World Meteorological Organization

Weather • Climate • Water

# The science of climate and the Global Framework for Climate Services

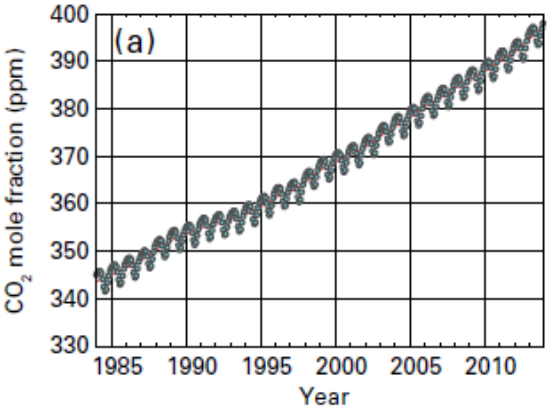

**M. Jarraud**

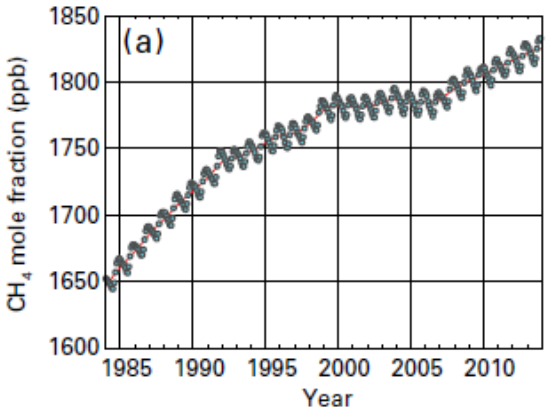
**Secretary-General**

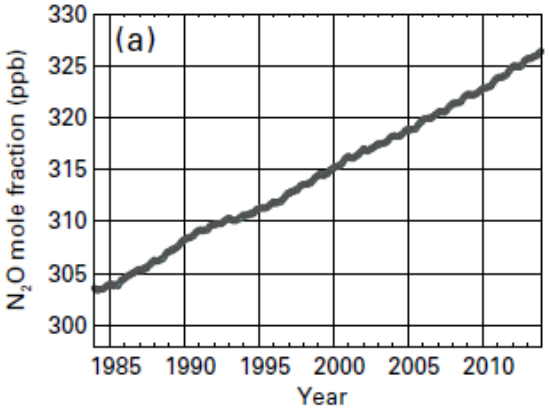

**ICTP: 50 Years of Science for the Future**

**Trieste, 6–9 October 2014**

# Greenhouse gas concentrations



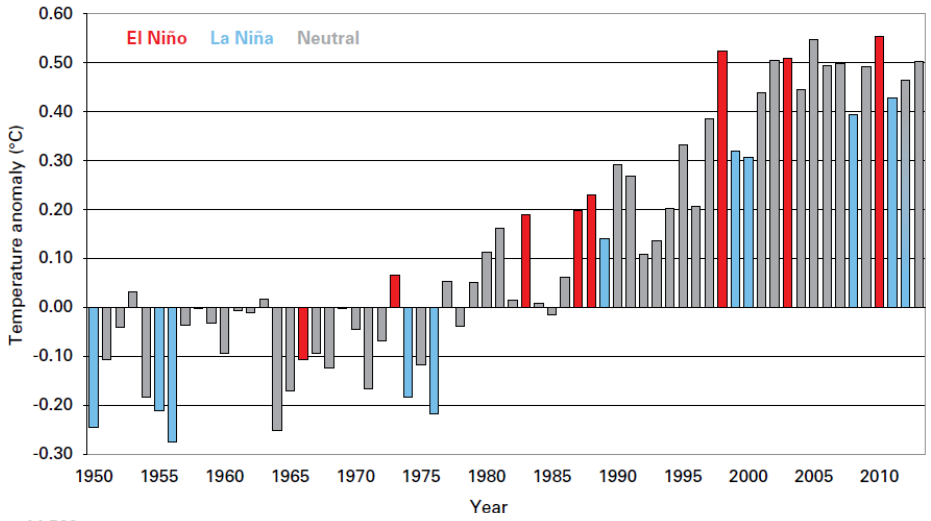



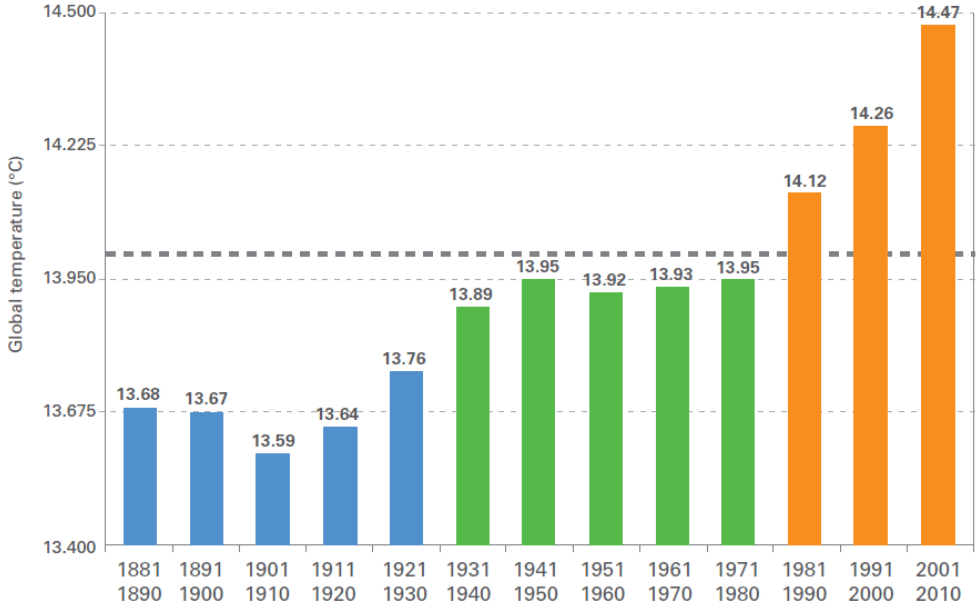




$CO_2$ $CH_4$ $N_2O$

**Amount of GHG in the atmosphere reached a new record high – In April 2014 concentrations of $CO_2$ exceeded 400 ppm on average in the Northern hemisphere**

