The Global Observing System for Climate
Paris Agreement
GCOS Support of the
Global Stocktake
GCOS Steering Committee Meeting
Helsinki, October 2018
COP21·CMP11
PARIS 2015
UN CLIMATE CHANGE CONFERENCE
Presentation: Simon Eggleston, Carolin Richter,
Sybil Seitzinger
Task Team: Florin Vladu, Stephen Briggs, Qinchen Chao, Han Dolman,
Sybil Seitzinger, Youba Sokona, Michel Verstraete
GCOS
GLOBAL CLIMATE OBSERVING SYSTEM
WMO
IOC
UN
environment

Summary

2015
- Paris Agreement

2016
- GCOS Implementation Plan
  - incl. adaptation, mitigation
- UNFCCC invited full implementation IP

2017
- GCOS SC-25 formed Task Team
  - develop plan - observations for adaptation
  - investigate how support mitigation
  - ID initial actions and funding

Identifiied need for and actions A and M and monitoring 3 climate cycles

3 months to develop position paper
Report back to panel mtgs March 2018

Obs will be needed to help plan adaptation strategies
To observe how effective those strategies are
Provide information that could be used to modify strategies as climate change unfolds.

Want to show you three examples of how global climate obs are essential to adaptation and how global obs and products derived from them can support local planning and adaptation

Major Actions Identified in GCOS IP

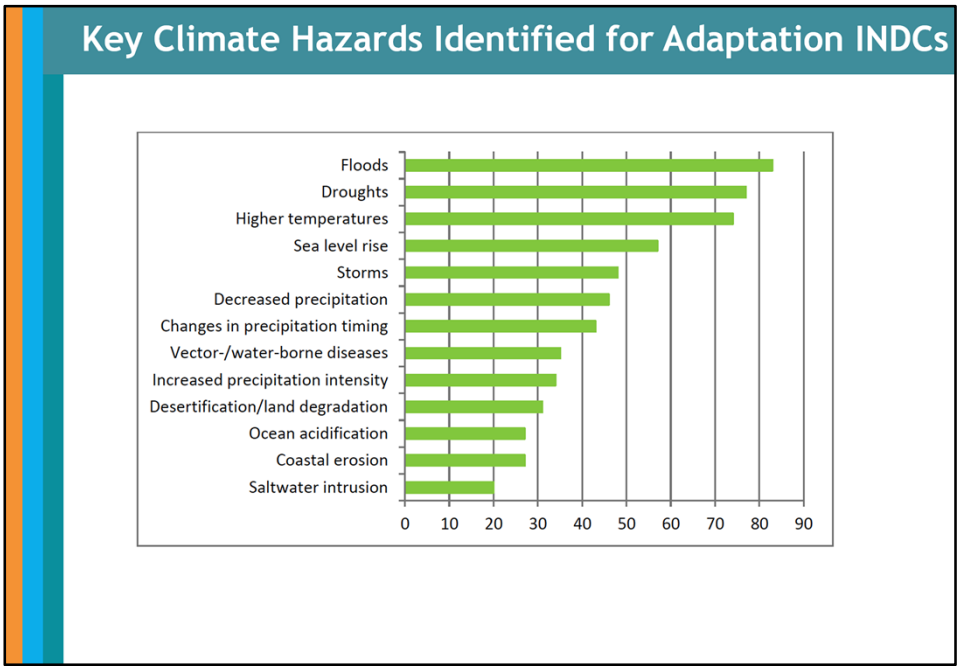
Requirements and guidance
- define user needs
- provide guidance

Acquire data
- produce hi-resolution data
- data rescue
- invest in observations

Data
- improve data stewardship

Climate Services
- climate services
- GFCS

Coordination
- coordination
- long-term research and observations



Let's think for example about adaptation around flooding and some observation needs

