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**Project** : **CCI Phase 1 (SST)**

**Title** : **Data Access Requirements Document**

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

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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 |
|---|---|---|
| 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 |

# 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. The SST_CCI project team will provide necessary data outside the project team within deliverable data packages (RRDP and CRDP). SST output products from the project in GHRSST format will be distributed to the GHRSST GDAC.

## 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.

**Sections 4 to 8**

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 9    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 |
| 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 | Australian Commonwealth Scientific and Industrial Research Organisation |
| 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 |
| 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, 7, and 8 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 ongoing. |
| **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. Where the date is followed by an asterisk a subset of the data product is required for development of the prototype MMD. This subset consists of data for January and July 2010 (these periods are determined by the current availability of the AVHRR GAC data) and is required by August 2010. |
| **Use within project** | The SST_cci project can be considered to have five strands: (1) the production of a 'long-term' ECV using data from 1991 to 2010, (2) the specification of the ECV as realised using a broader range of sensors, which will be demonstrated using 6 months of data from 2011/12, and is termed the 'short-term' ECV, (3) the construction of the Multi-sensor Match-up Data set, the production of the Round Robin Data Package and the algorithm selection process (4) product validation (5) inter-comparison of the ECV with other SST products. These strands are referred to in subsequent tables as (1) long-term ECV, (2) short-term ECV, (3) Algorithm selection, (4) validation and (5) inter-comparison. Some data sets will be used for more than one strand and subsequent entries in the table are accompanied by the relevant number in brackets. |

| 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 will depend on the use to which the data is put in the project (see 'Use within project' entry in this table). Strands (1), (3), (4) and (5) will use the complete record of the product for the period 1991-2010, denoted '1991-2010 complete record' in subsequent tables. A sub-set of the record consisting of all data available for the period October 2011 to March 2012 will be required for strand (2). This subset is termed 'subset 2011/2012' in subsequent tables. |

**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 present | Version 2.0 | Jan 2011* | (1) Long term ECV (Require all available data for 1991-2010)<br><br>(2) Short-term ECV (Require all available data for 2011-2012<br><br>(3) Algorithm selection (Require all available data for 1991-2010) | ESA | NEODC and UK-MM-PAF | 23 TB |
| 1.02 | ATSR Match-up Dataset | 1991 to present | Version 2.0 | Jan 2011* | (3) Algorithm selection (Require all available data for 1991-2010)<br><br>(4) Product validation (Require all available data for 1991-2012) | ESA | UoL | 1.5 GB |
| 1.03 | AVHRR Global GAC L1 | 1978 to present | Various | Jan 2011* | (1) Long term ECV (Require all available data for 1991-2010)<br><br>(2) Short-term ECV (Require all available data for 2011-2012<br><br>(3) Algorithm selection (Require all available data for 1991-2010) | NOAA | NOAA CLASS | 12 TB |
| 1.04 | AVHRR MetOp Internal format L1b | 2007 to present | A1.0p1.0 | Jan 2011 | (2) Short-term ECV (Require all available data for 2011-2012 | Eumetsat | CMS | 3 TB |

| 1.05 | AVHRR MetOp Match-up Dataset | 2007 to present | Version 2 | Jan 2011* | (3) Algorithm selection (Require all available data for 1991-2010)<br><br>(4) Product validation (Require all available data for 1991-2012) | Eumetsat | CMS | 1.4GB /month |
|------|------|------|------|------|------|------|------|------|
| 1.06 | AVHRR Pathfinder Match-up Dataset | 1984 to present | No version control | Jan 2011* | (3) Algorithm selection (Require all available data for 1991 to start of MetOp)<br><br>(4) Product validation (Require all available data for 1991 start of MetOp) | RSMAS | RSMAS | 0.5 GB |
| 1.07 | SEVIRI Level 3C | 2011 to present | A0.0p0.1 | Jan 2011 | (2) Short-term ECV (Require all available data for 2011-2012 | Eumetsat | CMS | 23 TB |
| 1.08 | SEVIRI Match-up Dataset | 2010 to present | No version control | Jan 2011* | (3) Algorithm selection (Require all available data for 1991 - 2010)<br><br>(4) Product validation (Require all available data for 1991 - 2012) | Eumetsat | CMS | 170Mb/month |
| 1.09 | AMSR-E GHRSST L2P | 2002 to present | Version 7 GHRSST L2P | Jul 2011 | (2) Short-term ECV (Require all available data for 2011-2012<br><br>(3) Algorithm selection (Require all available data for 1991 - 2010)<br><br>(4) Product validation (Require all available data for 1991 - 2012) | NASA/JAXA | RSS via GHRSST LTSRF | 255 GB |
| 1.10 | TMI GHRSST L2P | 1999 to present | Version 4 | Jul 2011 | (2) Short-term ECV (Require all available data for 2011-2012<br><br>(3) Algorithm selection (Require all available data for 1991 - 2010)<br><br>(4) Product validation (Require all available data for 1991 - 2012) | NASA | RSS via GHRSST LTSRF | 60 GB |

## 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 | 1991 to present | Version 1.0 | Jan 2011* | (1) Long term ECV (Require all available data for 1991-2010)<br><br>(2) Short-term ECV (Require all available data for 2011-2012<br><br>(3) Algorithm selection (Require all available data for 1991-2010)<br><br>(4) Product validation (Require all available data for 1991 - 2012)<br><br>Refer to Section 9 for specific fields required. | ECMWF | ECMWF | 2 TB |
| 2.02 | CLAVR-x | 1984 to present | No version control | Jan 2011* | (1) Long term ECV (Require all available data for 1991-2010)<br><br>(2) Short-term ECV (Require all available data for 2011-2012<br><br>(3) Algorithm selection (Require all available data for 1991-2010) | NOAA | CIMSS | 4GB |

| 2.03 | NCEP/NCAR Reanalysis 1 | 1991 to present | Version 1 | Jan 2011* | (1) Long term ECV (Require all available data for 1991-2010)<br><br>(2) Short-term ECV (Require all available data for 2011-2012<br><br>(3) Algorithm selection (Require all available data for 1991-2010)<br><br>(4) Product validation (Require all available data for 1991 - 2012) | NOAA NCEP | NOAA | 30 GB |
| 2.04 | OSI-SAF Maximum Gradient Atlas | N/A | No version control | Jan 2011* | (3) Algorithm selection (Require all available data for 1991-2010)<br><br>(4) Product validation (Require all available data for 1991 - 2012) | CMS | CMS | << 1 GB |
| 2.05 | AOML Ocean Current Climatology | N/A | No version control | Jan 2011* | (1) Long term ECV (Require all available data for 1991-2010)<br><br>(2) Short-term ECV (Require all available data for 2011-2012<br><br>(3) Algorithm selection (Require all available data for 1991-2010)<br><br>(4) Product validation (Require all available data for 1991 - 2012) | AOML | AOML | 29 MB |

