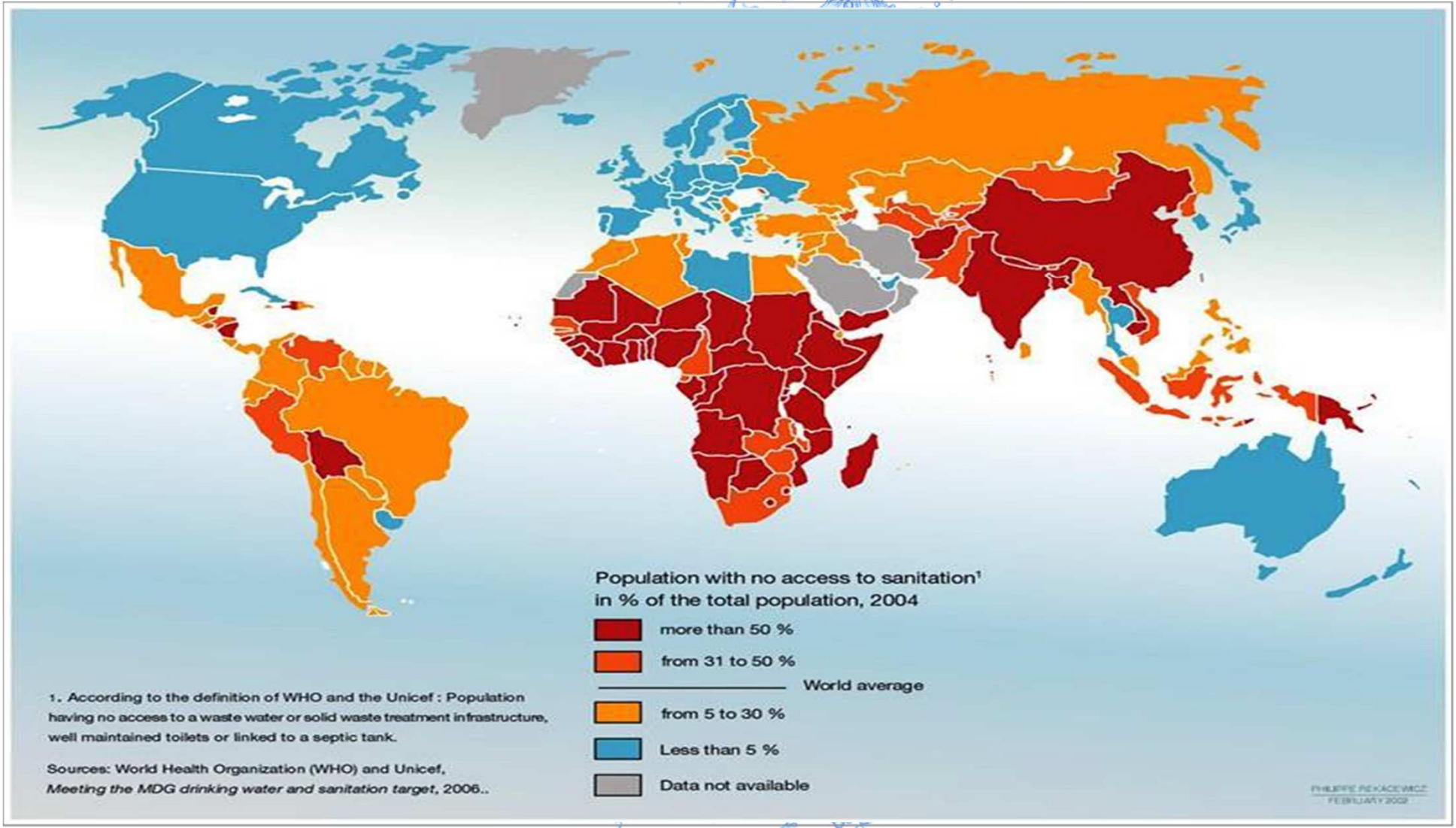
INDIRECT HUMAN SOURCES: OVER-USAGE

- Depletion of availability of existing water sources
- Contamination of water supplies by transient events
- Removal of natural water reclamation systems



Montage MEC : Les images couvrent la période de 1963-2007, soit 44 années.

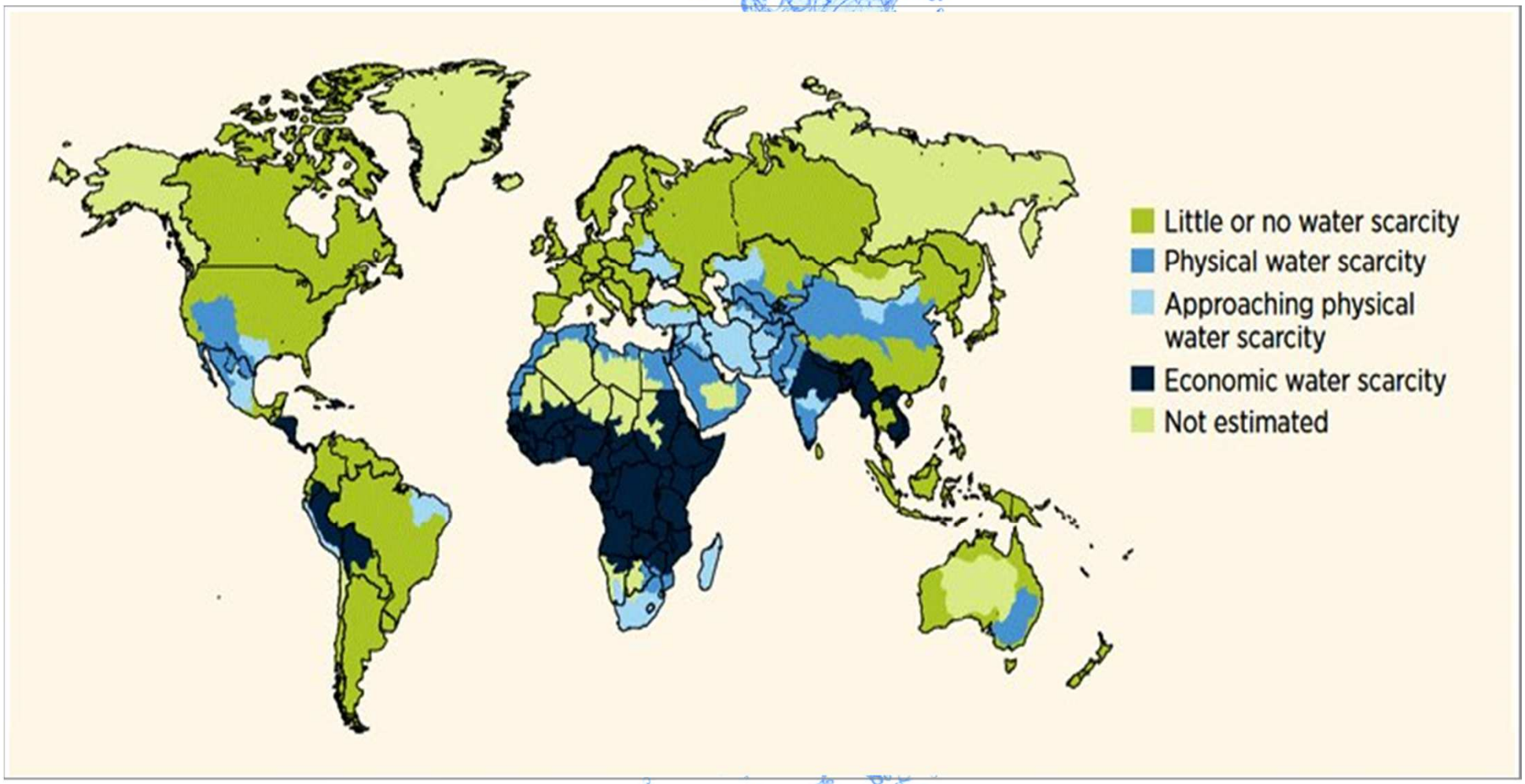
WATER QUALITY, POLLUTION & SANITATION



The percentage of population without access to proper sanitation (Rekacewicz, 2006)

