

Annex C: Inventory for GFCS relevant data and products currently available from WMO global and regional centres and other major climate institutions

Annex C provides the inventory for GFCS-relevant data and products currently available from WMO global and regional centres and other major climate institutions, namely:

- WMO World Data Centres (WDCs) for meteorology and climatology,
- WMO Global Producing Centres for Long-Range Forecasts (GPCLRFs),
- WMO Lead Centres,
- WMO Regional Climate Centers (RCCs),
- Regional Climate Outlook Forums (RCOFs),
- WMO World Weather Information Service (WWIS)
- Coordinated Regional Climate Downscaling Experiment (CORDEX),
- International Research Institute for Climate and Society (IRI),
- Asia-Pacific Economic Cooperation (APEC) Climate Center (APCC),
- European Centre for Medium-Range Weather Forecasts (ECMWF),
- NOAA's National Centers for Environmental Information (NCEI),
- NOAA's National Centers for Environmental Prediction (NCEP),
- National Centre for Atmospheric Research (NCAR),
- Global Precipitation Climatology Centre (GPCC),
- Global Precipitation Climate Project (GPCP),
- Climatic Research Unit (CRU) – University of East Anglia (UEA),
- ClimatView,
- Enhancing National Climate Service (ENACTS),
- International Climate Assessment and Dataset (ICA&D),
- European Organization for the Exploitation of Meteorological Satellites (EUMETSAT),
- Satellite Application Facility on Climate Monitoring (CM SAF),
- Copernicus Climate Change Services,
- some National Meteorological and Hydrological Services (NMHSs).

These institutions constitute the key operational entities of the Climate Service Information System (CSIS).

To ensure an unambiguous understanding of forecast period and forecast lead time, and although there is no universally accepted definition, here below the definition of these terminologies (WMO, 2010) used in this document:

forecast period	Forecast period is the validity period of a forecast. For example, long-range forecasts may be valid for a 90-day period or a season.
lead time	The lead time refers to the period of time between the issue time of the forecast and the beginning of the forecast validity period.

Also for a concern of legibility, some colors have been assigned to the different sections.

Prehistorical past	Historical and recent past	Sub-seasonal to seasonal and annual to decadal timescale	Climate Change timescale
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1. Prehistorical past

THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

National Oceanic and Atmospheric Administration		
Variables	Area	Availability
borehole	global	Data available to public
speleotherm		Data available to public
coral – SST and salinity reconstruction		Data available to public
fauna		Data available to public
fire history		Data available to public
climate forcing (volcanic eruption, solar variability)		Data available to public
historical references and documentary evidence (church records, harvest dates, harbor ice free date, ship logs)		Data available to public
ice core (oxygen isotopes, methane concentrations, dust content)		Data available to public
insect		Data available to public
lake and bog sediments		Data available to public
water lake level		Data available to public
Loess and Eolian dust		Data available to public
plant macrofossil		Data available to public
pollen grains		Data available to public
tree rings		Data available to public

Table 1: Paleoclimatology datasets from NOAA

National Oceanic and Atmospheric Administration		
Variables	Area	Availability
air temperature glaciers and ice sheets vegetation sea level hurricanes and tropical cyclones other hydroclimate atmospheric and oceanic circulation patterns sea surface temperature precipitation	global	Data available to public
drought	Africa, Asia, Europe, North America, South America	
streamflow	Asia, Australia/New Zealand, Europe, North America	
sea ice	Arctic Ocean, Atlantic Ocean, Pacific Ocean, Southern Ocean	

Table 2: *Reconstruction of past climate conditions*

CLIMATIC RESEARCH UNIT – UNIVERSITY OF EAST ANGLIA

	Climatic Research Unit – University of East Anglia			
	Variables	Period	Area	Availability
Data used in some of the figures in the paper in <i>Reviews of Geophysics</i> by Jones and Mann (2004)	reconstructed monthly North Atlantic Oscillation Index	December 1658 to 2001	-	Data available to public (ASCII format)
	reconstructed seasonal North Atlantic Oscillation Index	1500-1658		
	reconstructed summer temperature (24 grid point locations)	1850-1983 and 1600-1983	Western United States	Data available to public (ASCII format)
	reconstructed temperature anomalies	several time series	several regions around the world	Data available to public (ASCII format)
	data used in the IPCC AR4 “Paleoclimate chapter”	reconstructed temperature anomalies	700-1993, 1856-2005	Northern hemisphere
reconstructed temperature anomalies (climatological base period 1961-1990)		1000-2004	South America, Southern Africa, Australasia	
volcanic forcing and temperature anomalies		several time series ~ 1000-2000	Northern hemisphere	
volcanic forcing, solar irradiance forcing, and temperature anomalies		several time series ~ 1000-2000		
normalised temperature anomalies		850-2001	South-West Canada, Western USA, Western Greenland, Northern Sweden, North-West Russia, North Russia, Mongolia, East Asia	

Table 3: *Reconstructed variables from CRU-UEA used in publications*

Climatic Research Unit – University of East Anglia				
Variables	Resolution	Period	Area	Availability
monthly temperature anomalies (climatological base period 1961-1990)	5° latitude × 5° longitude	1850 to current date	global	Gridded data available to public (NetCDF format)
monthly precipitation	2.5° latitude × 3.75° longitude	1900 to 1998	global land areas	Gridded data available to public
	5° latitude × 5° longitude			
	2.5° latitude × 3.75° longitude	1974 to 1994	tropical land and tropical ocean	
monthly mean sea level pressure	5° latitude × 10° longitude	1873 to 2000	Northern hemisphere	Gridded data available to public

Table 4: Reconstructed variables from CRU-UEA

Climatic Research Unit – University of East Anglia			
Variables	Period	Area	Availability
monthly North Atlantic Oscillation	1821-2000	-	Data available to public (ASCII format)
monthly station pressure	1865-2002	Ponta Delgada, Azores	
	1821-2003	Gibraltar South-West Iceland	
monthly Southern Oscillation Index	1866-2015	-	Data available to public (ASCII format)
monthly station pressure	1855-2015	Darwin Tahiti	
monthly mean sea level pressure	1796-2003	Mandras (Chennai)	Data available to public (ASCII format)
monthly mean sea level pressure (and seasonal DJF, MAM, JJA, SON)	1818-2000	Nagasaki	Data available to public (ASCII format)
monthly mean temperature (and seasonal DJF, MAM, JJA, SON)			
reconstructed monthly North Atlantic Oscillation Index	December 1658 to 2001	-	Data available to public (ASCII format)
reconstructed seasonal North Atlantic Oscillation Index	1500-1658		
Trans Polar Index	1895-2014	-	Data available to public (ASCII format)
pressure data	1841-2014	Hobart, Australia Stanley, Falklands	
	1859-2013	Cape Pembroke/Stanley/Mt Pleasant	
monthly mean pressure	1821-1987	Cadiz/San Fernando	Data available to public (ASCII format)
monthly North Atlantic Oscillation Index	1821-1999	Iberia/Iceland	
North Sea Caspian Pattern	1948-2005	-	Data available to public (ASCII format)
Mediterranean Oscillation Index	1948-2014	Algiers and Cairo	Data available to public (ASCII format)
		Israel and Gibraltar	
monthly composite rainfall series	1912-1999 and 1863-1979	United Kingdom	Data available to public (ASCII format)
	1890-1994	Republic of Ireland	

Table 5: Reconstructed variables from CRU-UEA

Climatic Research Unit – University of East Anglia				
Variables	Resolution	Period	Area	Availability
monthly precipitation totals	10-min	1800-2003	Greater Alpine Region of Europe	Data available to public (NetCDF or ASCII format)
Self-calibrating Palmer Drought Severity Index	0.5° latitude × 0.5° longitude	1901-2002	Europe	Data available to public (NetCDF or ASCII format)
			North America	
	10-min	1800-2003	Greater Alpine Region of Europe	

Table 6: *Reconstructed variables from CRU-UEA*

2. Historical and recent past

CLIMATIC RESEARCH UNIT – UNIVERSITY OF EAST ANGLIA

Climatic Research Unit – University of East Anglia						
	Variables	Resolution	Period	Types	Area	Availability
Reanalysis	air temperature at surface 2 m air temperature 2 m maximum air temperature minimum air temperature air temperature at 1000, 200, 300, 500, 700, 850 hPa geopotential height at 1000, 200, 300, 500, 700, 850 hPa precipitation rate precipitable water relative humidity 2 m specific humidity specific humidity at 1000, 300, 500, 700, 850 hPa sea level pressure zonal wind at 1000, 200, 300, 500, 700, 850 hPa zonal wind at surface 10 m zonal wind meridional wind at 1000, 200, 300, 500, 700, 850 hPa meridional wind at surface 10 m meridional wind land/sea mask for surface and pressure level data land/sea mask for surface flux data	Each file contains vertically-concatenated grids of values, each grid being a set of values for a particular time step	1948 to present	daily and 6-hourly	global	data available to public (ASCII format)

Table 7: Reanalysis

Climatic Research Unit – University of East Anglia				
Variables	Resolution	Period	Area	Availability
precipitation maximum temperature minimum temperature mean temperature mean diurnal temperature range vapour pressure cloud wet days ground frost pet	0.5° latitude × 0.5° longitude	1901-2014	all land areas, excluding Antarctica	Gridded data and dataset of country means available to public
precipitation maximum temperature minimum temperature mean temperature vapour pressure diurnal range cloud wet days radiation 10 m wind speed		1961-1990		Gridded data available to public
precipitation mean temperature wet days mean diurnal temperature range relative humidity sunshine (% of maximum possible) ground frost elevation 10 m wind speed	10° latitude × 10° longitude		all land areas, excluding Antarctica	available on request
cloud vapour pressure			European land areas	

Table 8: High-resolution gridded data

EXETER, MET OFFICE

Exeter, Met Office					
	Variable	Period	Resolution	Area	Availability
Daily temperature anomalies (updated May 2015) (climatological base period 1961-1990)	daily maximum temperature anomalies daily minimum temperature anomalies	1950-2014	3.75° longitude × 2.5° latitude	Global	data available to public (in NetCDF format)
Daily actual temperature (updated October 2015)	daily actual maximum temperature daily actual minimum temperature				
Daily temperature anomalies and actual temperatures used in the IPCC AR5 (climatological base period 1961-1990)	daily maximum temperature anomalies daily minimum temperature anomalies daily actual maximum temperature daily actual minimum temperature	1950-2011			
Extremes Indices derived from HadGHCND	maximum maximum temperature minimum maximum temperature maximum minimum temperature minimum minimum temperature frequency of warm days frequency of cold days frequency of warm nights frequency of cold nights daily temperature range growing season length warm spell duration index cold spell duration index frost days icing days summer days tropical nights	1949-2011			

Table 9: Met Office Hadley Global Historical Climatology Network Daily Database (HadGHCND) data. The HadGHCND is a gridded daily temperature dataset based upon near-surface maximum and minimum temperature observations. The temperature extremes indices are based on the ETCCDI indices definitions.

MELBOURNE, BUREAU OF METEOROLOGY

Melbourne, Bureau of Meteorology			
Variable	Period	Area	Availability
daily rainfall monthly rainfall	highly variable recent observations and older dating back from the mid-1800s for some sites	Australia	data available to public (variety of data formats, including tables, data file (csv), PDF, graphs and maps)
daily maximum temperature			
daily minimum temperature			
monthly mean maximum temperature			
monthly mean minimum temperature			
monthly highest temperature			
monthly lowest temperature			
monthly highest minimum temperature			
monthly lowest maximum temperature			
daily weather observations			
climate calendar			
climate statistics			
daily solar exposure			
monthly solar exposure			

Table 10: Climate data online. The BOM also provides access to a range of statistics, recent weather observations and climate data collected by a range of different types of individual weather stations through the [Climate Data Online](#) portal.

Melbourne, Bureau of Meteorology				
Variables	Resolution	Period	Area	Availability
daily, monthly, seasonal and annual rainfall average rainfall average decadal and multi-decadal rainfall average rainfall percentiles average rainfall percentages average rainfall variability average rain days	0.05°	Extend from 1900 onwards to present	Australia	data and graphical products available to public (in ARS ASCII format) Except average percentiles whose the gridded data are available on request and charges apply
daily, monthly, seasonal and annual temperature average temperature average decadal and multi-decadal temperature average daily apparent temperature average temperature percentiles average potential frost days average heating and cooling degree days				data and graphical products available to public (in ARS ASCII format) Except average percentiles whose the gridded data are available on request and charges apply
daily, monthly, seasonal and annual humidity average relative humidity				data and graphical products available to public (in ARS ASCII format)
average evaporation average evapotranspiration				data and graphical products available to public (in ARS ASCII format)
average wind velocity				gridded data available on request and charges apply
daily, monthly, seasonal and annual solar exposure average sunshine duration average daily solar exposure average solar ultraviolet index average cloud				data and graphical products available to public (in ARS ASCII format)
average number of tropical cyclones average thunder and lightning flash density	0.05°	Extend from 1900 onwards to present	Australia	data and graphical products available to public (in ARS ASCII format) Except number of tropical cyclones whose the gridded data are available on request and charges apply
climate zones, Köppen classification and seasonal rainfall zones monthly and seasonal NDVI				data and graphical products available to public (in ARS ASCII format)
recent atmospheric circulation patterns across Australia and the globe, including geopotential height, horizontal wind and temperature at various levels, velocity potential at 200 hPa, OLR and MSLP				data and graphical products available to public (in ARS ASCII format)

Table 11: Maps and gridded spatial data. The BOM provide a webpage to browse online maps and download gridded spatial data in Australia. All gridded data are provided with relevant metadata to assist in understanding the analysis techniques, spatial extents and data limitations.

Melbourne, Bureau of Meteorology				
Variables	Reporting frequency	Period	Area	Availability
total rainfall	monthly, daily, 3 hourly, half hourly, minute	highly variable	Australia	Some items are available as free download , while some others need a request and are charged at a cost recovery rate
intensity rainfall	minute			
maximum temperature	monthly, daily			
minimum temperature	monthly, daily			
temperature - dry bulb	3 hourly, half hourly, minute			
temperature - dew point	3 hourly, half hourly, minute			
ground minimum temperature	daily, minute			
10 cm depth temperature	3 hourly, minute			
below surface				
total evaporation	daily			
wind speed and direction	3 hourly, half hourly, minute			
wind - maximum gust	daily, minute			
wind - run above 3 m	daily			
wind - run below 3 m	daily			
sunshine duration	daily			
cloud amount	3 hourly, half hourly, minute			
mean sea level pressure	3 hourly, half hourly, minute			

Table 12: Weather station in Australia. The *Weather Station Directory* provides additional data types and specific dates and localities in Australia. The weather data are obtained from different types of observing stations around Australia, on offshore islands, and in the Antarctic.

Melbourne, Bureau of Meteorology				
Variables	Season	Period	Area	Availability
mean surface temperature anomalies	annual, monthly,	1850-2015	global	data and graphical products available to public
rainfall anomalies	DJF, MAM, JJA, SON	1900-2014		

Table 13: Time series of mean surface temperature and rainfall anomalies by the Australian Bureau of Meteorology.

MOSCOW, HYDROMETEOROLOGICAL CENTRE OF RUSSIA

Moscow, Hydrometeorological Centre of Russia				
Variables	Data types	Period	Area	Availability
minimum air temperature mean air temperature maximum air temperature total precipitation	daily	highly variable, some from late 1800s to current date	CIS territory	data available to public (ASCII format)
2 m mean temperature	monthly	1945-2008	Russia	data available to public (ASCII format)
mean total precipitation		1966-2008		

Table 14: The Hydrometeorological Centre of Russia provides daily temperature and rainfall series from 223 stations for the territories of CIS and the GCOS monthly mean temperature and precipitation from 135 stations in the Russia territory.

TOKYO – JAPAN METEOROLOGICAL AGENCY / TOKYO CLIMATE CENTER

Tokyo, Japan Meteorological Agency / Tokyo Climate Center					
	Variables	Resolution	Period	Area	Availability
Sea Surface Temperature (SST) Analysis	monthly mean SST analysis	1° latitude × 1° longitude	1891 to current date	global	Gridded data for public
Sea Surface Temperature (SST) for the 1981-2010 base period	monthly mean southern oscillation index	-	1946 to current date	Equatorial Pacific	ASCII file available to public
	monthly mean SST monthly mean SST anomalies 5-month running mean SST anomalies			Niño 1+2 Niño 3 Niño 4 Niño West	
Sea Surface Temperature (SST) climatological based on a sliding 30-year base period	monthly mean SST monthly mean SST deviation 5-month running mean SST deviation		1949-2017 (for monthly mean SST) 1949 to 2016	Niño 3 Niño West IOBW	

Table 15: Monthly mean SST and El Niño monitoring indices provided by the TCC/JMA

Tokyo, Japan Meteorological Agency / Tokyo Climate Center					
climatological base reference 1981-2010	Variable	Period	Period for	Area	Availability
	sea level pressure and anomaly 500 <i>hPa</i> geopotential height and anomaly 100 <i>hPa</i> geopotential height and anomaly 30 <i>hPa</i> geopotential height and anomaly 850 <i>hPa</i> temperature and anomaly 200 <i>hPa</i> wind speed and vectors 300 <i>hPa</i> wave activity flux	from 1958 to current date	5-day, 10-day, month, 3-month mean	Northern hemisphere, Southern hemisphere	Charts available to public
	500 <i>hPa</i> kinetic energy of high-frequency variation number of days of snow cover		month	Northern hemisphere	
	outgoing longwave radiation outgoing longwave radiation anomaly sea level pressure and surface wind vector sea level pressure anomaly and surface wind anomaly vector 850 <i>hPa</i> geopotential height and wind vector 200 <i>hPa</i> geopotential height and wind vector 850 <i>hPa</i> stream function and anomaly 850 <i>hPa</i> stream function anomaly and wind anomaly vector 200 <i>hPa</i> stream function and anomaly 200 <i>hPa</i> stream function anomaly and wind anomaly vector 850 <i>hPa</i> velocity potential, divergent wind vector and velocity potential anomaly 200 <i>hPa</i> velocity potential, divergent wind vector and velocity potential anomaly		5-day, 10-day, month, 3-month mean	Tropics	
	sea level pressure and anomaly 850 <i>hPa</i> temperature and anomaly			Japan or around Japan	
	northward flux of horizontal momentum in the upper troposphere 850 <i>hPa</i> northward heat flux zonal wind temperature vertical velocity		month	zonal mean	

Table 16: Analysis charts of atmospheric circulation from TCC/JMA

Tokyo, Japan Meteorological Agency / Tokyo Climate Center				
Variable	Period	Period for	Area	Availability
Outgoing Longwave Radiation and 500 <i>hPa</i> geopotential height and 250 <i>hPa</i> wave activity flux	from 1958 to current date	1-day, 5-day, 7-day, 10-day, 30-day	Asian region	Animation maps available to public
Outgoing Longwave Radiation and 500 <i>hPa</i> geopotential height				
Outgoing Longwave Radiation and 200 <i>hPa</i> stream function and wave activity flux				
Outgoing Longwave Radiation and 200 <i>hPa</i> stream function				
Sea Level Pressure and 850 <i>hPa</i> temperature and 925 <i>hPa</i> wind vector				
925 <i>hPa</i> moisture flux and moisture flux convergence/divergence				
850 <i>hPa</i> equivalent potential temperature and moisture flux			global	
Outgoing Longwave Radiation and 200 <i>hPa</i> velocity potential and divergent wind vector				
Sea Level Pressure and 2 <i>m</i> temperature and 10 <i>m</i> wind vector				
Outgoing Longwave Radiation and 850 <i>hPa</i> stream function and wave activity flux				
Outgoing Longwave Radiation and 850 <i>hPa</i> stream function				
Outgoing Longwave Radiation and 200 <i>hPa</i> stream function and wave activity flux				
Outgoing Longwave Radiation and 200 <i>hPa</i> stream function			Northern hemisphere and Southern hemisphere	
sea level pressure				
500 <i>hPa</i> geopotential height				
100 <i>hPa</i> geopotential height				
30 <i>hPa</i> geopotential height				
850 <i>hPa</i> temperature				
300 <i>hPa</i> wind speed and vectors				
300 <i>hPa</i> wave activity flux				

Table 17: Animation maps of atmospheric circulation from TCC/JMA

Tokyo, Japan Meteorological Agency / Tokyo Climate Center					
Variable	Period for	Period	Climatological period	Area	Availability
mean 200 <i>hPa</i> zonal wind	5-day	from 1958 to current date	1981-2010	zonal mean (Northern hemisphere), east mean (Japan)	Charts available to public
mean outgoing longwave radiation				80°E - 100°E mean, 120°E - 140°E mean, 160°E - 180°E mean	
mean 500 <i>hPa</i> geopotential height				120°E, 140°E, 160°E	
mean zonal wind anomaly				around equator between 5°S and 5°N	
mean zonal 200 <i>hPa</i> velocity potential					
outgoing longwave radiation anomaly					
850 <i>hPa</i> zonal wind anomaly	3-month				
sea surface temperature					
mean outgoing longwave radiation and anomaly	3-day and 7-day	from 1979 to current date		15°N - 25°N, 5°N - 15°N, 5°S - 5°N (equator), 15°S - 5°S	Time-longitude cross section available to public
mean 200 hPa velocity potential and anomaly					
mean 10 m zonal wind and anomaly					
mean 850 hPa zonal wind and anomaly					
mean sea surface temperature and anomaly					

Table 18: Latitude and longitude time cross section from TCC/JMA

Tokyo, Japan Meteorological Agency / Tokyo Climate Center					
Variable	Period for	Period	Area	Availability	
Southern Oscillation Index and Sea Level Pressure	monthly and five month running mean values	from 1958 to current date	SOI, Darwin, Tahiti	Charts available to public	
equatorial zonal wind index					
outgoing longwave radiation					
Sea Surface Temperature anomaly			IOBW, Niño West, Niño.4, Niño.3, Niño. 1+2		
sea level anomaly			Yap (10°N, 130°E), Tarawa (1°N, 173°E), Christmas (2°N, 157°W), Santa (1°S, 90°W)		
zonal mean temperature anomaly calculated from thickness	-		stratosphere: 90°N – 90°S, 90°N- 30°N troposphere: 90°N – 90°S, 90°N- 30°N, 25°N, 25°S		
eigen vector from Empirical Orthogonal Function analysis of seasonal mean 500 hPa			Northern hemisphere		
Empirical Orthogonal Function scores			-		

Table 19: Time series of tropical atmospheric and oceanic monitoring indices

Tokyo, Japan Meteorological Agency / Tokyo Climate Center			
Variable	Period	Area	Availability
monthly mean Sea Surface Temperature	from 1970 to current date	global	Charts available to public
monthly mean Sea Surface Temperature anomalies (climatological base reference 1981-2010)			
3-month mean Sea Surface Temperature			
3-month mean Sea Surface Temperature anomalies (climatological base reference 1981-2010)			
Sea Surface Temperature and anomalies along the Equator	from 1972 to current date	Equatorial Pacific	
temperature and anomalies	from 1979 to current date		
sub-surface temperature along the Equator	from 1983 to current date		
20°C depth and anomalies along the Equator	from 1981 to current date	Equatorial Pacific	
ocean heat content and anomalies along the Equator			
ocean heat content and anomalies along 6°N			
ocean heat content and anomalies along 6°S			
surface zonal wind stress and anomalies along the Equator			

Table 20: *Charts of oceanographic conditions from TCC/JMA*

Tokyo, Japan Meteorological Agency / Tokyo Climate Center		
Variable	Period	Availability
monthly Southern Oscillation Index (SOI, Darwin, Tahiti)	from 1946 to current date	data (ASCII format) and graphical daily time series available to public
monthly equatorial zonal wind index (U200-IN, U200-CP, U850-WP, U850-CP, U850-EP)	from 1958 to current date	
monthly outgoing longwave radiation (OLR-PH, OLR-MC, OLR-DL)	from 1979 to current date	
monthly summer Asian monsoon outgoing longwave radiation index (SAMOI-A, SAMOI-N, SAMOI-W)	from 1979 to current data	

Table 21: *Asian Monsoon Monitoring Indices from TCC/JMA*

Tokyo, Japan Meteorological Agency / Tokyo Climate Center		
Variable	Period	Availability
daily Real-time Multivariate Madden-Julian Oscillation (1 and 2) daily phase daily amplitude	from 1980 to current date	data (ASCII format) and graphical daily time series available to public

Table 22: *Madden-Julian Oscillation from TCC/JMA*

TOULOUSE, METEO-FRANCE

Toulouse, Météo-France				
Variables	Data types	Period	Area	Availability
precipitation temperature wind pressure humidity solar radiation	station monthly and annual data	1981-2010	France	ASCII/Excel/PDF/HTML format charge apply

