Version 0.1, 31 August 2012

# APSDEU12 / NAEDEX24 - DATA EXCHANGE MEETING - 2012

# EUROPEAN REQUIREMENTS

This document presents the combined status of and requirements for data and products from NOAA for operational NWP and related activities in Europe. Unless otherwise specified, the stated requirement represents a common requirement of two or more centres.

A key requirement common to all the products listed below is the reliable exchange of information on any changes impacting any of the transmitted products. Timely exchange of information will help in explaining anomalies in the monitoring and if assimilated in forecast trends.

The European Meteorological Services referred to in this document together with the abbreviations used are:

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| * DMI | Danish Meteorological Institute |
| * DWD | German Weather Service |
| * KNMI | Royal Netherlands Meteorological Institute |
| * ECMWF | European Centre for Medium Range Weather Forecasts |
| * EUMETSAT | European Organisation for the Exploitation of Meteorological Satellites |
| * METEO-FRANCE | Météo-France |
| * METO | Met Office (U.K.) |

Unless otherwise specified the timeliness requirement is to have data available within 60 minutes for Global NWP and 30 minutes for Regional NWP, as recommended at ECMWF workshop in November 2003 (TBC). The WMO breakthrough value is 30 minutes for both Global and Regional NWP. The WMO threshold value is 6 hours.

