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Project : **SST-CCI- Phase-II**

Title : **Data Access Requirements Document**

Abstract : This document describes the data requirements for the development of the SST ECV and details their availability.

Authors : Karen Veal, Gary Corlett
University of Leicester

Approved : Chris Merchant
University of Reading
Science Leader

Digitally signed by Craig Donlon
DN: cn=Craig Donlon, o=European Space Agency, ou=ESTEC, email=craig.donlon@esa.int, c=NL
Location: Noordwijk, The Netherlands
Date: 2017.03.27 15:18:16 +02'00'

Accepted : Craig Donlon
ESA

Distribution : SST_CCI team members
Craig Donlon (ESA)

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AMENDMENT RECORD

This document shall be amended by releasing a new edition of the document in its entirety. The Amendment Record Sheet below records the history and issue status of this document.

AMENDMENT RECORD SHEET

ISSUE	DATE	REASON FOR CHANGE
Phase-I		
A	27 Oct 2010	Initial Draft
B	09 Dec 2010	Incorporation of comments from the rest of the project. Microwave Level 2 products have been removed, the L2P products are retained. The sea-ice products from the OSI-SAF have been moved to the section describing products to be used for intercomparison. Additional in situ products are included. Argo product is renamed EN3 and this product no longer appears in section on products for intercomparison. Additional analyses are included: OSTIA products and the GHRSST L4 products that are used in the GHRSST GMPE system. The TOMS and OMI aerosol data appear as one product that now also includes GOME-1 and GOME-2 data SAGE II aerosol is included and ECMWF/MACC analysis is no longer included. The product numbering has changed. Some unused fields have been removed from the tables for intercomparison products. The Referenced Document section now refers to the document list at UoE.
C	15 Dec 2010	Update to Metop and SEVIRI data requirements following feedback from CMS
D	07 Feb 2011	Update to ECMWF and sea-ice concentration data requirements following feedback from UoE
E	19 Apr 2011	Additional ECMWF forecast variables have been added. Additional ancillary products are included: CLAVR-x, NCEP/NCAR Reanalysis 1, OSI-SAF Maximum Gradient Atlas and AOML Ocean Current Climatology Additional products for intercomparison are included: AVHRR Pathfinder SST, NOAA Real-Time Global SST High-Resolution Analysis, Odyssea, NOAA OIv2. HadSST3 replaces HadSST2. The product numbering has changed.
F	2 Jun 2011	To Science Leader for approval
G	14 Jun 2011	To ESA technical officer for approval
H	14 Jun 2011	Editorial changes by Project Manager
I	14 Jun 2011	Additional editorial changes by Project Manager
J	17 Jan 2012	Updates to action agreed RIDS in ESA-RIDS-SST_cci-PVP-UoL-001-Draft-H-BATCH-1-and-BATCH-2_Issue3.docx
1	27 Jan 2012	Issue 1 (accepted). Remaining TBCs to be cleared in Issue 2
2	13 Jan 2014	Final version summarising data used in SST_CCI Phase I
Phase-II		
1	23 Sep 2014	Updated for first reprocessing of Phase-II. Major changes on most pages.
2	24 Feb 2017	Updated for final reprocessing of Phase-II. Changes on most pages; new datasets plus update of dates. No changes to reference data or Intercomparison data.

1. Introduction

1.1 PURPOSE AND SCOPE

This document identifies all the data that are needed as input to perform the SST_CCI project, including:

- all Level 1 products from ESA and Third Party Missions (no Level 0 products are required)
- all ancillary data
- all in situ observation data sources as well as higher-level products needed for product inter-comparison
- all historical archives and currently operational sources (it is not anticipated that data from sources due to become operational in the next 3 years will be required).

The SST_CCI project team is responsible for obtaining all input data for use within the SST_CCI project. All input data are available via FTP, SFTP or HTTP for external parties to obtain from source.

1.2 STRUCTURE OF THE DOCUMENT

After this introduction, the document is divided into a number of major sections that are briefly described below:

Section 2 **Definition of table fields**

This section provides definitions of the table fields used throughout the rest of the document.

Section 3 **Summary of data sets required**

This section lists all the data products required by the SST_CCI project. The information in this section identifies the product, its version number, the original source, the date the product is first required by the project, the sub-set of the record required, where the data can be obtained and the size of the data set.

Section 4 **Satellite data**

These sections provide further information about the data products listed in Section 3.

For each data source the DARD includes:

- information about the original source of the data
- identification of the data type
- the sensor type and key technical characteristics
- information about data availability and coverage

- the product name and reference to product technical specification documents
- estimates of data quantity
- indication of data quality and reliability
- description of the ordering and delivery mechanism
- identification of access conditions and pricing
- details of any formal agreements with data suppliers for delivery of the data product to the project.
- any requirements for resolving issues concerning data access, calibration, validation and performance issues specific to the ground segment should they exist
- any potential algorithm upgrades that would enable the regeneration of improved input products for the SST ECV.

Section 8 **SST_CCI Requirements for ECMWF Data**

This section lists the ECMWF variable fields required by the project.

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1.4 DEFINITIONS OF TERMS

The following terms have been used in this report with the meanings shown.

Term	**Definition**
AATSR	Advanced Along-Track Scanning Radiometer
AMSR-E	Advanced Microwave Scanning Radiometer - EOS
AMSR2	2nd Advanced Microwave Scanning Radiometer
AOML	Atlantic Oceanographic and Meteorological Laboratory
APL	Applied Physics Laboratory
ASCAT	Advanced Scatterometer
ASCII	American Standard Code for Information Interchange
ATSR	Along-Track Scanning Radiometer
AVHRR	Advanced Very High Resolution Radiometer
BMRC	Bureau of Meteorology Research Centre (Australia)
BT	Brightness temperature
CCI	Climate Change Initiative
CDRP	Climate Data Research Package
CIMSS	Cooperative Institute for Meteorological Satellite Studies
CIRIMS	The Calibrated InfraRed In situ Measurement System
CISL	Computational and Information Systems Laboratory
CLAVR-x	Clouds from AVHRR Extended
CMC	Canadian Meteorological Centre

CMS	Centre de Meteorologie Spatiale
COBE	Centennial in situ Observation-Based Estimates
CSIRO	Commonwealth Scientific and Industrial Research Organisation (Australia)
CTD	Conductivity, Temperature and Depth
DARD	Data Access Requirements Document
DBCP	Data Buoy Cooperation Panel
DISCOVER	Distributed Information Services for Climate and Ocean Products and Visualizations for Earth Research
DMI	Danish Meteorological Institute
DMSP	Defense Meteorological Satellite Program
EASE	Equal-Area Scalable Earth grid
ECMWF	European Centre for Medium-Range Weather Forecasts
ECV	Essential Climate Variable
EOS	Earth Observing System
ERS	European Remote-sensing Satellite
ERSSTv3	Extended Reconstructed SST Analysis version 3
ESA	European Space Agency
ESRL	Earth System Research Laboratory (NOAA)
EUMETSAT	The European Organisation for the Exploitation of Meteorological Satellites
FMI	Finnish Meteorological Institute
FNMOC	The Fleet Numerical Meteorology and Oceanography Center (US)
FTP	File Transfer Protocol
GAC	Global Area Coverage
GAMSSA	Global Australian Multi-Sensor SST Analysis
GDAC	Global Data Assembly Center
GDS	GHRSST Data Processing Specification
GHRSST	Group for High Resolution SST

GHRSST LTSRF	GHRSST's Long Term Stewardship and Reanalysis Facility
GMES	Global Monitoring for Environment and Security
GMPE	GHRSST Multi Product Ensemble
GOME	Global Ozone Monitoring Experiment
GOOS	Global Ocean Observing System
GRIB	Gridded Binary file format
GSFC	Goddard Space Flight Center
GTMBA	Global Tropical Moored Buoy Array
GTS	Global Telecommunication System
GVAR	GOES VARiable Format
HadGEM3	Hadley Centre Global Environment Model version 3
HadISST	Hadley Centre Ice and Sea Surface Temperature
HadSST2	Hadley Centre Sea Surface Temperature version 2
HDF5	Hierarchical Data Format 5
ICOADS	International Comprehensive Ocean-Atmosphere Data Set
IEEE	Institute of Electrical and Electronics Engineers
IOC	Intergovernmental Oceanographic Commission
IR	Infra-red
IRI	International Research Institute for Climate and Society
ISAR	Infra-red Sea surface temperature Autonomous Radiometer
JAXA	Japanese Aerospace Exploration Agency
JCOMM	Joint Commission for Oceanography and Marine Meteorology
JMA	Japan Meteorological Agency
L2P	The GHRSST Level 2 product format
LDEO	Lamont-Doherty Earth Observatory (Columbia University)
MACC	Monitoring Atmospheric Composition and Climate (GMES project)

M-AERI	Marine-Atmosphere Emitted Radiance Interferometer
MEaSUREs	Making Earth Science Data Records for Use in Research Environments
MEDS	Marine Environmental Data Service
Met No	The Norwegian Meteorological Institute
METOC	Meteorology & Oceanography (Australian navy)
MGDSST	Merged satellite and in situ data Global Daily Sea Surface Temperatures
MMD	Multi-sensor Match-up Dataset
MODIS	Moderate Resolution Imaging Spectroradiometer
MOHC	Met Office Hadley Centre
MV	Motor Vessel
MW	Microwave
na	Not applicable
NASA	National Aeronautics and Space Administration
naVOCEANO	naval Oceanographic Office
NCAR	National Center for Atmospheric Research (NOAA)
NCDC	National Climatic Data Center (NOAA)
NCEP	National Centers for Environmental Prediction (NOAA)
NCEP-GTS	NCEP Global Telecommunications System
NEAR-GOOS	North-Eastern Asian Regional GOOS
NEODC	NERC Earth Observation Data Centre
NERC	Natural Environment Research Council
NESDIS	National Environmental Satellite, Data, and Information Service
netCDF	Network Common Data Form
NIST	National Institute of Standards and Technology
NOAA	National Oceanic and Atmospheric Administration
NOCS	National Oceanography Centre, Southampton
NRT	Near real time