Table 23: Station monthly and annual data in France

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

National Oceanic and Atmospheric Administration			
Variable	Period	Area	Availability
monthly mean 200 <i>hPa</i> zonal winds equator (original data, anomaly and standardized)	from 1979 to current date	Equator (165°W - 110°W)	data available to public (ASCII format)
monthly mean 850 <i>hPa</i> Trade wind index (original data, anomaly and standardized)		West Pacific, Central Pacific, and East Pacific	
30 <i>hPa</i> zonal wind index (Quasi-Biennial Oscillation) (original data, anomaly and standardized)			
50 <i>hPa</i> zonal wind index (Quasi-Biennial Oscillation) (original data, anomaly and standardized)			
Darwin Sea Level Pressure Tahiti Sea Level Pressure	from 1951 to current date and from 1882 to current date	-	
Southern Oscillation Index (monthly and three-month running mean)	from 1951 to current date and from 1882 to current date		
Indonesia Sea Level Pressure (standardized anomalies)	from 1949 to current date		
Equatorial Eastern Pacific Sea Level Pressure (standardized anomalies)			
Equatorial Southern Oscillation Index (monthly and three-month running mean)			
weekly Sea Surface Temperature anomalies (for climatological base period 1981 -2010)	from 1990 to current date and from 1950 to current date	Niño1+2, Niño 3, Niño 3.4, Niño 4	
monthly Sea Surface Temperature anomalies (for climatological base period 1981 -2010)	from 1982 to current date		
seasonal Sea Surface Temperature anomalies (for climatological base period 1981 -2010)	from 1950 to current date	Niño 3.4	
monthly Sea Surface Temperature anomalies	from 1982 to current date	North Atlantic, South Atlantic, Global Tropics	
monthly mean 850 <i>hPa</i> temperature anomalies (original data, anomaly and standardized)	from 1979 to current date	-	
Outgoing Longwave Radiation	from 1974 to current date	Equator (160°E – 160°W)	

Table 24: Atmospheric and Sea Surface Temperature indices

GLOBAL PRECIPITATION CLIMATOLOGY CENTRE

Global Precipitation Climatology Centre (GPCC) GPCC Climatology				
Variables	Resolution	Period	Area	Availability
Monthly precipitation	0.25, 0.5°, 1.0° and 2.5°	1951-2000	global	Graphical products and data available to public (netCDF format)

Table 25: GPCC Climatology Version 2015 – Monthly land-surface precipitation climatology from Rain-Gauges built on GTS-based and historic data

Global Precipitation Climatology Centre (GPCC) GPCC Full Data Reanalysis				
Variables	Resolution	Period	Area	Availability
Monthly precipitation	0.5°, 1.0° and 2.5°	1901-2013	global	data available to public (netCDF format)

Table 26: GPCC Full Data Reanalysis Version 7 – Monthly Land-Surface Precipitation from Rain-Gauges built on GTS-based and historic data

Global Precipitation Climatology Centre (GPCC) GPCC Full Data Daily				
Variables	Resolution	Period	Area	Availability
Daily precipitation	1.0°	1988-2013	global	data available to public (netCDF format)

Table 27: GPCC Full Data Daily – Daily Land-surface precipitation from Rain-Gauges built on GTS-based and historic data

Global Precipitation Climatology Centre (GPCC) GPCC Drought Index Product				
Variables	Resolution	Period	Area	Availability
GPCC Drought Index	1.0°	1952-2013	global	data available to public (netCDF format)

Table 28: GPCC Drought Index Product - Globally Gridded Drought Index with averaging periods 1, 3, 6, 9, 12, 24 and 48 months

Global Precipitation Climatology Centre (GPCC) VASclimO 50-year				
Variables	Resolution	Period	Area	Availability
Monthly precipitation	0.5°, 1.0° and 2.5°	1951-2000	global, excluding Antarctica and Greenland	Graphical product and data available to public (csv format)

Table 29: The VASclimO 50-year precipitation climatology is a globally gridded data set of monthly observed precipitation

Global Precipitation Climatology Centre (GPCC) HOAPS/GPCC				
Variables	Resolution	Period	Area	Availability
Daily precipitation	1.0° and 2.5°	1988-2008	global	data available to public (netCDF format)
	0.5°		Europe	

Table 30: HOAPS/GPCC global daily precipitation data record with uncertainty estimates using satellite and gauge based observations

GLOBAL PRECIPITATION CLIMATE PROJECT

Global Precipitation Climate Project (GPCP) GPCP Version 2.2 Climatology				
Variables	Resolution	Period	Area	Availability
Monthly precipitation	2.5° latitude x 2.5° longitude	1979-2011	global	data available to public

Table 31: *Monthly climatology of the satellite-gauge combination product*

EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS

European Centre for Medium-Range Weather Forecasts (ECMWF)						
	Variables	Resolution	Time	Period	Area	Availability
Reanalysis ERA-20C: daily	2 metre dewpoint temperature	0.125° × 0.125°	00 UTC, 03 UTC, 06 UTC, 09 UTC, 12 UTC, 15 UTC, 18 UTC, 21 UTC	1900-2010	global	data available to public, but need to login before retrieving data (grib or netCDF format)
	2 metre temperature					
	10 metre U wind component					
	10 metre V wind component					
	100 metre U wind component					
	100 metre V wind component					
	Albedo					
	Boundary layer height					
	Charnock					
	Convective available potential energy					
	Forecast albedo					
	Forecast logarithm of surface roughness for heat					
	Forecast surface roughness					
	High cloud cover					
	Ice temperature layer 1					
	Ice temperature layer 2					
	Ice temperature layer 3					
	Ice temperature layer 4					
	Instantaneous eastward turbulent surface stress					
	Instantaneous moisture flux					
	Instantaneous northward turbulent surface stress					
	Instantaneous surface sensible heat flux					
	Leaf area index, high vegetation					
	Leaf area index, low vegetation					
	Low cloud cover					
	Mean sea level pressure					
	Medium cloud cover					
	Near IR albedo for diffuse radiation					
	Near IR albedo for direct radiation					
	Neutral wind at 10 m u-component					
	Neutral wind at 10 m v-component					

Table 32: Set of ERA-20C parameters on surface – daily (part 1/4)

	European Centre for Medium-Range Weather Forecasts (ECMWF)					
	Variables	Resolution	Time	Period	Area	Availability
Reanalysis ERA-20C: daily	Sea surface temperature	0.125° × 0.125°	00 UTC, 03 UTC, 06 UTC, 09 UTC, 12 UTC, 15 UTC, 18 UTC, 21 UTC	1900-2010	global	data available to public, but need to login before retrieving data (grib or netCDF format)
	Sea-ice cover					
	Skin reservoir content					
	Skin temperature					
	Snow albedo					
	Snow density					
	Snow depth					
	Soil temperature level 1					
	Soil temperature level 2					
	Soil temperature level 3					
	Soil temperature level 4					
	Surface pressure					
	Temperature of snow layer					
	Total cloud cover					
	Total column ice water					
	Total column liquid water					
	Total column ozone					
	Total column rain water					
	Total column snow water					
	Total column water					
	Total column water vapour					
	UV visible albedo for diffuse radiation					
	UV visible albedo for direct radiation					

Table 33: Set of ERA-20C parameters on surface – daily (part 2/4)

European Centre for Medium-Range Weather Forecasts (ECMWF)					
	Variables	Resolution	Time	Period	Area
Reanalysis ERA-20C: daily	Vertical integral of cloud frozen water	0.125° × 0.125°	00 UTC, 03 UTC, 06 UTC, 09 UTC, 12 UTC, 15 UTC, 18 UTC, 21 UTC	1900-2010	global
	Vertical integral of cloud liquid water				
	Vertical integral of divergence of cloud frozen water flux				
	Vertical integral of divergence of cloud liquid water flux				
	Vertical integral of divergence of geopotential flux				
	Vertical integral of divergence of kinetic energy flux				
	Vertical integral of divergence of mass flux				
	Vertical integral of divergence of moisture flux				
	Vertical integral of divergence of ozone flux				
	Vertical integral of divergence of thermal energy flux				
	Vertical integral of divergence of total energy flux				
	Vertical integral of eastward cloud frozen water flux				
	Vertical integral of eastward cloud liquid water flux				
	Vertical integral of eastward geopotential flux				
	Vertical integral of eastward heat flux				
	Vertical integral of eastward kinetic energy flux				
	Vertical integral of eastward mass flux				
	Vertical integral of eastward ozone flux				
	Vertical integral of eastward total energy flux				
	Vertical integral of eastward water vapour flux				
	Vertical integral of energy conversion				
	Vertical integral of kinetic energy				
	Vertical integral of mass of atmosphere				
	Vertical integral of mass tendency				
	Vertical integral of northward cloud frozen water flux				
	Vertical integral of northward cloud liquid water flux				
	Vertical integral of northward geopotential flux				
	Vertical integral of northward heat flux				
	Vertical integral of northward kinetic energy flux				
	Vertical integral of northward mass flux				
	Vertical integral of northward ozone flux				
	Vertical integral of northward total energy flux				
	Vertical integral of northward water vapour flux				
	Vertical integral of ozone				

[data](#) available to public, but need to login before retrieving data (grib or netCDF format)

Table 34: Set of ERA-20C parameters on surface – daily (part 3/4)

European Centre for Medium-Range Weather Forecasts (ECMWF)						
Reanalysis ERA-20C: daily	Variables	Resolution	Time	Period	Area	Availability
	Vertical integral of potential+internal energy	0.125° × 0.125°	00 UTC, 03 UTC, 06 UTC, 09 UTC, 12 UTC, 15 UTC, 18 UTC, 21 UTC	1900-2010	global	data available to public, but need to login before retrieving data (grib or netCDF format)
	Vertical integral of potential+internal+latent energy					
	Vertical integral of temperature					
	Vertical integral of thermal energy					
	Vertical integral of total energy					
	Vertical integral of water vapour					
	Volumetric soil water layer 1					
	Volumetric soil water layer 2					
	Volumetric soil water layer 3					
	Volumetric soil water layer 4					

Table 35: Set of ERA-20C parameters on surface – daily (part 4/4)

European Centre for Medium-Range Weather Forecasts (ECMWF)							
Reanalysis ERA-20C: daily	Variables	Resolution	Time	Level	Period	Area	Availability
	Divergence Fraction of cloud cover Geopotential Logarithm of surface pressure Ozone mass mixing ratio Specific cloud ice water content Specific cloud liquid water content Specific humidity Specific rain water content Specific snow water content Temperature U component of wind V component of wind Vertical velocity Vorticity (relative)	0.125° × 0.125°	00 UTC, 03 UTC, 06 UTC, 09 UTC, 12 UTC, 15 UTC, 18 UTC, 21 UTC	91 vertical levels, between surface and 0.01 hPa	1900-2010	global	data available to public, but need to login before retrieving data (grib or netCDF format)

Table 36: Set of ERA-20C parameters at different models levels - daily

European Centre for Medium-Range Weather Forecasts (ECMWF)							
Reanalysis ERA-20C: daily, synoptic monthly means, monthly means of daily means	Variables	Resolution	Time	Level	Period	Area	Availability
	Divergence Fraction of cloud cover Geopotential Ozone mass mixing ratio Potential vorticity Relative humidity Specific cloud ice water content Specific cloud liquid water content Specific humidity Specific rain water content Specific snow water content Temperature U component of wind V component of wind Vertical velocity Vorticity (relative)	0.125° × 0.125°	00 UTC, 03 UTC, 06 UTC, 09 UTC, 12 UTC, 15 UTC, 18 UTC, 21 UTC	1hPa to 1000 hPa	1900-2010	global	data available to public, but need to login before retrieving data (grib or netCDF format) ERA-20C daily ERA-20C synoptic monthly means ERA-20C monthly means of daily means

Table 37: Set of ERA-20C parameters at different pressure levels – daily, synoptic monthly means, monthly means of daily means

	European Centre for Medium-Range Weather Forecasts (ECMWF)						
	Variables	Resolution	Time	Level	Period	Area	Availability
Reanalysis ERA-20C: Potential temperature daily, synoptic monthly means	Divergence Montgomery potential Ozone mass mixing ratio Potential vorticity Pressure Specific humidity Vorticity (relative)	0.125° × 0.125°	00 UTC, 03 UTC, 06 UTC, 09 UTC, 12 UTC, 15 UTC, 18 UTC, 21 UTC	850 hPa, 700 hPa, 600 hPa, 530 hPa, 475 hPa, 430 hPa, 395 hPa, 370 hPa, 350 hPa, 330 hPa, 320 hPa, 315 hPa, 300 hPa, 285 hPa, 275 hPa, 265 hPa	1900-2010	global	data available to public, but need to login before retrieving data (grib or netCDF format)

Table 38: Set of ERA-20C parameters at the potential temperature level – daily and synoptic monthly means

Reanalysis ERA-20C: Potential temperature monthly means of daily means	European Centre for Medium-Range Weather Forecasts (ECMWF)					
	Variables	Resolution	Level	Period	Area	Availability
	Divergence	0.125° × 0.125°	850 hPa, 700 hPa, 600 hPa, 530 hPa, 475 hPa, 430 hPa, 395 hPa, 370 hPa, 350 hPa, 330 hPa, 320 hPa, 315 hPa, 300 hPa, 285 hPa, 275 hPa, 265 hPa	1900-2010	global	data available to public, but need to login before retrieving data (grib or netCDF format)
	Montgomery potential					
	Ozone mass mixing ratio					
	Potential vorticity					
	Pressure					
	Specific humidity					
	U component of wind					
	V component of wind					
Vorticity (relative)						

Table 39: Set of ERA-20C parameters at the potential temperature level – monthly means of daily means

	European Centre for Medium-Range Weather Forecasts (ECMWF)						
	Variables	Resolution	Time	Level	Period	Area	Availability
Reanalysis ERA-20C: Potential vorticity daily, synoptic monthly means, monthly means of daily means	Geopotential Ozone mass mixing ratio Potential temperature Pressure Specific humidity U component of wind V component of wind	0.125° × 0.125°	00 UTC, 03 UTC, 06 UTC, 09 UTC, 12 UTC, 15 UTC, 18 UTC, 21 UTC	2000	1900-2010	global	data available to public, but need to login before retrieving data (grib or netCDF format)

Table 40: Set of ERA-20C parameters at the potential vorticity level – daily, synoptic monthly means and monthly means of daily means

	European Centre for Medium-Range Weather Forecasts (ECMWF)			
	Variables	Resolution	Area	Availability
Reanalysis ERA-20C invariant/ ERA Interim invariant (except variables with *)	Angle of sub-gridscale orography Anisotropy of sub-gridscale orography Geopotential High vegetation cover Land-sea mask Logarithm of surface roughness length for heat* Low vegetation cover Slope of sub-gridscale orography Soil type* Standard deviation of filtered subgrid orography Standard deviation of orography Surface roughness* Type of high vegetation Type of low vegetation	0.125° × 0.125°	global	data available to public, but need to login before retrieving data (grib or netCDF format)
Reanalysis ERA-20C: ocean wave invariant	Model bathymetry			data available to public, but need to login before retrieving data (grib or netCDF format)

Table 41: Set of ERA-20C and ERA-interim invariant parameters

European Centre for Medium-Range Weather Forecasts (ECMWF)					
	Variables	Resolution	Time	Period	Area
	Availability				
Reanalysis ERA-20C: ocean wave daily, ocean wave synoptic monthly means, ocean wave monthly means of daily means	10 metre wind direction	0.125° × 0.125°	00 UTC, 03 UTC, 06 UTC, 09 UTC, 12 UTC, 15 UTC, 18 UTC, 21 UTC	1900-2010	global
	10 metre wind speed				
	Benjamin-Feir index				
	Coefficient of drag with waves				
	Maximum individual wave height				
	Mean direction of total swell				
	Mean direction of wind waves				
	Mean period of total swell				
	Mean period of wind waves				
	Mean square slope of waves				
	Mean wave direction				
	Mean wave period				
	Mean wave period based on first moment				
	Mean wave period based on first moment for swell				
	Mean wave period based on first moment for wind waves				
	Mean wave period based on second moment				
	Mean wave period based on second moment for swell				
	Mean wave period based on second moment for wind waves				
	Normalized energy flux into ocean				
	Normalized energy flux into waves				
	Normalized stress into ocean				
	Peak period of 1D spectra				
	Period corresponding to maximum individual wave height				
	Significant height of combined wind waves and swell				
	Significant height of total swell				
	Significant height of wind waves				
	U-component stokes drift				
	V-component stokes drift				
	Wave spectral directional width				
	Wave spectral directional width for swell				
	Wave spectral directional width for wind waves				
	Wave spectral kurtosis				
	Wave spectral peakedness				

data available to public, but need
to login before retrieving data
(grib or netCDF format)

[Ocean wave daily](#)

[Ocean wave synoptic monthly
means](#)

[Ocean wave monthly means of
daily means](#)

Table 42: Set of ERA-20C parameters – ocean wave daily, ocean wave synoptic monthly means and ocean wave monthly means of daily means

European Centre for Medium-Range Weather Forecasts (ECMWF)						
Forecast ERA-20C: daily	Variables	Resolution	Step	Period	Area	Availability
	2 metre dewpoint temperature	0.125° × 0.125°	3, 6, 9, 12, 15, 18, 21, 24, 27	1900-2010	global	data available to public, but need to login before retrieving data (grib or netCDF format)
	2 metre temperature					
	10 metre U wind component					
	10 metre V wind component					
	10 metre wind gust since previous post-processing					
	100 metre U wind component					
	100 metre V wind component					
	Accumulated Carbon Dioxide Ecosystem Respiration					
	Accumulated Carbon Dioxide Gross Primary Production					
	Accumulated Carbon Dioxide Net Ecosystem Exchange					
	Albedo					
	Boundary layer dissipation					
	Boundary layer height					
	Charnock					
	Clear sky surface photosynthetically active radiation					
	Clear-sky direct solar radiation at surface					
	Cloud base height					
	Convective available potential energy					
	Convective inhibition					
	Convective precipitation					
	Convective snowfall					
	Downward UV radiation at the surface					
	Duct base height					
	Eastward gravity wave surface stress					
	Eastward turbulent surface stress					
	Evaporation					
	Flux of Carbon Dioxide Ecosystem Respiration					
	Flux of Carbon Dioxide Gross Primary Production					
	Flux of Carbon Dioxide Net Ecosystem Exchange					
	Forecast albedo					
	Forecast logarithm of surface roughness for heat					
	Forecast surface roughness					
	Gravity wave dissipation					

Table 43: Set of ERA-20 forecasted parameters – daily. All forecasts are integrated daily from 06 UTC for + step hours. The significance of the forecast step depends on whether the forecast parameter is instantaneous or accumulated (from the beginning of the forecast) (part 1/4)

European Centre for Medium-Range Weather Forecasts (ECMWF)						
	Variables	Resolution	Step	Period	Area	Availability
Forecast ERA-20C: daily	High cloud cover	0.125° × 0.125°	3, 6, 9, 12, 15, 18, 21, 24, 27	1900-2010	global	data available to public, but need to login before retrieving data (grib or netCDF format)
	Ice temperature layer 1					
	Ice temperature layer 2					
	Ice temperature layer 3					
	Ice temperature layer 4					
	Instantaneous eastward turbulent surface stress					
	Instantaneous moisture flux					
	Instantaneous northward turbulent surface stress					
	Instantaneous surface sensible heat flux					
	Large-scale precipitation					
	Large-scale precipitation fraction					
	Large-scale snowfall					
	Leaf area index, high vegetation					
	Leaf area index, low vegetation					
	Low cloud cover					
	Maximum temperature at 2 metres since previous post-processing*					
	Mean sea level pressure					
	Mean vertical gradient of refractivity inside trapping layer					
	Medium cloud cover					
	Minimum temperature at 2 metres since previous post-processing					
	Minimum vertical gradient of refractivity inside trapping layer					
	Neutral wind at 10 m u-component					
	Neutral wind at 10 m v-component					
	Northward gravity wave surface stress					
	Northward turbulent surface stress					
	Photosynthetically active radiation at the surface					

Table 44: Set of ERA-20 forecasted parameters – daily. All forecasts are integrated daily from 06 UTC for + step hours. The significance of the forecast step depends on whether the forecast parameter is instantaneous or accumulated (from the beginning of the forecast) (part 2/4)

European Centre for Medium-Range Weather Forecasts (ECMWF)						
	Variables	Resolution	Step	Period	Area	Availability
Forecast ERA-20C: daily	Runoff	0.125° × 0.125°	3, 6, 9, 12, 15, 18, 21, 24, 27	1900-2010	global	data available to public, but need to login before retrieving data (grib or netCDF format)
	Sea surface temperature					
	Sea-ice cover					
	Skin reservoir content					
	Skin temperature					
	Snow albedo					
	Snow density					
	Snow depth					
	Snow evaporation					
	Snowfall					
	Snowmelt					
	Soil temperature level 1					
	Soil temperature level 2					
	Soil temperature level 3					
	Soil temperature level 4					
	Sub-surface runoff					
	Sunshine duration					
	Surface latent heat flux					
	Surface net solar radiation					
	Surface net solar radiation, clear sky					
	Surface net thermal radiation					
	Surface net thermal radiation, clear sky					
	Surface pressure					
	Surface runoff					
	Surface sensible heat flux					
	Surface solar radiation downwards					
	Surface thermal radiation downwards					
	TOA incident solar radiation					
	Temperature of snow layer					
	Top net solar radiation					
	Top net solar radiation, clear sky					
	Top net thermal radiation					
	Top net thermal radiation, clear sky					

Table 45: Set of ERA-20 forecasted parameters – daily. All forecasts are integrated daily from 06 UTC for + step hours. The significance of the forecast step depends on whether the forecast parameter is instantaneous or accumulated (from the beginning of the forecast) (part 3/4)

European Centre for Medium-Range Weather Forecasts (ECMWF)						
Forecast ERA-20C: daily	Variables	Resolution	Step	Period	Area	Availability
	Total cloud cover	0.125° × 0.125°	3, 6, 9, 12, 15, 18, 21, 24, 27	1900-2010	global	data available to public, but need to login before retrieving data (grib or netCDF format)
	Total column ice water					
	Total column liquid water					
	Total column ozone					
	Total column rain water					
	Total column snow water					
	Total column water					
	Total column water vapour					
	Total precipitation					
	Total sky direct solar radiation at surface					
	Trapping layer base height					
	Trapping layer top height					
	Vertically integrated moisture divergence					
	Volumetric soil water layer 1					
	Volumetric soil water layer 2					
	Volumetric soil water layer 3					
	Volumetric soil water layer 4					
	Zero degree level					

Table 46: Set of ERA-20 forecasted parameters – daily. All forecasts are integrated daily from 06 UTC for + step hours. The significance of the forecast step depends on whether the forecast parameter is instantaneous or accumulated (from the beginning of the forecast) (part 4/4)

European Centre for Medium-Range Weather Forecasts (ECMWF)						
Forecast ERA-20C: synoptic monthly means	Variables	Resolution	Step	Period	Area	Availability
	2 metre dewpoint temperature	0.125° × 0.125°	3, 6, 9, 12, 15, 18, 21, 24	1900-2010	global	data available to public, but need to login before retrieving data (grib or netCDF format)
	2 metre temperature					
	10 metre U wind component					
	10 metre V wind component					
	10 metre wind speed					
	100 metre U wind component					
	100 metre V wind component					
	Accumulated Carbon Dioxide Ecosystem Respiration					
	Accumulated Carbon Dioxide Gross Primary Production					
	Accumulated Carbon Dioxide Net Ecosystem Exchange					
	Albedo					
	Boundary layer dissipation					
	Boundary layer height					
	Charnock					
	Clear sky surface photosynthetically active radiation					
	Clear-sky direct solar radiation at surface					
	Cloud base height					
	Convective available potential energy					
	Convective inhibition					
	Convective precipitation					
	Convective snowfall					
	Downward UV radiation at the surface					
	Duct base height					
	Eastward gravity wave surface stress					
	Eastward turbulent surface stress					
	Evaporation					
	Flux of Carbon Dioxide Ecosystem Respiration					
	Flux of Carbon Dioxide Gross Primary Production					
	Flux of Carbon Dioxide Net Ecosystem Exchange					

Table 47: Set of ERA-20C forecasted parameters on surface – synoptic monthly means (part 1/4)

European Centre for Medium-Range Weather Forecasts (ECMWF)						
	Variables	Resolution	Step	Period	Area	Availability
Forecast ERA-20C: synoptic monthly means	Forecast albedo	0.125° × 0.125°	3, 6, 9, 12, 15, 18, 21, 24	1900-2010	global	data available to public, but need to login before retrieving data (grib or netCDF format)
	Forecast logarithm of surface roughness for heat					
	Forecast surface roughness					
	Gravity wave dissipation					
	High cloud cover					
	Ice temperature layer 1					
	Ice temperature layer 2					
	Ice temperature layer 3					
	Ice temperature layer 4					
	Instantaneous eastward turbulent surface stress					
	Instantaneous moisture flux					
	Instantaneous northward turbulent surface stress					
	Instantaneous surface sensible heat flux					
	Large-scale precipitation					
	Large-scale precipitation fraction					
	Large-scale snowfall					
	Leaf area index, high vegetation					
	Leaf area index, low vegetation					
	Low cloud cover					
	Magnitude of turbulent surface stress					
	Mean sea level pressure					
	Mean vertical gradient of refractivity inside trapping layer					
	Medium cloud cover					
	Minimum vertical gradient of refractivity inside trapping layer					
	Neutral wind at 10 m u-component					
	Neutral wind at 10 m v-component					
	Northward gravity wave surface stress					
	Northward turbulent surface stress					
	Photosynthetically active radiation at the surface					
	Runoff					
	Sea surface temperature					
	Sea-ice cover					

Table 48: Set of ERA-20C forecasted parameters on surface – synoptic monthly means (part 2/4)

