

CLIMATTERS 2017

**Budapest,
25 May, 2017**

WA(TE)R AND PEACE

András Szöllősi-Nagy

NUPS, Hungary

Office for Sustainable Development Studies

UNESCO International Hydrological Programme, Chair

THE OVERALL SETTING:

WATER AND POLITICS

**WAR OVER WATER
OR
TRANSBOUNDARY
COOPERATION OVER
WATER?**

"The next war in the Middle East will be fought over water, not politics."

Boutros Boutros Ghali, former UN Secretary General in 1985 as Vice Foreign Minister of Egypt

"The wars of the next century will be about water."

Ismail Serageldin, former Vice President of the World Bank in 1999

"Fierce competition for fresh water may well become a source of conflict and wars in the future."

Kofi Annan, former U.N. Secretary-General in 2001



GLOBAL TRENDS 2030:

ALTERNATIVE WORLDS

a publication of the National Intelligence Council



Four overarching megatrends will shape the world in 2030:

- Individual Empowerment.
- The Diffusion of Power.
- Demographic Patterns.
- The Growing Nexus among Food, Water, and Energy



National Security (2012)

GLOBAL TRENDS 2030:

ALTERNATIVE WORLDS

a publication of the National Intelligence Council



Four overarching megatrends will shape the world in 2030:

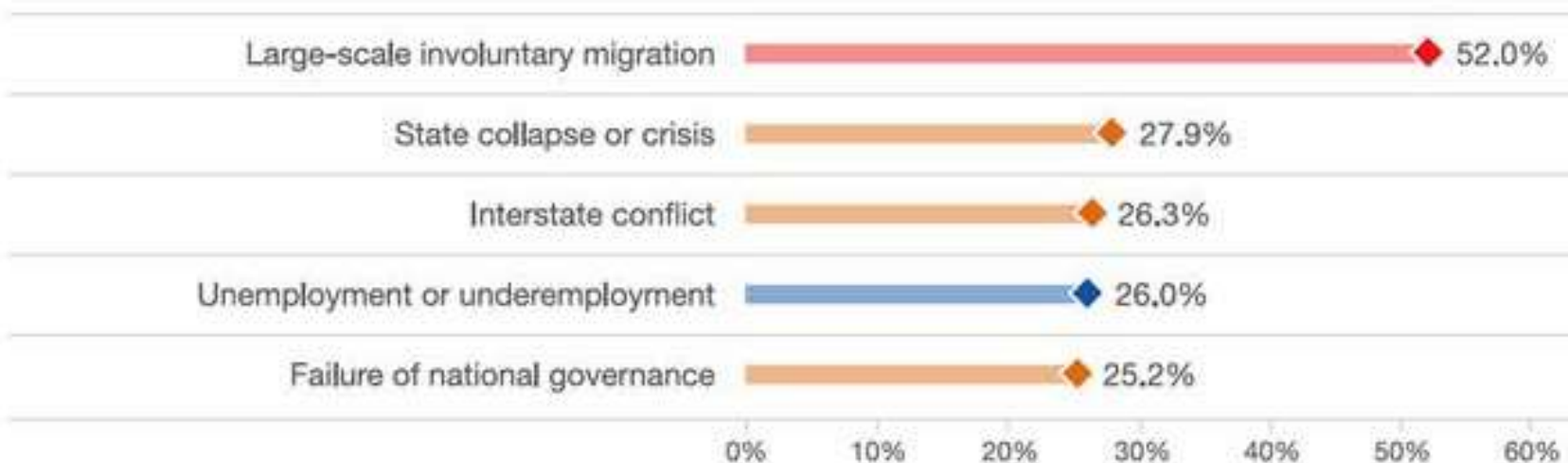
"Water may become a more significant source of contention than energy or minerals out to 2030 at both the intrastate and interstate levels."

- The Growing Nexus among Food, Water, and Energy

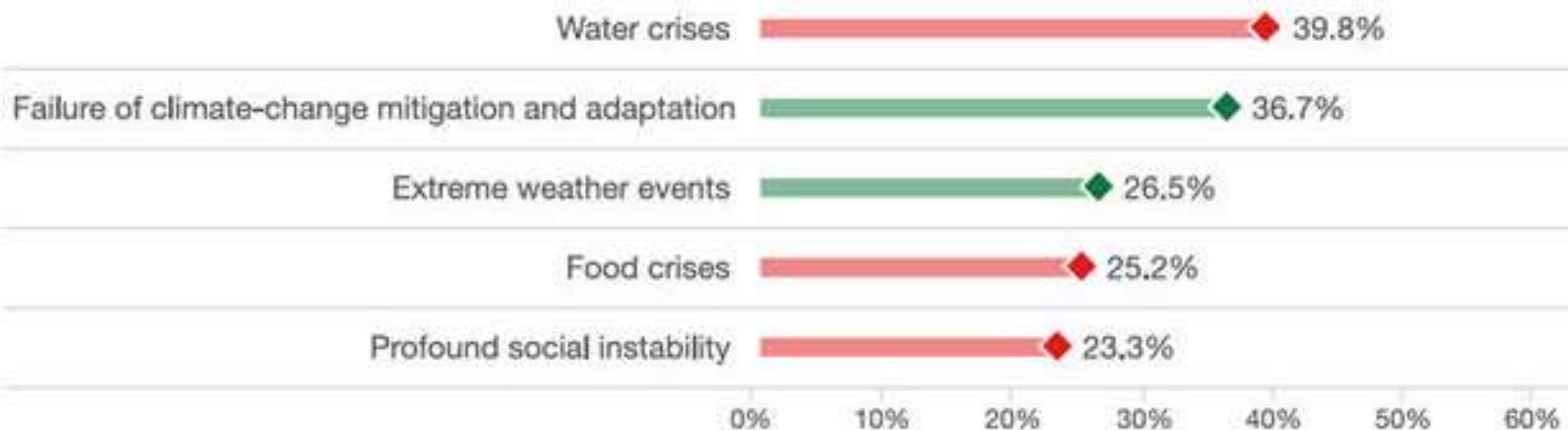
The Global Risks of Highest Concern, 2016

Percent of participants mentioning the respective risk to be of high concern for the time frame of 18 months or 10 years, respectively. Participants could name up to five risks in each time frame. In each category, the risks are sorted by the total sum of mentions.

For the next 18 months



For the next 10 years



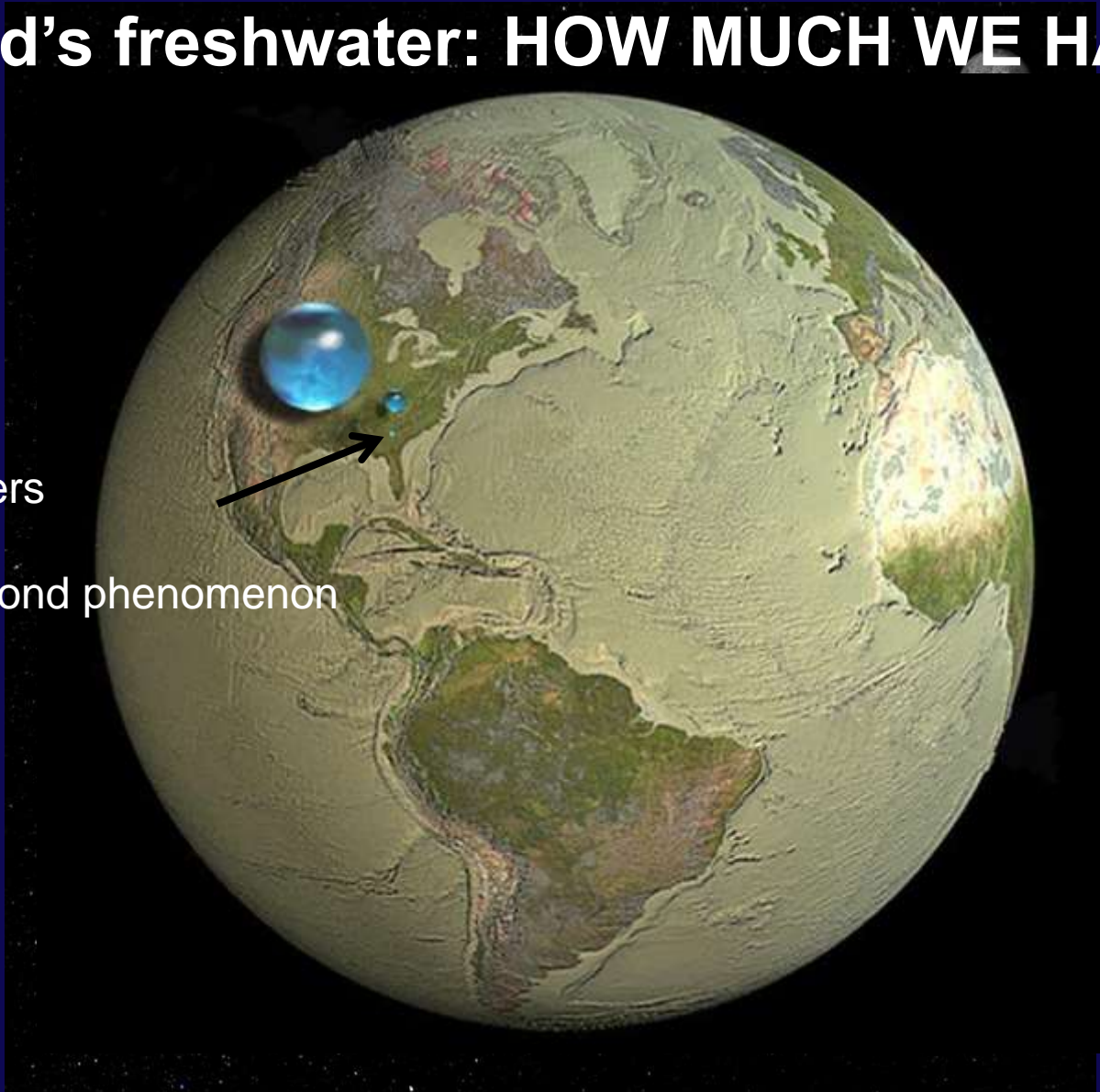
The world's freshwater: HOW MUCH WE HAVE?

Lakes and rivers

•41,000 km³

•The James Bond phenomenon

.007



How much water is easily accessible?

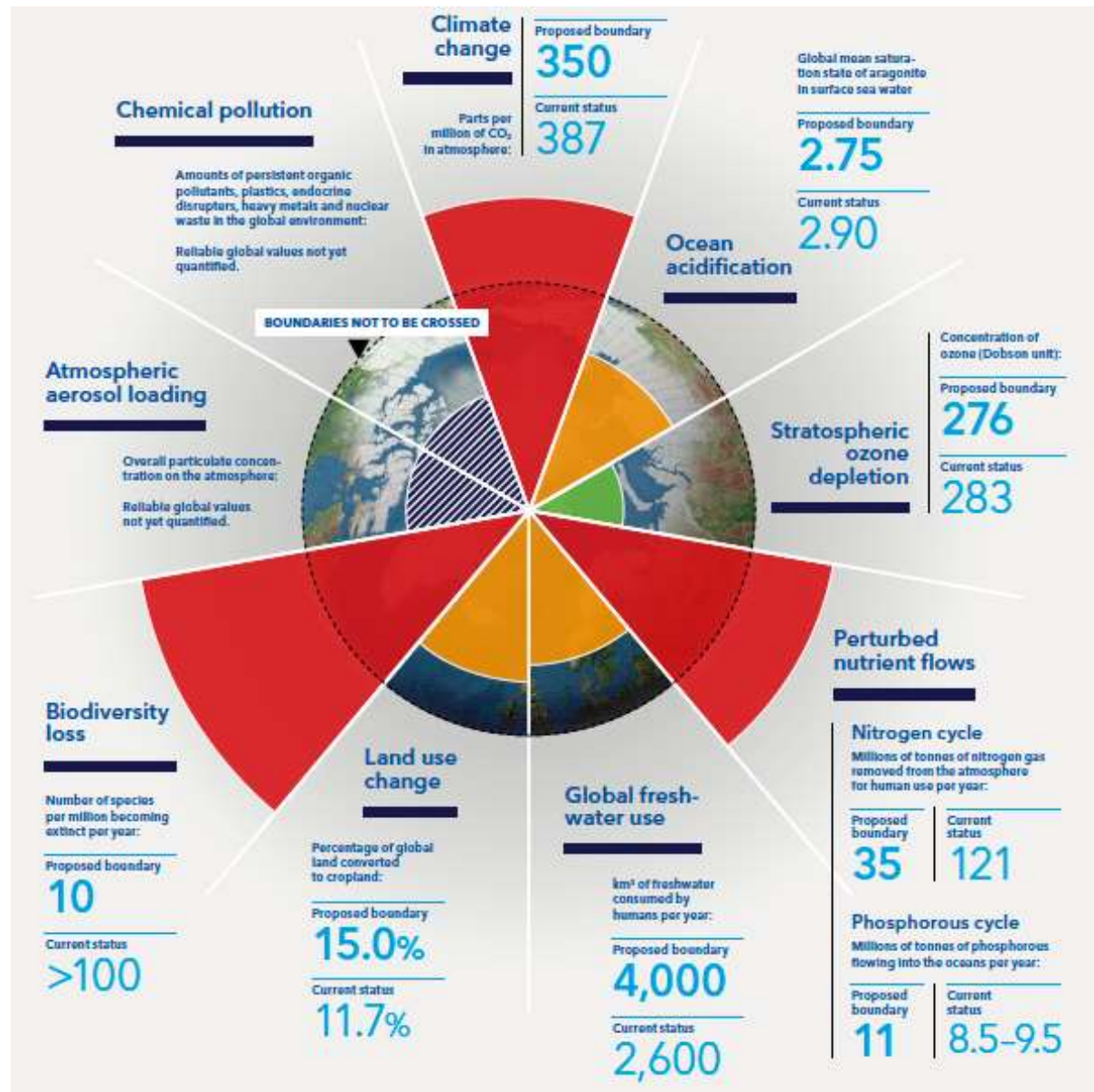


● Areas where we have exceeded the boundaries and are continuing to move further beyond them.