NWP	Numerical Weather Prediction
OI	Optimal Interpolation
OMI	Ozone Monitoring Instrument
OPeNDAP	Open-source Project for a Network Data Access Protocol
OSI SAF	The Ocean and Sea Ice Satellite Application Facility
OSTIA	Operational Sea Surface Temperature and Sea Ice Analysis
PANGEA	Publishing Network for Geoscientific & Environmental Data
PIRATA	Prediction and Research Moored Array in the Atlantic
PMEL	NOAA's Pacific Marine Environmental Laboratory
PMW	Passive Microwave
POSH	Profiles of Ocean Surface Heating
PSD	Physical Sciences Division (NOAA)
RAL	Rutherford Appleton Laboratory
RAMA	Research Moored Array for African-Asian–Australian Monsoon Analysis and Prediction
RRDP	Round Robin Data Package
RSS	Remote Sensing Systems
RV	Research Vessel
SAF	Satellite Applications Facility
SAGE	Stratospheric Aerosol and Gas Experiment
SCOPE CM	Sustained, Co-Ordinated Processing of Environmental Satellite Data for Climate Monitoring
SEVIRI	Spinning Enhanced Visible and Infrared Imager
SISTeR	Scanning Infra-red Surface Temperature Radiometer
SMMR	Scanning Multichannel Microwave Radiometer
SQUAM	SST Quality Monitor
SSM/I	Special Sensor Microwave / Imager
SST	Sea Surface Temperature
SST_cci	SST ECV part of the ESA CCI project

TAO	Tropical Atmosphere Ocean project
TBC	To be completed
TEMIS	Tropospheric Emission Monitoring Internet Service
TMI	TRMM Microwave Imager
TOMS	Total Ozone Mapping Spectrometer
TRITON	Triangle Trans-Ocean Buoy Network
TRMM	Tropical Rainfall Measuring Mission
TSG	Thermosalinograph
UoL	University of Leicester
USCGC	US Coast Guard Cutter
USGODAE	US Global Ocean Data Assimilation Experiment.
UTC	Coordinated Universal Time
VOS	Voluntary Observing Ships
WMO	World Meteorological Organisation

2. Definition of table fields

This section gives definitions of the table fields used in Sections 3, 4, 5, 6, and 7 of this document.

Product name	The name and, in the case of satellite data, the level of the data product described in the table.
ID	Explanation of term
Data type	Type of platform (satellite/in situ/model/analysis) and variable for which data is provided in product.
Source	The system or agency from which the data originates.
Key Websites	URLs of websites giving key information about the product
Version	Version of data that will be used within the project.
Platform name	The name of the platform to which the sensor is attached. For products originating from space instruments, this is the name of the satellite on which the instrument flies (not used for analysis products).
Platform characteristics	Key attributes of the platform (not used for analysis products).
Sensor(s)	The name of the instrument from which the data originates (not used for analysis products).
Sensor type	The type of sensor making the observations (applicable only for observational data).
Sensor key technical characteristics	Information concerning key sensor technical characteristics observations (applicable only for observational data).
Analysis characteristics	Analysis products: the observational data used in the analysis. Model: indication if product is model data.
References to technical specifications documents	References to external journal articles, reports and web pages that provide details of technical specifications of the instrument or data product specifications.
Product format	File format of data.
Data gridding	Details of the grid where applicable.
Data coverage: temporal	Year of the first available data and year of the last available data or to present if data production is on-going.
Data coverage: spatial	The locations for which data is available.

Project Requirements

Date required within project	Date that the data will be first required by the project.
Use within project	The SST_cci project can be considered to have three strands: (1) the production of a 'long-term' ECV using data from 1991 to 2013, (2) product validation of the long-term ECV (3) and inter-comparison of the ECV with other SST products as part of a climate assessment analysis. These strands are referred to in subsequent tables as (1) long-term ECV, (2) validation and (3) inter-comparison.
Reason for selection	The properties of the product that have led to its selection for use in the project.
Temporal coverage required	The period of data required.

Data quality

Data calibration	References to external journal articles, reports and web pages describing calibration procedures and results.
Data validation	References to external journal articles, reports and web pages giving data validation procedures and results.
Product limitations	Known access, calibration, validation and performance limitations.
Potential product upgrades	Details of any ongoing efforts that will provide upgrades to the product prior to generation of the ECV.

Data availability

Available from	The distributor of the data product.
Availability time-scale	The time interval between data time and data availability.
Estimates of data quantity	An estimate of the computer storage capacity needed to store the required data.
Product delivery	A description of product ordering and delivery mechanisms
Data reliability - space segment	Space segment redundancy
Data reliability - ground segment	Ground segment redundancy
Pricing	Cost of the data.
Access conditions	Any conditions imposed by the data distributor and/or originator on the use of the data within this SST_cci project.
Formal agreements with data suppliers	Details of any formal agreements that exist between the project and the data suppliers.
Third party redistribution.	Has permission for redistribution to third parties as part of the RRDP or CDRP been obtained?

Miscellaneous

Comments	Other comments.

3. Summary of data sets required

The tables in this section summarise the requirements for data access. The table fields are defined in Section 2.

Note: All volumes assume data compression

Note: For explanation of asterisk, see the 'Present required within project' field description in Section 2.

3.1 SATELLITE DATA

ID	Product name	Available Temporal Coverage	Version	Present required within project	Use of data in project and temporal coverage required	Source	Available from	Estimates of data quantity (compressed)
1.01	ATSR Level 1	1991 to 2012	Version 3.0	Start of Phase II	(1) Long term ECV (Require all available data for 1991-2012)	ESA	NEODC and UK-MM-PAF	23 TB
1.02	AVHRR Global GAC L1	1981 to 2016	Various	Start of Phase II	(1) Long term ECV (Require all available data for 1991-2016)	NOAA	NOAA CLASS/UoM/CEDA	18 TB
1.03	AVHRR Global FRAC L1	2006 to 2016	Various	Start of Phase II	(1) Long term ECV - reference sensor post ATSR (Require all available data for 2006 to 2016)	EUMETSAT	CEDA	15.5 TB
1.04	AMSR2 L1	2012 to 2016	V1	Start of Phase II	(1) Long term ECV – PMW impact (Require all available data for 2002 to 2012)	JAXA	JAXA	2.5 TB
1.05	AMSR-E L1	2002 to 2012	V12	Start of WP 90	(1) Long term ECV – PMW impact (Require all available date from 2002 to 2012)	JAXA	RSS	6 TB

3.2 ANCILLARY DATA

ID	Product name	Available Temporal Coverage	Version	Present required within project	Use of data in project and temporal coverage required	Source	Available from	Estimates of data quantity (compressed)
2.01	ECMWF ERA-Interim	1978 to 2016	Version 1.0	Start of Phase II	(1) Long term ECV (Require all available data for 1991-2013)	ECMWF	ECMWF	6 TB
2.02	CLAVR-x	1978 to 2016	No version control	Start of Phase II	(1) Long term ECV (Require all available data for 1991-2013)	NOAA	CIMSS	9 GB
2.03	OSI-401: SSM/I Sea Ice Concentration Maps on 10 km Polar Stereographic Grid	2005 – 2016	No version control	Start of Phase II	(2) Product validation (Require all available data for 2009 - 2013)	OSI SAF	OSI SAF	7 GB
2.04	OSI-409: Global Sea Ice Concentration Reprocessing	1978-2009	Version 1	Start of Phase II	(2) Product validation (Require all available data for 1991 - 2013)	OSI SAF	OSI SAF	60 GB
2.05	TOMS OMI GOME-1 GOME-2 Absorbing Aerosol Index	1978 – 2005 2007 – 2016	Version 8	Start of Phase II	(2) Product validation (Require all available data for 1991 - 2013)	NASA GSFC, TEMIS	TOMS: NASA GSFC OMI, GOME-1, GOME-2: TEMIS	5 GB

3.3 IN SITU DATA

ID	Product name	Available Temporal Coverage	Version	Present required within project	Use of data in project and temporal coverage required	Source	Available from	Estimates of data quantity (compressed)
3.01	Shipborne Radiometer Skin SST	1999 to 2016	No version control	Start of Phase II	(2) Product validation (Require all available data for 1991-2013)	(a) A. Jessup, APL (b) I. Barton, CSIRO (c) W. Wimmer, NOCS (d) P. Minnett, University of Miami (e) T. Nightingale, RAL	UoL	1GB
3.02	Drifting buoy	1978 to 2016	Version 1	Start of Phase II	(2) Product validation (Require all available data for 1991-2013)	HadIOD	MOHC	2 GB
3.03	GTMBA	1978 to 2016	No version control	Start of Phase II	(2) Product validation (Require all available data for 1991-2013)	TAO Project Office and HadIOD	PMEL/MOHC	< 1 GB
3.04	Voluntary Observing Ships	1978 to 2016	Version 1	Start of Phase II	(2) Product validation (Require all available data for 1991-2013)	HadIOD	MOHC	< 1 GB

3.4 INTER-COMPARISON DATA

ID	Product name	Available Temporal Coverage	Version	Date required within project	Use of data in project and temporal coverage required	Source	Available from	Estimates of data quantity (compressed)
4.01	ICOADS	1662 - 2013	Release 2.5	Feb 2015	(3) Intercomparison (Require all available data for 1991-2013)	ICOADS Project	MOHC	65 GB
4.02	HadSST3	1850 - 2013	HadSST3 is version 3 of HadSST	Feb 2015	(3) Intercomparison (Require all available data for 1991-2013)	MOHC	MOHC	100 times 20Mb
4.03	HadISST	1871 - 2013	Version 1	Feb 2015	(3) Intercomparison (Require all available data for 1991-2013)	MOHC	MOHC	30 MB
4.04	ERSSTv3	1854 – 2013	Version 3	Feb 2015	(3) Intercomparison (Require all available data for 1991-2013)	NOAA NCDC	NOAA NCDC	4 MB
4.05	Kaplan	1981 – 2007	Version 2	Feb 2015	(3) Intercomparison (Require all available data for 1991-2013)	LDEO Columbia	GHRSST LTSRF	6 MB
4.06	Cobe SST	1891 – 2008	Version 1	Feb 2015	(3) Intercomparison (Require all available data for 1991-2013)	JMA	GHRSST LTSRF	33 MB
4.07	NOCS Surface Flux Dataset v2.0	1973 – 2009	Version 2.0	Feb 2015	(3) Intercomparison (Require all available data for 1991-2013)	NOCS	CISL Research Data Archive at NCAR	2.3 GB
4.08	Karspeck	1850-2008	Version 1	Feb 2015	(3) Intercomparison (Require all available data for 1991-2013)	LDEO Columbia	NCAR	580 MB
4.09	OI v2	1662 - 2013	Version 2	Feb 2015	(3) Intercomparison (Require all available data for 1991-2013)	NOAA	NOAA	250 MB
4.10	HadGEM SST	Present day control runs	GC1 & GC2	Feb 2015	(3) Intercomparison (Any 20 year period form control run)	MOHC	MOHC	2.3 Gb (ocean)

