



CLIPC DELIVERABLE (D -N°: 5.1)

Climate dataset inventory

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Abstract

CLIPC will provide a single point of access for a comprehensive range of climate data products. This deliverable creates an initial inventory consisting of high value products selected to cover a broad range of data types. Data from this inventory will be prioritised for publication in CLIPC in order to demonstrate and evaluate the capabilities of the harmonised data access services.

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Executive Summary

This document presents a summary of long term climate datasets identified by the CLIPC project as being of potential relevance for the creation of impact indicators and which can feasibly be provided by the project through the harmonised data access system.

CLIPC will provide access to data through several routes. The architecture is designed to avoid unnecessary data movement and duplication of storage costs. Three major categories: (A) data which will be held by CLIPC partners and will be (re-)published through the harmonised interface, (B) data which is available elsewhere through services which are compatible with the harmonised interface will be available in a transparent manner, (C) data which will be worked on in CLIPC and published by a CLIPC partner, (D) data which will be linked to, but will not be brought into the harmonised.

The data collections mentioned in the description of work are reviewed, and additional details on the plans for their incorporation in CLIPC are provided.

Details of the harmonised data services will be in the architecture document, but the guiding principle will be provision of flexible access to the data, including sub-setting, visualization and bulk download.

1. Overview

The aim of the CLIPC dataset inventory is to present, in one unified form, an initial summary of data that work package 5 aims to make available through the harmonized data access layer. Data will be selected according to scientific and project priorities. The project is developing a framework for delivery of comprehensive data delivery. It is not expected to archive this within the project: further work will be needed in the Copernicus Climate Change Service (C3S). Within the C3S arrangements for the procurement of datasets will provide a rigorous administrative framework. The CLIPC project aims to ensure that the technical framework can support the key types of data required for the climate services. For this reason it is necessary to ensure that a broad range of data types are published in within the project.

The data collections to be targeted are reviewed in section 2. The list reflects the commitments made in the Description of Work (DoW), with the addition of the “ana4MIPs” collection of global re-analyses, which has become available since the DoW was finalised and represents a high value data collection with a low barrier to inclusion.

Each data source varies considerably in its geospatial and temporal coverage, sampling resolution and quality control measures and this variation affects the utility of different properties that are available from multiple sources, such as surface temperature. Therefore the inventory gives particular prominence to these features.

The Earth System Grid Federation (ESGF) distributed archive system will provide a core harmonisation layer. Some data will be brought into the system by creating bespoke copies of the data which can be published in ESGF. Significant volumes of data will also be brought in by making direct links to existing archive services provided through the ECMWF MARS system and planned services to be provided through the ESA ngEO system.

2. Data collections

2.1 Observations from space

ESA Climate Change Initiative (CCI)

The ESA Climate Change Initiative aims to provide stable, long-term, satellite-based Essential Climate Variable (ECV) data products for climate modelers and researchers based on the long-term global Earth Observation archives that ESA, together with its member states, has established over the last thirty years. The first phase of the CCI involved a considerable amount of research and evaluation of techniques. The 2nd phase, which is getting under way, will initiate operational data delivery. CCI will also fund a portal for dissemination of the CCI products to the climate science community¹. CLIPC will work closely with the CCI portal operators.

ESA-CCI is divided into 13 datasets, each covering an ECV category: Aerosol, Cloud, Fire, GHG, Glaciers, Ice Sheets, Land cover, Ocean colour, Ozone, Sea ice, Sea level, Soil moisture and Sea surface temperature. Each dataset is developed and managed by different institutions and are at different stages of readiness. CLIPC has identified two CCI datasets that are suitable for early inclusion in the harmonised data access system: Sea Surface Temperature and Ocean Colour. These are suitable for early inclusion as they are already available in the STFC data archives. These data will be published in ESGF to test the system configuration and gain early experience with this class of data before the CCI portal becomes active.

Other CCI products will be added as the ESA CCI portal project develops. CLIPC will work with the CCI portal development team to ensure that ESGF services run by the portal are compatible with CLIPC services.

