

WGClimate

The Joint CEOS/CGMS
Working Group on Climate



Gap Analysis 2019: organisation

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Outline

- ▶ Main targets
 - ▶ Comparative analysis #2 / #3
 - ▶ Set of ECVs for detailed analysis
 - ▶ GCOS-IP/other actions (other items for analysis)

- ▶ Process and timeline
 - ▶ Approach
 - ▶ Schedule

- ▶ Commitments
 - ▶ Teams and team leaders
 - ▶ Writing team



Main targets: comparison #2 / #3

- ▶ Overall analysis contents of the ECV Inventory: population (distribution per domain, existing / planned), absolute gaps, agencies' contributions
- ▶ General scenario with respect to assessment against GCOS criteria
- ▶ Revisit set of ECVs / ECV Products targeted by the previous gap analysis (CO₂, CH₄, Precipitation, Land Surface Temperature, Leaf Area Index, Above-Ground Biomass, Sea Surface Temperature, Sea Surface Salinity) and assess evolution, cross-referencing with the Recommendations and Actions



Process and timeline: Approach (1)

WGClimate ECV Inventory Gap Analysis Report V1.1 – May 2018

WGClimate ECV-Inventory Gap Analysis Report

- ▶ Similar to 2018 GA exercise
- ▶ New set of ECVs
- ▶ Work on the “delta”
- ▶ Add comparative analysis

4	Inventory Content (Covered ECVs).....
4.1	Relative portions of ECVs per GCOS Domain
4.2	Detailed View on Temporal Coverage per ECV Product
5	Gap Analysis against GCOS Criteria
5.1	Existing Data Records (Current Part of Inventory)
5.2	Planned Data Records (Future Part of the Inventory)
6	Gap Analysis for Selected ECV Products
6.1	CO ₂
6.2	CH ₄
6.3	Precipitation.....
6.4	Sea Surface Temperature.....
6.5	Sea Surface Salinity
6.6	Land Surface Temperature
6.7	Leaf Area Index
6.8	Above-ground Biomass.....

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Document Reference WGCL/REP18/988356.1



Process and timeline: Approach (2)

4	Inventory Content (Covered ECVs).....
4.1	Relative portions of ECVs per GCOS Domain
4.2	Detailed View on Temporal Coverage per ECV Product.....
5	Gap Analysis against GCOS Criteria
5.1	Existing Data Records (Current Part of Inventory)
5.2	Planned Data Records (Future Part of the Inventory).....
6	Gap Analysis for Selected ECV Products
6.1	CO ₂
6.2	CH ₄
6.3	Precipitation.....
6.4	Sea Surface Temperature.....
6.5	Sea Surface Salinity
6.6	Land Surface Temperature
6.7	Leaf Area Index
6.8	Above-ground Biomass.....

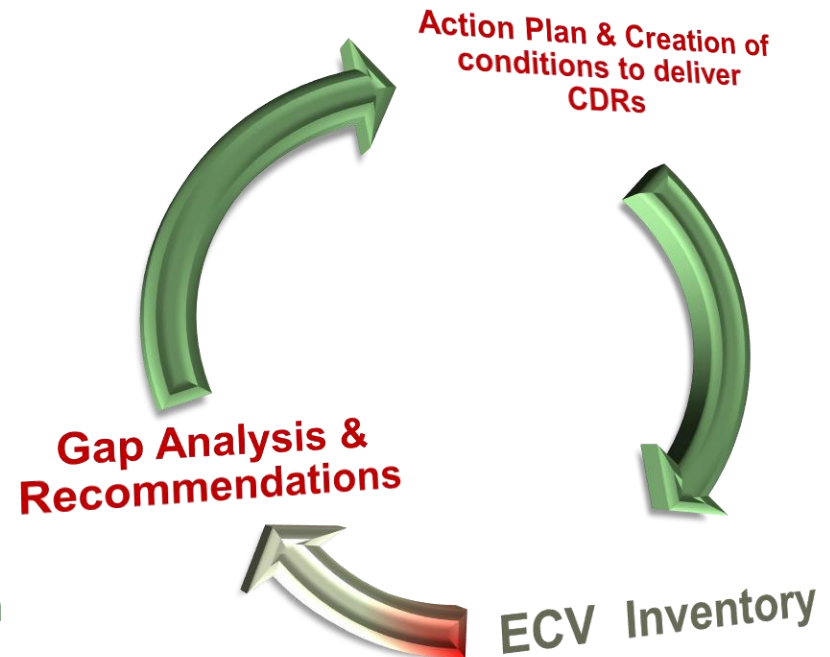
- ▶ Automatic assessment
- ▶ Statistical analysis tools and graphical display
- ▶ Individual CDRs
- ▶ Assessment tools on the web interface (GA teams of experts) > “delta”
- ▶ Statistical analysis tools and graphical display