| 2.06 | OSI-401: SSM/I Sea Ice Concentration Maps on 10 km Polar Stereographic Grid | 2005 - present | No version control | May 2012 | (3) Algorithm selection (Require all available data for 2009-2010)<br><br>(4) Product validation (Require all available data for 2009 - 2012) | OSI SAF | OSI SAF | 60 GB |
|---|---|---|---|---|---|---|---|---|
| 2.07 | OSI-409: Global Sea Ice Concentration Reprocessing | 1978-2009 | Version 1 | May 2012 | (3) Algorithm selection (Require all available data for 1991-2010)<br><br>(4) Product validation (Require all available data for 1991 - 2012) | OSI SAF | OSI SAF | 1 GB |
| 2.08 | TOMS OMI GOME-1 GOME-2 Absorbing Aerosol Index | 1978 – 2005<br><br>2007 – present | Version 8 | May 2012 | (3) Algorithm selection (Require all available data for 1991-2010)<br><br>(4) Product validation (Require all available data for 1991 - 2012) | NASA GSFC, TEMIS | TOMS: NASA GSFC OMI, GOME-1, GOME-2: TEMIS | 3 GB |
| 2.09 | SAGE II V6.20 AEROSOL, O3, NO2, H2O binary data set | 1984 - 2005 | Version 6.2 | May 2012 | (3) Algorithm selection (Require all available data for 1991-2010)<br><br>(4) Product validation (Require all available data for 1991 - 2012) | NASA | NASA | 1 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 present | No version control | Jan 2011* | (4) Product validation (Require all available data for 1991-2012) | (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 | 1991 to present | No version control | Jan 2011* | (3) Algorithm selection (Require all available data for 1991-2010)  (4) Product validation (Require all available data for 1991-2012) | GOOS and DBCP | AOML | 1 GB |
| 3.03 | GTMBA | 1991 to present | No version control | Jan 2011* | (4) Product validation (Require all available data for 1991-2012) | TAO Project Office | PMEL | 5 GB |
| 3.04 | EN3 ocean temperature and salinity profiles | 1999 to present | Version 2a | Jan 2011* | (4) Product validation (Require all available data for 1991-2012) | MOHC | MOHC | 2 GB |
| 3.05 | Barents Sea Moored Buoys | 2009 to present | No version control | Jan 2011* | (4) Product validation (Require all available data for 1991-2012) | Fugro OCEANOR | Fugro OCEANOR | << 1 GB |
| 3.06 | Polarstern TSG | 1998 to present | No version control | Jan 2011* | (4) Product validation (Require all available data for 1991-2012) | Alfred Wegener Institute for Polar and Marine Research | PANGAEA® Publishing Network for Geoscientific & Environmental Data | 0.5 GB |

| 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) |
|---|---|---|---|---|---|---|---|---|
| 3.07 | Voluntary Observing Ships | 1991 to present | No version control | Jan 2011* | (4) Product validation (Require all available data for 1991-2012) | WMO-IOC Joint Technical Commission for Oceanography and Marine Meteorology | JCOMM GTS | < 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 - present | Release 2.5 | May 2012 | (5) Intercomparison (Require all available data for 1991-2012) | ICOADS Project | MOHC | 65 GB |
| 4.02 | HadSST3 | 1850 - 2006 | HadSST3 is version 3 of HadSST | May 2012 | (5) Intercomparison (Require all available data for 1991-2012) | MOHC | MOHC | 100 times 20Mb |
| 4.03 | HadISST | 1871 - present | Version 1 | May 2012 | (5) Intercomparison (Require all available data for 1991-2012) | MOHC | MOHC | 30 MB |
| 4.04 | ERSSTv3 | 1854 – present | Version 3 | May 2012 | (5) Intercomparison (Require all available data for 1991-2012) | NOAA NCDC | NOAA NCDC | 4 MB |
| 4.05 | Kaplan | 1981 – 2007 | Version 2 | May 2012 | (5) Intercomparison (Require all available data for 1991-2012) | LDEO Columbia | GHRSST LTSRF | 6 MB |
| 4.06 | Cobe SST | 1891 – 2008 | Version 1 | May 2012 | (5) Intercomparison (Require all available data for 1991-2012) | JMA | GHRSST LTSRF | 33 MB |
| 4.07 | NOCS Surface Flux Dataset v2.0 | 1973 – 2009 | Version 2.0 | May 2012 | (5) Intercomparison (Require all available data for 1991-2012) | NOCS | CISL Research Data Archive at NCAR | 2.3 GB |
| 4.08 | Karspeck | 1850-2008 | Version 1 | May 2012 | (5) Intercomparison (Require all available data for 1991-2012) | LDEO Columbia | NCAR | 580 MB |
| 4.09 | OI v2 | 1662 - present | Version 2 | May 2012 | (5) Intercomparison (Require all available data for 1991-2012) | NOAA | NOAA | 250 MB |
| 4.10 | HadGEM SST | Present day control runs | GC1 & GC2 | May 2012 | (5) 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 |
| 4.16 | MODIS-A SST and chlorophyll-a concentration | 2002 to present | Not given | October 2013 | (5) Inter-comparison | NASA | http://oceandata.sci.gsfc.nasa.gov/ | 6.2 GB |

## 3.5 OUTPUTS FROM OTHER CCI PROJECTS

| 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) |
|---|---|---|---|---|---|---|---|---|
| 5.01 | Ocean colour data | daily | V0.95 | October 2013 | (5) Intercomparison over 2003 | ESA | ESA | 146GBytes |

# 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/<br>ESA Envisat page http://envisat.esa.int/earth/www/area/index.cfm?fareaid=6<br>ESA AATSR page http://earth.esa.int/object/index.cfm?fobjectid=3773<br>RAL AATSR Ops page http://www.aatsrops.rl.ac.uk/<br>ATSR 1/2 Home page http://www.atsr.rl.ac.uk/<br>ESA ERS page http://earth.esa.int/ers/ |
| **Version** | Version 2.0 |
| **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 present |
| **Data coverage: spatial** | Global |

**Project Requirements**

| | |
|---|---|
| **Date required within project** | Jan 2011* |
| **Use within project** | (1) Long term ECV; (2) Short term ECV; (3) Algorithm selection |
| **Reason for selection** | Accuracy |
| **Temporal coverage required** | All available data for 1991-2010 |

**Data quality**

| | |
|---|---|
| **Data calibration** | RD.2, RD.6, RD.5 |

| Data validation | RD.15, RD.16, RD.128, RD.129, RD.130, RD.131, RD.132, RD.133, RD.134 |
|---|---|
| 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 | NEODC and UK-MM-PAF |
|---|---|
| Availability time-scale | 1 month from acqusition |
| Estimates of data quantity | 23 TB |
| Product delivery | FTP from NEODC |
| 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 RRDP and CDRP |

**Miscellaneous**

| Comments | None |
|---|---|

## 4.2   ATSR MATCH-UP DATASET

| | |
|---|---|
| **Product name** | ATSR Match-up Dataset |
| **ID** | 1.02 |
| **Data type** | Match-ups of in situ SST and satellite SST observations for the ATSR-1, ATSR-2 and AATSR missions |
| **Source** | ESA |
| **Key Websites** | AATSR Home page http://www.leos.le.ac.uk/aatsr/<br>ESA Envisat page http://envisat.esa.int/earth/www/area/index.cfm?fareaid=6<br>ESA AATSR page http://earth.esa.int/object/index.cfm?fobjectid=3773<br>RAL AATSR Ops page http://www.aatsrops.rl.ac.uk/<br>ATSR 1/2 Home page http://www.atsr.rl.ac.uk/<br>ESA ERS page http://earth.esa.int/ers/ |
| **Version** | Version 2.0 |
| **Platform name** | ERS-1, ERS-2, Envisat |
| **Platform characteristics** | Sun-synchronous polar orbits |
| **Sensor(s)** | ATSR-1, ATSR-2, AATSR, drifters, moorings, Argo, ships, radiometers |
| **Sensor type** | Various |
| **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.13, RD.14, RD.3, RD.4, RD.1 |
| **Product format** | NetCDF |
| **Data gridding** | Native |
| **Data coverage: temporal** | 1991 - to present |
| **Data coverage: spatial** | Global |

**Project Requirements**

| | |
|---|---|
| **Date required within project** | Jan 2011* |
| **Use within project** | (3) Algorithm selection (4) Product validation |
| **Reason for selection** | Accuracy |
| **Temporal coverage required** | All available data for 1991-2012 |

**Data quality**

| | |
|---|---|
| **Data calibration** | Calibration of the ATSRs: RD.2, RD.6, RD.5 |
| **Data validation** | N/A |
| **Product limitations** | Contains matches to 1 km data only. |
| **Potential product upgrades** | None |

