

# OSCAR and RRR

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# Rolling Review of Requirements

- The RRR is the process used by WMO to collect, vet and record user requirements for all WMO application areas and match them against observational capabilities
- Gap analysis results in Statement of Guidance, one per application area, that provides a narrative of how well a given application area is supported by WIGOS;
- **A WMO Application Area** describes a homogeneous activity for which it is possible to compile a consistent set of observational user requirements agreed by community experts working operationally in this area.

# WMO Application areas

1. Global numerical weather prediction
2. High-resolution numerical weather prediction
3. Nowcasting and very short range forecasting
4. Seasonal and inter-annual forecasting
5. Aeronautical meteorology
6. Forecasting atmospheric composition
7. Monitoring atmospheric composition
8. Atmospheric composition for urban applications
9. Ocean applications
10. Agricultural meteorology
11. Hydrology
12. Climate monitoring (as undertaken through GCOS)
13. Climate applications
14. Space weather

# OSCAR

## The RRR is supported by three key databases of OSCAR (Observation Systems Capabilities and Review) tool :

**OSCAR/Space**, listing the capabilities of all satellite sensors, whether historical, operational or planned (such as Instrument type, measurement technique, high-level characteristics (mass, power, data rate), measurement program, operating period, heritage, etc.)

**OSCAR/Surface**, developed by MeteoSwiss for WMO, list surface-based capabilities: Comprehensive metadata for all stations/platforms under WIGOS ;all over the world, all types; weather, climate, air quality, hydrology,...

**OSCAR/Requirements**, in which “technology free” requirements are provided for each application area, expressed in units of geophysical variables (260 in total currently), not measurands; not just atmosphere, also terrestrial, ocean, cryosphere, ...

# OSCAR/Requirements

- The following requirements are listed (separately for each of the 14 application areas and for all relevant variables):
  - Spatial (horizontal and vertical) and temporal resolution, uncertainty, data latency, required coverage area, source, and level of confidence
- Each requirement is expressed in terms of three separate values:
  - Threshold (observations not useful unless this is met)
  - Break-through (optimum cost-benefit ratio)
  - Goal (exceeding this provides no additional benefit)
- OSCAR/Requirements information content is assembled by CBS and other WMO Inter-Program Expert Teams and Task Teams and is informed by the broader scientific community

## Inconsistency:

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

## Application Areas under OSCAR

### 9 Application areas for GCOS/WCRP

- some are sources of information rather than actual application areas
- Actual requirements - both variable lists and actual values – may be out of date

Name	Focal Point	Respon. Org.	Description
CLIC		WCRP	CLIC is the Climate and Cryosphere project of the World Climate Research Programme (WCRP).
CLIVAR		WCRP	CLIVAR is the World Climate Research Programme (WCRP) project that addresses Climate Variability and Predictability.
Climate Modelling Research	Michel Rixen	WCRP	
Climate-AOPC	GCOS Secretariat	GCOS	Climate Monitoring - Atmospheric Domain
Climate-OOPC	GCOS Secretariat	GCOS	Climate Monitoring – Oceanic Domain
Climate-TOPC	GCOS Secretariat	GCOS	Climate Monitoring – Terrestrial Domain

Name	Focal Point	Respon. Org.	Description
GEWEX	Michel Rixen	WCRP	The Global Energy and Water Cycle Experiment (GEWEX) is a core project in the World Climate Research Programme (WCRP) concerned with the dynamics and thermodynamics of the atmosphere and interactions with the Earth's surface
SOLAS	Michel Rixen	WCRP	The Surface Ocean - Lower Atmosphere Study (SOLAS) is a multidisciplinary and global-scale research programme, with a goal to achieve quantitative understanding of the key biogeochemical-physical interactions and feedbacks between the ocean and the atmosphere, and how this coupled system affects and is affected by climate and environmental change.
SPARC	Michel Rixen	WCRP	SPARC is a core project of the World Climate Research Programme (WCRP) on Stratospheric Processes And their Role in Climate

## Application: Climate-AOPC

### Details

Name	Climate-AOPC
Description	Climate Monitoring - Atmospheric Domain
Corresponding Institution	Global Climate Observing System
Contact Person	GCOS Secretariat <a href="mailto:gcosipo@wmo.int">gcosipo@wmo.int</a>