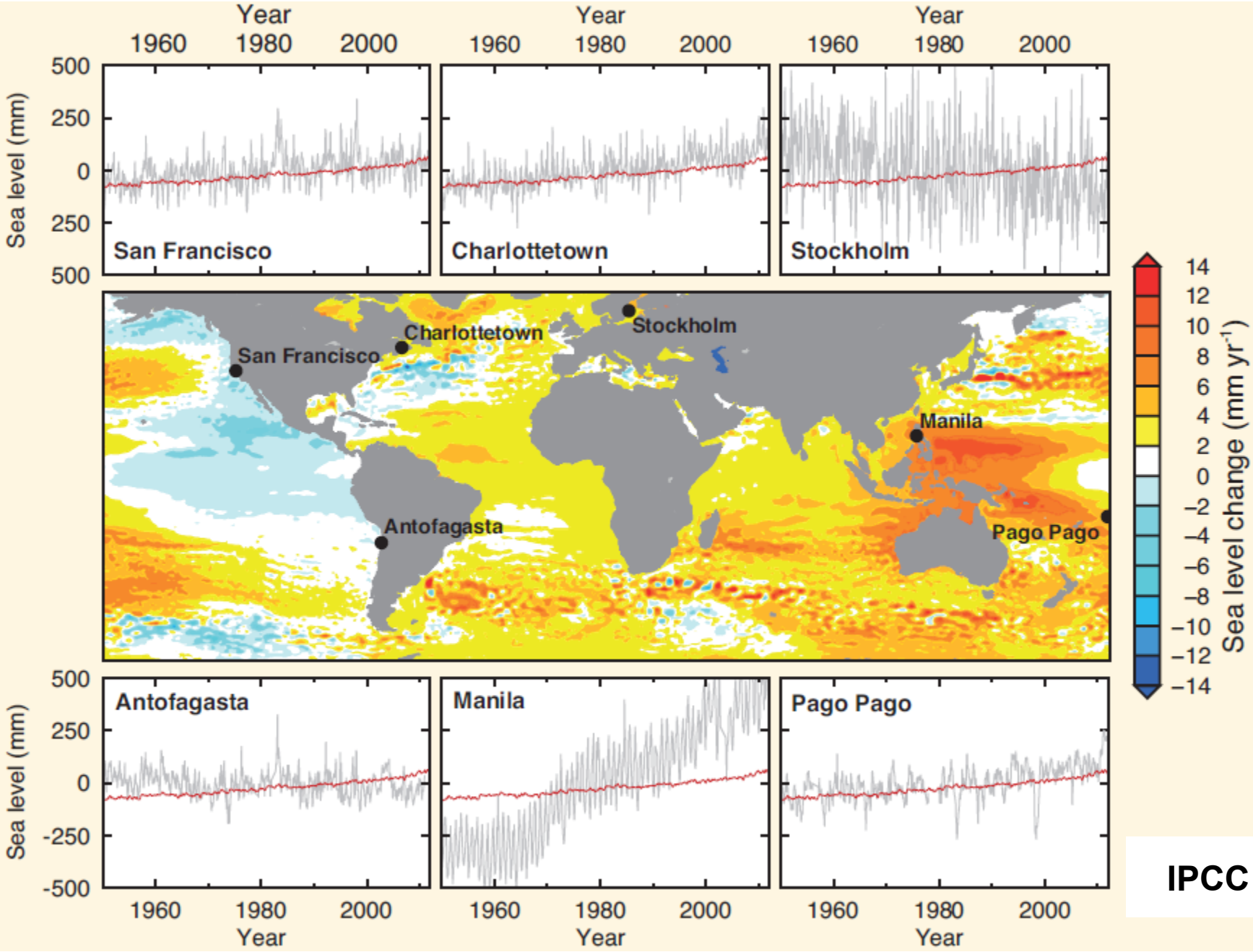
# State of the global climate in 2013



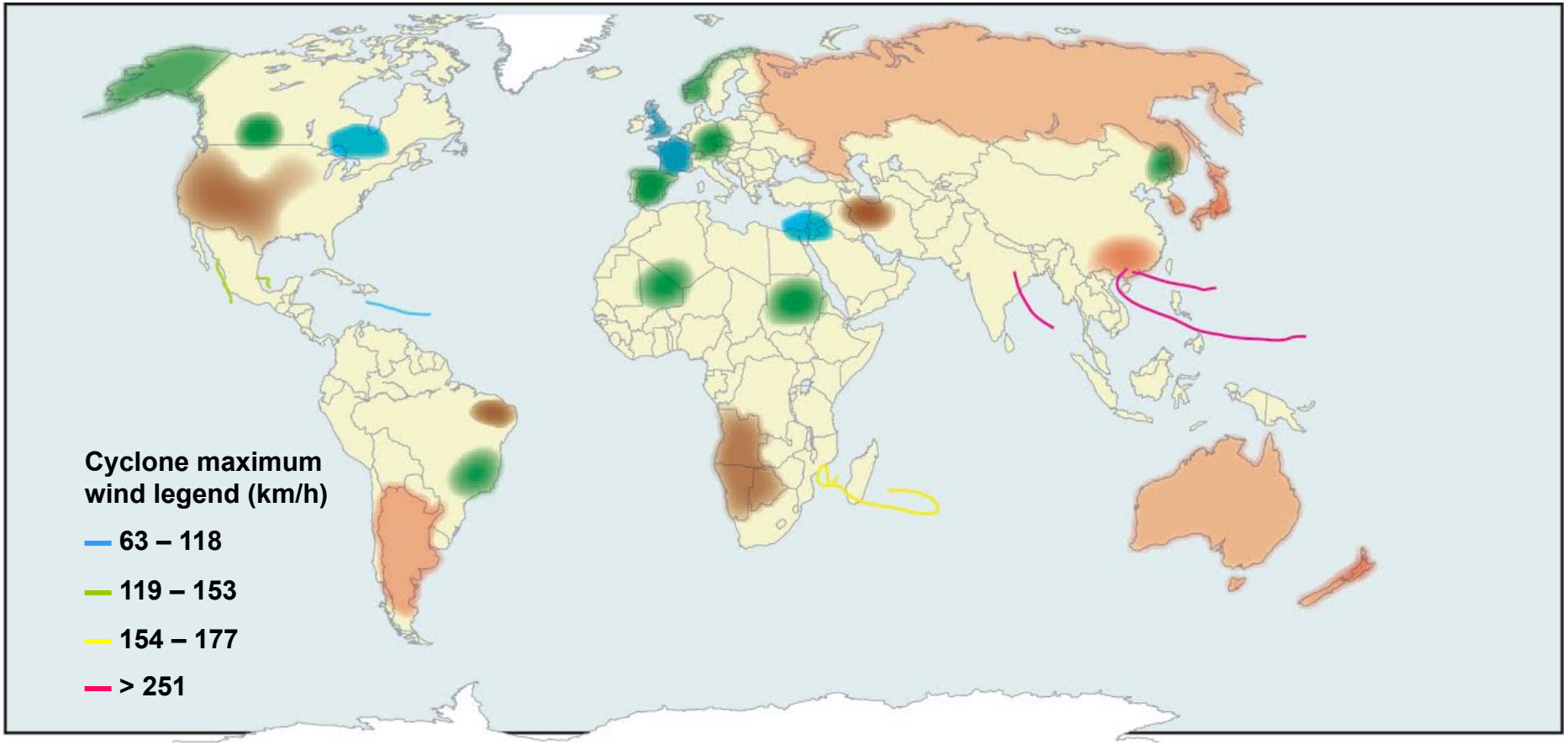

- 2013 ranks as the 6th warmest on record
- Last thirteen years among the top 14 warmest years on record
- Global land and ocean surface temperature about 0.50°C above the 1961–1990 average of 14°C