Across scales – local to regional to national

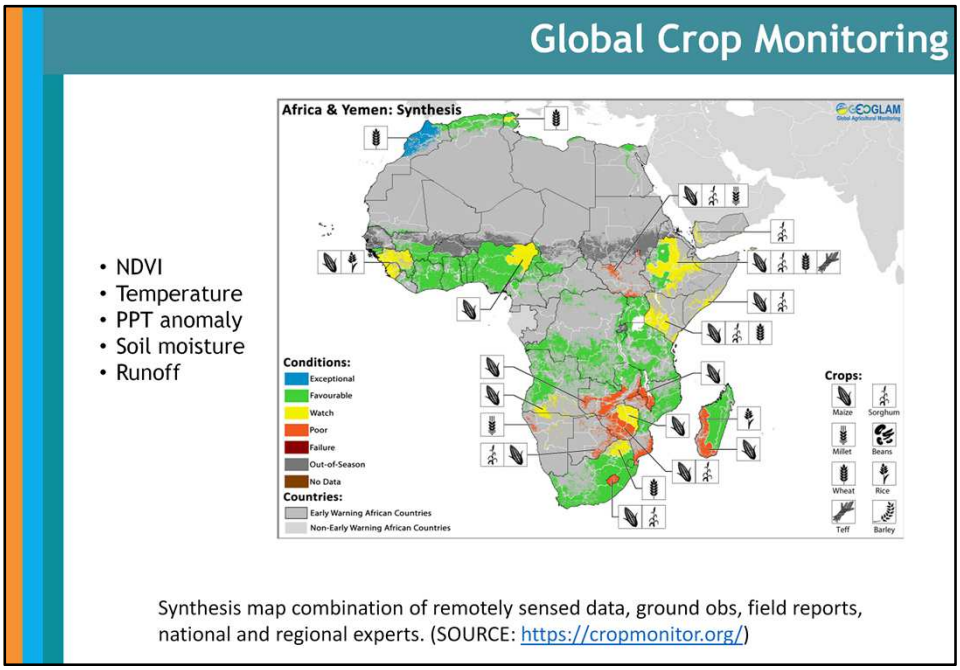
Obs will be needed to help plan adaptation strategies

Long term obs extent and timing flooding

To observe how effective those strategies are

Important development plans/policies resulting in communities moving out of flood zone (obs which communities and if see changes over time)

Provide information that could be used to modify strategies as climate change unfolds.



Crop production many parts world impacted by cc
Need for adaptation at many levels

Build on existing programs

In this case, Global Agriculture Monitoring (GEOGLAM) and Agriculture Marke Information System (AMIS) providing information within countries at risk of food insecurity usig remotely sensed data, ground obs, field reports, experts.

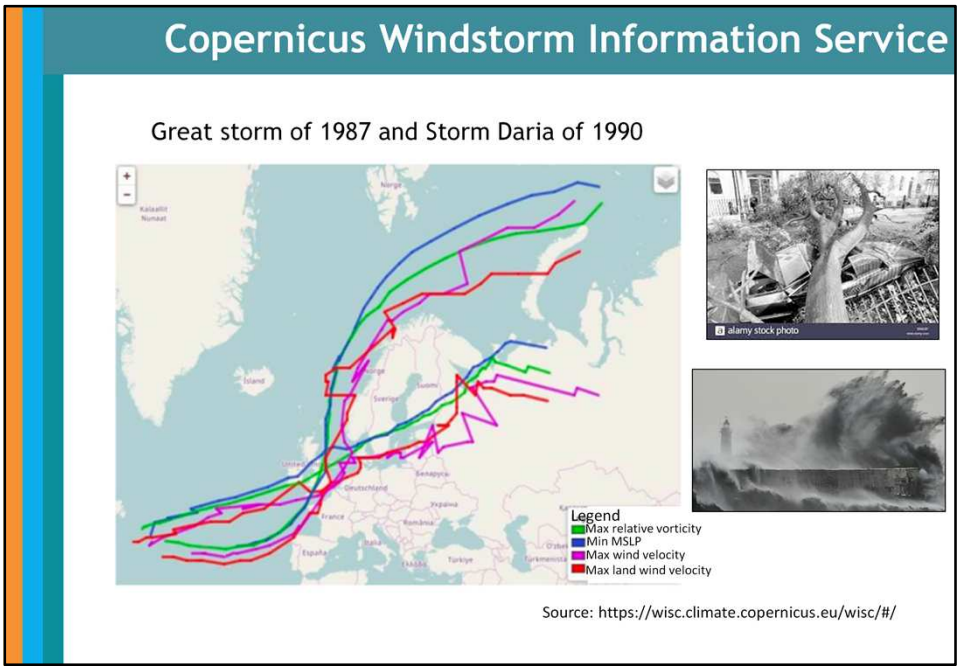
Help coordinate policy action in times of market uncertainty on crop conditions and markets at regional, national and global scales

Also monitor over time whether food production, location; areal extent; crop type; etc. is changing in response to changing climate

NDVI - Version-5 MODIS/Terra Surface Reflectance products
Temperature
PPT anomaly – NCEP-DOE reanalysis 2 productions
Soil Moisture anomaly -

Evapo-transpiration - **Evaporative stress index** Hourly land-surface temperature and insolation from geostationary satellites such as GOES-East and West and Meteosat Second Generation (MSG), leaf area index and albedo from MODIS sensor, and surface meteorological and atmospheric temperature profile data from the North American Regional Reanalysis (NARR) dataset.

Runoff MERRA-2 meteorological variables (list) are provided by NASA GMAO. The NASA Global Modeling and Assimilation Office (GMAO) The Modern-Era Retrospective analysis for Research and Applications, version 2 (MERRA-2) is available from 1980-present (~2 week latency) at 0.625° x 0.5° lon-lat spatial resolution. CHIRPS rainfall is provided by UCSB Climate Hazards Group. CHIRPS is available from 1981-present at 0.05° x 0.05° lon-lat spatial resolution.

