AOPC Update

WDAC 7th Session – 26 March 2018

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AOPC Atmospheric Observation Panel for Climate
GCOS • WCRP

WMO

UNESCO

IOC

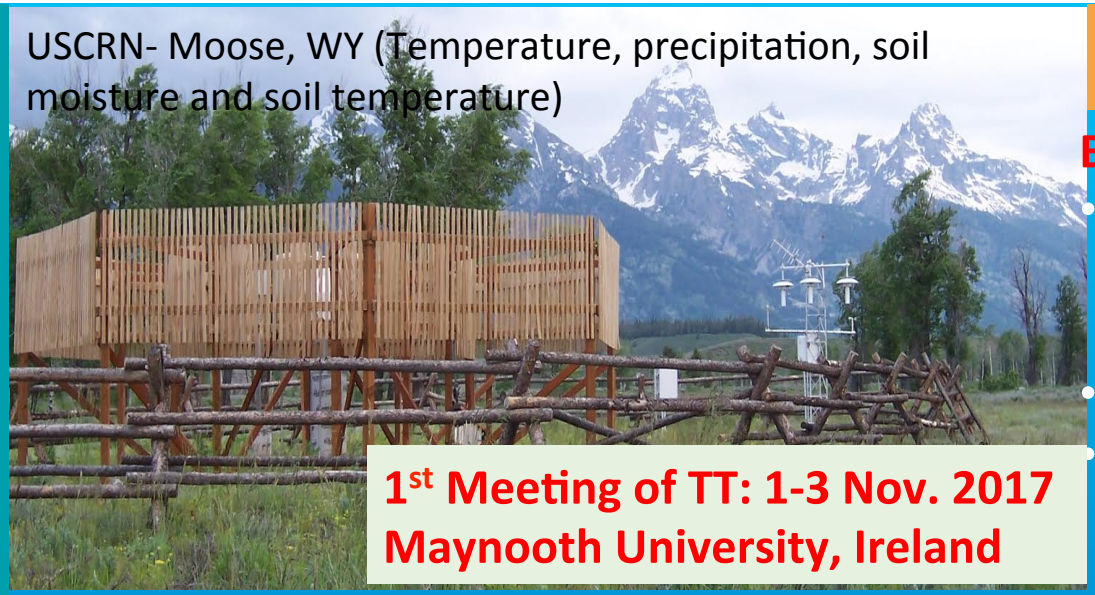
ICSU International Council for Science

UNEP

Overview on current AOPC work plan

1. Implement actions related to atmosphere of GCOS IP
2. AOPC 22 established 4 Task Teams:
   - GCOS Surface Reference Network - GSRN TT
   - Weather radar for climate studies – Radar TT
   - New ECV: lightning – LOCA TT
   - Reviewing the requirements for GUAN – GUAN TT
3. Establish and monitor ECV requirements
4. ECV fact sheets
5. Cross-cutting issues with other panels (AOPC – OOPC around air-sea fluxes)

GCOS Surface Reference Network



USCRN- Moose, WY (Temperature, precipitation, soil moisture and soil temperature)

1st Meeting of TT: 1-3 Nov. 2017
Maynooth University, Ireland

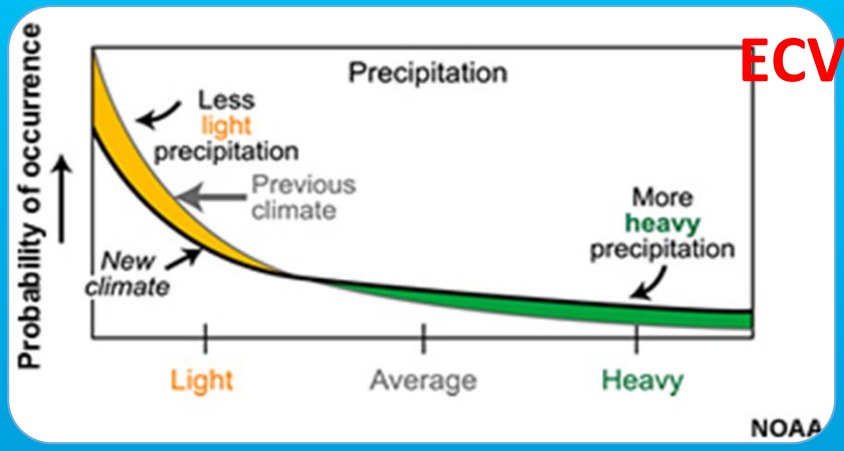
"Towards a global land surface climate fiducial reference measurements network", DOI: 10.1002/joc.5458)