ID	Product name	Available Temporal Coverage	Version	Date required within project	Use of data in project and temporal coverage required	Source	Available from	Estimates of data quantity (compressed)
4.11	MyOcean OSTIA reanalysis	1985-2007	Version 1	May 2012	(5) Intercomparison (Require all available data for 1991-2012)	MyOcean	MyOcean	75GB
4.12	NOAA Optimum Interpolation 1/4 Degree Daily Sea Surface Temperature Analysis - AVHRR OI	1981 – present	Version 2	May 2012	(5) Intercomparison (Require all available data for 1991-2012)	NCDC/NOAA	GHRSST LTSRF	5 GB
4.13	MGDSST	1982-2011	Version 1	May 2012	(5) Intercomparison (Require all available data for 1991-2012)	JMA, Japan.	GHRSST LTSRF	8 GB
4.14	CMC	1991-2011	Version 1	May 2012	(5) Intercomparison (Require all available data for 1991-2012)	CMC, Canada	GHRSST LTSRF	11 GB
4.15	AVHRR Pathfinder SST	1981 - present	Version 5.2	May 2012	(5) Intercomparison (Require all available data for 1991-2012)	NOAA NODC	NODC	200 GB

4. Satellite data

This section contains more extensive information about the satellite data products that will be used for the ECV production and Algorithm selection. The information is displayed in the form of tables: one table for each product. Definitions of the table fields are given in Section 2.

4.1 ATSR LEVEL 1

Product name	ATSR Level 1
ID	1.01
Data type	Satellite: top of the atmosphere radiances
Source	ESA
Key Websites	AATSR Home page http://www.leos.le.ac.uk/aatsr/ ESA Envisat page http://envisat.esa.int/earth/www/area/index.cfm?fareaid=6 ESA AATSR page http://earth.esa.int/object/index.cfm?fobjectid=3773 RAL AATSR Ops page http://www.aatsrops.rl.ac.uk/ ATSR 1/2 Home page http://www.atsr.rl.ac.uk/ ESA ERS page http://earth.esa.int/ers/
Version	Version 2.1
Platform name	ERS-1, ERS-2, Envisat
Platform characteristics	Sun-synchronous polar orbits
Sensor(s)	ATSR-1, ATSR-2, AATSR
Sensor type	Visible and infra-red radiometer
Sensor key technical characteristics	Dual-view, on-board calibration, visible channels: 0.55 µm, 0.66 µm, 0.87 µm, 1.6 µm, infra-red channels 3.7 µm, 11 µm, 12 µm.
References to technical specifications documents	RD.3, RD.4, RD.1
Product format	Envisat
Data gridding	Rectangular grid centred on instrument ground track, approximate resolution is 1 km x 1 km
Data coverage: temporal	1991 - to end of AATSR mission (April 2012)
Data coverage: spatial	Global

Project Requirements

Date required within project	Start of Phase II
Use within project	(1) Long term ECV
Reason for selection	Accuracy
Temporal coverage required	All available data for 1991-2012

Data quality

Data calibration	RD.2, RD.6, RD.5

Data validation	N/A
Product limitations	Known data quality issues are reported on the AATSR website at http://www.leos.le.ac.uk/AATSR/howgood/known/index.html
Potential product upgrades	None

Data availability

Available from	CEDA
Availability time-scale	N/A
Estimates of data quantity	23 TB
Product delivery	Direct access from CEMS
Data reliability - space segment	No redundancy
Data reliability - ground segment	No redundancy
Pricing	Free
Access conditions	User registration
Formal agreements with data suppliers	None
Third party redistribution.	Subset for CDRP

Miscellaneous

Comments	None

4.2 AVHRR GLOBAL GAC L1

Product name	AVHRR Global GAC L1
ID	1.02
Data type	Satellite: top of the atmosphere radiances
Source	NOAA
Key Websites	NESDIS, Advanced Very High Resolution Radiometer - AVHRR http://noaasis.noaa.gov/NOAASIS/ml/avhrr.html
Version	Various
Platform name	NOAA
Platform characteristics	Polar orbit
Sensor(s)	AVHRR
Sensor type	Visible and infra-red radiometer
Sensor key technical characteristics	AVHRR/3 has 6 channels: 0.58 - 0.68 µm, 0.725 - 1.00 µm, 1.58 - 1.64 µm, 3.55 - 3.93 µm, 10.30 - 11.30 µm, 11.50 - 12.50 µm.
References to technical specifications documents	See the NOAA KLM User's Guide at http://www.ncdc.noaa.gov/oa/pod-guide/ncdc/docs/klm/index.htm
Product format	See the NOAA KLM User's Guide at http://www.ncdc.noaa.gov/oa/pod-guide/ncdc/docs/klm/index.htm
Data gridding	4 km (4^{th} line, 4^{th} pixel)
Data coverage: temporal	1978 - to 2016
Data coverage: spatial	Global

Project Requirements

Date required within project	Start of Phase II
Use within project	(1) Long-term ECV
Reason for selection	Long-term Fundamental Climate Record
Temporal coverage required	All available data for 1991-2013

Data quality

Data calibration	RD.18, RD.19, RD.20, RD.21
Data validation	N/A
Product limitations	L1b cloud information not supplied for all epochs/missions as previously expected.
Potential product upgrades	Calibration update by John Mittaz see RD.21

Data availability

Available from	NOAA CLASS/University of Maryland/CEDA
Availability time-scale	Near real time
Estimates of data quantity	18 TB
Product delivery	FTP and tape

Data reliability - space segment	Multiple space craft in orbit
Data reliability - ground segment	Multiple ground receiving stations
Pricing	Free
Access conditions	User registration
Formal agreements with data suppliers	None
Third party redistribution.	Subset for CDRP

Miscellaneous

Comments	Alternative source is Climate Monitoring SAF via SCOPE CM, which will provide cloud information and some quality control.

4.3 AVHRR FRAC LEVEL 1

Product name	AVHRR FRAC Level 1
ID	1.03
Data type	Satellite: top of the atmosphere radiances
Source	EUMETSAT
Key Websites	EUMETSAT http://www.eumetsat.int/website/home/Satellites/CurrentSatellites/Metop/index.html
Version	Various
Platform name	METOP-A, METOP-B
Platform characteristics	Sun-synchronous polar orbits
Sensor(s)	AVHRR-3
Sensor type	Visible and infrared radiometer
Sensor key technical characteristics	AVHRR/3 has 6 channels: 0.58 - 0.68 µm, 0.725 - 1.00 µm, 1.58 - 1.64 µm, 3.55 - 3.93 µm, 10.30 - 11.30 µm, 11.50 - 12.50 µm.
References to technical specifications documents	http://oiswww.eumetsat.org/WEBOPS/eps-pg/AVHRR/AVHRR-PG-0TOC.htm
Product format	EUMETSAT Native
Data gridding	1 km
Data coverage: temporal	2006 to date
Data coverage: spatial	Global

Project Requirements

Date required within project	Start of Phase II
Use within project	Alternate reference sensor to AATSR
Reason for selection	Loss of AATSR
Temporal coverage required	All available data from 2006

Data quality

Data calibration	RD.20, RD.298
Data validation	N/A
Product limitations	None
Potential product upgrades	Bayesian cloud mask developed in SST_CCI Phase II

Data availability

Available from	CEDA
Availability time-scale	N/A
Estimates of data quantity	13 TB (METOP-A) 2.5 TB (METOP-B)
Product delivery	Direct access from CEMS

Data reliability - space segment	No redundancy
Data reliability - ground segment	No redundancy
Pricing	Free
Access conditions	User registration
Formal agreements with data suppliers	None
Third party redistribution.	None

Miscellaneous

Comments	None

4.4 AMSR2 LEVEL 1

Product name	AMSR2 Level 1
ID	1.04
Data type	Satellite: top of the atmosphere radiances
Source	JAXA
Key Websites	http://www.remss.com/missions/amsr http://sharaku.eorc.jaxa.jp/AMSR/
Version	Version 1
Platform name	GCOM-W1
Platform characteristics	Sun-synchronous polar orbits
Sensor(s)	AMSRE
Sensor type	Microwave radiometer
Sensor key technical characteristics	Bands as 6.93 GHz (V&H), 10.65 GHz (V&H), 18.7 GHz (V&H), 23.8 GHz (V&H), 36.5 GHz (V&H), and 89 GHz (V&H)
References to technical specifications documents	http://suzaku.eorc.jaxa.jp/GCOM_W/w_amsr2/w_amsr2_doc.html
Product format	HDF5
Data gridding	Various - depends on channel
Data coverage: temporal	2012 to date
Data coverage: spatial	Global

Project Requirements

Date required within project	Start of Work Package 90
Use within project	Impact of PMW on long-term ECV
Reason for selection	Primary microwave radiometer in space
Temporal coverage required	All available data from 2012 to 2016

Data quality

Data calibration	None
Data validation	N/A
Product limitations	Variable spatial resolution between channels; calibration
Potential product upgrades	None

Data availability

Available from	JAXA
Availability time-scale	One week behind real time
Estimates of data quantity	2.5 TB
Product delivery	FTP
Data reliability - space segment	No redundancy

Data reliability - ground segment	No redundancy
Pricing	Free
Access conditions	User registration
Formal agreements with data suppliers	None
Third party redistribution.	None