● Areas where we are still below the boundary values, but are moving towards them.

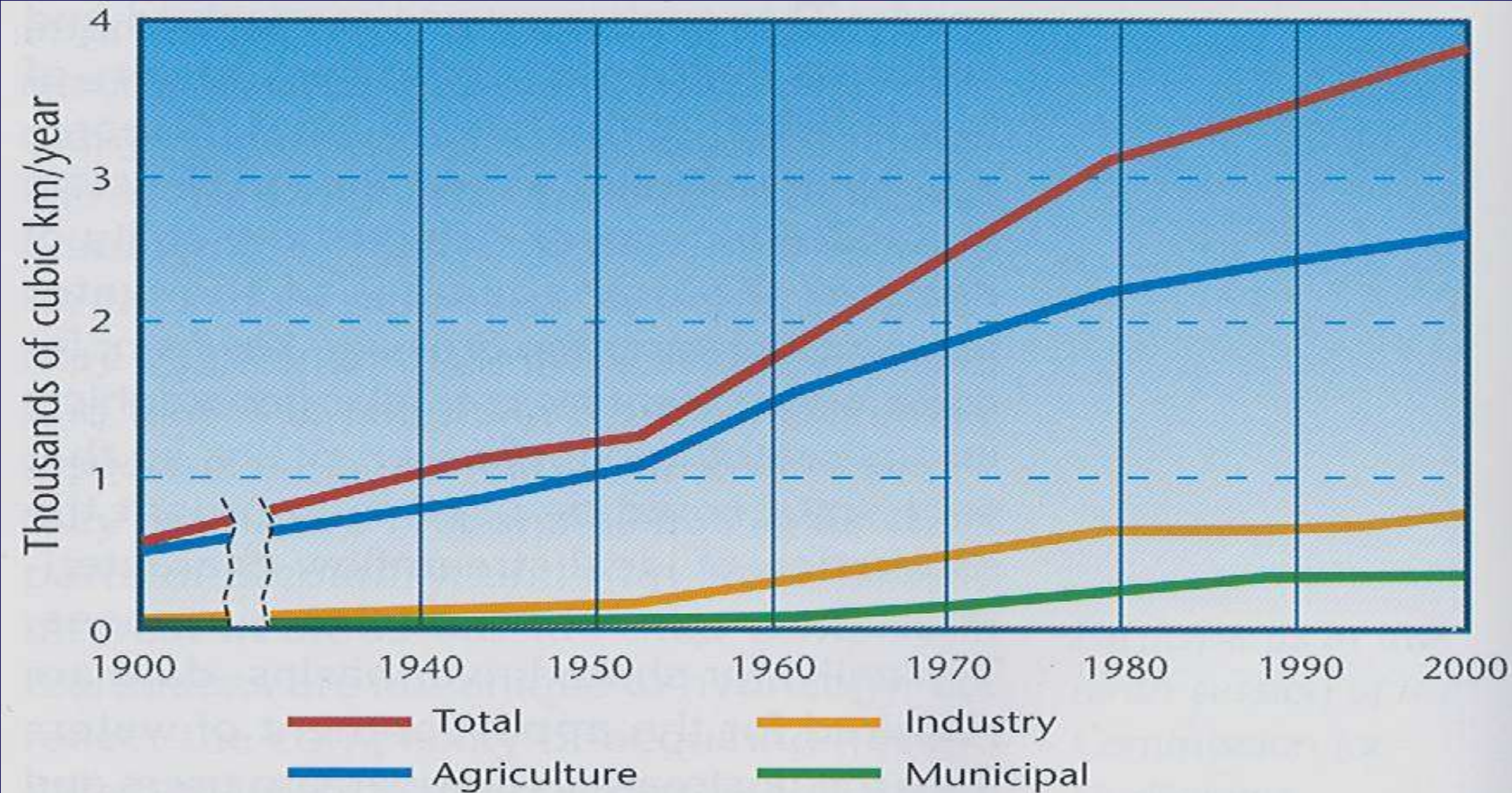
● Area where international political agreements have allowed us to start moving away from a boundary - in the correct direction.

● Areas where no boundary values were established.



Rockström, et al., Nature, 2009
 DNV GL Report 2014

TRENDS OF NON-SUSTAINABLE WATER USE [1000 KM³/YR]



KEY CHANGES SINCE 1900

- **The world's population has increased 3-fold**
- **Water withdrawal has increased 6-fold**
- **The area of cropland has almost doubled**
- **The area of pasture has decreased by about 75%**
- **The area covered by tropical forests has decreased by about 25%.**
- **Dams now intercept ca. 40% of the runoff from the continents**

LOOMING WATER CRISES

The time of easy water is over

WATER



- Is the cycle changing?
- Increased risks?
- Growing vulnerability?
- More disasters ?
- Less water for people?
- Crisis is looming?
- What crisis?
- Global or local?

**A CRISIS OF
GOVERNANCE**

GOVERNANCE
versus
MANAGEMENT

GOVERNANCE:

Doing the right things

MANAGEMENT:

Doing things right

Accountability

Transparency

Integrity

Gender

Equity

Informed decisions

Knowledge transfer and sharing from data to science

Conflict resolution

Participation

Inclusive approach

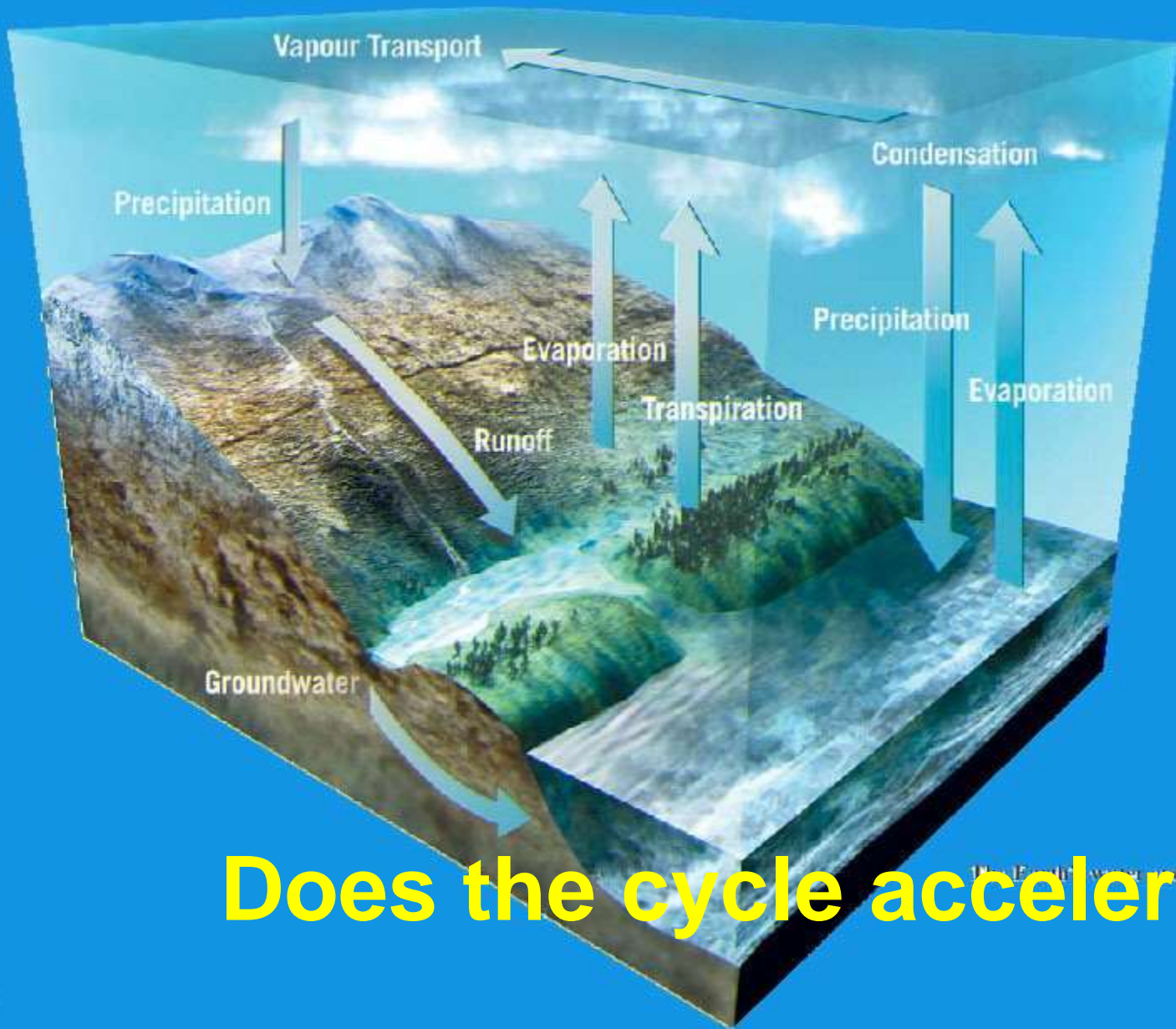
Rule of Law

HEADLINE NEWS!!!!!!

The climate is changing !!!

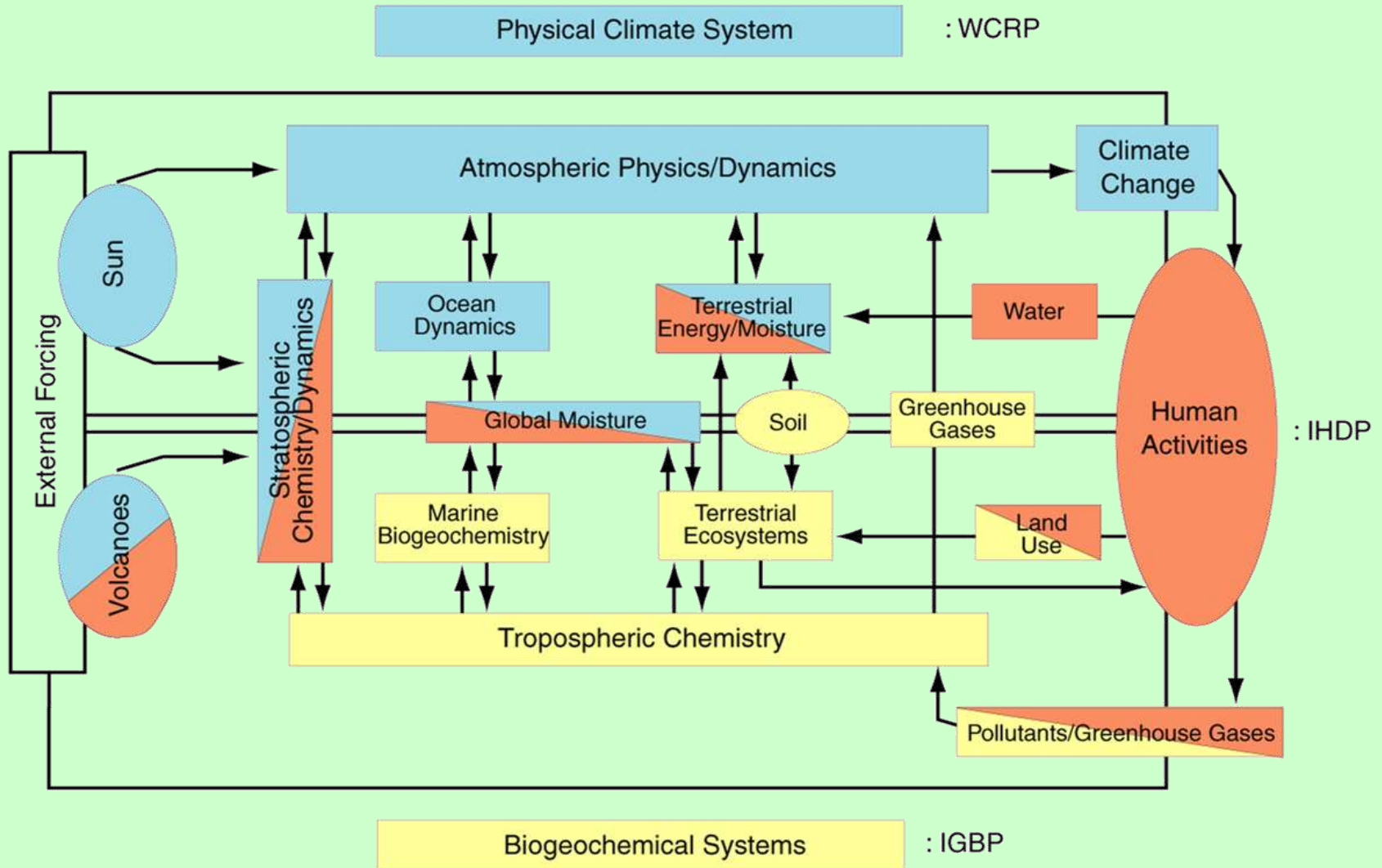
(Yap, for 4 billion years now ...)