**Data availability**

| | |
|---|---|
| **Available from** | UoL |
| **Availability time-scale** | 2 months behind real time |
| **Estimates of data quantity** | 1.5 GB |

| Product delivery | SFTP from UoL |
|---|---|
| Data reliability - space segment | No redundancy |
| Data reliability - ground segment | No redundancy |
| Pricing | Free |
| Access conditions | On request |
| Formal agreements with data suppliers | None |
| Third party redistribution. | For RRDP and CDRP |

**Miscellaneous**

| Comments | None |
|---|---|

## 4.3　AVHRR GLOBAL GAC L1

| | |
|---|---|
| **Product name** | AVHRR Global GAC L1 |
| **ID** | 1.03 |
| **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 present |
| **Data coverage: spatial** | Global |

**Project Requirements**

| | |
|---|---|
| **Date required within project** | Jan 2011* |
| **Use within project** | (1) Long-term ECV (2) Short-term ECV (3) Algorithm selection |
| **Reason for selection** | Long-term Fundamental Climate Record |
| **Temporal coverage required** | All available data for 1991-2010 |

**Data quality**

| | |
|---|---|
| **Data calibration** | RD.18, RD.19, RD.20, RD.21 |
| **Data validation** | 1 month |
| **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 |
| **Availability time-scale** | Near real time |
| **Estimates of data quantity** | 12 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 RRDP and CDRP |

**Miscellaneous**

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

## 4.4   AVHRR METOP INTERNAL FORMAT L1B

| | |
|---|---|
| **Product name** | AVHRR MetOp Internal format L1b |
| **ID** | 1.04 |
| **Data type** | Satellite: top of the atmosphere radiances |
| **Source** | Eumetsat |
| **Key Websites** | Eumetsat, Monitoring weather and climate from space - AVHRR http://www.eumetsat.int/Home/Main/Satellites/Metop/Instruments/SP_2010053153142514?l=en |
| **Version** | A1.0p1.0 |
| **Platform name** | MetOp |
| **Platform characteristics** | Sun-synchronous 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** | Low Earth Orbiter Sea Surface Temperature Product User Manual SAF/OSI/CDOP/M-F/TEC/MA/127 |
| **Product format** | NetCDF (OSI-SAF Work file) |
| **Data gridding** | Remapped to 12 hourly regular 0.05° lat/lon |
| **Data coverage: temporal** | 2007 - to present |
| **Data coverage: spatial** | Global |

**Project Requirements**

| | |
|---|---|
| **Date required within project** | Jan 2011 |
| **Use within project** | (2) Short-term ECV |
| **Reason for selection** | Operational European AVHRR record |
| **Temporal coverage required** | All available data for 2011 - 2012 |

**Data quality**

| | |
|---|---|
| **Data calibration** | RD.18, RD.19, RD.20, RD.21 |
| **Data validation** | None identified so far |
| **Product limitations** | None identified so far |
| **Potential product upgrades** | Version 0 includes observed BTs; version 1 includes NWP profiles and simulated BTs (mid 2011) ; version 2 include some Jacobian profiles (TBD, Oct 2011) |

**Data availability**

| | |
|---|---|
| **Available from** | CMS |
| **Availability time-scale** | 2 h |
| **Estimates of data quantity** | 3 TB |
| **Product delivery** | FTP |

| | |
|---|---|
| **Data reliability - space segment** | In case of METOP failure, EUMETSAT is committed to launch a successor within 6 month |
| **Data reliability - ground segment** | Fully redundant ground segment |
| **Pricing** | Free |
| **Access conditions** | See EUMETSAT data policy |
| **Formal agreements with data suppliers** | None |
| **Third party redistribution.** | Subset for RRDP and CDRP |

**Miscellaneous**

| | |
|---|---|
| **Comments** | Cloud-screened 0.05° clear-sky BTs (L1b) & associated forward model & auxiliary fields |

## 4.5    AVHRR METOP MATCH-UP DATASET

| | |
|---|---|
| **Product name** | AVHRR MetOp Match-up Dataset |
| **ID** | 1.05 |
| **Data type** | Match-ups of in situ SST and satellite SST |
| **Source** | Eumetsat |
| **Key Websites** | Eumetsat, Monitoring weather and climate from space - AVHRR<br>http://www.eumetsat.int/Home/Main/Satellites/Metop/Instruments/SP_2010053 153142514?l=en |
| **Version** | No version control |
| **Platform name** | MetOp |
| **Platform characteristics** | Sun-synchronous 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** | None currently available |
| **Product format** | NetCDF |
| **Data gridding** | Native |
| **Data coverage: temporal** | 2007 - to present |
| **Data coverage: spatial** | Global |

**Project Requirements**

| | |
|---|---|
| **Date required within project** | Jan 2011* |
| **Use within project** | (3) Algorithm selection (4) Product validation |
| **Reason for selection** | Pre-matched MetOp data |
| **Temporal coverage required** | All available data for 1991-2012 |

**Data quality**

| | |
|---|---|
| **Data calibration** | RD.18, RD.19, RD.20, RD.21 |
| **Data validation** | N/A |
| **Product limitations** | Limited spatial coverage at each match-up |
| **Potential product upgrades** | To be defined by CMS within SST_CCI project |

**Data availability**

| | |
|---|---|
| **Available from** | CMS |
| **Availability time-scale** | 1 day |
| **Estimates of data quantity** | 1.4GB /month |
| **Product delivery** | FTP from CMS |

| | |
|---|---|
| **Data reliability - space segment** | As per MetOp Internal format L1b |
| **Data reliability - ground segment** | As per MetOp Internal format L1b |
| **Pricing** | Free |
| **Access conditions** | On request |
| **Formal agreements with data suppliers** | None |
| **Third party redistribution.** | For RRDP and CDRP |

**Miscellaneous**

| | |
|---|---|
| **Comments** | None |

## 4.6   AVHRR PATHFINDER MATCH-UP DATASET

| | |
|---|---|
| **Product name** | AVHRR Pathfinder Match-up Dataset |
| **ID** | 1.06 |
| **Data type** | Match-ups of in situ SST and satellite SST |
| **Source** | University of Miami/RSMAS |
| **Key Websites** | University of Miami Pathfinder MDB homepage<br>http://yyy.rsmas.miami.edu/groups/rrsl/pathfinder/Matchups/match_index.html |
| **Version** | No version control |
| **Platform name** | NOAA Series |
| **Platform characteristics** | Sun-synchronous 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** | None currently available |
| **Product format** | ASCII converted to NetCDF |
| **Data gridding** | Native |
| **Data coverage: temporal** | 1991 to present |
| **Data coverage: spatial** | Global |

**Project Requirements**

| | |
|---|---|
| **Date required within project** | Jan 2011* |
| **Use within project** | (3) Algorithm selection (4) Product validation |
| **Reason for selection** | Pre-matched AVHRR GAC data |
| **Temporal coverage required** | All available data for 1991 to the start of MetOp |

**Data quality**

| | |
|---|---|
| **Data calibration** | RD.18, RD.19, RD.20, RD.21 |
| **Data validation** | N/A |
| **Product limitations** | Not all available sensors included |
| **Potential product upgrades** | None identified |

**Data availability**

| | |
|---|---|
| **Available from** | RSMAS |
| **Availability time-scale** | 1 month |
| **Estimates of data quantity** | 0.5 GB |
| **Product delivery** | FTP from CMS |
| **Data reliability - space segment** | As per AVHRR GAC L1b |

| | |
|---|---|
| **Data reliability - ground segment** | As per AVHRR GAC L1b |
| **Pricing** | Free |
| **Access conditions** | On request |
| **Formal agreements with data suppliers** | None |
| **Third party redistribution.** | For RRDP and CDRP |