A Reference Network is traceable to an internationally accepted standard and has a comprehensive uncertainty analysis and is validated and is documented in accessible literature and Includes complete metadata description

BENEFITS:

- Improved long-term accuracy, stability and comparability of observations.
- Underpinning existing networks
- Provide reference data to constrain and calibrate from more spatially comprehensive observing system.
- Provide appropriate data for studying atmospheric processes (eg global cycles)
- test and develop new techniques and equipment
- provide desirable locations to base future field campaigns

ECV: T, precipitation, pressure, winds, relative humidity, surface radiation land surface T, soil moisture, soil temperature, albedo, ground water, river discharge.



ECV: Precipitation

Radar for Climate

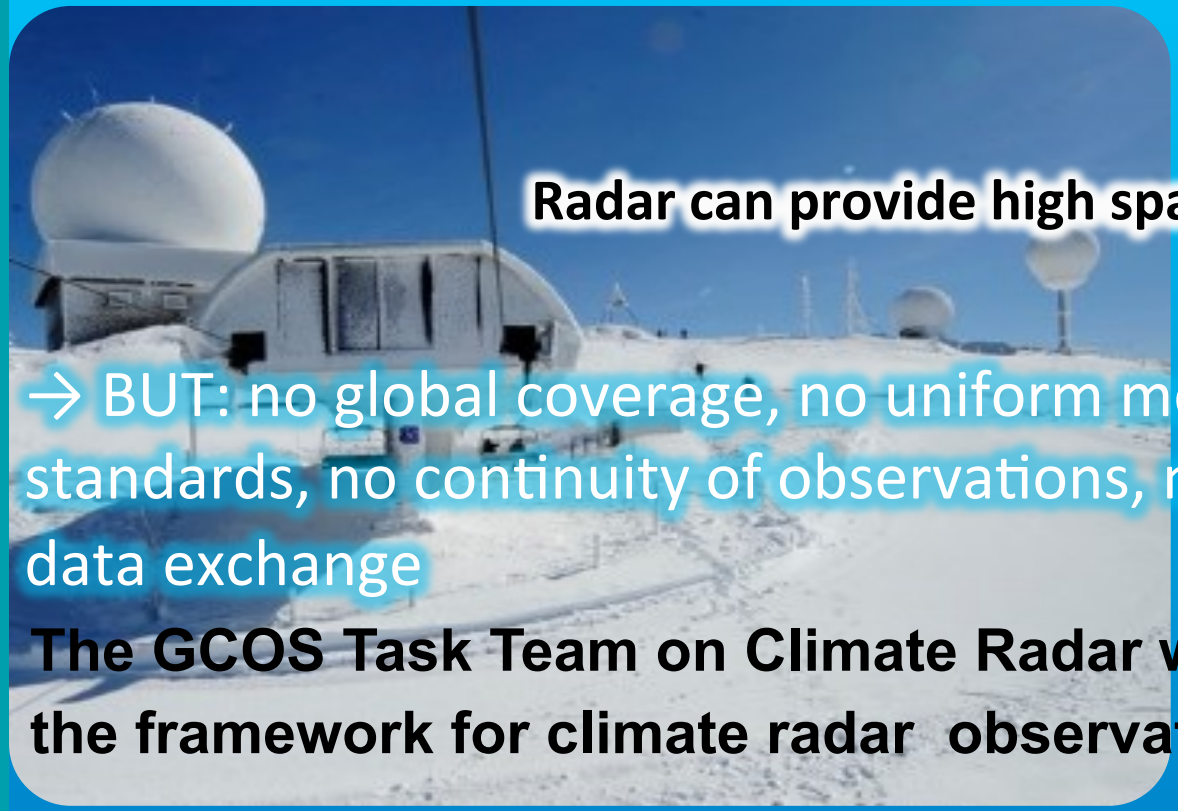
Extreme precipitation is projected to increase under climate change

Extreme precipitation is highly relevant not only for climate science (WCRP Grand Challenge) but particularly for adaptation

Currently precipitation for climate is monitored with gauges on a daily basis and extreme precipitation statistics require long gauge records.