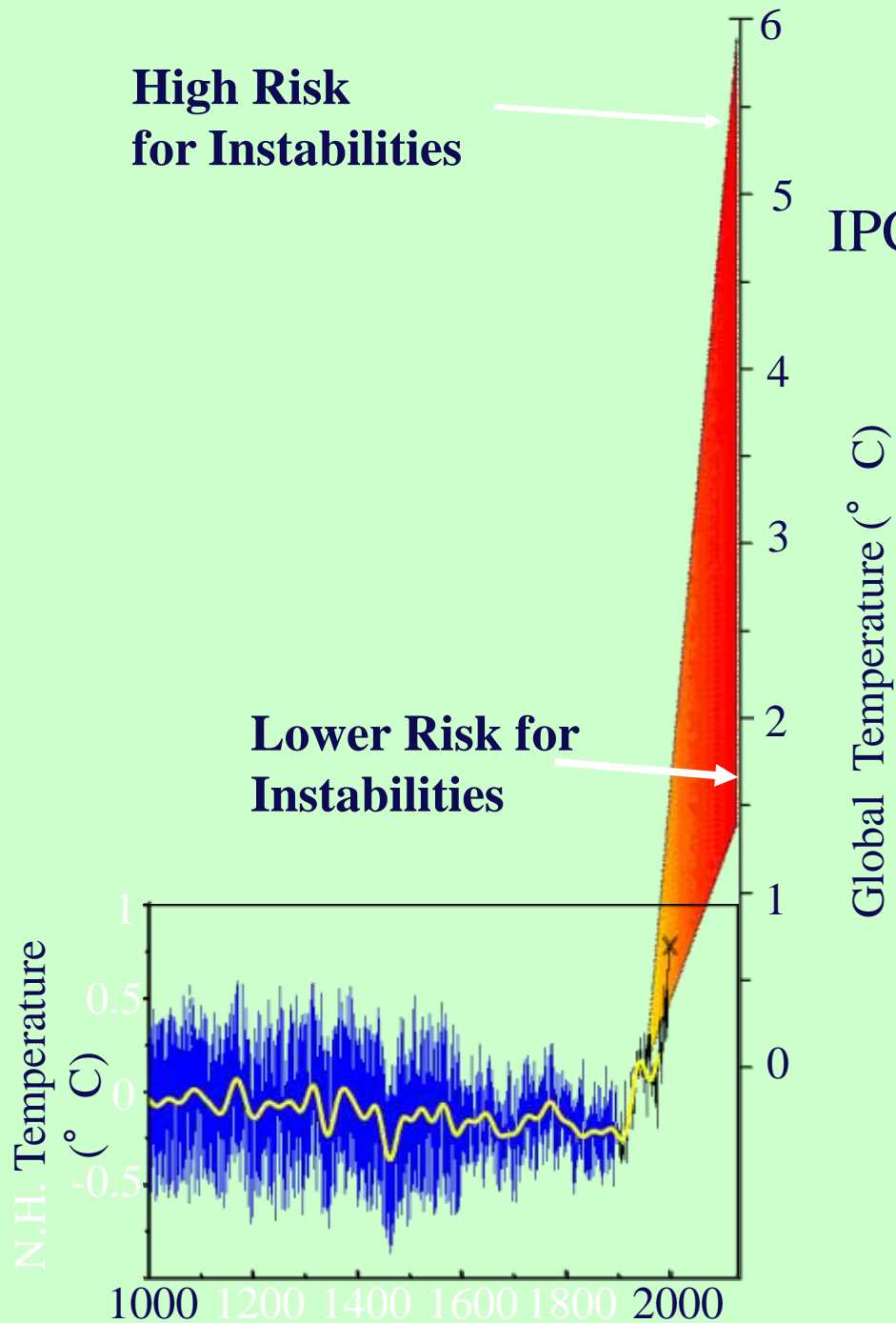




Does the cycle accelerate?

The Earth System Models: Coupling the Physical, Biogeochemical and Human Components





IPCC Projections
for 2100

**High Risk
for Instabilities**

**Lower Risk for
Instabilities**

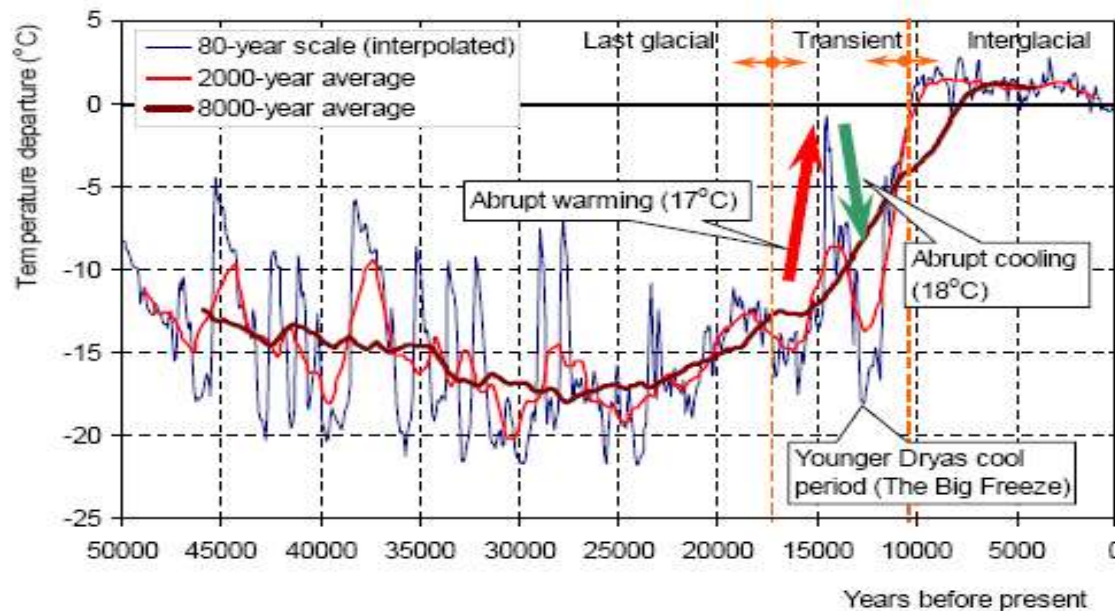
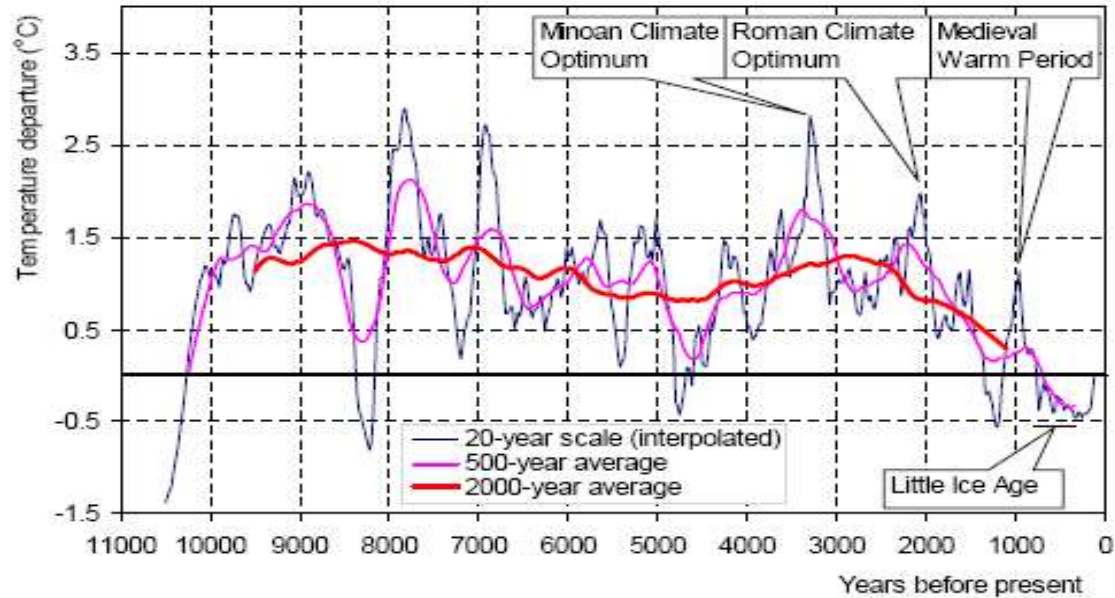
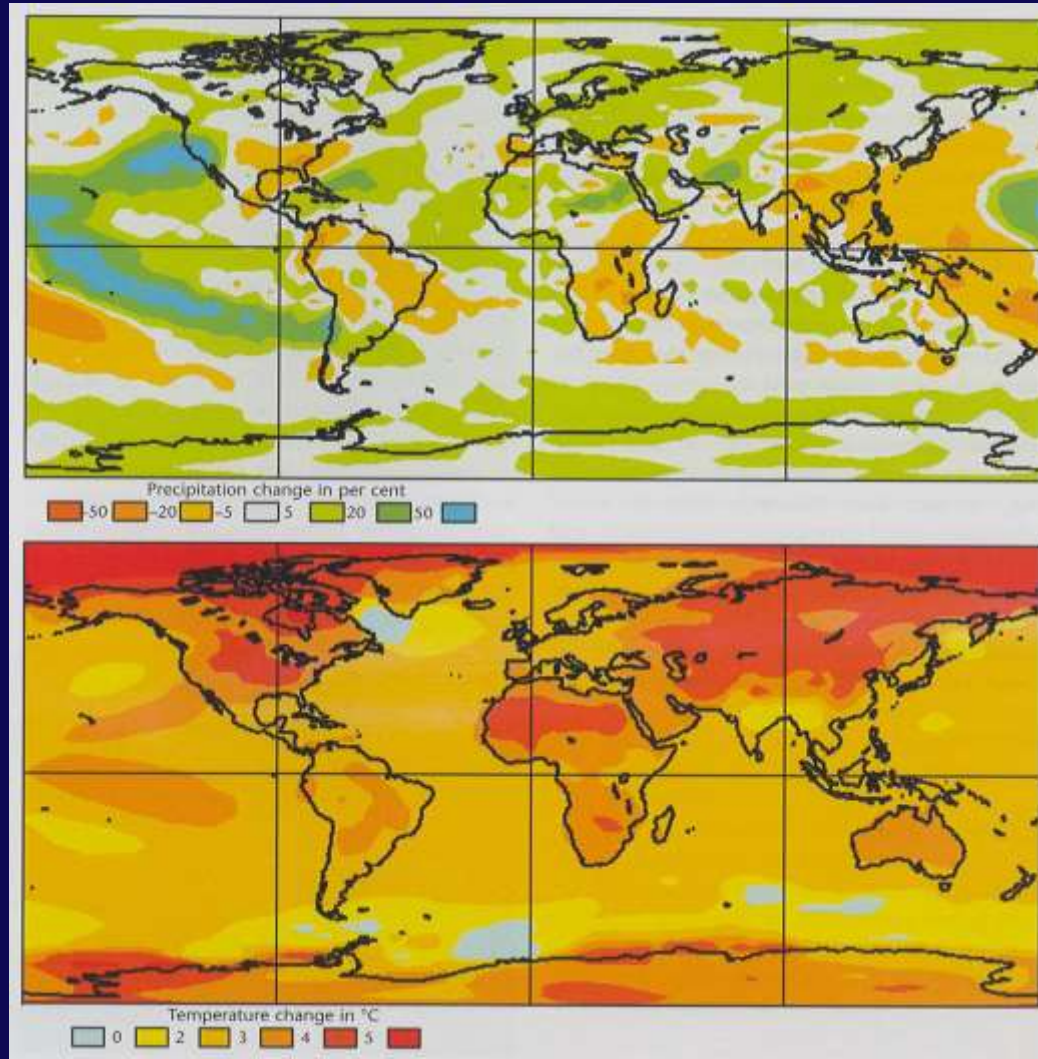


