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# NOAA/NESDIS, Silver Spring, MD

June 9-11, 1998

Meeting Report

**1 Introduction**

The 11th Meeting of the U.S./Europe Data Requirements meeting took place at Silver Spring, MD, on June 9-11, 1998. Rob Mairs, Chief of Information Processing Division, welcomed the participants to the meeting. For the remainder of the first day, the United States and Europe provided status reports on their programs. On the second day of meetings, requirements were discussed. On the third day of the meetings, a list of action items was reviewed and a closing statement was delivered by Rob Mairs.

**2 United States Status Reports**

**2.1 NOAA’s Geostationary Operational Environmental Satellite (GOES) Program Status- Don Gray**

**2.1.1 Current Satellites:**

The status of three GOES satellites was discussed. GOES-8, which was launched on April 13, 1994, is operational at 75W and has one East/West motor remaining. GOES-9 is also operational and is stationed at 135W. It has one East/West motor remaining. GOES-10, which was launched on June 6, 1998 is in on orbit storage at 105W. It was inverted due to solar array drive anomaly and will be stored on orbit following checkout.

**2.1.2 GOES Launch Planning (as of April 29, 1998):**

Spacecraft Availability Planned Launch Date

GOES-10 Apr 1997 Apr 1997

GOES-L May 1999 May 1999

GOES-M Oct 2000 Apr 2002

GOES-N Oct 2001 Apr 2002

GOES-O Apr 2003 Apr 2005

GOES-P Apr 2006 Apr 2007

GOES-Q Apr 2008 Apr 2010

**2.1.3 GOES-10 Science and Operations Test:**

GOES-10 Visible Imagery complements Doppler Radar information in several ways:

(1)Development of convection identified prior to detection by radar.

(2)Characteristics to identify developing convection improved.

(3)Improved spatial and temporal convection nowcasts.

(4)Supercell rotation observed, associated with severe weather.

Topic areas being analyzed (draft report on findings December 1998) are listed below:

(1)Convection/severe storm forecasting.

(2)Synoptic/mesoscale short range forecasting.

(3)Volcanic ash detection and tracking

(4)Aviation forecasting.

(5)Quantitative products: Soundings, winds, precipitation, clouds and sea surface temperature.

**2.1.4 GOES N-Q Status:**

The imager and sounder instruments are being manufactured by ITT Aerospace/Communications. The contract is a two plus one plus one year. The SXI instruments are being manufactured by Lockheed Martin Solar & Astrophysics Laboratory. The contract is two plus one plus one. There is a NOAA/USAF partnership. The spacecraft bus is being manufactured by Hughes Space and Communications and includes launch services. The contract is two plus one plus one.

**2.1.5 GOES Imager Evolution:**

GOES-8, 9, 10, L: Visible (1km), 3.9, 10.7, 12.0 (4km), 6.7 (8km)

GOES-M, N: Visible (1km), 3.9, 6.7, 10.7 (4km), 13.3 (8km)

GOES-O: Visible (1km), 3.9, 6.7, 10.7, 13.3 (4km)

GOES-P, Q: Visible (1km), 3.9, 6.7, 10.7, 12.0, 13.3 (4km)

**2.1.6 GOES Products:**

NCEP/EMC models began using the GOES sounder for precipitable water in the fall of 1997.

NWS AWIPS has established requirements for GOES soundings. NWS Western, Central and Eastern Region forecasters, Naval Surface Warfare Center and the Weather Channel (convective nowcasts) have increased their use of GOES soundings. Uses of the GOES Imager include high density winds in NCEP/EMC models (Regional and Global), NWS AWIPS, System for Convection Analysis and Nowcasting (SCAN).

**2.1.7 Planning for Future GOES:**

NESDIS concept studies include~~s~~ architecture, advanced imager, lightning mapper benefits and emergency imager feasibility. Advanced Geostationary Studies (AGS), an NOAA/NASA Partnership, are investigating imaging (GSFC), IR sounding (LaRC), Microwave sounding (MIT/LL), lightning mapping (MSFC), ground systems, and benefit studies ( NWS). GOES Long Range Planning Team is planning to update requirements.