# Sea level trends 1993–2012



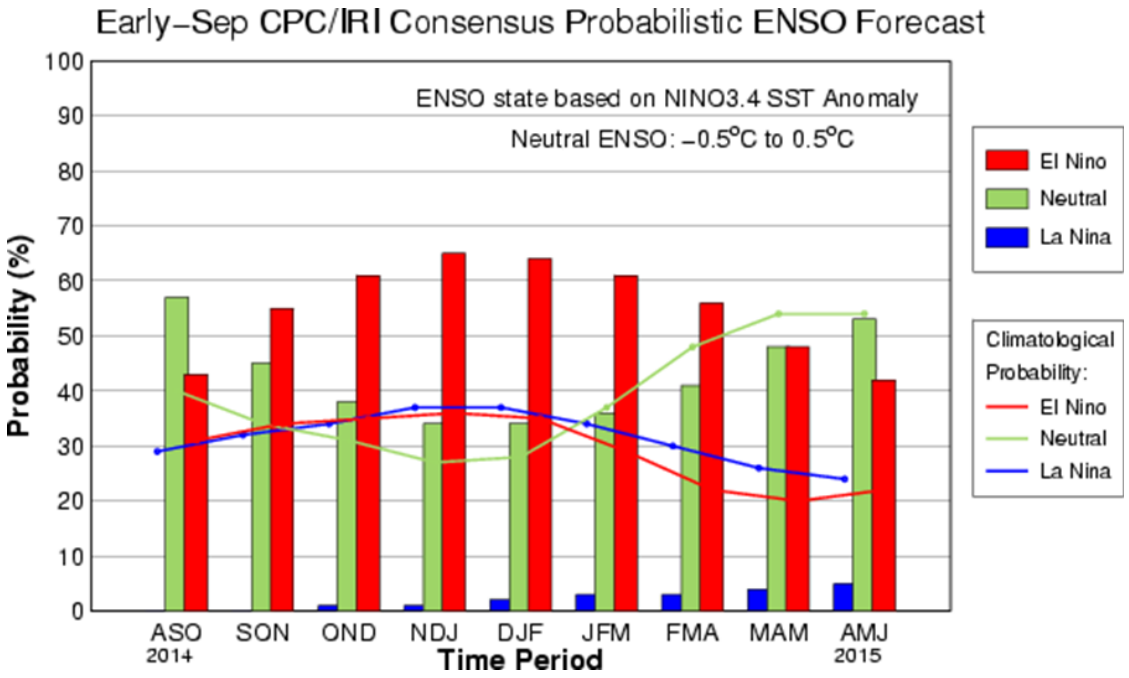

IPCC

# 2013 climate anomalies and events




- Heavy rain and floods
- Drought
- Cold waves and extremely low temperatures
- Heat waves and extremely high temperatures