European Centre for Medium-Range Weather Forecasts (ECMWF)						
Forecast ERA-20C: synoptic monthly means	Variables	Resolution	Step	Period	Area	Availability
	Skin reservoir content	0.125° × 0.125°	3, 6, 9, 12, 15, 18, 21, 24	1900-2010	global	data available to public, but need to login before retrieving data (grib or netCDF format)
	Skin temperature					
	Snow albedo					
	Snow density					
	Snow depth					
	Snow evaporation					
	Snowfall					
	Snowmelt					
	Soil temperature level 1					
	Soil temperature level 2					
	Soil temperature level 3					
	Soil temperature level 4					
	Sub-surface runoff					
	Sunshine duration					
	Surface latent heat flux					
	Surface net solar radiation					
	Surface net solar radiation, clear sky					
	Surface net thermal radiation					
	Surface net thermal radiation, clear sky					
	Surface pressure					
	Surface runoff					
	Surface sensible heat flux					
	Surface solar radiation downwards					
	Surface thermal radiation downwards					
	TOA incident solar radiation					
	Temperature of snow layer					
	Top net solar radiation					
	Top net solar radiation, clear sky					
	Top net thermal radiation					
	Top net thermal radiation, clear sky					

Table 49: Set of ERA-20C forecasted parameters on surface – synoptic monthly means (part 3/4)

European Centre for Medium-Range Weather Forecasts (ECMWF)						
Forecast ERA-20C: synoptic monthly means	Variables	Resolution	Step	Period	Area	Availability
	Total cloud cover	0.125° × 0.125°	3, 6, 9, 12, 15, 18, 21, 24	1900-2010	global	data available to public, but need to login before retrieving data (grib or netCDF format)
	Total column ice water					
	Total column liquid water					
	Total column ozone					
	Total column rain water					
	Total column snow water					
	Total column water					
	Total column water vapour					
	Total precipitation					
	Total sky direct solar radiation at surface					
	Trapping layer base height					
	Trapping layer top height					
	Vertically integrated moisture divergence					
	Volumetric soil water layer 1					
	Volumetric soil water layer 2					
	Volumetric soil water layer 3					
	Volumetric soil water layer 4					
	Zero degree level					

Table 50: Set of ERA-20C forecasted parameters on surface – synoptic monthly means (part 4/4)

	European Centre for Medium-Range Weather Forecasts (ECMWF)					
	Variables	Resolution	Step	Level	Period	Area
Forecast ERA-20C: daily, synoptic monthly means (except *), monthly means of daily means	Divergence	0.125° × 0.125°	3, 6, 9, 12, 15, 18, 21, 24, 27*	1hPa to 1000 hPa	1900-2010	global
	Fraction of cloud cover					
	Geopotential					
	Ozone mass mixing ratio					
	Potential vorticity					
	Relative humidity					
	Specific cloud ice water content					
	Specific cloud liquid water content					
	Specific humidity					
	Specific rain water content					
	Specific snow water content					
	Temperature					
	U component of wind					
	V component of wind					
	Vertical velocity					
	Vorticity (relative)					

data available to public, but
need to login before
retrieving data
(grib or netCDF format)

[ERAC-20 Daily](#)

[ERA-20C synoptic monthly
means](#)

[ERA-20C monthly means of
daily means](#)

Table 51: Set of ERA-20C forecasted parameters at different pressure levels – daily, synoptic monthly means, monthly means of daily means

European Centre for Medium-Range Weather Forecasts (ECMWF)						
Forecast ERA-20C: ocean wave daily, ocean wave synoptic monthly means (except for *), ocean wave monthly means of daily means	Variables	Resolution	Step	Period	Area	Availability
	10 metre wind direction	0.125° × 0.125°	3, 6, 9, 12, 15, 18, 21, 24, 27*	1900-2010	global	data available to public, but need to login before retrieving data (grib or netCDF format) Ocean wave daily Ocean wave synoptic monthly means Ocean wave monthly means of daily means
	10 metre wind speed					
	Benjamin-Feir index					
	Coefficient of drag with waves					
	Maximum individual wave height					
	Mean direction of total swell					
	Mean direction of wind waves					
	Mean period of total swell					
	Mean period of wind waves					
	Mean square slope of waves					
	Mean wave direction					
	Mean wave period					
	Mean wave period based on first moment					
	Mean wave period based on first moment for swell					
	Mean wave period based on first moment for wind waves					
	Mean wave period based on second moment					
	Mean wave period based on second moment for swell					
	Mean wave period based on second moment for wind waves					
	Normalized energy flux into ocean					
	Normalized energy flux into waves					
	Normalized stress into ocean					
	Peak period of 1D spectra					
	Period corresponding to maximum individual wave height					
	Significant height of combined wind waves and swell					
	Significant height of total swell					
	Significant height of wind waves					
	U-component stokes drift					
	V-component stokes drift					
	Wave spectral directional width					
	Wave spectral directional width for swell					
	Wave spectral directional width for wind waves					
	Wave spectral kurtosis					
	Wave spectral peakedness					

Table 52: Set of ERA-20 forecasted parameters – ocean wave daily, synoptic monthly means and monthly means of daily means

European Centre for Medium-Range Weather Forecasts (ECMWF)							
	Variables	Resolution	Time	Step	Period	Area	Availability
Reanalysis ERA-Interim: daily, synoptic monthly means	2 metre dewpoint temperature	0.125° × 0.125°	00 UTC, 06 UTC, 12 UTC, 18 UTC	0, 3, 6, 9, 12	from 1979 to current date	global	data available to public, but need to login before retrieving data (grib or netCDF format) ERA-Interim daily ERA-Interim synoptic monthly means
	2 metre temperature						
	10 metre U wind component						
	10 metre V wind component						
	10 metre wind gust since previous post-processing						
	Albedo						
	Boundary layer dissipation						
	Boundary layer height						
	Charnock						
	Clear sky surface photosynthetically active radiation						
	Convective available potential energy						
	Convective precipitation						
	Convective snowfall						
	Downward UV radiation at the surface						
	Eastward gravity wave surface stress						
	Eastward turbulent surface stress						
	Evaporation						
	Forecast albedo						
	Forecast logarithm of surface roughness for heat						
	Forecast surface roughness						
	Gravity wave dissipation						
	High cloud cover						

Table 53: Set of ERA-Interim parameters on surface – daily, synoptic monthly means (part 1/5)

European Centre for Medium-Range Weather Forecasts (ECMWF)						
	Variables	Resolution	Time	Step	Period	Area
Reanalysis ERA-Interim: daily, synoptic monthly means	Ice temperature layer 1	0.125° × 0.125°	00 UTC, 06 UTC, 12 UTC, 18 UTC	0, 3, 6, 9, 12	from 1979 to current date	global
	Ice temperature layer 2					
	Ice temperature layer 3					
	Ice temperature layer 4					
	Instantaneous eastward turbulent surface stress					
	Instantaneous moisture flux					
	Instantaneous northward turbulent surface stress					
	Instantaneous surface sensible heat flux					
	Large-scale precipitation					
	Large-scale precipitation fraction					
	Large-scale snowfall					
	Logarithm of surface roughness length for heat					
	Low cloud cover					
	Maximum temperature at 2 metres since previous post-processing					
	Mean sea level pressure					
	Mean wave direction					
	Mean wave period					
	Medium cloud cover					
	Minimum temperature at 2 metres since previous post-processing					
	Northward gravity wave surface stress					
	Northward turbulent surface stress					
	Photosynthetically active radiation at the surface					
	Runoff					
	Sea surface temperature					
	Sea-ice cover					
	Significant height of combined wind waves and swell					
	Skin reservoir content					
	Skin temperature					
	Snow albedo					
	Snow density					
	Snow depth					

data available to public,
but need to login before
retrieving data
(grib or netCDF format)

[ERA-Interim daily](#)

[ERA-Interim synoptic
monthly means](#)

Table 54: Set of ERA-Interim parameters on surface – daily, synoptic monthly means (part 2/5)

European Centre for Medium-Range Weather Forecasts (ECMWF)						
Variables	Resolution	Time	Step	Period	Area	Availability
Reanalysis ERA-Interim: daily, synoptic monthly means	0.125° × 0.125°	00 UTC, 06 UTC, 12 UTC, 18 UTC	0, 3, 6, 9, 12	from 1979 to current date	global	data available to public, but need to login before retrieving data (grib or netCDF format) ERA-Interim daily ERA-Interim synoptic monthly means
Snow evaporation						
Snowfall						
Snowmelt						
Soil temperature level 1						
Soil temperature level 2						
Soil temperature level 3						
Soil temperature level 4						
Sunshine duration						
Surface latent heat flux						
Surface net solar radiation						
Surface net solar radiation, clear sky						
Surface net thermal radiation						
Surface net thermal radiation, clear sky						
Surface pressure						
Surface roughness						
Surface sensible heat flux						
Surface solar radiation downwards						
Surface thermal radiation downwards						
TOA incident solar radiation						
Temperature of snow layer						
Top net solar radiation						
Top net solar radiation, clear sky						
Top net thermal radiation						
Top net thermal radiation, clear sky						
Total cloud cover						
Total column ice water						
Total column liquid water						
Total column ozone						
Total column water						
Total column water vapour						
Total precipitation						
Vertical integral of cloud frozen water						
Vertical integral of cloud liquid water						

Table 55: Set of ERA-Interim parameters on surface – daily, synoptic monthly means (part 3/5)

European Centre for Medium-Range Weather Forecasts (ECMWF)						
Variables	Resolution	Time	Step	Period	Area	Availability
Reanalysis ERA-Interim: daily, synoptic monthly means	0.125° × 0.125°	00 UTC, 06 UTC, 12 UTC, 18 UTC	0, 3, 6, 9, 12	from 1979 to current date	global	data available to public, but need to login before retrieving data (grib or netCDF format) ERA-Interim daily ERA-Interim synoptic monthly means
Vertical integral of divergence of cloud frozen water flux Vertical integral of divergence of cloud liquid water flux Vertical integral of divergence of geopotential flux Vertical integral of divergence of kinetic energy flux Vertical integral of divergence of mass flux Vertical integral of divergence of moisture flux Vertical integral of divergence of ozone flux Vertical integral of divergence of thermal energy flux Vertical integral of divergence of total energy flux Vertical integral of eastward cloud frozen water flux Vertical integral of eastward cloud liquid water flux Vertical integral of eastward geopotential flux Vertical integral of eastward heat flux Vertical integral of eastward kinetic energy flux Vertical integral of eastward mass flux Vertical integral of eastward ozone flux Vertical integral of eastward total energy flux Vertical integral of eastward water vapour flux Vertical integral of energy conversion Vertical integral of kinetic energy Vertical integral of mass of atmosphere Vertical integral of mass tendency Vertical integral of northward cloud frozen water flux Vertical integral of northward cloud liquid water flux Vertical integral of northward geopotential flux Vertical integral of northward heat flux Vertical integral of northward kinetic energy flux Vertical integral of northward mass flux Vertical integral of northward ozone flux Vertical integral of northward total energy flux Vertical integral of northward water vapour flux Vertical integral of ozone						

Table 56: Set of ERA-Interim parameters on surface – daily, synoptic monthly means (part 4/5)

European Centre for Medium-Range Weather Forecasts (ECMWF)							
Reanalysis ERA-Interim: daily, synoptic monthly means	Variables	Resolution	Time	Step	Period	Area	Availability
	Vertical integral of potential+internal energy	0.125° × 0.125°	00 UTC, 06 UTC, 12 UTC, 18 UTC	0, 3, 6, 9, 12	from 1979 to current date	global	data available to public, but need to login before retrieving data (grib or netCDF format) ERA-Interim daily ERA-Interim synoptic monthly means
	Vertical integral of potential+internal+latent energy						
	Vertical integral of temperature						
	Vertical integral of thermal energy						
	Vertical integral of total energy						
	Vertical integral of water vapour						
	Volumetric soil water layer 1						
	Volumetric soil water layer 2						
	Volumetric soil water layer 3						
	Volumetric soil water layer 4						

Table 57: Set of ERA-Interim parameters on surface – daily, synoptic monthly means (part 5/5)

European Centre for Medium-Range Weather Forecasts (ECMWF)					
	Variables	Resolution	Period	Area	Availability
Reanalysis ERA-Interim: monthly means of daily means	2 metre dewpoint temperature	0.125° × 0.125°	from 1979 to current date	global	data available to public, but need to login before retrieving data (grib or netCDF format)
	2 metre temperature				
	10 metre U wind component				
	10 metre V wind component				
	10 metre wind speed				
	Albedo				
	Boundary layer height				
	Charnock				
	Convective available potential energy				
	Forecast albedo				
	Forecast logarithm of surface roughness for heat				
	Forecast surface roughness				
	High cloud cover				
	Ice temperature layer 1				
	Ice temperature layer 2				
	Ice temperature layer 3				
	Ice temperature layer 4				
	Instantaneous eastward turbulent surface stress				
	Instantaneous moisture flux				
	Instantaneous northward turbulent surface stress				
	Instantaneous surface sensible heat flux				
	Logarithm of surface roughness length for heat				
	Low cloud cover				
	Mean sea level pressure				
	Medium cloud cover				
	Sea surface temperature				
	Sea-ice cover				
	Skin reservoir content				
	Skin temperature				
	Snow albedo				
	Snow density				
	Snow depth				

Table 58: Set of ERA-Interim parameters on surface – monthly means of daily means (part 1/3)

European Centre for Medium-Range Weather Forecasts (ECMWF)				
Variables	Resolution	Period	Area	Availability
Reanalysis ERA-Interim: monthly means of daily means	0.125° × 0.125°	from 1979 to current date	global	data available to public, but need to login before retrieving data (grib or netCDF format)
Soil temperature level 1				
Soil temperature level 2				
Soil temperature level 3				
Soil temperature level 4				
Surface pressure				
Surface roughness				
Temperature of snow layer				
Total cloud cover				
Total column ice water				
Total column liquid water				
Total column ozone				
Total column water				
Total column water vapour				
Vertical integral of cloud frozen water				
Vertical integral of cloud liquid water				
Vertical integral of divergence of cloud frozen water flux				
Vertical integral of divergence of cloud liquid water flux				
Vertical integral of divergence of geopotential flux				
Vertical integral of divergence of kinetic energy flux				
Vertical integral of divergence of mass flux				
Vertical integral of divergence of moisture flux				
Vertical integral of divergence of ozone flux				
Vertical integral of divergence of thermal energy flux				
Vertical integral of divergence of total energy flux				

Table 59: Set of ERA-Interim parameters on surface – monthly means of daily means (part 2/3)

European Centre for Medium-Range Weather Forecasts (ECMWF)				
Variables	Resolution	Period	Area	Availability
Reanalysis ERA-Interim: monthly means of daily means				
Vertical integral of eastward cloud frozen water flux	0.125° × 0.125°	from 1979 to current date	global	data available to public, but need to login before retrieving data (grib or netCDF format)
Vertical integral of eastward cloud liquid water flux				
Vertical integral of eastward geopotential flux				
Vertical integral of eastward heat flux				
Vertical integral of eastward kinetic energy flux				
Vertical integral of eastward mass flux				
Vertical integral of eastward ozone flux				
Vertical integral of eastward total energy flux				
Vertical integral of eastward water vapour flux				
Vertical integral of energy conversion				
Vertical integral of kinetic energy				
Vertical integral of mass of atmosphere				
Vertical integral of mass tendency				
Vertical integral of northward cloud frozen water flux				
Vertical integral of northward cloud liquid water flux				
Vertical integral of northward geopotential flux				
Vertical integral of northward heat flux				
Vertical integral of northward kinetic energy flux				
Vertical integral of northward mass flux				
Vertical integral of northward ozone flux				
Vertical integral of northward total energy flux				
Vertical integral of northward water vapour flux				
Vertical integral of ozone				
Vertical integral of potential+internal energy				
Vertical integral of potential+internal+latent energy				
Vertical integral of temperature				
Vertical integral of thermal energy				
Vertical integral of total energy				
Vertical integral of water vapour				
Volumetric soil water layer 1				
Volumetric soil water layer 2				
Volumetric soil water layer 3				
Volumetric soil water layer 4				

Table 60: Set of ERA-Interim parameters on surface – monthly means of daily means (part 3/3)

European Centre for Medium-Range Weather Forecasts (ECMWF)						
Reanalysis ERA-Interim: monthly means of daily forecast accumulations	Variables	Resolution	Step	Period	Area	Availability
	Boundary layer dissipation	0.125° × 0.125°	0-12, 12-24, 24-36	1979 to 2015	global	data available to public, but need to login before retrieving data (grib or netCDF format)
	Clear sky surface photosynthetically active radiation					
	Convective precipitation					
	Convective snowfall					
	Downward UV radiation at the surface					
	Eastward gravity wave surface stress					
	Eastward turbulent surface stress					
	Evaporation					
	Gravity wave dissipation					
	Large-scale precipitation					
	Large-scale precipitation fraction					
	Large-scale snowfall					
	Magnitude of turbulent surface stress					
	Northward gravity wave surface stress					
	Northward turbulent surface stress					
	Photosynthetically active radiation at the surface					
	Runoff					
	Snow evaporation					
	Snowfall					
	Snowmelt					
	Sunshine duration					
	Surface latent heat flux					
	Surface net solar radiation					
	Surface net solar radiation, clear sky					
	Surface net thermal radiation					
	Surface net thermal radiation, clear sky					
	Surface sensible heat flux					
	Surface solar radiation downwards					
	Surface thermal radiation downwards					
	TOA incident solar radiation					
	Top net solar radiation					
	Top net solar radiation, clear sky					
	Top net thermal radiation					
	Top net thermal radiation, clear sky					
	Total precipitation					

Table 61: Set of ERA-Interim parameters – monthly means of daily forecast accumulations

European Centre for Medium-Range Weather Forecasts (ECMWF)						
Variables	Resolution	Time	Level	Period	Area	Availability
Reanalysis ERA-Interim: daily Divergence Fraction of cloud cover Geopotential Logarithm of surface pressure Ozone mass mixing ratio Specific cloud ice water content Specific cloud liquid water content Specific humidity Temperature U component of wind V component of wind Vertical velocity Vorticity (relative)	0.125° × 0.125°	00 UTC, 06 UTC, 12 UTC, 18 UTC	60 vertical levels	from 1979 to current date	global	data available to public, but need to login before retrieving data (grib or netCDF format)

Table 62: Set of ERA-Interim parameters at different atmospheric models level - daily

European Centre for Medium-Range Weather Forecasts (ECMWF)						
Variables	Resolution	Time	Level	Period	Area	Availability
Reanalysis ERA-Interim: daily Divergence Fraction of cloud cover Geopotential Ozone mass mixing ratio Potential vorticity Relative humidity Specific cloud ice water content Specific cloud liquid water content Specific humidity Temperature U component of wind V component of wind Vertical velocity Vorticity (relative)	0.125° × 0.125°	00 UTC, 06 UTC, 12 UTC, 18 UTC	from 1000 hPa to 1 hPa	from 1979 to current date	global	data available to public, but need to login before retrieving data (grib or netCDF format)

Table 63: Set of ERA-Interim parameters at different pressure level - daily

	European Centre for Medium-Range Weather Forecasts (ECMWF)						
	Variables	Resolution	Time	Level	Period	Area	Availability
Reanalysis ERA-Interim: Potential temperature daily, synoptic monthly means	Divergence	0.125° × 0.125°	00 UTC, 06 UTC, 12 UTC, 18 UTC	850 hPa, 700 hPa,	from 1979 to current date	global	data available to public, but need to login before retrieving data (grib or netCDF format)
	Montgomery potential			600 hPa, 530 hPa,			
	Ozone mass mixing ratio			475 hPa, 430 hPa,			
	Potential vorticity			395 hPa, 370 hPa,			
	Pressure			350 hPa, 330 hPa,			
	Specific humidity			315 hPa, 300 hPa,			
	U component of wind			285 hPa, 275 hPa,			
	V component of wind			265 hPa			
	Vorticity (relative)						

Table 64: Set of ERA-Interim at the potential temperature level – daily and synoptic monthly means

	European Centre for Medium-Range Weather Forecasts (ECMWF)						
	Variables	Resolution	Time	Level	Period	Area	Availability
Reanalysis ERA-Interim: Potential vorticity daily, synoptic monthly means	Geopotential	0.125° × 0.125°	00 UTC, 06 UTC, 12 UTC, 18 UTC	2000	from 1979 to current date	global	data available to public, but need to login before retrieving data (grib or netCDF format)
	Ozone mass mixing ratio						
	Potential temperature						
	Pressure						
	Specific humidity						
	U component of wind						
	V component of wind						

Table 65: Set of ERA- Interim parameters at the potential vorticity level – daily and synoptic monthly means

	European Centre for Medium-Range Weather Forecasts (ECMWF)					
	Variables	Resolution	Time	Period	Area	Availability
Reanalysis ERA-Interim/LAND	Skin temperature	0.125° × 0.125°	00 UTC, 06 UTC, 12 UTC, 18 UTC	1979-2010	global	data available to public, but need to login before retrieving data (grib or netCDF format)
	Snow albedo					
	Snow density					
	Snow depth					
	Soil temperature level 1					
	Soil temperature level 2					
	Soil temperature level 3					
	Soil temperature level 4					
	Temperature of snow layer					
	Volumetric soil water layer 1					
	Volumetric soil water layer 2					
	Volumetric soil water layer 3					
	Volumetric soil water layer 4					

Table 66: Set of ERA-Interim/LAND parameters on surface

	European Centre for Medium-Range Weather Forecasts (ECMWF)					
	Variables	Resolution	Step	Period	Area	Availability
Forecast ERA-Interim/LAND	Evaporation	0.125° × 0.125°	3, 6, 9, 12, 18, 24	1979-2010	global	data available to public, but need to login before retrieving data (grib or netCDF format)
	Forecast albedo					
	Snowfall					
	Snowmelt					
	Sub-surface runoff					
	Surface latent heat flux					
	Surface net solar radiation					
	Surface net thermal radiation					
	Surface runoff					
	Surface sensible heat flux					
	Total precipitation					

Table 67: Set of ERA-Interim/LAND parameters type forecast

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH

National Center for Atmospheric Research NCEP/NCAR Global Reanalysis Products					
Variables	Resolution	Time	Period	Area	Availability
Air Temperature Cloud Amount/Frequency Dew Point Temperature Heat Flux Incoming Solar Radiation Outgoing Longwave Radiation Pressure Tendency Shortwave Radiation Streamfunctions Surface Winds Vegetation Species Wind Shear Albedo Cloud Base Pressure Evaporation Humidity Land Cover Potential Temperature Runoff Skin Temperature Surface Air Temperature	2.5° latitude x 2.5° longitude	6-hour average	from 1948 to current date	Global	Data available to public (need to register)

Table 68: NCEP/NCAR global reanalysis products. The variables are available in 17 levels pressures, 28 sigma levels and 11 isentropic level (part 1/2).