- ▶ Detailed analysis per ECV / ECV Product
 - ▶ Missed known CDRs > GA Teams, VCs
 - ▶ Overview of analysis against GCOS criteria > resulting from previous phase
 - ▶ Missed opportunities (OSCAR, MIM) > EUMETSAT + GA Teams
 - ▶ Missing measurements for future > EUMETSAT + GA Teams

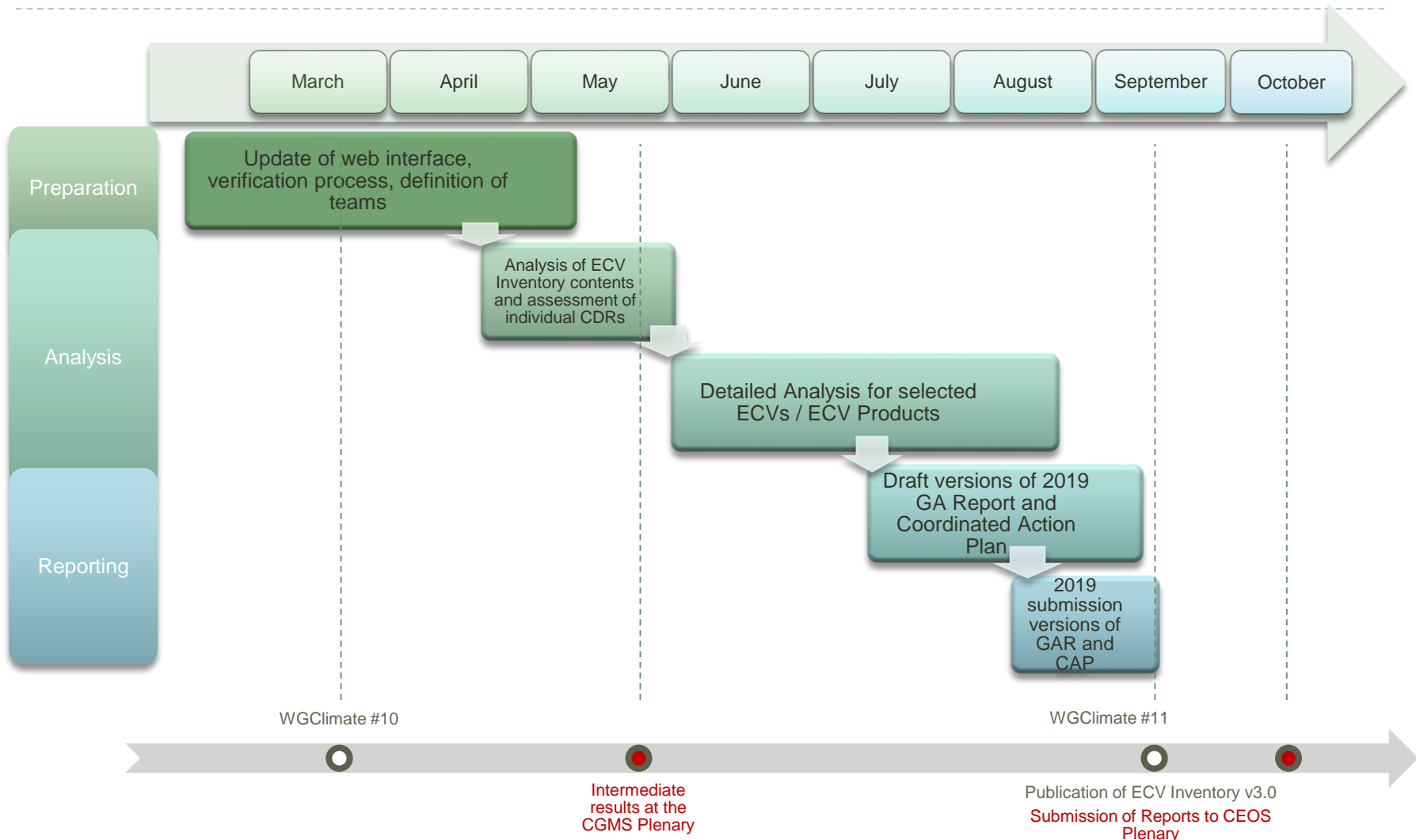


Process and timeline: cycle and constraints

- ▶ Upstream constraints
 - ▶ Data collection timeline
 - ▶ Verification process
 - ▶ Update of web interface tools
- ▶ **Now: agreement on scope, approach and definition of teams**
- ▶ Downstream constraints
 - ▶ Writing and reviewing of GA Report & Coordinated Action Plan
 - ▶ CGMS and CEOS Plenaries



Process and timeline: proposed schedule



Status: a provisional (pre-verification) snapshot in numbers

1394 records	976* inherited (#2)	33 removed			
		943 available	649 existing 294 planned	817 existing + 481 planned	1298 records
	418 new (#3)	355 available	168 existing 187 planned		
		63 removed			

892 Atmosphere	688 (#2)	486 existing 202 planned	590 existing + 302 planned	801 existing + 472 planned	1273 records
	204 (#3)	104 existing 100 planned			
235 Land		139 (#2)	84 existing 55 planned		
	96 (#3)	36 existing 60 planned			
146 Ocean	111 (#2)	74 existing 37 planned	91 existing + 55 planned		
	35 (#3)	17 existing 18 planned			
25 ?					



Status: a provisional (pre-verification) snapshot in numbers

► Atmosphere

Atmosphere	Aerosol properties	Aerosol optical depth
		Aerosol-extinction coefficient profile
		Single-scattering albedo
	Cloud properties	Aerosol-layer height