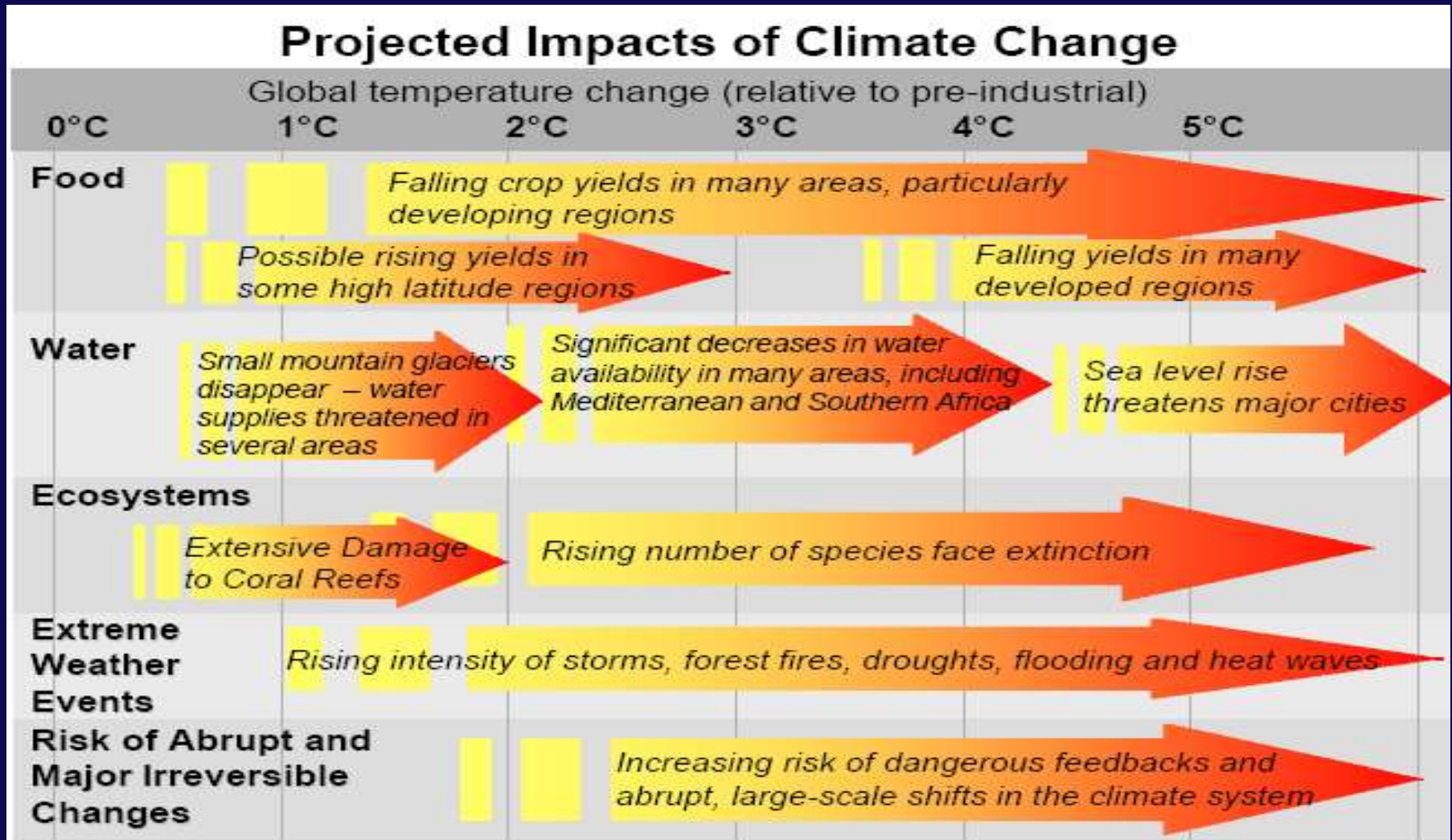
Fig. 3 Times series plot of the temperature in Greenland, as reconstructed from the GISP2 Ice Core (Alley 2000, 2004; temperature departures from the most recent value, which is -31.6°C ; data from ftp.ncdc.noaa.gov/pub/data/paleo/icecore/greenland/summit/gisp2/isotopes/gisp2_temp_accum_alley2000.txt): (a) during the Holocene (current interglacial period), with marking of the most prominent recent lows and highs; and (b) the entire record with marking of the most prominent abrupt warming and cooling episodes (in a transient period between the current interglacial and the last glacial period) that ended with the Younger Dryas cool period.

NOT TOO MUCH HOPE ...

UNLESS POLITICAL LEADERS STICK TO THE PARIS AGREEMENT



Climate change is effecting our environment, our societies and our cultures



**CLIMATE CHANGE IS
ALL ABOUT WATER**






FLOODS



Budapest

A photograph of a white wall with a window and a louvered vent, partially submerged in water. Red graffiti on the wall reads "I DON'T BELIEVE IN GLOBAL WARMING". The text is reflected in the water below. The scene is set at dusk or dawn, with a blueish tint to the sky and water.

I DON'T BELIEVE IN
GLOBAL WARMING

CLIMATE ADAPTIVE WATER MANAGEMENT STRATEGIES

ADAPTATION

RESILIENCE



KEY TO SUSTAINABILITY:

**CLIMATE ADAPTIVE WATER
STRATEGIES**

WHAT SHOULD WE DO?

**WE NEED TO INCREASE THE
RESILIENCE
OF OUR SYSTEMS**

ADAPTATION OPTIONS:

- MORE STORAGE
- MORE HYDROPOWER
- MORE GROUNDWATER USE
- MORE INLAND NAVIGATION
- INTERBASIN WATER TRANSFER
- CONSERVATION
- **GOOD GOVERNANCE**
-
-
-

POTENTIAL SOURCE(S) OF CONFLICTS

**HUMANITY WILL NEED MORE
STORAGE SPACE**

**STORAGE IS THE NEXUS BETWEEN
WATER / FOOD / ENERGY**

ADDITIONAL CHALLENGES THAT NEED TO BE CONSIDERED

- **HYDROLOGICAL EXTREMES**
- **CLIMATE ADAPTIVE WATER STRATEGIES**
- **TRANSBOUNDARY ISSUES**
- **ECOSYSTEM SERVICES**
- **CAPACITY DEVELOPMENT**

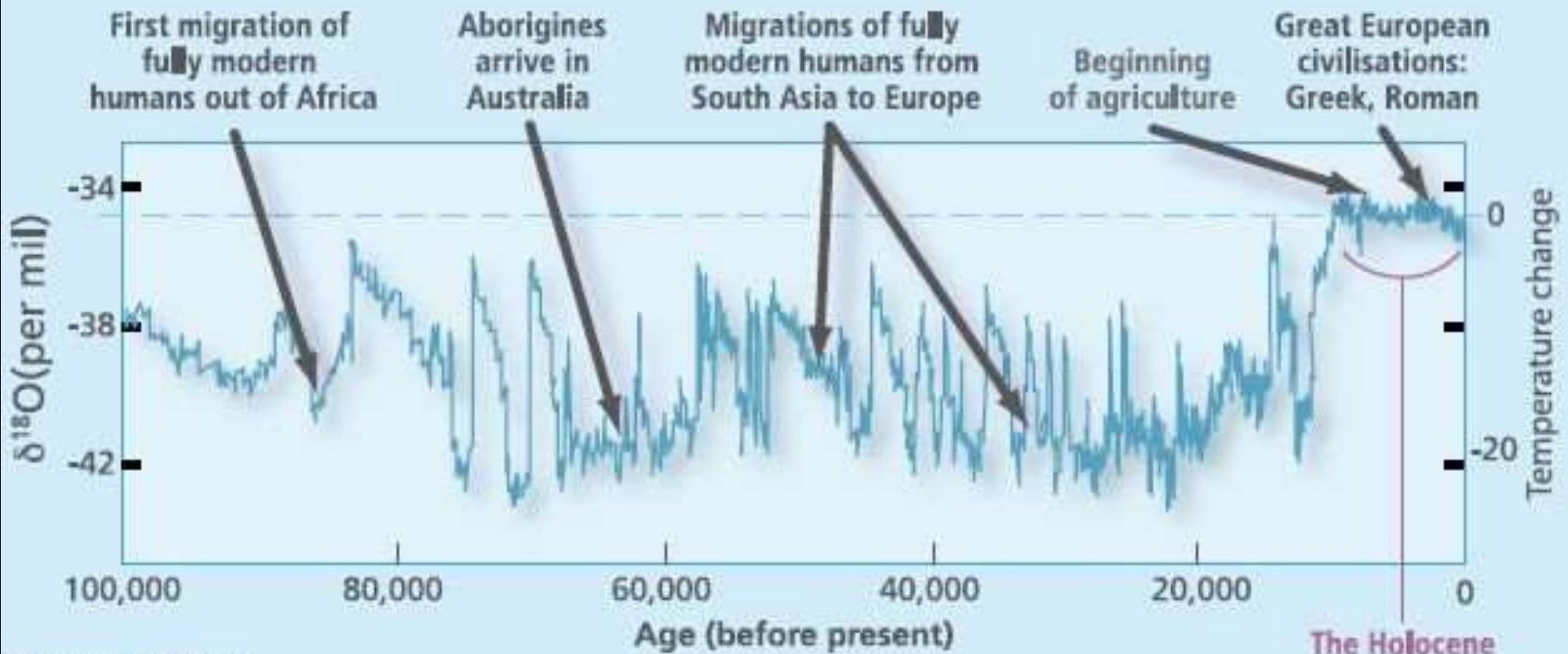
But these are all transboundary!

SO IS MIGRATION ...



Az elmúlt 100,000 év nagy migrációs hullámai

HUMAN DEVELOPMENT AND GLACIAL-INTERGLACIAL CYCLING



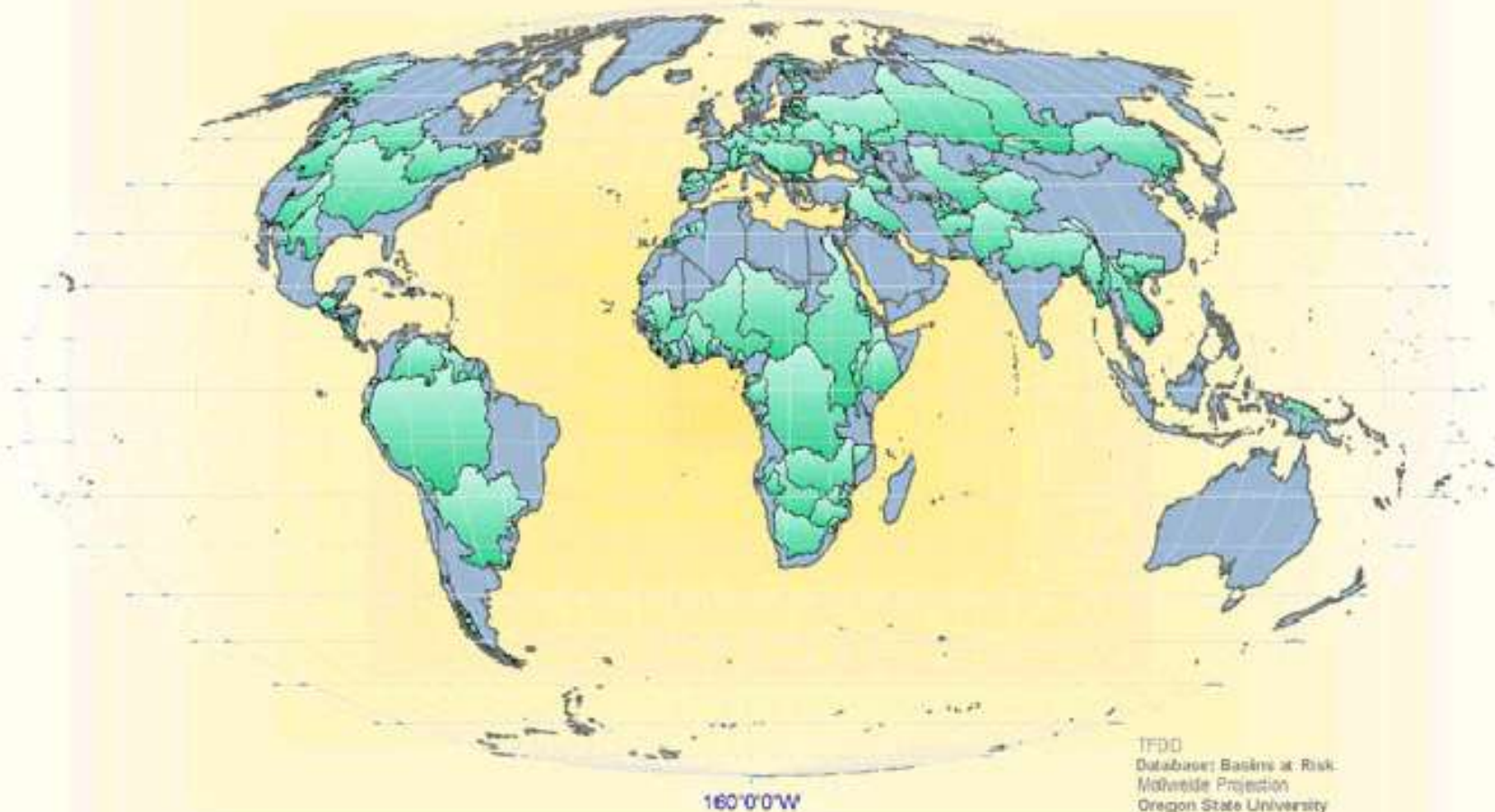
Young and Steffen (2009)