**2.1.8 GOES Internet Information:**

GOES Satellite Operations, Instrument Descriptions

http://www.nnic.noaa.gov/SOCC/SOCC\_Home.html

Product Demonstrations, Samples, Learning

http://cimss.ssec.wisc.edu/goes/goes.html

http://www.cira.colostate.edu/RAMM/overview.htm

http://orbit7i.nesdis.noaa.gov:8080/goes.html

http://climate.gsfc.nasa.gov/~chesters/goesproject.html

News Releases (NESDIS in the News)

http://ns.noaa.gov/NESDIS/NESDIS\_Home.html

Retrospective GOES Data

http://www.ncdc.noaa.gov

**2.1.9 Activities for the Future:**

Planning, Requirements and Integration Team Activities includes GOES FFRDC Studies and GOES Requirements Workshop (July 20-23, 1998). GOES FFRDC Studies delivered

Future GOES Architecture Options (April 98), Advanced Baseline Imager Concept ( April 98),

Concept Design for GOES Special Events Imager ( April 98), GOES Lightning Mapper Incremental Benefits ( Feb. 98), and Emergency Gap-Filler Instrument Options ( Dec. 97). Some Advanced Geostationary Studies (AGS) are Joint NOAA/NASA programs that initiate

technical studies for future instruments and possible NASA/NOAA New Millennium Program (NMP) demonstration mission.

**2.2 NOAA/NESDIS Spacecraft Status and Products – Barbara A. Banks**

**2.2.1 Spacecraft Status**

NOAA currently maintains four polar orbiting satellites. NOAA-12 and

NOAA-14 are operational, NOAA-11 in stand by (4/10/95), and NOAA-10 deactivated (3/22/95). On May 13, 1998, NOAA-K was launched and is currently undergoing on orbit verification. The NOAA-15 spacecraft is reporting nominal operation for all systems except COMM and Thermal. The VHF real-time antenna did not fully deploy as planned, but, COMM is reporting consistent movement of the VRA (about one count a day). Investigation is continuing into the resolution of this problem. Thermal has confirmed the active control of the baseplate temperature for the HIRS and AVHRR is not working though the temperature is still within calibration limits.

The AMSU-A1 instrument has a channel switch due to a cable wiring problem and can be corrected via ground software. The AMSU-A2 instrument is working nominally. The AMSU-B instrument has a scan angle dependency and an offset when compared with similar data sets from the DMSP instruments of similar heritage.

**2.2.2 Planned Activities**

The investigation into the AMSU-B detector offset and scan angle dependency will continue. Operational implementation of selected NOAA-K polar product systems is planned for November 1998.

**2.3 NOAA/NESDIS Polar Sounding Processing – Vince Tabor**

**2.3.1 Introduction**

NOAA/NESDIS continues to process sounding data from the NOAA and Department of Defense polar orbiting satellites. The status of each processing system was discussed as well as new systems in development.

**2.3.2 SSM/T-1**

The SSM/T-1 on the F-13 satellite continues nominal operational processing. Processing of the SSM/T-1 data from the F-14 satellite, launched in April 1997 was halted due to instrument failure. The F-13 SSM/T-1 data are available to ECMWF through FTP and the data are being transmitted to Shared Processing Sites via the Shared Processing Network. SSM/T-1 products and weekly statistics are being archived.

**2.3.3 SSM/T-2**

Processing of the SSM/T-2 data from the F-14 began in late April 1997. It was determined that beam positions 26, 27, and 28 are obscured by the Glare Obstructor for the OLS instrument, and hence those beam positions are filtered from the processing and retrievals are not made at those locations. The F-14 SSM/T-2 processing was approved and implemented for operations in late July 1998. An upgrade was made to the system to use the Information Processing Division’s 50 kilometer Sea Surface Temperature (SST) file instead of the National Center for Environmental Predictions SST fifteen day composite file. SSM/T-2 data are available to ECMWF and NCEP via FTP and are transmitted via the shared processing network. The products and weekly statistics are archived.