EUMETSAT Satellite Application Facility on Climate Monitoring (CMSAF).

The EUMETSAT CMSAF provides access to a wide range of data products relevant to climate science and the monitoring of climate. The range of data available is expanding.

¹Tenders for the operation of the CCI portal were submitted in December 2014.

EUMETSAT has a mature and well worked out data referencing system: each variable is assigned a 3 letter code which is then used in file names and file metadata. Integration of EUMETSAT data into the harmonised data services will require a mapping between the EUMETSAT system of data referencing and that developed within the ESA CCI. This will be discussed further in MS19.

34 merged climate data records from polar orbiting satellites provide global records. There are an additional 14 records from METEOSAT. At this stage the data in climate data records covers three ECVs: Cloud, surface albedo and surface radiation.

Quality Assurance for Essential Climate Variables (QA4ECV)

The QA4ECV project, running in parallel with CLIPC, will generate additional Essential Climate Variable (ECV) data records which are not covered by EUMETSAT and ESA CCI. CLIPC will liaise with QA4ECV to ensure that CLIPC services can provide support for dissemination of QA4ECV products.

Observations for Model Inter-comparison Projects (Obs4MIPs)

The OBS4MIPS project re-publishes a range of observational datasets through ESGF in a format which is consistent with the CMIP climate projections, facilitating evaluation of those projections. Coercing the observational data into the CMIP format is achieved with the loss of information about data quality and uncertainty which is normally kept in the data files to ensure appropriate usage. Data is transformed onto a grid which is comparable in resolution to the CMIP5 Earth System models (i.e. those models which represent a comprehensive range of the physical processes targeted for investigation in CMIP5), which, in some cases, results in significant loss of resolution.

ESA Next Generation Earth Observation archive (ngEO)

The ESA ngEO archive service will provide a rich a flexible set of data discovery, access and transformation services. NgEO is still in a development phase, CLIPC will provide a proof of concept demonstration of interoperability with CLIPC services.

2.2 Global re-analysis

European Reanalysis of Global Climate Observations[2] (ERA-CLIM[2])

ERA-CLIM provides a re-analysis of the atmospheric observations in the 20th century. The FP7 project ERA-CLIM2, running in parallel of CLIPC, will extend the scientific scope of ERA-CLIM by incorporating ocean model and observations into the re-analysis system.

Re-analysis data for model inter-comparison projects (ANA4MIPS)

The ANA4MIPS project is publishing a range of global re-analysis data products through the ESGF system. This data collection includes 75 variables in a format compatible with the CMIP climate projections.

Institution	Project	Notes	Time range
European Centre for Medium-range Weather forecasting (ECMWF)	ERA-Interim	Of shorter duration than ERA-CLIM, this dataset does not capture long term trends, but is widely used for process studies.	1979-present
Japan Meteorological Agency (JMA) and Central Research Institute for Electric Power Industry (CRIEPI)	Japanese 55-year Reanalysis (JRA-55) [JRA-25 is also on the system]	The JRA-25 collection is deprecated, but was cited by IPCC AR5	1979-present

NASA Global Modeling and Assimilation Office (GMAO)	Modern-era Retrospective Analysis for Research and Applications (MERRA)		1979-present
NOAA National Center for Environmental Prediction (NCEP)	Climate Forecast System Reanalysis (CFSR)		1979-present
NOAA Earth System Research Laboratory (ESRL) and Colorado Univeristy Cooperative Institute for Research in Environmental Sciences (CIRES)	NOAA-CIRES 20th Century Reanalysis (20CRv2)		1871-2012

2.3 Regional re-analysis

European Reanalysis and Observations for Monitoring (EURO4M)

EURO4M² is an EU 7th framework project aiming to deliver the best possible and most complete gridded climate change time series and monitoring services covering all of Europe. It combines observations from satellites, ground-based stations and results from comprehensive model-based regional reanalyses. CLIPC will concentrate on the reanalysis products developed by EURO4M. The EURO4M products are a pre-cursor of the UERRA products, which will in turn provide the basis of operational products to be incorporated in C3S when a suitable level of maturity is reached. The **3D-VAR reanalysis**³ and the **MESAN downscaled reanalysis**⁴ are held at the Swedish Meteorological and Hydrological Institute (SMHI). As a project partner, SMHI will be making these reanalysis products available through the CLIPC system by integrating the ECMWF MARS archive system with ESGF. This work will also enable integration of further resources held in the MARS system, such as global re-analyses published by ECMWF and the International Polar Year data (see below).