# El Niño Watch: 2014

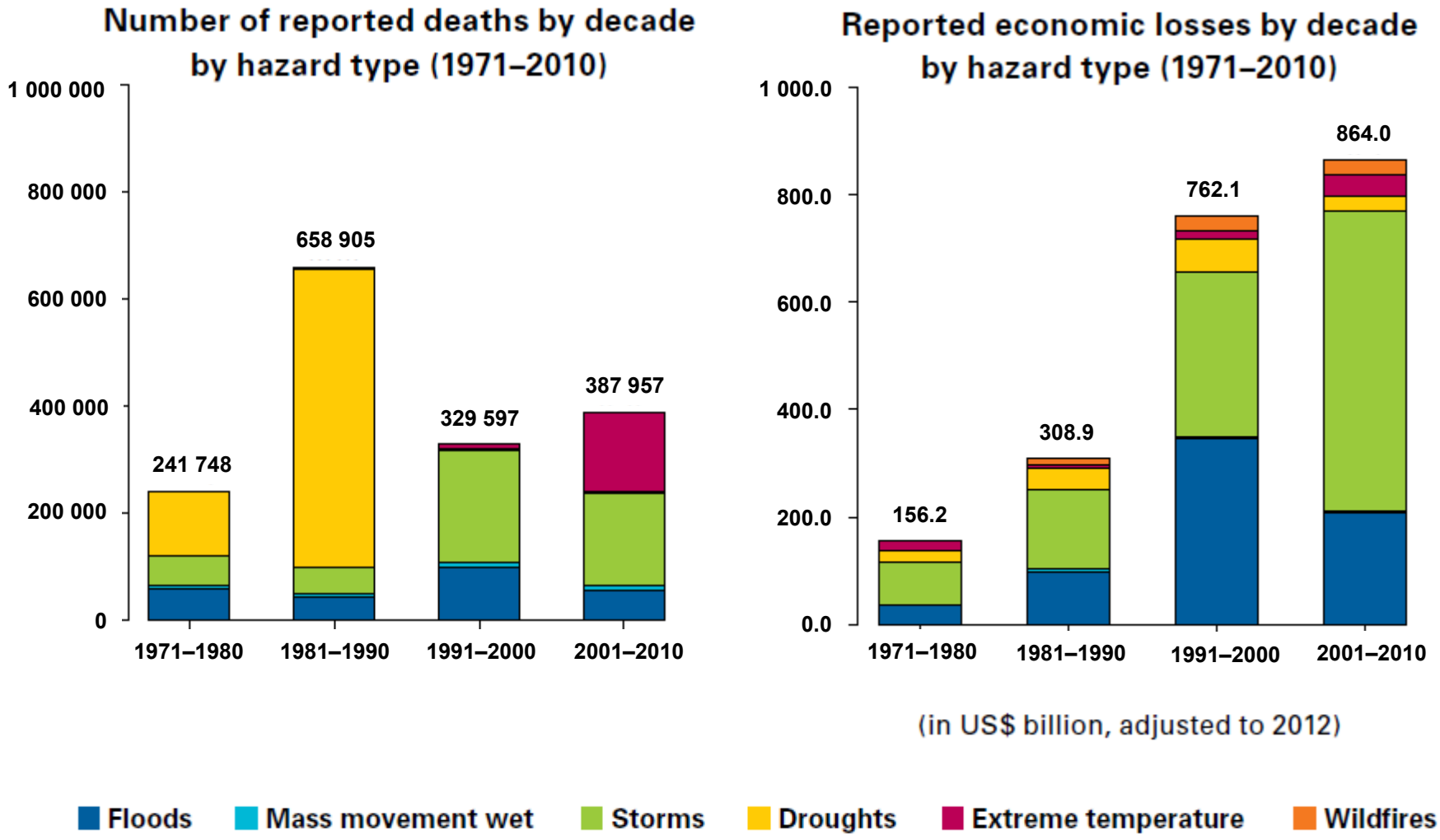



*NOAA, 4 September 2014*

**El Niño affects regional climates, particularly in the tropics/sub-tropical zones, including with health impacts. Economic impact of 1997–1998 El Niño to U.S. economy worthy $25 billion.**

- **WMO El Niño/La Niña Update issued on 8 September 2014**
- **Sea surface temperature anomalies pulled back from El Niño thresholds in July/August, with atmospheric indicators neutral**
- **Models outlooks still suggest up to a 60% chance of El Niño becoming established in late 2014/early 2015**