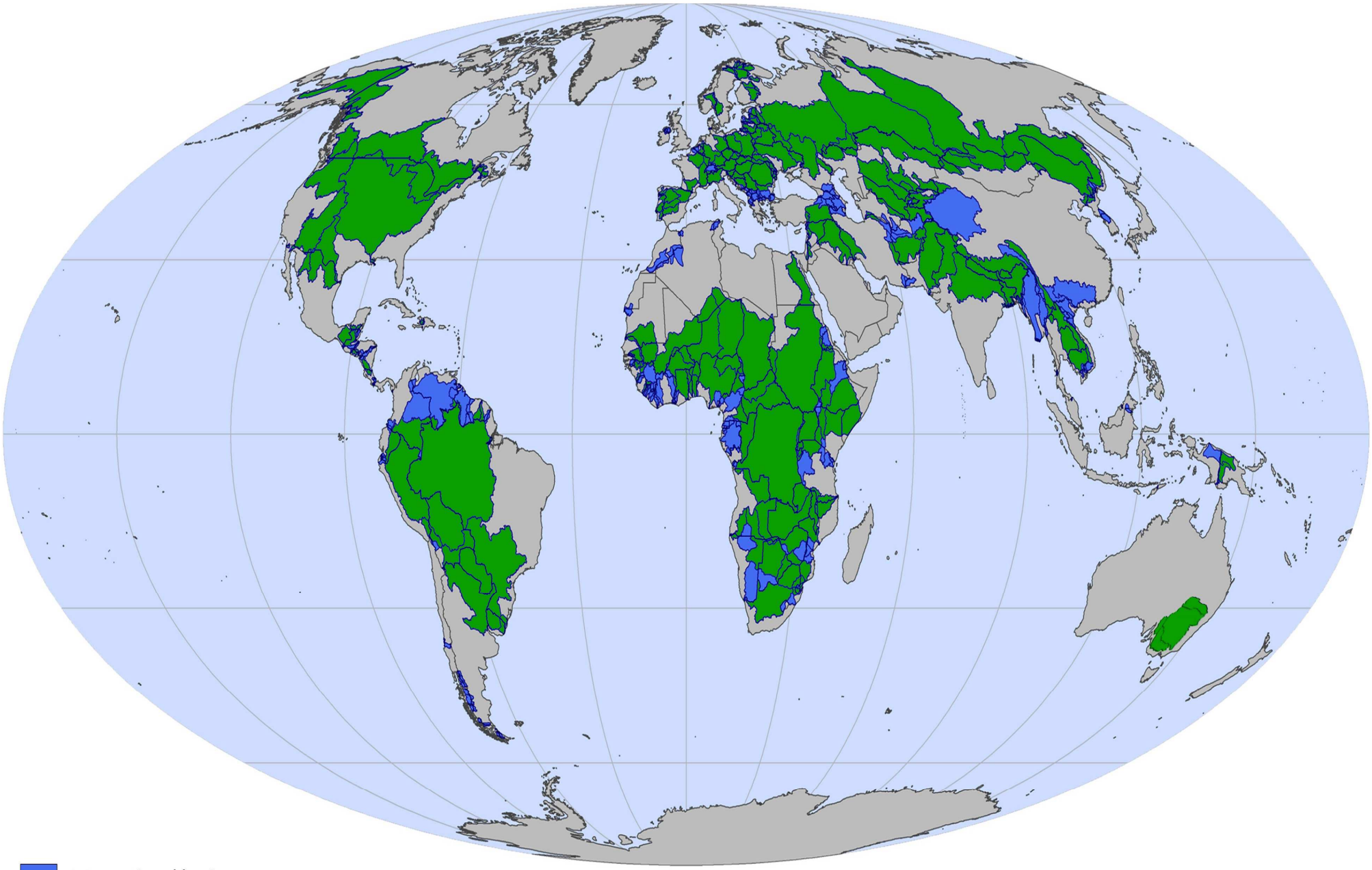
DEMOGRAPHICS & DEVELOPMENT

Worldwide water usage & access



Global Map of Water Scarcity by Region (The World Bank, 2014)

