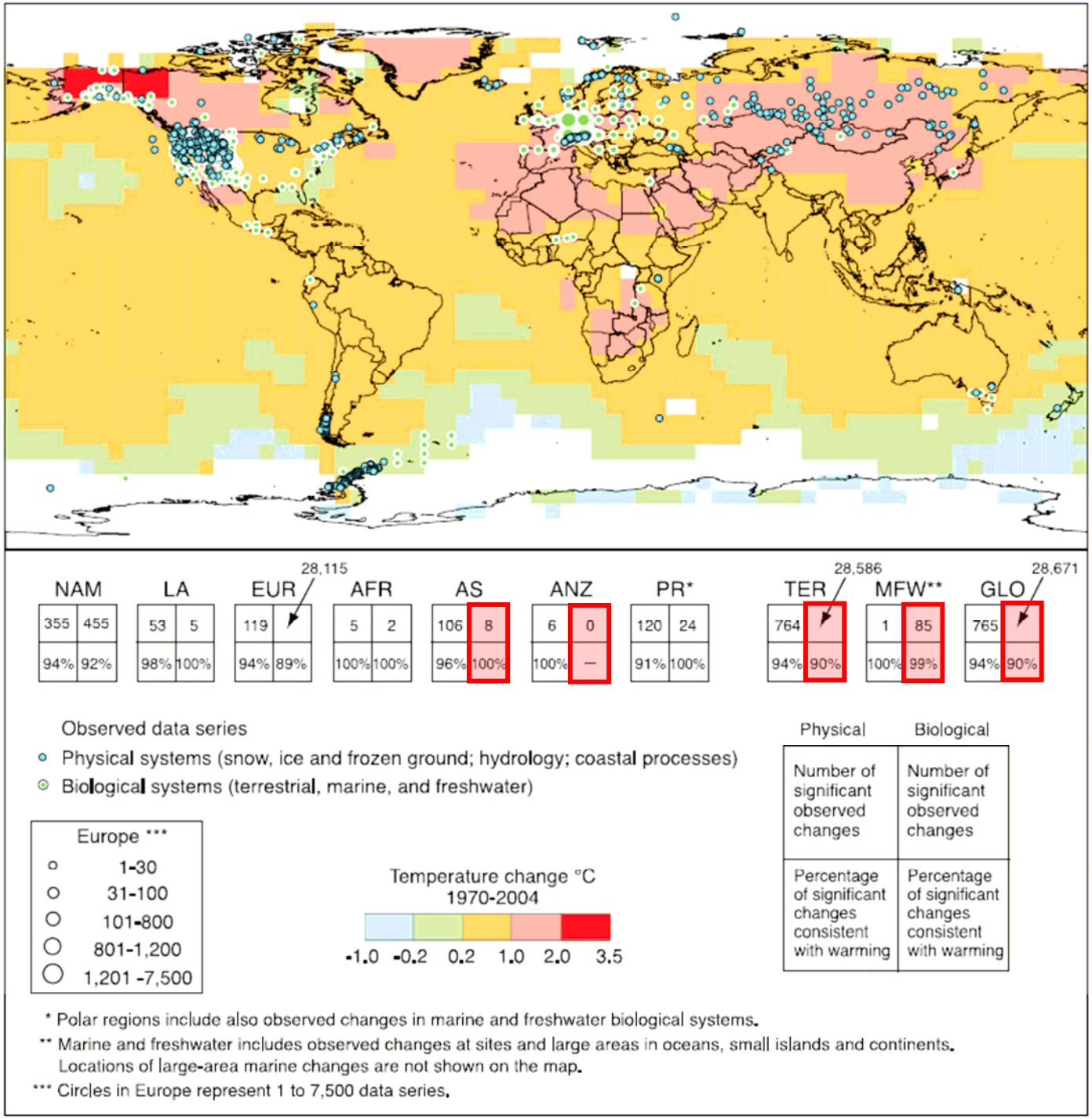
IPCC AR4 WG II TS

There is more evidence, from a wider range of species and communities in terrestrial ecosystems than reported in the Third Assessment, that recent warming is already strongly affecting natural biological systems. There is substantial new evidence relating changes in marine and freshwater systems to warming. The evidence suggests that both terrestrial and marine biological systems are now being strongly influenced by observed recent warming

Figure TS.1.

Locations of significant changes in data series of physical systems (snow, ice and frozen ground; hydrology; and coastal processes) and biological systems (terrestrial, marine and freshwater biological systems), are shown together with surface air temperature changes over the period 1970-2004.

(IPCC AR4 WG II)



The main projected impacts Ecosystems (IPCC AR4 WG II)

- Most vulnerable ecosystems : tundra, boreal forest, mountain and Mediterranean-type ecosystems, mangroves, salt marshes, coral reefs, and sea-ice biomes.
- Net primary productivity (NPP) increases at high latitudes, while decline at low latitudes.
- An intensification and expansion of wildfires
- Projected carbon sequestration by poleward taiga expansion is as likely as not to be offset by albedo changes, wildfire, and forest declines and methane losses from tundra.
- Accelerated release of carbon from peatlands, tundra frozen loess, permafrost soils, and soils of boreal and tropical forests
- Tropical forest sequestration, despite recently observed productivity gains, is very likely to depend on land-use change
- The low-productivity zones in sub-tropical oceans are likely to expand, but the productive polar sea-ice biomes are very likely to contract

The main projected impacts Biodiversity (IPCC AR4 WG II)

- As sea-ice biomes shrink, including penguins, seals and polar bears.
- Loss of corals due to bleaching
- Tropical forests are likely to experience severe impacts, including biodiversity losses.
- Greater rainfall variability compromise inland and coastal wetland species
- Surface ocean pH decrease impair shell or exoskeleton formation by marine organisms

Ecosystem GEOSS

Observations are needed on the area, condition, and natural-resource stock levels of ecosystems such as forests, rangelands, and oceans. GEOSS implementation will seek to ensure that methodologies and observations are available on a global basis to detect and predict changes in ecosystem condition and to define resource potentials and limits. Ecosystem observations will be better harmonized and shared, spatial and topical gaps will be filled, and in situ data will be better integrated with space-based observations. Continuity of observations for monitoring wild fisheries, the carbon and nitrogen cycles, canopy properties, ocean colour, and temperature will be set in place.