### Variables measured in this Application Area

Subdomain	Variables		
Basic atmospheric	<a href="#">Air pressure (at surface)</a>	<a href="#">Air specific humidity (at surface)</a>	<a href="#">Air temperature (at surface)</a>
	<a href="#">Atmospheric temperature</a>	<a href="#">Specific humidity</a>	<a href="#">Integrated Water Vapour (IWV)</a>
	<a href="#">Wind (horizontal)</a>	<a href="#">Wind vector over the surface (horizontal)</a>	
Clouds and precipitations	<a href="#">Accumulated precipitation (over 24 h)</a>	<a href="#">Cloud cover</a>	<a href="#">Cloud ice (total column)</a>
	<a href="#">Precipitation intensity at surface (liquid or solid)</a>	<a href="#">Cloud liquid water (CLW) total column</a>	<a href="#">Cloud top height</a>
		<a href="#">Precipitation intensity at surface (solid)</a>	<a href="#">Cloud top temperature</a>
Aerosols and radiation	<a href="#">Aerosol Extinction Coefficient</a>	<a href="#">Aerosol Optical Depth</a>	<a href="#">Downward short-wave irradiance at Earth surface</a>
	<a href="#">Downward short-wave irradiance at TOA</a>	<a href="#">Downward long-wave irradiance at Earth surface</a>	<a href="#">Earth surface short-wave bidirectional reflectance</a>
	<a href="#">Upward short-wave irradiance at TOA</a>	<a href="#">Upward long-wave irradiance at TOA</a>	<a href="#">Upward long-wave irradiance at Earth surface</a>
	<a href="#">Aerosol Absorption Optical Depth</a>		
Ocean	<a href="#">Sea surface temperature</a>	<a href="#">Significant wave height</a>	
Land surface	<a href="#">Land surface temperature</a>	<a href="#">Snow cover</a>	<a href="#">Snow water equivalent</a>
Atmospheric chemistry	<a href="#">CH4</a>	<a href="#">CO2</a>	<a href="#">O3</a>
	<a href="#">O3 (Total column)</a>		



## Requirements defined for *Climate-AOPC* (61)

This table shows all related requirements. For more operations/filtering, please consult the full list of [Requirements](#)

Note: In reading the values, goal is marked **blue**, breakthrough **green** and threshold **orange**

Id ▲	Variable ◇	Layer ◇	App Area ◇	Uncertainty	Stability / decade	Hor Res	Ver Res	Obs Cyc	Timeliness	Coverage ◇	Conf Level ◇	Val Date ◇	Source ◇
<a href="#">100</a>	<a href="#">O3</a>	LS	<a href="#">Climate-AOPC</a>	5 % 8 % 20 %		50 km 75 km 100 km	0.5 km 1 km 3 km	3 h 9 h 3 d	30 d 60 d 180 d	Global	firm	2007-07-19	AOPC
<a href="#">101</a>	<a href="#">O3</a>	LT	<a href="#">Climate-AOPC</a>	10 % 13 % 20 %		5 km 10 km 50 km	0.5 km 1 km 2 km	3 h 9 h 3 d	30 d 60 d 180 d	Global	firm	2007-07-19	AOPC
<a href="#">102</a>	<a href="#">O3 (Total column)</a>	TC	<a href="#">Climate-AOPC</a>	5 DU 8 DU 15 DU		5 km 10 km 50 km		3 h 9 h 3 d	30 d 60 d 180 d	Global	firm	2007-07-19	AOPC
<a href="#">103</a>	<a href="#">O3 (Total column)</a>	TrC	<a href="#">Climate-AOPC</a>	5 DU 8 DU 15 DU		5 km 10 km 50 km		3 h 9 h 3 d	30 d 60 d 180 d	Global	firm	2007-07-19	AOPC
<a href="#">104</a>	<a href="#">Precipitation intensity at surface (liquid or solid)</a>	Near Surface	<a href="#">Climate-AOPC</a>	0.1 mm/h 0.3 mm/h 2 mm/h		100 km 200 km 500 km		3 h 4 h 6 h	3 h 6 h 12 h	Global	firm	2007-07-19	AOPC
<a href="#">105</a>	<a href="#">Precipitation intensity at surface (solid)</a>	Near Surface	<a href="#">Climate-AOPC</a>	0.1 mm/h 0.3 mm/h 2 mm/h		100 km 200 km 500 km		3 h 4 h 6 h	3 h 6 h 12 h	Global	firm	2007-07-19	AOPC
<a href="#">106</a>	<a href="#">Sea surface temperature</a>	Sea surface	<a href="#">Climate-AOPC</a>	0.25 K 0.4 K 1 K		10 km 50 km 500 km		3 h 6 h 24 h	3 h 6 h 12 h	Global ocean	firm	2007-07-19	AOPC

## Variable: Cloud top temperature

### Definition

Full name	Cloud top temperature		
Definition	Temperature of the upper surface of the cloud		
Measuring Units	K	Uncertainty Units	K
Horizontal Res Units	km	Vertical Res Units	
Stability Units	K (Stability /decade)		

Comment:

Last modified:

### Classification

Domain: Atmosphere	Used in Application Areas:
Sub-domain: Clouds and precipitations	Climate-AOPC
Variable: Cloud top temperature	GEWEX
Measured in Layers:	Nowcasting / VSRF
Cloud-top	
Cross-cutting themes:	

