

# Future Earth



## and its implication in Asia

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**Research Institute for Humanity and Nature**



大学共同利用機関法人 人間文化研究機構  
**総合地球環境学研究所**



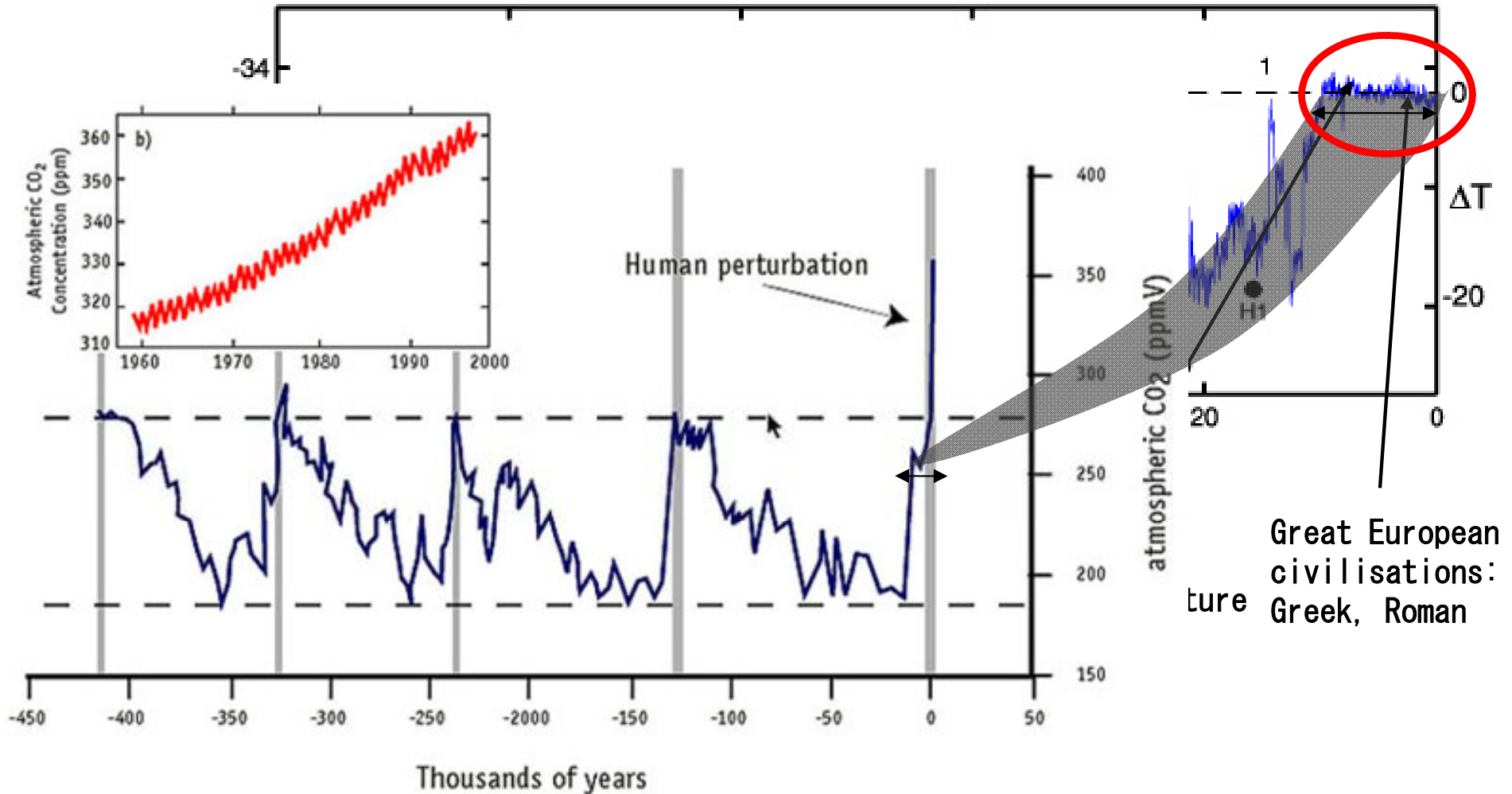
For Future Asia Symposium, please go to:

<http://www.chikyu.ac.jp/gec-jp/events/20121213-14/20121213-14.html>

**Present status  
of the global environment  
in the long history of the earth ?**

# 人類の猶予期間

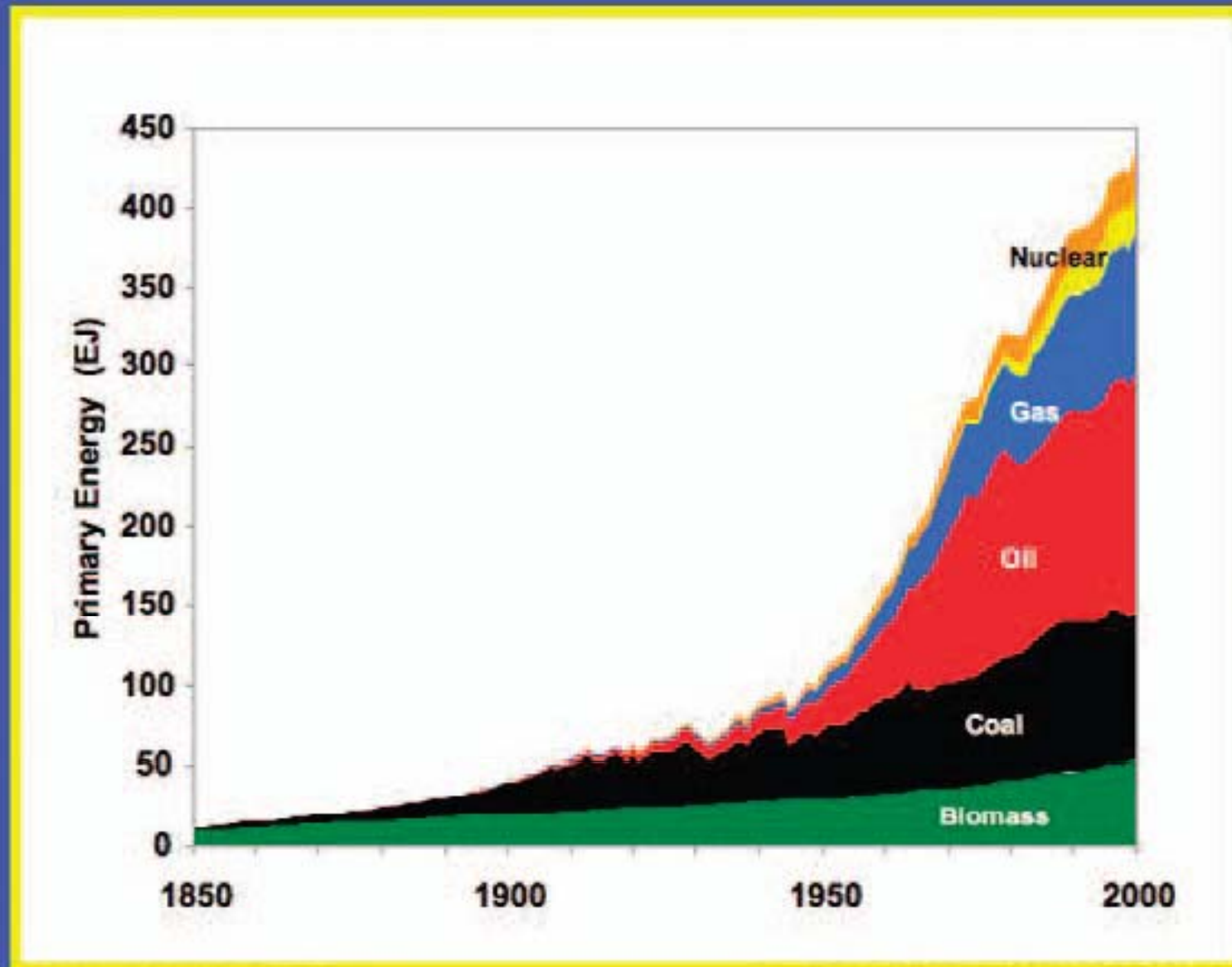
## Humanity's period of grace – the last 10000 years