**2.3.4 TOVS**

The HIRS on NOAA-12 failed at 0139 GMT on 31 May due to overheating of the HIRS filter wheel motor. The NESDIS Satellite Operations Control Center (SOCC) promptly responded to this problem and had the instrument operational by June 1. The frequency of many channels shifted outside the calibration limits in the 1b processing and prevented TOVS processing until the limits were opened. TOVS processing resumed on 1 June at 1330 GMT. TOVS products were checked on 1 June and again, more throughly, the 2nd and were of operational quality. A later analysis showed an increase in cloudy data, but the quality of the retrievals continued to be high. The HIRS instrument was closely monitored by SOCC; while the noise went down, the HIRS was not expected to last. In anticipation of the failure of the NOAA-12 HIRS, NESDIS began limited processing of the TOVS data on NOAA-11. At first about one orbit a day was ingested and processed to retrievals. Procedures for ingesting and processing more data from NOAA-11 were developed. On August 21, 1997, NOAA-11 became the operational TOVS backup system. Due to the operational switch of sounding processing to the RTOVS system, transmission of NOAA-11 TOVS data stopped on October 11, 1997. Operational processing of NOAA-14 data stopped on June 1, 1998. Transmission of NOAA-14 TOVS data stopped on November 14, 1998 and operational processing of NOAA-14 TOVS data stopped on June 8, 1998.

**2.3.5 RTOVS**

NOAA-14 RTOVS was made operational in October of 1997 and NOAA-11 RTOVS was made operational in November 1997. The system is performing quite well for a new system. There are three minute challenges with the system:

(1) Cloud Clearing

Adjustments are being made to the cloud clearing.

(2) Limb Correction

RTOVS uses real data to compute the limb correction and a new set of limb correction coefficients are being computed.

(3) Streamline Processing

The current RTOVS processing system takes three time longer than the TOVS system to process an orbit of data.

RTOVS data encoded using the new BUFR format will be made available to ECMWF via FTP. NCEP has access to 1b’s and products via FTP. The 500km SATEM/SARAD and 120km BUFR (sampled) are being transmitted via GTS. UKMO is receiving SSU 1b’s and will be receiving PTOVS files through June 1998. RTOVS data are also being transmitted via the shared processing network. RTOVS products, Coefficient Data Base (CDB), and radiosonde/retrieval co-locations are being archived.

**2.3.6 ATOVS**

The NOAA-15 ATOVS system is running and making retrievals. Test data is projected to be available in late August or early September 1998. Operational implementation is scheduled for October or November 1998. NCEP will have access to the 1b’s and products. The 500km SATEM/SARAD and 120 km BUFR(sampled) will be available via GTS. UKMO will receive HIRS 1b’s, AMSU-A 1b’s, 80km BUFR and AVHRR statistics files. Full resolution products (in BUFR), HIRS radiance/instrument resolution and AMSU-A will be transmitted over the shared processing network. ATOVS products, CDB, weekly statistics and radiosonde/retrieval co-locations will be archived.

**2.3.7 AMSU-A**

The NOAA-15 AMSU-A1 instrument had two channels switch due to a cable wiring problem. The problem can be corrected with software on the ground. AMSU-A2 is working nominally and the data appear~~s~~ good.

**2.3.8 AMSU-B**

The NOAA-15 AMSU-B instrument has a scan angle dependency and an offset when compared with similar data sets from DMSP instruments. Three channels appear bad. The system is running but no retrievals are being made. NCEP will access the AMSU-B 1b’s via FTP. The AMSU-B 1b’s will be transmitted to UKMO. AMSU-B products will be transmitted to shared processing sites via the shared processing network. The AMSUS-B products, CDB, weekly statistics and radiosonde/retrieval co-locations will be archived.

**2.4 NOAA/NWS Telecommunication Gateway – Fred Branski**

No written input received.

**2.5 NCEP Status Report- Steve Lord**

**2.5.1 Review of Activities in 1997**

On February 5, 1997 soil moisture was reset to climatology, SSM/I water vapor removed,

and a new data decoder (on the Cray) implemented. In June 1997, AVN runs were set to four

times/day out to 78 hours (0,6,12, 18Z). A host of small changes to the analysis and

forecast models were made on November 5, 1997. Other 1997 activities include next ~~g~~eneration atmospheric model for Climate Modeling Branch and the completion of a re-analysis for the period from 1958-1997.