WORLD MAP OF RIVERS BASINS

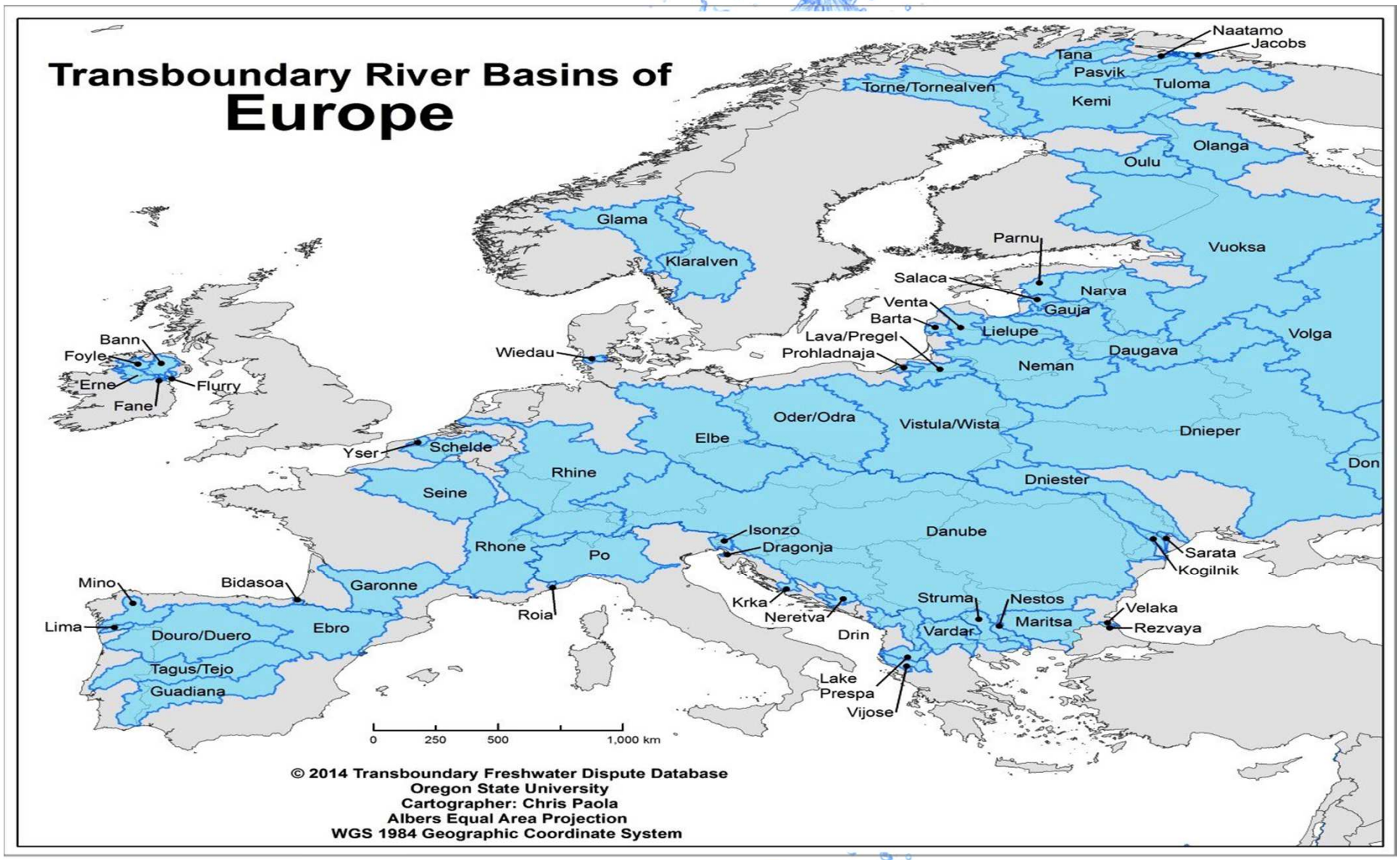


International basin

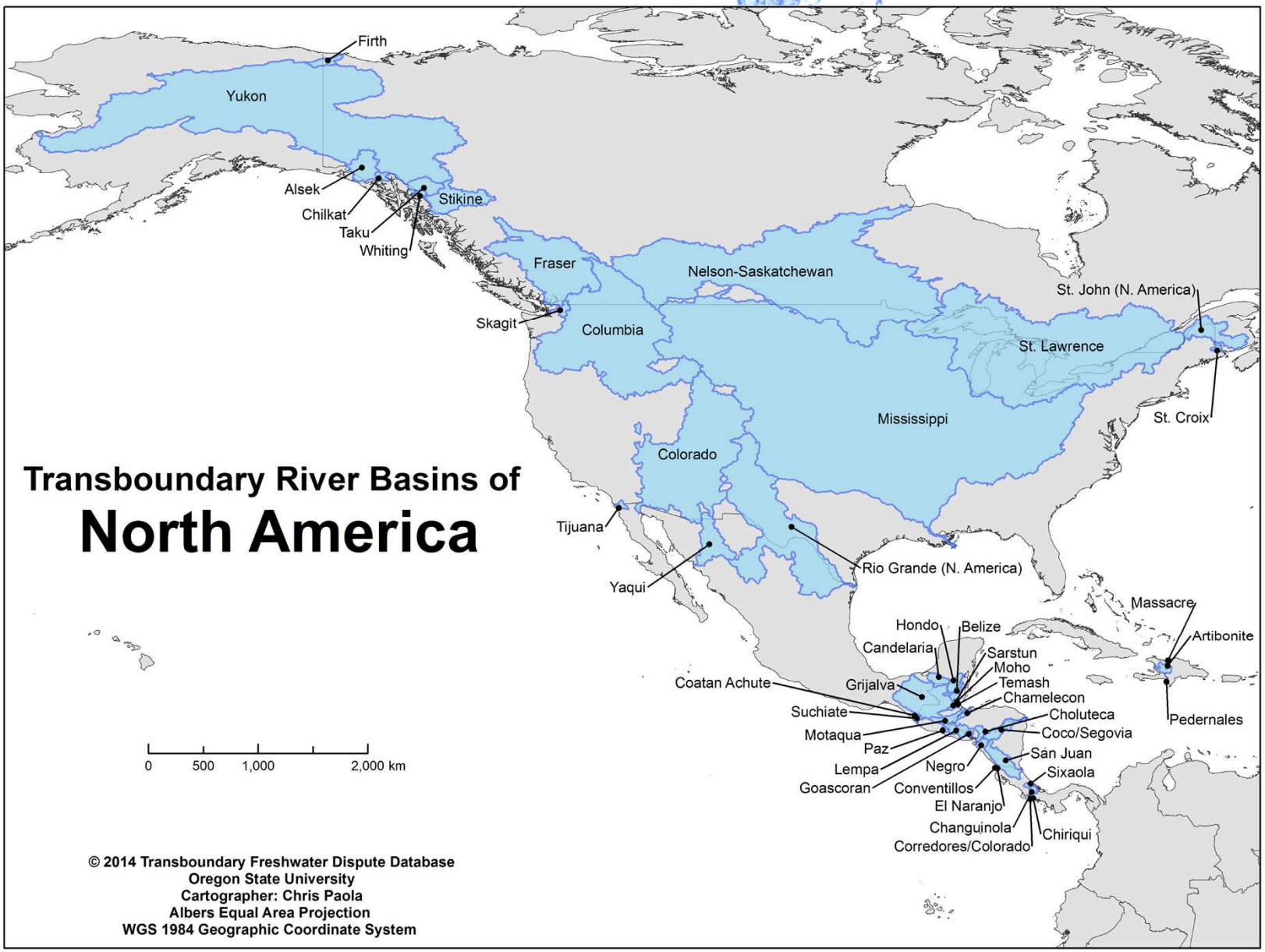
International basin with treaty

SOURCE: http://www.unwatercoursesconvention.org/importance/the-legal-architecture-for-transboundary-waters/