Miscellaneous

Comments	None

4.5 AMSR-E LEVEL 1

Product name	AMSR-E Level 1
ID	1.05
Data type	Satellite: top of the atmosphere radiances
Source	JAXA
Key Websites	http://www.remss.com/missions/amsr http://nsidc.org/data/amsre http://sharaku.eorc.jaxa.jp/AMSR/
Version	Version 12
Platform name	EOS-AQUA
Platform characteristics	Sun-synchronous polar orbits
Sensor(s)	AMSR-E
Sensor type	Microwave radiometer
Sensor key technical characteristics	Bands as 6.93 GHz (V&H), 10.65 GHz (V&H), 18.7 GHz (V&H), 23.8 GHz (V), 36.5 GHz (V&H), and 89 GHz (V&H)
References to technical specifications documents	RD.28, RD.31, RD.32
Product format	HDF
Data gridding	Various - depends on channel
Data coverage: temporal	2002 to 2012
Data coverage: spatial	Global

Project Requirements

Date required within project	Start of Phase II
Use within project	Impact of PMW on long-term ECV
Reason for selection	Primary microwave radiometer in space
Temporal coverage required	All available data for 2002 to 2012

Data quality

Data calibration	RD.30
Data validation	N/A
Product limitations	Variable spatial resolution between channels; calibration
Potential product upgrades	None

Data availability

Available from	Remote Sensing Systems
Availability time-scale	N/A
Estimates of data quantity	6 TB
Product delivery	FTP

Data reliability - space segment	No redundancy
Data reliability - ground segment	No redundancy
Pricing	Free
Access conditions	User registration
Formal agreements with data suppliers	None
Third party redistribution.	None

Miscellaneous

Comments	None

5. Ancillary data

This section contains further information about the data products that will be used as ancillary data in the ECV production. The information is displayed in the form of tables: one table for each product. Definitions of the table fields are given in Section 2.

5.1 ECMWF ERA-INTERIM

See Section 8 for descriptions of the various fields of ECMWF data that are required.

Product name	ECMWF ERA-Interim
ID	2.01
Data type	NWP model forecast and analysis fields
Source	ECMWF
Key Websites	ECMWF home page http://www.ecmwf.int/ ECMWF data server page http://data.ecmwf.int/data/ ERA Project page http://www.ecmwf.int/research/era/do/get/index
Version	Version 1.0
Analysis characteristics	Model data
References to technical specifications documents	RD.38
Product format	WMO format FM92 GRIB http://www.wmo.int/pages/prog/www/WDM/Guides/Guide-binary-2.html
Data gridding	See supplementary Table 8-1
Data coverage: temporal	1978 - to 2016
Data coverage: spatial	Global

Project Requirements

Date required within project	Start of Phase II
Use within project	(1) Long-term ECV (2) Product validation
Reason for selection	Long-term consistent reanalysis dataset
Temporal coverage required	All available data for 1991-2013

Data quality

Data validation	None identified so far
Product limitations	None identified so far
Potential product upgrades	Next ECMWF reanalysis dataset will be called ERA-20c; currently no schedule for release.

Data availability

Available from	ECMWF/BADC
Availability time-scale	Archive updated monthly, 3 months behind real-time

Estimates of data quantity	6 TB
Product delivery	FTP
Data reliability - space segment	N/A
Data reliability - ground segment	Unknown
Pricing	Free
Access conditions	Data from the projects available on this server is provided without charge and may be used for research and education only. Commercial use of the data is not permitted. Research is understood as any project organised by a university, scientific institute or similar (private or institutional), for non-commercial research purposes only. A necessary condition for the recognition of non-commercial purposes is that all the results obtained are openly available at delivery costs only, without any delay linked to commercial objectives, and that the research itself is submitted for open publication. Although every care has been taken in preparing and testing the data, ECMWF cannot guarantee that the data are correct in all circumstances; neither does ECMWF accept any liability whatsoever for any error or omission in the data, or for any loss or damage arising from its use. Any person extracting data from this server will accept responsibility for informing all data users of these conditions. Data must not be supplied as a whole or in part to any third party without the authorisation of ECMWF. Articles, papers, or written scientific works of any form, based in whole or in part on data supplied by ECMWF, will contain an acknowledgment concerning the supplied data.
Formal agreements with data suppliers	Special license agreement between ECMWF and ESA for use in CCI program
Third party redistribution.	Subset for CDRP

Miscellaneous

Comments	For a list of parameters, see the tables in Section 8.

5.2 CLAVR-X

Product name	CLAVR-x
ID	2.02
Data type	NOAA's operational cloud processing system for the AVHRR
Source	NOAA
Key Websites	CIMSS CLAVR-x home page http://cimss.ssec.wisc.edu/clavr/
Version	No version control
References to technical specifications documents	RD.154
Product format	Code: tar archive. Ancillary data: compressed tar archive
Data gridding	Same as ID 1.02
Data coverage: temporal	Same as ID 1.02
Data coverage: spatial	Same as ID 1.02

Project Requirements

Date required within project	Start of Phase II
Use within project	(1) Long-term ECV
Reason for selection	Cloud detection in AVHRR data
Temporal coverage required	All available data for 1978-2016

Data quality

Data calibration	Same as ID 1.02
Data validation	RD.153
Product limitations	None identified
Potential product upgrades	None identified

Data availability

Available from	Code: FTP://FTP.ssec.wisc.edu/clavr/clavrx_distribution/clavrx_src_10_28_2010.tar Ancillary data: FTP://FTP.wisc.edu/clavr/clavrx_distribution/ clavrx_ancil_data_08_17_2010.tar.bz2
Availability time-scale	Same as ID 1.02
Estimates of data quantity	Code: 3.5 MB; Ancillary data: 9GB
Product delivery	FTP
Pricing	Free
Access conditions	None
Formal agreements with data suppliers	None
Third party redistribution.	For CDRP

Miscellaneous

Comments	The ancillary data includes albedo (from MODIS), land emissivity, land elevation, land cover, land mask, coastline mask, fast RTM coefficients, cloud reflectance and emissivity, aerosol coefficients.

5.3 OSI-401: SSM/I SEA ICE CONCENTRATION MAPS ON 10 KM POLAR STEREOGRAPHIC GRID

Product name	OSI-401: SSM/I Sea Ice Concentration Maps on 10 km Polar Stereographic Grid
ID	2.03
Data type	Satellite: Ice concentration computed from atmospherically corrected SSM/I brightness temperatures
Source	OSI SAF
Key Websites	High Latitude Processing Centre, OSI SAF, Sea Ice Products http://saf.met.no/p/ice/
Version	No version control
Platform name	Nimbus-7 (October 1978 to August 1987), DMSP
Platform characteristics	Sun-synchronous polar orbits
Sensor(s)	Nimbus-7, DMSP SSM/I
Sensor type	Passive microwave radiometers
Sensor key technical characteristics	SMMR see RD.45
References to technical specifications documents	RD.43, RD.113
Product format	HDF5
Data gridding	12.5 km EASE Grid for Northern and Southern Hemispheres
Data coverage: temporal	2005 - 2016
Data coverage: spatial	Northern Hemisphere and Southern Hemisphere fields

Project Requirements

Date required within project	Start of Phase II
Use within project	(2) Product validation
Reason for selection	As defined in the PVP
Temporal coverage required	All available data for 2009-2013

Data quality

Data calibration	None identified so far
Data validation	None identified so far

Data availability

Available from	OSI SAF
Estimates of data quantity	6 GB
Product delivery	FTP via OSI SAF High Latitude Processing Centre at http://saf.met.no/p/ice/
Pricing	Free
Access conditions	See EUMETSAT data policy

Formal agreements with data suppliers	None
Third party redistribution.	Subset for CDRP

Miscellaneous

Comments	None

5.4 OSI-409: GLOBAL SEA ICE CONCENTRATION REPROCESSING

Product name	OSI-409: Global Sea Ice Concentration Reprocessing
ID	2.04
Data type	Satellite: Ice classes are assigned from atmospherically corrected SSM/I brightness temperatures and ASCAT backscatter values, using a Bayesian approach
Source	OSI SAF
Key Websites	High Latitude Processing Centre, OSI SAF, Sea Ice Products http://saf.met.no/p/ice/
Version	Version 1
Platform name	Nimbus-7 (October 1978 to August 1987), DMSP
Platform characteristics	Sun-synchronous polar orbits
Sensor(s)	Nimbus-7, DMSP SSM/I
Sensor type	Passive microwave radiometers
Sensor key technical characteristics	SMMR see RD.45
References to technical specifications documents	RD.43, RD.113
Product format	NetCDF
Data gridding	10 km Polar Stereographic Grid
Data coverage: temporal	1978 - 2009
Data coverage: spatial	Northern Hemisphere and Southern Hemisphere fields

Project Requirements

Date required within project	Start of Phase II
Use within project	(2) Product validation
Reason for selection	As defined in the PVP
Temporal coverage required	All available data for 1991-2013

Data quality

Data calibration	None identified so far
Data validation	None identified so far

Data availability

Available from	OSI SAF
Estimates of data quantity	60 GB
Product delivery	FTP via OSI SAF High Latitude Processing Centre at http://saf.met.no/p/ice/
Pricing	Free
Access conditions	See EUMETSAT data policy
Formal agreements with data suppliers	None