National Center for Atmospheric Research NCEP/NCAR Global Reanalysis Products					
Variables	Resolution	Time	Period	Area	Availability
Temperature Tendency Vertical Wind Motion Atmospheric Pressure Measurements Cloud Top Pressure Geopotential Height Hydrostatic Pressure Longwave Radiation Precipitable Water Sea Level Pressure Snow Water Equivalent Surface Pressure Tropopause Virtual Temperature Atmospheric Stability Convergence/Divergence Gravity Wave Ice Extent Maximum/Minimum Temperature Precipitation Rate Sea Surface Temperature Soil Moisture/Water Content Surface Roughness Upper Level Winds Vorticity	2.5° latitude x 2.5° longitude	6-hour average	from 1948 to current date	Global	Data available to public (need to register)

Table 69: NCEP/NCAR global reanalysis products. The variables are available in 17 levels pressures, 28 sigma levels and 11 isentropic level (part 2/2)

TCC - CLIMATVIEW

ClimatView			
Variables	Period	Area	Availability
monthly mean temperature monthly maximum temperature monthly minimum temperature mean temperature anomaly precipitation precipitation ratio	from 1982 to current date	global	graphical products and digital data available to public
climatological normal for monthly mean temperature climatological normal for monthly mean precipitation	1981-2010 (climatological period)		

Table 70: Station data available through the ClimatView

WMO WORLD WEATHER INFORMATION SERVICE

WMO World Weather Information Service			
Variables	Climatological Period	Area	Availability
monthly mean precipitation monthly maximum temperature monthly minimum temperature	1971-2010	global	graphical products available to public

Table 71: *Climatological data for a station in the World Weather Information Service website*

WMO WORLD DATA CENTRE – WORLD OZONE AND ULTRAVIOLET RADIATION DATA CENTRE

World Ozone and Ultraviolet Radiation Data Centre (WOUDC)				
	Variables	Period	Area	Availability
Total column ozone	Total ozone – daily observations Total ozone – hourly observations	from 1924 to current date	global	digital data and graphical products available to public (csv and ASCII format)
Vertical ozone profile	Lidar OzoneSonde UmkehrN14 (level 1.0) UmkehrN14 (level 2.0)			
UV irradiance	Broadband Multiband Spectral UV index			

Table 72: Data on a station provided by the WOUDC

World Ozone and Ultraviolet Radiation Data Centre (WOUDC)	
Variables	Availability
ozonesonde plots total ozone plot UV index plot most recent global total ozone maps ozone maps recent ozone maps individual data sources and ozone forecast maps	graphical products available to public

Table 73: Special output data products are prepared by the WOUDC, the period is highly variable, depending on the station of interest

WMO WORLD DATA CENTRE – WORLD RADIATION DATA CENTRE

World Radiation Data Centre (WRDC)			
Variables	Period	Area	Availability
monthly sums and mean sunshine duration daily sum, monthly sums and mean diffuse radiation daily sum, monthly sums and mean global radiation	~ 1964-2014	global	data available to public

Table 74: *Dataset from WRDC*

WMO WORLD DATA CENTRE – WORLD DATA CENTRE FOR GREENHOUSE GASES

World Data Centre for Greenhouse Gases (WDCGG)			
Variables	Period	Area	Availability
1,1,1,2-tetrafluoroethane 1,1-difluoroethane trichlorofluoromethane dichlorodifluoromethane chlorotrifluoromethane chlorodifluoromethane 1,1-dichloro-1-fluoroethane 1-chloro-1,1-difluoroethane	highly variable (recent past)	for each WMO country/territory	data available to public (csv format)

Table 75: WDCGG parameters for hydrofluorocarbons, chlorofluorocarbons and hydrochlorofluorocarbons

World Data Centre for Greenhouse Gases (WDCGG)			
Variables	Period	Area	Availability
carbon dioxide	highly variable (recent past)	for each WMO country/territory	data available to public (csv format)
methane			
nitrous oxide			
sulfur hexafluoride			
bromotrifluoromethane			
bromochlorodifluoromethane			
tetrachloromethane			
bromomethane			
1,1,1-trichloroethane			
tetrachloroethene			
dibromomethane			
trichloromethane			
iodomethane			
dichloromethane			
chloromethane			
ozone			
carbon monoxide			
sulfur dioxide			
hydrogen peroxide			
hydrogen			
nitrogen monoxide			
nitrogen dioxide			
nitrogen oxides			
total reactive nitrogen			
organic peroxides			
peroxyacyl nitrate(PAN)			
total inorganic carbon (TIC)			
stable carbon isotopes (CO ₂)			
stable carbon isotopes (CH ₄)			
stable oxygen isotopes (CO ₂)			
radon-222			
krypton-85			

Table 76: WDCGG parameters

World Data Centre for Greenhouse Gases (WDCGG)			
Variables	Period	Area	Availability
ethane*	highly variable (recent past)	for each WMO country/territory	data available to public (csv format)
ethene			
propane*			
propene			
2-methylpropane*			
butane*			
acetylene*			
trans-2-butene			
1-butene			
2-methylpropene			
cis-2-butene			
2-methylbutane*			
pentane*			
propyne			
1,3-butadiene			
trans-2-pentene			
cis-2-pentene			
cyclohexane			
2-methylpentane			
3-methylpentane			
hexane			
2-methyl-1,3-butadiene*			
heptane			

Table 77: WDCGG parameters for Volatile Organic Compounds (VOCs) (part 1/2)

World Data Centre for Greenhouse Gases (WDCGG)			
Variables	Period	Area	Availability
benzene*	highly variable (recent past)	for each WMO country/territory	data available to public (csv format)
toluene*			
ethylbenzene			
o-xylene			
m-xylene			
p-xylene			
1,3,5-trimethylbenzene			
1,2,4-trimethylbenzene			
terpenes*			
dimethyl sulfide*(DMS)			
formaldehyde*			
acetonitrile*			
methanol*			
ethanol*			
acetone*			
acetaldehyde			

Table 78: WDCGG parameters for Volatile Organic Compounds (VOCs) (part 2/2)

WMO WORLD DATA CENTRE – WORLD DATA CENTRE FOR REMOTE SENSING OF THE ATMOSPHERE

World Data Centre for Remote Sensing of the Atmosphere (WDC-RSAT)				
	Variables	Period	Area	Availability
Ozone	Daily Vertical Column (near real time) foot prints			
	Assimilated Daily Vertical Column (forecast / near real time) maps			
	Daily 4DVAR Analysis at 20 km (SACADA-17)			
	Daily 4DVAR Analysis at 20 km altitude (SACADA-28)			
	Total Ozone Column (Nadir)			
	Ozone VMR (Limb)			
	Daily Vertical Column (near-real time)			
	GDP 4.0 Total Ozone Record (1995-2005)			
	GDP 4.0 Total Ozone Monthly Means and Statistics (1995-2005)			
	Level 2 Profiles (NNORSY)			
Nitrogen compounds	Daily Vertical Column (near-real time)			
	Daily 3-D Stratospheric Distributions (Global Analysis)			
	Vertical Profiles			
	NO ₂ Daily Vertical Column (near real time)			
	tropNO ₂ Tropospheric Vertical Column			
	tropNO ₂ Daily forecast of ground-level NO2 concentrations up to 72 hours for all of Europe			
	Daily Vertical Column			
	Total NO2 column (Nadir)			
	NO ₂ NO2 (Limb)			
	Vertical Profiles			
	N ₂ O Vertical Profiles			
	N ₂ O ₅ Vertical Profiles			

[data](#) available to public, but need to login to a WDC account

Table 79: Trace gases parameters from WDC-RSAT (part 1/2)

World Data Centre for Remote Sensing of the Atmosphere (WDC-RSAT)					
	Variables	Period	Area	Availability	
Nitrogen compounds	HNO ₃	Daily 4DVAR Analysis at 20 km (SACADA-17) Daily 4DVAR Analysis at 20 km (SACADA-20) Daily 4DVAR Analysis at 20 km altitude (SACADA-28)	global	data available to public, but need to login to a WDC account	
	ClO	Daily 4DVAR Analysis at 20 km (SACADA-17) Daily 4DVAR Analysis at 20 km (SACADA-20) Daily 4DVAR Analysis at 20 km altitude (SACADA-28)			
Chlorine compounds	ClONO ₂	Daily 4DVAR Analysis at 20 km (SACADA-17) Daily 4DVAR Analysis at 20 km (SACADA-20) Daily 4DVAR Analysis at 20 km altitude (SACADA-28)			
	HCl	Daily 4DVAR Analysis at 20 km (SACADA-17) Daily 4DVAR Analysis at 20 km (SACADA-20) Daily 4DVAR Analysis at 20 km altitude (SACADA-28)			
Sulphur compounds	SO ₂	Daily Vertical Column (near real time) Vertical Column Densities			
Hydrogen compounds	H ₂ O	Daily total water vapour column over Europe and Africa Temperature and Dewpoint Temperature Profiles Total Water Vapor Content 3D Stratospheric Distribution (Vertical Profiles)			
Carbon-containing compounds	CH ₄	Daily 4DVAR Analysis at 20 km (SACADA-17) Daily 4DVAR Analysis at 20 km (SACADA-20) Column averaged mixing ratio (XCH ₄) Vertical Profiles Daily 4DVAR Analysis at 20 km altitude (SACADA-28)			
	CO ₂	Column averaged mixing ratio (XCO ₂)			
	CO	Vertical Column			
	CFC-11	Vertical Profile			

Table 80: Trace gases parameters from WDC-RSAT (part 2/2)

World Data Centre for Remote Sensing of the Atmosphere (WDC-RSAT)

Parameters	Aerosol Instrument / Algorithm	Period	Area	Availability
AOD, Ångström coefficient, Fine mode ratio (over ocean)	MODIS Dark Target collection 6	2002 -	global	data available to public, but need to login
AOD, Ångström coefficient, SSA	MODIS Deep Blue collection 6	2000 -	global	
AOD	VIIRS Aerosol	2013 -	global	
AOD, Ångström coefficient, SSA (land), fine mode fraction (ocean)	SEAWIFS Deep Blue version 4	1997 - 2010	global	
AOD	MERIS Bremen AErosol Retrieval (BAER)	2005 - 2006	Germany, Maroco	
AOD, Ångström coefficient, aerosol mixtures	ATSR Aerosol_cci ADV	1995 - 2012	global	
AOD, Ångström coefficient, effective radius and other aerosol properties	ATSR Aerosol_cci ORAC	1995 - 2012	global	
AOD, Ångström coefficient, aerosol mixtures	ATSR Aerosol_cci SU	1995 - 2012	global	
AOD, Ångström coefficient	GlobAerosol	1995 - 2008	global	
AOD 3-to-5 size bins, fraction non-spherical, qualitative SSA	MISR Level 2 and Level 3 Aerosol Products	2000 -	global	
Plume Top Height	MISR Plume Height Climatology Product	2000 -	global	
AOD (over ocean 2 modes and size, over land only fine mode AOD)	PARASOL Aerosol	2005 - 2013	global	
AOD (spectral), SSA (spectral), fraction of spherical particles, aerosol fraction	PARASOL GRASP	2008	Africa, further selected regions	
AOD	AVHRR AOD	1988 -	global oceans	
AOD	Global Aerosol Climatology Project (GACP)	1983 - 2009	global oceans	
AOD	European AVHRR	1989 - 2009	Central Europe	
AOD	Alpine MSG	NRT	Alpine Europe	
AOD	GASP	NRT	US domain	

Table 81: Satellite aerosols products from WDC-RSAT (part 1/2)

World Data Centre for Remote Sensing of the Atmosphere (WDC-RSAT)				
Parameters	Aerosol Instrument / Algorithm	Period	Area	Availability
AOD Type PM	SYNAER	2003 - 2012	Europe, Africa, Atlantic	data available to public, but need to login
AOD	PMap	2014 -	global oceans	
AOD AAOD, SSA AI	OMAERUV	2004 -	global	
AOD AAI Type	OMAERO	2004 -	global	
AAI	GOME & SCIAMACHY Absorbing Aerosol Index	1995 -	global	
AAI	Absorbing Aerosol Index	1978 -	global	
AOD Dust Height	AIRS Aerosol Climatology	2003 - 2011	global	
AOD Extinction Profile, aerosol type	CALIPSO Level 2 Aerosol	2006 -	global	
Dust AOD	IASI / DLR Dust Retrieval	2009	global dust belt	
Extinction profile, AOD (stratosphere)	GOMOS stratosphere	2008	global	
Extinction profile (stratosphere)	OSIRIS stratosphere	2002 - 2014	global	

Table 82: Satellite aerosols products from WDC-RSAT (part 2/2)

World Data Centre for Remote Sensing of the Atmosphere (WDC-RSAT)		
Parameters	Area	Availability
Daily cloud top height from GOME-2 Daily cloud top albedo (ROCINN) from GOME-2 Daily cloud fraction (OCRA) from GOME-2 Daily NRT cloud physical parameters from AVHRR Cloud physical parameters over Europe and Africa from SEVIRI	global	data available to public, but need to login to WDC account

Table 83: Clouds parameters from WDC-RSAT

World Data Centre for Remote Sensing of the Atmosphere (WDC-RSAT)				
	Parameters	Period	Area	Availability
Sunburn time	Sunburn times at any location by the UV-Check Service via Web or SMS (German only)			data available to public, but need to be registered
UV index	Daily UV index – information and forecast maps			
Solar energy	SOLEMI data base for long-term global and direct irradiance McClea time series for irradiation under clear skies	from 2004 to current date	-	
	MACC-RAD service for irradiation time series		-66° to 66° in both latitudes and longitudes	

Table 84: Solar radiation parameters from WDC-RSAT

World Data Centre for Remote Sensing of the Atmosphere (WDC-RSAT)				
Parameters	Resolution	Period	Area	Availability
Digital GIS map of annual sums, long-term average and bio-energy variability and digital map (jpeg) for agriculture, forest and grassland	1 km	from 2000 to current date	Europe, Northern Africa, Central Asia, further areas on request	maps accessible via email request

Table 85: Annual bio-energy maps from WDC-RSAT

World Data Centre for Remote Sensing of the Atmosphere (WDC-RSAT)

Parameters	Resolution	Period	Area	Availability
Daily NRT SST Weekly mean SST Monthly mean SST Weekly Mean Multi-channel SST Monthly mean Multi-channel SST Time series data of SST	1.1 km		Western Atlantic, Mediterranean Sea, Madeira area	
Daily NRT Land Surface Temperature Weekly mean Land Surface Temperature Time series data of Land Surface Temperature			Europe	
Daily NRT NDVI Weekly mean NDVI Monthly mean NDVI Time series data of NDVI			European continent	
Leaf Area Index	1 km	1997-2012	global	
Daily Net Primary Productivity Fluxes Annual Net Primary Productivity Fluxes Annual Net Primary Productivity Sum Landcover and estimated fractional cover		2000-2007 and 2010	Europe and North Africa	
Daily Gross Primary Productivity Fluxes Annual Gross Primary Productivity Fluxes Annual Gross Primary Productivity Sum				
Land Cover Classification				
Daily cumulative snow cover from SEVIRI			Germany	
	300 m		Europe	
	3 km nadir, 5-6 km in Europe			

Table 86: Surface parameters from WDC-RSAT

World Data Centre for Remote Sensing of the Atmosphere (WDC-RSAT)				
Parameters	Resolution	Period	Area	Availability
Daily Dynamic Activity Index	1.0° x 1.25°	2014-2016	Northern and Southern Hemisphere	map available to public

Table 87: *Dynamic Activity Index from WDC-RSAT*

World Data Centre for Remote Sensing of the Atmosphere (WDC-RSAT)	
Parameters	Availability Period
UV and VIS spectra of atmospheric constituents	available on a CD-ROM (ASCII file)
Fourier Transform Spectroscopy at DLR (molecule: ClOCl, ClONO ₂ , N ₂ O ₅ , O ₃ , H ₂ O)	data available to public, but need to login to WDC account
Optical Properties of Aerosols and Clouds (OPAC)	data available to public
Global Aerosol Data Set (GADS)	
Molecular Line Parameter Databases	

Table 88: *Spectroscopy data from WDC-RSAT*

INTERNATIONAL RESEARCH INSTITUTE FOR CLIMATE AND SOCIETY

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room			
Variable	Period	Area	Availability
Monthly Geopotential Height Anomaly at 250 hPa Monthly Geopotential Height Anomaly at 500 hPa Monthly Geopotential Height Anomaly at 925 hPa Monthly Standardized Geopotential Height Anomaly Monthly Standardized Streamfunction Anomaly Monthly Standardized Velocity Potential Anomaly Monthly Streamfunction Anomaly at 250 hPa Monthly Streamfunction Anomaly at 500 hPa Monthly Streamfunction Anomaly at 925 hPa Monthly Velocity Potential Anomaly	1981-2010	global	data and graphical products available to public
Quasi-biennial Oscillation	past ten years		
Monthly Sea Level Pressure Monthly Sea Level Pressure Anomaly	from 1949 to current date		
Monthly Sea Level Pressure Standardized Anomaly Monthly Tropical Wind Anomalies: African sector Monthly Tropical Wind Anomalies: Indian Ocean Sector Monthly Tropical Wind Anomalies: Pacific Ocean Sector Monthly Vector Wind Anomaly	1981-2010	Africa Indian Ocean Pacific Ocean	
Monthly SST Anomaly Change and Previous Month's Wind Anomaly Monthly SST, Vector Wind, and Wind Speed Monthly SST, Vector Wind, and Wind Speed Anomalies	1971-2000 from 1981 to current date 1971-2000	global	

Table 89: IRI Climate and Society Map Room – Daily pentad, monthly and seasonal measures of atmospheric circulation (part 1/2)

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room			
Variable	Period	Area	Availability
90-day animation of thirty-day average geopotential height anomaly at 250 hPa 90-day animation of thirty-day average geopotential height anomaly at 500 hPa 90-day animation of thirty-day average geopotential height anomaly at 925 hPa 90-day animation of thirty-day average standardized geopotential height anomaly at 250 hPa 90-day animation of thirty-day average standardized geopotential height anomaly at 500 hPa 90-day animation of thirty-day average standardized geopotential height anomaly at 925 hPa thirty-day average geopotential height anomaly at 250 hPa thirty-day average geopotential height anomaly at 500 hPa thirty-day average geopotential height anomaly at 925 hPa thirty-day average standardized geopotential height anomaly at 250 hPa thirty-day average standardized geopotential height anomaly at 500 hPa thirty-day average standardized geopotential height anomaly at 925 hPa Pentad-average geopotential height and anomaly loop at the 250 hPa	1981-2010	global	data and graphical products available to public
Seasonal Geopotential Height Anomaly at 250 hPa Seasonal Geopotential Height Anomaly at 500 hPa Seasonal Geopotential Height Anomaly at 925 hPa Seasonal Standardized Geopotential Height Anomaly Seasonal Standardized Streamfunction Anomaly Seasonal Standardized Velocity Potential Anomaly Seasonal Streamfunction Anomaly at 250 hPa Seasonal Streamfunction Anomaly at 500 hPa Seasonal Streamfunction Anomaly at 925 hPa Seasonal Velocity Potential Anomaly	from 1949 to current date (climatology 1981-2010)		

Table 90: IRI Climate and Society Map Room – Daily pentad, monthly and seasonal measures of atmospheric circulation (part 2/2)

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room				
Variable	Resolution	Period	Area	Availability
Monthly gridded surface air temperature anomalies	2° latitude x 2° longitude	from 1950 to current date (climatology 1971-2000)	global	data and graphical products available to public
Difference in CAMS monthly gridded surface temperature anomaly from the previous month		from 1950 to current date		
Monthly CAMS Station Surface Air Temperature Anomaly	-	from 1842 to 2013 (climatology 1971-2000)		
Monthly CAMS Station Surface Air Temperature Percentile				
Monthly Surface Air Temperature Percentile below the 20th percentile and above the 80th percentile	0.5° latitude x 0.5° longitude	from 1948 to current date (climatology 1981-2010)		
Monthly Surface Air Temperature Persistence		from 2000 to current date (climatology 1981-2010)		
Standardized difference in CAMS monthly gridded surface air temperature anomaly from the previous month	2° latitude x 2° longitude	from 1950 to current date		
30-day animation of daily 925 hPa temperature anomalies				
90-day animation of the thirty-day running average 925 hPa standardized temperature anomalies	2.5° latitude x 2.5° longitude	climatology 1981-2010		
90-day animation of the thirty-day running average 925 hPa temperature anomaly				
Pentad (5-day average) 925 hPa temperature anomaly		from 2000 to current date (climatology 1981-2010)		
CAMS seasonal (3-month average) gridded surface air temperature anomalies	2° latitude x 2° longitude	from 1950 to current date (climatology 1971-2000)		

Table 91: IRI Climate and Society Map Room – Daily, pentad, monthly and seasonal measures of atmospheric temperature. The data are from the NOAA Climate Prediction Center's Climate Anomaly Monitoring System (CAMS) station temperature dataset.

	International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room				
Data Source	Variable	Resolution	Climatological Period	Area	Availability
CRU TS2.1 data sets	Monthly Climatological Precipitation Frequency	0.5° latitude x 0.5° longitude	1971-2000	global	data and graphical products available to public
CAMS_OPI, NCEP, CPC	Month-to-month change in monthly climatological precipitation	2.5° latitude x 2.5° longitude	1981-2010		
CPC Merged Analysis of Precipitation (CMAP) version 2 (using rain gauge and satellite estimates)	Seasonal Fraction of Annual Precipitation				
CAMS_OPI, NCEP, CPC	Monthly Climatological Precipitation				
NCEP	Monthly Climatological Sea Surface Temperature	1° latitude x 1° longitude	1971-2000		
CRU TS2.1 data sets	Monthly Climatological Surface Air Temperature	0.5° latitude x 0.5° longitude			
NCEP-NCAR reanalysis	Monthly Wind Climatology (10 to 1000 hPa)	2.5° latitude x 2.5° longitude			
Select a point climatology (CRU TS2.1 data sets)	Monthly average precipitation Monthly average temperature Wet-day frequency (number of day/month with precipitation) Ground-frost frequency (number of days/months with minimum temperature < 0°C)	0.5° latitude x 0.5° longitude	1971-2000	global	data and graphical products available to public

Table 92: IRI Climate and Society Map Room – Monthly or seasonal climatology for temperature, precipitation and wind

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room					
Data source	Variable	Resolution	Period	Area	Availability
real-time CPC-Unified daily precipitation	monthly Standardized Precipitation Index (SPI) accumulation period (3, 6, 9, or 12-month)	0.5° latitude x 0.5° longitude	from 1979 to current date	United states and Mexico	graphical products and data available to public
US National Climatic Data Centre	monthly Standardized Precipitation Index (SPI) accumulation period (3, 6, 9, or 12-month)	-	from 1895 to current date	United states	

Table 93: US-Mexico Drought Analysis Tool and US Climate Divisions Drought Analysis Tool

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room			
Variables	Period	Area	Availability
monthly nitrate monthly temperature monthly salinity monthly oxygen monthly phosphate monthly silicate monthly chlorophyll monthly pH monthly dissolved inorganic carbon monthly nitrite monthly nitrate-nitrite	?	global	graphical products available to public

Table 94: Ocean chemistry (it seems that it is not functional)

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room					
Variable	Resolution	Climatological Period	Period	Area	Availability
Month of Maximum Climatological Monthly Sea Surface Temperature	1° latitude x 1° longitude	1971-2000	-	global	graphical products and data available to public
Month of Minimum Climatological Monthly Sea Surface Temperature		1971-2000	from 1981 to current date		
Annual Range of Climatological Monthly Sea Surface Temperature	2° latitude x 2° longitude	1981-2010	from 1950 to current date		
Change in Sea Surface Temperature Anomaly from Previous Month		-	from 1981 to current date		
Monthly Sea Surface Temperature Anomaly	1° latitude x 1° longitude	1971-2000	from 1981 to current date		
Monthly Extended Reconstructed Sea Surface Temperature (ERSST) Anomaly		1981-2010	from 1950 to current date		
Monthly Sea Surface Temperature	5° latitude x 5° longitude	1951-1980	from 1950 to current date		
Three-Month Standardized Monthly SST Anomaly Persistence		1971-2000	from 1981 to current date		
Six-Month Standardized Monthly SST Anomaly Persistence	1° latitude x 1° longitude	1971-2000	from 1981 to current date		
Monthly Standardized Sea Surface Temperature Anomaly		-	from 1981 to current date		
Standardized Change in Sea Surface Temperature Anomaly from Previous Month	2° latitude x 2° longitude	1981-2010	-	Northern Hemisphere and Southern Hemisphere extratropical oceans	
Weekly Sea Surface Temperature Anomaly		1981-2010	-	global oceans, the NINO3.4 region, and the extratropical oceans	
Weekly Sea Surface Temperature	1° latitude x 1° longitude	1971-2000	from 1981 to current date	global tropics, the NINO3.4 region, and tropical ocean areas excluding the eastern Pacific Ocean	
Time Series of Extratropical Standardized Sea Surface Temperature Anomalies		1971-2000	from 1981 to current date	global	
Time Series of Global, Extratropical, and Niño3.4 Standardized Sea Surface Temperature Anomalies	1° latitude x 1° longitude	1971-2000	from 1981 to current date	global	
Time Series of Tropical and Niño3.4 Standardized Sea Surface Temperature Anomalies		1971-2000	from 1981 to current date	global	
Seasonal Sea Surface Temperature Anomaly	1° latitude x 1° longitude	1971-2000	from 1981 to current date	global	
Seasonal Standardized Sea Surface Temperature Anomaly		1971-2000	from 1981 to current date	global	

Table 95: Ocean temperature – monthly, weekly and seasonal

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room					
Variables	Resolution	Climatological Period	Period	Area	Availability
Monthly Precipitation Anomaly	2.5° latitude x 2.5° longitude	-	from 1979 to current date	global	graphical products and data available to public
Monthly Average OLR		1974-present	from 1974 to current date		
Monthly OLR Anomaly					
Monthly CAMS Station Precipitation Anomaly	-	1981-2010	from 1842 to 2013		
Monthly CAMS Station Precipitation Percentile					
Monthly CAMS Station Percent of Median Precipitation					
Monthly Precipitation Percentile	2.5° latitude x 2.5° longitude	1981-2010	from 1979 to current date		
Monthly Precipitation Persistence					
Monthly Weighted Anomaly Standardized Precipitation Indices		1974-present	from 1979 to 2014		
Pentad OLR Anomaly		-			
Standardized Precipitation Index		1979-2000	from 1979 to current date		
Seasonal Precipitation Anomaly		-	from 1979 to current date		
Seasonal-Average OLR		1974-present			
Seasonal OLR Anomaly		1981-2010	from 1974 to current date		
Seasonal Weighted Anomaly Standardized Precipitation Indices					

Table 96: *Monthly to seasonal precipitation*

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room					
Variables	Time scale	Variability	Period	Area	Availability
precipitation temperature	trends, decadal, interannual	percent of variance explained, standard deviation	20 th century	global	graphical products and data available to public

Table 97: *Approximate decomposition by time scale (trends, decadal, interannual) of 20th century precipitation and temperature variations*

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room					
Variables	Products	Resolution	Period	Area	Availability
GHCN Precipitation	seasonal average precipitation, its interannual variability, decadal variability, and trend for the nearest available station	2.5° latitude x 3.75° longitude	from 1901 to 2000	global	graphical products and data (gridded and stations) available to public
GHCN Temperature		5° latitude x 5° longitude			

Table 98: World Bank Climate Variability Tool (collaboration between the World Bank and IRI)- This tool allows a user to investigate the historical variability of precipitation and temperature at various time scales (interannual, decadal, and long-term linear trend) over the 20th century near a user-selected location.