Source: GRIP ice core data (Greenland) and S. Oppenheimer, "Out of Eden", 2004

Rapid increase of energy since around 1950

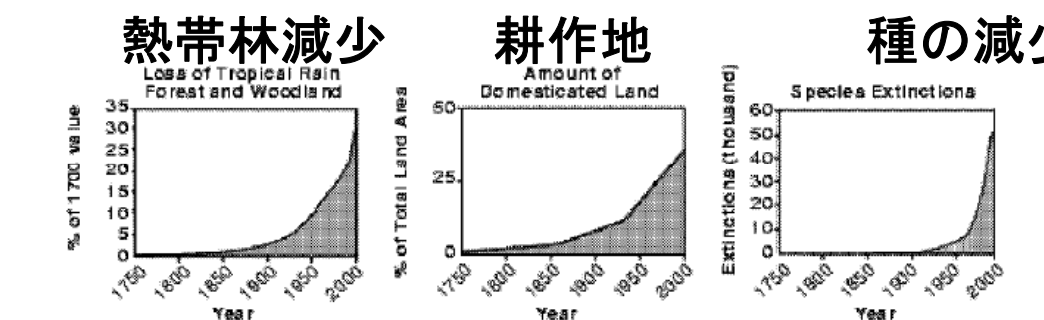
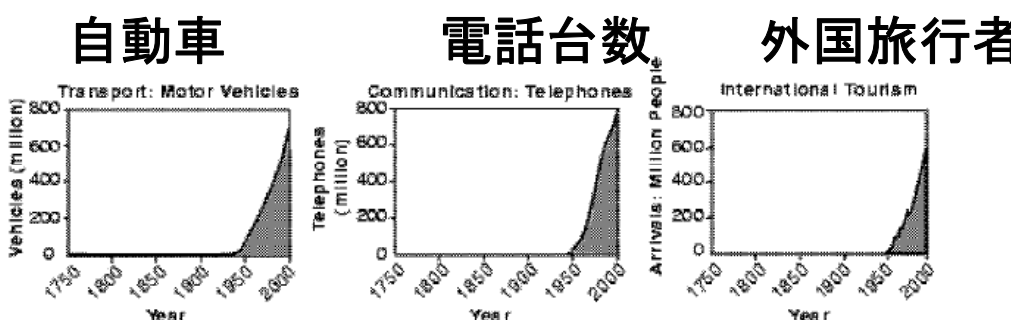
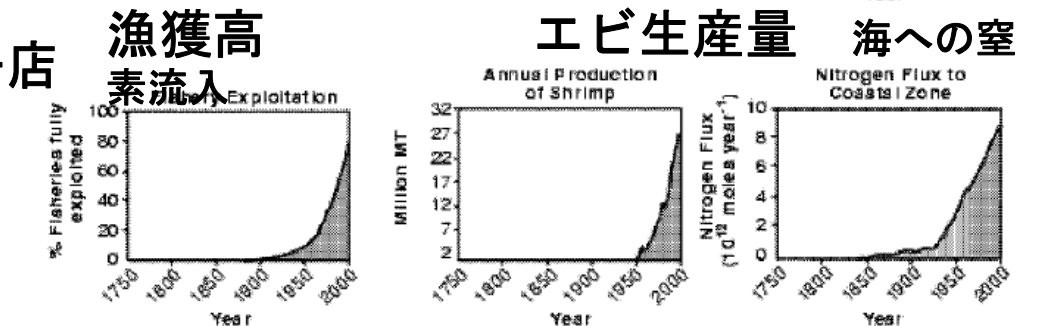
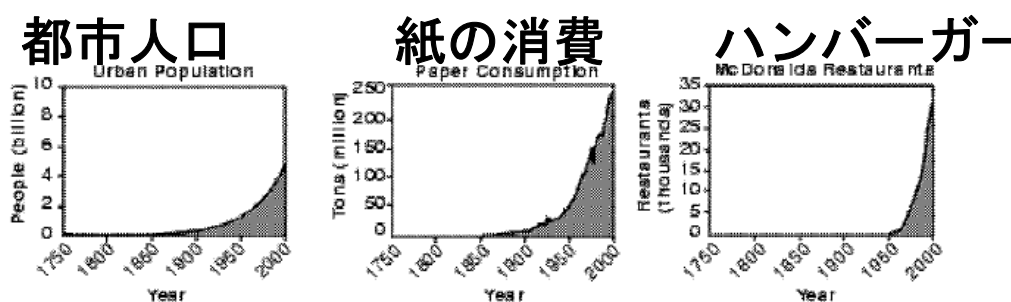
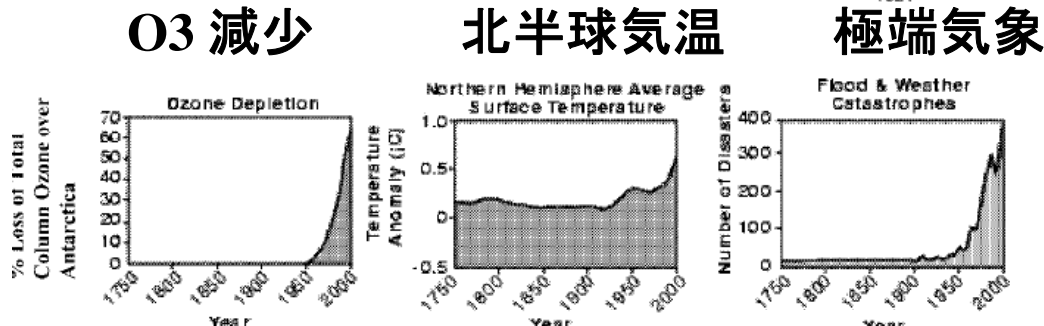
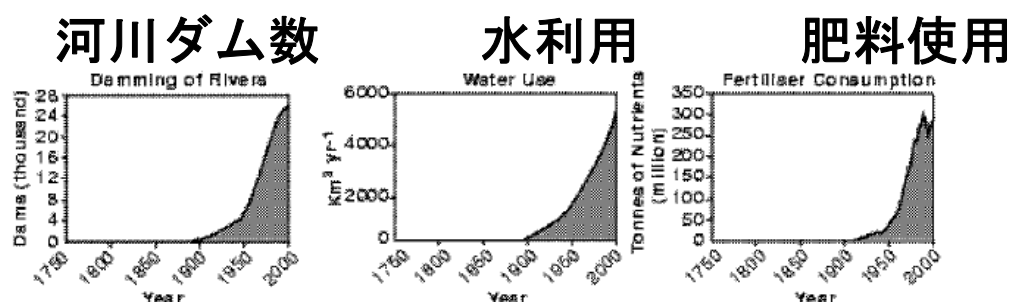
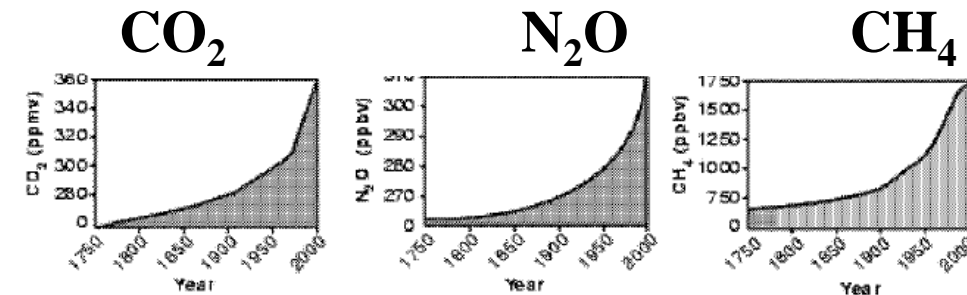
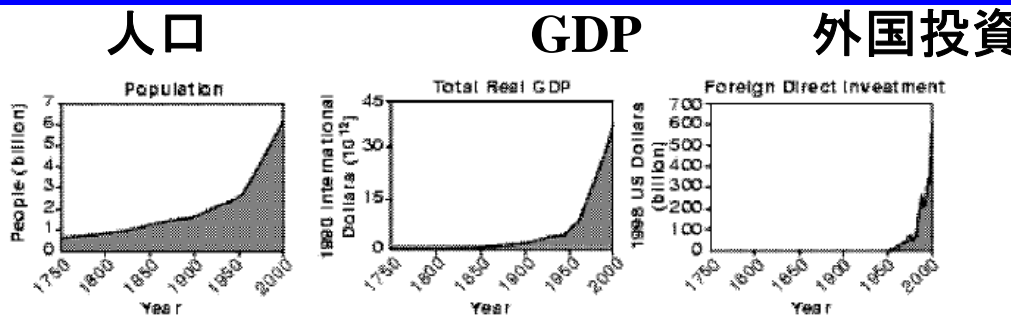
⇒ Anthropocene [人類世 (人新世)] の開始?