REGIONAL BASINS: EUROPE

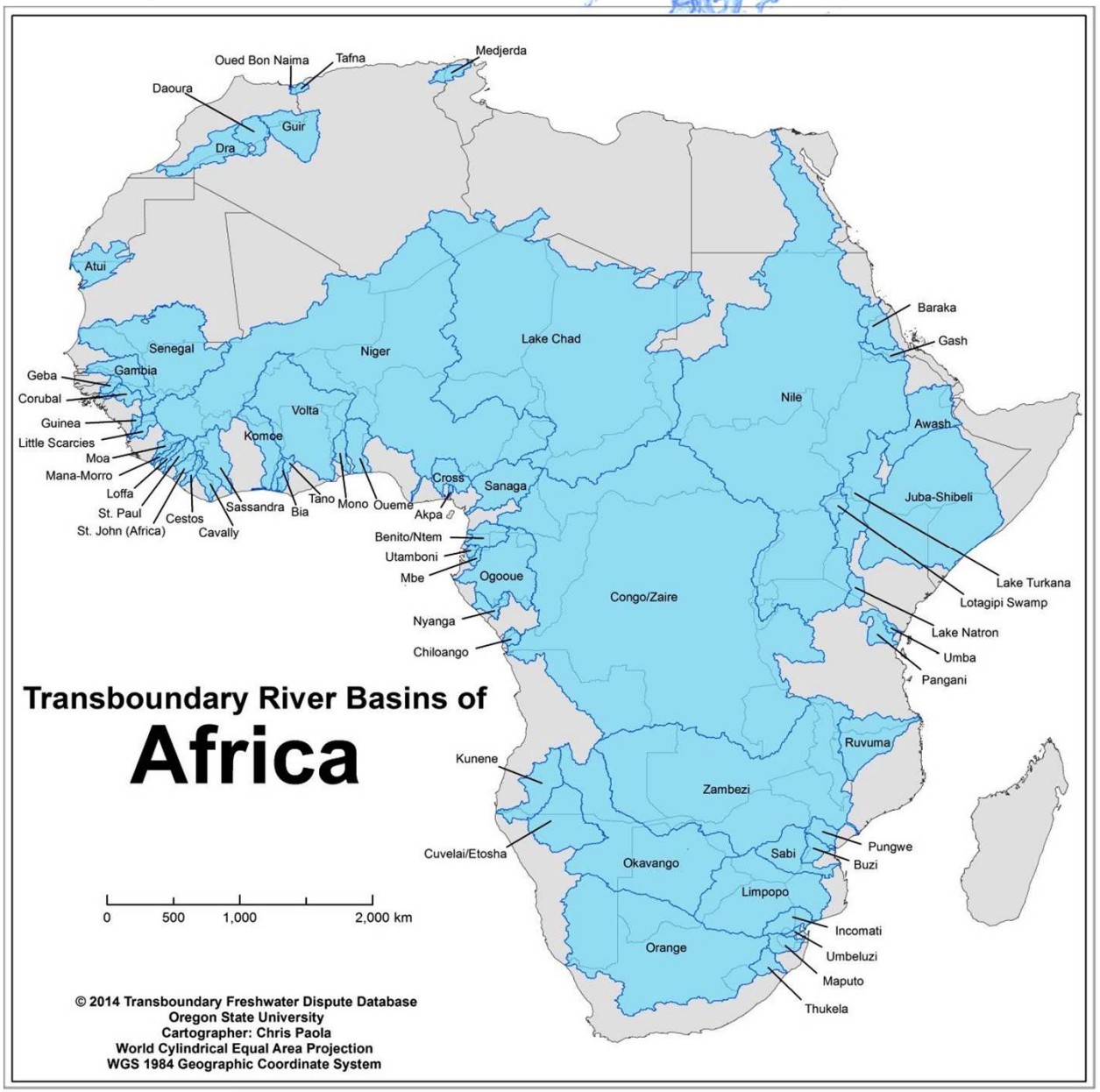


REGIONAL BASINS: NORTH/CENTRAL AMERICA

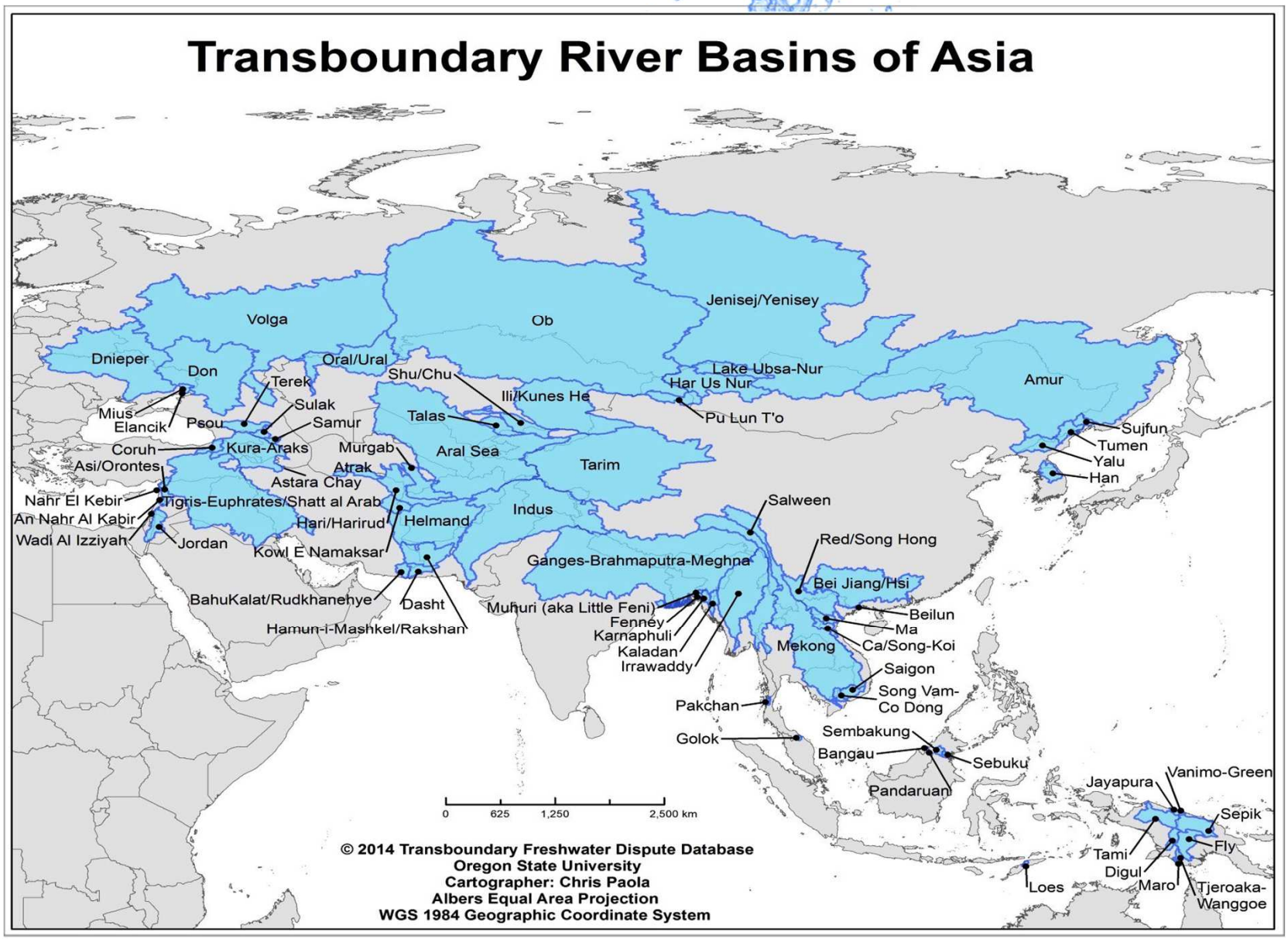


REGIONAL BASINS: SOUTH-AMERICA

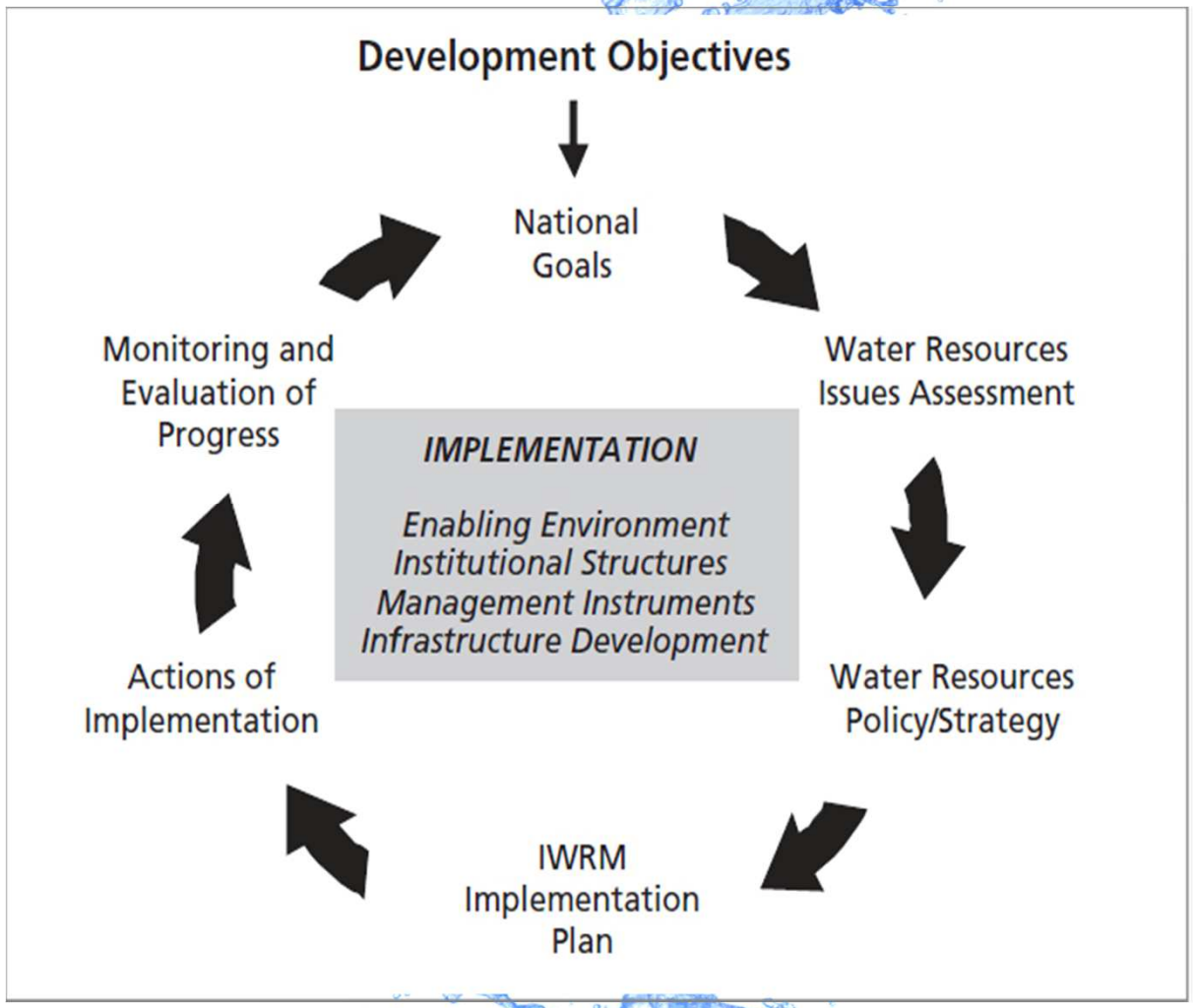
REGIONAL BASINS: AFRICA



REGIONAL BASINS: ASIA



GLOBAL WATER MANAGEMENT PROGRAM



MAJOR SPACE ACTORS FOR WATER

INTERNATIONAL® SPACE UNIVERSITY

Group on Earth Observation (GEO)

- 90 governments and 77 international organizations to form capacity building in public infrastructures

Committee on Earth Observations Satellites (CEOS)

- Water portal project providing data for the development of Geographical Information Systems (GIS) and decision support model

NASA: Landsat, Terra, Aqua, GRACE, GWP