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room				
Variables	Resolution	Climatological period	Area	Availability
monthly precipitation	2.5° latitude x 2.5° longitude	1985-2010	global	graphical products available to public

Table 99: CPC Merged Analysis of precipitation monthly climatology

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room				
Variables	Resolution	Period	Area	Availability
Century/decade/year-to-year precipitation	0.5° latitude x 0.5° longitude	1901-2009	global	graphical products available to public
Century/decade/year-to-year temperature				

Table 100: Century-long, decade-long and year-to-year shifts. The map show how wet and dry periods have varied over time (from year to year, decade to decade, and over the past century)

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room					
Variables	Resolution	Period	Climatological period	Area	Availability
Historical Probability of Seasonal Average Temperature Tercile Conditioned on ENSO (maximum, mean and minimum temperature) Historical Tercile Probability of the Seasonal Frequency of Daily Temperature Conditioned on ENSO			1979-2011	South Asia	graphical products and data available to public

Table 101: Historical climate information describing historical daily precipitation and temperature characteristics variability and their relationship with ENSO

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room				
Variables	Resolution	Climatological period	Area	Availability
Monthly climatological reference evapotranspiration animation	0.5° latitude x 0.5° longitude	1961-1990	Africa	Graphical products and data available to public
Monthly climatological precipitation animation		1971-2000		
Monthly climatological temperature animation		1982-2004		
Monthly climatological NDVI animation				

Table 102: Food and Agriculture Organization of the United Nations - Farming Systems: Sub-Saharan Africa

IRI – ENHANCING NATIONAL CLIMATE SERVICES INITIATIVE

Enhancing National Climate Services Initiative (ENACTS)			
Variables	Period	Area	Availability
rainfall amount cumulative anomalies rainfall anomalies SPI	1983-2015	Ethiopia, Ghana, Madagascar, Mali, Rwanda, Tanzania, Zambia	graphical products available to public

Table 103: Most recent decadal (approximately 10-day) rainfall amount over a country

Enhancing National Climate Services Initiative (ENACTS)			
Variables	Period	Area	Availability
daily/monthly/dekadal rainfall	1983-2014	Ethiopia, Ghana, Madagascar, Mali, Rwanda, Tanzania, Zambia	graphical products available to public
daily/monthly/dekadal minimum and maximum temperature	1961-2014		

Table 104: Climate analysis from ENACTS. Rainfall and temperature time series reconstructed from station observations and remote sensing proxies. This interface allows users to view rainfall, maximum and minimum temperature climatologies and anomalies. Rainfall climatology is defined over the period 1983-2012 whereas temperature ones over the period 1981-2010.

Enhancing National Climate Services Initiative (ENACTS)				
Variables	Period	Climatological Period	Area	Availability
probability of monthly averages rainfall tercile conditioned on ENSO probability of monthly averages temperature tercile conditioned on ENSO probability of monthly averages rainfall tercile conditioned on IOD probability of monthly averages temperature tercile conditioned on IOD	Season	1983-2014	Ethiopia, Ghana, Madagascar, Mali, Rwanda, Tanzania, Zambia	graphical products available to public

Table 105: Historical probability (given in percentile) of average monthly rainfall or temperature falling within the upper, middle or bottom one-third of the 1983-2014 historical distribution in the country given the ENSO (El Niño, Neutral, La Niña) or IOD (positive, neutral or negative) during that same season. This is not a forecast, it is based just on historical observations of rainfall/temperature and SST.

Enhancing National Climate Services Initiative (ENACTS)				
	Variables	Climatological Period	Area	Availability
Seasonal Climatic Suitability for Malaria transmission	number of months suitable for Malaria transmission	1983-2014	Ethiopia, Ghana, Madagascar, Mali, Rwanda, Tanzania, Zambia	graphical products available to public
	percent occurrence of climate condition suitable for malaria transmission			
	percent occurrence of all three climate condition in historical record			
	percent occurrence of precipitation condition in historical record			
	percent occurrence of relative humidity condition in historical record			
	percent occurrence of temperature condition in historical record			
	monthly precipitation over land areas (> 80 mm)			
Measures of vegetation	monthly temperature over land areas (18°C < T < 32°C)			
	monthly relative humidity (RH > 60%)			
Average WASP Index				

Table 106: Malaria historical analysis from ENACTS. The seasonal climatic suitability for malaria transmission provides a map showing the number of months suitable for malaria transmission, based on climatological averages. Map and graphs are produced to estimate vegetation using data from NASA's MODIS sensor. The WASP index plot shows time series of 12-month WASP index relative to a baseline period.

PRETORIA, SOUTH AFRICAN WEATHER SERVICES

Pretoria, South African Weather Services				
Variable	Average	Year	Area	Availability
mean rainfall (mm)	first ten days, second ten days,	from 2009 to	South Africa	Graphics for public
mean percentage of normal rainfall (%)	third ten days, monthly, seasonal	current date		

Table 107: Graphical products for rainfall in South Africa

PUNE – INDIA METEOROLOGICAL DEPARTMENT

PUNE – INDIA METEOROLOGICAL DEPARTMENT			
Variables	Climatological Period	Area	Availability
Monthly precipitation	1981-2010	South Asia	Graphical products available to public
Monthly surface temperature			

Table 108: *Climate of South Asia based on the 1981-2010 climatological base period*

PUNE – INDIA METEOROLOGICAL DEPARTMENT						
Variables	Lead time	Forecast period	Climatological period	Period	Area	Availability
Precipitation anomalies	1 to 9-month	monthly and seasonal	1981-2009	from 2015 to current date	global	Graphical products available to public
Temperature anomalies						
SST anomalies						

Table 109: *NCEP Climate Forecast System*

PUNE – INDIA METEOROLOGICAL DEPARTMENT						
Variables	Lead time	Forecast period	Climatological period	Period	Area	Availability
Precipitation anomalies	1 to 4-month	seasonal	1982-2010	2015	global	Graphical products available to public
2m temperature anomalies						

Table 110: *IMD Seasonal Forecast Model*

RCC-NETWORK FOR SOUTHERN SOUTH AMERICA

Argentina

RCC-Network for Southern South America			
Variables	Climatological Period	Area	Availability
Monthly precipitation	1961-1990 1981-2010	Southern South America (Argentina, Bolivia, Brazil, Chile, Paraguay and Uruguay)	Graphical products available to public
Monthly mean temperature			
Monthly maximum temperature			
Monthly minimum temperature			

Table 111: Precipitation and temperature climatology in South America

RCC-Network for Southern South America			
Variables	Climatological Period	Area	Availability
Mean seasonal precipitation	1981-2010	Southern South America (Argentina, Bolivia, Brazil, Chile, Paraguay and Uruguay)	Graphical products available to public

Table 112: Seasonal precipitation for 318 stations in South America. The mean, the upper limit and the lower limit are also indicated

RCC-Network for Southern South America				
Variables	Climatological Period	Period	Area	Availability
Mean seasonal precipitation	1981-2010	from 2014 to current date	Southern South America (Argentina, Bolivia, Brazil, Chile, Paraguay and Uruguay)	Graphical products available to public
Mean seasonal temperature				
33% percentile temperature/precipitation				
66% percentile temperature/precipitation				

Table 113: Precipitation and temperature climatology from the statistical model of RCC-Network-SSA

LATIN AMERICAN CLIMATE ASSESSMENT & DATASET

Latin American Climate Assessment & Dataset			
Variables	Period	Area	Availability
Daily precipitation amount Daily mean temperature Daily minimum temperature Daily maximum temperature Daily relative humidity Daily sea level pressure Daily cloud cover	~ 1960-2015	Antarctica Bolivia Chile Colombia Caribbean Netherlands Ecuador Peru Suriname Venezuela	Not All data are available to public

Table 114: Unblended and blended series of meteorological stations. The period is an approximation, the period is variable according to the stations

EUROPEAN CLIMATE ASSESSMENT & DATASET

European Climate Assessment & Dataset			
Variables	Period	Area	Availability
Daily precipitation amount Daily mean temperature Daily minimum temperature Daily maximum temperature Daily relative humidity Daily sea level pressure Daily cloud cover Daily wind gust Daily wind direction Daily wind speed Daily snow depth Daily sunshine	~ 1950-2015	Albania, Algeria, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia And Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Georgia, Germany, Gibraltar, Greece, Greenland [Denmark], Hungary, Iceland, Iran, Iraq, Ireland, Israel, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lebanon, Libyan Arab Jamahiriya, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Morocco, Netherlands, Norway, Poland, Portugal, Republic Of Macedonia, Romania, Russian Federation, Saudi Arabia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syrian Arab Republic, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, United Kingdom, Uzbekistan	Not All data are available to public

Table 115: Unblended and blended series of meteorological stations in Europe. The period is an approximation, the period is variable according to the stations

European Climate Assessment & Dataset				
Variables	Resolution	Period	Area	Availability
Daily mean temperature Daily minimum temperature Daily maximum temperature Daily precipitation amount Daily sea level pressure	0.25° latitude x 0.25° longitude (regular grid) 0.5° latitude x 0.5° longitude (regular grid) 0.22° latitude x 0.22° longitude (rotated grid) 0.44° latitude x 0.44° longitude (rotated grid)	1950-2015	25°N-75°N x 40°W-75°E	Gridded data available after registration (NetCDF format) Interactive map to plot these variables is available to public

Table 116: Ensembles daily gridded observational dataset for precipitation, temperature and sea level pressure in Europe (E-OBS gridded dataset)

SOUTHEAST ASIAN CLIMATE ASSESSMENT & DATASET

Southeast Asian Climate Assessment & Dataset			
Variables	Period	Area	Availability
Daily precipitation amount Daily mean temperature Daily minimum temperature Daily maximum temperature Daily relative humidity Daily sea level pressure Daily wind gust Daily wind direction Daily wind speed Daily sunshine	~1950-2015	American Samoa, Australia, Fiji, Indonesia, Kiribati, Malaysia, Federated States of Micronesia, Papua New Guinea, Philippines, Samoa, Singapore, Solomon Islands, Thailand, Timor-Leste, Viet Nam	Not All data are available to public

Table 117: Unblended and blended series of meteorological stations in Southeast Asia. The period is an approximation, the period is variable according to the stations

CARIBBEAN REGIONAL CLIMATE CENTRE

Caribbean Regional Climate Centre			
Variables	Period	Area	Availability
monthly rainfall monthly mean temperature monthly maximum temperature monthly minimum temperature	1981-2010	Caribbean country	Graphical products available to public

Table 118: Historical reference climatology of around 162 stations in the Caribbean region

Caribbean Regional Climate Centre CariCOF Outlook Generator (CAROGEN)			
Variables	Period	Area	Availability
daily/monthly rainfall daily/monthly mean temperature daily/monthly maximum temperature daily/monthly minimum temperature	variable, depends on the stations ~ 1960-2010	Caribbean country	Graphical products available to public

Table 119: Country daily and monthly statistics of the stations in the Caribbean region. CAROGEN also indicates the hottest values of temperature and rainfall and the date corresponding during the record period.

RA VI REGIONAL CLIMATE CENTER-NETWORK NODE ON CLIMATE MONITORING

Germany

RA VI RCC-Network Node on Climate Monitoring					
Variables	Types (climatological period)	Resolution	Period	Area	Availability
Monthly cloud coverage	Annual course, Absolute anomaly, Relative anomaly, Standardized anomaly, Mean values, Percentiles	0.25° latitude x 0.25° longitude	from 2009 to current date	Europe, Mediterranean	Graphical products available to public Gridded data to all products are available for the NMHSs of RA VI via ftp (need to login)
Monthly dull days			from 2007 to current date		
Monthly fair days			1982-2009		
Monthly cloud coverage	Reference climatology, Standard deviation, Time series, Trend maps	0.25° latitude x 0.25° longitude	1982-2009	Europe, Mediterranean	
Monthly dull days					
Monthly fair days					
Monthly event map	-	-	from 2010 to current date	Europe	
Monthly Sea Level Pressure	Anomaly (1981-2010), Anomaly (1961-1990), Mean	1° latitude x 1° longitude	from 2006 to current date	Europe, Mediterranean	
Monthly radiation	Global radiation, Direct radiation	0.05° latitude x 0.05° longitude	1994-2005, 1983-2005	Europe, Mediterranean	
	Reference climatology, Standard deviation, Time series, Trend maps		from 2004 to current date	Europe	
Monthly Precipitation	Total, Absolute/Relative anomaly (1961-1990, 1981-2010, 1951-2000), Percentile	1° latitude x 1° longitude	from 2009 to current date	Europe, Mediterranean	
Monthly Albedo	Total, Absolute/Relative anomaly (1982-2009)	0.25° latitude x 0.25° longitude	1982-2009	Europe, Mediterranean	
	Reference climatology, Standard deviation, Time series, Trend maps				

Table 120: European products from RA VI RCC-NETWORK Node on Climate Monitoring (part 1/2)

RA VI RCC-Network Node on Climate Monitoring					
Variables	Types (climatological period)	Resolution	Period	Area	Availability
Monthly soil moisture	Total, Standardized anomaly (1979-2010), Absolute/Relative anomaly (1979-2010), Percentile (1979-2010)	0.25° latitude x 0.25° longitude	from 2009 to current date	Europe, Mediterranean	Graphical products available to public Gridded data to all products are available for the NMHSs of RA VI via ftp (need to login)
	Reference climatology, Standard deviation, Time series, Trend maps		1979-2010		
Monthly number of snow days	-	0.1° latitude x 0.1° longitude	from 2009 to current date	Europe	
Monthly maximum snow depth			from 1981 to current date		
Monthly mean snow depth					
First occurrence of snow					
Duration of snow	Mean	1° latitude x 1° longitude	from 2005 to current date and 1961-1990	Europe, Mediterranean	
Last occurrence of snow			from 2012 to current date		
Monthly precipitation index (drought index)	-	0.1° latitude x 0.1° longitude	from 1975 to current date and 1961-1990	Europe	
Monthly Sea Surface Temperature	-		from 2004 to current date	Europe, Mediterranean	
Monthly sunshine duration	Total, Anomaly (1961-1990), Absolute anomaly (1961-1990)	1° latitude x 1° longitude	from 2004 to current date	Europe, Mediterranean	
Monthly total precipitable water (water vapor)	Annual course, Absolute anomaly, Relative anomaly, Standardized anomaly, Mean values, Percentiles		2001-2011		
	Reference climatology, Standard deviation, Time series, Trend maps				
Monthly temperature	Anomaly (1961-1990), Mean, Percentile (1951-2010)	0.1° latitude x 0.1° longitude	from 2007 to current date and 1981-2010, 1961-1990	Europe	
Daily maximum/minimum temperature	-	5 km	from 31 days back to today	Europe, Mediterranean	
Monthly maximum/minimum temperature normal			-		

Table 121: European products from RA VI RCC-NETWORK Node on Climate Monitoring (part 2/2)

RA VI RCC-Network Node on Climate Monitoring					
Variables	Types (climatological period)	Resolution	Period	Area	Availability
Monthly temperature	Mean/total, Anomaly/Percentage	0.1° latitude x 0.1° longitude	from 2010 to current date	European countries	Graphical products available to public Gridded data to all products are available for the NMHSs of RA VI via ftp (need to login)
Monthly precipitation		1° latitude x 1° longitude			
Monthly sunshine		0.1° latitude x 0.1° longitude			
Monthly temperature	Mean	0.1° latitude x 0.1° longitude	1961-1990 or 1991- 2000 or 1971-2000	Switzerland, Germany, France, Italy, Poland, United Kingdom	
Monthly precipitation		1° latitude x 1° longitude			
Monthly sunshine		0.1° latitude x 0.1° longitude			

Table 122: National climate products in Europe

RA VI REGIONAL CLIMATE CENTER-NETWORK NODE ON LONG-RANGE FORECASTS FRANCE and RUSSIAN FEDERATION

RA VI Regional Climate Center-Network Node on Long-Range Forecasts France and Russian Federation			
Variables	Period	Area	Availability
Monthly/Seasonal 2m temperature Monthly/Seasonal 1000 hPa temperature Monthly/Seasonal 850 hPa temperature Monthly/Seasonal 500 hPa geopotential height Monthly/Seasonal Mean Sea Level Pressure Seasonal precipitation	1981-2010	Global	Graphical products available to public

Table 123: *Monthly and quarterly climatological maps from ERA Interim reanalysis*

SATELLITE APPLICATION FACILITY ON CLIMATE MONITORING

Satellite Application Facility on Climate Monitoring (CM SAT)					
Variables	Temporal resolution	Spatial resolution	Period	Area	Availability
Microwave Radiance FCDR (BTR)	Instantaneous	cylindrical equal area projection (90 km ² x 90 km ²)	1982-2015	Global	Data available to public via order online (The products are distributed via temporary FTP-Access, CD, DVD or e-mails (small data amounts only))
Effective Cloud Albedo (CAL)	Daily, Hourly, Monthly			METEOSAT disk	
Fractional cloud cover (CFC)	Daily, Instantaneous, Monthly			Northern/Southern Polar region, Global, METEOSAT disk	
Cloud Radiative Effect SW (CFS) Cloud Radiative Effect LW (CFL)	Daily, Monthly			Global, METEOSAT disk	
Cloud Mask (CMA)	Daily, Instantaneous				
Clout Top parameters (CTO) Cloud Optical Thickness (COT) Cloud Phase (CPH)	Daily, Monthly	Lambert azimuthal equal-area projection (25 km ² x 25 km ²)			
Instantaneous COT, CPH and CWP (CPP) Instantaneous CTT, CTP and CTH (CTX)	Daily, Instantaneous	grid (0.03° x 0.03°. 0.05° x 0.05°, 0.25°x 0.25°, 0.5° x 0.5°, 0.625° x 0.625°, 1° x 1°)		METEOSAT disk	
Cloud Water Path (CWP) Daylight (DAL)	Daily, Monthly				
Direct Normalized Irradiance (DNI)	Daily, Hourly, Instantaneous, Monthly	Satellite projection (MSG/Seviri, SSM/I, SSMIS)		70°S-70°N, 10°W-130°E, METEOSAT disk	
Evaporation – Precipitation (EMP) Evaporation (EVA) Free Tropospheric Humidity (FTH)	Instantaneous, Monthly	Sinusoidal projection (45 km ² x 45 km ² , 100 km ² x 100 km ² in polar regions)		Global	
				METEOSAT disk	
Vertically integrated water vapour (HTW) Water vapour, temperature and humidity at 5 layers (HLW) Temperature and specific humidity at 6 pressure levels (HSH) Ice Water Path (IWP)	Daily, Monthly			Global	
Joint Cloud Property Histogram (JCH)	Monthly			Global, METEOSAT disk	

Table 124: Climate records data (part 1/2)

Satellite Application Facility on Climate Monitoring (CM SAT)						
Variables		Temporal resolution	Spatial resolution	Period	Area	Availability
Latent Heat Fluxes (LHF)		Instantaneous, Monthly	cylindrical equal area projection (90 km ² x 90 km ²)	1982- 2015	Global	Data available to public via order online (The products are distributed via temporary FTP-Access, CD, DVD or e- mails (small data amounts only))
Vertically integrated liquid water (LWP)		Daily, Monthly			Global, METEOSAT disk	
Near Surface Specific Humidity (NSH) Precipitation (PRE)		Instantaneous, Monthly			Global	
Surface Albedo (SAL)		Pentad, Monthly	Lambert azimuthal equal-area projection (25 km ² x 25 km ²)		Northern/Southern Polar region, Global, METEOSAT disk	
Surface Downward Longwave Radiation (SDL)		Monthly	grid (0.03° x 0.03°. 0.05° x 0.05°, 0.25°x 0.25°, 0.5° x 0.5°, 0.625° x 0.625°, 1° x 1°)		Global, METEOSAT disk	
Surface Incoming Direct Radiation (SID)		Daily, Hourly, Instantaneous, Monthly			70°S-70°N, 10°W-130°E, METEOSAT disk	
Surface Incoming Shortwave Radiation (SIS)					70°S-70°N, 10°W-130°E, Global	
Surface Net Longwave Radiation (SNL) Surface Net Shortwave Radiation (SNS) Surface Outgoing Longwave Radiation (SOL) Surface Radiation Budget (SRB)		Monthly	Satellite projection (MSG/Seviri, SSM/I, SSMIS) Sinusoidal projection (45 km ² x 45 km ² , 100 km ² x 100 km ² in polar regions)		Global, METEOSAT disk	
Spectral Resolved Irradiance (SRI)		Daily, Monthly			METEOSAT disk	
Near Surface Wind Speed (SWS)		Instantaneous, Monthly			Global	
Emitted Thermal Radiative Flux at the top of atmosphere (TET) Reflected Solar Radiative Flux at the top of atmosphere (TRS)		Daily, Monthly			CM SAF baseline area + MSG disk and arctic	

Table 125: Climate records data (part 2/2)

REGIONAL CLIMATE CENTRE-NETWORK FOR NORTH AFRICA

Regional Climate Centre-Network for North Africa			
Variables	Climatological period	Area	Availability
Monthly precipitation Monthly mean temperature Monthly maximum temperature Monthly minimum temperature	1981-2010	Tunisia, Morocco, Libya, Egypt, Algeria	Data available to public

Table 126: Historical climatology for 86 stations in North Africa. 17 stations in Tunisia, 17 stations in Morocco, 16 in Libya, 9 in Egypt and 27 in Algeria. The climatology is calculated with the NCDC's observations daily data.

EXETER, MET OFFICE

CCI/CLIVAR/JCOMM ETCCDI - Exeter, Met Office				
Variable	Period	Resolution	Area	Availability
Number of summer days (TX > 25°C) Number of icing days (TX < 0°C) Number of tropical nights (TN > 20°C) Growing season length Maximum value of daily maximum temperature Maximum value of daily minimum temperature Minimum value of daily maximum temperature Minimum value of daily minimum temperature Percentage of days when TN < 10th percentile Percentage of days when TX < 10th percentile Percentage of days when TN > 90th percentile Percentage of days when TX > 90th percentile Warm spell duration index Cold spell duration index Diurnal temperature range Maximum 1-day precipitation amount Maximum consecutive 5-day precipitation amount Simple daily intensity index Annual count of days when PRCP ≥ 10mm Annual count of days when PRCP ≥ 20mm Maximum length of dry spell, maximum number of consecutive days with RR < 1mm Maximum length of wet spell, maximum number of consecutive days with RR ≥ 1mm Very wet days Contribution to very wet days Extremely wet days Annual total wet-day precipitation	1951-2003	3.75° longitude × 2.5° latitude	global	gridded data available to public and indices computed from daily station data are also available to public

Table 127: ETCCDI Climate Extreme Indices dataset. This is a global land-based climate extreme dataset comprising 27 indices of temperature and precipitation computed from daily station data. Gridded version of this data set is also available on Met Office website.

LATIN AMERICAN CLIMATE ASSESSMENT & DATASET

Latin American Climate Assessment & Dataset			
Variable	Period	Area	Availability
Mean of daily mean cloud cover Mostly cloudy days Mostly sunny days Growing degree days No. consecutive frost days Heating degree days Cold spell duration index No. of cold nights Minimum of daily maximum temperature Growing season length No. frost days No. ice days No. of cold days No. of cold day-times Minimum of daily minimum temperature No. of cold/dry days No. of warm/dry days No. of cold/wet days No. of warm/wet days Maximum no. of consecutive dry days 3-month Standardized Precipitation Index 6-month Standardized Precipitation Index	variable according to the stations (indices aggregated over the year, October to March, April to September, DJF, MAM, JJA, SON and each of the calendar months)	All stations within LACA&D: Antarctica, Bolivia, Chile, Colombia, Caribbean Netherlands, Ecuador, Peru, Suriname, Venezuela	Data available to public Time series plots for each index and station, maps of trends over Latin America for each index, maps of index anomalies (with respect to the normal period 1961-1990) for a particular year or season, or climatology maps are also available to public.

Table 128: *Indices of extremes for all stations within LACA&D (part 1/2)*

Latin American Climate Assessment & Dataset			
Variable	Period	Area	Availability
No. of summer days Warm spell duration index No. of warm nights Maximum of daily maximum temperature Consecutive summer days No. tropical nights No. of warm days No. of warm day-times Maximum of daily minimum temperature Mean of daily mean relative humidity Precipitation sum Simple daily intensity index Heavy precipitation days Highest 1-day precipitation amount No. of moderate wet days No. of very wet days No. of extremely wet days Precipitation amount due to wet days No. of wet days Maximum no. of consecutive wet days Very heavy precipitation days Highest 5-day precipitation amount Precipitation fraction due to moderate wet days Precipitation fraction due to very wet days Precipitation fraction due to extremely wet days Mean of daily mean temperature Mean of daily maximum temperature Intra-period extreme temperature range Mean of daily minimum temperature Mean of diurnal temperature range Mean absolute day-to-day difference in DTR	variable according to the stations (~1960-2015) (indices aggregated over the year, October to March, April to September, DJF, MAM, JJA, SON and each of the calendar months)	All stations within LACA&D: Antarctica, Bolivia, Chile, Colombia, Caribbean Netherlands, Ecuador, Peru, Suriname, Venezuela	Data available to public Time series plots for each index and station, maps of trends over Latin America for each index, maps of index anomalies (with respect to the normal period 1961-1990) for a particular year or season, or climatology maps are also available to public.

Table 129: *Indices of extremes for all stations within LACA&D (part 2/2)*

EUROPEAN CLIMATE ASSESSMENT & DATASET

European Climate Assessment & Dataset			
Variable	Period	Area	Availability
Mean of daily mean cloud cover Mostly cloudy days Mostly sunny days Growing degree days Growing season length Maximum No. of frost days Frost days Heating degree days Ice days Cold spell duration index Days with TG < 10 th percentile of daily mean temperature Days with TN < 10 th percentile of daily minimum temperature Days with TX < 10 th percentile of daily maximum temperature Minimum value of daily maximum temperature Minimum of daily minimum temperature Days with TG < 25 th percentile of daily mean temperature and RR < 25 th percentile of daily amounts (cold/dry days) Days with TG < 25 th percentile of daily mean temperature and RR > 75 th percentile of daily amounts (cold/wet days) Days with TG > 75 th percentile of daily mean temperature and RR < 25 th percentile of daily amounts (warm/dry days) Days with TG > 75 th percentile of daily mean temperature and RR > 75 th percentile of daily amounts (warm/wet days) Tourism Climatic Index Universal Thermal Climate Index Huglin Index (grape growth) Biologically Effective Degree Days	variable according to the stations (~1950-2015) (indices aggregated over the year, October to March, April to September, DJF, MAM, JJA, SON and each of the calendar months)	All stations within ECA&D: Albania, Algeria, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia And Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Georgia, Germany, Gibraltar, Greece, Greenland [Denmark], Hungary, Iceland, Iran, Iraq, Ireland, Israel, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lebanon, Libyan Arab Jamahiriya, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Morocco, Netherlands, Norway, Poland, Portugal, Republic Of Macedonia, Romania, Russian Federation, Saudi Arabia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syrian Arab Republic, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, United Kingdom, Uzbekistan	Data available to public Time series plots for each index and station, maps of trends over Europe for each index, maps of index anomalies (with respect to the normal period 1961-1990) for a particular year or season, or climatology maps are also available to public.