		Cloud optical depth
		Cloud-top pressure
		Cloud effective particle radius (liquid and ice)
		Cloud water path (liquid and ice)
		Cloud-top temperature
		Cloud amount
	Water vapour	Total column water vapour
		Upper tropospheric humidity
	Earth radiation budget	Tropospheric and lower-stratospheric profiles of water vapour
		Top-of-atmosphere ERB long-wave
		Top-of-atmosphere ERB short-wave (reflected)
		Solar spectral irradiance
	Ozone	Total solar irradiance
		Total column ozone
		Troposphere ozone profile
		Ozone profile in upper troposphere and lower stratosphere
		Ozone profile in upper stratosphere and mesosphere
	Precursors supporting the Ozone and Aerosol ECVs	CO tropospheric column
		SO ₂ , HCHO tropospheric columns
		CO tropospheric profile
	Carbon Dioxide, Methane and other greenhouse gases	NO ₂ tropospheric column
		Tropospheric CH ₄ column
		Tropospheric CO ₂ column
		Tropospheric CO ₂ profile
		Tropospheric CH ₄ profile
	Surface wind speed and direction	Stratospheric CH ₄ profile
		Surface wind speed and direction
	Wind speed and direction (upper-air)	Surface wind speed and direction
Precipitation	Upper-air wind retrievals	
Surface radiation budget	Estimates of liquid and solid precipitation	
	Surface ERB short-wave	
Temperature (upper-air)	Surface ERB long-wave	
	Tropospheric temperature profile	
	Temperature of deep atmospheric layers	
	Stratospheric temperature profile	
Lightning	Lightning	

Temperature (upper-air)	Tropospheric temperature profile
	Temperature of deep atmospheric layers
Lightning	Stratospheric temperature profile
	Lightning