1. POLAR SATELLITES: ORBIT-BY-ORBIT DATA/PRODUCTS

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| --- | --- |
| * 1. ATOVS      1. ATOVS level 1 B data | |
| Availability | Data copied from NESDIS via dedicated link to the Met Office who encode the 1B data into BUFR (1C data). Access given to other European Met. Services and ECMWF. There is a continuing requirement to receive AMSU data in 1B rather than 1C form as the AMSU housekeeping information is monitored by the Met Office. |
| Usage and plans (by when) | ECMWF: 1C radiances from NOAA-15, 17, 18, 19 and METOP assimilated operationally (AMSUA from 15, 18, 19 and METOP, AMSUB from 17, HIRS from NOAA-17, 19 and METOP and MHS from NOAA-18, 19 and METOP). Currently NOAA-19 MHS channel 3 is blacklisted due to increased instrument noise. Monitoring statistics can be found at www.ecmwf.int/products/forecasts/d/charts/monitoring/satellite.  EUMETSAT:  METO: NOAA-15 AMSU-A, NOAA-17 HIRS/, NOAA-18 AMSU-A/MHS, NOAA-19 HIRS/AMSU-A and METOP-A HIRS/AMSU-A/MHS are currently assimilated. All ATOVS data are monitored routinely for possible assimilation. Plots available on the Met Office www site at: (http://research.metoffice.gov.uk/research/interproj/nwpsaf/monitoring.html).  METEO-FRANCE: 1C radiances (AMSU-A from NOAA-15, 16 , 18, 19 AQUA [and METOP], HIRS from NOAA-17, 19 [and METOP], MHS from NOAA18 [and METOP]) assimilated operationally. IASI METOP radiances assimilated operationally (77 channels over sea, 50 channels over land, 38 channels over sea ice ; 9 water vapour channels). Available but not assimilated ; HIRS NOAA16 – MHS NOAA 19 *provided through Eumetcast*  DWD: 1C radiances (AMSU-A from NOAA-15, 18, 19 and METOP) assimilated operationally. AMSU-B/MHS from NOAA-15, 17, 18 and METOP monitored with activities towards operational assimilation. HIRS (NOAA-17, 18, 19 and METOP) monitored with activities towards operational assimilation. |
| Requirement  Access and timeliness | Yes in NRT. NOAA-16 is still required for reanalysis activities. Blind orbit support for METOP-A is being worked through NOAA/NESDIS. |
| * + 1. ATOVS and AVHRR level-0 raw HRPT data from NOAA/NESDIS | |
| Availability | Not received via NESDIS but some U.S. EARS station data provided to EUMETSAT.  ATOVS derived products with strict timeliness requirement (<30 minutes after start of pass) have been provided since 12 November 2002 with the EUMETSAT ATOVS Retransmission Service (EARS). Usage is for short-range NWP in Europe. The approach for transmitting the data to Europe is via a dedicated IP Virtual Private Network. The WMO web site provides current status. |
| Usage and plans (by when) | ECMWF: EARS and RARS ATOVS data is used and assimilated operationally.  EUMETSAT:  METO: Assimilate EARS AMSU-A/B radiances in regional and global NWP models to fill in gaps due to late NESDIS ATOVS data. Data received from South American RARS (7 stations).  METEO-FRANCE: EARS (collected and provided by Lannion) and RARS (all stations provided by Eumetsat), AMSU-A and AMSU-B/MHS data used and assimilated operationally.  DWD: EARS and RARS AMSU-A data are used and assimilated operationally. |
| Requirement  Access and timeliness | Yes. |
| * + 1. AVHRR L1 data | |
| Availability | EUMETSAT is now providing METOP AVHRR data at 1 km resolution via its EARS network in near real time. The current service is based on reception at Maspalomas, Athens, Lannion, Svalbard and Kangerlussuaq stations. Global METOP AVHRR distributed via EUMETCast. GAC (4km) from NOAA-19 via EUMETCast. |
| Usage and plans (by when) | ECMWF: Will reconsider the use of AVHRR data in the context of METOP/IASI to help the cloud detection  EUMETSAT:  METO: Using 1km METOP AVHRR imagery data over several areas of globe to meet requirements. Would like same capability from NOAA satellites.  METEO-FRANCE: Use of imagery through local acquisition from Lannion.  DWD: Use of AVHRR data which are included in the IASI Bufr file |
| Requirement  Access and timeliness | Yes at METO. |
| * + 1. AVHRR polar winds | |
| Availability | NOAA/CIMSS and EUMETSAT are producing AVHRR polar AMVs in BUFR and these are provided to users via the Internet. A similar product is available from NESDIS using the CIMSS algorithm. |
| Usage and plans (by when) | ECMWF: Quality of the AVHRR polar winds is currently operationally monitored. Plans for use in the reanalysis.  EUMETSAT:  METO: CIMSS AVHRR polar AMVs used operationally since May 2008 and now also use CIMSS DB AMVs to improve timeliness.  METEO-FRANCE: AVHRR polar winds from NESDIS via GTS are used operatioanlly since November 2010. Direct broadcast product via CIMSS/Eumetcast link used operationally since 15 December 2010 has allowed to improve the imeliness of short cutoffs (no NESDIS data, around 400 DB winds for 00UTC run) and also long cutoffs (~doubling). AVHRR polar AMVs from MetOp by Eumetsat are monitored. Future use dependent on improvements in quality control of AMVs, observation errors and correlation specifications in the assimilation system.  DWD: Assimilation of AVHRR polar winds operationally from the NOAA satellites and METOP processed by NESDIS and also the CIMSS DB AMVs to improve timeliness. |
| Requirement  Access and timeliness | Yes in NRT. Request access from NESDIS in BUFR on GTS. Requirement for the entire record of reprocessed AVHRR data for re-analysis (Note, new action: timeliness of GTS data from NESDIS to be investigated) |
| * 1. Ozone retrieved profiles and/or total column from SBUV on NOAA | |
| Availability | Ozone profile data are received in BUFR from NOAA/NESDIS.  NOAA-19 data are available on NOAA/NESDIS Data Distribution Server in BUFR. |
| Usage and plans (by when) | ECMWF: Assimilate these data operationally from NOAA-17, 18 and 19.  EUMETSAT: The use of total column for the validation of the Total Ozone Product from MSG data will be investigated. Data would be received via ECMWF.  METO: We are receiving and archiving NOAA-16, 17 and 18 SBUV data via ECMWF so that we can use the data in their BUFR format. Interested to assimilate for future improvements to stratospheric analysis.  METEO-FRANCE: Validation or assimilation of chemistry transport model (not needed in real time). |
| Requirement  Access and timeliness | Yes in NRT |
| * 1. Scatterometer Data – Oceansat-2 and GCOM-W2 | |
| Availability | Access to Oceansat-2 data in real-time is being arranged by EUMETSAT. Distribution via EUMETCast is planned. |
| Usage and plans (by when) | ECMWF: Ready to monitor the data as soon as data become available. Plan to assimilate depending on data quality  EUMETSAT:  METO: Will monitor winds as soon as routinely available. Will assimilate if of good quality.  METEO-FRANCE: Eumetsat OSI-SAF product (OWDP by KNMI. BUFR format) evaluation and validation have started. Not in the loop for GCOM-W2.  DWD: Assimilate KNMI Oceansat-2 wind product since Juli 2012. Access of data via ftp. NRT dissemination via EUMETCAST would be preferred.  KNMI:  DMI: |
| Requirement  Access and timeliness | Yes in NRT (hope to see OSCAT replace SeaWinds role in the observing system, besides ASCAT).  BUFR format for operational NWP purposes requested (ISRO OSCAT product is in HDF5) with meteorological convention for wind direction.  Note: We will need to revisit this item as to which document the requirement should reside. |