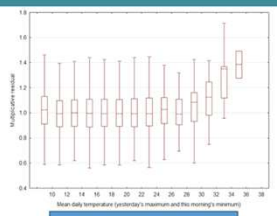


Finance

WIS provides data resources for insurance sector –
Enhance understanding nature windstorms over European continent
Target groups are **insurers, reinsurers, and insurance industry service provides interested in risk models**
Also suports planning for impact of cc on other sectors such as **energy, transport, civil enginering, govt**

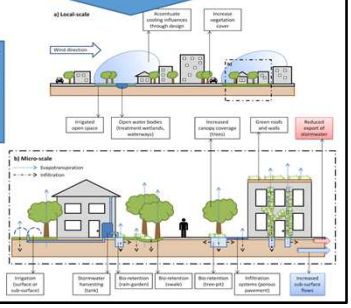
Urban Heat Islands and Human Health

Adelaide. SOURCE: modified Copernicus Sentinel data (2017), processed by ESA, CC BY-SA 3.0 IGO



Expected Mortality leads to Actions to cool Cities

Overall impact of these actions can be monitored remotely



GCOS Task Team on Adaptation, Terrestrial Observation Panel for Climate, Nigel Tapper, 2018.

Other Examples Monitoring Needs

- Built environment
  - Track land footprint renewable energy
  - Near ground level wind speed
  - Heat loss from buildings

- Early warning
  - Ppt intensity, lightning, flooding…..

- Human health and food production
  - Heat waves
  - Day/night
  - Shifts growing season

- Development new sensors/capabilities

Monitoring for the Paris Agreement – all are possible inputs to the Global Stocktake through the Transparency Framework

Mitigation

Observation needs

Examples - Monitoring Needs

- Entire global C cycle
  - Sinks ⬆ ⬇
  - New natural sources
- Including --
  - Strengthen forests
  - Other land uses (agriculture, wetlands, ….)
  - Above ground biomass
  - Soils
  - Permafrost
  - Fires
  - Ocean ecosystems
  - Coastal sinks
  - ……..

Monitoring for the Paris Agreement – all are possible inputs to the Global Stocktake through the Transparency Framework

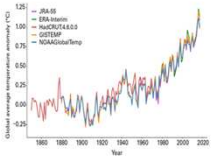
Existing ECVs – additional

Indicators

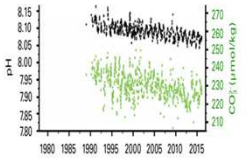
For describing the rate and range of climate changes, and also becoming an input into the UNFCCC