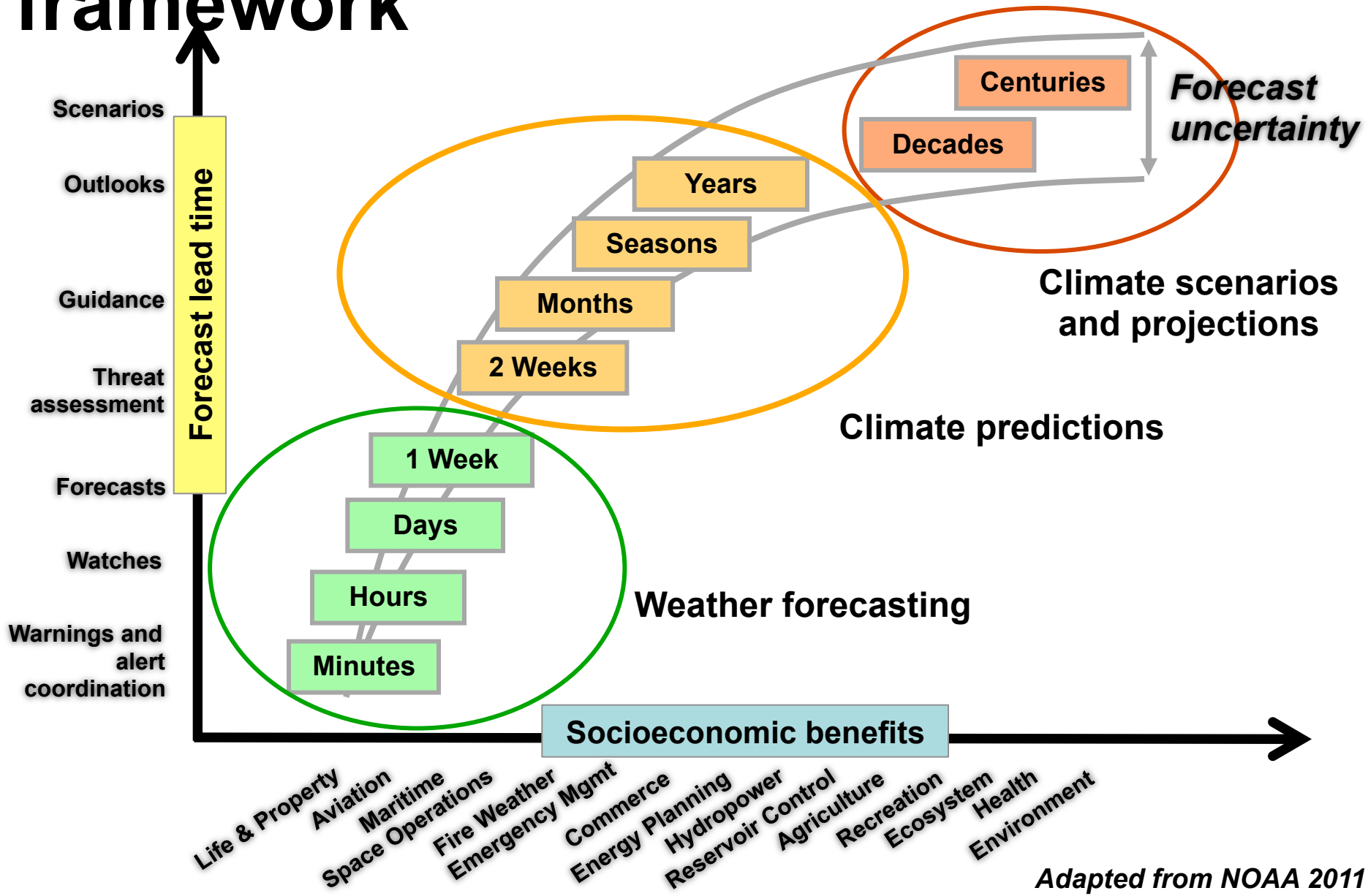
# Deaths and economic losses by hydrometeorological hazards





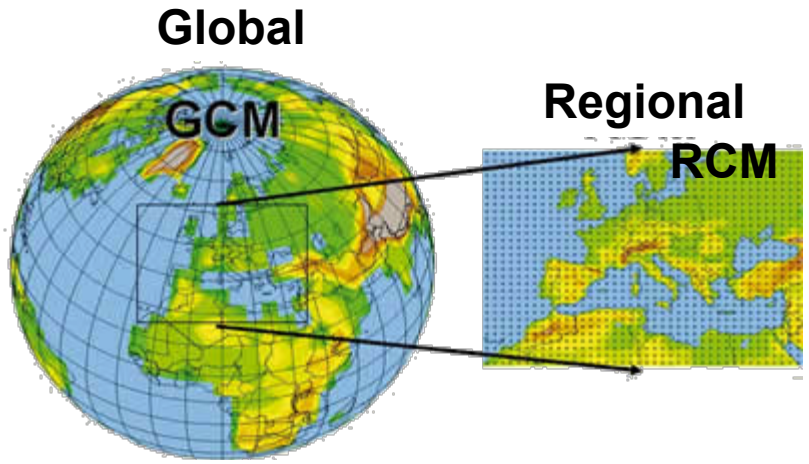

*WMO-CRED-UCL 2014*

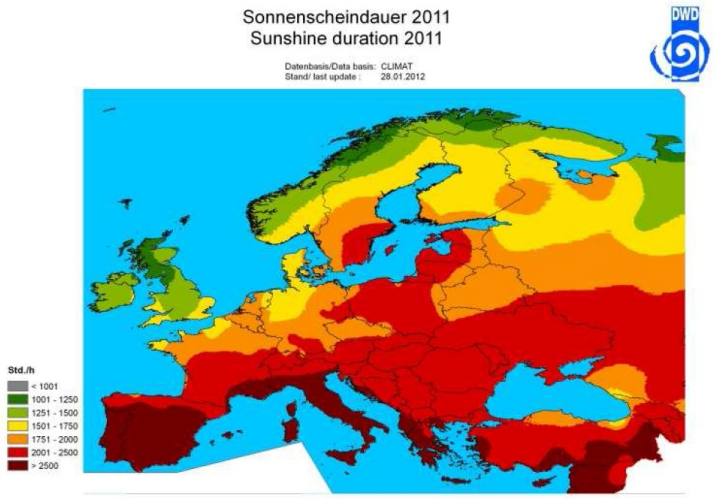
# Weather-to-climate: seamless framework