GLOBAL FRESHWATER RESOURCES

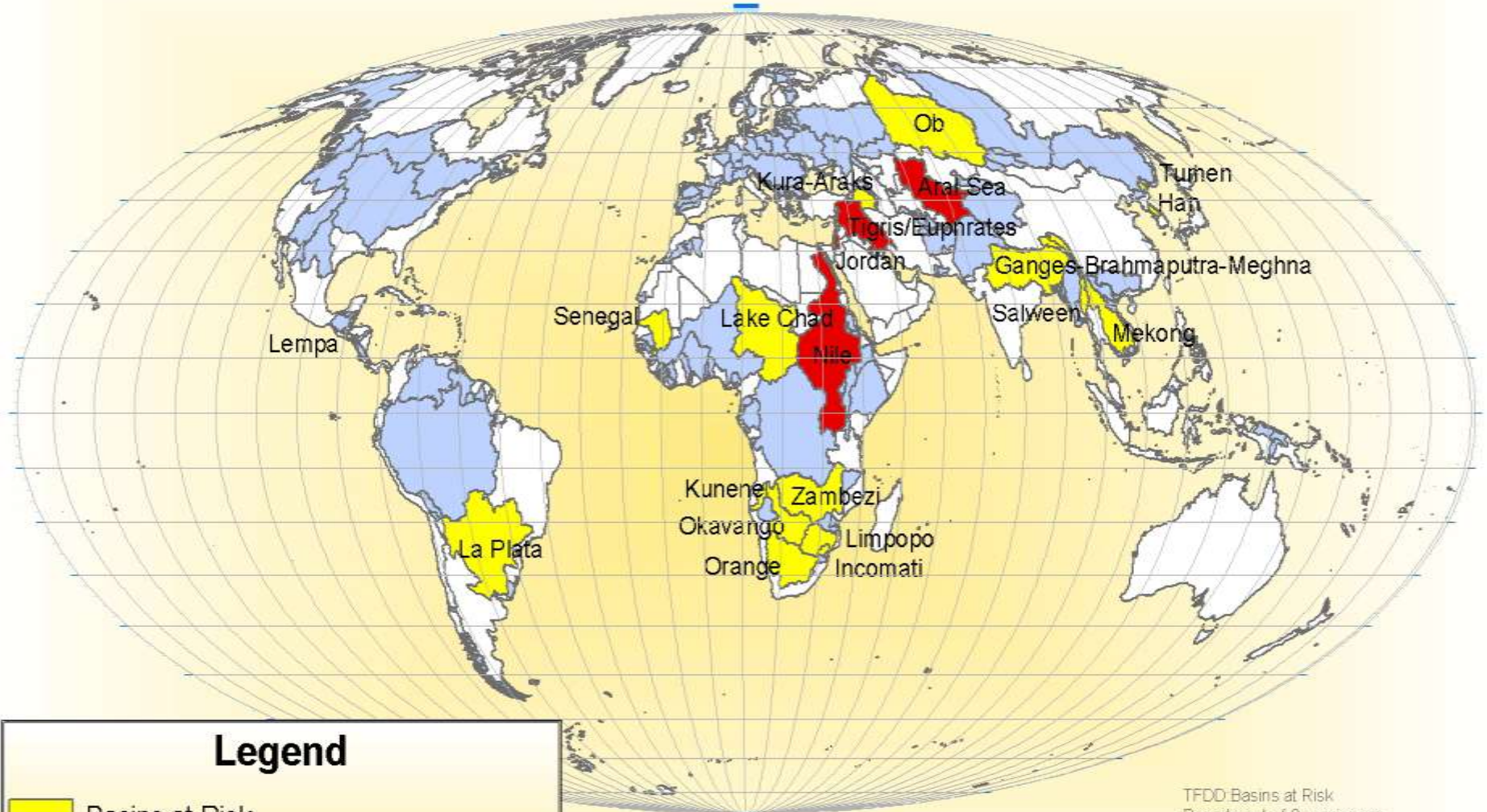
Relation between water availability and population



International Basins of the World



Basins at Risk



Legend

-  Basins at Risk
-  Political Boundaries
-  International Basins
-  Basins Currently in Dispute/Negotiations

TFDD Basins at Risk
Department of Geosciences
Oregon State University
Cartography: Greg Fiske
June 2001

States' surface within 263 (?) transboundary basins

145 States include territory within transboundary basins

21 States lie entirely within a transboundary basin

12 States have more than 95% of their territory within one or more transboundary basin(s)

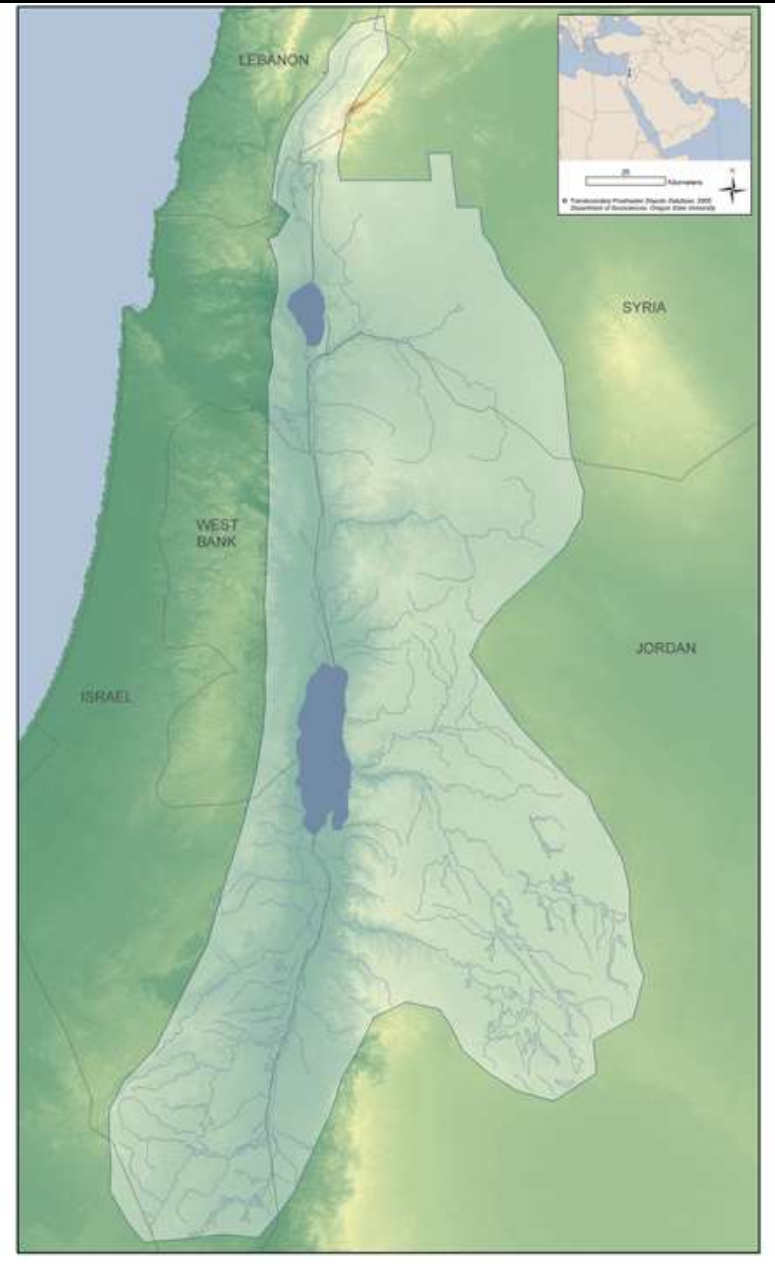
**WAR OVER WATER
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WAR OVER WATER?