## Requirements defined for *Cloud top temperature* (3)

This tables shows all related requirements. For more operations/filtering, please consult the full list of [Requirements](#)

Note: In reading the values, goal is marked **blue**, breakthrough **green** and threshold **orange**

Id	Variable	Layer	App Area	Uncertainty	Stability / decade	Hor Res	Ver Res	Obs Cyc	Timeliness	Coverage	Conf Level	Val Date	Source
<a href="#">218</a>	<a href="#">Cloud top temperature</a>	Cloud-top	<a href="#">GEWEX</a>	0.5 K 1 K 2 K		50 km 100 km 250 km		3 h 6 h 12 h	30 d 45 d 60 d	Global	reasonable	1998-10-29	WCRP
<a href="#">432</a>	<a href="#">Cloud top temperature</a>	Cloud-top	<a href="#">Nowcasting / VSRF</a>	0.5 K 0.8 K 2 K		1 km 5 km 10 km		5 min 15 min 60 min	5 min 10 min 30 min	Global	firm	2013-04-09	P. Ambrosetti
<a href="#">86</a>	<a href="#">Cloud top temperature</a>	Cloud-top	<a href="#">Climate-AOPC</a>	0.3 K 0.4 K 0.6 K		100 km 200 km 500 km		3 h 4 h 6 h	3 h 6 h 12 h	Global	firm	2007-07-19	AOPC

# Application Areas proposed by GCOS

GCOS has proposed the following Application Areas :

They are agreed on by the AOPC/OOPC/TOPC panel and are now being introduced into the OSCAR DB.

- 1) **“Climate Monitoring”** – long-term, global, observations of ECVs monitoring climate and climate change to underpin assessments such as those of the IPCC and providing a baseline understanding of climate change. Nearly all of the requirements in the GCOS implementation plan fit into this category;
- 2) **“Climate Services”** – monitoring to support climate services such as adaptation and mitigation. These may be global, regional or national and will depend on national priorities, aims and objectives. There are currently a few terrestrial requirements in this category, GCOS expects to develop additional climate service requirements in the near future;

# GCOS requirements for OSCAR

## GCOS Implementation Plan 2016 presented ECV product requirements

- Covering all ECV products
- Will be entered in the OSCAR database for the Climate Monitoring
- These were revised by panels and reviewed in the Implementation Plan

Table 15. Atmospheric ECV product requirements.

Atmospheric ECV product requirements								
ECV	Product	Frequency	Resolution	Required measurement uncertainty	Stability (per decade)	Standards/ references	Entity (see Part II, section 2.2) <sup>93</sup>	
							Satellite	In situ
Surface wind speed and direction	Surface wind speed and direction	3 h	10 km/NA	0.5 m/s and mean quadratic statistics to 10% of the locally prevailing mean wind speed, for speed >20 m/s	0.05 m/s/decade	For stability: International Vector Winds Science Team Meeting (M. Bourassa)	WGClimate	WIGOS
Precipitation	Estimates of liquid and solid precipitation	Monthly (resolving diurnal cycles and with statistics of three-hour values)	25 km/NA	0.5 mm/h	0.02 mm/decade	CMSAF requirements related to the HOAPS release 4.0 (CM-12611)	WGClimate	WIGOS
Temperature (surface)		Hourly	Site	0.1 K	0.02 K/decade	P. Jones		WIGOS
		Daily Tx/Tn		0.1 K				WIGOS
Pressure (surface)		Hourly	Site	0.1 hPa	0.02 hPa/decade	P. Jones		WIGOS
Water vapour (surface)		Hourly	Site	RH 1% DP 0.1 K	0.5%/decade 0.02 K/decade	Kate Willet		WIGOS
Temperature (upper air)	Tropospheric temperature profile	4 h	25 km/1 km	0.5 K	0.05 K		WGClimate	WIGOS
	Stratospheric temperature profile	4 h	100 km/2 km	0.5 K	0.05 K		WGClimate	WIGOS
	Temperature of deep atmospheric layers	Monthly averages	100 km/5 km	0.2 K	0.02 K		WGClimate	WIGOS
Wind speed and direction (upper air)	Upper-air wind retrievals	1 h	10 km/0.5 km	2m/s, 20°	0.5m/s, 5°		WGClimate	WIGOS

# GCOS requirements for OSCAR

	Climate Monitoring (Global monitoring)	Climate Services (includes local needs)
<b>The goal</b> , the level to be aimed at where further improvements lead to little or no additional benefits. This would be sufficient for all climate applications	✓	✓
<i>OSCAR has a third, intermediate level but the usefulness of this is unclear in climate monitoring where capabilities are changing and users needs being refined</i>	<i>Retain information on specific applications</i>	
<b>The baseline</b> : the minimum needed to produce useful climate information. This would be sufficient for some applications but not all.	✓	✓