**Miscellaneous**

| | |
|---|---|
| **Comments** | None |

## 4.7   SEVIRI LEVEL 3C

| Product name | SEVIRI Level 3C |
|---|---|
| ID | 1.07 |
| Data type | Satellite: retrieved SST |
| Source | Eumetsat |
| Key Websites | Eumetsat, Meteosat Second Generation<br>http://www.eumetsat.int/Home/Main/Satellites/MeteosatSecondGeneration/index.htm?l=en |
| Version | A0.0p0.1 |
| Platform name | Meteosat |
| Platform characteristics | Geostationary orbit |
| Sensor(s) | SEVIRI |
| Sensor type | Visible and infrared imager |
| Sensor key technical characteristics | 12 spectral channels, 1 km resolution in high resolution visible channel, 3 km in other visible channels |
| References to technical specifications documents | RD.24 |
| Product format | NetCDF |
| Data gridding | Hourly 0.05° lat/lon |
| Data coverage: temporal | 2002 - to present |
| Data coverage: spatial | 79° W to 79° E longitude, 81° S to 81° N latitude |

**Project Requirements**

| Date required within project | Jan 2011 |
|---|---|
| Use within project | (2) Short-term ECV |
| Reason for selection | High frequency of data acquisition allows resolution of diurnal variation under clear skies |
| Temporal coverage required | All available data for 2011 - 2012 |

**Data quality**

| Data calibration | www.eumetsat.int/.../Main/DataProducts/Calibration/Inter-calibration/GSCISMeteosatIRInter-calibration/ |
|---|---|
| Data validation | http://www.osi-saf.org/. Marsouin et al. 2010, Homogeneous validation scheme of the OSI SAF Sea Surface Temperature Products , EUMETSAT conference, Cordoba |
| Product limitations | None identified so far |
| Potential product upgrades | Experimental products to be added in 2011 |

**Data availability**

| Available from | CMS |
|---|---|
| Availability time-scale | 2 h |
| Estimates of data quantity | 23 TB |

| | |
|---|---|
| **Product delivery** | FTP |
| **Data reliability - space segment** | Two operable satellites maintained in orbit at any one time |
| **Data reliability - ground segment** | Fully redundant ground segment |
| **Pricing** | Free |
| **Access conditions** | See EUMETSAT data policy |
| **Formal agreements with data suppliers** | None |
| **Third party redistribution.** | Subset for RRDP and CDRP |

**Miscellaneous**

| | |
|---|---|
| **Comments** | L1 processed within CMS. L3C outputs from operational & experimental processing chains available to rest of project |

## 4.8 SEVIRI MATCH-UP DATASET

| | |
|---|---|
| **Product name** | SEVIRI Match-up Dataset |
| **ID** | 1.08 |
| **Data type** | Match-ups of in situ SST and satellite SST |
| **Source** | Eumetsat |
| **Key Websites** | Eumetsat, Meteosat Second Generation http://www.eumetsat.int/Home/Main/Satellites/MeteosatSecondGeneration/index.htm?l=en |
| **Version** | Version 2 |
| **Platform name** | Meteosat |
| **Platform characteristics** | Geostationary orbit |
| **Sensor(s)** | SEVIRI |
| **Sensor type** | Visible and infrared imager |
| **Sensor key technical characteristics** | 13 spectral channels, 1 km resolution in high resolution visible channel, 3 km in other visible channels |
| **References to technical specifications documents** | None currently available |
| **Product format** | NetCDF |
| **Data gridding** | Satellite projection |
| **Data coverage: temporal** | 2002 - to present |
| **Data coverage: spatial** | 79° W to 79° E longitude, 81° S to 81° N latitude |

**Project Requirements**

| | |
|---|---|
| **Date required within project** | Jan 2011* |
| **Use within project** | (3) Algorithm selection (4) Validation |
| **Reason for selection** | Pre-matched data |
| **Temporal coverage required** | All available data for 1991-2012 |

**Data quality**

| | |
|---|---|
| **Data calibration** | www.eumetsat.int/.../Main/DataProducts/Calibration/Inter-calibration/GSCISMeteosatIRInter-calibration/ |
| **Data validation** | N/A |
| **Product limitations** | Limited spatial coverage at each match-up |
| **Potential product upgrades** | 2 |

**Data availability**

| | |
|---|---|
| **Available from** | CMS |
| **Availability time-scale** | 5 days |
| **Estimates of data quantity** | 170Mb/month |
| **Product delivery** | FTP |

| | |
|---|---|
| **Data reliability - space segment** | See SEVIRI Level 3C |
| **Data reliability - ground segment** | See SEVIRI Level 3C |
| **Pricing** | Free |
| **Access conditions** | On request |
| **Formal agreements with data suppliers** | None |
| **Third party redistribution.** | For RRDP and CDRP |

**Miscellaneous**

| | |
|---|---|
| **Comments** | None |

## 4.9   AMSR-E GHRSST L2P

| | |
|---|---|
| **Product name** | AMSR-E GHRSST L2P |
| **ID** | 1.09 |
| **Data type** | Satellite: retrieved SST |
| **Source** | NASA |
| **Key Websites** | NASA AMSR-E page http://wwwghcc.msfc.nasa.gov/AMSR/ RSS Home page http://www.remss.com/ |
| **Version** | Version 7 GHRSST L2P |
| **Platform name** | EOS-AQUA |
| **Platform characteristics** | Sun-synchronous |
| **Sensor(s)** | AMSR-E |
| **Sensor type** | Passive microwave radiometer |
| **Sensor key technical characteristics** | On-board calibration frequency bands: 6.925, 10.65, 18.7, 23.8, 36.5, and 89.0 GHz. |
| **References to technical specifications documents** | RD.28, RD.31, RD.32 |
| **Product format** | GHRSST L2P format in NetCDF file |
| **Data gridding** | Orbital swath - 25 km resolution |
| **Data coverage: temporal** | 2002 - to present |
| **Data coverage: spatial** | Global |

**Project Requirements**

| | |
|---|---|
| **Date required within project** | July 2011 |
| **Use within project** | (2) Short-term ECV (3) Algorithm Selection (4) Validation |
| **Reason for selection** | Only global PMW available, with L2P quality flags and auxiliary data |
| **Temporal coverage required** | All available data for 1991-2012 |

**Data quality**

| | |
|---|---|
| **Data calibration** | RD.30 |
| **Data validation** | RD.29, RD.27, RD.25, RD.26 |
| **Product limitations** | Several - use L2P quality flags |
| **Potential product upgrades** | Version 7 data available mid-2011 |

**Data availability**

| | |
|---|---|
| **Available from** | RSS via GHRSST LTSRF |
| **Availability time-scale** | Usually available within 2 days from acquisition |
| **Estimates of data quantity** | 255 GB |
| **Product delivery** | FTP |
| **Data reliability - space segment** | No redundancy |

| Data reliability - ground segment | No redundancy |
|---|---|
| Pricing | Free |
| Access conditions | None |
| Formal agreements with data suppliers | None |
| Third party redistribution. | Subset for RRDP and CDRP |

**Miscellaneous**

| Comments | None |
|---|---|

## 4.10   TMI GHRSST L2P

| | |
|---|---|
| **Product name** | TMI GHRSST L2P |
| **ID** | 1.10 |
| **Data type** | Satellite: retrieved SST |
| **Source** | NASA |
| **Key Websites** | NASA, TRMM Microwave Imager<br>http://trmm.gsfc.nasa.gov/overview_dir/tmi.html<br>RSS, Description of TMI Data Products<br>http://www.remss.com/tmi/tmi_description.html |
| **Version** | Version 4 |
| **Platform name** | TRMM |
| **Platform characteristics** | Circular orbit, inclination of 35° |
| **Sensor(s)** | TMI |
| **Sensor type** | Passive microwave radiometer |
| **Sensor key technical characteristics** | Frequency bands: 10.7, 19.4, 21.3, 37, 85.5 GHz. |
| **References to technical specifications documents** | RD.36 |
| **Product format** | GHRSST L2P format in NetCDF file |
| **Data gridding** | Orbital swath - 25 km resolution |
| **Data coverage: temporal** | 1997 - to present |
| **Data coverage: spatial** | Global region extending from 40° S to 40° N |