Third party redistribution.	Subset for CDRP

Miscellaneous

Comments	None

5.5 TOMS OMI GOME-1 GOME-2 ABSORBING AEROSOL INDEX

Product name	TOMS OMI GOME-1 GOME-2 Absorbing Aerosol Index
ID	2.05
Data type	Satellite : aerosol index
Source	NASA GSFC, TEMIS
Key Websites	Temis Absorbing Aerosol Index http://www.temis.nl/airpollution/absaai/ NASA Ozone Processing Team, Data Product: Aerosol Index http://toms.gsfc.nasa.gov/aerosols/aerosols_v8.html NASA Space-based Measurements of Ozone and Air Quality in the Ultraviolet and Visible http://macuv.gsfc.nasa.gov/index.md Total Ozone Mapping Spectrometer http://toms.gsfc.nasa.gov/ NASA GSFC page http://aura.gsfc.nasa.gov/instruments/omi.html
Version	Version 8
Platform name	TOMS - Nimbus-7 and Earth Probe; OMI - EOS Aura; GOME-1 - ERS-2; GOME-2 - MetOp-A
Platform characteristics	Sun-synchronous polar orbit
Sensor(s)	Total Ozone Mapping Spectrometer, Ozone Monitoring Instrument, Global Ozone Monitoring Experiment 1 and 2
Sensor type	TOMS - Optical Spectrometer OMI - nadir-viewing wide-field-imaging spectrometer GOME - nadir-scanning ultraviolet and visible spectrometer
Sensor key technical characteristics	TOMS - Global daily coverage. The FOV is 3 x 3 degrees. Scanning angle is +/- 55.5° along the track. OMI - Daily global coverage. GOME - Waveband (UV-NIR) 0.24-0.79µm, resolution 0.2-0.4nm.
References to technical specifications documents	TOMS: RD.117, RD.118, RD.120, RD.121 OMI: RD.118 GOME-1: RD.141 GOME-2: RD.140. Absorbing Aerosol Index: RD.143, RD.142
Product format	ASCII converted to NetCDF
Data gridding	Daily. TOMS, GOME-1 and GOME-2: 1.25° longitude x 1° latitude resolution OMI 1° x 1° resolution
Data coverage: temporal	TOMS-Nimbus7: 1/11/1978 to 6/5/1993 TOMS-EarthProbe: 25/7/1996 to 31/12/2005 GOME-1: 1/7/1995 to 31/12/2000 GOME-2: 4/1/2007 to 2016
Data coverage: spatial	TOMS - Global between 70° N and 70° S OMI, GOME-1 and GOME-2 - Global

Project Requirements

Date required within project	Start of Phase II
Use within project	(2) Product validation
Reason for selection	TOMS is the only long-term satellite aerosol record. OMI, GOME-1 and GOME-2 extend the TOMS record.
Temporal coverage required	All available data for 1991-2013

Data quality

Data calibration	TOMS: RD.120, RD.121 OMI: RD.122, RD.124, RD.125, RD.126, RD.147, RD.148 GOME-1: RD.144, RD.145 GOME-2: RD.146
Data validation	TOMS: RD.91 OMI: RD.123 GOME: RD.149, RD.142

Data availability

Available from	TOMS: NASA GSFC OMI, GOME-1, GOME-2: TEMIS
Estimates of data quantity	5 GB
Product delivery	Download from website
Pricing	Free
Access conditions	None
Formal agreements with data suppliers	None
Third party redistribution.	Subset for CDRP

Miscellaneous

Comments	Data gap from 07/05/1993 to 24/07/1996.

6. In situ data

This section contains more extensive information about the in situ data products that will be used in the SST_CCI project. The information is displayed in the form of tables: one table for each product. Definitions of the table fields are given in Section 2.

6.1 SHIPBORNE RADIOMETER SKIN SST

Product name	Shipborne Radiometer Skin SST
ID	3.01
Data type	In situ observations of skin SST
Source	(a) A. Jessup, APL (b) I. Barton, CSIRO (c) W. Wimmer, NOCS (d) P. Minnett, University of Miami (e) T. Nightingale, RAL
Key Websites	(a) Jessup, A., Skin and Bulk SST Validation Program http://cirims.apl.washington.edu/index.php (b) (c) ISAR home page http://www.noc.soton.ac.uk/lso/isar/ (d) Minnett, P., Instruments http://www.rsmas.miami.edu/personal/pminnett/Instruments/m_aeri.html (e) RAL Space Science and Technology Spectroscopy Group, SISTeR http://www.sstd.rl.ac.uk/sg/projects/sister/index.htm
Version	No version control
Platform name	(a) RV Thomas G. Thompson, R/V Ronald H.Brown (b) RV Southern Surveyor (c) Pride of Bilbao (d) USCGC Polar Star (e) MV Val de Loire
Platform characteristics	Ships of opportunity
Sensor(s)	(a) CIRIMS (b) DAR011 (c) ISAR (d) M-AERI (e) SISTeR
Sensor type	(a) Infra-red radiometer (b) Infra-red radiometer (c) Infra-red radiometer (d) Infra-red spectroradiometer (e) Infra-red radiometer
Sensor key technical characteristics	(a) Design incorporates two Heitronics infrared KT11 radiometers with a spectral bandwidth in the 9.6-11.5 µm range; calibration uses a modified Hart Scientific microbath. (b) Self-calibrating; single-channel 10.5-11.5 µm. (c) On-board calibration uses two black bodies; spectral band 9.8 - 11 µm; optical rain gauge and shutter mechanism. (d) Seagoing Fourier-transform interferometric infrared spectroradiometer ~3 to ~18 µm; self-calibration uses two internal, NIST-traceable blackbody cavities. (e) Self-calibrating using two black bodies; bands centred at 3.7, 10.8 and 12.0 µm.

References to technical specifications documents	(a) RD.54 (b) RD.51 (c) RD.47 (d) RD.52
Product format	Various
Data gridding	N/A
Data coverage: temporal	Various
Data coverage: spatial	Various

Project Requirements

Date required within project	Start of Phase II
Use within project	(2) Product validation
Reason for selection	Only in situ skin SST observations
Temporal coverage required	All available data for 1996-2016

Data quality

Data calibration	RD.50, RD.56
Data validation	RD.50, RD.56
Product limitations	None identified
Potential product upgrades	None identified

Data availability

Available from	UoL
Availability time-scale	UP to one year behind real-time
Estimates of data quantity	< 1GB
Product delivery	FTP
Data reliability - space segment	N/A
Data reliability - ground segment	N/A
Pricing	Free
Access conditions	Approval of data supplier before publication
Formal agreements with data suppliers	None
Third party redistribution.	As part of CDRP

Miscellaneous

Comments	None

6.2 DRIFTING BUOY

Product name	Drifting buoy
ID	3.02
Data type	In situ SST_{depth} measurements
Source	GOOS and DBCP
Key Websites	Data Buoy Cooperation Panel http://www.jcommops.org/dbcp/ Atlantic Oceanographic and Meteorological Laboratory, Environmental Data Server Global Lagrangian Drifter Data http://www.aoml.noaa.gov/envids/gld/index.php
Version	None
Platform name	Various
Platform characteristics	Freely drifting buoys
Sensor(s)	Various
Sensor type	Various
Sensor key technical characteristics	RD.58
References to technical specifications documents	RD.58
Product format	NetCDF
Data gridding	N/A
Data coverage: temporal	1979 - 2013
Data coverage: spatial	Global

Project Requirements

Date required within project	Start of Phase II
Use within project	(2) Product validation
Reason for selection	Independently quality-controlled drifting buoy data set
Temporal coverage required	All available data for 1978-2016

Data quality

Data calibration	None
Data validation	RD.59
Product limitations	None
Potential product upgrades	See GHRSST pilot project https://www.ghrsst.org/ghrsst-science/science-team-groups/stval-wg/dbcp-ghrsst-pilot-project/.

Data availability

Available from	MOHC
Availability time-scale	One month behind real-time
Estimates of data quantity	2 GB
Product delivery	FTP

Data reliability - space segment	N/A
Data reliability - ground segment	N/A
Pricing	Free
Access conditions	None
Formal agreements with data suppliers	None
Third party redistribution.	As part of CDRP

Miscellaneous

Comments	None

6.3 GTMBA

Product name	GTMBA
ID	3.03
Data type	In situ SST_{depth} measurements
Source	TAO Project Office
Key Websites	Laboratory, P. M. E., Global Tropical Moored Buoy Array http://www.pmel.noaa.gov/tao/global/global.html
Version	None
Platform name	The major components of the GTMBA are the TAO/TRITON, PIRATA and RAMA arrays.
Platform characteristics	Moored buoys
Sensor(s)	Various
Sensor type	Various
Sensor key technical characteristics	RD.61, RD.62
References to technical specifications documents	RD.61, RD.62
Product format	compressed ASCII text file
Data gridding	N/A
Data coverage: temporal	1979 - to 2016
Data coverage: spatial	Tropical Pacific, Tropical Atlantic and Tropical Indian Oceans

Project Requirements

Date required within project	Start of Phase II
Use within project	(2) Product validation
Reason for selection	Relatively long-term, actively maintained in situ data set
Temporal coverage required	All available data for 1979-2016

Data quality

Data calibration	None
Data validation	N/A
Product limitations	None identified
Potential product upgrades	None identified

Data availability

Available from	PMEL/MOHC
Availability time-scale	Real-time
Estimates of data quantity	< 1 GB
Product delivery	HTTP

Data reliability - space segment	N/A
Data reliability - ground segment	N/A
Pricing	Free
Access conditions	If you use these data in publications, please acknowledge the TAO Project Office of NOAA/PMEL. Also, we would appreciate receiving a preprint and/or reprint of publications utilizing the data for inclusion in the TAO bibliography. Relevant publications should be sent to: TAO Project Office, NOAA/Pacific Marine Environmental Laboratory, 7600 Sand Point Way NE, Seattle, WA 98115.
Formal agreements with data suppliers	None
Third party redistribution.	As part of CDRP

Miscellaneous

Comments	None

6.4 VOLUNTARY OBSERVING SHIPS

Product name	Voluntary Observing Ships
ID	3.05
Data type	In situ SST and sea-ice reports
Source	WMO-IOC Joint Technical Commission for Oceanography and Marine Meteorology
Key Websites	JCOMM http://www.jcomm.info/
Version	None
Platform name	Various ships
Platform characteristics	Various
Sensor(s)	Various
Sensor type	Various
Sensor key technical characteristics	Various
References to technical specifications documents	http://www.bom.gov.au/jcomm/vos/information.html
Product format	ASCII
Data gridding	N/A
Data coverage: temporal	1853 to 2016
Data coverage: spatial	Global

Project Requirements

Date required within project	Start of Phase II
Use within project	(2) Product validation
Reason for selection	Sea-ice reports will add to validation data especially in marginal ice zones.
Temporal coverage required	All available data for 1978-2016

Data quality

Data calibration	None
Data validation	N/A
Product limitations	Large uncertainties on a single measurements
Potential product upgrades	None identified so far

Data availability

Available from	MOHC
Availability time-scale	Once month behind real time
Estimates of data quantity	< 1 GB
Product delivery	FTP

Data reliability - space segment	N/A
Data reliability - ground segment	N/A
Pricing	Free
Access conditions	None
Formal agreements with data suppliers	None
Third party redistribution.	As part of CDRP

Miscellaneous

Comments	Covers VOS data not in ICOADS

7. Inter-comparison data

This section contains more extensive information about the data products that will be used for the inter-comparison task of the SST_CCI project. The information is displayed in the form of tables: one table for each product. Definitions of the table fields are given in Section 2.