WMO Climate Indicators

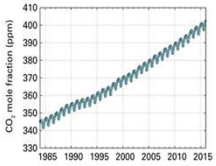
Mean Temperature



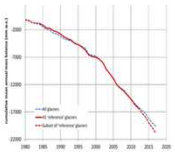
Ocean Acidity



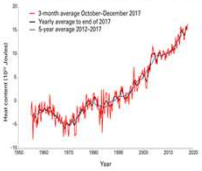
Atmospheric CO_2



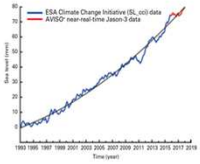
Glacier Mass Balance



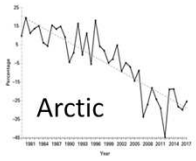
Ocean Heat Content

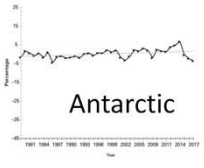


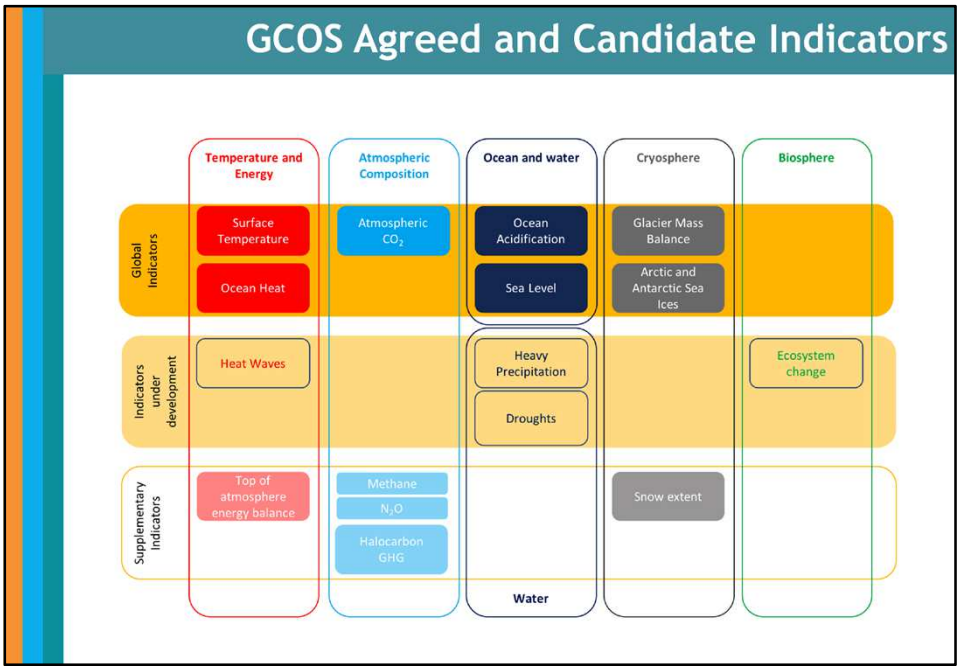
Sea Level Change

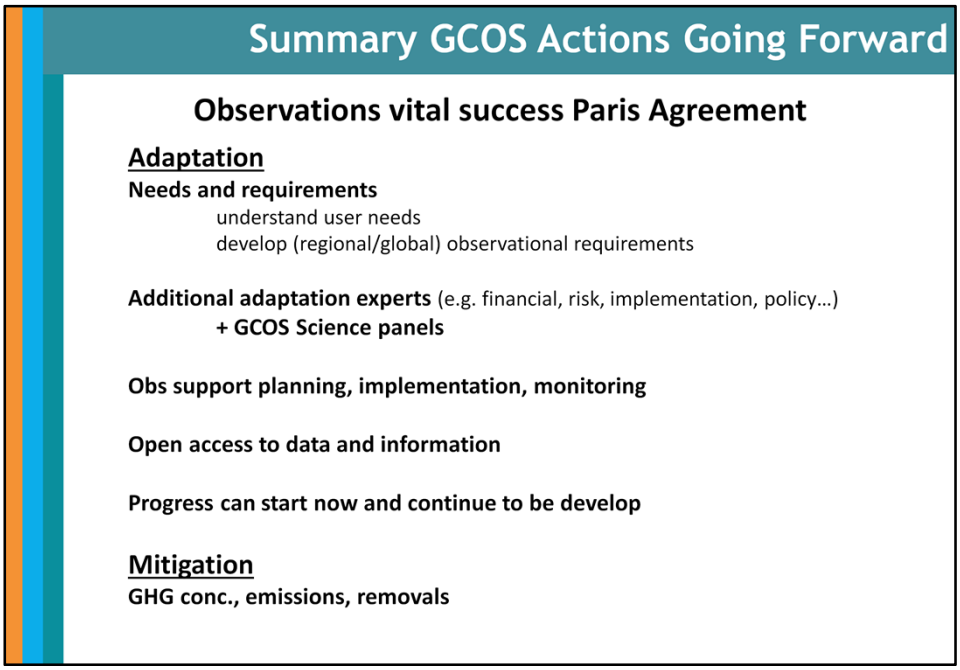


Sea Ice Extent






GCOS Agreed and Candidate Indicators
Temperature and Energy
Atmospheric Composition
Ocean and water
Cryosphere
Biosphere
Global Indicators
Surface Temperature
Ocean Heat
Atmospheric CO_2
Ocean Acidification
Sea Level
Glacier Mass Balance
Arctic and Antarctic Sea Ices
Indicators under development
Heat Waves
Heavy Precipitation
Droughts
Ecosystem change
Supplementary Indicators
Top of atmosphere energy balance
Methane
N_2O
Halocarbon GHG
Snow extent
Water



Existing ECV contribute to supporting adaptation, **GCOS needs specific activity**
Better understand **Needs and requirements**

understand user needs
develop (global) observational requirements

Includes ablity to understand and estimate risks (current and future)

Need for additional adaptation experts

+ obs experts GCOS Science panels

Lead to identification new observations methods and approaches

Obs support planning and monitoring (where needed but not being implemented or not effective) – status of adaptation

Open access to data and information greatly increase ability of countries to design, implement effective adaptation strategies and tactics and better implement early warning systems

GHG conc.,– along with inverse models – help support Emissions, removal estimates submitted to UNFCCC
Provide independent global estimate emission and removal, indicate changes natural sources and sinks (processes) that can impact conc. GHG

Identified improvements in observing system

16 Actions Noted

- Implement GCOS IP
- Specific Activity
- New sensors adaptation
- Local obs – adaptation
- Free and open data
- Cooperation Mechanisms

Specifically

- Urban areas, radar, lightning obs, GHG fluxes
- Land cover, biomass, soils, permafrost, forests, ecosystems
- Extreme events
- Hydrosphere, biosphere
- Earth's energy budget

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Additional Discussion:
How Should
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