2.4 In-situ observations

European Climate Assessment & Dataset (ECA&D) observational datasets (e-OBS).

The European Climate Assessment & Dataset (ECA&D) contains daily land **station observations**⁵ for up to around 10,000 stations throughout Europe and the Mediterranean. The data is provided by National Meteorological Services, Universities as well as by other data providers.

The daily station series are used to create the **E-OBS gridded dataset**⁶. E-OBS is available for the period 1950-present. Data is made available on a 0.25 and 0.5 degree regular latitude-longitude grid, as well as on a 0.22 and 0.44 degree rotated pole grid, with the north pole at 39.25N, 162W. CLIPC will initially concentrate on making the E-OBS gridded dataset available via the CLIPC portal, to exploit the benefits of the ESGF services for gridded data.

² <http://www.euro4m.eu/>

³ http://www.euro4m.eu/downloads/Factsheets/EURO4M_Factsheet_D2.03_SMHI_HIRLAM_3DVAR_V2.pdf

⁴ http://www.euro4m.eu/downloads/Factsheets/EURO4M_Factsheet_D2.04_SMHI_MESAN_V2.pdf

⁵ <http://www.ecad.eu/dailydata/index.php>

⁶ <http://www.ecad.eu/download/ensembles/ensembles.php>

Met Office Hadley Centre observations datasets (HadOBS)

The range of gridded datasets of meteorological variables for use in climate monitoring and climate modeling by the UK Met Office Hadley Centre through HadOBS⁷ provide key references for long term climate monitoring. The collection is based on a broad range of data and extends back into the 19th century, providing crucial information for the interpretation of long term trends. These datasets cover a diverse range of product types and domains including global grids of climate variables, a comprehensive set of climate indices, time series and regional aggregations. These datasets have had particular focus on quality control and long-term homogeneity. In some cases, comprehensive uncertainty assessments have also been made. This makes the datasets particularly suited to climate monitoring.

HadOBS includes a collection of climate indices: HadEX2 is a global land-based climate extremes dataset produced through the coordination of the Expert Team on Climate Change Detection and Indices (ETCCDI). It comprises of 27 indices of temperature and precipitation on a 2.5° x 3.75° grid from 1901 to 2010. The indices represent seasonal and/or annual values derived from daily station data. Data are calculated using RCLimDex/FClimDex software; developed and maintained on behalf of the ETCCDI by the Climate Research Branch of the Meteorological Service of Canada.

SeaDataNet and EMODNET (European Marine Observation Data NETWORK)

SeaDataNet and EMODNET support the MyOcean pre-operational Copernicus Ocean Monitoring service. SeaDataNet links 45 national data centres and maintains the “Common Data Inventory”, which is a common catalogue for the distributed data resources. The distributed search approach envisaged for CLIPC will be compatible with that used for the SeaDataNet portal, allowing smooth integration of the data discovery services.

International Polar Year (IPY)

IPY data are available through the MARS archive system. Integration of MARS archive services is being tested through publication of EURO4M data. In a later phase, the IPY data will be addressed.