Table 130: *Indices of extremes for all stations within ECA&D (part 1/3)*

European Climate Assessment & Dataset			
Variable	Period	Area	Availability
Days where the Tourism Climatic Index ≥ 60 Days where the Tourism Climatic Index ≥ 80 Maximum no. of consecutive dry days 6-Month Standardized Precipitation Index Potential evapotranspiration 3-Month Standardized Precipitation Index Summer days (TX $> 25^{\circ}\text{C}$) Tropical nights (TN $> 20^{\circ}\text{C}$) Warm-spell duration index Days with TG $> 90^{\text{th}}$ percentile of daily mean temperature (warm days) Days with TN $> 90^{\text{th}}$ percentile of daily minimum temperature (warm nights) Days with TX $> 90^{\text{th}}$ percentile of daily maximum temperature (warm day-times) Maximum value of daily maximum temperature Maximum value of daily minimum temperature Maximum no. of consecutive summer days (TX $> 25^{\circ}\text{C}$) Mean of daily relative humidity Mean of daily sea level pressure Precipitation sum Wet days (RR ≥ 1 mm) Simple daily intensity index Maximum no. of consecutive wet days (RR ≥ 1 mm) Heavy precipitation days (precipitation ≥ 10 mm) Very heavy precipitation days (precipitation ≥ 20 mm) Highest 1-day precipitation amount Highest 5-day precipitation amount	variable according to the stations (~1950-2015) (indices aggregated over the year, October to March, April to September, DJF, MAM, JJA, SON and each of the calendar months)	All stations within ECA&D: Albania, Algeria, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia And Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Georgia, Germany, Gibraltar, Greece, Greenland [Denmark], Hungary, Iceland, Iran, Iraq, Ireland, Israel, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lebanon, Libyan Arab Jamahiriya, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Morocco, Netherlands, Norway, Poland, Portugal, Republic Of Macedonia, Romania, Russian Federation, Saudi Arabia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syrian Arab Republic, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, United Kingdom, Uzbekistan	Data available to public Time series plots for each index and station, maps of trends over Europe for each index, maps of index anomalies (with respect to the normal period 1961-1990) for a particular year or season, or climatology maps are also available to public.

Table 131: Indices of extremes for all stations within ECA&D (part 2/3)

European Climate Assessment & Dataset			
Variable	Period	Area	Availability
Days with RR > 75 th percentile of daily amounts (moderate wet days) Precipitation fraction due to moderate wet days (> 75 th percentile) Days with RR > 95 th percentile of daily amounts (very wet days) Precipitation fraction due to very wet days (> 95 th percentile) Days with RR > 99 th percentile of daily amounts (extremely wet days) Precipitation fraction due to extremely wet days (> 99 th percentile) Total precipitation in wet days (RR ≥ 1 mm) Mean of daily snow depth Sunshine duration fraction with respect to day length Sunshine duration Mean of daily mean temperature Mean of daily minimum temperature Mean of daily maximum temperature Mean of diurnal temperature range Intra-period extreme temperature range Mean absolute day-to-day difference in DTR Maximum value of daily maximum wind gust Days with daily average wind ≥ 6 Bft (10.8 m/s) Calm days (FG ≤ 2 m/s) Days with northerly winds (-45° < DD ≤ 45°) Days with southerly winds (135° < DD ≤ 225°) Days with westerly winds (225° < DD ≤ 315°) Days with easterly winds (45° < DD ≤ 135°) Mean of daily mean wind strength	variable according to the stations (~1950-2015) (indices aggregated over the year, October to March, April to September, DJF, MAM, JJA, SON and each of the calendar months)	All stations within ECA&D: Albania, Algeria, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia And Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Georgia, Germany, Gibraltar, Greece, Greenland [Denmark], Hungary, Iceland, Iran, Iraq, Ireland, Israel, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lebanon, Libyan Arab Jamahiriya, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Morocco, Netherlands, Norway, Poland, Portugal, Republic Of Macedonia, Romania, Russian Federation, Saudi Arabia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syrian Arab Republic, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, United Kingdom, Uzbekistan	Data available to public Time series plots for each index and station, maps of trends over Europe for each index, maps of index anomalies (with respect to the normal period 1961-1990) for a particular year or season, or climatology maps are also available to public.

Table 132: Indices of extremes for all stations within ECA&D (part 3/3)

European Climate Assessment & Dataset					
Variable	Climatological Period	Season	Return period	Area	Availability
Highest no. of frost days (TN < 0°C) Highest no. of consecutive dry days (RR < 1mm) Highest no. of summer days (TX > 25°C) Warmest day Warmest night Highest 1-day precipitation amount Highest 5-day precipitation amount Highest no. of extremely wet days (RR > 99 th percentile) Highest no. of heavy precipitation days (RR > = 10 mm) Highest no. of moderate wet days (RR > 75 th percentile) Highest no. of very heavy precipitation days (RR > = 20 mm) Highest no. of very wet days (RR > 95 th percentile) Highest no. of wet days (RR > = 1 mm) Highest precipitation sum Highest average snow depth Highest sunshine duration Highest maximum wind gust	1941-1960, 1951-1970, 1961-1980, 1971-1990, 1981-2000, 1991-2010	annual, monthly, winter-half, summer- half, seasonal	2 years, 5 years, 10 years, 20 years	Europe	Graphical products and data available to public

Table 133: Return period for only stations within ECA&D which passed the homogeneity test and for which the Gumbel distribution provides acceptable fit. Maps of return values and data over Europe for several extremes of temperature, precipitation, etc.

SOUTHEAST ASIAN CLIMATE ASSESSMENT & DATASET

Southeast Asian Climate Assessment & Dataset			
Variable	Period	Area	Availability
Cold spell duration index (CSDI) No. of cold nights (TN10p) Minimum of daily maximum temperature (TXn) No. of cold days (TG10p) No. of cold day-times (TX10p) Minimum of daily minimum temperature (TNn) Maximum no. of consecutive dry days (CDD) 3-month Standardized Precipitation Index (SPI3) 6-month Standardized Precipitation Index (SPI6) Warm spell duration index (WSDI) No. of warm nights (TN90p) Maximum of daily maximum temperature (TXx) No. of warm days (TG90p) No. of warm day-times (TX90p) Maximum of daily minimum temperature (TNx) Mean of daily surface air pressure (PP) Precipitation sum (RR) Simple daily intensity index (SDII) Heavy precipitation days (> 10mm) (R10mm) Highest 1-day precipitation amount (RX1day) No. of moderate wet days (R75p) No. of very wet days (R95p) No. of extremely wet days (R99p) Onset of rainy season (definition 1, ORS1) Onset of rainy season (BMKG, ORS2)	variable according to the stations (~1950-2015) (indices aggregated over the year, October to March, April to September, DJF, MAM, JJA, SON and each of the calendar months)	Southeast Asia	Data available to public Time series plots for each index and station, maps of trends over Southeast Asia for each index, maps of index anomalies (with respect to the normal period 1961-1990) for a particular year or season, or climatology maps are also available to public.

Table 134: *Indices of extremes for all stations within SACA&D (part 1/2)*

Southeast Asian Climate Assessment & Dataset			
Variable	Period	Area	Availability
Precipitation amount due to wet days (PRCPTOT) No. of wet days (RR1) Maximum no. of consecutive wet days (CWD) Very heavy precipitation days (> 20mm) (R20mm) Highest 5-day precipitation amount (RX5day) Precipitation fraction due to moderate wet days (R75pTOT) Precipitation fraction due to very wet days (R95pTOT) Precipitation fraction due to extremely wet days (R99pTOT) End of rainy season (definition 1, ERS1) End of rainy season (BMKG definition, ERS2) Mean of daily mean temperature (TG) Mean of daily maximum temperature (TX) Intra-period extreme temperature range (ETR) Mean of daily minimum temperature (TN) Mean of diurnal temperature range (DTR) Mean absolute day-to-day difference in DTR (vDTR)	variable according to the stations (~1950-2015) (indices aggregated over the year, October to March, April to September, DJF, MAM, JJA, SON and each of the calendar months)	Southeast Asia	Data available to public Time series plots for each index and station, maps of trends over Southeast Asia for each index, maps of index anomalies (with respect to the normal period 1961-1990) for a particular year or season, or climatology maps are also available to public.

Table 135: *Indices of extremes for all stations within SACA&D (part 2/2)*

COPERNICUS CLIMATE CHANGE SERVICES

Copernicus Climate Change Services			
Variables	Period	Area	Availability
Monthly surface air temperature	from 2015 to current date	Global	Graphical products available to public

Table 136: *Monthly surface air temperature maps. The data come from ERA-Interim.*

EUROPEAN ORGANIZATION FOR THE EXPLOITATION OF METEOROLOGICAL SATELLITES

EUMETSAT				
Variable	Period	Resolution	Area	Availability
AMSU-A GDS Level 1B - Metop AMSU-A GDS Level 1B - NOAA ASCAT Coastal Winds at 12.5 km Swath Grid - Metop ASCAT GDS Level 1 Sigma0 at Full Sensor Resolution - Metop ASCAT GDS Level 1 Sigma0 resampled at 12.5 km Swath Grid - Metop ASCAT GDS Level 1 Sigma0 resampled at 25 km Swath Grid - Metop ASCAT L1 SZF Climate Data Record Release 2 - Metop ASCAT L1 SZO Climate Data Record Release 2 - Metop ASCAT L1 SZR Climate Data Record Release 2 - Metop ASCAT Soil Moisture at 12.5 km Swath Grid - Metop ASCAT Soil Moisture at 25 km Swath Grid - Metop ASCAT Winds and Soil Moisture at 12.5 km Swath Grid - Metop ASCAT Winds and Soil Moisture at 25 km Swath Grid - Metop ASCAT Winds at 12.5 km Swath Grid - Metop ASCAT Winds at 25 km Swath Grid - Metop ATOVS Sounding Products - Metop ATOVS Sounding Products - NOAA AVHRR Atmospheric Motion Vectors (triplet mode) - Metop - Polar AVHRR Atmospheric Motion Vectors - Metop - Global AVHRR Atmospheric Motion Vectors - Metop - Polar AVHRR GDS Level 1B - Metop AVHRR GDS Level 1B - NOAA AVHRR NDVI 02 AVHRR Regional Data Service - Multimission Active Fire Monitoring (ASCII) - MSG - 0 degree Active Fire Monitoring (CAP) - MSG - 0 degree Active Fire Monitoring (GRIB) - MSG - 0 degree Aerosol Properties over Sea - MSG - 0 degree Aggregated GOME-2 Offline Trace Gas Column Densities - Metop	~ from 1960 to current data	~few km	global	Data available via Internet

Table 137: Parameters from EUMETSAT (1/8)

EUMETSAT				
Variable	Period	Resolution	Area	Availability
All Sky Radiances - MSG - 0 degree All Sky Radiances - MSG - 0 degree (CF-015 Release 1) Atlantic Downward Longwave Irradiance at Low and Mid Latitudes Atlantic High Latitude Downward Longwave Irradiance - Multimission Atlantic High Latitude Sea Surface Temperature - Multimission Atlantic High Latitude Surface Shortwave Irradiance - Multimission Atlantic Sea Surface Temperature at Low and Mid Latitudes Atlantic Surface Solar Irradiance at Low and Mid Latitudes - Multimission Atmospheric Motion Vectors - MSG - 0 degree Atmospheric Motion Vectors - MSG - 0 degree (CF-015 Release 1) Atmospheric Temperature Water Vapour and Surface Skin Temperature Error Estimate - Metop Clear Sky Radiances - MFG - Indian Ocean - Reprocessed Clear Sky Radiances - MFG - 0 degree - Reprocessed Clear Sky Radiances - MFG - ADC - Reprocessed Clear Sky Radiances - MFG - Indian Ocean Clear Sky Radiances - MFG - XADC - Reprocessed Clear Sky Radiances - MSG - 0 degree Clear Sky Radiances - MSG - 0 degree (CF-015 Release 1) Clear Sky Water Vapour Winds - MFG - Indian Ocean Clear-Sky Reflectance Map - MSG - 0 degree Climate Data Set - MFG - 0 degree Climate Data Set - MFG - Indian Ocean Climate Data Set - MSG - 0 degree Climate Data Set - Reprocessed Climate Data Set in BUFR Cloud Albedo Cloud Analysis (BUFR) - MFG - 0 degree Cloud Analysis (BUFR) - MFG - Indian Ocean Cloud Analysis - MFG Cloud Analysis - MSG - 0 degree Cloud Analysis Image - MSG - 0 degree Cloud Mask - MFG Cloud Mask - MSG - 0 degree	~ from 1960 to current data	~few km	global	Data available via Internet

Table 138: Parameters from EUMETSAT (2/8)

EUMETSAT				
Variable	Period	Resolution	Area	Availability
Cloud Motion Winds - MFG - 0 degree - Reprocessed Cloud Motion Winds - MFG - Indian Ocean Cloud Motion Winds - MFG - Indian Ocean - Reprocessed Cloud Optical Thickness - Multimission Cloud Phase - Multimission Cloud Top Height - MSG - 0 degree Cloud Top Height - Multimission Cloud Top Pressure - Multimission Cloud Top Temperature - Multimission Cloud Type - Multimission Cloud Water Path - Multimission Daily Downward Longwave Irradiance - GOES Daily Downward Longwave Irradiance - MSG Daily Shortwave Solar Irradiance - GOES Daily Shortwave Solar Irradiance - MSG Divergence Product - MSG - 0 degree EARS Cloud Mask - Multimission EARS Cloud Top Temperature & Height - Multimission EARS Cloud Type - Multimission Emitted Thermal radiative flux at the Top of the atmosphere - Multimission Evaporation Expanded Low-Resolution Cloud Motion Winds - MFG - 0 degree - Reprocessed Expanded Low-resolution Cloud Motion Winds - MFG - ADC - Reprocessed Expanded Low-resolution Cloud Motion Winds - MFG - Indian Ocean Expanded Low-resolution Cloud Motion Winds - MFG - Indian Ocean - Reprocessed Expanded Low-resolution Cloud Motion Winds - MFG - XADC - Reprocessed Fractional Cloud Cover - Multimission Freshwater Flux GOME-2 GDS Level 1B - Metop GRAS GDS Level 1B - Metop Geophysical Data Record - Sea Surface Height Anomaly - Jason-2	~ from 1960 to current data	~few km	global	Data available via Internet

Table 139: Parameters from EUMETSAT (3/8)

EUMETSAT				
Variable	Period	Resolution	Area	Availability
Global Instability Index - MSG - 0 degree Global L3C AVHRR Sea Surface Temperature (GHRST) - Metop Global Low Resolution Sea Ice Drift - Multimission Global MetOp Sea Surface Temperature in NetCDF Global Sea Ice Concentration - DMSP Global Sea Ice Edge - Multimission Global Sea Ice Emissivity - DMSP Global Sea Ice Type - Multimission HIRS GDS Level 1B - Metop HIRS GDS Level 1B - NOAA HRI Level 1.5 Image Data - MFG - 0 degree HRI Level 1.5 Image Data - MFG - ADC HRI Level 1.5 Image Data - MFG - Indian Ocean HRI Level 1.5 Image Data - MFG - XADC Hamburg Ocean Atmosphere Parameters and Fluxes from Satellite Data - HOAPS 3.2 - Monthly Means / 6-Hourly Composites High Rate SEVIRI Level 1.5 Image Data - MSG - 0 degree High Resolution GOME-2 Vertical Ozone Profiles High Resolution Precipitation Index - MFG - 0 degree - Reprocessed High Resolution Precipitation Index - MFG - Indian Ocean High Resolution Precipitation Index - MSG - 0 degree High Resolution Visible Winds - MFG - 0 degree High Resolution Visible Winds - MFG - 0 degree - Reprocessed High Resolution Visible Winds - MFG - ADC - Reprocessed High Resolution Visible Winds - MFG - Indian Ocean - Reprocessed High Resolution Visible Winds - MFG - XADC - Reprocessed High Resolution Water Vapour Winds - MFG - 0 degree Hourly Downward Longwave Irradiance - GOES Hourly Downward Longwave Irradiance - MSG Hourly Sea Surface Temperature in NetCDF Hourly Shortwave Solar Irradiance - GOES Hourly Shortwave Solar Irradiance - MSG	~ from 1960 to current data	~few km	global	Data available via Internet

Table 140: Parameters from EUMETSAT (4/8)

EUMETSAT				
Variable	Period	Resolution	Area	Availability
IASI Atmospheric Temperature Water Vapour and Surface Skin Temperature – Metop IASI Carbon Monoxide Profiles FORLI-CO - Metop IASI Cloud Parameters - Metop IASI Combined Sounding Products - Metop IASI GDS Level 1 Principal Component Residuals - Metop IASI GDS Level 1 Principal Component Scores - Metop IASI GDS Level 1C - all spectral samples - Metop IASI L2PCore Sea Surface Temperature (GHRST) - Metop IASI Ozone - Metop IASI PCC Band 1 eigenvectors IASI PCC Band 2 eigenvectors IASI PCC Band 3 eigenvectors IASI Surface Emissivity - Metop IASI Trace Gases - Metop Incoming Solar Radiative flux at the top of the atmosphere - Multimission L3C North Atlantic Regional (NAR) Sea Surface Temperature (GHRST) - Multimission L3C hourly Sea Surface Temperature (GHRST) - GOES-E L3C hourly Sea Surface Temperature (GHRST) - MSG Latent Heat Flux Layered Water Vapour and Temperature - NOAA MHS GDS Level 1B - Metop MHS GDS Level 1B - NOAA Medium Resolution Sea Ice Drift - Metop Merged Atlantic Product Downward Longwave Irradiance Merged Atlantic Product Sea Surface Temperature - Multimission Merged Atlantic Product Surface Solar Irradiance Meteosat Surface Albedo - MFG - 0 degree Meteosat Surface Albedo - MFG - Atlantic Ocean 50 W Meteosat Surface Albedo - MFG - Atlantic Ocean 75 W Meteosat Surface Albedo - MFG - Indian Ocean 57 E Meteosat Surface Albedo - MFG - Indian Ocean 63 E Multi-Sensor Precipitation Estimate (GRIB) - MFG - Indian Ocean Multi-Sensor Precipitation Estimate (GRIB) - MSG - 0 degree	~ from 1960 to current data	~few km	global	Data available via Internet

Table 141: Parameters from EUMETSAT (5/8)

EUMETSAT				
Variable	Period	Resolution	Area	Availability
Multi-Sensor Precipitation Estimate (JPEG) - MSG - 0 degree Multi-Sensor Precipitation Estimate in GRIB - Reprocessed NAR Sea Surface Temperature in NetCDF Near Surface Wind Speed Normalised Difference Vegetation Index - MSG - 0 degree Normalised Difference Vegetation Index Decadal - MSG - 0 degree North Atlantic and Regional Sea Surface Temperature (NAR SST) - NOAA OSCAT Winds at 50 km Swath Grid - Oceansat Offline Absorbing Aerosol Index - Metop Offline Absorbing Aerosol Index from the GOME-2 PMD Offline Ozone Profile - Metop Offline Total Column - Metop Offline UV Daily - Metop Operational Geophysical Data Record (BUFR) - Jason-2 Operational Geophysical Data Record (BUFR) - Jason-3 Operational Geophysical Data Record (BUFR) - SARAL Operational Geophysical Data Record (netCDF) - Jason-2 Operational Geophysical Data Record (netCDF) - Jason-3 Operational Geophysical Data Record (netCDF) - SARAL Operational Geophysical Data Record - SSHA (netCDF) - SARAL Operational Geophysical Data Record - Sea Surface Height Anomaly - Jason-2 Operational Geophysical Data Record - Sea Surface Height Anomaly - Jason-3 Optimal Cloud Analysis - MSG - 0 degree Polar Multi-Sensor Aerosol Optical Properties - Metop Precipitation Rapid Scan Active Fire Monitoring (ASCII) - MSG Rapid Scan Active Fire Monitoring (CAP) - MSG Rapid Scan Active Fire Monitoring (GRIB) - MSG Rapid Scan Atmospheric Motion Vectors - MSG Rapid Scan Clear-Sky Radiances - MSG Rapid Scan Global Instability Index - MSG Rapid Scan HRI Level 1.5 Image Data - MFG Rapid Scan High Rate SEVIRI Level 1.5 Image Data - MSG Rapid Scan Multi-sensor Precipitation Estimate (GRIB) - MSG	~ from 1960 to current data	~few km	global	Data available via Internet

Table 142: *Parameters from EUMETSAT (6/8)*

EUMETSAT				
Variable	Period	Resolution	Area	Availability
Rapid Scan Multi-sensor Precipitation Estimate (JPEG) - MSG Rapid Scan Regional Instability Index - MSG RapidScat Winds at 25 km Swath Grid, 3 Hours Latency - ISS RapidScat Winds at 50 km Swath Grid, 3 Hours Latency - ISS Reflected Solar Radiative Flux at the Top of the atmosphere - Multimission Regional Instability Index - MSG - 0 degree SEM GDS level 0 - Metop Sea Surface Temperature - MFG - 0 degree - Reprocessed Sea Surface Temperature - MFG - Indian Ocean Sea Surface Temperature - MFG - Indian Ocean - Reprocessed Sea Surface Temperature Acores Islands Sea Surface Temperature Canary Islands Sea Surface Temperature East Mediterranean Sea Sea Surface Temperature Gascogne Sea Surface Temperature North Sea Sea Surface Temperature Norwegian Sea Sea Surface Temperature West Mediterranean Sea Sea Surface Temperature in BUFR Seawinds 100 km Wind - QuikSCAT Seawinds 25 km Wind - QuikSCAT Specific Humidity and Temperature at pressure Levels - Multimission Surface Albedo - Multimission Surface Direct Irradiance Surface Downward Longwave Radiation - Multimission Surface Incoming Shortwave Radiation - Multimission Surface Net Longwave Radiation - Multimission Surface Net Shortwave Radiation - Multimission Surface Outgoing Longwave Radiation - Multimission Surface Radiation Budget - Multimission	~ from 1960 to current data	~few km	global	Data available via Internet

Table 143: Parameters from EUMETSAT (7/8)

EUMETSAT				
Variable	Period	Resolution	Area	Availability
Total Ozone - MSG - 0 degree Tropospheric Humidity - MSG - 0 degree Upper Tropospheric Humidity - MFG - 0 degree - Reprocessed Upper Tropospheric Humidity - MFG - ADC - Reprocessed Upper Tropospheric Humidity - MFG - Indian Ocean Upper Tropospheric Humidity - MFG - Indian Ocean - Reprocessed Upper Tropospheric Humidity - MFG - XADC - Reprocessed Vertical Integrated Water Vapour - Multimission Volcanic Ash Detection (CAP) - MSG - 0 degree Volcanic Ash Detection (netCDF) - MSG - 0 degree	~ from 1960 to current data	~few km	global	Data available via Internet

Table 144: *Parameters from EUMETSAT (8/8)*

SATELLITE APPLICATION FACILITY ON CLIMATE MONITORING

Satellite Application Facility on Climate Monitoring (CM SAT)						
Variables	Temporal resolution	Spatial resolution	Period	Area	Availability	
Fractional cloud cover (CFC) Cloud type (CTY) Cloud top temperature (CTT) Cloud top height (CTH) Cloud top pressure (CTP)	daily, monthly	Lambert azimuthal equal-area projection (15 km ² x 15 km ²) Sinusoidal projection (15 km ² x 15 km ²)	from ~2004 to current date	Arctic, 30°N-80°N, 60°W-60°E METEOSAT disk	Data available to public via order online (The products are distributed via temporary FTP-Access, CD, DVD or e-mails (small data amounts only))	
Cloud optical thickness (COT) Cloud phase (CPH) Cloud water path (CWP) Surface incoming short-wave radiation (SIS)				Sinusoidal projection (15 km ² x 15 km ²)		METEOSAT disk
Surface incoming direct radiation (SID)						Arctic METEOSAT disk
Surface albedo (SAL)						monthly, weekly
Surface net short-wave radiation (SNS)				daily, monthly		30°N-80°N, 60°W-60°E METEOSAT disk
Surface outgoing long-wave radiation (SOL) Surface downward long-wave radiation (SDL) Surface net long-wave radiation (SNL) Surface radiation budget (SRB)	monthly					
Incoming solar radiative flux at the top of the atmosphere (TIS) Reflected solar radiative flux at the top of the atmosphere (TRS) Emitted thermal radiative flux at the top of the atmosphere (TET)	daily monthly	Sinusoidal projection (45 km ² x 45 km ² , 100 km ² x 100 km ² in polar)		30°N-80°N, 60°W-60°E + MSG disk and Arctic		
Vertically integrated water vapour (HTW) Layered vertically integrated water vapour and layer mean temperature and relative humidity for 5 layers (HLW) Temperature and mixing ratio at 6 pressure levels (HSH)		cylindrical equal area projection (90 km ² x 90 km ²)		Global		