# Change from 1750 to 2000

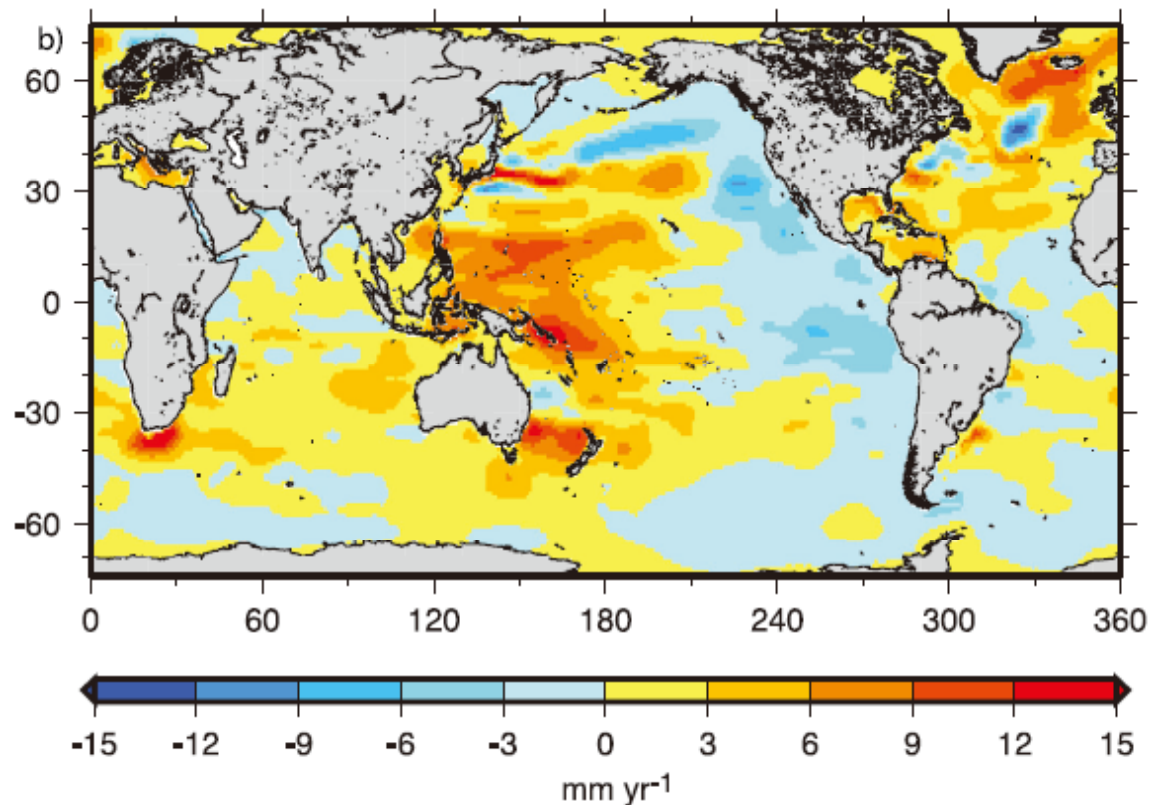
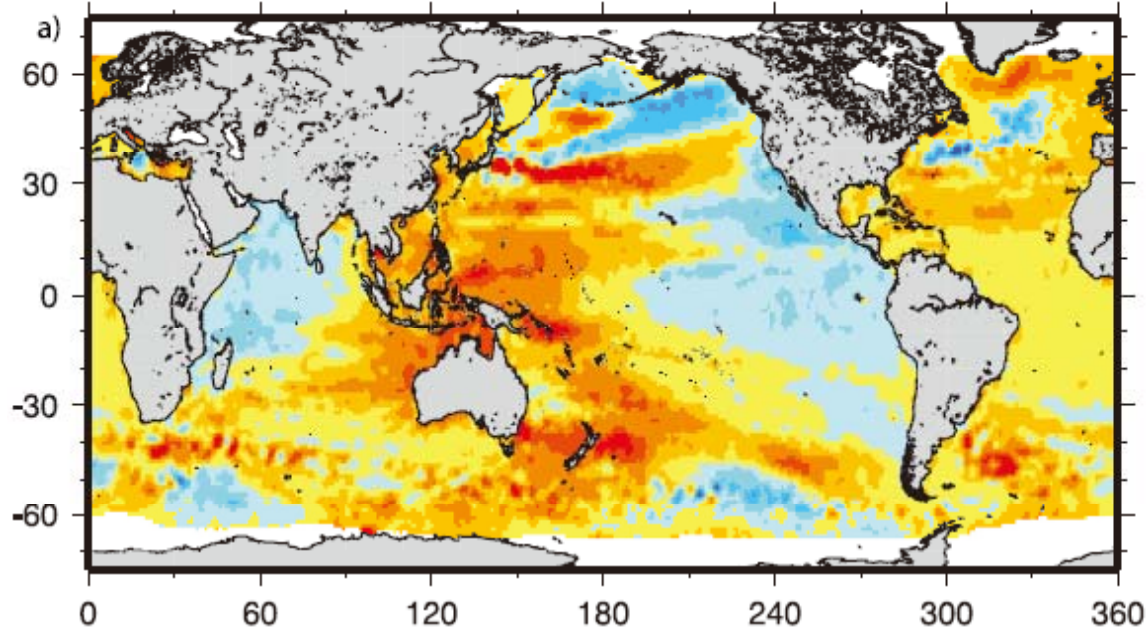
(Left) human activities

(right) environment



**Impact of GHG increase  
on hydro-climate and water cycle  
is becoming serious over the whole  
globe, particularly  
in Asia-Pacific region**

**Sea level change due to global warming is most serious in Asia/Pacific region**



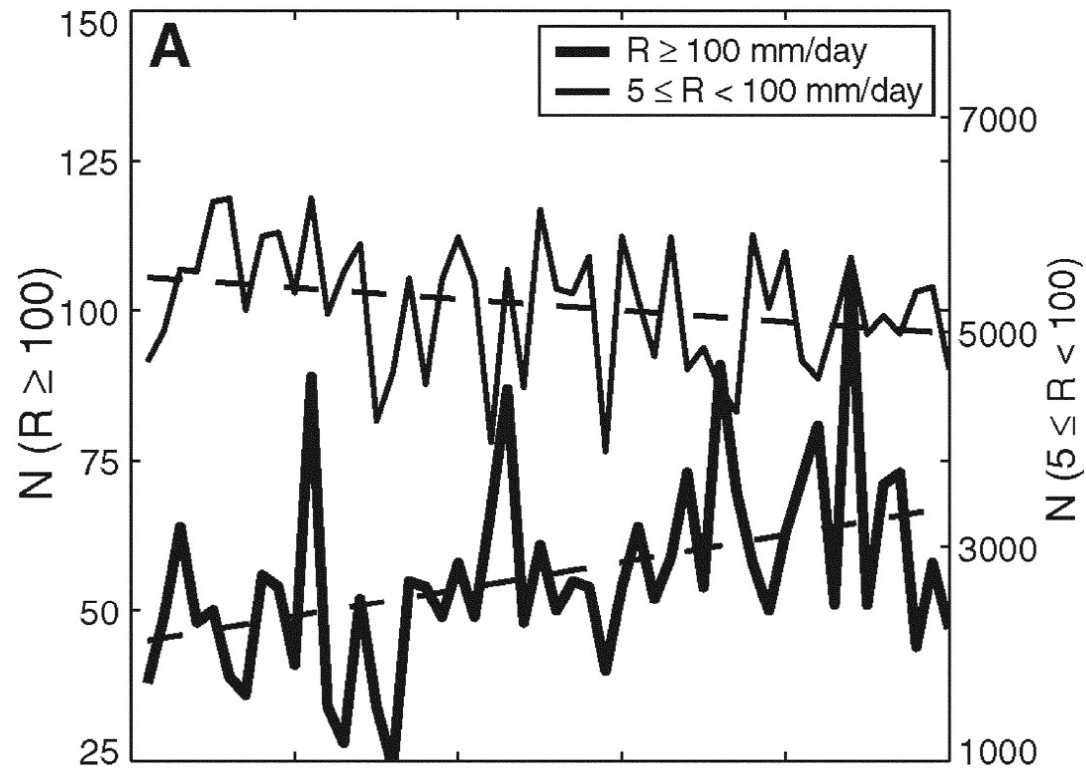
SL change (mm/yr)  
For 1993 to 2003 base on  
TOPEX/Poseidon satellite  
(IPCC, 2007)

Figure 5.15. (a) Geographic distribution of short-term linear trends in mean



# Indian monsoon rainfall (1951-2000)

Very heavy and heavy rainfall days are increasing,  
But moderate/weak rainfall days are decreasing.