7.1 ICOADS

Product name	ICOADS
ID	4.01
Data type	In situ SST
Source	ICOADS Project
Key Websites	NOAA/ESRL/PSD, International Comprehensive Ocean-Atmosphere Data Set http://icoads.noaa.gov/
Version	Release 2.5
Platform name	Various
Platform characteristics	Surface marine observational records from ships, buoys, and other platform types
Sensor(s)	Various
Sensor type	Various
Sensor key technical characteristics	Various
References to technical specifications documents	RD.68, RD.69, RD.70
Product format	ASCII
Data gridding	N/A
Data coverage: temporal	1662-2007, plus preliminary data and products for 2008 to near-real-time
Data coverage: spatial	Global

Project Requirements

Date required within project	Feb 2015
Use within project	(3) Inter-comparison
Reason for selection	As defined in the PVP
Temporal coverage required	All available data for 1991-2013

Data quality

Data calibration	None
Data validation	N/A

Data availability

Available from	MOHC

Estimates of data quantity	65 GB
Product delivery	FTP
Pricing	Free
Access conditions	None
Formal agreements with data suppliers	None
Third party redistribution.	As part of CDRP

Miscellaneous

Comments	None

7.2 HADSST3

Product name	HadSST3
ID	4.02
Data type	SST Analysis
Source	MOHC
Key Websites	MOHC HadSST3 Page http://hadobs.metoffice.com/hadsst3/
Version	HadSST3 is version 3 of HadSST
Analysis characteristics	Ship and buoy SST measurements taken from ICOADS 2.5 (from 1850 to 2006). Data presented as 100 equi-probable realisations that span the uncertainty in the bias adjustments applied to the data.
References to technical specifications documents	RD.163 and RD.164
Product format	Compressed plain text files: anomalies, climatology, errors and corrections applied to the data are in separate files. Also available as NetCDF files.
Data gridding	Monthly, 5° x 5° lat-lon grid
Data coverage: temporal	1850 - 2006
Data coverage: spatial	Global

Project Requirements

Date required within project	Feb 2015
Use within project	(3) Inter-comparison
Reason for selection	As defined in the PVP
Temporal coverage required	All available data for 1991-2013

Data quality

Data validation	None

Data availability

Available from	MOHC
Estimates of data quantity	100 times 20Mb
Product delivery	FTP from http://hadobs.metoffice.com/hadsst3/
Pricing	Free

Access conditions	HadSST3 is subject to Crown copyright protection. The material may be downloaded to file or printer for the purposes of private study and scientific research. Any other proposed use of the material is subject to a copyright licence available from the Met Office. Licences and further information can be obtained from the Met Office IPR Officer, Met Office, FitzRoy Road, Exeter, Devon, EX1 3PB. E-mail: ipr@metoffice.gov.uk. For further information on Crown Copyright policy and licensing arrangements, see the guidance featured on HMSO's web site. When publishing work using the data, please use the following citations: Kennedy J.J., Rayner, N.A., Smith, R.O., Saunby, M. and Parker, D.E. (2011). Reassessing biases and other uncertainties in sea-surface temperature observations since 1850 part 1: measurement and sampling errors. In press JGR Atmosphere and Kennedy J.J., Rayner, N.A., Smith, R.O., Saunby, M. and Parker, D.E. (2011). Reassessing biases and other uncertainties in sea-surface temperature observations since 1850 part 2: biases and homogenisation. In press JGR Atmosphere. The source should also be quoted in the acknowledgements section as www.metoffice.gov.uk/hadobs.
Formal agreements with data suppliers	None
Third party redistribution.	As part of CDRP

Miscellaneous

Comments	Met Office Hadley Centre's SST climate data record

7.3 HADISST

Product name	HadISST
ID	4.03
Data type	Sea-ice and SST Analysis
Source	MOHC
Key Websites	Hadley Centre Sea Ice and Sea Surface Temperature Page http://hadobs.metoffice.com/hadisst/
Version	Version 1
Analysis characteristics	The SST data are taken from the Met Office Marine Data Bank (MDB), which from 1982 onwards also includes data received through the Global Telecommunications System (GTS). In order to enhance data coverage, monthly median SSTs for 1871-1995 from the Comprehensive Ocean-Atmosphere Data Set (COADS) (now ICOADS) were also used where there were no MDB data. The sea ice data are taken from a variety of sources including digitized sea ice charts and passive microwave retrievals.
References to technical specifications documents	RD.74
Product format	Compressed plain text files. Also available in netCDF files.
Data gridding	Global 1° x 1° lat-lon grid
Data coverage: temporal	1871 - to 2013
Data coverage: spatial	Global

Project Requirements

Date required within project	Feb 2015
Use within project	(3) Inter-comparison
Reason for selection	As defined in the PVP
Temporal coverage required	All available data for 1991-2013

Data quality

Data validation	None

Data availability

Available from	MOHC
Availability time-scale	Fields for the month-before-last are added to the data set on the 2nd of every new month
Estimates of data quantity	30 MB
Product delivery	FTP from http://hadobs.metoffice.com/hadisst/data/download.html
Pricing	Free

Access conditions	HadISST1 is subject to Crown copyright protection. The material may be downloaded to file or printer for the purposes of private study and scientific research. Any other proposed use of the material is subject to a copyright licence available from the Met Office. Licences and further information can be obtained from the Met Office IPR Officer, Met Office, FitzRoy Road, Exeter, Devon, EX1 3PB. E-mail: ipr@metoffice.gov.uk. For further information on Crown Copyright policy and licensing arrangements, see the guidance featured on HMSO's web site. When publishing work using the data, please use the following citation: Rayner, N. A.; Parker, D. E.; Horton, E. B.; Folland, C. K.; Alexander, L. V.; Rowell, D. P.; Kent, E. C.; Kaplan, A.; Global analyses of sea surface temperature, sea ice, and night marine air temperature since the late nineteenth century J. Geophys. Res.Vol. 108, ID D14, 4407 10.1029/2002JD002670 The source should also be quoted in the acknowledgements section as www.metoffice.gov.uk/hadobs.
Formal agreements with data suppliers	None
Third party redistribution.	As part of CDRP

Miscellaneous

Comments	HadISST2 will be used if available

7.4 ERSSTV3

Product name	ERSSTv3
ID	4.04
Data type	SST Analysis
Source	NOAA NCDC
Key Websites	NOAA Satellite and Information Service, Extended Reconstruction Sea Surface Temperature (ERSST.v3b) http://www.ncdc.noaa.gov/oa/climate/research/sst/ersstv3.php
Version	Version 3
Analysis characteristics	The analysis is based on the International Comprehensive Ocean-Atmosphere Data Set (ICOADS) release 2.4.
References to technical specifications documents	RD.79
Product format	Plain text files
Data gridding	Monthly 2° x 2° lat-lon grid
Data coverage: temporal	1854 - to 2013
Data coverage: spatial	Global

Project Requirements

Date required within project	Feb 2015
Use within project	(3) Inter-comparison
Reason for selection	As defined in the PVP
Temporal coverage required	All available data for 1991-2013

Data quality

Data validation	None

Data availability

Available from	NOAA NCDC
Estimates of data quantity	4 MB
Product delivery	FTP access through http://www.ncdc.noaa.gov/oa/climate/research/sst/ersstv3.php#grid
Pricing	Free
Access conditions	See NOAA/national Climate Data Center, cited 2010: NOAA/national Climatic Data Center Open Access to Physical Climate Data Policy. [Available online at http://www.ncdc.noaa.gov/oa/about/open-access-climate-data-policy.pdf.]
Formal agreements with data suppliers	None
Third party redistribution.	As part of CDRP

Miscellaneous

Comments	None

7.5 KAPLAN

Product name	Kaplan
ID	4.05
Data type	Day/night average SST analysis
Source	GHRSST LTSRF
Key Websites	from IRI/LDEO Climate Data Library, Kaplan Extended http://iridl.ldeo.columbia.edu/SOURCES/.KAPLAN/.EXTENDED/
Version	Version 2
Analysis characteristics	The data set uses a combination of optimally-interpolated ship observations and remote sensing data. For 1856-1981 this is the analysis of Kaplan et al. [RD.83] which uses optimal estimation in the space of 80 empirical orthogonal functions (EOFs) in order to interpolate ship observations of the U.K. Met Office database [RD.83]. The data after 1981 represents the projection of the NCEP OI analysis (which combines ship observations with remote sensing data) by Reynolds and Smith [RD.85] on the same set of 80 EOFs as used in Kaplan et al. [RD.83] in order to provide enhanced data quality of the former in the spatial resolution of the latter.
References to technical specifications documents	RD.81
Product format	NetCDF
Data gridding	Monthly 5° x 5° lat-lon grid
Data coverage: temporal	1981 - 2007
Data coverage: spatial	Global

Project Requirements

Date required within project	Feb 2015
Use within project	(3) Inter-comparison
Reason for selection	As defined in the PVP
Temporal coverage required	All available data for 1991-2013

Data quality

Data validation	None

Data availability

Available from	GHRSST LTSRF
Estimates of data quantity	6 MB
Product delivery	from the GHRSST LTSRF http://www.nodc.noaa.gov/SatelliteData/ghrsst/intercomp_data.html or FTP://FTP.nodc.noaa.gov/pub/data.nodc/GCOS/
Pricing	Free
Access conditions	None
Formal agreements with data suppliers	None
Third party redistribution.	As part of CDRP

Miscellaneous

Comments	None

7.6 COBE SST

Product name	Cobe SST
ID	4.06
Data type	Day/night average SST analysis
Source	GHRSST LTSRF
Key Websites	GHRSST LTSRF http://www.nodc.noaa.gov/SatelliteData/ghrsst/
Version	Version 1
Analysis characteristics	This data set was created from the Centennial in situ Observation-Based Estimates (COBE) Analysis SST data set, which is a monthly one degree analysis product that combines SST observations from ICOADS, the Kobe Collection, and a buoy data set compiled by the Marine Environmental Data Service (MEDS).
References to technical specifications documents	RD.85
Product format	netCDF
Data gridding	Monthly 5° x 5° lat-lon grid
Data coverage: temporal	1891-2008
Data coverage: spatial	Global