| * 1. SSM/I and SSM/IS on DMSP satellite | |
| * + 1. SSM/I brightness temperatures | |
| Availability | F-15 data received from NESDIS server. Data passed through METO to ECMWF where they are BUFR-encoded and returned to METO for onward transmission to other European centres. Fully operational service requires BUFR encoding at NESDIS (NESDIS does not encode to BUFR at the moment). Also being copied to Italian Met Service. |
| Usage and plans (by when) | ECMWF: Data from F-15 are received and monitored.  EUMETSAT: Use SSM/I derived rain rates for calibration of an NRT rain rate product from METEOSAT.  METO: No longer used.  METEO-FRANCE: F15 data received at Toulouse. Sea-ice mask produced locally and used in operational assimilation.  DWD: Data are received from METO, plans for monitoring with view towards operational usage. |
| Requirement  Access and timeliness | Yes in NRT and for later use in ERA  Note: Users would like to have interference free 22 GHz data from F-15 (NESDIS) – this is on original Action Item list. |
| * + 1. SSM/I retrieved products (surface wind speed (WS), total column water vapour (TCWV), cloud liquid water (CLW), rain rate, others?) | |
| Availability | Available on NESDIS server to be copied via Internet |
| Usage and plans (by when) | ECMWF: No requirement.  EUMETSAT:  METO: No requirement.  METEO-FRANCE: Currently using 1.4.1 to derive the products.  DWD: |
| Requirement  Access and timeliness | No requirement |
| * + 1. SSM/IS | |
| Availability | The F-16, F-17 and F-18 data is received by the Met Office after unified pre-processing (UPP) by NRL. Occasional jumps in F-16 bias due to moving solar array without warning. |
| Usage and plans (by when) | ECMWF: Receive F-16, F-17 and F-18 pre-processed data from the Met Office. Monitoring of F-16 and F-17 and assimilation of F-17 imager channels.  EUMETSAT: Use SSM/IS derived rain rates for calibration of NRT rain rate product from METEOSAT.  METO: AMSU-A ‘like’ channels from F-16 assimilated in cloud-free areas. Plans to use F-17 data and F-18 data when it becomes available.  METEO-FRANCE: Monitoring and assimilation of F16, 17, 18 (F18 currently in experimental suite) imager channel data as pre-processed by the Met Office.  DWD: Plans to monitor and assimilate the data as soon as we have free capacities.  DMI: SSM/I(S) is currently used as a high priority input to OSI-SAF; to be used by HIRLAM in the future. |
| Requirement  Access and timeliness | Yes in NRT. |
| * 1. Altimeter data from JASON (and JASON-2/ENVISAT)      1. Altimeter wave/wind data | |
| Availability | JASON-2 data (Operational Geophysical Data Record, OGDR) is available via EUMETCast and GTS. |
| Usage and plans (by when) | ECMWF: JASON-2 and ENVISAT RA-2 are assimilated operationally. Jason-1 and ERS-2 are monitored  EUMETSAT:  METO: Use ENVISAT RA-2 data for research. Altimeter wave heights AND wind speeds required with timeliness of < 6 hours. JASON-2 data accessed from EUMETCAST for validation.  METEO-FRANCE: Use of data (wave heights and wind speed) for assimilation in wave model and for forecasters.  DWD: Use of the data (wave heights and wind speed) for assimilation in a global wave model (timeliness of <3 hours). |
| Requirement  Access and timeliness | Yes in NRT. |
| * + 1. Altimeter sea surface height anomaly data | |
| Availability | The SSHA data is now available within the OGDR data from both NOAA and EUMETSAT in NRT. This data is available via the GTS. Delayed mode data (IGDR) received via CLS (Toulouse).  NASA (NAVO) does produce the data using a similar processing chain. Information is requested about the planned provision of the data via the GTS. BUFR formats have recently been defined. Not requested. |
| Usage and plans (by when) | ECMWF: The CLS products, based on ERS/JASON1-2/ENVISAT data, are used regularly. Near real time and real time products are required for the delayed mode and early delivery ocean analyses. Gridded maps of altimeter anomalies (blend of several satellites) are assimilated in the current operational ocean analysis. In addition to the gridded maps, along track data of the different satellites are also used in the pre-operational ocean analysis.  EUMETSAT:  METO: Receive data products and assimilate them in the operational FOAM suite. Access more timely CLS product.  METEO-FRANCE: No NRT usage.  DWD: No NRT usage |
| Requirement  Access and timeliness | Yes. Timeliness defined above. |
| * 1. TERRA, AQUA and AURA data (NASA)      1. AQUA AIRS+AMSU-A data | |
| Availability | NESDIS process data in near‑real time and transfer them in BUFR to METO. METO also receives AIRS by direct broadcast processed using IMAPP-AIRS. |
| Usage and plans (by when) | ECMWF: Assimilate AIRS and AMSU-A operationally. Use of warmest FoV. Monitoring available at:  http://www.ecmwf.int/products/forecasts/d/charts/monitoring/satellite. Interest for NRT access to mapped MODIS cloud products, e.g. to test cloud detection of AIRS.  EUMETSAT:  METO: Received data since 11 Oct 2002. AIRS monitoring web page at:  <http://www.metoffice.gov.uk/research/nwp/satellite/infrared/sounders/>  Used AIRS operationally since May 04. AIRS warmest FoV is now used. Aqua AMSU-A is backup.  METEO-FRANCE: AMSU-A used operationally since 2005. Operational assimilation of AIRS clear sky radiances since 2006. Assimilation of AIRS cloudy radiances since 2009.  DWD: AMSU-A data used operationally. Activities in AIRS postponed due to missing man power. |
| Requirement  Access and timeliness | Yes, in NRT. |
| * + 1. AQUA AMSR-E data | |
| Availability | Access to L1 radiance data from NESDIS via internet. Data files acquired from ftp2.orbit.nesdis.noaa.gov server. |
| Usage and plans (by when) | ECMWF: AMSR-E all-sky radiances assimilated operationally.  EUMETSAT:  METO: Access data through Internet FTP and are storing these data. AMSR-E SSTs from REMSS are also used in OSTIA SST analysis.  METEO-FRANCE: Interest for research.  DWD: So far no plans to use the data operationally. Interest for research.  DMI: AMSR is currently used as input to OSI-SAF. |
| Requirement  Access and timeliness | Yes, in NRT. |
| * + 1. AQUA and TERRA MODIS polar winds | |
| Availability | University of Wisconsin and NESDIS produce cloud track winds from MODIS-TERRA/AQUA over Polar Regions. Direct broadcast winds are also received from the University of Wisconsin via Eumetcast or by ftp request. |
| Usage and plans (by when) | ECMWF: Assimilates the data from TERRA and AQUA operationally (NESDIS products). Direct-broadcast winds have been tested and are monitored operationally.  EUMETSAT:  METO: Assimilates NESDIS winds since Feb 2005 and DB winds since 13 Dec 2006 which has drastically improved the coverage for the main model runs. Now using additional DB winds from Sodylanka and Fairbanks.  METEO-FRANCE: NESDIS stream used operationally since June 2006 (IR and cloudy WV channels). DB stations Tromsöe and Mac Murdo via CIMSS/Eumetcast link used operatioanlly since Feb 2009. Winds from clear sky WV channel used operatiaonlly since Apr. 2010. DB stations (Sodankylä, Fairbanks) added on Eumetcast used also operationally since 15 Dec 2010.  DWD: Operational Assimilation of NESDIS product in Bufr on GTS and operational use of Direct Broadcasting winds since early 2009. |