ESA: SMOS, GOCE, Copernicus

INPE: PRODES, DETER, DEGRAD, TerraClass

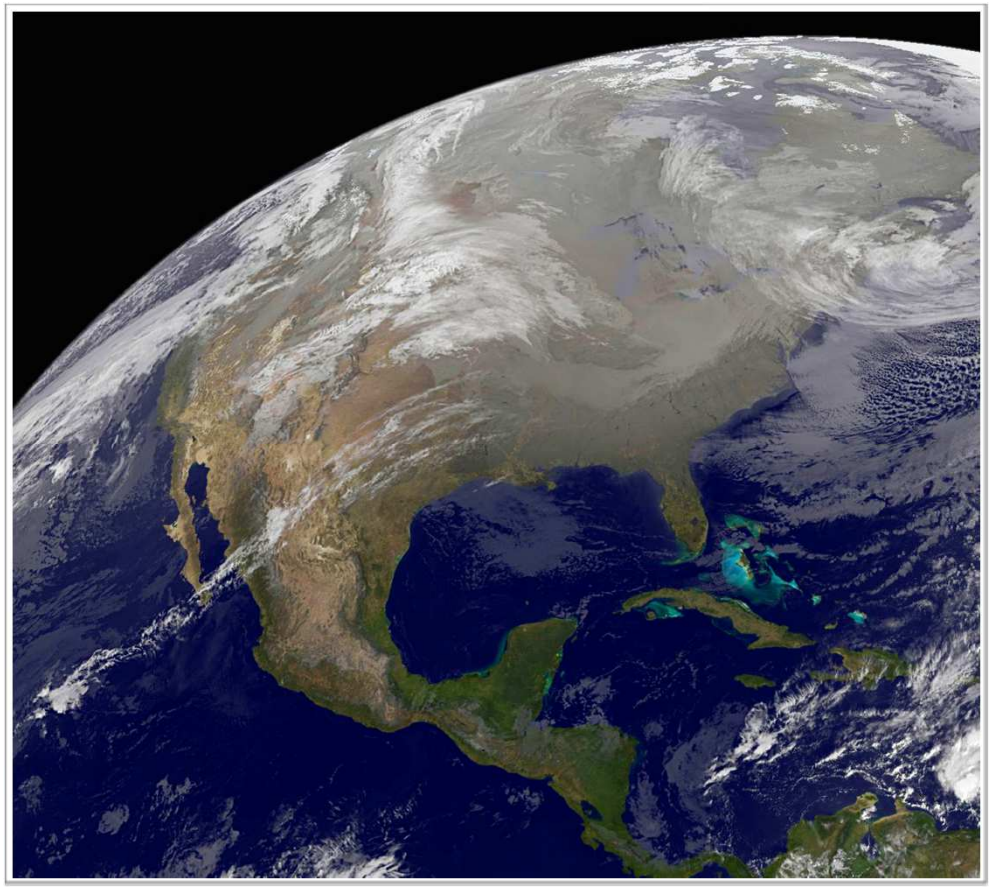
Others: Disaster Monitoring Constellation (DMC), SPOT

MAIN POLICIES & PROGRAMS

- World Health Organization
- United Nations Environment Program
- World Meteorological Organization
- Asian Development Bank
- National Governmental Programs

PROGRAMS: NORTH AMERICA

- **United-States**
  - Clean Water Act - 1972
  - Safe Drinking Water Act - 1974
  - NASA - core of water monitoring & management programs
- **Canada**
  - Canada Center for Mapping & Earth Observation
  - CSA & Environment Canada work with RADARSAT-2
- **Mexico**
  - Less advanced legislation & public oversight
  - Greater pollution level