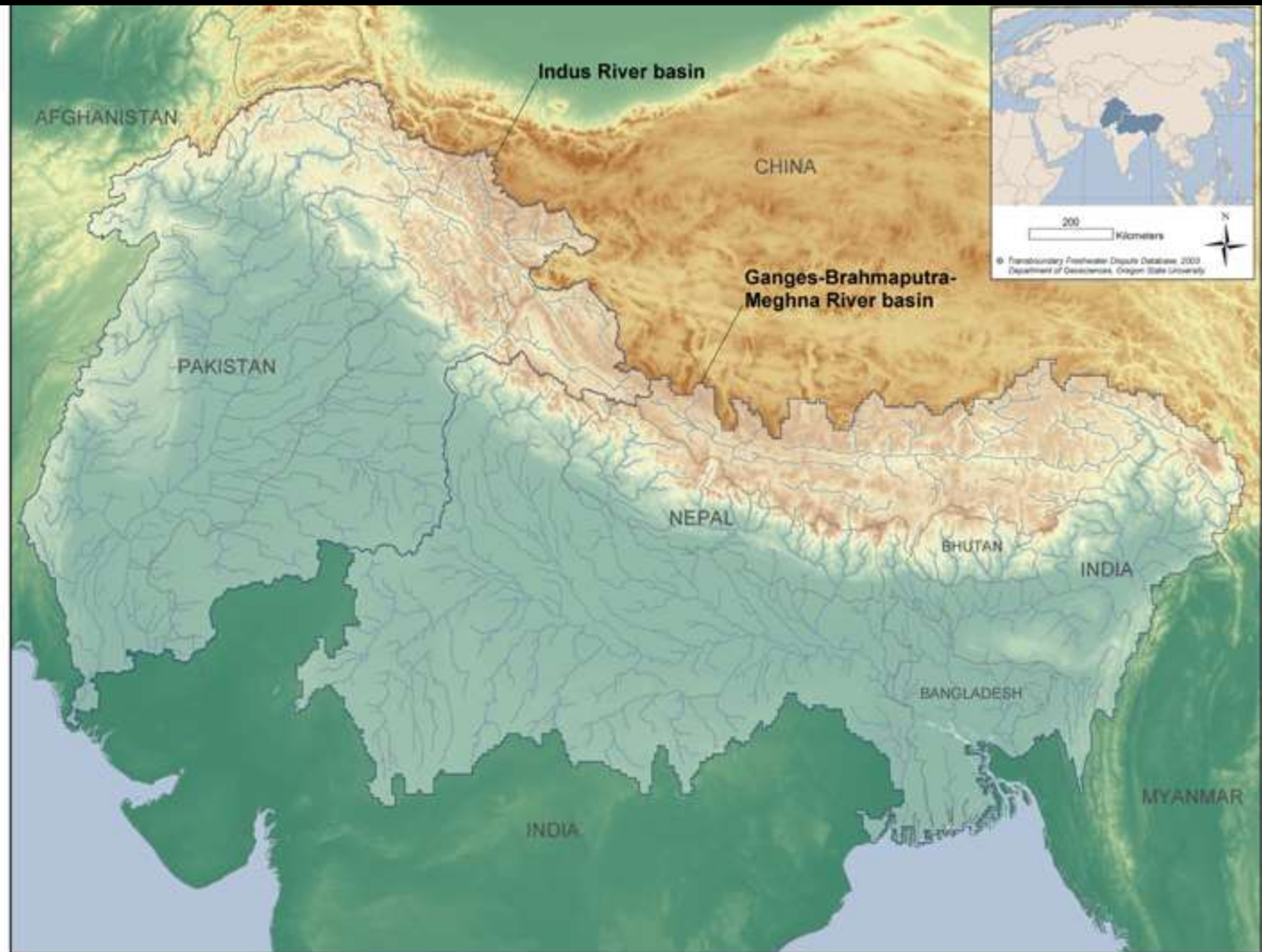
The Nile River basin



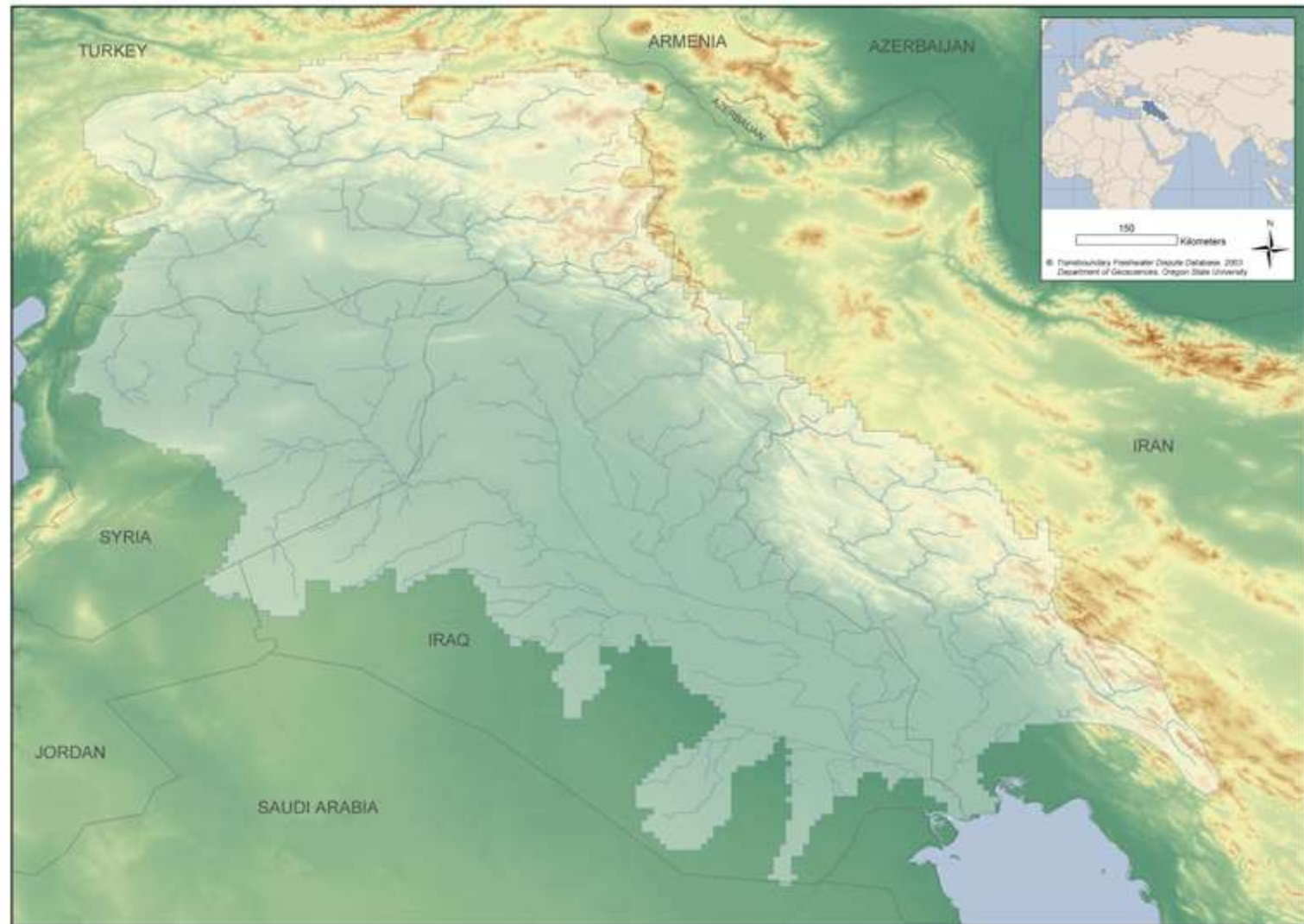
The Jordan River basin



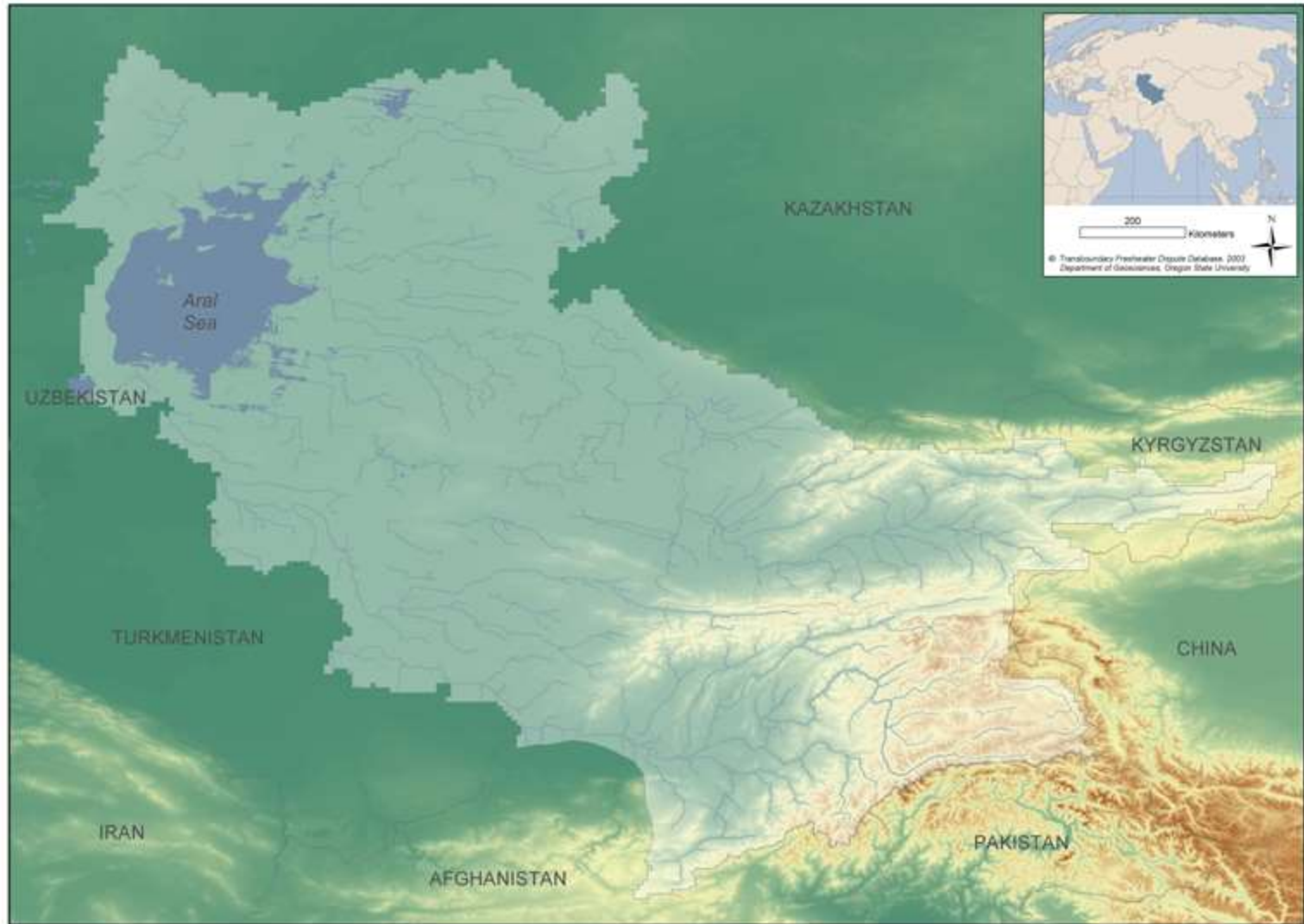
The Indus River and the Ganges Brahmaputra-Maghna River Basin



The Tigris Euphrates basin



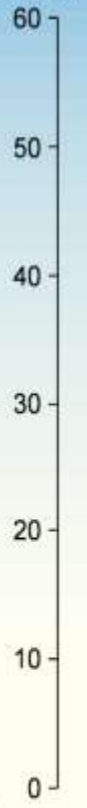
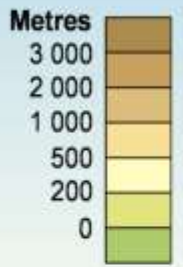
The Aral Sea basin



Water withdrawal and availability in the Aral Sea basin

km³ per year

- █ Flow generation: water available in the country from rainfall and glacier melt
- █ Water abstraction: withdrawal from surface water sources (rivers, canals and lakes)



Source: Diagnostic Report on Water Resources in Central Asia, ICWC 2000.

THE MAP DOES NOT IMPLY THE EXPRESSION OF ANY OPINION ON THE PART OF THE AGENCIES CONCERNING THE LEGAL STATUS OF ANY COUNTRY, TERRITORY, CITY OR AREA OF ITS AUTHORITY, OR DELINEATION OF ITS FRONTIERS AND BOUNDARIES.



Nurek / Rogun Dams



WAR OVER WATER?

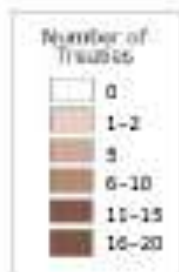
ONE war over water:

**Umma and Lagash in
Mesopotamia (Sumer)**

(4500 years ago)



Number of treaties per basin



UN Convention on the Law of Non-Navigational Uses of Transboundary Watercourses 1997

- **Consistent with state practice**
- **Comprises earlier efforts of codification**
- **Adopted equitable utilization as leading principles of international water law, with a list of factors to be used for determination of equitability of share**
- **Adopted the principle of “no significant harm”**

IN FORCE!!

(After 27 years of negotiations and 17 years of ratification ...)

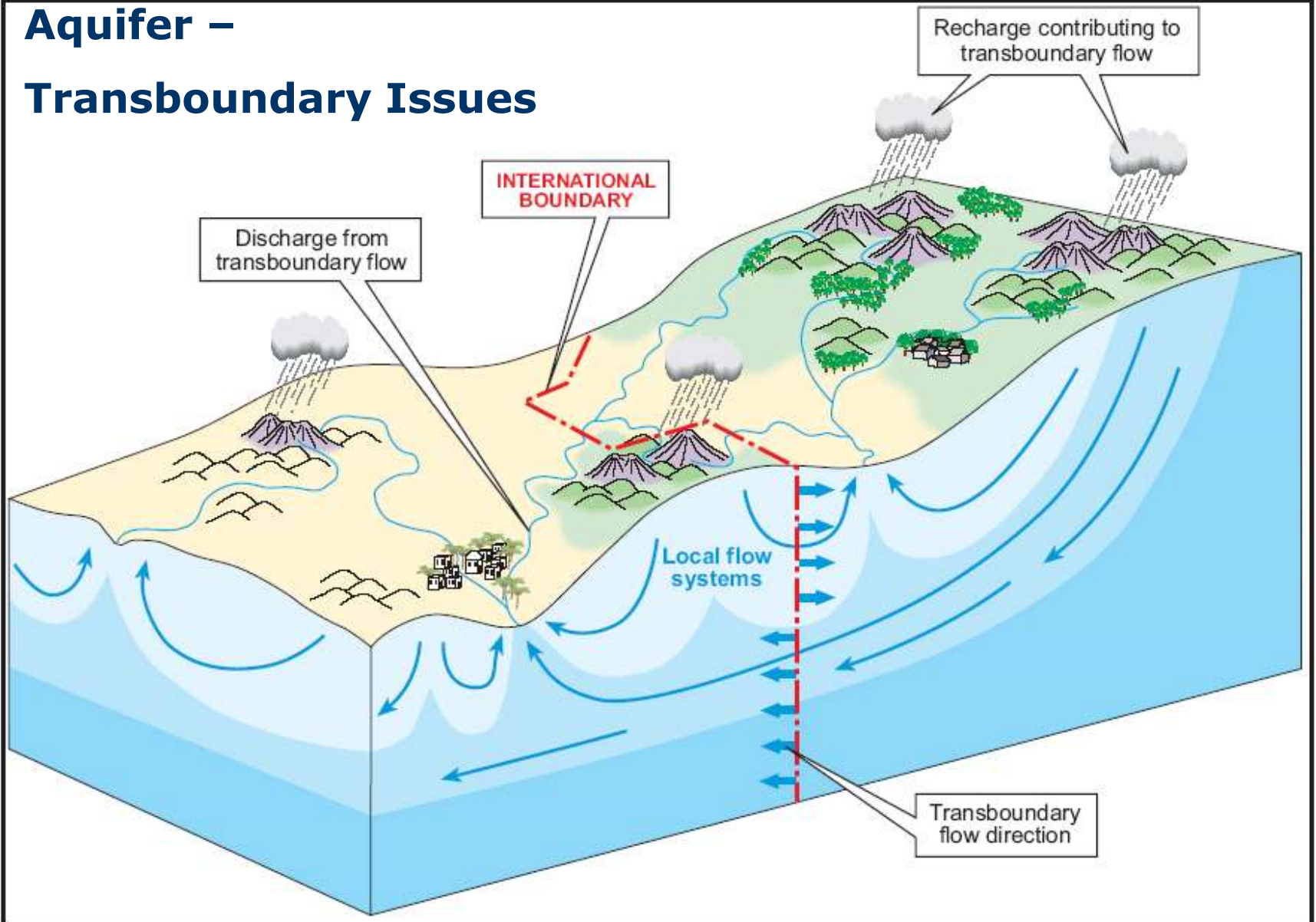
Water Conflict and Cooperation Indicators

"The likelihood of conflict rises as the rate of change within the basin exceeds the institutional capacity to absorb that change."