Status: a provisional (pre-verification) snapshot in numbers

Land		Land		Land	
Anthropogenic greenhouse-gas fluxes	Estimated fluxes by inversions of observed atmospheric composition - continental	Anthropogenic greenhouse-gas fluxes	Estimated fluxes by inversions of observed atmospheric composition - continental	Estimated fluxes by inversions of observed atmospheric composition - continental	Land
	Estimated fluxes by inversions of observed atmospheric composition - national		Estimated fluxes by inversions of observed atmospheric composition - national		
Ice sheets and ice shelves	High-resolution CO ₂ column concentrations to monitor point sources	Ice sheets and ice shelves	High-resolution CO ₂ column concentrations to monitor point sources	High-resolution CO ₂ column concentrations to monitor point sources	Land
	Ice mass change		Ice mass change		
	Ice velocity		Ice velocity		
	Surface elevation change		Surface elevation change		
FAPAR	Grounding line location and thickness	FAPAR	Grounding line location and thickness	Grounding line location and thickness	Land
	Maps of FAPAR for modelling		Maps of FAPAR for modelling		
Leaf area index	Maps of FAPAR for adaptation	Leaf area index	Maps of FAPAR for adaptation	Maps of FAPAR for adaptation	Land
	FAPAR (GCOS-154)		FAPAR (GCOS-154)		
Albedo	Maps of LAI for modelling	Albedo	Maps of LAI for modelling	Maps of LAI for modelling	Land
	Maps of LAI for adaptation		Maps of LAI for adaptation		
	LAI (GCOS-154)		LAI (GCOS-154)		
	Black-sky Albedo (GCOS-154)		Black-sky Albedo (GCOS-154)		
Fire	Maps of DHR albedo for modelling	Fire	Maps of DHR albedo for modelling	Maps of DHR albedo for modelling	Land
	Maps of DHR albedo for adaptation		Maps of DHR albedo for adaptation		
	White-sky Albedo (GCOS-154)		White-sky Albedo (GCOS-154)		
	Maps of BHR albedo for modelling		Maps of BHR albedo for modelling		
Soil moisture	Maps of BHR albedo for adaptation	Soil moisture	Maps of BHR albedo for adaptation	Maps of BHR albedo for adaptation	Land
	Burnt areas		Burnt areas		
	Fire radiative power		Fire radiative power		
Land cover	Active fire maps	Land cover	Active fire maps	Active fire maps	Land
	Surface soil moisture		Surface soil moisture		
Glaciers	Freeze/thaw	Glaciers	Freeze/thaw	Freeze/thaw	Land
	Root-zone soil moisture		Root-zone soil moisture		
	Surface inundation		Surface inundation		
Lakes	Vegetation optical depth	Lakes	Vegetation optical depth	Vegetation optical depth	Land
	Maps of land cover		Maps of land cover		
Permafrost	Maps of high-resolution land cover	Permafrost	Maps of high-resolution land cover	Maps of high-resolution land cover	Land
	Maps of land-surface temperature		Maps of land-surface temperature		
Snow	Glacier elevation change	Snow	Glacier elevation change	Glacier elevation change	Land
	Glacier area		Glacier area		
Groundwater	Glacier mass change	Groundwater	Glacier mass change	Glacier mass change	Land
	Lake colour (Lake water-leaving reflectance)		Lake colour (Lake water-leaving reflectance)		
	Lake-ice cover		Lake-ice cover		
	Water extent		Water extent		
Above-ground biomass	Lake surface-water temperature	Above-ground biomass	Lake surface-water temperature	Lake surface-water temperature	Land
	Lake water level		Lake water level		
	Lake-ice thickness		Lake-ice thickness	Lake-ice thickness	

► Land



Status: a provisional (pre-verification) snapshot in numbers

► Ocean

Ocean	Sea level	Global mean sea level
		Regional sea level
	Sea state	Wave height
	Sea-surface temperature	Sea-surface temperature
	Sea ice	Sea-ice thickness
		Sea-ice extent/edge
		Sea-ice concentration
		Sea-ice drift
	Ocean-surface heat flux	Latent heat flux
		Radiative heat flux
		Sensible heat flux
	Sea-surface salinity	Sea-surface salinity
	Ocean colour	Chlorophyll-a concentration
		Water leaving radiance
Surface stress	Surface stress	
Surface currents	Surface geostrophic currents	