| Requirement  Access and timeliness | Yes, in NRT, from both AQUA and TERRA on GTS in BUFR. Interest in combined TERRA-AQUA MODIS AMVs when available (CIMSS). |
| * + 1. AURA: HIRDLS, MLS, OMI and TES | |
| Availability | Provides information on various chemical constituents of the atmosphere. Some data available in near real time on internet from NASA DAACs (distributed active archive centre), <http://daac.gsfc.nasa.gov> |
| Usage and plans (by when) | ECMWF: OMI is actively assimilated since June 2008. MLS ozone is operationally monitored in NRT. Interested in having MLS humidity in NRT.  The NRT O3 product and is a ‘quick retrieval’ that produces good results down to about 50 hPa but is clearly worse than the full retrieval below.  NRT interest in Aura data as well for MACC applications: namely OMI nitrogen dioxide, formaldehyde and sulphur dioxide; MLS carbon monoxide and sulphur dioxide; TES carbon monoxide, methane and nitrogen dioxide.  ECMWF acquire in NRT sulphur dioxide from OMI (LANCE system). This product is used in the MACC system.  EUMETSAT:  METO: Real time OMI total column ozone and aerosol L2 products (OMTO3 and OMAERUV) received for validation at present. Interest in MLS for model validation. Since February 2009 have been storing NRT AURA MLS temp and ozone profiles in BUFR via internet.  METEO-FRANCE: OMI total column currently used off-line for validation of chemical transport model runs Strong interest in receiving OMI NO2 total column and OMI 03 profile or total column retrievals. Interest also (but lower priority) on MLS 03, SO2 and water vapour retrievals, and TES CO and SO2 retrievals (SO2 data useful for volcanic ashes). Assimilation would benefit from inclusion of the averaging kernels and inclusion of the error covariances in the datasets.  DWD: Interest in NRW OMI aerosol 1.2 products and OMI SO2 data for aerosol assimilation. |
| Requirement  Access and timeliness | Yes, in NRT. Would like MLS temperature and moisture added. OMI NO2 also needed (added to Action Item list) |
| * + 1. TERRA:MOPITT | |
| Availability | The Version 4 data are available from NCAR FTP server  mop-ftp.acd.ucar.edu in NRT. |
| Usage and plans (by when) | ECMWF: MOPITT carbon monoxide data Version 4 (MOP02.004) is assimilated in reanalysis runs of the MACC system. NCAR now generate a NRT Version 4 product. This product is acquired routinely by ECMWF and used in the MACC NRT system.  EUMETSAT:  METEO-FRANCE: CO profile retrievals currently used for assimilation in chemical transport model test suite and received by FTP via NCAR. Interest in receiving CO profiles with a 24h time delay as short as possible (3h?) via GTS for pre-operational chemical model suite, in the context of the MACC project.  DWD: |
| Requirement  Access and timeliness | Yes, in NRT. |
| * + 1. TERRA and AQUA MODIS aerosol products | |
| Availability | The offline data are available from a NASA FTP server  (ftp://ladsftp.nascom.nasa.gov/allData/5/) with a delay of the order of 1 to 2 days. A NRT version of MODIS aerosol product is available from LANCE-MODIS data system operated by the GSFC. |
| Usage and plans (by when) | ECMWF: MODIS aerosol products (MOD04\_L2 and MYD04\_L2) are being assimilated in reanalysis runs of the MACC system. MACC is since 2008 running in near-real-time and the NRT product mentioned above is being assimilated.  EUMETSAT:  METO: Receive data via internet from above server for model validation in SDS format.  METEO-FRANCE: Use of MODIS aerosol products for verification of aerosol forecasts and hindcasts (in particular, dust, volcanic ashes, fires).  DWD: Interest in NRT MODIS aerosol product for a possible use in aerosol assimilation and for verification of aerosol forecasts and hindcasts.. |
| Requirement  Access and timeliness | Yes, in NRT |
| * + 1. MODIS level 1B MOD02 and high resolution navigation data MOD03 (only Aqua at present) | |
| Availability |  |
| Usage and plans (by when) | ECMWF:  EUMETSAT: Required for thinning and retransmission to the Nordic countries for both level 1B and high resolution. The timeliness of the data has been degraded since receiving this data from NASA instead of NOAA.  METO: Receive local area MODIS imagery directly. Used for nowcasting applications.  METEO FRANCE:  DWD: |
| Requirement  Access and timeliness | Yes, in NRT |
| * + 1. MODIS Fire data MOD14 from Terra and Aqua | |
| Availability | MOD14 products are available from LANCE system in NRT |
| Usage and plans (by when) | ECMWF: Acquired in NRT MOD14 products from LANCE system. This product is used in the MACC project for estimating chemical emissions due to fires. EUMETSAT: For redistribution to European users  METO: No requirement at present.  METEO-FRANCE:  DWD: |
| * + 1. MODIS MOD05 PW from Terra and Aqua | |
| Availability | PW products are available from LANCE system in NRT |
| Usage and plans (by when) | ECMWF:  EUMETSAT: For redistribution to European users  METO: No requirement at present.  METEO-FRANCE:  DWD: |
| Requirement  Access and timeliness |  |
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| * 1. Windsat/CORIOLIS | |
| Availability | Launched in Dec 2002. Data sent from NRL to Met Office in NRL format via internet and alternative datasets from NESDIS via dedicated link. Latter is 2 hours later than NRL dataset. Would like more timely data from NESDIS. |
| Usage and plans (by when) | ECMWF: ECMWF acquired (NRL pushed data files on our FTP server) CORIOLIS/EDR and SDR products. Plans to compare intrinsic value of passive polarimetry (WINDSAT) and scatterometry (ASCAT). Radiances are monitored.  EUMETSAT:  METO: Wind vector data in real time from NRL (Washington) is assimilated since September 2008. We put data into BUFR locally. The NESDIS BUFR product does not have enough fields for all required variables.  METEO FRANCE: Follow developments at ECMWF and METO.  DWD: We would like to have access to Windsat data.  DMI: We would like to have access to Windsat data; primarily to be used by OSI-SAF as backup for AMSR-E. |
| Requirement  Access and timeliness | Yes, in NRT in BUFR.  High priority to compensate for loss of QuikSCAT |
| * 1. Radio-Occultation constellation | |
| Availability | COSMIC data are now on the dedicated Washington/Exeter link (METO put them on GTS/RMDCN to other European users): timeliness has been nominal and stable. More recently, SAC-C, C-NOFS and TerraSAR have also become available. ROSA and C-NOFS are also required. |
| Usage and plans (by when) | ECMWF: Assimilating COSMIC and METOP GRAS operationally as bending angles. GRACE-A, SAC-C and TerraSAR data are monitored.  EUMETSAT:  METO: Assimilating COSMIC and GRAS/ GRACE bending angles.  METEO-FRANCE: COSMIC data received via GTS. Bending angles from COSMIC, METOP GRAS and GRACE-A are assimilated operationally.  DWD: Operational assimilation of COSMIC, GRACE, METOP, GRAS, TerraSAR, SAC-C and C-NOFS bending angles within 3D-Var. |