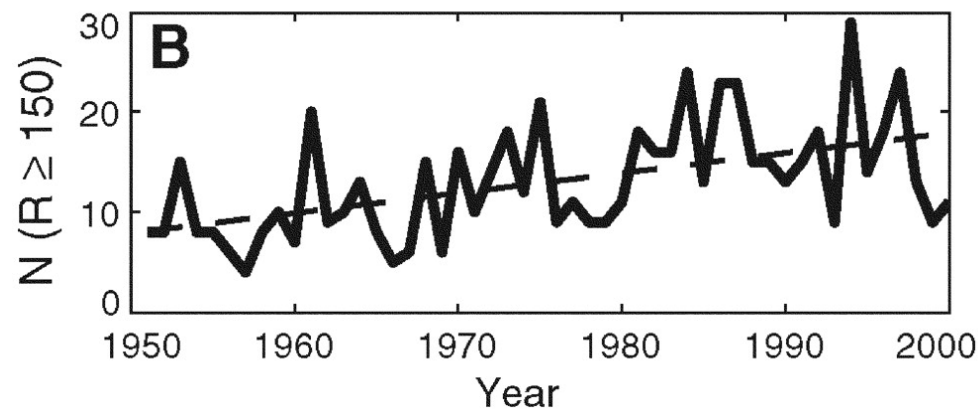


Moderate rain

並雨 ( $5 < R < 100$  mm/day)

Heavy rain

強雨 ( $R > 100$  mm/day)

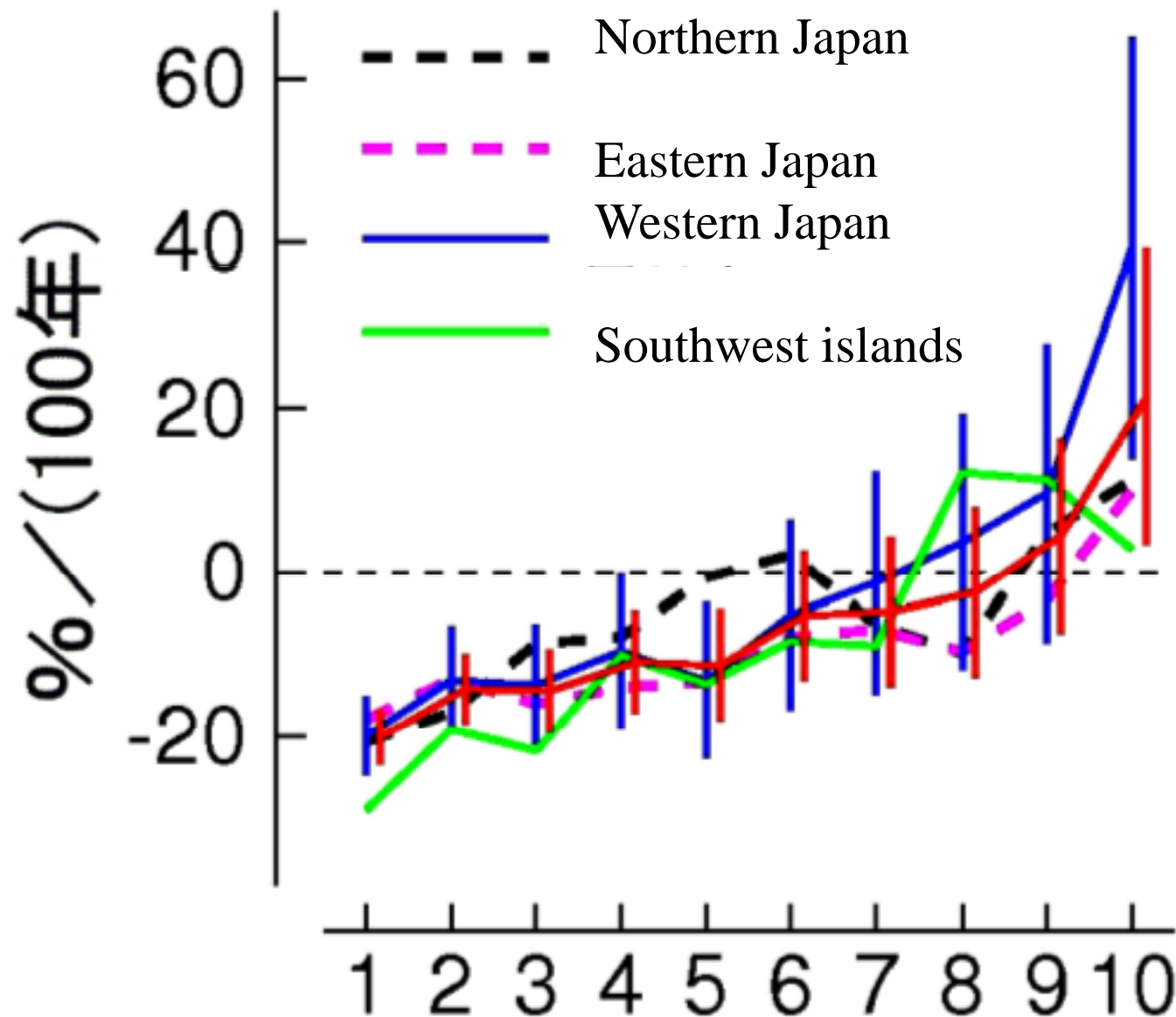


Very heavy rain

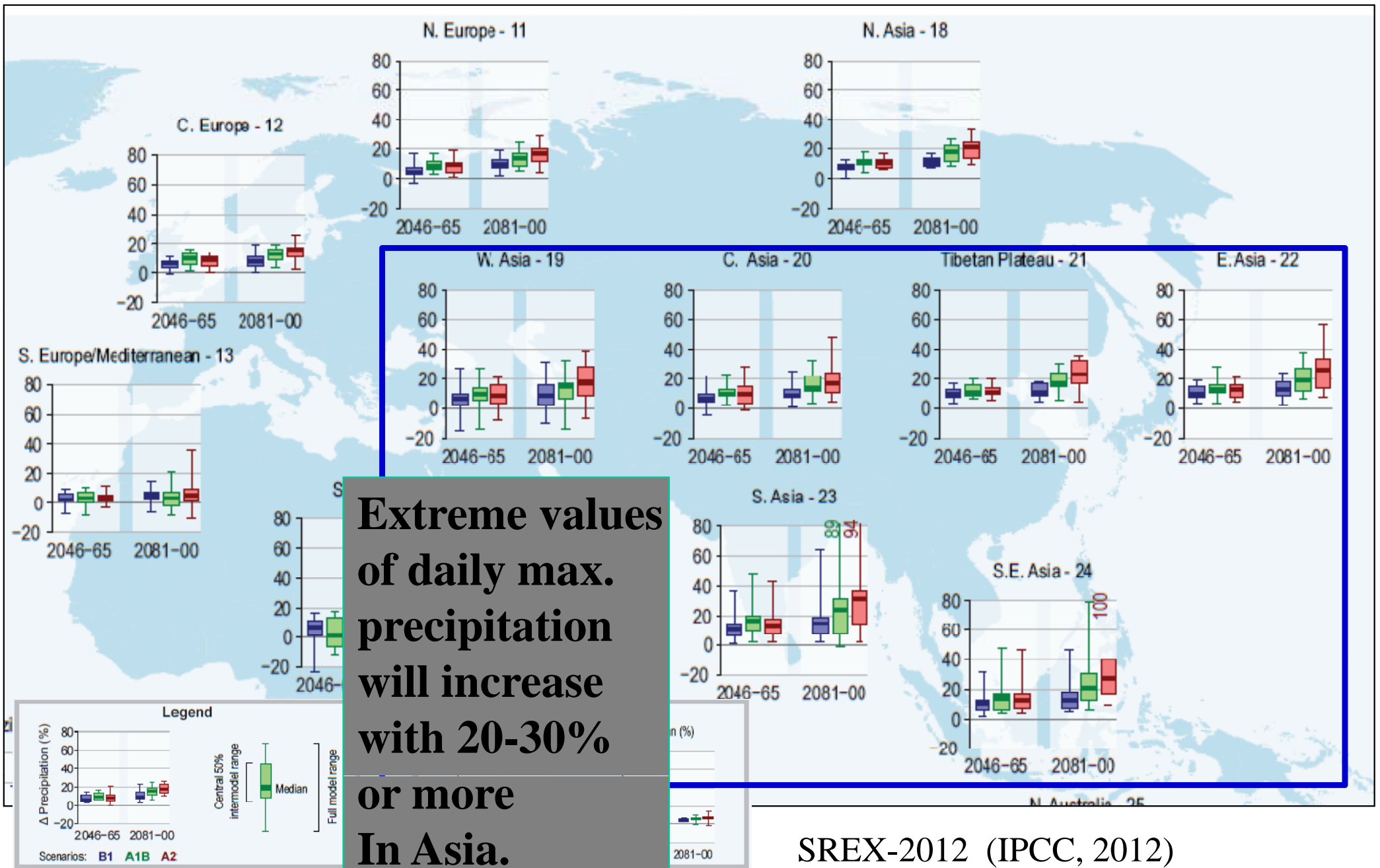
豪雨 ( $R > 150$  mm/day)