Project Requirements

Date required within project	Feb 2015
Use within project	(3) Inter-comparison
Reason for selection	As defined in the PVP
Temporal coverage required	All available data for 1991-2013

Data quality

Data validation	None

Data availability

Available from	GHRSST LTSRF
Estimates of data quantity	33 MB
Product delivery	Download from the GHRSST LTSRF http://www.nodc.noaa.gov/SatelliteData/ghrsst/intercomp_data.html or FTP://FTP.nodc.noaa.gov/pub/data.nodc/GCOS/
Pricing	Free
Access conditions	None
Formal agreements with data suppliers	None
Third party redistribution.	As part of CDRP

Miscellaneous

Comments	None

7.7 NOCS SURFACE FLUX DATASET

Product name	NOCS Surface Flux Dataset v2.0
ID	4.07
Data type	In-situ surface meteorology and flux analysis. SSTdepth field is calculated from optimally interpolated VOS data.
Source	NOCS
Key Websites	http://www.noc.soton.ac.uk/ooc/CLIMATOLOGY/noc2.php
Version	Version 2.0
Analysis characteristics	Dataset constructed from in situ weather reports from Voluntary Observing Ships
References to technical specifications documents	RD.99 and RD.103
Product format	archived and compressed NetCDF files
Data gridding	Daily 1° x 1° lat-lon grid
Data coverage: temporal	1973-2009
Data coverage: spatial	Global

Project Requirements

Date required within project	Feb 2015
Use within project	(3) Inter-comparison
Reason for selection	As defined in the PVP
Temporal coverage required	All available data for 1991-2013

Data quality

Data validation	RD.99

Data availability

Available from	CISL Research Data Archive at NCAR
Estimates of data quantity	2.3 GB
Product delivery	Download from the CISL Research Data Archive at NCAR
Pricing	Free
Access conditions	None
Formal agreements with data suppliers	None
Third party redistribution.	As part of CDRP

Miscellaneous

Comments	None

7.8 KARSPECK

Product name	Karspeck
ID	4.08
Data type	SST Analysis
Source	Not yet released
Key Websites	http://rainbow.ldeo.columbia.edu/~alexeyk/KKS2011supp/
Version	Version 1
Analysis characteristics	Data set based on HadSST2 which is constructed from in situ measurements from ships and buoys. The data are reconstructed using Reduced Space Optimal Smoothing and a local Optimal Interpolation scheme to reconstruct mid-scale variability.
References to technical specifications documents	RD.89
Product format	NetCDF
Data gridding	Monthly 1° x 1° lat-lon grid
Data coverage: temporal	1850-2008
Data coverage: spatial	North Atlantic

Project Requirements

Date required within project	Feb 2015
Use within project	(3) Inter-comparison
Reason for selection	As defined in the PVP
Temporal coverage required	All available data for 1991-2013

Data quality

Data validation	None

Data availability

Available from	NCAR
Estimates of data quantity	580 Mb
Product delivery	Download from http://rainbow.ldeo.columbia.edu/~alexeyk/KKS2011supp/
Pricing	Free
Access conditions	None
Formal agreements with data suppliers	None
Third party redistribution.	As part of CDRP

Miscellaneous

Comments	None

7.9 NOAA OI V2

Product name	OI v2
ID	4.09
Data type	SST Analysis
Source	NOAA
Key Websites	http://www.emc.ncep.noaa.gov/research/cmb/sst_analysis/
Version	Version 2
Analysis characteristics	The analysis uses in situ and satellite SSTs
References to technical specifications documents	RD.165
Product format	Binary files
Data gridding	Weekly and monthly, 1° x 1°
Data coverage: temporal	1981 to 2013
Data coverage: spatial	Global

Project Requirements

Date required within project	Feb 2015
Use within project	(3) Inter-comparison
Reason for selection	As defined in the PVP
Temporal coverage required	All available data for 1991-2013

Data quality

Data validation	None

Data availability

Available from	NOAA
Estimates of data quantity	250 MB
Product delivery	FTP
Pricing	Free
Access conditions	None
Formal agreements with data suppliers	None
Third party redistribution.	As part of CDRP

Miscellaneous

Comments	None

7.10 HADGEM SST

Product name	HadGEM SST
ID	4.10
Data type	Model simulated SST and ice fields
Source	MOHC
Key Websites	Met Office, Met Office climate prediction model: HadGEM3 family http://www.metoffice.gov.uk/research/modelling-systems/unified-model/climate-models/hadgem3
Version	Version 3
Analysis characteristics	HadGem3 simulations
References to technical specifications documents	RD.114
Product format	Met Office PP (Post Processing) binary file format (atmosphere)
Data gridding	NetCDF (ocean)
Data coverage: temporal	0.833° longitude by 0.555° latitude grid (atmosphere model)
Data coverage: spatial	Global

Project Requirements

Date required within project	May 2012
Use within project	(3) Inter-comparison
Reason for selection	As defined in the PVP
Temporal coverage required	All available data for 1991-2013

Data quality

Data validation	N/A

Data availability

Available from	MOHC
Estimates of data quantity	20Gb (atmosphere) & 2.4 Gb (ocean)
Product delivery	Internal disks at the Met Office Hadley Centre (where the CRG is based)
Pricing	Free
Access conditions	For research purposes only
Formal agreements with data suppliers	None
Third party redistribution.	As part of CDRP

Miscellaneous

Comments	None

7.11 MYOCEAN OSTIA REANALYSIS

Product name	MyOcean OSTIA reanalysis
ID	4.11
Data type	SST and sea-ice analysis
Source	MyOcean
Key Websites	www.myocean.eu.org
Version	Version 1
Analysis characteristics	Satellite IR SST (AVHRR Pathfinder, (A)ATSR) and in situ SST (ICOADS)
References to technical specifications documents	RD.168, RD.169
Product format	GHRSST L4 format
Data gridding	Daily, 1/20 degree grid
Data coverage: temporal	1985-2007
Data coverage: spatial	Global

Project Requirements

Date required within project	May 2012
Use within project	(5) Inter-comparison
Reason for selection	As defined in the PVP
Temporal coverage required	All available data for 1991-2012

Data quality

Data validation	RD.168, RD.169

Data availability

Available from	MyOcean
Estimates of data quantity	75GB
Product delivery	FTP
Pricing	Free
Access conditions	Freely available subject to conditions described in the Service Commitments And Licence [see http://www.myocean.eu.org/products-services/service-commitments-and-licence.html]
Formal agreements with data suppliers	None
Third party redistribution.	N/A

Miscellaneous

Comments	None

7.12 NOAA DAILY OI

Product name	NOAA Optimum Interpolation 1/4 Degree Daily Sea Surface Temperature Analysis - AVHRR OI
ID	4.12
Data type	SST analysis
Source	NCDC/NOAA
Key Websites	NOAA Optimum Interpolation 1/4 Degree Daily Sea Surface Temperature Analysis http://www.ncdc.noaa.gov/oa/climate/research/sst/oi-daily.php
Version	Version 2
Analysis characteristics	In situ buoy and ship SST. AMSR-E and AVHRR PF v5 satellite SST.
References to technical specifications documents	RD.76, RD.77
Product format	GHRSST L4
Data gridding	Daily 0.25° x 0.25° lat-lon grid
Data coverage: temporal	September 1981 - present
Data coverage: spatial	Global

Project Requirements

Date required within project	May 2012
Use within project	(5) Inter-comparison
Reason for selection	Part of GMPE system
Temporal coverage required	All available data for 1991-2012

Data quality

Data validation	None

Data availability

Available from	NOAA NCDC
Estimates of data quantity	5 GB
Product delivery	FTP
Pricing	Free
Access conditions	None
Formal agreements with data suppliers	None
Third party redistribution.	N/A

Miscellaneous

Comments	None

7.13 MGDSST

Product name	MGDSST
ID	4.13
Data type	SST Analysis
Source	JMA, Japan.
Key Websites	GHRSST L4 Gridded SST Products https://www.ghrsst.org/L4-Gridded-SST.html
Version	Version 1
Analysis characteristics	AMSR-E, WindSat, Pathfinder and in-situ SST (buoy and ship)
References to technical specifications documents	RD.111
Product format	GHRSST L4
Data gridding	Daily, 0.25° resolution
Data coverage: temporal	1982-2011
Data coverage: spatial	Global

Project Requirements

Date required within project	May 2012
Use within project	(5) Inter-comparison
Reason for selection	Part of GMPE system
Temporal coverage required	All available data for 1991-2012

Data quality

Data validation	RD.110

Data availability

Available from	GHRSST LTSRF
Estimates of data quantity	8 GB
Product delivery	FTP
Pricing	Free
Access conditions	None
Formal agreements with data suppliers	None
Third party redistribution.	N/A

Miscellaneous

Comments	None

7.14 CMC

Product name	CMC
ID	4.14
Data type	SST analysis
Source	CMC, Canada
Key Websites	SQUAM http://www.star.nesdis.noaa.gov/sod/sst/squam/L4/
Version	Version 1
Analysis characteristics	In situ data from buoys and ships, satellite-retrieved SST data, and SST's derived from satellite-observed sea-ice coverage
References to technical specifications documents	RD.112, RD.170
Product format	GHRSST L4
Data gridding	Daily, 0.2° resolution
Data coverage: temporal	1991-2011
Data coverage: spatial	Global

Project Requirements

Date required within project	May 2012
Use within project	(5) Inter-comparison
Reason for selection	Part of GMPE system
Temporal coverage required	All available data for 1991-2012

Data quality

Data validation	None

Data availability

Available from	CMC
Estimates of data quantity	11 GB
Product delivery	FTP
Pricing	Free
Access conditions	None
Formal agreements with data suppliers	None
Third party redistribution.	N/A