Ongoing tasks

EC-06-01: Integrated Global Carbon Observation *(USA, IGOS-P)*

EC-06-02: Ecosystem Classification *(USA and Guyra Paraguay)*

EC-06-07: Regional Networks for Ecosystems *(USA, POGO and GTOS)*

EC-07-01: Global Ecosystem Observation and Monitoring Network

Biodiversity GEOSS

Issues in this area include the condition and extent of ecosystems, distribution and status of species, and genetic diversity in key populations. Implementing GEOSS will unify many disparate biodiversity-observing systems and create a platform to integrate biodiversity data with other types of information. Taxonomic and spatial gaps will be filled, and the pace of information collection and dissemination will be increased.

Ongoing tasks

BI-06-03: Capturing Historical Biodiversity Data *(GBIF)*

BI-07-01: Biodiversity Observation Network *(DIVERSITAS)*

BI-07-02: Invasive Species Monitoring System *(USA)*

Adaptation to Global Warming Ecosystem and Biodiversity

- **Put priority to conserve ecosystem, biodiversity and ecosystem services**
- **Reconsideration of reserves**
  - **Predict the change**
  - **Identify the refugia**
- **Assist natural and smooth shifts of distribution**
  - **Reduce the human impacts other than global warming**
  - **Remove barriers of distribution shifts**
- **Control disturbance regime to some extent**

2nd GEOSS AP Symposium

- How GEOSS can contribute to monitor the change and adaptation of ecosystem and/or biodiversity in the global warming process? Or, what kind of system should be established or enhanced to do this?
- How we can connect the large scaled observations with on-site observations?

April 15

10:00-12:00	**Using GEOSS to manage ecosystems**
13:00-15:00	**Using GEOSS to protect Biodiversity**
15:30-16:30	**Linking remote sensing and on site observation**
16:30-17:30	**General discussion and wrap up session summary**

Using GEOSS to manage ecosystems

10:00-12:00

- ***EAP-ILTER：Regional Effort on Ecosystem Research and Management Under Climate Change*** (Dr Zhao Shidong, Chair, EAP ILTER, China)
- ***Challenges of JaLTER toward interdisciplinary study on ecosystem adaptation under global changes*** (Dr Shibata, JaLTER)
- ***Networking of Observations for Detecting and Adapting to Global Warming: A Korean Perspective*** (Eun-Shik Kim, Korea)
- ***The IUFRO-led Expert Panel on Adaptation of Forests to Climate Change - Linking forest policy and management with scientific knowledge*** (Alexander Buck, IUFRO)

Using GEOSS to protect Biodiversity

13:00-15:00

- ***Newest developments in the formation of the global Biodiversity Observation Network (GEO BON)*** (Bruno Walther, DIVERSITAS/NASA/GEO)
- ***NaGISA and DIWPA ---- as examples for strategic implimentation plan of global-scale and long-term biodiversity monitoring program*** (Dr Shirayama, Kyoto University)
- ***Monitoring Sites 1000, a nationwide project for monitoring ecosystems and biodiversity in Japan*** (Mr. Sakaguchi, Biodiversity Center of Japan, Ministry of Environment)
- ***Biodiversity and Climate Change - a role for GBIF*** (Dr. Eamonn O Tuama, GBIF)
- ***Predicting potential habitats for plants under climate change and assessing vulnerability in Japan: especially referring to buna (Fagus crenata) forests*** (Tanaka, N., Matsui, T., Yagihashi, T., Taoda, H., FFPRI Japan)

Linking remote sensing and on site observation *15:30-16:30*

- ***A vegetation transition model at the topographical scale and its application to the Mongolian Forest-Steppe ecotone*** (R. Ishii, Frontier Research Center for Global Change)
- ***Introduction of Three-dimensional digital analysis of aerial photographs and Phenology monitoring camera system*** (Dr Oguma, NIES Japan)

General discussion and wrap up session summary *16:30-17:30*

Summary Report (draft)

- Asia-Pacific region includes variety of ecosystems, which includes from low to high latitudes. However, human population and economics are growing rapidly in this region to cause interactive effects with global warming, and it is expected that the effect would extend.

- To establish effective observing system to monitor the impacts and develop adaptive measure of global warming, it is expected that Asia-Pacific nations coordinate the observation network with the aim of protecting the ecosystems and biodiversity in the Asia-Pacific region under the framework of GEOSS

- GEO is expected to accelerate the following GEOSS tasks especially
  - EC-06-02: Ecosystem Classification and Mapping
  - EC-06-07: Regional Networks for Ecosystems
  - EC-07-01: Global Ecosystem Observation and Monitoring Network
  - BI-06-03: Capturing Historical Biodiversity Data
  - BI-07-01: Biodiversity Observation Network