2.5 Global climate projections

CMIP model inter-comparison

Under the World Climate Research Programme (WCRP) the Working Group on Coupled Modelling (WGCM) established the Coupled Model Intercomparison Project (CMIP) as a standard experimental protocol for studying the output of coupled atmosphere-ocean general circulation models (AOGCMs). CMIP provides a community-based infrastructure in support of climate model diagnosis, validation, intercomparison, documentation and data access. This framework enables a diverse community of scientists to analyze GCMs in a systematic fashion, a process which serves to facilitate model improvement. Virtually the entire international climate modeling community has participated in this project since its inception in 1995⁸

The CMIP5 model simulation data can be access through a partnership of collaborating data centres. The CMIP5 archive includes around 800 variables, stored at a variety of frequencies. A few variables are archived for a limited number of spatial points at 20 minute intervals, there are global surface fields at 3 hourly intervals, and 3-dimensional fields for a limited range of variables at 6 hourly intervals. A wider range of variables is available at daily, monthly and annual frequencies.

Seasonal-to-decadal climate Prediction for the improvement of European Climate Services (SPECS)

The FP7 project SPECS is delivering a set of climate simulations for the evaluation of seasonal climate projections. The data are being published through ESGF at STFC (as sub-contractors to the Catalan Climate Change Institute who are leading the SPECS project) and will thus be easily available alongside the CMIP5 data discussed below.

2.6 Regional climate projections

⁷ <http://www.metoffice.gov.uk/hadobs/>

⁸ <http://cmip-pcmdi.llnl.gov/index.html>

COordinated Regional climate Downscaling Experiment (CORDEX)

CORDEX is a WCRP-sponsored program to produce an improved generation of regional climate change projections world-wide for input into impact and adaptation studies within the AR5 timeline and beyond. The CORDEX simulations for the European domain will be provided at 11 and 44km resolution. These simulations will update the work of the FP7 ENSEMBLES project, which provided key data for a wide range of climate impact studies.

CORDEX will produce an ensemble of multiple dynamical and statistical downscaling models considering multiple forcing GCMs from the CMIP5 archive. Initially a 50 km grid spacing has been selected, favoring engagement of wider community. Multiple common domains covering most land areas in the World have been selected, including Europe.

2.7 Impact Indicators

Outputs from WP7 and WP8

Deliverable 7.1 of WP7 provides a list of indicators which are available or considered feasible for generation within CLIPC.

3. Catalogues and annotations

DWD and KNMI have trialled the use of CHARMe to annotate climate data records. CLIPC should explore the opportunities for exploiting and extending this work.

4. The CLIPC Dataset Inventory

4.1 Inventory methodology

The inventory is designed to summarise all datasets being targeted for initial inclusion in the data access system in a form which enables prioritization of these datasets by the CLIPC partners, particularly those generating impact indicators. Thus we aim to identify datasets that should be brought online early in the project.

Datasets are broken down into individual variables where possible and tabulated with spatial and temporal coverage information.

Data format is listed as an indication of how much work would be involved in harmonizing the format and metadata. When datasets are in Climate and Forecast (CF) convention compliant Network Common Data Format (NetCDF) files it should be possible to publish them through ESGF with little or no modification of the file metadata. NetCDF datasets which do not comply this convention may need reformatting to be compatible with the visualization within the CLIPC portal. Datasets in plain text (e.g. American Standard Code for Information Interchange -ASCII) or Hierarchical Data Format version 5 (HDF5) will need converting to CF compliant NetCDF.

The inventory will be converted into an expanding online resource to allow for the inclusion of additional variables. The full list of variables available from the climate models will be included in the online version.

For data which is available on limited domains, the specific details of domain boundaries are listed in section 4.3