Miscellaneous

Comments	None

7.15 AVHRR PATHFINDER SST

Product name	AVHRR Pathfinder SST
ID	4.15
Data type	Satellite: SST
Source	NOAA NODC
Key Websites	Pathfinder Project http://www.nodc.noaa.gov/SatelliteData/pathfinder4km/
Version	Version 5.2
Platform name	NOAA
Platform characteristics	Polar orbit
Sensor(s)	AVHRR
Sensor type	Visible and infra-red radiometer
Sensor key technical characteristics	AVHRR/3 has 6 channels: 0.58 - 0.68 µm, 0.725 - 1.00 µm, 1.58 - 1.64 µm, 3.55 - 3.93 µm, 10.30 - 11.30 µm, 11.50 - 12.50 µm.
References to technical specifications documents	RD.158
Product format	NetCDF 4
Data gridding	twice daily, approx. 4 km
Data coverage: temporal	1981 to present
Data coverage: spatial	Global

Project Requirements

Date required within project	May 2012
Use within project	(5) Inter-comparison
Reason for selection	As defined in the PVP
Temporal coverage required	All available data for 1991-2012

Data quality

Data validation	RD.159

Data availability

Available from	NODC OpeNDAP server http://data.nodc.noaa.gov/opendap/pathfinder/
Estimates of data quantity	200 GB
Product delivery	FTP
Pricing	Free
Access conditions	None
Formal agreements with data suppliers	None
Third party redistribution.	N/A

Miscellaneous

Comments	None

8. SST_CCI Requirements for ECMWF Data

ECMWF ERA-interim reanalysis data are required by the SST_CCI project for use in both the SST retrieval and its interpretation. A document summarising the ERA-interim archive is available on the web at:

http://www.ecmwf.int/publications/library/ecpublications/_pdf/era/era_report_series/rs_1.pdf

In summary, the ERA-interim atmospheric model outputs are available as analysis and forecast fields at:

- Four analyses at 0000, 0600, 1200 and 1800 UTC
- Two daily 10 day forecasts initialised at 0000 and 1200 UTC

Data are available at the full T255 resolution of the model or and the corresponding N128 reduced Gaussian grid (0.703125 degree). Most upper-air parameters are available on the 60 model levels and on 37 pressure levels.

A subset of the ERA-interim archive is available for direct download from the ECMWF Data Server. This data is at a reduced resolution of 1.5 degrees at all 37 pressure levels. This reduced resolution data is not suitable for the SST_CCI project.

After reviewing the ERA-interim documentation, the SST_CCI project requires:

1. Surface analysed parameters at 0000, 0600, 1200 and 1800 UTC on the N128 reduced Gaussian grid.
2. Accumulated forecast parameters for 3-, 6-, 9- and 12- hour steps from the 0000 and 1200 analysis times.
3. Upper-air analysed parameters at 0000, 0600, 1200 and 1800 UTC at the 60 model levels on either the T255 grid and N128 reduced Gaussian grid (whichever is available).

The SST_CCI project will need ERA-interim for the period from 01/01/1991 to 31/03/2013.

A summary of all ERA-interim parameters required by the SST_CCI project is provided in Table 8-1.

ECMWF Code	Output field	Units	Analysis or Forecast	Model levels	Model Grid	Needed for
34	Sea surface temperature	K	Analysis and Forecast	Surface	GG (N128)	OE retrieval and cloud detection and skin to depth model
165	10m east wind component	m s^{-1}	Analysis and Forecast	Surface	GG (N128)	OE retrieval and cloud detection and skin to depth model
166	10m north wind component	m s^{-1}	Analysis and Forecast	Surface	GG (N128)	OE retrieval and cloud detection and skin to depth model
172	Land/sea mask	(0,1)	Analysis	Surface	GG (N128)	OE retrieval and cloud detection
130	Temperature	K	Analysis	Profile (SH)	SH (T255)	OE retrieval and cloud detection.
133	Specific humidity	kg/kg	Analysis	Profile (GG)	GG (N128)	OE retrieval and cloud detection.
152	Log surface pressure (Pa)	-	Analysis	Single level	SH (T255)	OE retrieval and cloud detection
31	Sea-ice fraction	(0-1)	Analysis	Surface	GG (N128)	Quality control and cloud/ice detection
137	Total column water vapour	kg m^{-2}	Analysis	Column	GG (N128)	Check on profiles
151	Mean sea level pressure	Pa	Analysis and Forecast	Surface	GG (N128)	Check on profiles and skin to depth model
167	2m Temperature	K	Analysis and Forecast	Surface	GG (N128)	Check on profiles and skin to depth model
168	2m Dew point	K	Analysis and Forecast	Surface	GG (N128)	Check on profiles and skin to depth model
146	Surface sensible heat flux	W m^{-2} s	Forecast accumulated	Surface	GG (N128)	Skin to depth model
147	Surface latent heat flux	W m^{-2} s	Forecast accumulated	Surface	GG (N128)	Skin to depth model
159	Boundary layer height	m	Forecast	Surface	GG (N128)	Skin to depth model
169	Downward surface solar radiation	W m^{-2} s	Forecast accumulated	Surface	GG (N128)	Skin to depth model
175	Downward surface thermal radiation	W m^{-2} s	Forecast accumulated	Surface	GG (N128)	Skin to depth model
176	Surface solar radiation	W m^{-2} s	Forecast accumulated	Surface	GG (N128)	Skin to depth model

ECMWF Code	Output field	Units	Analysis or Forecast	Model levels	Model Grid	Needed for
177	Surface thermal radiation	W m^{-2} s	Forecast accumulated	Surface	GG (N128)	Skin to depth model
180	Turbulent stress east	N m^{-2} s	Forecast accumulated	Surface	GG (N128)	Skin to depth model
181	Turbulent stress north	N m^{-2} s	Forecast accumulated	Surface	GG (N128)	Skin to depth model
182	Evaporation	m of water	Forecast accumulated	Surface	GG (N128)	Skin to depth model
228	Total precipitation	m of water	Forecast accumulated	Surface	GG (N128)	Skin to depth model
164	Total cloud cover	(0-1)	Analysis	Surface	GG (N128)	Algorithm selection
235	Skin temperature	K	Analysis	Surface	GG (N128)	Algorithm selection
174	Albedo (climate)	-	Analysis	Surface	GG (N128)	Algorithm selection
32	Snow albedo	(0-1)	Analysis	Surface	GG (N128)	Algorithm selection
203	Ozone mass mixing ratio	kg/kg	Analysis	Profile (GG)	GG (N128)	Algorithm selection

Table 8-1: Summary of ERA-interim data required for SST_CCI project.

Note 1: All outputs requested at highest possible model spatial resolution (T255 or N128)

Note 2: All profiles required on model levels and not pressure levels in either Spherical Harmonics (SH) or Gridded Gaussian (GG) as indicated.

Note 3: All data will be provided in GRIB format and interpolation will be done using the CDO tool https://code.zmaw.de/projects/cdo.

8.1 SUMMARY OF SST_CCI ECMWF REQUIREMENTS IN ECMWF FORMAT

ECMWF (email from David Tan 01/10/2010) asks for ECMWF ERA-interim requirements to be provided in a specific style. This section summarises the SST_CCI ECMWF data requirements in the requested ECMWF format.

Surface and single level parameters from ERA Interim, Atmospheric model, Analysis

- Requested analysis times: 0000, 0600, 1200, 1800 UTC
- Dates: 01/01/1991 to 31/12/2010; 01/10/2011 to 31/03/2012
- Requested representation: Lat/lon grid
- Requested representation: 0.7 degree
- Requested area: Global
- Requested parameters: see Table 8-2

Grib number	Grib Abbreviation	Units	name
31	CI	(0-1)	Sea-ice fraction
32	ASN	(0-1)	Snow albedo
34	SSTK	K	Sea surface temperature
137	TCWV	kg m^{-2}	Total column water vapour
151	MSL	Pa	Mean sea level pressure
164	TCC	(0-1)	Total cloud cover
165	10U	m s^{-1}	10m east wind component
166	10V	m s^{-1}	10m north wind component
167	2T	K	2m Temperature
168	2D	K	2m Dew point
172	LSM	(0,1)	Land/sea mask
174	AL	-	Albedo (climate)
235	SKT	K	Skin temperature

Table 8-2: Table of Single Level Parameters from ERA Interim, Atmospheric model, Analysis

Surface and single level parameters from ERA Interim, Atmospheric model, Forecast/Forecast accumulated

- Requested forecast times: 00 UTC +3, +6, +9, +12 hours and 12 UTC +3,+6, +9, +12 hours
- Dates: 01/01/1991 to 31/12/2010; 01/10/2011 to 31/03/2012
- Requested representation: Lat/lon grid
- Requested representation: 0.7 degree
- Requested area: Global

- Requested parameters: see Table 8-3

Grib number	Grib Abbreviation	Units	name
34	SSTK	K	Sea surface temperature
146	SSHF	W m-2 s	Surface sensible heat flux
147	SLHF	W m-2 s	Surface latent heat flux
151	MSL	Pa	Mean sea level pressure
159	BLH	m	Boundary layer height
165	10U	m s^{-1}	10m east wind component
166	10V	m s^{-1}	10m north wind component
167	2T	K	2m Temperature
168	2D	K	2m Dew point
169	SSRD	W m-2 s	Downward surface solar radiation
175	STRD	W m-2 s	Downward surface thermal radiation
176	SSR	W m-2 s	Surface solar radiation
177	STR	W m-2 s	Surface thermal radiation
180	EWSS	N m-2 s	Turbulent stress east
181	NSSS	N m-2 s	Turbulent stress north
182	E	m of water	Evaporation
228	TP	m of water	Total precipitation

Table 8-3: Table of Single Level Parameters from ERA Interim, Atmospheric model, Forecast accumulated

Model level parameters from ERA Interim, Atmospheric model, Analysis

- Requested analysis times: 0000, 0600, 1200, 1800 UTC
- Dates: 01/01/1991 to 31/12/2010; 01/10/2011 to 31/03/2012
- Requested representation: Lat/lon grid
- Requested representation: 0.7 degree
- Requested area: Global
- Requested parameters: see Table 8-4

Grib number	Grib Abbreviation	Units	name	Model levels
130	T	K	Temperature	All levels
133	Q	kg/kg	Specific humidity	All levels
152	LNSP	-	Log surface pressure (Pa)	Surface
203	O3	kg/kg	Ozone mass mixing ratio	All levels

Table 8-4: Table of Model Level Parameters from ERA Interim, Atmospheric model, Analysis