*Adapted from NOAA 2011*

# Examples of climate services based on predictions




- Expected future temperature
- Precipitation scenarios
- Changing frequency of extreme weather events
- Sea-level changes
- Snow, glacier and sea ice coverage
- Growing seasons
- Potential impacts of climate change on the natural environment and major business and public sectors

# Global Framework for Climate Services

**Use of climate information in policy and practice**

- Better management of risks and opportunities related to climate variability and change
- Adaptation to climate change

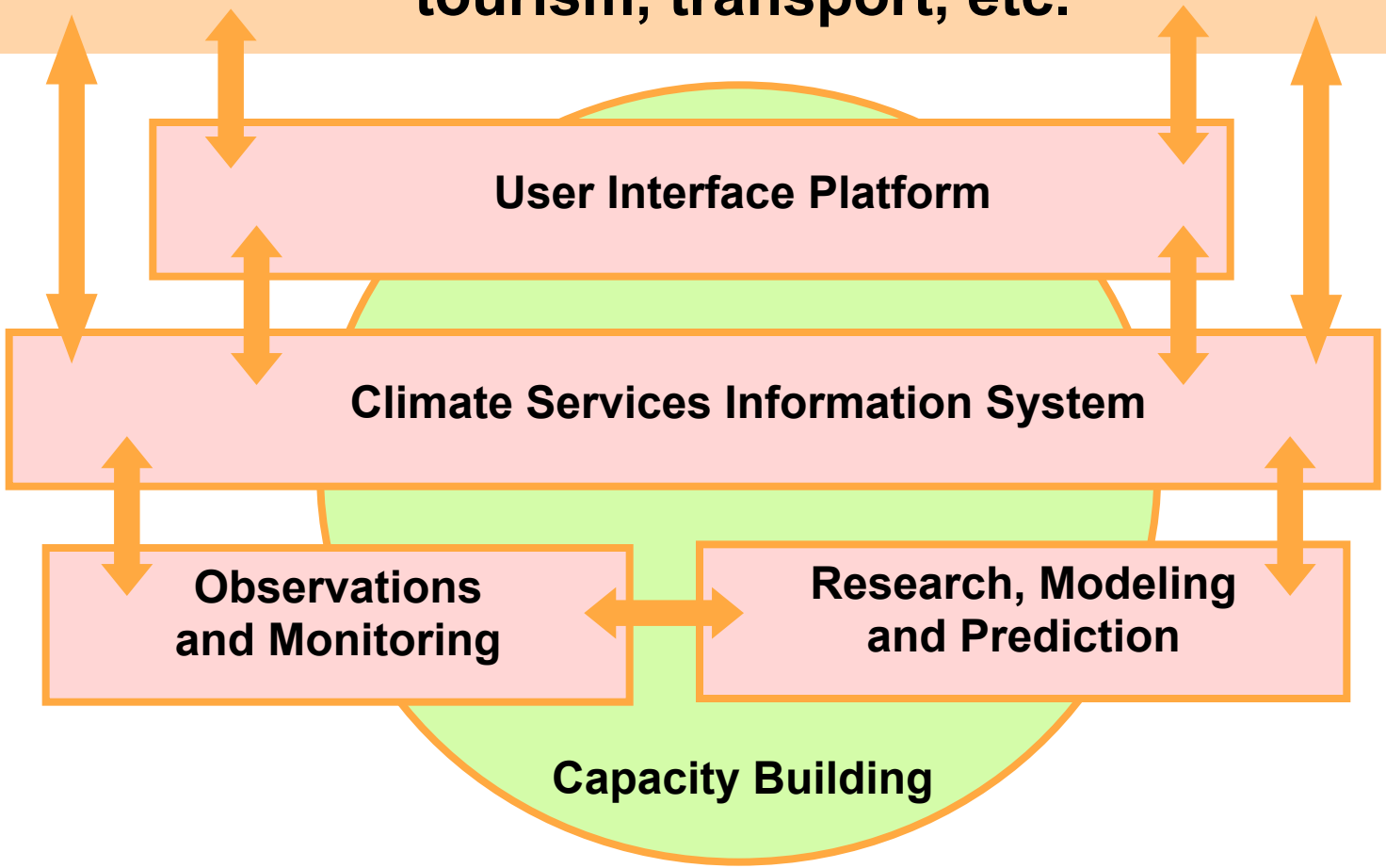
**All sectors to be covered but in the first four years the GFCS is giving initial priority to:**

- Agriculture and food security
- Disaster risk reduction
- Water resources
- Health