Table 145: Operational products from CM SAT

MOSCOW, HYDROMETEOROLOGICAL CENTRE OF RUSSIA

Moscow, Hydrometeorological Centre of Russia			
Variables	Validity period	Area	Availability
100 <i>hPa</i> geopotential height 100 <i>hPa</i> temperature 500 <i>hPa</i> geopotential height 500 <i>hPa</i> temperature mean sea level pressure surface temperature 500 <i>hPa</i> anomalies of geopotential height 500 <i>hPa</i> anomalies of temperature anomalies of mean sea level pressure anomalies of surface temperature	For the previous month	Northern hemisphere	Graphics for public

Table 146: *Graphical products for monitoring*

INTERNATIONAL RESEARCH INSTITUTE FOR CLIMATE AND SOCIETY

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room						
Variables	Resolution	Period	Climatological Period	Area	Availability	
Five-Day Running Average 925 hPa Zonal Wind Anomaly Hovmöller (averaged over 5°S to 5°N)	2.5° latitude x 2.5° longitude	the past 120 days	1981-2010	Equatorial Pacific/Indian Ocean (50°E to 80°W)	Graphical products and data available to public	
Pentad Outgoing Longwave Radiation Anomaly (averaged over 5°S to 5°N)		the past year	1979-1995	Equatorial Pacific Ocean (120°E to 70°W)		
Monthly and Seasonal OLR and SST Anomaly and Climatology (averaged over 5°S to 5°N)		the last 36 months	1971-2000 (for SST) 1979-present (for OLR)	Equatorial Pacific Ocean (120°E to 80°W)		
Weekly Sea Surface Temperature and Monthly Sub-Surface Potential Temperature Anomaly (averaged over 5°S to 5°N)	1° latitude x 1° longitude	the past year	1981-2010			
200 hPa Velocity Potential Anomaly (averaged over 5°S to 5°N)	2.5° latitude x 2.5° longitude	the past 180 days	1999-2013	Equatorial Indian and Pacific Oceans (50°E to 80°W)		
925 hPa Zonal Wind Hovmöller (anomaly and observed) (averaged over 5°S to 5°N)		the past year	1981-2010	Equatorial Pacific Ocean (120°E to 80°W)		
Monthly Sea Surface Temperature Greater Than 28°C	1° latitude x 1° longitude	the past month	1971-2000	global		
Change in Sea Surface Temperature Anomaly from Previous Month				Pacific Ocean		
Monthly Sea Surface Temperature Anomaly		global				
Three-Month Standardized Monthly SST Anomaly Persistence		from 1981 to current date		Pacific Ocean		
Six-Month Standardized Monthly SST Anomaly Persistence						
Seasonal Sea Surface Temperature Anomaly	5° latitude x 5° longitude	from 1950 to current date	1951-1980	Tropical Pacific Ocean		
Monthly Standardized Sea Surface Temperature Anomaly						
Standardized Change in Sea Surface Temperature Anomaly from Previous Month	1° latitude x 1° longitude	from 1981 to current date	1971-2000			
Weekly Sea Surface Temperature Anomaly						

Table 147: Monitoring ENSO (part 1/3)

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room						
Variables	Resolution	Period	Climatological Period	Area	Availability	
925 hPa Monthly Wind Vector Anomaly	2.5° latitude x 2.5° longitude	from 1949 to current date	1981-2010	Tropical Pacific Ocean	Graphical products and data available to public	
Pentad Zonal Wind Component at 925 hPa		the past year		Niño1+2 Region, Niño3.4 Region, Niño3 Region, Niño4 Region		
Equatorial Pacific Monthly Thermocline Animation (averaged over 5°S to 5°N)	1° latitude x 1/3° longitude vertical grid points at 5, 15, 25, 35, 45, 55, 65, 75, 85, 95, 105, 115, 125, 135, 145, 155, 165, 175, 185, 195, 205, 215, 225, 238, 262, 303, 366, and 459 meters below the surface	the current year	-	Equatorial Pacific thermocline (121°E to 79°W)		
Latitude-Depth Section of Equatorial Pacific Thermocline at 150°W		from 1980 to current date	-	along Tropical Pacific thermocline at 150°W		
Change in Equatorial Pacific Temperature Anomaly from Previous Month				the most recent 18 months		1980-present
Longitude-Depth Section of Potential Temperature Anomaly Along the Equatorial Pacific Thermocline (averaged over 5°S to 5°N)		from 1982 to current date	1982-present			
Standardized Anomaly of the Depth of the 20°C Isotherm				1° latitude x 1° longitude		from 1981 to current date
Central Equatorial Pacific Heat Storage and Niño 3.4 SST		1971-2000	Central Equatorial Indian Ocean			

Table 148: Monitoring ENSO (part 2/3)

International Research Institute for Climate and Society (IRI)						
IRI Climate and Society Map Room						
Variables	Resolution	Period	Climatological Period	Area	Availability	
Equatorial Pacific Weekly Sea Surface Temperature Hovmoller (averaged from 10°S to 10°N)	1° latitude x 1° longitude	from 1981 to current date	-	Equatorial Pacific Ocean (135°E to 85°W)	Graphical products and data available to public	
Southern Oscillation Index (SOI) and Equatorial SOI	2.5° latitude x 2.5° longitude	the past 20 years	1981-2010	an area of the eastern Equatorial Pacific (80°W - 130°W, 5°N - 5°S) and an area over Indonesia (90°E - 140°E, 5°N - 5°S)		
Anomalous Depth of the Equatorial Pacific Thermocline	1° latitude x 1° longitude	from 1982 to current date	1971-2000	East-Central Pacific, Full Pacific, Western Pacific		
North Tropical Atlantic Index		from 1981 to current date		monthly mean SST anomalies averaged over the region 10°N to 20°N latitude and 79°W to 20°W longitude		
North Tropical Atlantic Index and NINO3 Index						
Niño 3.4 SST Anomaly and Equatorial Central/Eastern Pacific 925 hPa Zonal Wind Anomaly	2.5° latitude x 2.5° longitude	the past 25 years	1981-2010	Equatorial Pacific Ocean		
Southern Oscillation Index	1° latitude x 1° longitude	from 1951 to current date		-		
Five-Month Running Average Southern Oscillation Index	2.5° latitude x 2.5° longitude	the past two years		Equatorial Pacific Ocean		
Equatorial Pacific Monthly Standardized Sea Level Pressure Anomaly Hovmoller		from 1981 to current date		global tropics		
Column-Average Tropospheric Temperature Anomaly over the Tropics				1981 to 2010 (for atmospheric temperature) 1971-2000 (for SST)		global
Standardized Anomalies of Average Tropical Tropospheric Temperature and Niño 3.4 SST				1981-2010		global tropics
Average Tropical Tropospheric Temperature Anomaly (averaged from 25°S to 25°N)						
Seasonal Precipitation and Standardized Streamfunction Anomalies (from 925 hPa and 200 hPa pressure levels)	from 1979 to current date	1979-2000 (for precipitation) 1981-2010 (for standardized velocity)	tropical Indian and Pacific Oceans			
Seasonal Precipitation and Standardized Velocity Potential Anomalies and Divergent Wind (from 925 hPa and 200 hPa pressure levels)	from 1949 to current date					

Table 149: Monitoring ENSO (part 3/3)

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room						
Variables		Resolution	Period	Climatological Period	Area	Availability
Dekadal precipitation		0.1° latitude x 0.1° longitude	from 1999 to current date	-	Africa	Graphical products and data available to public
Dekadal (10-day) precipitation estimates as the difference from the short term average Dekadal (10-day) precipitation estimates as a percentage of the short term average				from 2000 to last recent complete year		
Minimum Land Surface Temperature			from 2002 to current date	-	Western Africa, Eastern Africa, Southern Africa	
Inferred Maximum Air Temperature		1 km spatial resolution				
Measures of Vegetation (NDVI, EVI, Reflectance)		250 m latitude x 250 m longitude	from 2000 to current date			
Vectorial Capacity		-	from 2004 to current date		Africa	
Country-Average WASP Index		2.5° latitude x 2.5° longitude	1960-2014	1979-2010	by country in Africa	Graphical products and data available to public
Number of months suitable for malaria transmission		2.5° latitude x 2.5° longitude (relative humidity)	-	1951-2000	Africa	
Percent occurrence of all three climate conditions in historical record		0.5° latitude x 0.5° longitude (precipitation and temperature)				
Percent occurrence of precipitation condition in historical record						
Percent occurrence of relative humidity condition in historical record						
Percent occurrence of temperature condition in historical record						
Mapping Malaria Risk in Africa Distribution Model of Climatic Suitability for Malaria Transmission		0.5° latitude x 0.5° longitude		1971-2000		

Table 150: Malaria Early Warning System and Malaria Historical Analysis

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room				
Variables	Resolution	Period	Area	Availability
Ozone Monitoring Instrument Aerosol Monitoring for Meningitis	0.1° latitude x 0.1° longitude	from 2004 to current date	global	Graphical products and data available to public
Multi-angle imaging SpectroRadiometer Aerosol Monitoring for Meningitis	0.25° latitude x 0.25° longitude	2000-2009	Africa	
Reanalysis: Specific Humidity, Temperature, and Wind	2.5° latitude x 2.5° longitude	from 1948 to current date	Africa	
NASA Tropical Rainfall Measuring Mission and Satellite Rainfall Monitoring	0.25° latitude x 0.25° longitude	from 1998 to current date	global	
Observed Distribution of Meningitis in Historical Record	-	1841-1999	Africa	
Predicted Probability of Meningitis Epidemic Experience		-		
Regional Dust Model - presence of dust over northern Africa in dekadal (10-day) averages	1.25° latitude x 1.25° longitude	1985-2006		

Table 151: Climate and Meningitis in Africa

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room				
Variables	Resolution	Period	Area	Availability
Dekadal Rainfall Estimates	0.25° latitude x 0.25° longitude	from 2002 to current date	5°S - 40°N 20°W - 90°E	Graphical products and data available to public
Monthly Rainfall Estimates		from 2003 to current date		
Daily Rainfall Estimates		from 2002 to current date		
Greenness Estimates	250 m latitude x 250m longitude	from 2010 to current date	West Africa, East Africa, Southwest Africa	
Moderate Resolution Imaging Spectroradiometer Analysis Tool (NDVI, EVI, Reflectance)		from 2000 to current date		

Table 152: Food security – Desert locust

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room					
Tools	Variables	Resolution	Period	Area	Availability
Historical Precipitation Monitoring	Total rainfall Number of wet day Rainfall intensity Number of dry spells Number of wet spells	0.25° latitude x 0.25° longitude	1951-2007	Bangladesh	Graphical products and data available to public
		-	1944-2013	Honduras	
			1980-2010 and 1951-2007	Lao	
			1973-2002	Brazil	
			1951-2007	Nepal	
			1951-2007	Northern India	
			1977-2008	Philippines	
			1951-2007	Monsoon Asia	
Historical Temperature Monitoring	Minimum temperature Maximum temperature Heating degree days Number of cold days Number of hot days	-	1979-2011	Bangladesh	
			1944-2013	Honduras	
			1980-2010	Lao	
			1979-2011	Nepal	
	Chilling degree days Number of cold days Number of hot days Growing degree days	1° latitude x 1° longitude	1979-2011 and 1969-2005	Northern India	
		0.25° latitude x 0.25° longitude	1961-2007	Monsoon Asia	

Table 153: Historical seasonal composites

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room						
Variables	Resolution	Lead time	Forecasted period	Period	Area	Availability
Estimated dekadal precipitation	0.25° latitude x 0.25° longitude	-	-	from 2002 to current date	Indonesia	Graphical products and data available to public
Monthly precipitation				from 2003 to current date		
Experimental forecasts of the likelihood of high or low fire activity	-	1-, 2-month	-	from 1998 to current date	provinces of South, Central, West, and East Kalimantan in Indonesia	
Fire forecast/observed	-		3 consecutive months	from 2002 to current date	Western Amazon	

Table 154: Climate and Fire Map Room includes forecasts and analysis tools for Indonesia and Western Amazon

International Research Institute for Climate and Society (IRI)					
IRI Climate and Society Map Room					
Tools	Variables	Resolution	Period	Area	Availability
Historical precipitation monitoring	Total rainfall	0.25° latitude x 0.25° longitude (also stations)	1977-2007	Philippines	Graphical products and data available to public
	Number of wet day				
	Rainfall intensity				
	Number of dry spells				
	Number of wet spells				
Bicol Region Historical Drier/Wetter Water Balance Monitoring	Soil moisture	0.05° latitude x 0.05° longitude	1961-2007		
	reduced ET crop				
	effective precipitation				
	Water stress				
	Persistent water stress				
	Water excess				
	Persistent water excess				

Table 155: *Water management*

PUNE – INDIA METEOROLOGICAL DEPARTMENT

Pune – India Meteorological Department				
Variables	Period	Climatological period	Area	Availability
Monthly Mean Sea Level Pressure	from 2015 to current date	-	India	Graphical products available to public
Monthly maximum temperature			South Asia	
Monthly rainfall		1959-1988	Indian Ocean (30°S-60°N, 0-150°E)	
Monthly mean wind anomaly				
Monthly mean velocity potential				
Monthly mean stream function				
OLR anomaly	current date	-	South Asia (20°S-50°N, 40°E- 180°E)	
monthly Nino 1+2	from 2015 to current date	-	-	
monthly Nino 3.4				
monthly Nino 3				
monthly Nino 4				
monthly Indian Ocean Dipole				
monthly Madden-Julian Oscillation Phase Diagram				
monthly Indian Ocean Dipole	2015			

Table 156: *Climate Monitoring, ENSO indices and IOD*

CARIBBEAN REGIONAL CLIMATE CENTRE

Caribbean Regional Climate Centre				
Variables	Time scale	Period	Area	Availability
Standardized Precipitation Index	1-month, 3-month,	from 2010 to current date	Caribbean basin	Graphical products available to public
Decile (rainfall)	6-month, 12-month	from 2015 to current date		Graphical products available to public

Table 157: *Caribbean drought and precipitation monitoring (SPI and decile)*

REGIONAL CLIMATE CENTRE-NETWORK FOR NORTH AFRICA

Regional Climate Centre-Network for North Africa				
Variables	Type	Period	Area	Availability
Monthly/seasonal temperature Monthly/seasonal precipitation Monthly/seasonal Sea Surface Temperature Monthly/seasonal Sea Level Pressure	Mean, Anomaly (1981-2010)	from 2013 to current date	North Africa	Graphical products available to public
Monthly/seasonal SPI	1-month, 3-month, 6-month, 9-month 12-month, 24-month			

Table 158: *Climate monitoring in North Africa*

GLOBAL PRECIPITATION CLIMATOLOGY CENTRE

Global Precipitation Climatology Centre (GPCC) GPCC Monitoring Products				
Variables	Resolution	Period	Area	Availability
Monthly precipitation	1.0° and 2.5°	from 1982 to current date	global	data available to public (netCDF format)

Table 159: GPCC Monitoring Product – Near Real-Time Monthly Land-Surface Precipitation from Rain-Gauges based on SYNOP and CLIMAT data

Global Precipitation Climatology Centre (GPCC) GPCC First Guess Monthly Product				
Variables	Resolution	Period	Area	Availability
Monthly precipitation	1.0°	from 2004 to current date	global	data available to public (netCDF format)

Table 160: GPCC First Guess Monthly Product - Near Real-Time First Guess Monthly Land-Surface Precipitation from Rain-Gauges based on SYNOP Data

Global Precipitation Climatology Centre (GPCC) GPCC First Guess Daily Product				
Variables	Resolution	Period	Area	Availability
Daily precipitation	1.0°	from 2009 to current date	global	data available to public (netCDF format)

Table 161: GPCC First Guess Daily Product - Near Real-Time First Guess Daily Land-Surface Precipitation from Rain-Gauges based on SYNOP Data

GLOBAL PRECIPITATION CLIMATE PROJECT

Global Precipitation Climate Project (GPCP)				
Variables	Resolution	Period	Area	Availability
Daily precipitation	1.0°	from 1996 to current date	global	data available to public
Pentad precipitation	2.5°	from 1979 to current date		
Monthly precipitation		from 1979 to current date		

Table 162: GPCP One-Degree Daily Precipitation Data Set, Experimental GPCP Pentad (5-Day) Precipitation Analysis and GPCP Version 2.2 Combination providing monthly precipitation analysis

ASIA-PACIFIC ECONOMIC COOPERATION CLIMATE CENTER

Asia-Pacific Economic Cooperation Climate Center				
Variables	Type	Period	Area	Availability
Surface air temperature anomaly OLR anomaly Precipitation Sea surface temperature Wind anomaly at 850 hPa 500 hPa geopotential height	weekly, monthly or seasonal	from 1979 to current date	Global	Graphical products available to public

Table 163: *Monitoring information from APCC*

3. Sub-seasonal to seasonal and annual to decadal timescales

BEIJING – CHINA METEOROLOGICAL ADMINISTRATION/ BEIJING CLIMATE CENTRE

Beijing, China Meteorological Administration (CMA)/ Beijing Climate Center (BCC)				
Variables	Data type	Forecast period	Area	Availability
precipitation anomaly percentage	monthly forecast - ensemble mean	01-10 days	global	Graphical products freely available via Internet
surface temperature anomaly		11-20 days		
500 <i>hPa</i> height anomaly		21-30 days		
sea level pressure anomaly		31-40 days		
200 <i>hPa</i> wind anomaly	monthly forecast - Most likely categories (Probability)	01-30 days		
precipitation (wet, normal, dry)		11-40 days		
temperature (warm, normal, cold)	Digital data of seasonal forecast (model output)	monthly from 1983 to 2016		Password protected
200 <i>hPa</i> geopotential height				
500 <i>hPa</i> geopotential height				
sea level pressure geopotential height				
200 <i>hPa</i> zonal wind				
850 <i>hPa</i> zonal wind				
200 <i>hPa</i> meridional wind				
850 <i>hPa</i> meridional wind				
850 <i>hPa</i> air temperature				
2m air temperature				
sea surface temperature	Monitoring data (observations)	monthly from 1951 to the current year	China	free
precipitation				
temperature				
precipitation				

Table 164: Long-range forecasts from BCC

Beijing Climate Center			
Variable (Unit/Category)	Lead Time	Area	Availability
precipitation anomaly percentage probability of precipitation rate 2 m air temperature anomaly	1 to 9 months or 0 to 12 months (depending on the model)	China/Asia/Global	Graphical products freely available via Internet
probability of 2m air temperature 500 hPa height and its anomaly 200 hPa height and its anomaly 200 hPa zonal wind and its anomaly		Global	
850 hPa wind anomaly		Asia	
TOA upward LW flux and its anomaly snow depth 0 – 9 cm soil moisture 0 – 9 cm soil moisture anomaly 0 – 9 cm soil temperature and its anomaly Sea Surface Temperature and its anomaly 850 hPa air temperature and its anomaly		Global	

Table 165: Seasonal forecasts from BCC

CENTER FOR WEATHER FORECASTS AND CLIMATE STUDIES / NATIONAL INSTITUTE FOR SPACE RESEARCH

Center for Weather Forecasts and Climate Studies (CPTEC) / National Institute for Space Research (INPE)					
	Variable (Unit)	Lead time	Forecast period	Area	Availability
Ensemble mean	precipitation seasonal anomaly temperature seasonal anomaly 500 hPa geopotential height anomaly Sea level pressure anomaly	1 month	3 months	global	Public via Internet
Most likely tercile	precipitation temperature				

Table 166: Seasonal forecasts from CPTEC

EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS

European Centre for Medium-Range Weather Forecasts (ECMWF)					
Variable	Forecast type and skill measures	Base time	Climatology	Area	Availability
2 m temperature	tercile summary	Up to 13 months ahead		Tropics East Asia Africa South America	Charts for public via Internet
precipitation	ensemble mean				
mean sea level precipitation	probability exceeding median				
	probability for lower third of the distribution				
	probability for middle third of the distribution				
sea surface temperature	probability for upper third of the distribution				
	probability for lowest 20%				
	probability for highest 20%				
Niño sea surface temperature	plumes	Up to 7 months ahead	1981-2010	NINO3	Charts for public via Internet
plume	root mean square error			NINO3.4	
	mean square error skill scores			NINO4	

Table 167: Seasonal forecasts from ECMWF

EXETER - MET OFFICE

Exeter, Met Office				
Variable	Lead time	Category	Area	Availability
2 m temperature precipitation 850 hPa temperature 500 hPa geopotential height pressure Sea surface temperature	1 to 3-months	Ensemble mean and probability (tercile categories, outer tercile categories, two categories)	global	Probability maps for public via Internet Skill maps for public via Internet Ensemble mean maps for public via Internet
Tropical Pacific sea surface temperature	-	ensemble forecast	Central Tropical Pacific (NINO3.4) Eastern/Central Tropical Pacific (NINO3) Western/Central Tropical Pacific (NINO4) Region off coasts of Peru and Chile (NINO1.2)	Diagrams for public via Internet
Tropical Atlantic and Indian Ocean sea surface temperature	-	-	Western Tropical Indian Ocean Southeastern Tropical Indian Ocean Indian Ocean Dipole Tropical North Atlantic Tropical South Atlantic Tropical Atlantic Dipole	Diagrams for public via Internet

Table 168: Seasonal forecasts from Exeter

MONTREAL - METEOROLOGICAL SERVICE OF CANADA

Montreal, Meteorological Service of Canada						
Variables	Forecast	Hindcast	Types	Resolution	Area	Availability
500 hPa geopotential height precipitation rate 850 hPa temperature 2 m temperature 200 hPa zonal wind 800 hPa zonal wind 200 hPa meridional wind 800 hPa meridional wind mean sea level pressure surface water temperature	monthly to multi-seasonal forecasts extending to 12 months	climatology based on series of historical forecasts covering the period 1981-2010	monthly	2.5° latitude × 2.5° longitude	global	forecast available for public via Internet (GRIB2 format) hindcast available for public via Internet (GRIB2 format)

Table 169: Seasonal forecasts from Montreal

MOSCOW - HYDROMETEOROLOGICAL CENTRE OF RUSSIA

Moscow, Hydrometeorological Centre of Russia				
Variables	Lead Time	Category	Area	Availability
2 m temperature anomalies	1-month	below, near and above normal	Global, CIS territory	Graphics for public
precipitation anomalies				

Table 170: Seasonal forecasts from the Hydrometeorological Centre of Russia, Moscow

PRETORIA - SOUTH AFRICAN WEATHER SERVICES

Pretoria, South African Weather Services					
Variable	Lead time	Forecast period	Category	Area	Availability
2m temperature	1-month	3 consecutive months	most likely category (in term of percentile)	global	Graphics for public
precipitation	2-month, 3-month				

Table 171: Seasonal forecasts from Pretoria

SEOUL - KOREA METEOROLOGICAL ADMINISTRATION

Seoul, Korea Meteorological Administration					
Variable	Lead time	Period of forecast	Category	Area	Availability
2m temperature	1-month	1 month or 3 months	determinist forecast, probabilistic forecast (below normal, near normal, above normal)	Global	Graphics for public
850 hPa temperature					
precipitation	2-month	1 month			
500 hPa geopotential height	3-month	1 month			
sea surface temperature					
mean sea level pressure					
Sea ice concentration	1 to 6-month	1 month	-	Arctic	
Arctic Oscillation	1-month	6 months	-		
East Asian Monsoon Index					
East Asian Winter Monsoon Index					
Indian Monsoon Index					
Northern Oscillation Index					
Pacific/North American Pattern Index					
Regional Monsoon Index					
Southern Oscillation Index					
Western North Pacific-East Asian					
Summer Monsoon Index					
Webster-Yang Index					

Table 172: Seasonal forecasts from KMA

TOKYO - JAPAN METEOROLOGICAL AGENCY / TOKYO CLIMATE CENTER

Tokyo, Japan Meteorological Agency / Tokyo Climate Center					
Variables	Lead time	Period of forecast	Category	Area	Availability
500 hPa geopotential height 850 hPa temperature		first week of the month (3-9 day) second week of the month (10-16 day) third and fourth week of the month (17-30 day) 28 days mean (3-30 day)	ensemble mean forecast	Northern hemisphere	Graphical products available for public Hindcast gridded data (1981- 2010) available only for registered NMHSs
sea level pressure				60°N-60°S Asia	Graphical products available for public Hindcast gridded data (1981- 2010) available only for registered NMHSs
500 hPa geopotential height 2 m temperature precipitation sea surface temperature anomaly sea level pressure 200 hPa velocity potential 200 hPa stream function 850 hPa stream function					

Table 172: Seasonal forecasts from TCC

Tokyo, Japan Meteorological Agency / Tokyo Climate Center					
Variables	Lead time	Period of forecast	Category	Area	Availability
500 hPa geopotential height 850 hPa temperature sea level pressure			ensemble mean forecast and spread	Northern hemisphere	Graphical products available for public Hindcast gridded data (1981-2010) available only for registered NMHSs
500 hPa geopotential height 2 m temperature precipitation sea surface temperature anomaly sea level pressure 200 hPa velocity potential 200 hPa stream function 850 hPa stream function 850 hPa stream function and 850 hPa wind vector		first month second month third month 3 months mean	ensemble mean forecast		Graphical products available for public
500 hPa geopotential height 2 m temperature precipitation sea surface temperature anomaly sea level pressure			mask the ensemble mean with the area where mean square skill score is negative	60°N-60°S Asia	Hindcast gridded data (1981-2010) available only for registered NMHSs
500 hPa geopotential height 2 m temperature precipitation sea surface temperature anomaly sea level pressure 200 hPa velocity potential 200 hPa stream function 850 hPa stream function			spread and anomaly		