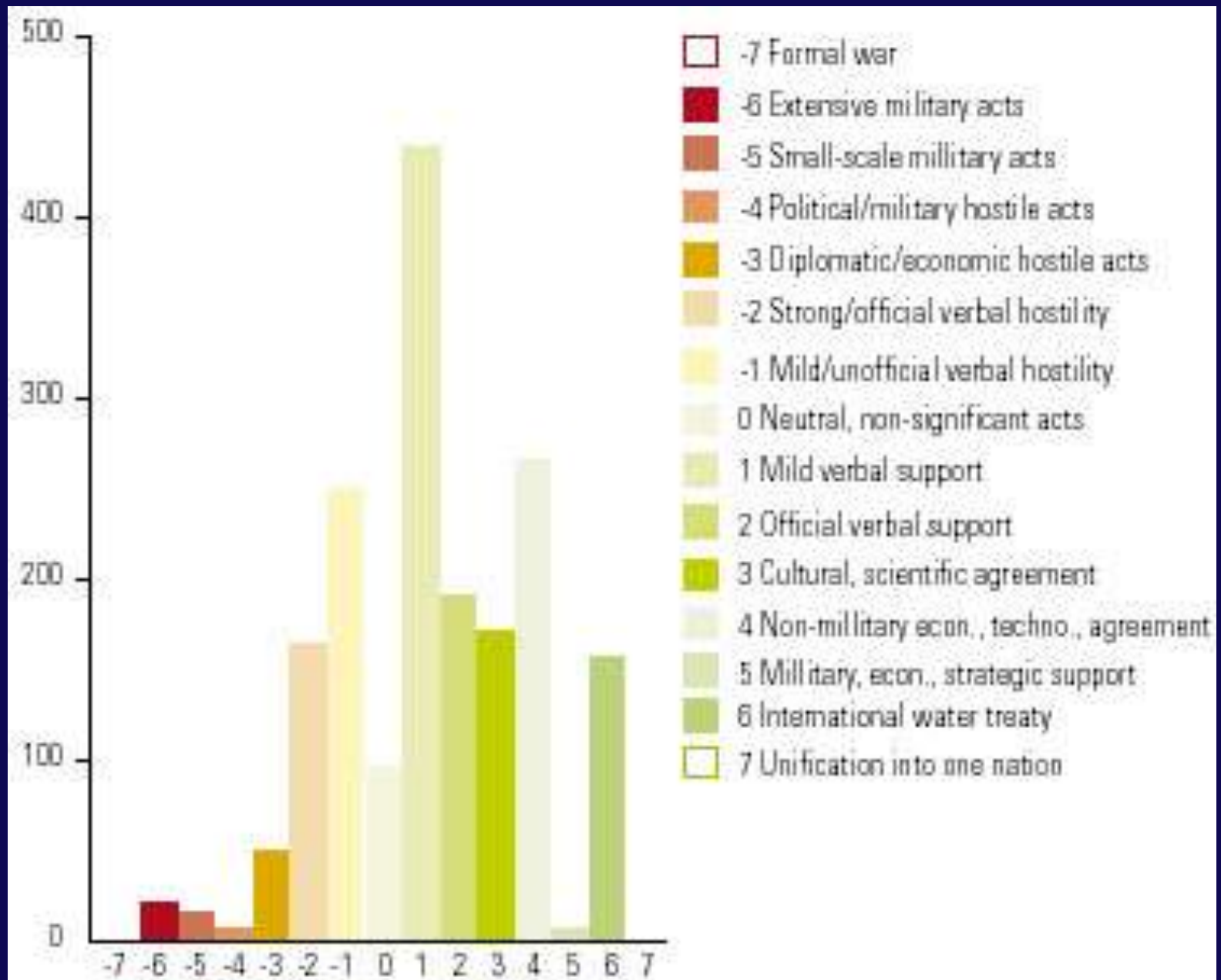
What are indicators?

- **Uncoordinated development: a major project in the absence of a treaty or commission**
- **"Internationalized basins"**
- **General animosity**

Aquifer – Transboundary Issues



Events related to transboundary waters



**DATA SECRECY:
NEW TECHNOLOGIES OFFER
NEW OPPORTUNITIES
FOR TRUST BUILDING**

Flow of information in a Hydroinformatics system

Data → Models → Knowledge → Decisions



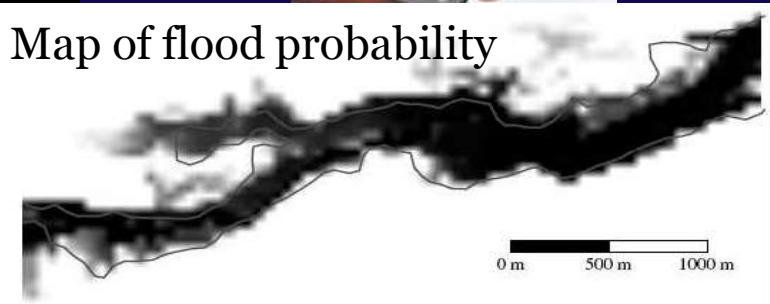
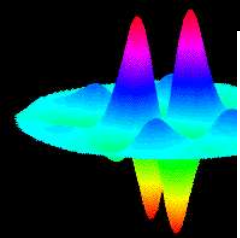
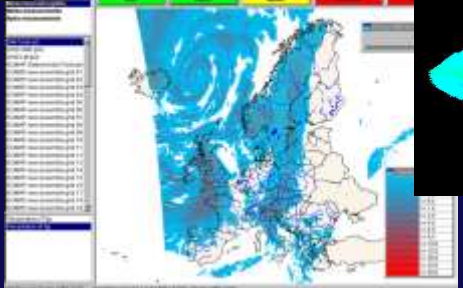
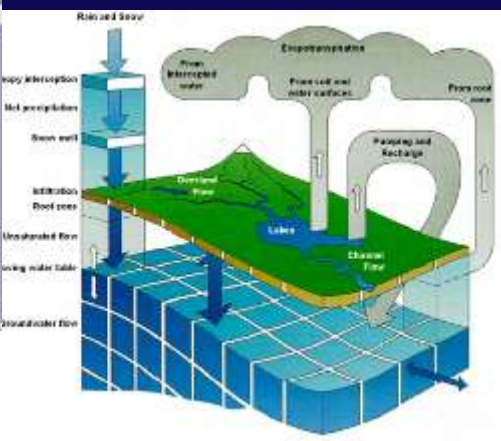
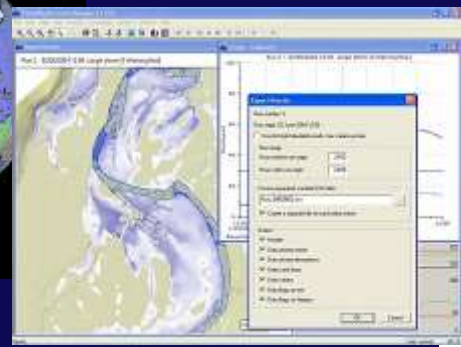
Earth observation,
monitoring

Numerical Weather
Prediction Models

Data modelling,
integration with
hydrologic and
hydraulic models

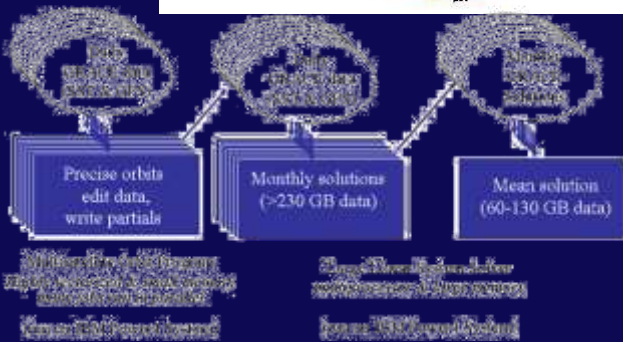
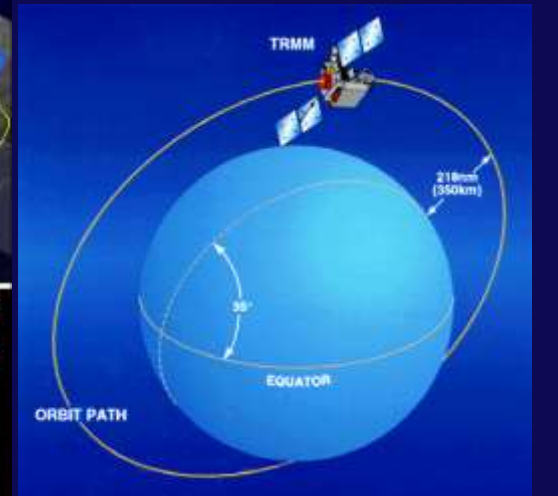
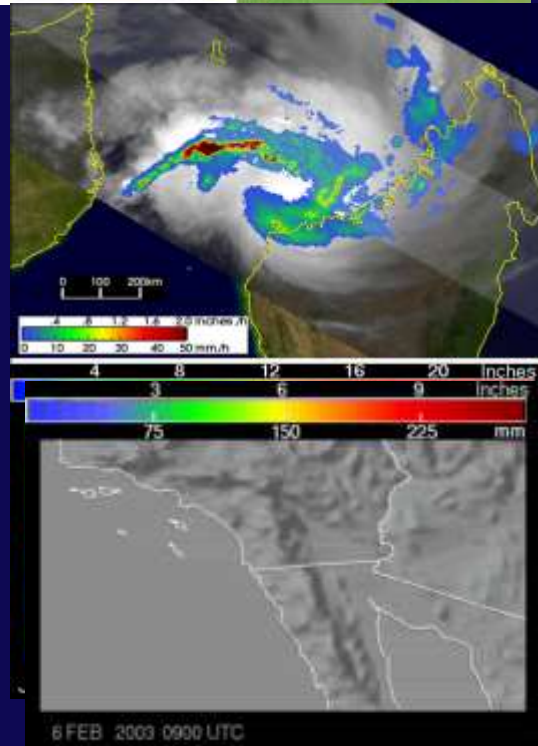
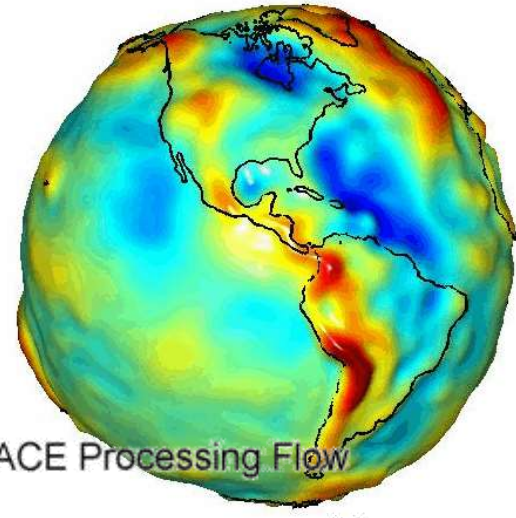
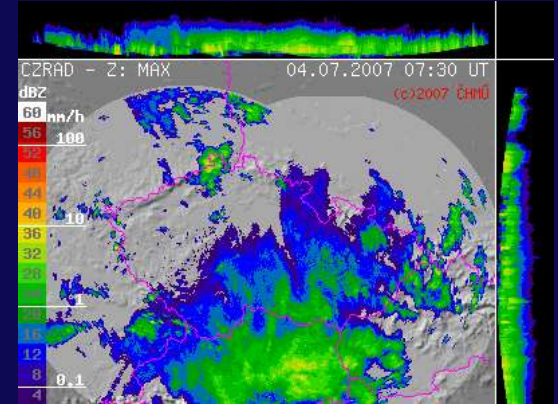
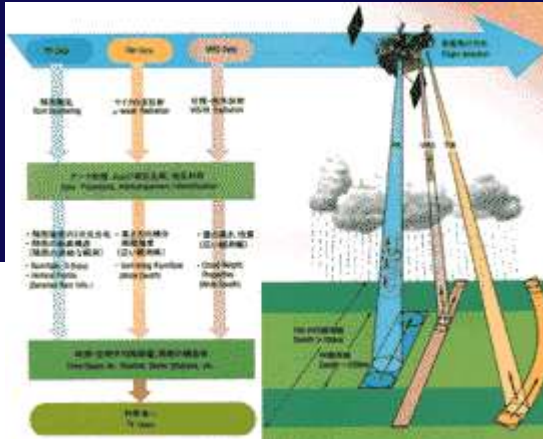
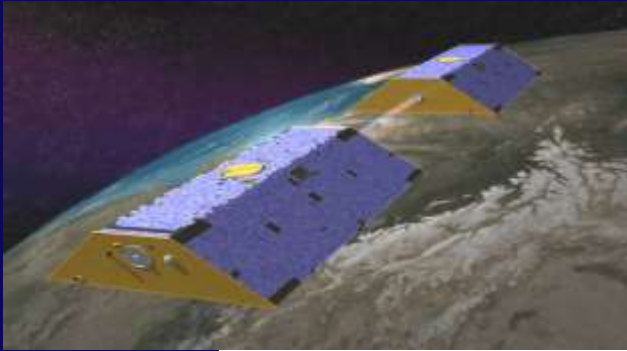
Access to
modelling
results

Decision
support



Source: D. Solomatine

Remotely sensed data



(Source: D. Solomatine)

- Formulation
- Implementation
- Primary Ops
- Extended Ops



NI-SAR

PACE

SWOT

TEMPO

GRACE-FO (2)

ICESat-2

CYGNSS

SAGE III (on ISS)

SMAP

OCO-2

TRMM

QuikSCAT

SORCE

Landsat-7
(USGS)

EO-1

ACRIMSAT

Aquarius

Terra

Suomi NPP
(NOAA)

Aqua

Landsat-8
(USGS)