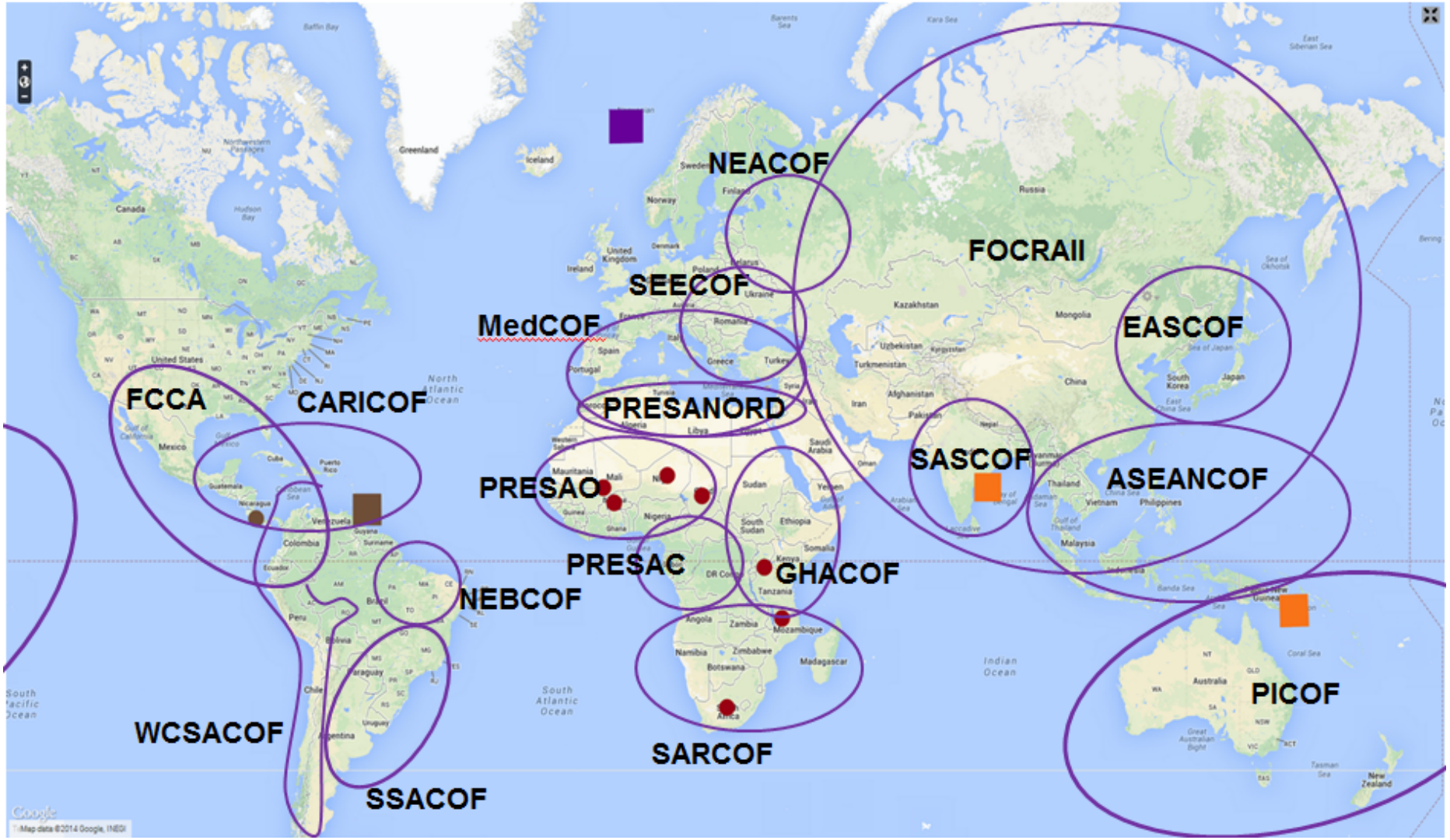



# The pillars of the GFCS

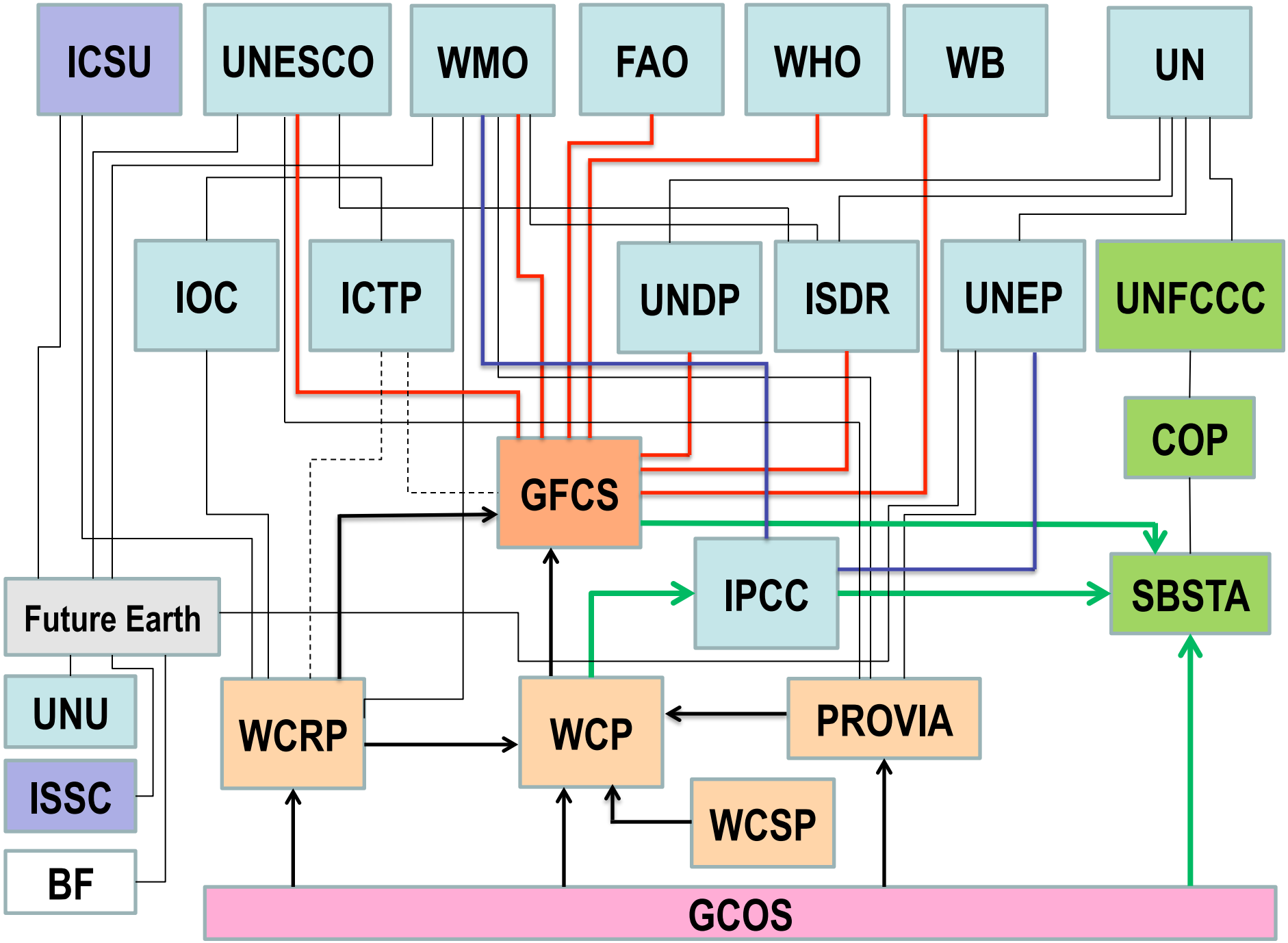
**Users, Government, private sector, research, agriculture, water, health, construction, disaster reduction, environment, tourism, transport, etc.**