| Requirement  Access and timeliness | Yes, in NRT. |
| * 1. TRMM Data | |
| Availability | Available via ftp level-1b TMI radiances and near-surface rain rates from the 2A12 TMI retrieval algorithm in NRT. This stream should be maintained as is. |
| Usage and plans (by when) | ECMWF: The TMI radiances are assimilated in all-sky conditions. The rain rates are used for validation.  EUMETSAT:  METEO-FRANCE: No requirement.  DWD: |
| Requirement  Access and timeliness | Yes at ECMWF |
| * 1. NPP Data | |
| Availability | Request information on future availability of NPP datasets to European Met Services in real time to include VIIRS, CrIS and ATMS SDR radiances. Information on both global data and local area direct readout services is requested to include timeliness of data, dataset descriptions, formats etc. Request to become formal collaborator in Cal/Val efforts with early access to simulated and real data. Also interest in receiving simulated NPP datasets. Launch planned for late 2011 Interest in RARS system for ATMS/CrIS. |
| Usage and plans (by when) | ECMWF: Plans to monitor and then assimilate CrIS and ATMS, as soon as data become available. Simulated test data is being processed routinely.  EUMETSAT: Will continue to consolidate European requirements and liaise with NOAA.  METO: Plans to monitor and then assimilate global and locally received CrIS and ATMS as soon as data becomes available. Simulated ATMS and CrIS BUFR data now available via internet from NESDIS. Only samples downloaded to date.  METEO-FRANCE: Plans to monitor and then assimilate CrIS and ATMS as soon as they become available. Tests with simulated data are about to start.  DWD: Will assimilate ATMS radiances late 2012 and CrIS in 2013. VIIRS imageries are required and used by our forecasters. |
| Requirement  Access and timeliness | Yes. Will there be an EARS-like service for ATMS/CrIS?  Need description of channel selection for CrIS SDR radiances for RARS distribution. |
| 1. POLAR SATELLITES: MAPPED PRODUCTS (not orbit-by-orbit)    1. SSM/I Products       1. NCEP sea-ice analysis | |
| Availability | Data received routinely via Washington-Exeter link. |
| Usage and plans (by when) | ECMWF: OSTIA high-resolution SST and OSI-SAF sea ice is currently used. NCEP sea ice is used as backup, and over some large lakes. NCEP low resolution (1degree) and high-resolution (¼ degree) SST and sea-ice reanalysis (from 1981) and updated weekly/daily are used in the production of ocean analysis.  EUMETSAT:  METO: Now using OSI-SAF sea-ice product operationally. Require NCEP product for backup and comparisons.  METEO-FRANCE: No requirement.  DWD: Used operationally with high resolution (1/12 deg). Ostia high resolution SST is under investigation. |
| Requirement  Access and timeliness | Yes. |
| * 1. AVHRR      1. AVHRR/MODIS products (eg vegetation indices, LAI, land use) | |
| Availability | Products available from Internet or order from EOS data gateway. |
| Usage and plans (by when) | ECMWF: Interest in these datasets (especially in the context of environmental monitoring: MACC). Information on availability of these products requested and NESDIS point of contact. Research requirement for MODIS aerosol optical depth products for model validation. Also interested in past years if available.  EUMETSAT:  METO: MODIS products required are: (i) Monthly updated fractional land cover product at 1 km resolution and global coverage, (ii) Weekly updated Leaf Area Index at 1 km resolution and global coverage. Qualified subscription service for local area data now available and products extracted for NWP trials.  METEO-FRANCE: No requirement.  DWD: Data received, interest for verification purposes. Research requirement for MODIS aerosol optical depth products. |
| Requirement  Access and timeliness | Access to datasets via NASA server or QSS. |
| 1. GEOSTATIONARY SATELLITES: DATA/PRODUCTS    1. GOES VIS/IR/WV atmospheric motion vectors | |
| Availability | High density (HD) product on GTS in BUFR from GOES EAST and WEST. Hourly data available for testing. |
| Usage and plans (by when) | ECMWF: The HD winds are used operationally thinned to one wind per 200 km box. GOES BUFR data received via GTS are used operationally.  EUMETSAT:  METO: HD GOES BUFR IR winds are used operationally and thinned to one wind per 2x2 degree box. Encourage use be made of GOES-13/14 as better systems in orbit.  METEO-FRANCE: The winds are used operationally, thinned to one per 2.5 deg. box.  DWD: BUFR product on GTS used operationally in thinned (model dependent) form. |
| Requirement  Access and timeliness | Yes. Request a parallel dataset be made available when a change of satellite or processing is made to avoid gap in GOES winds during changeover. |
| * 1. Clear Sky radiances from GOES-E and GOES-W | |
| Availability | Available from NESDIS and CIMSS. Contact persons at CIMSS are [tony.schreiner@ssec.wisc.edu](mailto:tony.schreiner@ssec.wisc.edu) and [tims@ssec.wisc.edu](mailto:tims@ssec.wisc.edu) and at NESDIS [john.paquette@noaa.gov](mailto:john.paquette@noaa.gov). |
| Usage and plans (by when) | ECMWF: Receiving GOES-11 from NESDIS and GOES-13 from CIMSS via ftp. The pre-processing is not exactly the same but we can't see any obvious differences in our monitoring statistics.  EUMETSAT:  METO: Receiving radiances via ftp and archiving. About to be assimilated in operations.  METEO-FRANCE: Assimilation trials are about to start.  DWD: Interest for possible use in our data assimilation system, depending on funding and personal situation. |
| Requirement  Access and timeliness | Yes in NRT. Request a parallel dataset be made available when a change of satellite or processing is made to avoid gap in GOES radiances during changeover. |
| * 1. Digital imagery from GOES-E and GOES-W | |
| Availability | Not received from NESDIS. GOES-E, GOES-W retransmitted via METEOSAT 0E, which satisfies current European requirements for imagery. |
| Usage and plans (by when) | ECMWF: Receive images re-transmitted via METEOSAT/EUMETCAST.  EUMETSAT:  METO: Receive 8 km resolution full-disk GOES-E and GOES-W images hourly from CMC, Dorval. Data passed on to EUMETSAT.  METEO-FRANCE: Involved in EUMETSAT initiative to co-ordinate transfer of these data to European Met. Services via Lannion.  DWD: Receive images re-transmitted via METEOSAT/EUMETCAST. |
| Requirement  Access and timeliness | Yes but currently met by EUMETCAST. |
| * 1. Level 0 (GVAR) data from GOES-W and GOES-E | |
| Availability | Currently received in NRT by MACC partner institution from UCAR Unidata (http://www.unidata.ucar.edu/)  Also currently received in NRT by EUMETSAT, but not suitable for radiative fire product. |
| Usage and plans (by when) | ECMWF: Interest within the MACC community for Fire Radiation Products generation (FRP).  EUMETSAT:  METO: Use UCAR data for a trial GOES fire product processed at UCL.  METEO-FRANCE:  DWD: |
| Requirement  Access and timeliness | Yes, in NRT. |
| 1. NON-SATELLITE DATA    1. NCEP SST gridded field | |
| Availability | Data received via GTS or via FTP once a day and used operationally. Current product resolution is 1 degree, 1/2 and ¼ degrees and 1/12 deg product. |