4.2 Inventory

Variable	Notes	Feature Type	Spatial Extent	Temporal Extent	Resolution		Format						
CF Standard name where possible	See key	gridded / point / series	lat/lon		Spatial (degrees)	Temporal							
Key: M=mean, m=min/max, a=anomaly, c=climatology, s=standard deviation, u=uncertainty, b=bias, d=diurnal range, mm=monthly min/max of daily min/max													
EURO4M 3D-VAR reanalysis													
Upper air parameters. 60 levels													
wind	m	gridded (rotated pole)	North Atlantic-Europe	1989-2010	0.2x0.2	6hr	Grib						
air_temperature													
specific_humidity													
cloud water													
total cloud cover													
turbulent kinetic energy													
cloud ice													
total precipitation													
10m parameters													
wind	M,m	gridded (rotated pole)	North Atlantic-Europe	1989-2010	0.2x0.2	6hr	Grib						
wind gust													
2m parameters													
air_temperature	M,m	gridded (rotated pole)	North Atlantic-Europe	1989-2010	0.2x0.2	6hr	Grib						
specific_humidity													
dewpoint													
relative_humidity													
2m parameters													
Soil parameters													
soil_temperature		gridded (rotated pole)	North Atlantic-Europe	1989	0.2x0.2	6hr	Grib						
soil_moisture_content													
Surface parameters													
geopotential_height		gridded (rotated pole)	North Atlantic-Europe	1989-2010	0.2x0.2	6hr	Grib						
pressure													
albedo													
total precipitation													
snowfall													
cloud cover													
surface temperature													
downwelling shortwave radiation													
diffuse surface shortwave radiation													
downwelling surface longwave radiation													
latent heat flux													
sensible heat flux													
EURO4M MESAN reanalysis (downscaled)													
10 wind	M,m							gridded (rotated pole)	North Atlantic-Europe	1989-2010	0.05x0.05	3hr	Grib
air_temperature													
relative_humidity													
specific_humidity													
precipitation													
ECA&D													
Station observations													

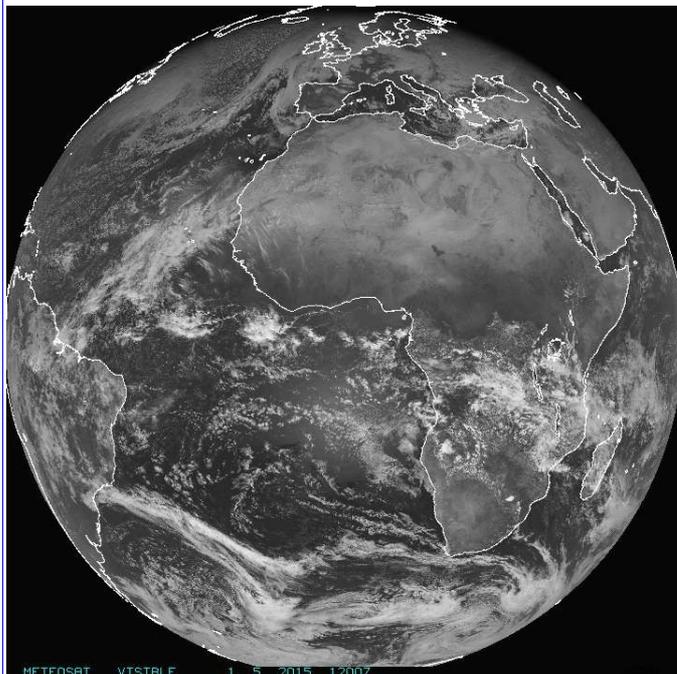
air_temperature	M,m	point	25-75N x 20W-75 E	1940-prese nt	~10,000 stations	day	ASCII
duration_of_sunshine							
snow depth							
precipitation_amount							
air_pressure_at_sea_level							
relative_humidity							
wind velocity							
Indices of extremes (listed by category, note shows number of indices)							
cloudiness	3	point	25-75N x 20W-75 E	1940-prese nt	~10,000 stations	day	ASCII
cold day-times	12						
compound	10						
drought	4						
heating degree days	9						
humidity	1						
pressure	1						
rain	15						
snow depth	4						
sunshine	2						
temperature	6						
wind	8						
e-OBS							
air_temperature	M,m	gridded	25-75N x 20W-75 E	1950-prese nt	0.25 x 0.5	day	NetCDF
precipitation_amount							
air_pressure_at_sea_level							
air_temperature	M,m	gridded (rotated pole)	25-75N x 20W-75 E	1950-prese nt	0.22 x 0.44	day	NetCDF
precipitation_amount							
air_pressure_at_sea_level							
ESA-CCI							
Sea Surface Temperature (SST)							
sea_water_temperature		gridded	global	1991-2010	0.05x0. 05	day	CF-NetCDF
sea_surface_skin_temperature							
sea_ice_fraction							
Ocean Colour (OC)							
chlorophyl concentration		gridded	global	1997-2012	0.04 x 0.04	Mon, day	CF-NetCDF
absorption coefficient							
attenuation coefficient							
backwards scattering coefficient							
HadOBS							
HadISST2							
sea_surface_temperature	a	gridded	global, ocean	1850-prese nt	1x1	mon	CF-NetCDF
sea_ice_area_fraction							
HadISST							
sea_surface_temperature		gridded	global, ocean	1870-prese nt	1x1	mon	CF-NetCDF
sea_ice_area_fraction							
HadSST3.1.0.0							
sea_surface_temperature	c,a, u	gridded	global, ocean	1850-prese nt	5x5	mon	CF-NetCDF
sea_surface_temperature	a	series					
MOHMA T43N							
air_temperature	c,a	gridded	global, ocean	1876-2007	5x5	mon	ASCII
EN3, EN4.x. Profiles; gridded data on 42 levels							
sea_water_temperature		point	global, ocean	1900-prese nt	NA	NA	NetCDF
sea_water_salinity							