**Project Requirements**

| | |
|---|---|
| **Date required within project** | Jul 2011 |
| **Use within project** | (2) Short-term ECV (3) Algorithm selection (4) Product validation |
| **Reason for selection** | Long-term microwave SST record with L2P quality flags and auxiliary data |
| **Temporal coverage required** | All available data for 1991-2010 |

**Data quality**

| | |
|---|---|
| **Data calibration** | RD.137, RD.138 |
| **Data validation** | RD.136 |
| **Product limitations** | Several - use L2P quality flags |
| **Potential product upgrades** | None identified |

**Data availability**

| | |
|---|---|
| **Available from** | RSS via GHRSST LTSRF |
| **Availability time-scale** | Usually available within 2 days from acquisition |
| **Estimates of data quantity** | 90 GB |
| **Product delivery** | FTP |

| | |
|---|---|
| **Data reliability - space segment** | No redundancy |
| **Data reliability - ground segment** | No redundancy |
| **Pricing** | Free |
| **Access conditions** | None |
| **Formal agreements with data suppliers** | None |
| **Third party redistribution.** | Subset for RRDP and CDRP |

**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 9 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/<br>ECMWF data server page http://data.ecmwf.int/data/<br>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<br>http://www.wmo.int/pages/prog/www/WDM/Guides/Guide-binary-2.html |
| Data gridding | See supplementary Table 9-1 |
| Data coverage: temporal | 1989 - to present |
| Data coverage: spatial | Global |

**Project Requirements**

| Date required within project | Jan 2011* |
|---|---|
| Use within project | (1) Long-term ECV (2) Short-term ECV (3) Algorithm selection (4) Product validation |
| Reason for selection | Long-term consistent reanalysis dataset |
| Temporal coverage required | All available data for 1991-2012 |

**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** | 2 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 RRDP and CDRP |

**Miscellaneous**

| | |
|---|---|
| **Comments** | For a list of parameters, see the tables in Section 9. |

## 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 1.03 |
| Data coverage: temporal | Same as ID 1.03 |
| Data coverage: spatial | Same as ID 1.03 |

**Project Requirements**

| Date required within project | Jan 2011* |
|---|---|
| Use within project | (1) Long-term ECV (2) Short-term ECV (3) Algorithm selection |
| Reason for selection | Cloud detection in AVHRR data |
| Temporal coverage required | All available data for 1991-2012 |

**Data quality**

| Data calibration | Same as ID 1.03 |
|---|---|
| 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 1.03 |
| Estimates of data quantity | Code: 3.5 MB; Ancillary data: 4GB |
| Product delivery | FTP |
| Pricing | Free |
| Access conditions | None |
| Formal agreements with data suppliers | None |
| Third party redistribution. | For RRDP and 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. CLAVR-x also requires the NCEP reanalysis data (Section 7.2) and the OI SST analysis (Section 8.14). |

## 5.3  NCEP/NCAR REANALYSIS 1

| | |
|---|---|
| **Product name** | NCEP/NCAR Reanalysis 1 |
| **ID** | 2.03 |
| **Data type** | Reanalysis |
| **Source** | NOAA NCEP |
| **Key Websites** | NOAA http://www.esrl.noaa.gov/psd/data/gridded/data.ncep.reanalysis.html |
| **Version** | 1 |
| **Analysis characteristics** | Produced using an analysis/forecast system |
| **References to technical specifications documents** | RD.155 |
| **Product format** | NetCDF |
| **Data gridding** | 2.5° x 2.5° |
| **Data coverage: temporal** | 4-times daily, daily and monthly values for 1948/01/01 to present |
| **Data coverage: spatial** | Global |

**Project Requirements**

| | |
|---|---|
| **Date required within project** | Jan 2011* |
| **Use within project** | (1) Long-term ECV (2) Short-term ECV (3) Algorithm selection |
| **Reason for selection** | Ancillary data for CLAVR-x |
| **Temporal coverage required** | All available data for 1991-2012 |

**Data quality**

| | |
|---|---|
| **Data validation** | None identified so far |

**Data availability**

| | |
|---|---|
| **Available from** | NOAA FTP://FTP.cdc.noaa.gov/Datasets/ncep.reanalysis/ |
| **Availability time-scale** | N/A |
| **Estimates of data quantity** | 30 GB |
| **Product delivery** | FTP |
| **Pricing** | Free |
| **Access conditions** | None |
| **Formal agreements with data suppliers** | None |
| **Third party redistribution.** | N/A |

**Miscellaneous**

| | |
|---|---|
| **Comments** | This data set is required as an input to the CLAVR-x. |

## 5.4 OSI-SAF MAXIMUM GRADIENT ATLAS

| | |
|---|---|
| **Product name** | OSI-SAF Maximum Gradient Atlas |
| **ID** | 2.04 |
| **Data type** | SST front climatology |
| **Source** | CMS |
| **Key Websites** | None |
| **Version** | No version control |
| **Platform name** | N/A |
| **Platform characteristics** | N/A |
| **Sensor(s)** | N/A |
| **Sensor type** | N/A |
| **Sensor key technical characteristics** | N/A |
| **Analysis characteristics** | Global SST front climatology derived from AVHRR data |
| **References to technical specifications documents** | RD.157 |
| **Product format** | NetCDF |
| **Data gridding** | monthly |
| **Data coverage: temporal** | N/A |
| **Data coverage: spatial** | Global |

**Project Requirements**

| | |
|---|---|
| **Date required within project** | Jan 2011* |
| **Use within project** | (3) Algorithm selection (4) Validation |
| **Reason for selection** | Possible source of improved prior information on spatial variability for cloud detection |
| **Temporal coverage required** | All available data for 1991-2012 |

**Data quality**

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

**Data availability**

| | |
|---|---|
| **Available from** | CMS |
| **Availability time-scale** | N/A |
| **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.** | N/A |

**Miscellaneous**

| | |
|---|---|
| **Comments** | None |

## 5.5    AOML OCEAN CURRENT CLIMATOLOGY

| | |
|---|---|
| **Product name** | AOML Ocean Current Climatology |
| **ID** | 2.05 |
| **Data type** | Ocean current velocities derived from drifting buoys |
| **Source** | AOML |
| **Key Websites** | A drifter-derived climatology of global near-surface currents<br>http://www.aoml.noaa.gov/phod/dac/drifter_climatology.html |
| **Version** | No version control |
| **Platform name** | N/A |
| **Platform characteristics** | N/A |
| **Sensor(s)** | N/A |
| **Sensor type** | N/A |
| **Sensor key technical characteristics** | N/A |
| **Analysis characteristics** | N/A |
| **References to technical specifications documents** | RD.156 |
| **Product format** | NetCDF |
| **Data gridding** | monthly |
| **Data coverage: temporal** | N/A |
| **Data coverage: spatial** | Near global: 73° S to 85° N |

**Project Requirements**

| | |
|---|---|
| **Date required within project** | Jan 2011* |
| **Use within project** | (1) Long-term ECV (2) Short-term ECV (3) Algorithm selection (4) Product validation |
| **Reason for selection** | Required for POSH flux calculation |
| **Temporal coverage required** | All available data for 1991-2012 |