| Usage and plans (by when) | ECMWF: Use the 0.5 degree SST operationally over American Great-Lakes area, Caspian Sea and Azov Sea only. 1/12 degree product is received but not used at the moment. The OSTIA 1/20 degree dataset provided by the Met Office is used operationally. NCEP low resolution (1degree) and high resolution (¼ degree) SST and sea-ice reanalysis (from 1981) and updated weekly/daily are used in the production of ocean analysis.  EUMETSAT: Operational requirement for the monitoring of the calibration of the METEOSAT IR channel.  METEO-FRANCE: 1/12 degree SST is used operationally as climatological relaxation for SST analysis. Data acquired via ftp in GRIB2 format.  DWD: 0.25 degree SST used operationally, plan to use higher resolution |
| Requirement  Access and timeliness | Yes, both resolutions (1/12 and 0.5 degrees). |
| * 1. U.S. Profiler data | |
| Availability | Received in BUFR. |
| Usage and plans (by when) | ECMWF: Data assimilated operationally.  EUMETSAT:  METO: Data assimilated operationally.  METEO-FRANCE: Assimilated operationally.  DWD: Data assimilated operationally.. |
| Requirement  Access and timeliness | Yes in real time at a half-hourly frequency. |
| * 1. MDCRS data including humidity where available (e.g. AMDAR etc) | |
| Availability | Received and used operationally. |
| Usage and plans (by when) | ECMWF: Used and assimilated. 70 km thinning applied, one data per model level.  EUMETSAT:  METO: All available MDCRS data received, assimilated operationally with a thinning to one report in a 4D box of 100km x 100km x 50hPa x 2hrs.  METEO-FRANCE: Assimilated operationally.  DWD: Used and assimilated. Activities to use humidity observations. |
| Requirement  Access and timeliness | Yes. Humidity observations are required. |
| * 1. Tropical cyclone data | |
| Availability | Received in tabular and BUFR form on GTS except from New Delhi. |
| Usage and plans (by when) | ECMWF: BUFR messages received from METO are used in EPS targeting.  EUMETSAT:  METO: Currently use BUFR format bulletins issued by NCEP and plain text TC advisories from NHC, Miami. The former are used in preference to the latter when available. Used to create bogus observations for assimilation.  METEO-FRANCE: These data are used operationally in the ALADIN-Réunion regional model and for othe rALADIN overseas domains.  DWD: |
| Requirement  Access and timeliness | Yes, any machineable form, preferably BUFR and enhanced to include radii of stronger winds when applicable. |
| * 1. Snow cover analysis | |
| Availability | NESDIS dataset is available via the Internet at 25 km and 4 km resolution. A product for the S. Hemisphere is also available. |
| Usage and plans (by when) | ECMWF: The NESDIS 4 km product is used operationally as input to snow depth analysis for the N. Hem. Use of the S. Hem product is being explored.  EUMETSAT:  METO: Used operationally as input to snow analysis for NH.  METEO FRANCE: Interest in 4km product for future operational applications following METO and ECMWF.  DWD: Data (including snow depths) used operationally at 25 km resolution. |
| Requirement  Access and timeliness | Yes, both at 25 and 4 km resolutions. Documentation for the S. Hem products is requested. |
| * 1. N. American hourly surface observations | |
| Availability | Hourly METAR data are received. |
| Usage and plans (by when) | ECMWF: Data received, processed and assimilated operationally. Both SYNOP and METAR.  EUMETSAT:  METO: Stored METAR but not assimilated. Plans for use in 4D-Var data assimilation.  METEO-FRANCE: Interest in hourly SYNOP for use in assimilation.  DWD: Data received, processed and assimilated. Only SYNOP data METARs are under investigation. |
| Requirement  Access and timeliness | Yes. There is a requirement for global exchange of hourly SYNOP data. |
| * 1. N. American soil temperature data on GTS | |
| Availability | The Climate Prediction Center providing soil temperature data on server. ECMWF has been given access to these data, which are transferred routinely via FTP. Nothing received since Nov 2008. The SCAN data set is available via Internet NRT. (insert link) |
| Usage and plans (by when) | ECMWF: Current use is for model validation.  EUMETSAT:  METO: Interest for assimilation and validation.  METEO-FRANCE: Interest for verification of global model.  DWD: Interest for verification of global model. |
| Requirement  Access and timeliness | Yes. |
| * 1. N. American ozone soundings on GTS | |
| Availability | Few soundings are available on the GTS. Canadian soundings are not received. |
| Usage and plans (by when) | ECMWF: Current use is for model validation.  EUMETSAT:  METO: Interest for model validation.  METEO-FRANCE: Interest for model validation.  DWD: |
| Requirement  Access and timeliness | Yes. |
| * 1. TAO/TRITON/PIRATA /RAMAarray data, XBT and PALACE and Argo floats | |
| Availability | Available on the GTS in BUOY, BATHY in BUFR and TESAC code, received and used in Europe. BUOY, BATHY and TESAC codes discontinued in 2012. Interest in BUFR encoded WAVEOB data from buoys. |
| Usage and plans (by when) | ECMWF: Requirement for ocean analysis in seasonal monthly and medium-range ensemble forecasting. Temperature and Salinity measurements are used.  EUMETSAT:  METO: Requirement for ocean model.  METEO-FRANCE: BUOY data used operationally in atmospheric model for surface analysis (surface winds and pressure also used for upper-air analysis). Ocean model: data used for monitoring and verification; interest for assimilation.  DWD: Assimilated operationally in atmospheric model for surface analysis (surface wind and pressure) and to improve SST analysis. |
| Requirement  Access and timeliness | Yes. Action Buoy data should be put in BUFR with all Meta data. |
| * 1. Ground-based GPS total column water vapour over N. America | |
| Availability | The SuomiNet data from UCAR  (http://www.gst.ucar.edu/gpsrg/realtime.html) is a potential NRT source of data. Initial investigations have shown BUFR product is not in WMO approved template. One option being explored is to receive non-BUFR format and METO would put the data into WMO BUFR to place on GTS. Recently EUMETNET are also getting involved in helping out. Contact is Seth Gutman (NOAA-ESRL). |
| Usage and plans (by when) | ECMWF: Investigating assimilation of ground-based GPS data from NRT network in Europe. Interest for similar products from North America (ZTD).  EUMETSAT:  METO: MetO operational use of European data and would like to extend to Global using similar N.American data, having found small, but consistent positive forecast impact in UK area. More contacts are being made with potential networks in the US.  METEO-FRANCE: Assimilation of ground based GPS data (total phase delays) from Europe in all models since 2006. Interest for similar products from North America.  DWD: Investigating assimilation of ground-based GPS data from Europe in our regional models. Interest for similar products from North America. |
| Requirement  Access and timeliness | Yes at METO, METEO-FRANCE and ECMWF. Also HIRLAM has an interest if Observations in HIRLAM area. |