Main targets: ECVs for detailed analysis (1)

- ▶ Draft proposal, based on analysis of GCOS-IP actions
 - ▶ Atmosphere
 - Aerosols
 - Lightning
 - Surface Winds
 - Upper-air winds
 - Water Vapour UT/LS
 - ▶ Land
 - Fire
 - Land Cover
 - Soil Moisture
 - FAPAR
 - Glaciers
 - ▶ Ocean
 - Sea Level
 - Sea State
 - Ocean-surface heat flux
- ▶ Considerations
 - ▶ Workload
 - ▶ Expertise
 - ▶ Other (relevance, cycles, ...) >
 - Scatterometry?
 - Limb sounding?



Main targets: ECVs for detailed analysis (2)

Domain	ECV	ECV Product	# records
Atmosphere (78 + 99)	Aerosol properties (73)	Aerosol optical depth	58
		Aerosol-extinction coefficient profile	5
		Single-scattering albedo	3
		Aerosol-layer height	7
	Carbon Dioxide, Methane and other greenhouse gases (75)	Tropospheric CH4 column	20
		Tropospheric CO2 column	31
		Tropospheric CO2 profile	2
		Tropospheric CH4 profile	21
		Stratospheric CH4 profile	1
	Wind speed and direction (upper-air) (5)	Upper-air wind retrievals	5
	Precipitation (24)	Estimates of liquid and solid precipitation	24
	Lightning (0)	Lightning	0



Main targets: ECVs for detailed analysis (3)

Domain	ECV	ECV Product	# records
Land (75 + 61)	FAPAR (10)	Maps of FAPAR for modelling	7
		Maps of FAPAR for adaptation	0
		FAPAR (GCOS-154)	3
	Leaf area index (10)	Maps of LAI for modelling	7
		Maps of LAI for adaptation	0
		LAI (GCOS-154)	3
	Fire (20)	Burnt areas	16
		Fire radiative power	3
		Active fire maps	1
	Soil moisture (31)	Surface soil moisture	30
		Freeze/thaw	1
		Root-zone soil moisture	0
		Surface inundation	0
		Vegetation optical depth	0
	Land-surface temperature (50)	Maps of land-surface temperature	50
	Glaciers (2)	Glacier elevation change	1
		Glacier mass change	0
		Glacier area	1
	Permafrost (2)	Permafrost temperature	1
		Depth of active layer	1
Above-ground biomass (1)	Maps of AGB	1	
Land cover (10)	Maps of high-resolution land cover	1	
	Maps of land cover	9	



Main targets: ECVs for detailed analysis (4)

Domain	ECV	ECV Product	# records
Ocean (39 + 38)	Sea level (20)	Global mean sea level	5
		Regional sea level	15
	Sea state (13)	Wave height	13
	Ocean-surface heat flux (6)	Latent heat flux	4
		Radiative heat flux	0
		Sensible heat flux	2
	Sea-surface salinity (4)	Sea-surface salinity	4
	Sea surface temperature (34)	Sea surface temperature	34



Commitments: Teams (TBC)

- ▶ Atmosphere
 - ▶ 2018 team, dropouts
 - ▶ 2019 team (leaders, members / needs, distribution of ECVs / expertise)

- ▶ Land
 - ▶ 2018 team, dropouts
 - ▶ 2019 team (leaders, members / needs, distribution of ECVs / expertise)

- ▶ Ocean
 - ▶ 2018 team, dropouts
 - ▶ 2019 team (leaders, members / needs, distribution of ECVs / expertise)



Commitments: detailed gap analysis (preliminary)

▶ Atmosphere

- Aerosols > Simon Pinnock, Wenying Su
- Lightning > Wenying Su
- Surface Winds > Wenying Su
- Upper-air winds > Jörg Schulz
- Water Vapour UT/LS > Jörg Schulz

▶ Land

- Fire > Jeff Privette
- Land Cover > Jeff Privette
- Soil Moisture > Jeff Privette
- FAPAR > Jörg Schulz
- Glaciers > Simon Pinnock

▶ Ocean

- Sea Level > Simon Pinnock
- Sea State > Simon Pinnock
- Ocean-surface heat flux > Jörg Schulz