# GFCS activities




■ Regional Projects ● National Projects ◯ Regional Climate Outlook Forums


ICSU
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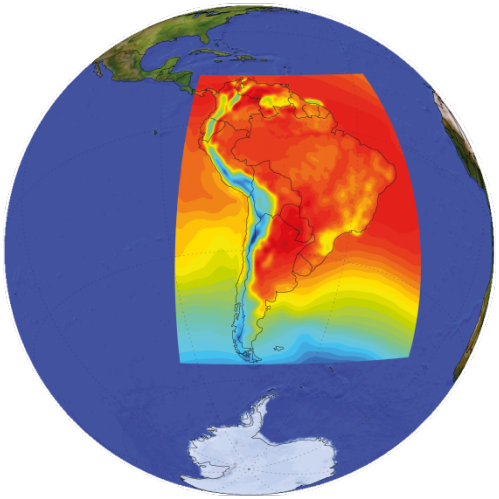
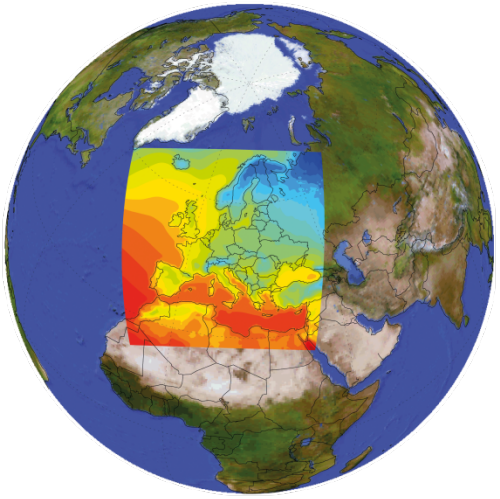
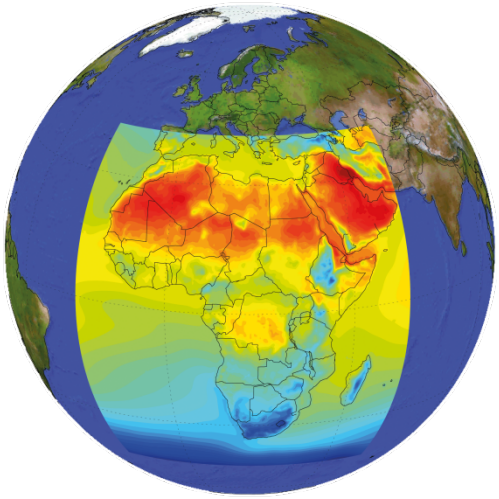
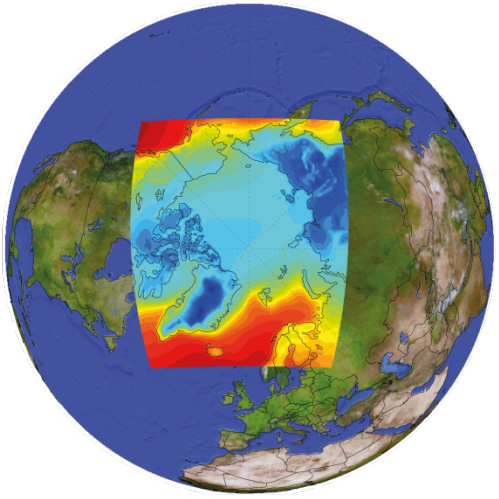
ISDR
UNEP
UNFCCC
COP
GFCS
IPCC
SBSTA
Future Earth
UNU
ISSC
BF
WCRP
WCP
PROVIA
WCSP
GCOS

# Some domains of the Coordinated Regional Climate Downscaling Experiment (CORDEX)









# Summer School on Attribution and Prediction of Extreme Events


WCRP World Climate Research Programme
ICSU International Council for Science
UGGI IUGG
ARC CENTRE OF EXCELLENCE FOR CLIMATE SYSTEM SCIENCE
US CLIVAR
NOAA
APN
CLIVAR

# Directions for future collaboration

- Research and modelling to better understand and predict weather and climate, especially on the regional scale
- Building and sustaining scientific and technical capacities of developing countries
- Forming cadres of scientists, especially women, to provide leadership to high-quality scientific programmes

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谢谢


Gracias

Merci

Thank you

спасибо