CloudSat

CALIPSO

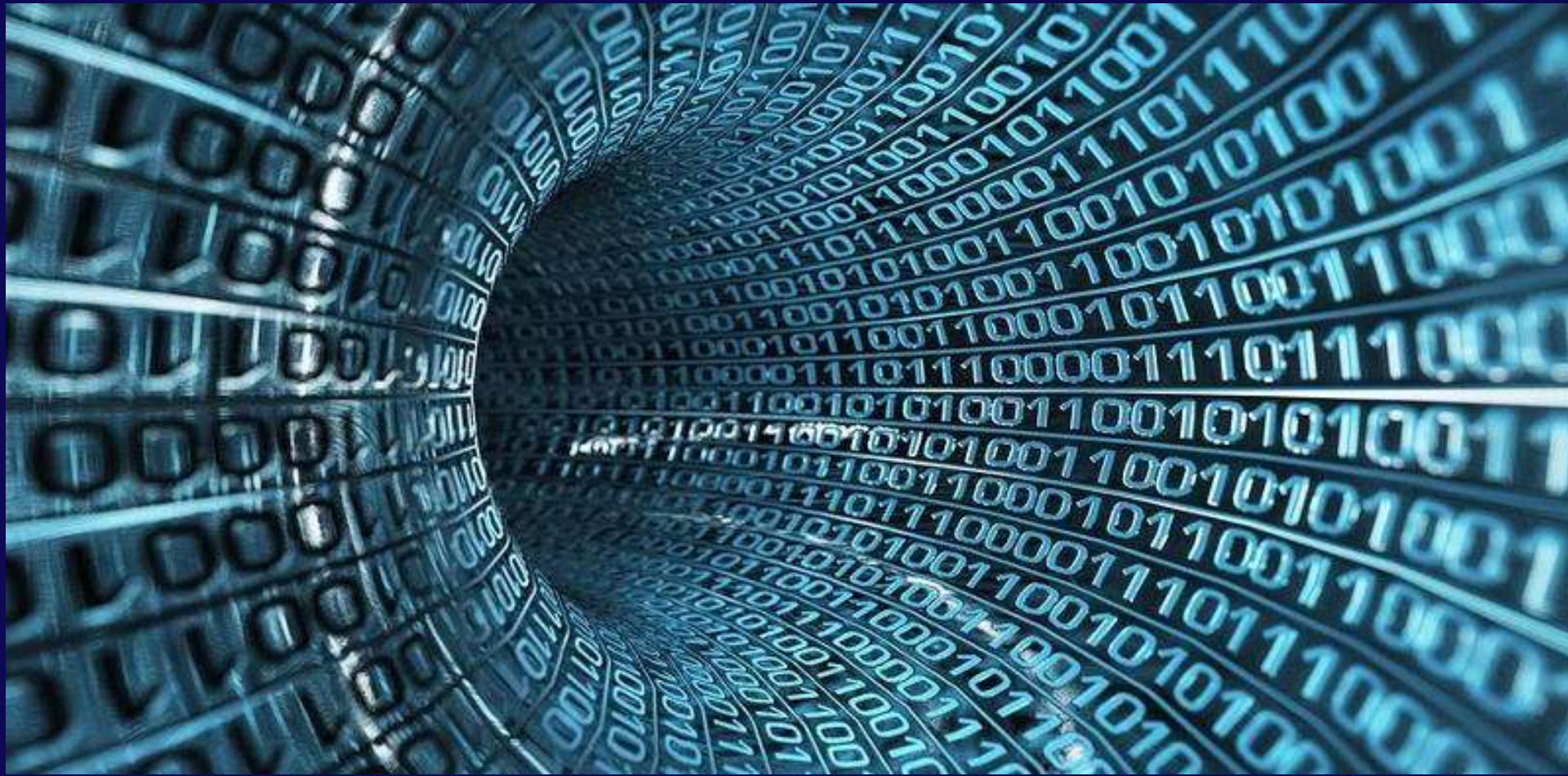
GPM

Aura

GRACE (2)

OSTM/Jason 2
(NOAA)

BIG DATA



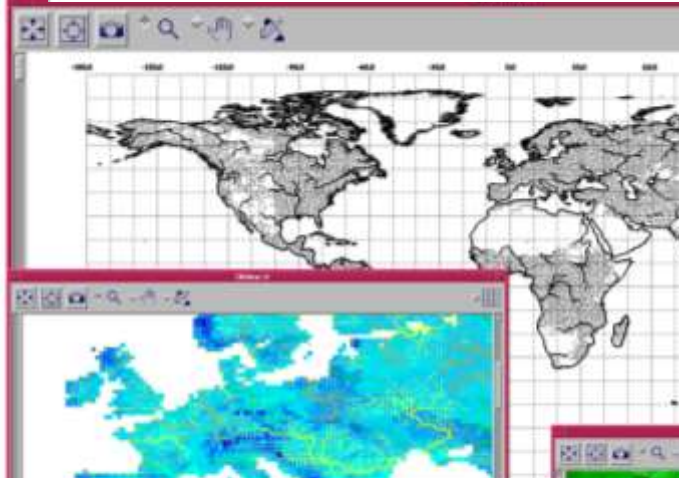
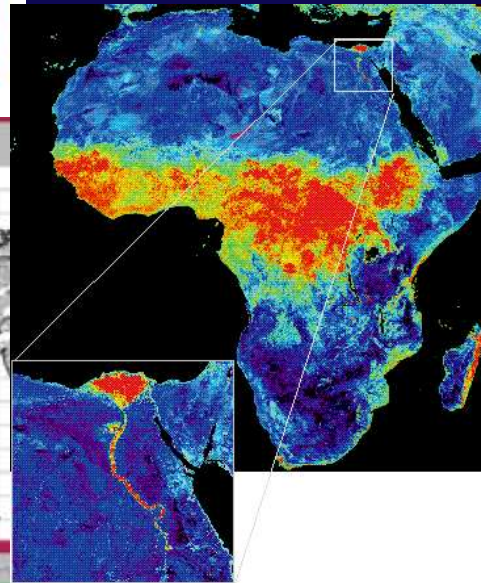
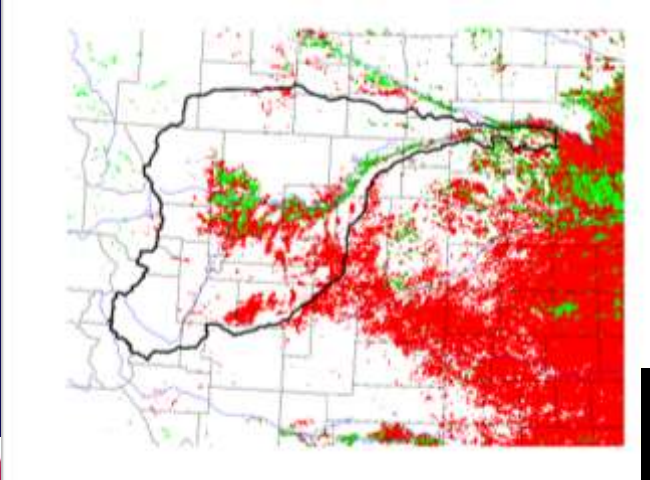
Data revolution:

Terra bytes Petabytes Exabytes ... Terra Hertz speed

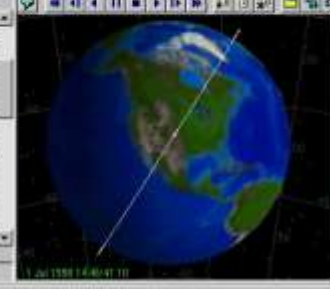
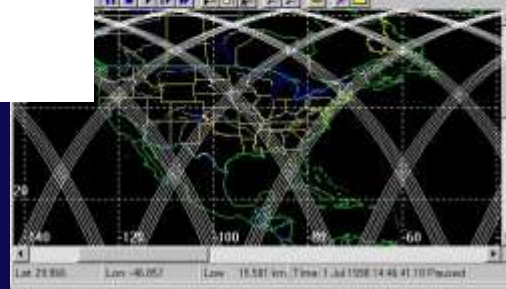
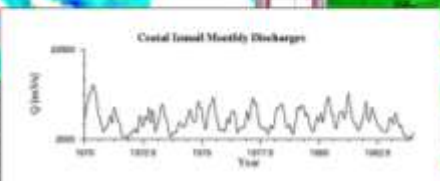
High Precision Earth Systems Tools

- Satellite data
- Data assimilation
- Simulation models
- Geospatial analysis / GIS

Huge progress but...

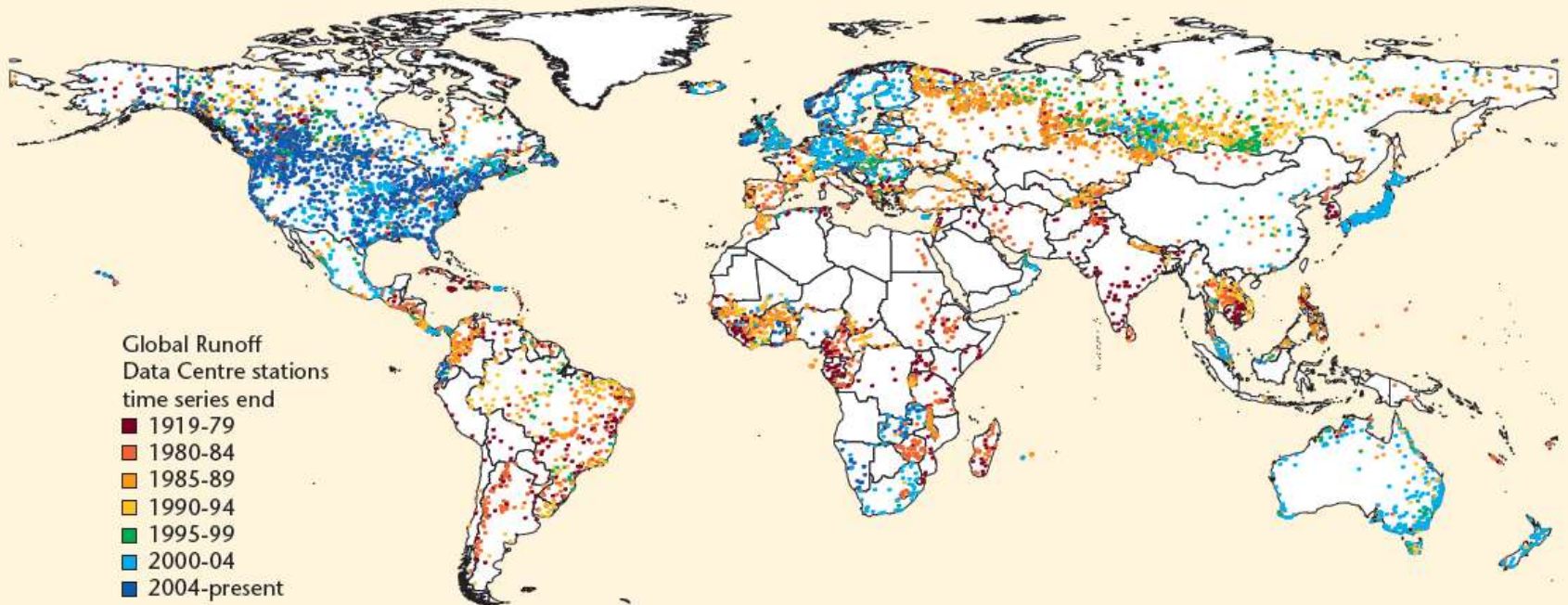


FAO Soil Texture	Percentage
Medium (Loam)	51.0
Medium + Fine (Clay Loam)	27.8
Coarse + Medium (Sandy Loam)	36.6
Coarse + Fine (Loam)	9.2
Fine (Clay)	5.1
Coarse (Sand)	4.3



Our capacity to monitor remains limited

Map 13.1 Distribution of Global Runoff Data Centre streamflow gauges



Source: Global Runoff Data Centre (<http://grdc.bafg.de/>).

“But the water problems of our world need not be only a cause of tension; they can also be a catalyst for cooperation

....If we work together, a secure and sustainable water future can be ours.”

Kofi Annan, February 2002

SUMMARY

**WATER IS A SOURCE OF
COOPERATION:
WATER CONNECTS AND DOES
NOT DIVIDE**

LOOKING BACK

- 1977: UN Conference on Water, Mar del Plata
- 1992: ICWE, Dublin
- 1992: UNCED, Rio de Janeiro
- 1997: **Annus mirabilis**
 - » 1st World Water Forum, Marrakech
 - » CSD 5-year review of Agenda 21 Chapter 17
 - » UN Convention on the Non-Navigational Use ...
 - » World Water Vision Project launched
- 2000: 2nd World Water Forum (ever since ...)
- 2001: The Bonn Conference on Freshwater
- 2002: WCSD, Johannesburg ...
- 2011: Bonn Conference The Water, Energy and Food Security Nexus
- 2012: Rio+20
- 2013 and 2016: Budapest Water Summit

WATER CONNECTS

the 17 Sustainable Development Goals

1 NO POVERTY



2 NO HUNGER



3 GOOD HEALTH



4 QUALITY EDUCATION



5 GENDER EQUALITY



6 CLEAN WATER AND SANITATION



7 CLEAN ENERGY



8 GOOD JOBS AND ECONOMIC GROWTH



9 INNOVATION AND INFRASTRUCTURE



10 REDUCED INEQUALITIES



11 SUSTAINABLE CITIES AND COMMUNITIES



12 RESPONSIBLE CONSUMPTION



13 PROTECT THE PLANET



14 LIFE BELOW WATER



15 LIFE ON LAND



16 PEACE AND JUSTICE



17 PARTNERSHIPS FOR THE GOALS



THE GLOBAL GOALS

WATER AS *THE* CENTER PIECE OF Sustainable Development



GLOBAL HIGH-LEVEL PANEL ON WATER AND PEACE

chaired by

DANILO TÜRK

former President of Slovenia

FINAL MESSAGE:

“Anybody who can solve the problems of water will be worthy of two Nobel Prizes, one for peace and one for science.”

(President John. F. Kennedy)

The challenge we all have

*How to put water in the minds
of people?*