**Data quality**

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

**Data availability**

| | |
|---|---|
| **Available from** | AOML |
| **Availability time-scale** | N/A |
| **Estimates of data quantity** | 29 MB |
| **Product delivery** | Download from http://www.aoml.noaa.gov/phod/dac/drifter_climatology.html |

| Pricing | Free |
|---|---|
| Access conditions | None |
| Formal agreements with data suppliers | None |
| Third party redistribution. | N/A |

**Miscellaneous**

| Comments | None |
|---|---|

## 5.6 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** | 2.06 |
| **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 - present |
| **Data coverage: spatial** | Northern Hemisphere and Southern Hemisphere fields |

**Project Requirements**

| | |
|---|---|
| **Date required within project** | Jan 2011* |
| **Use within project** | (3) Algorithm selection (4) Product validation |
| **Reason for selection** | As defined in the PVP |
| **Temporal coverage required** | All available data for 2009-2012 |

**Data quality**

| | |
|---|---|
| **Data calibration** | None identified so far |
| **Data validation** | None identified so far |

**Data availability**

| | |
|---|---|
| **Available from** | OSI SAF |
| **Estimates of data quantity** | 1 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 RRDP and CDRP |

**Miscellaneous**

| | |
|---|---|
| **Comments** | None |

## 5.7    OSI-409: GLOBAL SEA ICE CONCENTRATION REPROCESSING

| | |
|---|---|
| **Product name** | OSI-409: Global Sea Ice Concentration Reprocessing |
| **ID** | 2.07 |
| **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** | Jan 2011* |
| **Use within project** | (3) Algorithm selection (4) Product validation |
| **Reason for selection** | As defined in the PVP |
| **Temporal coverage required** | All available data for 1991-2012 |

**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 RRDP and CDRP |
|---|---|

**Miscellaneous**

| Comments | None |
|---|---|

## 5.8   TOMS OMI GOME-1 GOME-2 ABSORBING AEROSOL INDEX

| | |
|---|---|
| **Product name** | TOMS OMI GOME-1 GOME-2 Absorbing Aerosol Index |
| **ID** | 2.08 |
| **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 present |
| **Data coverage: spatial** | TOMS - Global between 70° N and 70° S OMI, GOME-1 and GOME-2 - Global |

**Project Requirements**

| | |
|---|---|
| **Date required within project** | May 2012 |
| **Use within project** | (3) Algorithm selection (4) 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 1991-2012 |

**Data quality**

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

**Data availability**

| | |
|---|---|
| **Available from** | TOMS: NASA GSFC<br>OMI, GOME-1, GOME-2: TEMIS |
| **Estimates of data quantity** | 3 GB |
| **Product delivery** | Download from website |
| **Pricing** | Free |
| **Access conditions** | None |
| **Formal agreements with data suppliers** | None |
| **Third party redistribution.** | Subset for RRDP and CDRP |

**Miscellaneous**

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

## 5.9    SAGE II AEROSOL

| | |
|---|---|
| **Product name** | SAGE II V6.20 AEROSOL, O3, NO2, H2O binary data set |
| **ID** | 2.09 |
| **Data type** | Aerosol extinction profiles; ozone and nitrogen dioxide number density; molecular density and mixing ratio profiles of water vapour; aerosol surface area density and effective radius profiles; and retrieved molecular density for the middle atmosphere (40-75 km). |
| **Source** | NASA |
| **Key Websites** | NASA Stratospheric Aerosol and Gas Experiment II Home page http://www-sage2.larc.nasa.gov/index.html |
| **Version** | Version 6.2 |
| **Platform name** | Earth Radiation Budget Satellite |
| **Platform characteristics** | Orbit: inclination 57°, precessing with a period of approximately 72 days |
| **Sensor(s)** | SAGE II |
| **Sensor type** | A seven-channel Sun photometer |
| **Sensor key technical characteristics** | Bands centred at 1020, 940, 600, 525, 453, 448, and 385 nm wavelengths. Vertical resolution at horizon of 0.5km. |
| **References to technical specifications documents** | RD.104 |
| **Product format** | Binary files |
| **Data gridding** | Vertical profiles have a resolution of 0.5 km |
| **Data coverage: temporal** | October 1984 - August 2005 |
| **Data coverage: spatial** | Global from 80° N to 80° S |

**Project Requirements**

| | |
|---|---|
| **Date required within project** | May 2012 |
| **Use within project** | (3) Algorithm selection (4) Product validation |
| **Reason for selection** | Independent stratospheric aerosol data post-Pinatubo |
| **Temporal coverage required** | All available data for 1991-2012 |

**Data quality**

| | |
|---|---|
| **Data calibration** | RD.127 |
| **Data validation** | RD.105 |

**Data availability**

| | |
|---|---|
| **Available from** | NASA |
| **Estimates of data quantity** | 1 GB |
| **Product delivery** | Download using web browser of anonymous FTP from FTP://FTP-rab.larc.nasa.gov/pub/sage2/v6.20 |
| **Pricing** | Free |

| | |
|---|---|
| **Access conditions** | Policies Concerning the Use of SAGE II Data Acknowledgements. The NASA Langley Radiation and Aerosols Branch offers various types of SAGE II-related data. When you use data from the NASA Langley Radiation and Aerosols Branch in a publication, please provide a proper acknowledgement of the data source. Please acknowledge both: the NASA Langley Research Center (NASA-LaRC) and the NASA Langley Radiation and Aerosols Branch. Reprints The NASA Langley Radiation and Aerosols Branch requests a reprint (in electronic or hardcopy form) of any published paper or report which cite the use of data distributed from this site. This will help to determine the use of data that is distributed from this site and assists in keeping our related references current. Redistribution of Data To assist the NASA Langley Radiation and Aerosols Branch in providing the best service to the scientific community, we request notification if you transmit these data to other researchers. |
| **Formal agreements with data suppliers** | None |
| **Third party redistribution.** | Subset for RRDP and CDRP |

**Miscellaneous**

| | |
|---|---|
| **Comments** | None |

# 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<br>(b) I. Barton, CSIRO<br>(c) W. Wimmer, NOCS<br>(d) P. Minnett, University of Miami<br>(e) T. Nightingale, RAL |
| **Key Websites** | (a) Jessup, A., Skin and Bulk SST Validation Program http://cirims.apl.washington.edu/index.php<br>(b)<br>(c) ISAR home page http://www.noc.soton.ac.uk/lso/isar/<br>(d) Minnett, P., Instruments http://www.rsmas.miami.edu/personal/pminnett/Instruments/m_aeri.html<br>(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<br>(b) RV Southern Surveyor<br>(c) Pride of Bilbao<br>(d) USCGC Polar Star<br>(e) MV Val de Loire |
| **Platform characteristics** | Ships of opportunity |
| **Sensor(s)** | (a) CIRIMS<br>(b) DAR011<br>(c) ISAR<br>(d) M-AERI<br>(e) SISTeR |
| **Sensor type** | (a) Infra-red radiometer<br>(b) Infra-red radiometer<br>(c) Infra-red radiometer<br>(d) Infra-red spectroradiometer<br>(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.<br>(b) Self-calibrating; single-channel 10.5-11.5 µm.<br>(c) On-board calibration uses two black bodies; spectral band 9.8 - 11 µm; optical rain gauge and shutter mechanism.<br>(d) Seagoing Fourier-transform interferometric infrared spectroradiometer ~3 to ~18 µm; self-calibration uses two internal, NIST-traceable blackbody cavities.<br>(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<br>(b) RD.51<br>(c) RD.47<br>(d) RD.52 |
|---|---|
| Product format | Various |
| Data gridding | N/A |
| Data coverage: temporal | Various |
| Data coverage: spatial | Various |