Add requirements for any NWP fields. New section. (e.g. NAEFS, TIGGE) Action for NCEP CMC to provide information on ensemble product availability.

Radar data requirements (eg VAD winds)

Blended GOES products?

1. Requirements with respect to Asian satellite agencies

I distinctly remember that in Boulder we created and worked on a separate document summarising European requirements for Asian data. I found our input doc to APSDEU-11, but not the version that resulted at the end of the meeting. I (Erik) will investigate!

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| * 1. Scatterometer Data – Oceansat-2 | |
| Availability | Access to Oceansat-2 data in real-time is being arranged by EUMETSAT. Distribution via EUMETCast is planned. |
| Usage and plans (by when) | ECMWF: Ready to monitor the data as soon as data become available. Plan to assimilate depending on data quality  EUMETSAT:  METO: Will monitor winds as soon as routinely available. Will assimilate if of good quality.  DWD: Will monior the winds as soon as routinely available with a possible use in our assimilation system. |

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| * 1. FY-2 AMVs | |
| Availability | Data for FY-2D and FY2E on GTS |
| Usage and plans (by when) | METO: Monitoring winds. Will assimilate when of good enough quality. Give feedback to CMA on our monitoring.  DWD: Monitor the winds and start assimilation experiments when quality is good enough. |

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| * 1. FY-3 Sounder data | |
| Availability | FY-3A/B data available on bilateral basis. |
| Usage and plans (by when) | METO: Interested to monitor and then assimilate MWTS and MWHS radiances. Interest in MWRI and IRAS also.  DWD: Interested to monitor and assimilate MWTS and MWHS radiances. |

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| * 1. FY-1/3 Imagery | |
| Availability | FY-1D imagery received directly from local antennae |
| Usage and plans (by when) | METO: Receive FY1D imagery in real time. Used by forecasters to supplement NOAA and METOP AVHRR imagery. Unable to receive FY-3A/B imagery at present.  DWD: Receive FY1D imagery in real time. Used by forecasters. |