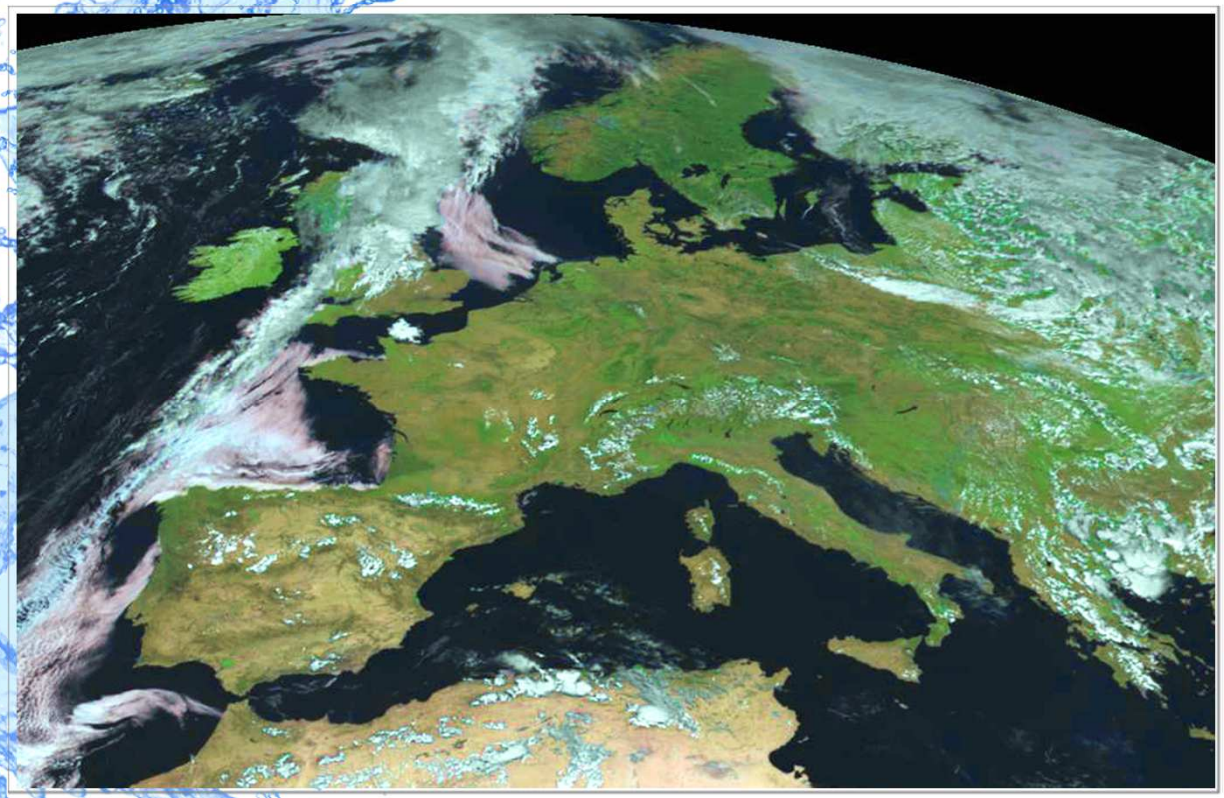


Credits: NASA

PROGRAMS: EUROPE

- **Sufficient good quality water available**

- **INTOGENER**
  - ESA project on the feasibility of water flow monitoring
  - Forecasting and data handling from Earth observation
  - Global positioning satellites



Credits: ESA

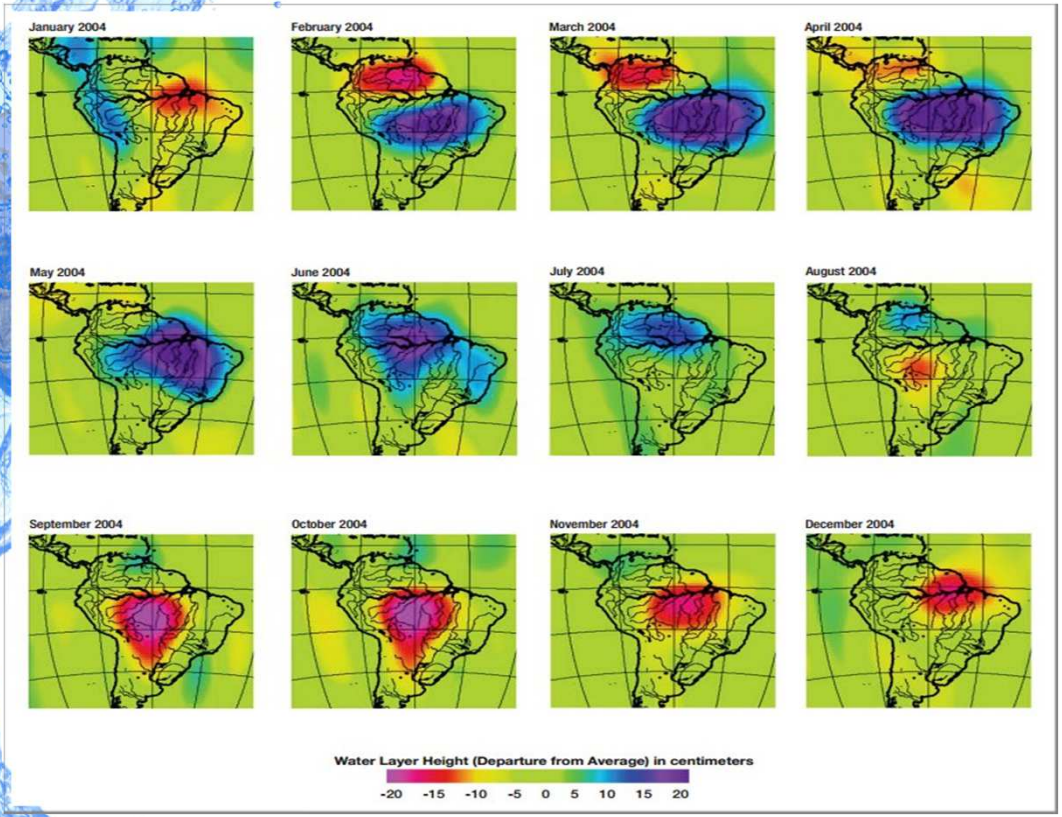
PROGRAMS: EUROPE

PROGRAM/MISSION	SATELLITE	MISSION DESCRIPTION	OPERATIONAL STATUS
Copernicus/GMES	SENTINEL-1 to SENTINEL-6	Global Monitoring for Environment and Security: Radar and Multi-spectral imaging instrument for land, ocean and atmospheric monitoring.	On going/In development. Sentinel 1 launched on 3 April 2014.
SMOS	SMOS	Measure of Soil Moisture and Ocean Salinity on global scale using an interferometric radiometer.	Operational
Eumetsat	Meteosat (MSG) and MetOp families	European Meteorological Satellite operator; provides data on weather, climate and the environment to member states and partners	Operational
ICARE	Meteosat (MSG) family	Interaction Clouds Aerosol Radiation Etc: Multi-satellite data processing center dedicated to aerosols, water vapour, clouds and radiation.	Operational
CALIPSO	CALISPO and CLOUDSAT	Cloud Aerosol Lidar and Infrared Pathfinder Satellite Observations: Measure atmospheric vertical profile trough LIDAR	Operational
ENVISAT	Envisat	One of the primary objectives of the mission was to make environmental studies in the area of atmospheric chemistry and ocean studies. (inoperative)	Dismissed. End of mission 9 May 2012

Summary of past and future European programs gathering relevant informations for monitoring water related issues.