# Trend values of rate-classified (1 to 10) rainfall amounts in the past 100 years in 4 regions of Japan

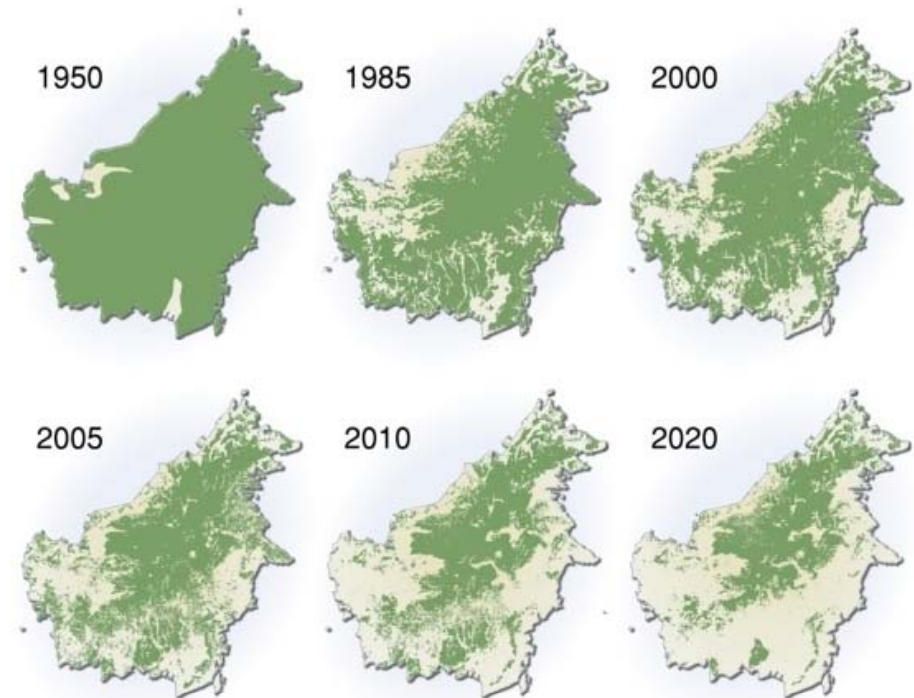
Strong rain (8,9,10) show increasing trends, but weak rain (1-5) show decreasing trends.