**Project Requirements**

| Date required within project | Jan 2011* |
|---|---|
| Use within project | (3) Algorithm selection (4) Product validation |
| Reason for selection | Only in situ skin SST observations |
| Temporal coverage required | All available data for 1991-2012 |

**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. | N/A |

**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/<br>Atlantic Oceanographic and Meteorological Laboratory, Environmental Data Server Global Lagrangian Drifter Data<br>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 | compressed ASCII text file |
| Data gridding | N/A |
| Data coverage: temporal | 1979 - present |
| Data coverage: spatial | Global |

**Project Requirements**

| Date required within project | Jan 2011* |
|---|---|
| Use within project | (3) Algorithm selection (4) Product validation |
| Reason for selection | Independently quality-controlled drifting buoy data set |
| Temporal coverage required | All available data for 1991-2012 |

**Data quality**

| Data calibration | None |
|---|---|
| Data validation | RD.59 |
| Product limitations | Incomplete mapping of AOML ID to WMO ID |
| 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 | AOML |
|---|---|
| Availability time-scale | Three months behind real-time |
| Estimates of data quantity | 1 GB |
| Product delivery | Anonymous FTP from FTP.aoml.noaa.gov |

| | |
|---|---|
| **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.** | For RRDP and 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 present |
| Data coverage: spatial | Tropical Pacific, Tropical Atlantic and Tropical Indian Oceans |

**Project Requirements**

| Date required within project | Jan 2011* |
|---|---|
| Use within project | (3) Algorithm selection (4) Product validation |
| Reason for selection | Relatively long-term, actively maintained in situ data set |
| Temporal coverage required | All available data for 1991-2012 |

**Data quality**

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

**Data availability**

| Available from | PMEL |
|---|---|
| Availability time-scale | Real-time |
| Estimates of data quantity | 5 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.** | N/A |

**Miscellaneous**

| | |
|---|---|
| **Comments** | None |

## 6.4 EN3

| | |
|---|---|
| **Product name** | EN3 ocean temperature and salinity profiles |
| **ID** | 3.04 |
| **Data type** | Observed subsurface ocean temperature and salinity profiles with data quality information and objective analyses formed from the profile data. The SST_cci requires the quality controlled ARGO subsurface ocean temperature and salinity data |
| **Source** | MOHC |
| **Key Websites** | Met Office Hadley Centre, EN3: quality controlled subsurface ocean temperature and salinity data http://hadobs.metoffice.com/en3/ <br> Argo, The International Argo Project Home Page http://www.argo.net/ |
| **Version** | Version 2a |
| **Platform name** | PROVOR, APEX, and SOLO floats |
| **Platform characteristics** | Free-drifting profiling floats (over 3000 in number) |
| **Sensor(s)** | Sea-Bird Electronics 41/41CP CTD Module for Autonomous Profiling Floats, Citadel CTD |
| **Sensor type** | CTD sensor |
| **Sensor key technical characteristics** | RD.64, RD.66 |
| **References to technical specifications documents** | RD.64, RD.66 |
| **Product format** | archived NetCDF files |
| **Data gridding** | N/A |
| **Data coverage: temporal** | 2000 - to present |
| **Data coverage: spatial** | Global |

**Project Requirements**

| | |
|---|---|
| **Date required within project** | Jan 2011* |
| **Use within project** | (3) Algorithm selection (4) Product validation |
| **Reason for selection** | Upper (4 m) observations usable as depth SSTs; highly accurate, with additional quality control. |
| **Temporal coverage required** | All available data for 1991-2012 |

**Data quality**

| | |
|---|---|
| **Data calibration** | RD.64, RD.66 |
| **Data validation** | N/A |
| **Product limitations** | None identified |
| **Potential product upgrades** | None identified |

**Data availability**

| | |
|---|---|
| **Available from** | MOHC |
| **Availability time-scale** | monthly updates |

| | |
|---|---|
| **Estimates of data quantity** | 2 GB |
| **Product delivery** | download from http://hadobs.metoffice.com/en3/data/EN3_v2a/download_EN3_v2a.html |
| **Data reliability - space segment** | N/A |
| **Data reliability - ground segment** | N/A |
| **Pricing** | Free |
| **Access conditions** | EN3 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: Ingleby, B., and M. Huddleston, 2007: Quality control of ocean temperature and salinity profiles - historical and real-time data. Journal of Marine Systems, 65, 158-175 10.1016/j.jmarsys.2005.11.019 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.** | N/A |

**Miscellaneous**

| | |
|---|---|
| **Comments** | The data required are quality controlled Argo observations which form a subset of the EN3_v2a product. |

## 6.5   BARENTS SEA MOORED BUOYS

| | |
|---|---|
| **Product name** | Barents Sea Moored Buoys |
| **ID** | 3.05 |
| **Data type** | In situ SST$_{depth}$ measurements |
| **Source** | Fugro OCEANOR |
| **Key Websites** | OCEANOR Data Presentation System http://www.oceanor.info/Barents_Sea/ |
| **Version** | None |
| **Platform name** | Wavescan Buoy |
| **Platform characteristics** | Moored buoy: two-way communication system, real-time data presentation. |
| **Sensor(s)** | Various |
| **Sensor type** | Various |
| **Sensor key technical characteristics** | RD.96 |
| **References to technical specifications documents** | RD.96 |
| **Product format** | ASCII files |
| **Data gridding** | N/A |
| **Data coverage: temporal** | From 2007; two buoys stopped operating 2010, one buoy operating at present. |
| **Data coverage: spatial** | 3 Moorings in the Barents Sea |

**Project Requirements**

| | |
|---|---|
| **Date required within project** | Jan 2011* |
| **Use within project** | (3) Algorithm selection (4) Product validation |
| **Reason for selection** | Other validation data is sparse at high latitudes. This data set will improve coverage in high latitude regions. |
| **Temporal coverage required** | All available data for 1991-2012 |

**Data quality**

| | |
|---|---|
| **Data calibration** | None |
| **Data validation** | N/A |
| **Product limitations** | None identified so far |
| **Potential product upgrades** | None identified so far |

**Data availability**

| | |
|---|---|
| **Available from** | Fugro OCEANOR |
| **Availability time-scale** | NRT |
| **Estimates of data quantity** | << 1 GB |
| **Product delivery** | Most recent 3 months can be downloaded from Fugro OCEANOR Online Data Presentation System at http://www.oceanor.com/Barents_Sea/ |

| | |
|---|---|
| **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.** | N/A |

**Miscellaneous**

| | |
|---|---|
| **Comments** | None |

## 6.6   POLARSTERN TSG

| Product name | Polarstern TSG |
|---|---|
| ID | 3.06 |
| Data type | In situ SST$_{depth}$ thermosalinograph measurements |
| Source | Alfred Wegener Institute for Polar and Marine Research |
| Key Websites | Polarstern http://www.awi.de/en/infrastructure/ships/polarstern/ |
| Version | None |
| Platform name | Research Vessel POLARSTERN |
| Platform characteristics | Research vessel specially designed for working in the polar seas. The thermosalinograph sensors are at depths of 5 and 11 meters |
| Sensor(s) | Sea-Bird Electronics SBE 21 |
| Sensor type | CTD sensor |
| Sensor key technical characteristics | RD.98 |
| References to technical specifications documents | RD.98 |
| Product format | Tab separated ASCII files |
| Data gridding | N/A |
| Data coverage: temporal | From 1993 to present - summer months in each hemisphere |
| Data coverage: spatial | Antarctic and Arctic cruise tracks |

**Project Requirements**

| Date required within project | Jan 2011* |
|---|---|
| Use within project | (3) Algorithm selection (4) Product validation |
| Reason for selection | Other validation data is sparse at high latitudes. This data set will improve coverage in high latitude regions. |
| Temporal coverage required | All available data for 1991-2012 |