→ Shorter records of radar observations needed

Radar for Climate



Radar can provide high spatial and temporal resolution

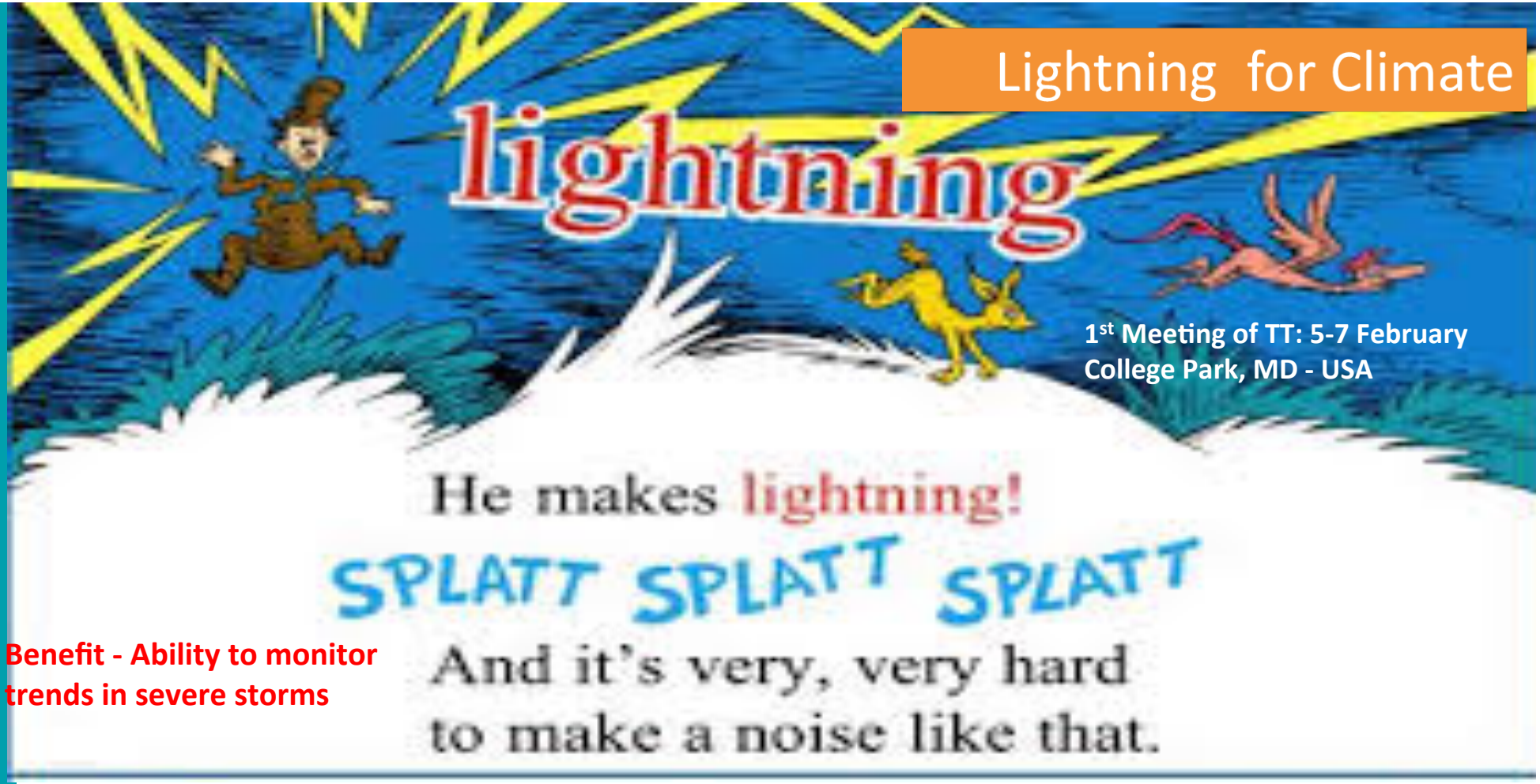
→ BUT: no global coverage, no uniform method, no data standards, no continuity of observations, no archive globally, no data exchange

The GCOS Task Team on Climate Radar works on a proposal for the framework for climate radar observations:

- define climate monitoring requirements for precipitation radar data, metadata and best practice.
- Propose how to harmonize retrieval and calibration methods
- Archives
- Handling of historical data

1st Meeting of TT: 30-31 August 2017
FMI Helsinki, Finland

Lightning for Climate



1st Meeting of TT: 5-7 February
College Park, MD - USA

Benefit - Ability to monitor trends in severe storms

IP Action A29: to define the requirement for lightning measurements, including data exchange, for climate monitoring and to encourage space agencies and operators of ground-based systems to provide global coverage and reprocessing of existing datasets