Table 173: Seasonal forecasts from TCC

Tokyo, Japan Meteorological Agency / Tokyo Climate Center					
Variables	Lead time	Period of forecast	Category	Area	Availability
500 hPa geopotential height 850 hPa temperature sea level pressure	~ 2-months	3 months mean (June-July-August for the warm season and December-January- February for the cold season)	ensemble mean forecast and spread	Northern hemisphere	Graphical products available for public Hindcast gridded data (1981- 2010) available only for registered NMHSs
500 hPa geopotential height 2 m temperature precipitation sea surface temperature anomaly sea level pressure 200 hPa velocity potential 200 hPa stream function 850 hPa stream function 850 hPa stream function and 850 hPa wind vector			ensemble mean forecast	60°N-60°S Asia	Graphical products available for public Hindcast gridded data (1981- 2010) available only for registered NMHSs
500 hPa geopotential height 2 m temperature precipitation sea surface temperature anomaly sea level pressure			mask the ensemble mean with the area where mean square skill score is negative		
500 hPa geopotential height 2 m temperature precipitation sea surface temperature anomaly sea level pressure 200 hPa velocity potential 200 hPa stream function 850 hPa stream function			spread and anomaly		

Table 174: Seasonal forecasts from TCC

Tokyo, Japan Meteorological Agency / Tokyo Climate Center						
Variables	Lead time	Period of forecast	Category	Climatology	Area	Availability
2 m temperature	1-day to 25-day	7 days average	probabilistic forecasts (below normal, normal, above normal)	1981-2010	Southeast Asia	Graphical products and data available for public
precipitation	1-day to 18-day	14 days average				

Table 175: Seasonal forecasts from TCC

Tokyo, Japan Meteorological Agency / Tokyo Climate Center					
Variables	Lead time	Period of forecast	Category	Area	Availability
average temperature	0-month,	3-month	probabilistic forecasts (below normal, normal, above normal)	Japan	Graphical products available for public
precipitation					
sunshine	1-, 2-month	one month			
snowfall					

Table 176: Seasonal forecasts in Japan

Tokyo, Japan Meteorological Agency / Tokyo Climate Center					
Variable	Forecast type and skill measures	Period of forecast	Climatology	Area	Availability
NINO.1+2	anomaly data bias-corrected data	3 months	1981-2010	Region off coasts of Peru and Chile	Charts for public
NINO.3				Eastern/Central Tropical Pacific	
NINO 3.4				Central Tropical Pacific	
NINO.4				Western/Central Tropical Pacific	
TNA				Tropical North Atlantic	
TSA				Tropical South Atlantic	
TAD				Tropical Atlantic Dipole	
WTIO				Western Tropical Indian Ocean	
SETIO				Southeastern Tropical Indian Ocean	
IOD				Indian Ocean Dipole	

Table 177: ENSO indices

TOULOUSE - MÉTÉO-FRANCE

Toulouse, Météo-France				
Variables	Lead time	Resolution	Area	Availability
mean geopotential height mean temperature mean precipitation	6-month	2.5° latitude × 2.5° longitude	global	GRIB/ASCII format charge apply

Table 178: Seasonal forecasts from Météo-France

WASHINGTON - CLIMATE PREDICTION CENTER / NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Washington, Climate Prediction Center / National Oceanic and Atmospheric Administration						
Variables	Category	Lead time	Forecast period	Climatological base period	Area	Availability
Temperature	probabilistic (above, normal below)	0.5-, 1.5-, 2.5-, 3.5-, 4.5-, 5.5-, 6.5-, 7.5-, 8.5-, 9.5-, 10.5-, 11.5, 12.5-month	all seasons	1981-2010	USA	Graphical products available to public
Precipitation						

Table 179: Seasonal forecasts of probability of deviations from normal temperature and precipitation

Washington, Climate Prediction Center / National Oceanic and Atmospheric Administration						
Variables	Category	Lead time	Forecast period	Archive	Area	Availability
Temperature	probabilistic (above, normal below)	1-month	all months and seasons	from October 1995 to current date	USA	Graphical products and data to download (ASCII format) available to public
Precipitation						

Table 179: Archive of monthly and seasonal forecasts from October 1995 to current date

ASIA-PACIFIC ECONOMIC COOPERATION CLIMATE CENTER

Asia-Pacific Economic Cooperation Climate Center (APEC)					
Variables	Category	Lead time	Forecast period	Area	Availability
precipitation 2 m temperature 850 hPa temperature 500 hPa geopotential height sea surface temperature	probabilistic et deterministic MME forecast	1-,2-,3-,4-, 5-, 6-month	3 consecutive months	global	Graphical products available to public

Table 180: Seasonal forecasts from APCC, using MME scheme

Asia-Pacific Economic Cooperation Climate Center (APEC)			
Variables	Lead time	Forecast period	Availability
Niño3 index Niño3.4 index Niño4 index Niño1+2 index ENSO Modoki index IOD index	1-month	6 consecutive months	Graphical products available to public
SST anomaly	1-month and 4-month	3 consecutive months	

Table 181: Sea surface temperature and ENSO long-range forecasts from APCC

AFRICAN CENTRE OF METEOROLOGICAL APPLICATION FOR DEVELOPMENT

African Centre of Meteorological Application for Development (ACMAD)					
Variables	Category	Lead time	Forecast period	Area	Availability
Precipitation	probabilistic	1-month and 2-month	3 consecutive months	Africa	Graphical products available to public
Temperature					

Table 182: *Seasonal forecasts from ACMAD*

INTERNATIONAL RESEARCH INSTITUTE FOR CLIMATE AND SOCIETY

International Research Institute for Climate and Society						
Variables	Category	Lead time	Forecast period	Climatological base period	Area	Availability
Temperature	probabilistic (above, normal below)	1-,2-,3-,4- month	3 consecutive months	1981-2010	global	Graphical products available to public
Precipitation						

Table 183: Probabilistic seasonal forecasts for temperature and precipitation for the next six months into the future

International Research Institute for Climate and Society						
Variables	Category	Lead time	Forecast period	Climatological base period	Area	Availability
Precipitation	probabilistic	1-month	3 consecutive months	not indicated	global	Graphical products available to public

Table 184: Likelihood of 3-month precipitation. Maps that can be used for humanitarian decision-making around the world, developed by IRI and the International Federation of Red Cross and Red Crescent Societies.

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room							
Tool	Data source	Variables	Lead time	Forecast period	Period	Area	Availability
US-Mexico Drought Prediction Tool: SPI Multi-Model Ensemble Forecast	CPC Global Unified Combined Retrospective and Real-Time Precipitation Data, U. S. Climate Prediction Center	Probabilistic forecasts of drought using a forecast of the Standardized Precipitation Index based upon forecast precipitation from the IRI Multi-Model Ensemble and the SPI Persistence methods (SPI; 3, 6, 9, or 12-month accumulation periods)	1 and 2-month	one month	from 2009 to current date	United States and Mexico	graphical products and data available to public
US-Mexico Drought Prediction Tool: SPI Persistence Forecast		Probabilistic forecasts of drought using a forecast of the Standardized Precipitation Index based upon the SPI Persistence method (SPI; 3, 6, 9, or 12-month accumulation periods)			from 1979 to current date		
US Climate Divisions Drought Prediction Tool: SPI Multi-Model Ensemble Forecast	Monthly precipitation totals from U.S. nClimDiv Version 1 climate divisions, U. S. National Climatic Data Center	Probabilistic forecasts of drought using a forecast of the Standardized Precipitation Index based upon forecast precipitation from the IRI Multi-Model Ensemble and the SPI Persistence methods. (SPI; 3, 6, 9, or 12-month accumulation periods)			from 2013 to current date	United States	
US Climate Divisions Drought Prediction Tool: SPI Persistence Forecast		Probabilistic forecasts of drought using a forecast of the Standardized Precipitation Index based upon the SPI Persistence method (SPI; 3, 6, 9, or 12-month accumulation periods)			from 1895 to current date		

Table 185: US-Mexico and US Climate Divisions Drought Prediction Tool for SPI Multi-Model Ensemble Forecast and SPI Persistence Forecast

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room							
Variables	Probability	Lead time	Forecast period	Climatological period	Period	Area	Availability
Temperature	exceeding or non-exceeding percentile or temperature/precipitation	0 to 2-month	3 consecutive months	flexible	from 2012 to current date	global	graphical products and data available to public
Precipitation							

Table 186: Flexible probabilistic seasonal forecast from multi-model ensembles based on the historical performance of those models

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room							
Variables	SST forcing	Lead time	Forecast period	Climatological period	Period	Area	Availability
2 m temperature	ASST, PSST, SSST	0 to 2-month	3 consecutive months	1981-2010 1971-2000 1969-1998 1961-1990	from 2004 to current date	global	graphical products and data available to public
2 m temperature anomaly							
Precipitation							
Precipitation anomaly							
Percent of median precipitation							
500 hPa geopotential height							
500 hPa geopotential height anomaly							
500 hPa geopotential height zonal anomaly							

Table 187: Temperature, precipitation and 500 hPa geopotential height forecasts from Individual Atmospheric General Circulation Models. The forecasts can be viewed with different SST forcing.

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room							
Variables	SST forcing	Lead time	Forecast period	Climatological period	Period	Area	Availability
Sea Surface Temperature anomaly	ASST, persisted	0 to 5-month	3 consecutive months	1969-1998 reconstructed SST	from 2007 to current date	global	graphical products and data available to public

Table 188: Sea Surface Temperature forecasts contains forecast SST anomalies for the tropical oceans and damped-persisted observed SST anomalies for the mid-latitude oceans.

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room					
Variables	Lead time	Forecast period	Period	Area	Availability
Precipitation	1 to 4-month	3 consecutive months	from 1997 to current date	global	graphical products and data available to public
Temperature					

Table 189: IRI seasonal forecasts for above, normal and below normal precipitation and temperature

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room				
Variables	Resolution	Period	Area	Availability
Reversed Tendency Between Forecast and 12-Month Precipitation Observation	2.5° latitude x 2.5° longitude	from 2001 to current date	global	graphical products and data available to public
Reversed Tendency Between Forecast and 3-Month Precipitation Observation				
Same Tendency in Forecast and 12-Month Precipitation Observation				
Same Tendency in Forecast and 3-Month Precipitation Observation				

Table 190: The two first maps identify regions where there has been below-normal or above-normal precipitation during the previous 12 or 3 months and where the IRI seasonal precipitation forecast for the next 3 months indicates an enhanced likelihood of a reversal of these precipitation conditions. The two latest maps identify regions where there has been below-normal or above-normal precipitation during the previous 12 or 3 months and where the IRI seasonal precipitation forecast for the next 3 months indicates an enhanced likelihood of a continuation of these precipitation conditions

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room							
Variables	Type of forecast	Lead time	Forecast period	Climatological Period	Period	Area	Availability
2 m temperature Sea Surface Temperature Precipitation	North American Multimodel Ensemble monthly anomalies	0.5, 1.5, 2.5, 3.5, 4.5, 5.5, 6.5, 7.5, 8.5-month	one month	1982-2010	from 1982 to current date	global	graphical products and data available to public
2m temperature Sea Surface Temperature Precipitation	North American Multimodel Ensemble Seasonal Anomalies	1 to 7-month	3 consecutive months				

Table 191: The North American Multimodel Ensemble monthly anomalies and seasonal anomalies

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room							
Variables	Type of forecast	Lead time	Forecast period	Climatological Period	Period	Area	Availability
2 m temperature Sea Surface Temperature Precipitation	North American Multimodel Ensemble Hindcast Monthly Climatology	0.5, 1.5, 2.5, 3.5, 4.5, 5.5, 6.5, 7.5, 8.5-month	one month	1982-2010	from 1982 to current date	global	graphical products and data available to public
2m temperature Sea Surface Temperature Precipitation	North American Multimodel Ensemble Hindcast Seasonal Climatology	1 to 7-month	3 consecutive months				

Table 192: *The North American Multimodel Ensemble hindcast monthly climatology and hindcast seasonal climatology*

International Research Institute for Climate and Society (IRI) IRI Climate and Society Map Room						
	Variables	Lead time	Forecast period	Period	Area	Availability
Precipitation	Rainfall Rainfall anomaly Percent of median Probability of exceeding Probability of non-exceeding	1-, 2-, 3-, 4-month	3 consecutive months	from 2012 to current date	Indonesia, South Asia, Philippines, Brazil	graphical products and data available to public
	Temperature Temperature anomaly Percent of median Probability of exceeding Probability of non-exceeding				South Asia	

Table 193: *Seasonal deterministic forecasts*

WMO REGIONAL CLIMATE CENTER

Pune – India Meteorological Department Seasonal Climate Outlook for South Asia					
Variables	Lead time	Forecast period	Period	Area	Availability
Precipitation anomalies	0-, 1-month	3 consecutive months	from 2015 to current date	South Asia	Outlook available to public
Temperature anomalies					

Table 194: Regional products from IMD. IMD, a WMO RCC in demonstration phase produces seasonal climate outlook for South Asia, in addition to the SASCOF.

Centro Internacional para la Investigación del Fenómeno de El Niño						
Variables	Category	Lead time	Forecast Period	Period	Area	Availability
Precipitation Mean Sea Level Pressure 850 hPa temperature 2m temperature 500 hPa geopotential height	probabilistic	1-month	3 consecutive months	from 2014 to current date	South America	Graphical products available to public
Precipitation Mean Sea Level Pressure 850 hPa temperature 2m temperature 500 hPa geopotential height Sea Surface temperature	deterministic			-		

Table 195: Seasonal probabilistic and deterministic forecast from CIIFEN

RCC-Network for Southern South America Argentina						
Variables	Category	Lead time	Forecast Period	Period	Area	Availability
Precipitation and precipitation anomalies	deterministic and probabilistic	1-month	3 consecutive months	from 2014 to current date	Southern South America (Argentina, Bolivia, Brazil, Chile, Paraguay and Uruguay)	Graphical products available to public
Temperature anomalies						

Table 196: *Deterministic and probabilistic seasonal forecasts from RCC-Network-SSA (node: Argentina)*

Caribbean Regional Climate Centre					
Variables	Time scale	Forecast period	Period	Area	Availability
Standardized Precipitation Index outlook	1-month, 3-month, 6-month, 12-month	3 consecutive months individually	from 2014 to current date	Caribbean countries (by stations)	Graphical products available to public

Table 197: *The SPI outlook is based on the CariCOF consensus statement*

REGIONAL CLIMATE OUTLOOK FORUM

Regional Climate Outlook Forum				
Variables	Lead time	Forecast period	Area	Availability
Precipitation, temperature	1-, 2-month	3 consecutive months	regional	Consensus statement available to public

Table 198: *There are currently 19 RCOFs which are held once or twice a year*

REGIONAL CLIMATE CENTRE-NETWORK FOR NORTH AFRICA

Regional Climate Centre-Network for North Africa					
Variables	Category	Lead time	Forecast period	Area	Availability
2 m temperature Precipitation	Probabilistic, deterministic	0-, 1-month	3 consecutive months	North Africa, Africa, Arab region, Mediterranean region	Graphical products available to public

Table 199: Seasonal forecasts for 2 m temperature and precipitation. The seasonal forecasts are issued from ARPEGE-Climate.

4. Climate change timescales

REGIONAL CLIMATE CENTRE-NETWORK FOR NORTH AFRICA

Regional Climate Centre-Network for North Africa						
Variables	Climatological period	Future period	Season	Scenario	Area	Availability
Mean precipitation Mean temperature Total number of high precipitation events Maximum consecutive dry days	1971-2000	2021-2050	DJF, MAM, JJA, SON, annual	IPCC-A1B	North Africa	Graphical products available to public

Table 200: Climate scenario in North Africa. Future changes projected by ARPEGE-Climate model under the scenario IPCC-A1B

COORDINATED REGIONAL CLIMATE DOWNSCALING EXPERIMENT

CORDEX-East Asia						
Variables	Climatological period	Future period	Season	Scenario	Area	Availability
Seasonal mean temperature Seasonal mean precipitation Seasonal maximum temperature Seasonal minimum temperature Seasonal extreme precipitation	1979-2005	2024-2049	JJA, DJF	RCP 8.5	East Asia	Graphical products available to public

Table 201: Future projections of CORDEX-East Asia for seasonal means and seasonal extremes of daily mean surface air temperature and daily precipitation

MED-CORDEX						
Variables	Climatological period	Future period	Season	Scenario	Area	Availability
2-metre Air Temperature Daily-Maximum 2-metre Air Temperature Daily-Minimum 2-metre Air Temperature Precipitation Surface Pressure Mean Sea Level Pressure 2-metre Specific Humidity 10-metre Wind Speed Near-Surface Wind Speed Daily-Maximum 10-metre Wind Speed Total Cloud Cover Sunshine Hours Surface Downwelling Shortwave Radiation Surface Downwelling Longwave Radiation Surface Latent Heat Flux Surface Sensible Heat Flux Upwelling Surface Shortwave Radiation Upwelling Longwave radiation Surface Evaporation Potential Evapotranspiration Soil Frozen Water Content Surface Runoff Total Runoff Total Soil Moisture Content Surface Snow Amount Snow Melt Maximum 1-hour Precipitation Rate within 24 hour period Convective Precipitation TOA Outgoing Longwave Radiation TOA Incident Shortwave Radiation TOA Outgoing Shortwave Radiation Eastward 10-metre Wind Northward 10-metre Wind	1981-2005 minimum, 1950-2005 advised	2011-2040 or 2041-2070 minimum, 2006-2100 advised	all	RCP8.5 RCP4.5	Mediterranean domain (MED-44)	Data available only to HyMeX and MED- CORDEX users, need to login (only for research purposes)

Table 202: Simulated parameters in MED-CORDEX (part 1/6)

MED-CORDEX						
Variables	Climatological period	Future period	Season	Scenario	Area	Availability
Maximum 10-metre Gust Wind Speed Surface Downward Eastward Wind Stress Surface (Skin) Temperature Atmospheric Boundary Layer Thickness Column Water Vapour Column Condensed (liquid+ice) Water Content Column Ice Water Content Zonal (eastward) Wind at 850 hPa Meridional (northward) Wind at 850 hPa Temperature at 850 hPa Specific Humidity at 850 hPa Zonal (eastward) Wind at 500 hPa Meridional (northward) Wind at 500 hPa Geopotential Height at 500 hPa Temperature at 500 hPa Zonal (eastward) Wind at 200 hPa Meridional (northward) Wind at 200 hPa Temperature at 200 hPa Geopotential Height at 200 hPa High Clouds (p<440hPa) Medium Clouds (680 hPa > p >440 hPa) Low Clouds (p>680hPa) Snow Area Fraction Snow Depth Sea Ice Area Fraction Snowfall Flux Atmosphere Grid-Cell Area Surface Altitude Land Area Fraction Fraction of Grid Cell Covered with Glacier Capacity of Soil to Store Water Maximum Root Depth	1981-2005 minimum, 1950-2005 advised	2011-2040 or 2041- 2070 minimum, 2006-2100 advised	all	RCP8.5 RCP4.5	Mediterranean domain (MED-44)	Data available only to HyMeX and MED- CORDEX users, need to login (only for research purposes)

Table 203: Simulated parameters in MED-CORDEX (part 2/6)

MED-CORDEX						
Variables	Climatological period	Future period	Season	Scenario	Area	Availability
sea_water_potential_temperature Sea_water_salinity sea_water_x_velocity sea_water_y_velocity sea_surface_height sea_surface_temperature sea_surface_salinity ocean_mixed_layer_defined_by_sigma_t water_flux_into_sea_water surface_heat_flux Sea Water Potential Temperature Sea Water Salinity Sea Surface Temperature Sea Surface Salinity sea_water_pressure_at_sea_water_surface gibraltar_net_water_flux net gibraltar_net_water_flux_in x_velocity >0 gibraltar_heat_flux net gibraltar_heat_flux_in heat flux >0 sea_surface_height sea_surface_height_at_the_western_boundary Surface Water Flux Water Evaporation Flux Snow Sublimation Flux Specific Humidity at 200 hPa Specific Humidity at 500 hPa Specific Humidity at 925 hPa Deep Soil Frozen Water Content Toa Longwave Crf Toa Clearsky Net Longwave Flux Surface Northward Gravity Wave Drag Convective Rainfall Flux Surface Net Longwave Flux in Air Surface Non Solar Flux Surface Net Shortwave Flux in Air	1981-2005 minimum, 1950-2005 advised	2011-2040 or 2041- 2070 minimum, 2006-2100 advised	all	RCP8.5 RCP4.5	Mediterranean domain (MED-44)	Data available only to HyMeX and MED- CORDEX users, need to login (only for research purposes)

Table 204: Simulated parameters in MED-CORDEX (part 3/6)

MED-CORDEX						
Variables	Climatological period	Future period	Season	Scenario	Area	Availability
Toa Net Shortwave Flux Largescale Rainfall Flux Rainfall Flux Toa Shortwave Crf Toa Clearsky Net Shortwave Flux Air Temperature at 925 hPa Soil Temperature Northward Wind at 10 hPa Northward Wind at 925 hPa Deep Soil Liquid Water Content Surface Soil Liquid Water Content Geopotential Height at 850 hPa Geopotential Height at 925 hPa Surface Eastward Gravity Wave drag convective_cloud_area_fraction Surface Water Evap Latent Heat Flux Surface Snow Subl Latent Heat Flux Specific Humidity at 10 hPa Specific Humidity at 100 hPa Specific Humidity at 1000 hPa Specific Humidity at 150 hPa Specific Humidity at 250 hPa Specific Humidity at 30 hPa Specific Humidity at 300 hPa Specific Humidity at 400 hPa Specific Humidity at 50 hPa Specific Humidity at 600 hPa Specific Humidity at 70 hPa Specific Humidity at 700 hPa Specific Humidity at Model Lowest Level	1981-2005 minimum, 1950-2005 advised	2011-2040 or 2041- 2070 minimum, 2006-2100 advised	all	RCP8.5 RCP4.5	Mediterranean domain (MED-44)	Data available only to HyMeX and MED-CORDEX users, need to login (only for research purposes)

Table 205: Simulated parameters in MED-CORDEX (part 4/6)

MED-CORDEX						
Variables	Climatological period	Future period	Season	Scenario	Area	Availability
Northward Wind at Model Lowest Level Air Temperature at Model Lowest Level Geopotential Height at Model Lowest Level Eastward Wind at Model Lowest Level Convective Snowfall Flux Largescale Snowfall Flux Air Temperature at 10 hPa Air Temperature at 100 hPa Air Temperature at 1000 hPa Air Temperature at 150 hPa Air Temperature at 250 hPa Air Temperature at 30 hPa Air Temperature at 300 hPa Air Temperature at 400 hPa Air Temperature at 50 hPa Air Temperature at 600 hPa Air Temperature at 70 hPa Air Temperature at 700 hPa Northward Wind at 100 hPa Northward Wind at 1000 hPa Northward Wind at 150 hPa Northward Wind at 250 hPa Northward Wind at 30 hPa Northward Wind at 300 hPa Northward Wind at 400 hPa Northward Wind at 50 hPa Northward Wind at 600 hPa Northward Wind at 70 hPa Northward Wind at 700 hPa Geopotential Height at 10 hPa Geopotential Height at 100 hPa Geopotential Height at 1000 hPa Geopotential Height at 150 hPa Geopotential Height at 250 hPa	1981-2005 minimum, 1950-2005 advised	2011-2040 or 2041- 2070 minimum, 2006-2100 advised	all	RCP8.5 RCP4.5	Mediterranean domain (MED-44)	Data available only to HyMeX and MED-CORDEX users, need to login (only for research purposes)

Table 206: Simulated parameters in MED-CORDEX (part 5/6)

MED-CORDEX						
Variables	Climatological period	Future period	Season	Scenario	Area	Availability
Geopotential Height at 30 hPa Geopotential Height at 300 hPa Geopotential Height at 400 hPa Geopotential Height at 50 hPa Geopotential Height at 600 hPa Geopotential Height at 70 hPa Geopotential Height at 700 hPa Total Evapotranspiration Large Scale Precipitation Flux Column Integrated Eastward Moisture Flux Column Integrated Northward Moisture Flux Lagrangian Tendency of Air Pressure Net Longwave Net Solar Absorbed Foliage Temperature Precipitation Accumulation Vertical Velocity surface_temperature_from_atmospheric_model net_downward_shortwave_flux_at_sea_water_surface surface_downward_x_stress surface_downward_y_stress surface_downward_heat_flux_in_sea_water water_flux_into_sea_water_without_runoff_without_flux_correction sea_surface_height_above_geoid surface_average_water_flux_into_sea_water air_pressure_at_sea_level_from_atmospheric_model	1981-2005 minimum, 1950-2005 advised	2011-2040 or 2041-2070 minimum, 2006-2100 advised		RCP8.5 RCP4.5	Mediterranean domain (MED-44)	Data available only to HyMeX and MED- CORDEX users, need to login (only for research purposes)

Table 207: Simulated parameters in MED-CORDEX (part 6/6)

ENVIRONMENT CANADA

Environment Canada					
Variables	Climatological period	Future period	Scenario	Area	Availability
5-year mean surface air temperature	1981-2000 1971-1990	2000-2100 1991-2100	A1B, B1, A2, GHG+A1, GHG+A2, GHG+A3	Global	Graphical products available to public, and data also available to public but need to register
Mean precipitation					
5-year mean precipitation rate					
Mean sea ice					
5-year soil moisture					