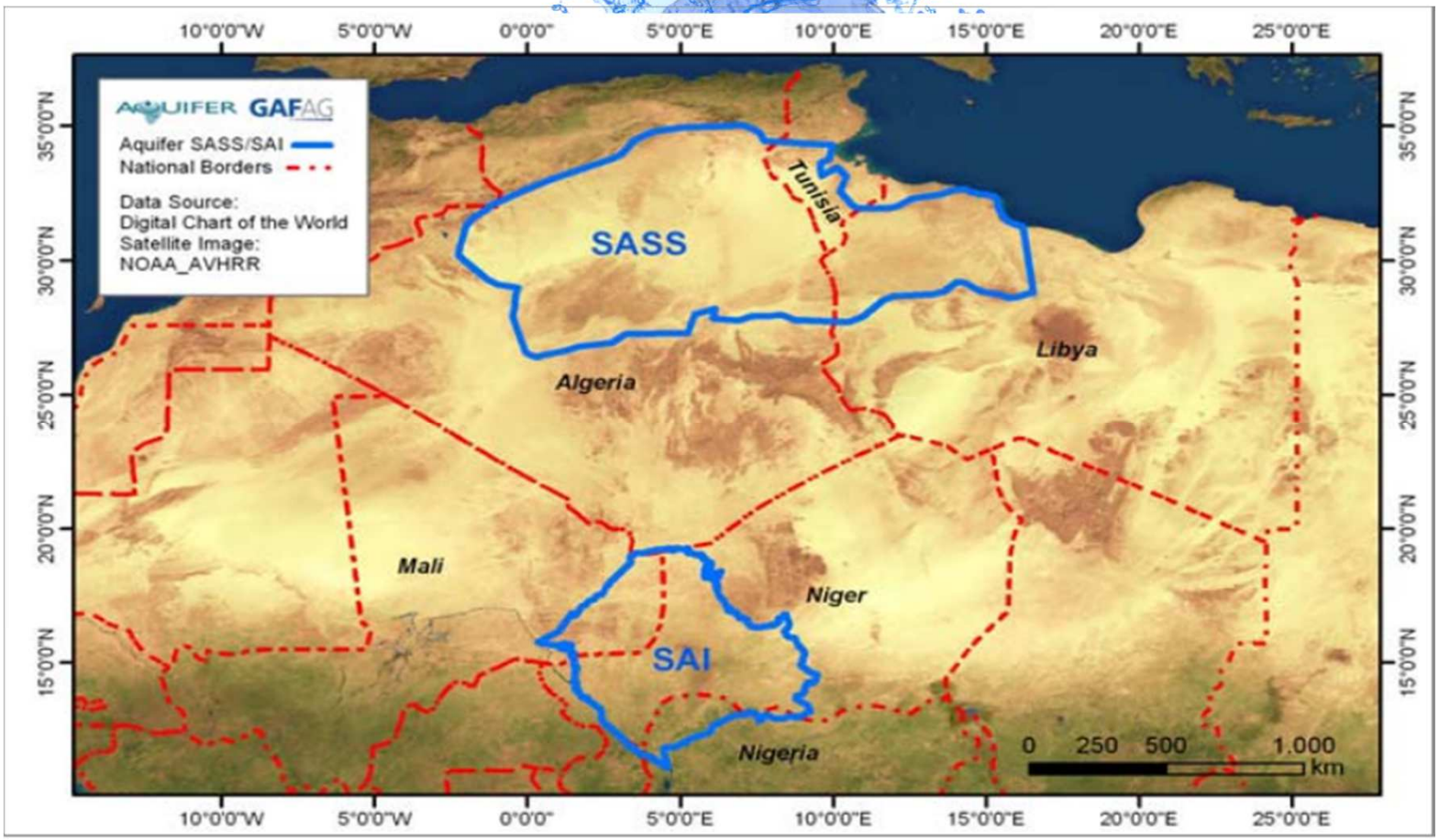
PROGRAMS: CENTRAL/ S. AMERICA

- **Central America**
  - SEVIR: monitoring rivers and surface water
- **Brazil**
  - Brazilian Institute of Space Research monitoring fresh water resources
- **Caribbean**
  - Lacking of national resources
  - Depending on other nations programs (Europe, Canada, US)



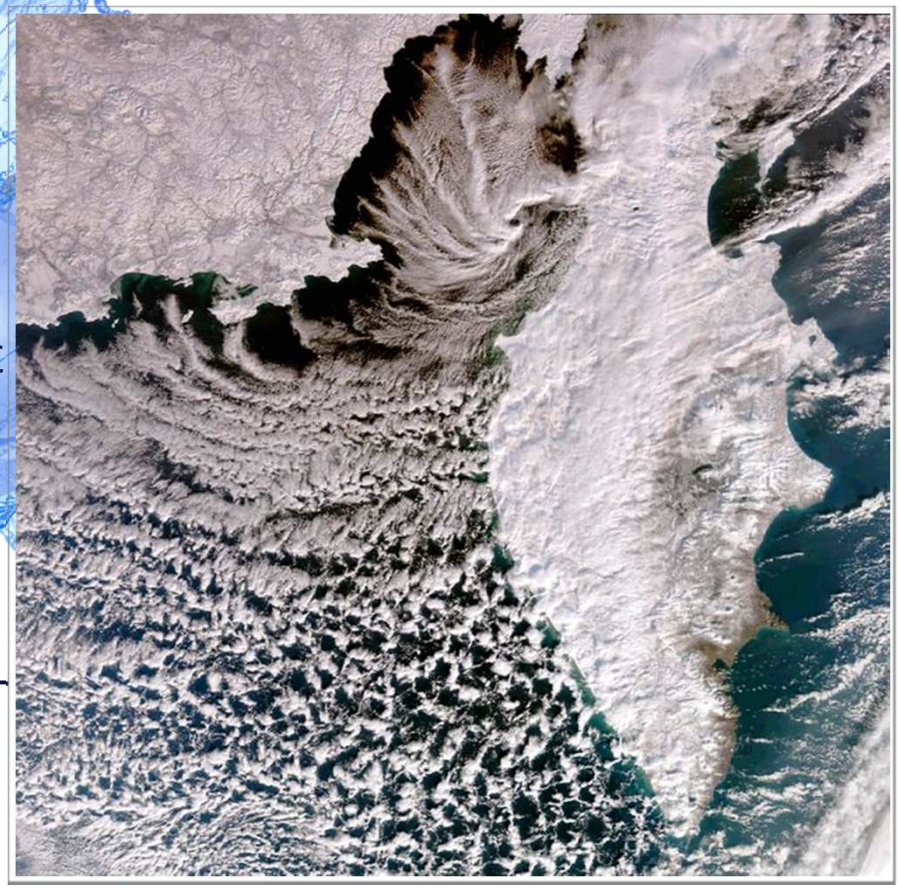
PROGRAMS: AFRICA

- **TIGER Initiative:** detecting ground and superficial water (ESA)



PROGRAMS: RUSSIA

- **Ministry of Natural Resources & Environment**
- **Commercial applications**
  - Sovzond: Providing high-resolution imaging on water usage and management
- **Developed space program & cooperation:**
  - Meteor-3M, Kanopus-V: atmospheric, sea-surface
  - ERS-2, Jason-1, Jason-2: water flow and movement



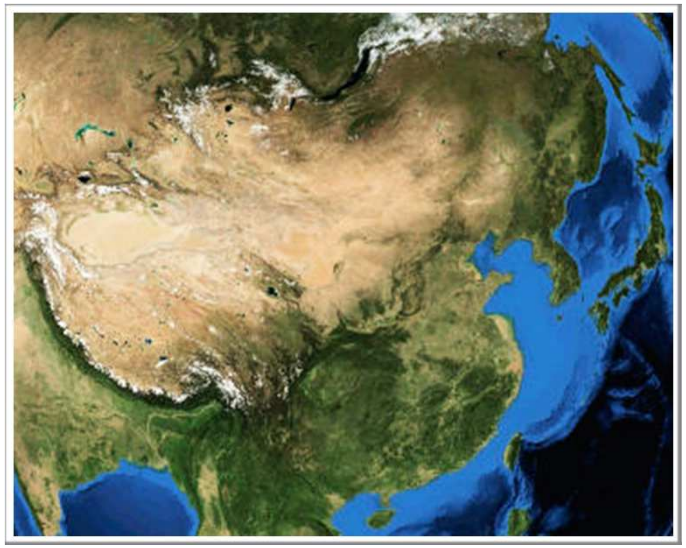
Kamtschatka Peninsula, ESA

PROGRAMS: INDIA/CHINA

- **India**
  - Space based information system used for better management of water resources