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| * 1. MTSAT AMVs | |
| Availability | MTSAT AMVs on GTS |
| Usage and plans (by when) | METO: Monitor and Assimilate MTSAT AMVs operationally.  DWD: Monitor and assimilate MTSAT AMVs operationally |

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| * 1. MTSAT radiances | |
| Availability | Available at ECMWF via FTP transfer from JMA. |
| Usage and plans (by when) | METO: Interest to assimilate MTSAT clear sky radiances. |

**Table of European Met Service Data Requirements from NOAA**

|  | | ECMWF | MET. OFFICE | DWD | METEO-FRANCE | EUMETSAT | NOAA | MSC |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. ATOVS | | | | | | |  | |
| E.1.1.1 | ATOVS 1B | 1 | 1 | 1 | 1 | - |  | 1 |
| E.1.1.2 | ATOVS from HRPT | 1 | 1 | 1 | 1 | 1 |  | 2 |
| E.1.1.3 | AVHRR L1 data | 3 | 1 | - | - | - |  | 3 |
| E.1.1.4 | AVHRR polar winds | 3 | 1 | 1 | 1 |  |  |  |
| E.1.2 | SBUV | 1 | 2 | - | 3 | 2 |  | 2 |
| E.1.3 | Oceansat-2 | 1 | 1 | 1 | - | 1 (KNMI)  (DMI) |  | 1 |
| E.1.4 | SSM/I BT SDR | 1 | - | 2 | 1 | 2 (DMI) |  | 1 |
| E.1.4.1 | SSM/I brightness temperatures |  |  |  |  |  |  |  |
| E.1.4.2 | SSM/I retrieved products |  |  |  |  |  |  |  |
| E.1.4.3 | SSM/IS | 1 | 1 | 1 | 1 | - |  | 1 |
| E.1.5.1 | Altimeter wind/wave | 1 | 2 | 1 | 1 | - |  | 3 |
| E.1.5.2 | Altimeter surface ht | - | 1 | - | 2 | - |  | - |
| E.1.6.1 | AIRS and AMSU-A data | 1 | 1 | 1 | 1 | - |  | 1 |
| E.1.6.2 | AMSR-E data | 1 | 2 | 2 | 3 | 1 (DMI) |  | 2 |
| E.1.6.3 | MODIS polar winds | 1 | 1 | 1 | 1 | - |  | 1 |
| E.1.6.4 | AURA: HIRDLS, MLS, OMI and TES | 1 (MLS, OMI) | 2 | 2 | 1 |  |  | 2 |
| E.1.6.5 | TERRA: MOPITT | 2 | - | - | 2 | - |  | 2 |
| E.1.6.6 | MODIS aerosol products | 2 | 1 | 2 | 2 | - |  | - |
| E.1.6.7 | MODIS level 1B MOD02 |  |  |  |  |  |  |  |
| E.1.6.8 | MODIS Fire data MOD14 from Terra and Aqua |  |  |  |  |  |  |  |
| E.1.7 | Windsat/CORIOLIS | 2 | 1 | 2 | 2 | 4 (DMI) |  | 2-3 |
| E.1.8 | Radio-Occultation constellation | 1 | 1 | 1 | 1 | - |  | 1 |
| E1.9 | TRMM Data | 1 |  |  |  |  |  |  |
| E1.10 | NPP Data | 1 | 1 | 1 | 1 |  |  | 1 |
| 2. POLAR SATELLITES MAPPED PRODUCTS | | | | | | |  | |
| E.2.1. | SSM/I Products | 2 | - | - | - | - |  | - |
| E.2.1.1 | NCEP sea-ice analyses | 1 | 4 | 1 | 3 | - |  | 2 |
| E.2.2 | AVHRR | - | 4 | - | - | - |  | 1 |
| E.2.2.1 | AVHRR/MODIS products | 3 | 2 | 2 | 3 | - |  | 2 |
|  |  |  |  |  |  |  |  |  |
| 3. GEOSTATIONARY SATELLITE PRODUCTS | | | | | | |  | | |
| E.3.1 | GOES VIS/IR/WV winds | 1 | 1 | 1 | 1 | - |  | 1 |
| E.3.2 | Cloud cleared radiances | 1 | 1 | 2 | 1 | - |  | 1 (local) |
| E.3.3 | GOES/GMS imagery | 3 | 1 | 1 | 1 | 1 |  | 1 |
| E.3.4 | Level 0 (GVAR) data from GOES-W and GOES-E | - | 1 | 1 | 1 | - |  | 2 |
| 4. NON-SATELLITE DATA | | | | | | |  | |
| E.4.1 |  | 1 | - | 1 | 1 | 1 |  | 2 |
| E.4.2 | Profiler data | 1 | 1 | 1 | 1 | - |  | 1 |
| E.4.3 | MDCRS (AMDAR) data | 1 | 1 | 1 | 1 | - |  | 1 |
| E.4.4 | Tropical cyclones | 1 | 1 | - | 1 | - |  | 1 |
| E.4.5 | Snow analysis | 1 | 1 | 1 | 2 | - |  | 2 |
| E.4.6 | N. American hourly surface observations | 1 | 2 | 2 | 2 | - |  | 1 |
| E.4.7 | N. American soil temperature data on GTS | 3 | 2 | 3 | 3 | - |  | 2 |
| E.4.8 | N. American ozone soundings on GTS | 1 | 2 | - | 3 | - |  | 2 |
| E.4.9 | TAO/TRITON/PIRATA/RAMArray data, XBT and PALACE and Argo floats | 1 | 1 | 1 | 2 | - |  | 1 |
| E.4.10 | Ground-based GPS total column water vapour over N. America | 1 | 1 | 1 | 1 | - |  | 1 |

1 = High priority required for operations2 = Medium priority to investigate possibility for future operational use3 = Low priority for research

4 = For backup