sea_water_potential_temperature							
sea_water_temperature		gridded	global, ocean	1900-present	1x1	mon	NetCDF
sea_water_salinity							
sea_water_potential_temperature							
ocean heat content from 0-700m depth	a	series	global, ocean	1956-2004	NA	mon	ASCII
HadDTR							
sea_surface_temperature	d,c	gridded	global, ocean	1990-2004	5x5	mon, season, yr	ASCII
HadSLP2							
air_pressure_at_sea_level	a,u	gridded	global	1850-present	5x5	mon	ASCII,pp
HadAT2. Data on MSU Channels and 9 levels							
air_temperature	u	point	global, land	1958-2012	NA	mon	CF-NetCDF
air_temperature	u	gridded		1958-2012	10x5		
HadTH. Radiosondes							
air_temperature		point	Northern Hemisphere, land	1973-2003	NA	mon	CF-NetCDF
specific_humidity							
relative_humidity							
HadGHCOND							
air_temperature	m	gridded	global, land	1950-2011	3.75x2.5	day	ASCII
HadEX1 & 2							
number of frost days		gridded	global, land	1901-2010	3.75x2.5	mon,yr	CF-NetCDF
number of summer days							
number of icing days							
number of tropical nights							
growing season length							
air_temperature	mm						
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							
precipitation_amount							
simple daily intensity index							
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 wet days							
extremely wet days							
annual count of days PCRP>=10mm		gridded	global, land	1901-2010	3.75x2.5	yr	CF-NetCDF
annual count of days PCRP>=20mm							
precipitation_amount							

HadISD.1.0.2							
air_temperature		point	global	1973-present	NA	hr	CF-NetCDF
dew_point_temperature							
air_pressure_at_sea_level							
wind_speed,							
significant weather, cloud cover							
HadCET							
air_temperature	m	series	UK	1772-present	NA	day	ASCII
HadUKP							
precipitation_amount		series	England & Wales	1931-present	54 UK Regions	day	ASCII
CRUTEM3 (superseded)							
air_temperature	u,a	gridded	global, land	1850-present	5x5	mon	CF-NetCDF
air_temperature	a	series			zonal categories	mon, yr, dec_s	
CRUTEM4.2.0.0							
air_temperature	a	gridded	global, land	1850-present	5x5	mon	CF-NetCDF
air_temperature	a	series			zonal categories	mon, yr, dec_s	
HadISDH.2.0.0							
specific_humidity	a,c,s,u	gridded	global, land	1973-present	5x5	mon	NetCDF
relative_humidity	a,c,s,u						
water_vapour_pressure_in_air	a,c,s,u						
dew_point_temperature	a,c,s,u						
air_temperature	a,c,s,u						
dew_point_depression	a,c,s,u						
wet_bulb_temperature	a,c,s,u						
specific_humidity	a,c,s,u	series	70S-70N, land	1973-present	zonal categories	mon, yr	ASCII
relative_humidity	a,c,s,u						
water_vapour_pressure_in_air	a,c,s,u						
dew_point_temperature	a,c,s,u						
air_temperature	a,c,s,u						
dew_point_depression	a,c,s,u						
wet_bulb_temperature	a,c,s,u						
HadCRUT4 (100 member ensemble)							
air_temperature	a,u	gridded	global	1850-present	5x5	mon	CF-NetCDF
air_temperature	a,u	series	global	1850-present	zonal categories	mon, yr, dec_s	CF-NetCDF
EUMETSAT CMSAF – global							
cloud fractional cover (CFC)		gridded	global	1982-2010	0.25 x 0.25	Mon, day	NetCDF
optical thickness (COT)							
cloud phase (CPH)							
cloud top parameters (CTO)							
cloud ice water path (IWP)							