**Data quality**

| Data calibration | None |
|---|---|
| Data validation | N/A |
| Product limitations | None identified so far |
| Potential product upgrades | None identified so far |

**Data availability**

| Available from | PANGAEA® Publishing Network for Geoscientific & Environmental Data |
|---|---|
| Availability time-scale | monthly updates |
| Estimates of data quantity | 0.5  GB |
| Product delivery | download from www.pangea.de |

| Data reliability - space segment | N/A |
|---|---|
| Data reliability - ground segment | N/A |
| Pricing | Free |
| Access conditions | The data are freely available and can be used by referencing the related publication or the dataset citation. |
| Formal agreements with data suppliers | None |
| Third party redistribution. | N/A |

**Miscellaneous**

| Comments | None |
|---|---|

## 6.7 VOLUNTARY OBSERVING SHIPS

| | |
|---|---|
| **Product name** | Voluntary Observing Ships |
| **ID** | 3.07 |
| **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 present |
| **Data coverage: spatial** | Global |

**Project Requirements**

| | |
|---|---|
| **Date required within project** | Jan 2011* |
| **Use within project** | (3) Algorithm selection (4) 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 1991-2012 |

**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** | JCOMM GTS |
| **Availability time-scale** | Real-time |
| **Estimates of data quantity** | << 1 GB |

| Product delivery | download from JCOMM<br>http://www.jcomm.info/index.php?option=com_content&task=view&id=15&Itemid=0 |
|---|---|
| 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. | N/A |

**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** | 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 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.** | N/A |

**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** | May 2012 |
| **Use within project** | (4) Product validation (5) Inter-comparison |
| **Reason for selection** | As defined in the PVP |
| **Temporal coverage required** | All available data for 1991-2012 |

**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.** | N/A |

**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<br>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 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 | 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.** | N/A |

**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)<br>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 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** | 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.** | N/A |

**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<br>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** | 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** | None |

**Data availability**

| | |
|---|---|
| **Available from** | GHRSST LTSRF |
| **Estimates of data quantity** | 6 MB |
| **Product delivery** | from the GHRSST LTSRF<br>http://www.nodc.noaa.gov/SatelliteData/ghrsst/intercomp_data.html or<br>FTP://FTP.nodc.noaa.gov/pub/data.nodc/GCOS/ |
| **Pricing** | Free |
| **Access conditions** | None |
| **Formal agreements with data suppliers** | None |
| **Third party redistribution.** | N/A |

**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** | 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** | 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.** | N/A |

**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** | 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.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.** | N/A |

**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** | 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** | 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.** | N/A |

**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 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** | 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.** | N/A |

**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** | (5) Inter-comparison |
| **Reason for selection** | As defined in the PVP |
| **Temporal coverage required** | All available data for 1991-2012 |

**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.** | N/A |

**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<br>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 |

## 7.16  MODIS-A SST AND CHL-A

| | |
|---|---|
| **Product name** | MODIS-A SST and chlorophyll-a concentration |
| **ID** | 4.16 |
| **Data type** | Satellite: SST and chl-a |
| **Source** | NASA |
| **Key Websites** | http://oceandata.sci.gsfc.nasa.gov/MODISA/L3SMI/2003 |
| **Version** | Not given |
| **Platform name** | Aqua |
| **Platform characteristics** | Polar orbit |
| **Sensor(s)** | MODIS-A |
| **Sensor type** | Visible and infra-red radiometer |
| **Sensor key technical characteristics** | Relevant MODIS-A channels are:<br><br>Band    Bandwidth1    SpectralRadiance2<br>8    405 - 420    44.9<br>9    438 - 448    41.9<br>10    483 - 493    32.1<br>11    526 - 536    27.9<br>12    546 - 556    21.0<br>13    662 - 672    9.5<br>14    673 - 683    8.7<br>15    743 - 753    10.2<br>16    862 - 877    6.2<br>20    3.660 - 3.840    0.45(300K)<br>21    3.929 - 3.989    2.38(335K)<br>22    3.929 - 3.989    0.67(300K)<br>23    4.020 - 4.080    0.79(300K) |
| **References to technical specifications documents** | http://modis.gsfc.nasa.gov/about/specifications.php |
| **Product format** | HDF |
| **Data gridding** | Daily, approx. 4 km |
| **Data coverage: temporal** | 2002 to present |
| **Data coverage: spatial** | Global |

**Project Requirements**

| | |
|---|---|
| **Date required within project** | Oct 2013 |
| **Use within project** | (5) Inter-comparison |
| **Reason for selection** | Coincident retrievals of SST and chl-a |
| **Temporal coverage required** | 2003 |

**Data quality**

| Data validation | Not available |
|---|---|

**Data availability**

| Available from | http://oceandata.sci.gsfc.nasa.gov/MODISA/L3SMI/2003 |
|---|---|
| Estimates of data quantity | 6.2 GB |
| Product delivery | FTP |
| Pricing | Free |
| Access conditions | None |
| Formal agreements with data suppliers | None |
| Third party redistribution. | N/A |

**Miscellaneous**

| Comments | None |
|---|---|

# 8.  CCI Outputs

This section contains information about the CCI project outputs that may be used in the SST_cci project. Whether or not a product is used will depend on the particular product's final specification and availability. The information is displayed in the form of tables: one table for each product. Definitions of the table fields are given in Section 2.

## 8.1  OCEAN COLOUR DATA

| Product name | Ocean colour data |
|---|---|
| ID | 5.01 |
| Data type | CCI output |
| Source | ESA |

**Project Requirements**

| Date required within project | October 2013 |
|---|---|
| Use within project | (5) Inter-comparison |
| Temporal coverage required | Complete record |

# 9.    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 31/12/2010 for the long-term SST ECV record, and will need data from 01/10/2011 to 31/03/2012 for the short-term SST ECV record. We expect ERA-interim data to be available approximately 3 months behind real time such that data for March 2012 will be available for processing by 01/07/2012.

The SST_CCI project will require delivery of all data up to and including 31/10/2010 by 1st February 2011; data for 11/2010 and 12/2010 will be required approximately 3-months after production on a monthly basis. All data for 01/10/2011 to 31/03/2012 will be required by 01/07/2012 but not before.

The SST_CCI project will also need to redistribute ERA-interim data as part of the Round Robin Data Package (RRDP). However, we will not be distributing full products, only data that has been matched as nearest in time and space to each match-up record included in the Multi-Sensor Match-up Dataset (MMD).

A summary of all ERA-interim parameters required by the SST_CCI project is provided in Table 9-1.

| 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 |
| 177 | Surface thermal 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 |
|---|---|---|---|---|---|---|
| 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 9-1:** 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.

## 9.1   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 9-2

| 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 9-2:** Table 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

- o Requested forecast times: 00 UTC +3, +6, +9, +12 hours and 12 UTC +3,+6, +9, +12 hours

- o Dates: 01/01/1991 to 31/12/2010; 01/10/2011 to 31/03/2012

- o Requested representation: Lat/lon grid

- o Requested representation: 0.7 degree

- o Requested area: Global

- o Requested parameters: see Table 9-3

| 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 |

| Grib number | Grib Abbreviation | Units | name |
|---|---|---|---|
| 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 9-3:** Table of Single Level Parameters from ERA Interim, Atmospheric model, Forecast accumulated

Model level parameters from ERA Interim, Atmospheric model, Analysis

- o   Requested analysis times: 0000, 0600, 1200, 1800 UTC

- o   Dates: 01/01/1991 to 31/12/2010; 01/10/2011 to 31/03/2012

- o   Requested representation: Lat/lon grid

- o   Requested representation: 0.7 degree

- o   Requested area: Global

- o   Requested parameters: see Table 9-4

| 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 9-4:** Table of Model Level Parameters from ERA Interim, Atmospheric model, Analysis