# Change of 20-year return values of annual 24-hour maximum precipitation (%) associated with GHG increases (to 2100)

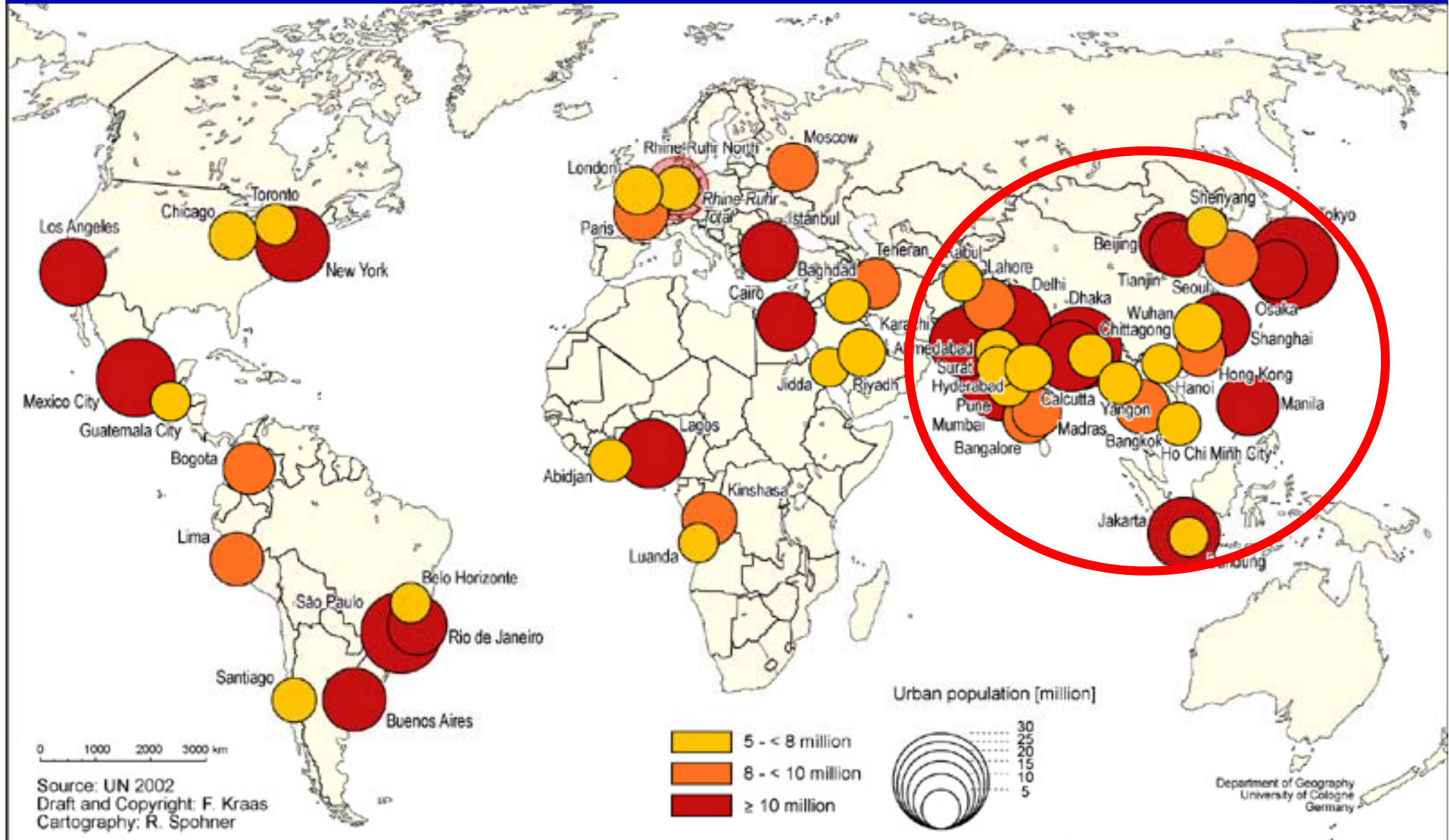


# Rapid Forest loss in South East Asia



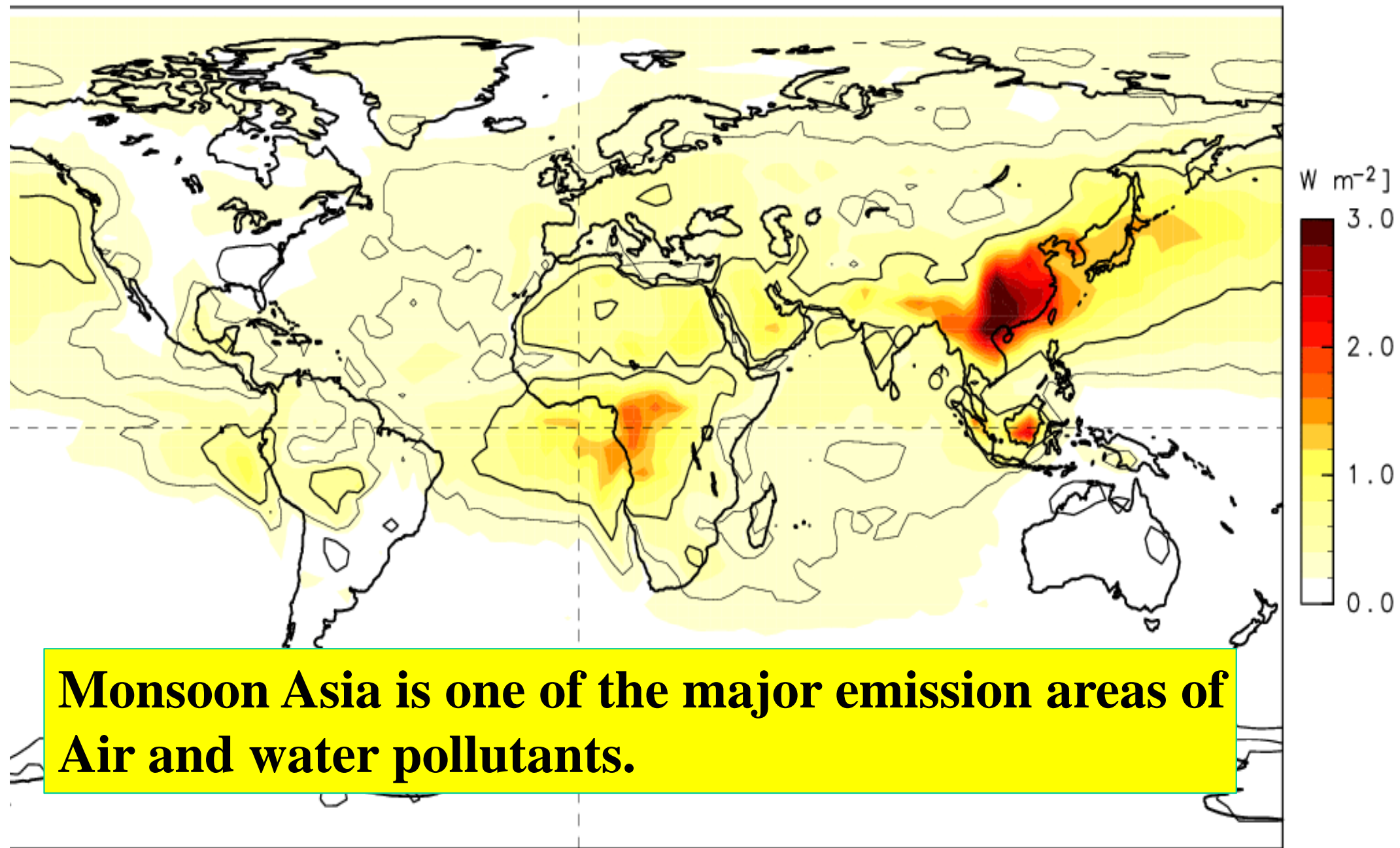
**Asia is experiencing significant transformation of terrestrial and aquatic ecosystems. Most extensively, forest disruption and conversion continues in developing countries, particularly in the tropics in the late 20th century.**

# Mega-cities in the world are concentrated in Asia

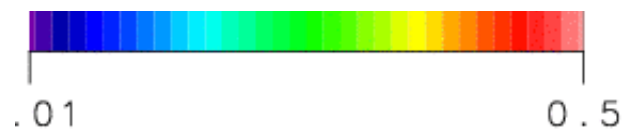


<http://www.megacities.uni-koeln.de/documentation/megacity/map/MC-2015-PGM.jpg>

ect:BC.ann



**Monsoon Asia is one of the major emission areas of Air and water pollutants.**



# Planetary Boundaries (地球の限界)

Threshold conditions for tipping-points of the earth system

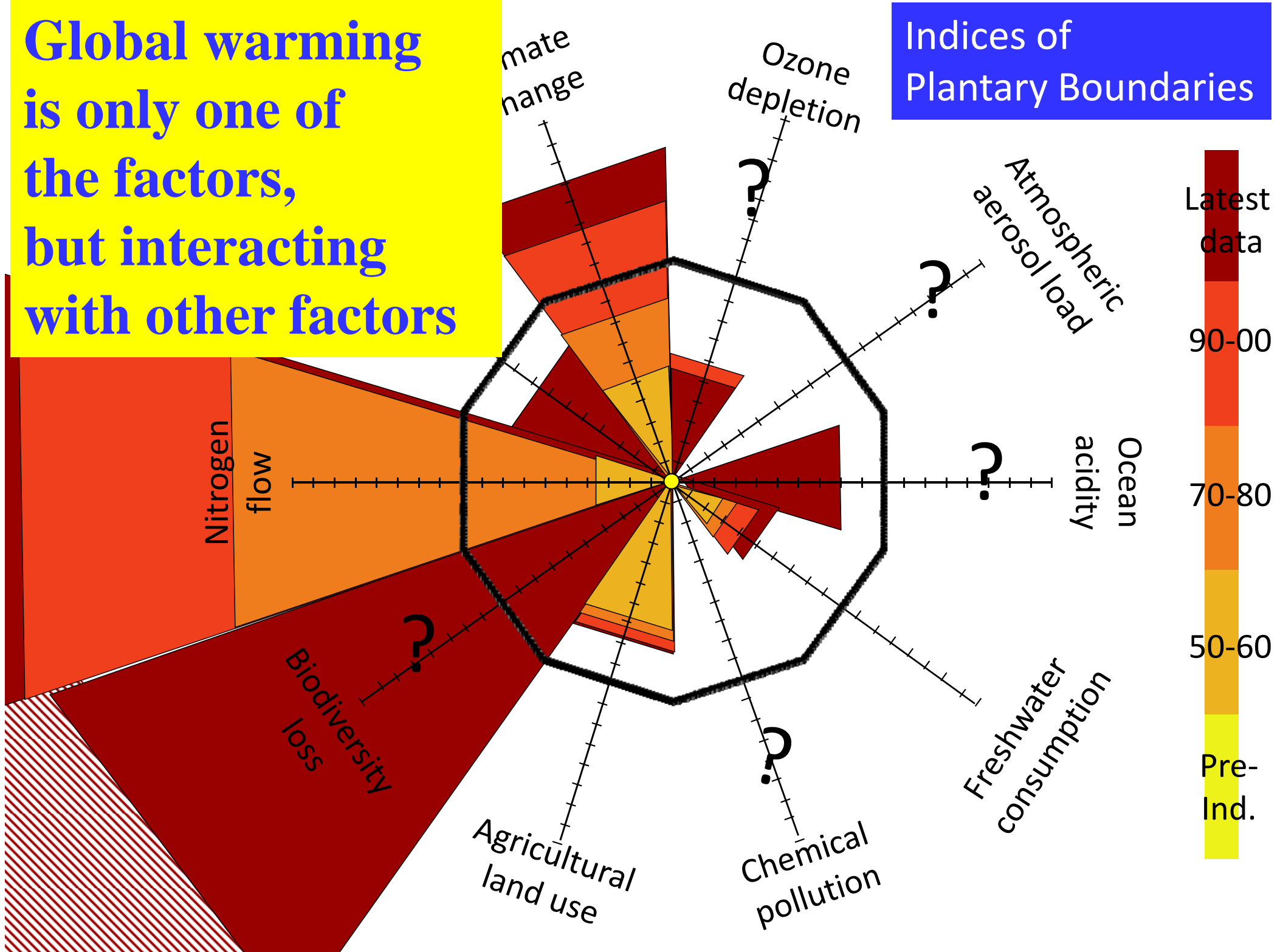
Exploring the Safe  
Operating Space for  
Humanity



Prof. Johan Rockström  
Stockholm Resilience  
Centre

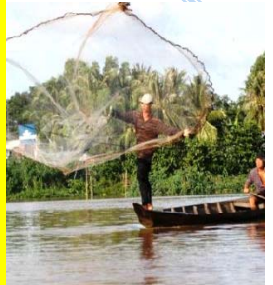
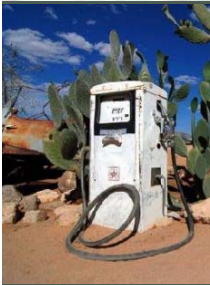
**Global warming is only one of the factors, but interacting with other factors**

**Indices of Planetary Boundaries**





To provide the knowledge required for societies in the world to face risks posed by global environmental change, and to seize opportunities in a transition to global sustainability



photos: [www.dawide.com](http://www.dawide.com)