Vertically integrated liquid water path (LWP)							
surface incoming shortwave radiation (SIS)							
Cloud radiative effect: long wave (CFL)		gridded	global	1982-2010	0.25 x 0.25	mon	NetCDF
Cloud radiative effect: short wave (CFS)							
surface downwelling longwave radiance (SDL)							
surface radiation budget (SRB)							
surface outgoing longwave radiation (SOL)							
surface longwave radiation budget (SNL)							
surface short wave radiation budget (SNS)							
surface albedo (SAL)							
EUMETSAT CMSAF – Meteosat							
Cloud Albedo (CAL)		Gridded	Meteosat Disk	1983-2005	0.05 x 0.05	Hourly, daily, monthly	NetCDF
Surface incoming direct radiation (SID)							
Surface incoming shortwave radiation (SIR)							
Spectral Resolved Irradiance (SRI)							
Daylight (DAL)							
Surface net shortwave radiation (SNS)		Monthly					

4.3 Domains for limited area data



The METEOSAT field of view.

Rotated pole domains						
	Grid pole		Domain boundaries in rotated coordinates			
	latitude	longitude	Lower grid latitude	Upper grid latitude	Lower grid longitude	Upper grid longitude
Euro4M	29N	165W	-36	13.95	-28.15	24.35
ECAD (0.44Deg)	39.25N	162W	-23.65	23.43	-35.25	24.59
METOSAT disk	0.	0.	8.6	90.	-180.	180.

5. Glossary

- ASCII American Standard Code for Information Interchange
- CCI Climate Change Initiative
- CCI WMO Commission for Climatology
- CLIVAR Variability and predictability of the ocean-atmosphere system
- CMIP
- (5) Coupled Model Intercomparison Project (Phase 5)
 - CORDEX Coordinated Regional Climate Downscaling Experiment
 - ECMWF European Centre for Medium-range Weather forecasting
 - ENSEMBLES: <http://www.ensembles-eu.org/>
 - ERA-CLIM/ERA-CLIM2 ECMWF Re-Analysis for Climate [2]
 - ESGF Earth System Grid Federation
 - ETCCDI CLIVAR/CCI/JCOMM/GEWEX Expert Team on Climate Change Detection and Indices
 - GEWEX Global Energy and Water Exchanges Project
 - HDF Hierarchical Data Format
 - JCOMM Joint Technical Commission for Oceanography and Marine Meteorology
 - NASA US National Aeronautics and Space Administration
 - NOAA US National Oceanic and Atmospheric Administration

- MARS ECMWF Meteorological Archival and Retrieval System
- NetCDF UNIDATA network Common Data Form
- ngEO Next Generation Earth Observation
- SPECS Seasonal-to-decadal climate Prediction for the improvement of European Climate Services
- UNIDATA is a Community Program of the US University Corporation for Atmospheric Research
- WCRP: World Climate Research Programme
- WGCM: Working Group on Coupled Models
- WMO World Meteorological Organisation