GCOS Upper-Air Network

Reviewing the network requirements;

- **Assessing and documenting the benefits of meeting stated requirements;**
- **How it contributes as a baseline network in the tiered network framework with GRUAN and the comprehensive network.**

1st Meeting of TT: 5-7 December 2017
DWD Lindenberg Observatory, Germany

Application Areas under OSCAR and requirements

Inconsistency:
14 WMO application areas officially supported under RRR
20 application areas under OSCAR DB

9 Application areas for GCOS/WCRP

2017

2 Application areas for GCOS/WCRP

Name	Focal Point	Respon. Org.	Description
Climate monitoring (GCOS)	GCOS Secretariat gcos@wmo.int	GCOS	The WMO-IOC-UNEP-ICSU Global Climate Observing System (GCOS) is an internationally coordinated network of global observing systems for climate, is designed to meet the requirements for climate observations, which are essential to climate monitoring. Climate observations are fundamental to detect, model and assess climate change, support adaptation to climate change, monitor the effectiveness of policies for mitigating climate change, develop climate information services, promote sustainable national economic development and meet other requirements of the UNFCCC and other convention and agreements.
Climate Science	Michel Rixen	WCRP	This application area aims at coordinating international research to improve the understanding, analysis and prediction of the Earth System

In 2017 GCOS launched a first public review to of the requirements of the GCOS IP.

ECV factsheets

ECV IN BRIEF

Domain: Atmosphere
Subdomain: Atmospheric Composition
Scientific Area: Hydrosphere
Products: Cloud Amount
Cloud Top Pressure
Cloud Top Temperature
Cloud Optical Depth
Cloud Water Path
Cloud Effective Particle Radius

Cloud Properties

The variable properties of clouds determines the clouds profound effects on radiation and precipitation. They are influenced by and in turn influence the motion of the atmosphere on many scales. They are affected by the presence of aerosols, and modify atmospheric composition in several ways, including the depletion of ozone when they form in the polar stratosphere.

ECV Product

PRODUCT	DEFINITION	REQUIREMENTS				
		FREQUENCY	RESOLUTION	REQUIRED MEASUREMENT UNCERTAINTY	STABILITY	STANDARDS/ REFERENCES
CLOUD AMOUNT	XXX	3hr	50km/NA	0.01-0.05	0.01/decade	ESA CCI CMUG tables
CLOUD TOP PRESSURE	XXX	3hr	50km/NA	15-50hPa,	3-15hPa	
CLOUD TOP TEMPERATURE	XXX	3hr	50km/NA	1-5K;	0.25K/decade	
CLOUD OPTICAL DEPTH	XXX	3hr	50km/NA	10%,	2%	
CLOUD WATER PATH	XXX	3hr	50km/NA	25%;	5%	
CLOUD EFFECTIVE PARTICLE RADIUS	XXX	3hr	50km/NA	1um;	1um/decade	

Selected Data Sources

- World Data Center for Remote Sensing of the Atmosphere (WDC-RSAT)
  https://wdc.dlr.de/
- Copernicus Climate Change Service (C3S), European Centre for Medium-Range Weather Forecasts (ECMWF)
  http://apps.ecmwf.int/datasets/data/interim-full-daily/levtype=sfc/
- European Centre for Medium-Range Weather Forecasts (ECMWF)
  https://www.ecmwf.int/en/research/climate-reanalysis
- National Aeronautics and Space Administration (NASA)
  https://gmao.gsfc.nasa.gov/reanalysis/
- Japan Meteorological Agency (JMA)
  http://jra.kishou.go.jp/index.html
- Satellite ECV Inventory by the CEOS/CGMS Working Group on Climate (WGClimate)
  http://climatemonitoring.info/ecvinventory

XXX

Source (13/12/2017): http://www.climate4you.com/ClimateAndClouds.htm

AOPC ： definition and when necessary change/ add new ECV products

Future Plans

AOPC Plans:

- Continue work with Task Teams
- Complete ECV Fact sheets – including definition of new and existing ECV products
- Start review for new and existing ECV products requirements
- Contribute to work of OOPC on Air-Sea fluxes

- WCRP → AOPC: how can we better represent the requirements needed by the WCRP community?

- AOPC → WCRP: comment ECV fact sheets (including ECV products and requirements)

Thank you!

gcos.wmo.int