# Future Earth

## research for global sustainability



WMO

**BELMONT**  
FORUM



**ICCSU**

International Council for Science



UNITED NATIONS  
UNIVERSITY

# Establishment of a new Science & Technology Alliance for Global Sustainability



United Nations  
Educational, Scientific and  
Cultural Organization



INTERNATIONAL GROUP OF  
FUNDING AGENCIES FOR  
GLOBAL CHANGE RESEARCH



WMO as  
observer

# Future Earth attributes

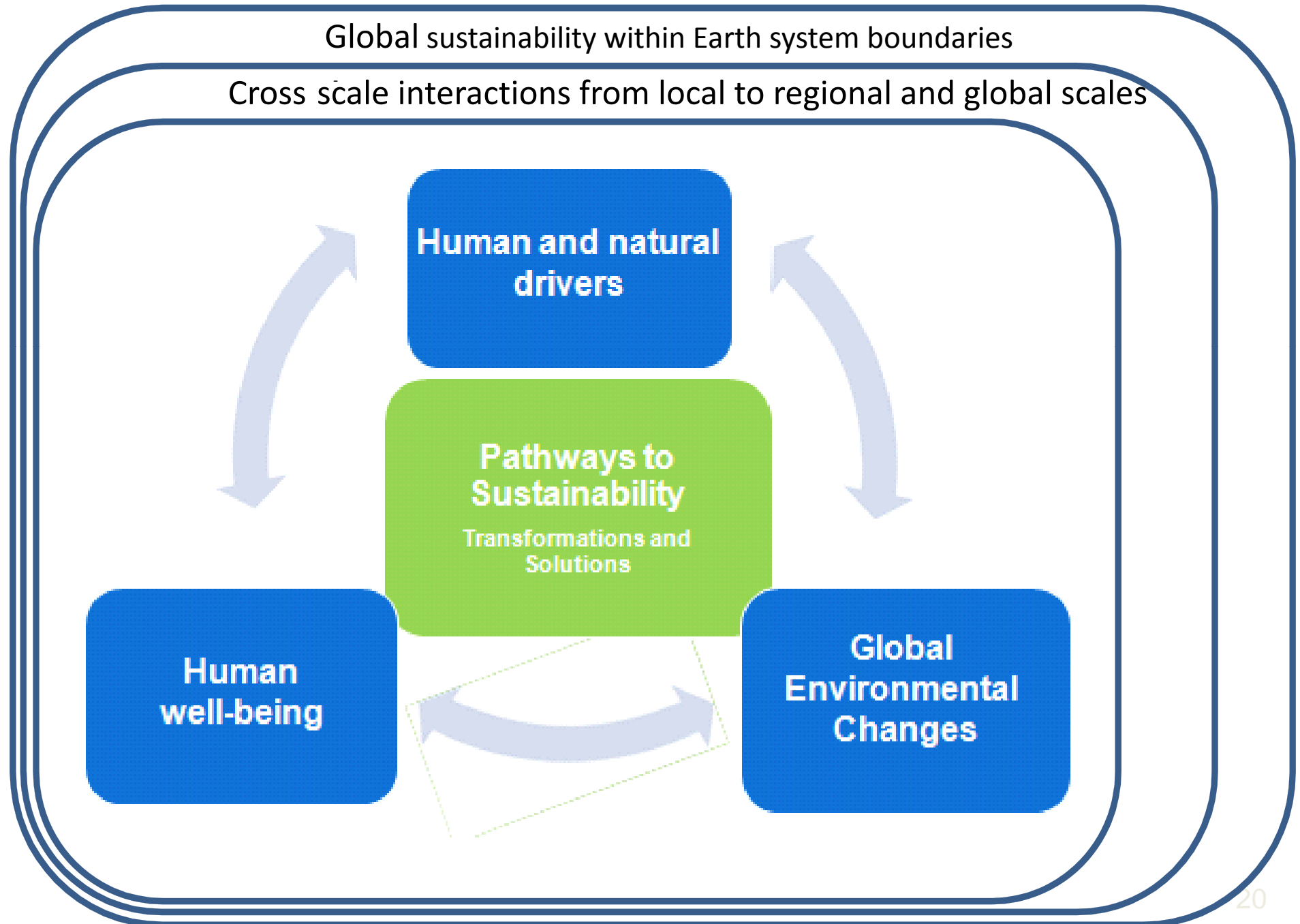
A global platform  
for international research collaboration

To promote earth system science focusing impacts of environmental change on **people**, adaptation and transformation

To deliver **interdisciplinary** research on global environmental change for sustainable development

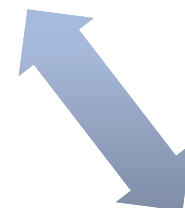
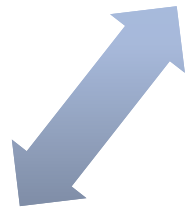
To strengthen partnership between researchers/funders/users (**co-design**)