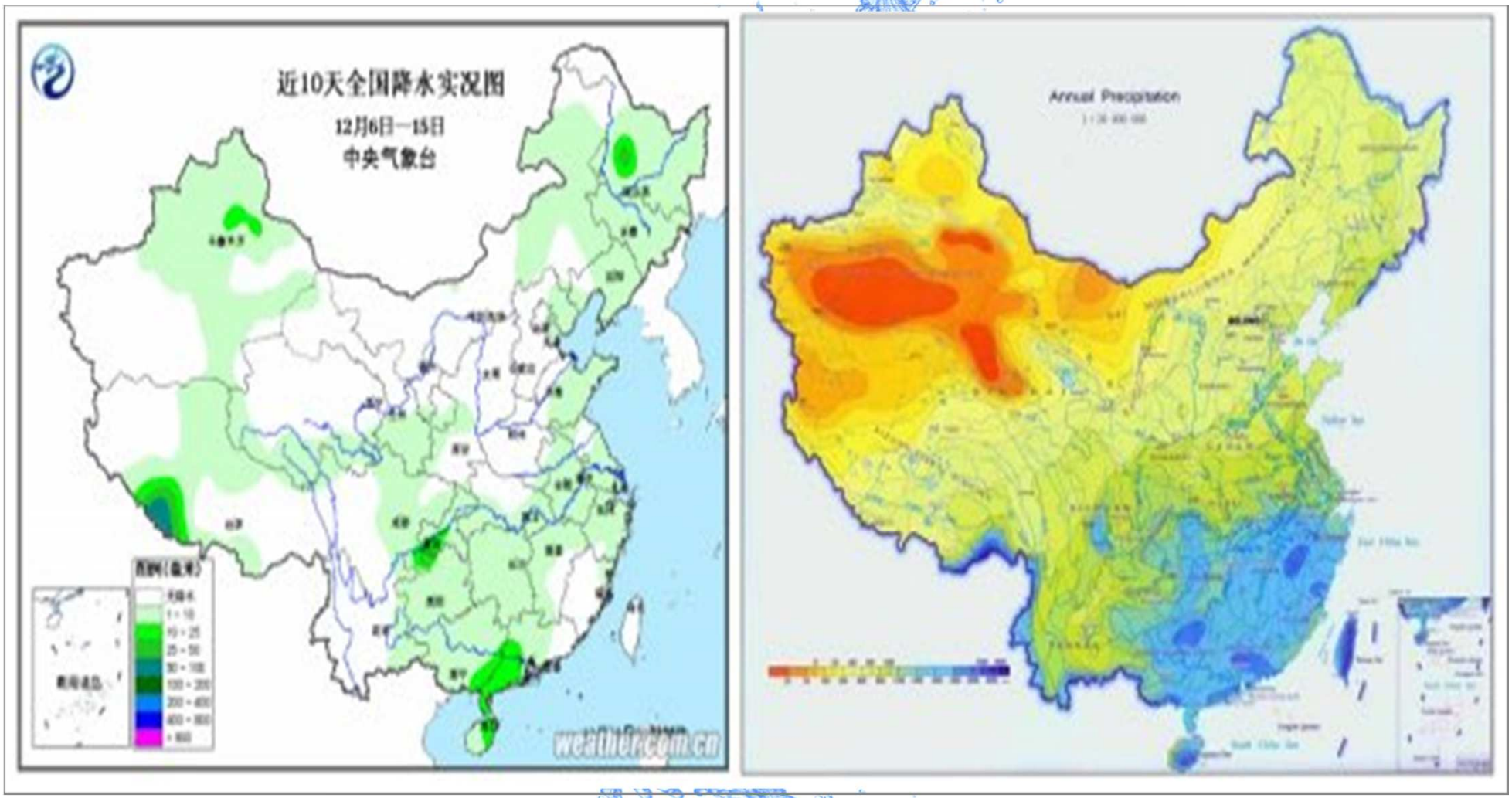
Credits: ISRO

- **China**
  - South-North Water Transfer Project supporting continued development on the North China plain
    - ➡ *US$ 62 billion for diverting 44.8 billion cubic meters of water*
  - FenhYun: weather & typhoon forecast
  - Gaofen series: land and water monitoring/management



Credits: NASA

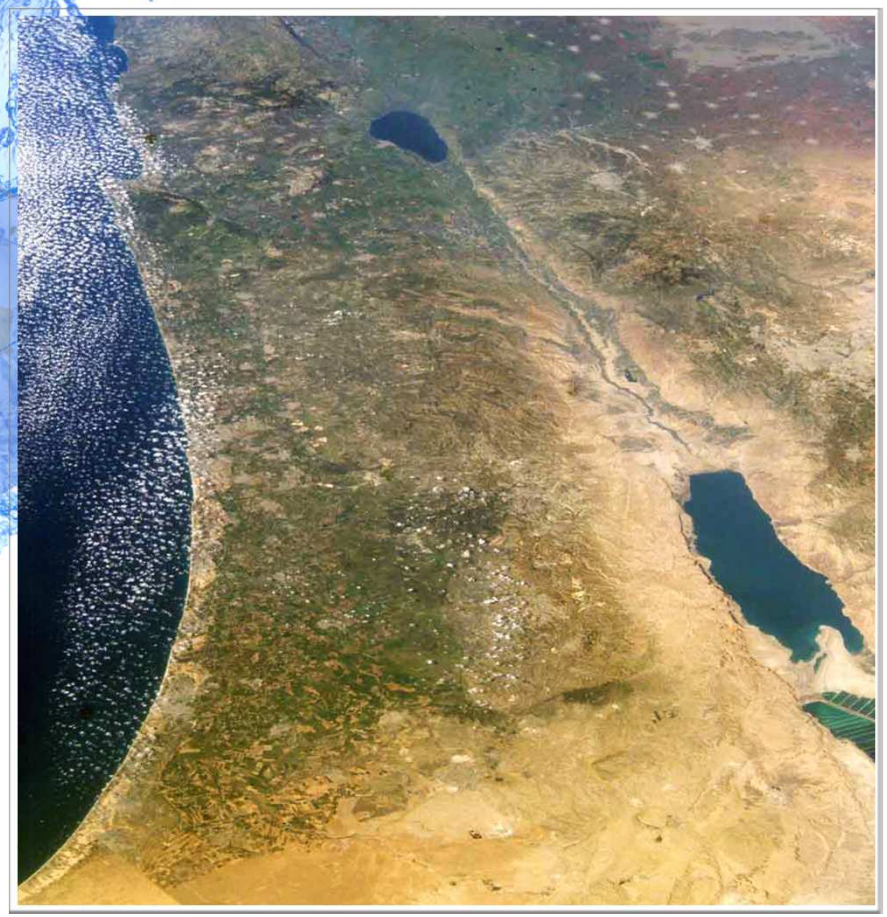
PRECIPITATIONS REMOTE SENSING IN CHINA



Precipitation levels in China [Weather China, 2014]

PROGRAMS: MIDDLE-EAST

- **Relies on international assistance**
  - USAID providing remote sensing data to regional decision-makers
  - US Geological Survey working with Israel, Palestine and Jordan
  - GLOWA Jordan River Project**:** internationally funded regional initiative
- **Israel**
  - Earth Observing System Data Information System: for gathering geographical information on land, humidity, soil and vegetation
  - Important collaboration with the *Centre National d'Etudes Spatiales* (CNES) on the Venus mission



Credits: Israel Space Agency

AN AMBITIOUS APPROACH

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U.S.A.

HELP US TO HELP THE WORLD

- Research areas for potential improvement for water management globally at a regional scale.
- Research and identify solutions derived from space activities
- Develop opportunities and methods for knowledge transfer and raising awareness
- Implement the findings of our into your policy to better the lives of the population there

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