# Conceptual framework for Future Earth



# Future Earth Research Themes

**Transformation  
towards  
Sustainability**

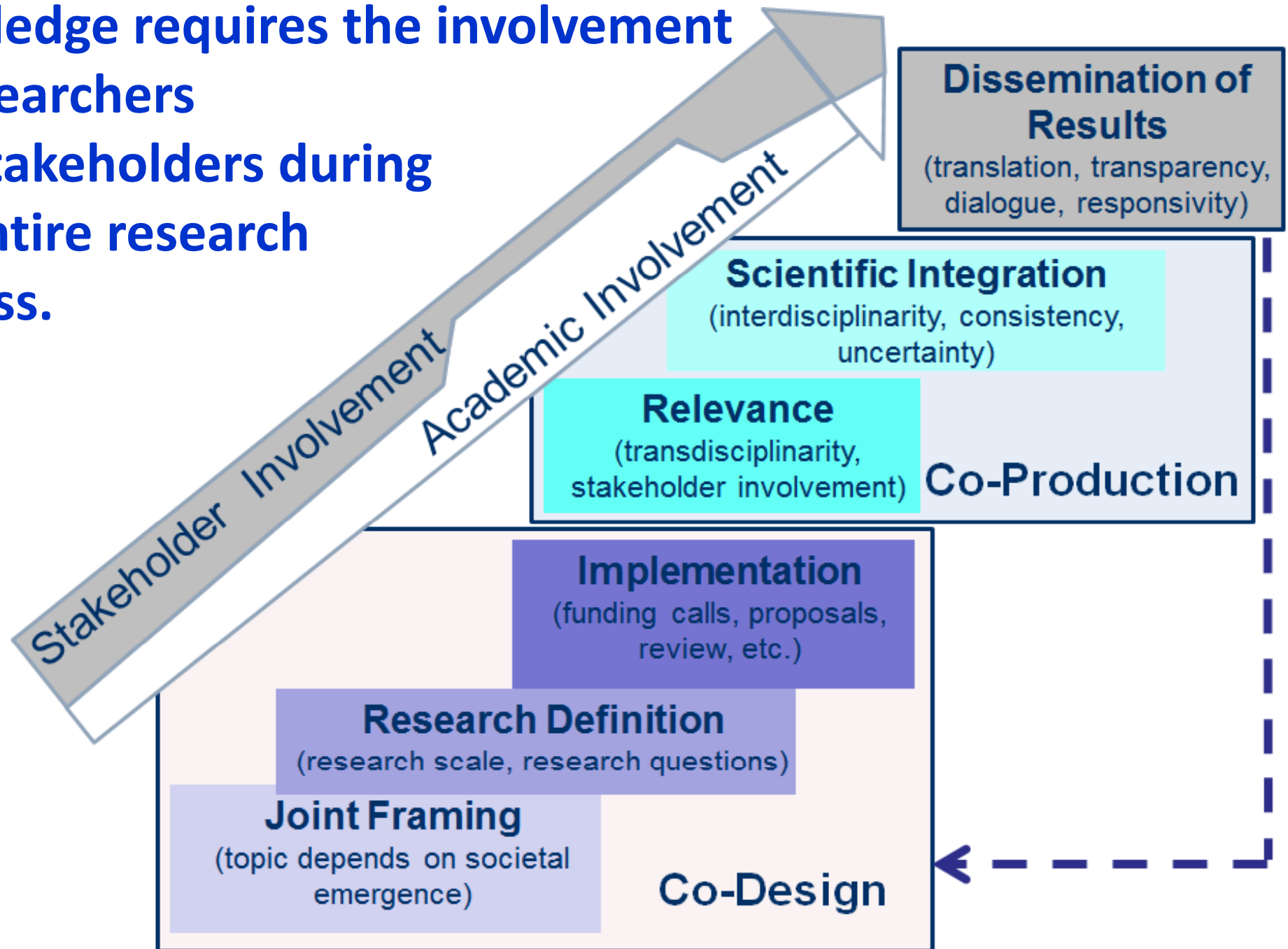


**Global  
Development**

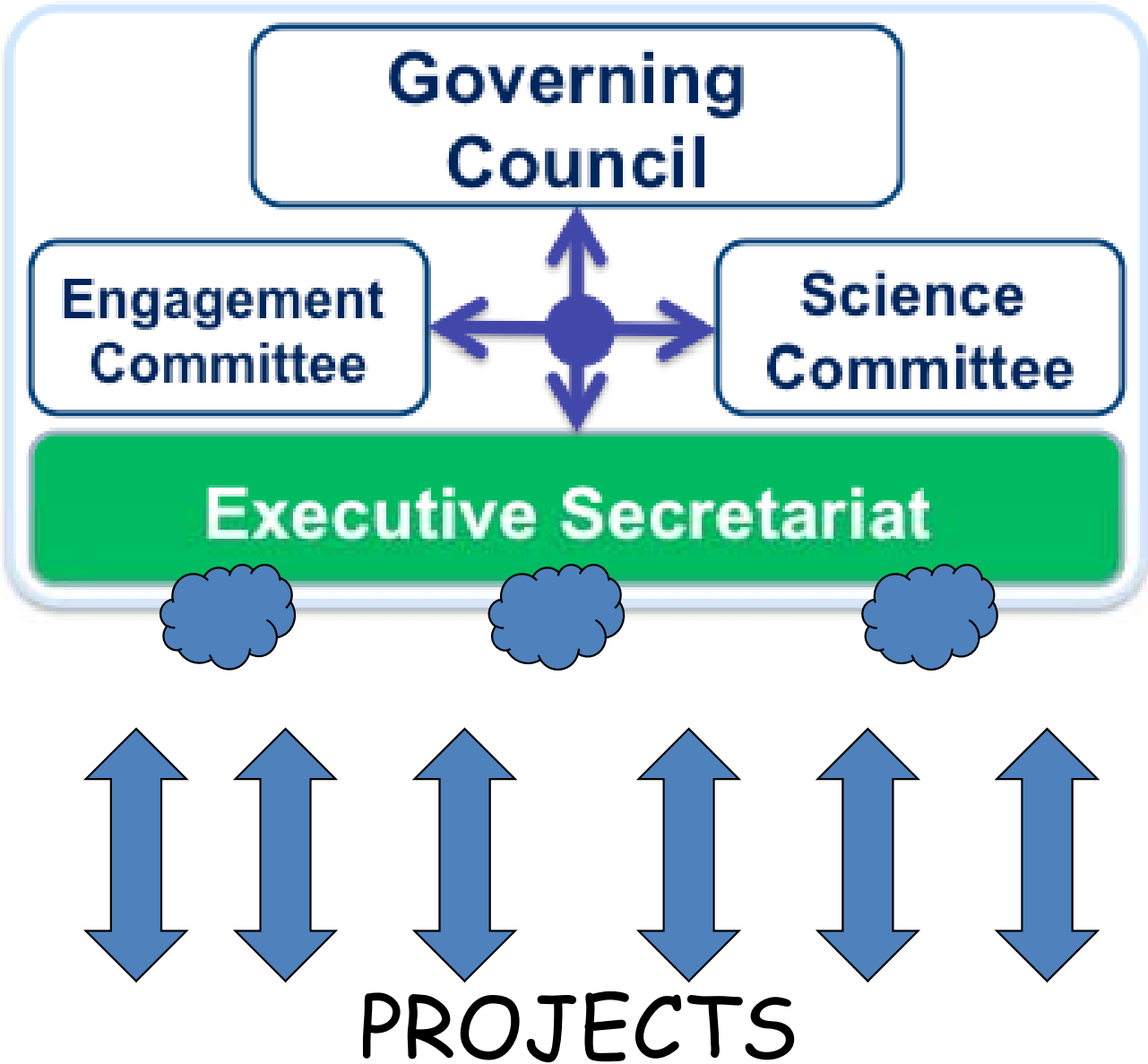


**Dynamic  
Planet**

Co-design and co-production of knowledge requires the involvement of researchers and stakeholders during the entire research process.



# Governance of Future Earth



# **Future Earth is particularly important in Asia “Need for Future Asia”**





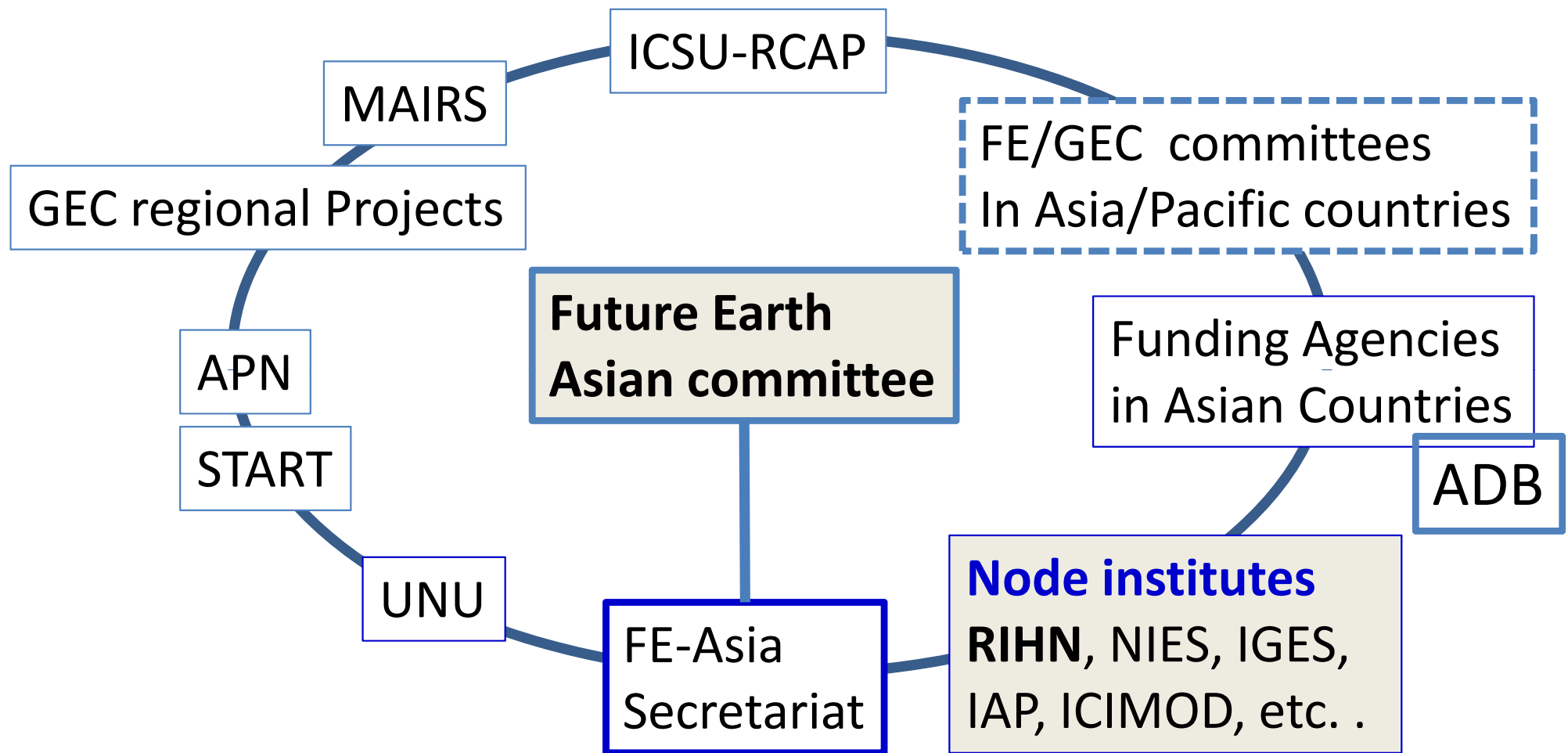
# The Asian Challenge

- The region as a whole is characterized by rapid population and economic growth and urbanization, great disparities of wealth both within and between countries, and social and ecological vulnerability to the potential impacts of climate change.
- Associated with this rapid population & economic growth, this region has become a huge hot-spot of GHG increase, air and water pollutions, affecting regional to global climate change.
- **This region is located in the midst of world tectonic zone and monsoon climate, which cause high frequency of natural disasters (e.g., massive earthquakes, Tsunamis, landslides, typhoons, floods and droughts).**

# **Needs for International and multi-national collaboration**

- To promote sustainability studies, innovative funding sources and institutional support mechanisms need to be established by national science foundations, relevant government agencies, and multi-national & international actors and institutions.**
- The complexity of sustainability issues in Asia requires visionary political and scientific leadership and high level of exchange and coordination between different epistemic communities in the region.**
- The science community and society should tightly collaborate particularly in Asia to form Future Earth in Asia initiative.**

# Future Asia contributing to Future Earth



**Scientists and Stakeholders in Asia/Pacific region need to tightly collaborate to construct sustainable society In A/P region as part of the Future Earth Initiative.**



**Future Earth will be  
an initiative from  
“ Science for Science”  
to “Science for Society”**

**Thank you very much !**