**2.5.2 Changes to the 1998 NCEP Operational Global Model Analysis/Forecast System**

**2.5.2.1 Analysis**

A higher resolution (T170142) was implemented. The result was a better resolution of orography (decreases difference between observed/modeled elevations) and an improved radiative transfer. New formulation for background error covariance was implemented, thus making future improvements possible and a major impact in the tropics. Changes in the use of Polar-Orbiting Level 1-B data were made. More satellite data are being used and NESDIS’ transmittance calculation in radiative transfer. GOES Sounder data were also incorporated. The result was an improved use of moisture data and impacts on the moisture fields over eastern Pacific and western fields. External iteration was changed to account for non-linearities in the SSI analysis and to better use moisture channels and SSMI winds. Other changes include improved time interpolation for satellite data when observation time is after analysis time, limiting super-saturation and negative moisture and 3-D ozone analysis(includes SBUV profile).

**2.5.2.2 Forecast Model**

Better resolution of orography due to implementation of higher resolution (T170142). Convection changes(ocean) allows for earlier initiation of convection which reduces precipitation ‘bullseyes’ and modified evaporation of falling rain. Land Surface processes now use~~s~~ monthly mean vegetation cover + soil type/vegetation categories from ETA and simulate runoff from frozen soil and initial snow depth minimum. Enhanced Gravity Wave Drag, where a mountain profile is a function of wind direction, improves placement of storms id. Prognostic Ozone change, which was needed by analysis, added 10% to model’s computational overhead but radiative heating is now more accurate through replacement if seasonal, zonal mean climatology. New shortwave(solar) radiation, including improved treatment of surface albedo and calculations within cloudiness, was also implemented.

**2.5.3 GMB Research and Development Priorities for 1998**

GMB Research and Development priorities for 1998 are improvements to Global Precipitation

Forecast, AVN jet stream winds, tropical winds, and improved Ensembles. Conversions to a

new computer and climate modeling are also planned.

**2.5.4 February 1997 Bundle of Eta Model Changes**

February 1997 Eta model changes included Eta model code, Eta model post-processor,

shortwave radiation package, cloud scheme, soil package, and minimum background

mixing**.**

**2.6 NOAA/NESDIS Non-NOAA Data Sources - Gene Legg**

**2.6.1 Introduction**

NOAA/NESDIS continues to plan to process data from some non-NOAA Satellite data sources. Some of

these data and proposed launch dates were discussed by Gene Legg.

**2.6.2 QuikSCAT**

NASA Quick Scatterometer Mission (QuikSCAT) launch is scheduled for November 1, 1998.

The satellite will fly a SeaWINDS sensor. There will be near real time data recovery via NASA

Polar Ground Stations (Alaska, Svalbard) and the data will be delivered to NOAA via GSFC, and

BUFR Ocean Surface Wind Vector product will be produced.

**2.6.3 EOS-AM1**

EOS-AM1 launch is scheduled for December 1998. The instrument of interest is MODIS. Near

real-time data will be obtained from TDRSS and EDOS. An NOAA processing facility in EDOS

was established and a TIA between NOAA and NASA was signed.

**2.6.4 ADEOS-II**

ADEOS-II launch is scheduled for November 2000. The instruments of interest are as follows:

(1) GLI-Global Imager

(2) SeaWINDS-Scatterometer

(3 AMSR-Advanced Microwave Scanning Radiometer

Near real-time acquisition via IOCS or X-Band is planned. MOU and interface documents have

been signed between NASA, NASDA, and NOAA.

**2.6.5 ENVISAT**

ENVISAT launch is scheduled for November 1999 but this date is questionable. The instruments

of interest are as follows:

(1) MERIS

(2) AATSR

The near real time data delivery is being explored per ENVISAT AO and NOAA/EUMETSAT

MOU.

**2.6.6 EOS-PM1**

EOS-PM1 launch is scheduled for December 2000. The instruments of interest are as follows:

(1) AIRS

(2) HSB

(3 )AMSU-A

(4) AMSR-E

(5) MODIS

There will be near real-time data recovery via NASA Polar Ground Stations (Alaska, Svalbard)

and an NOAA processing facility in EDOS.

**3 European Status Reports**

**3.1 EUMETSAT Operations Status – Mikael Rattenborg**

**3.1.1 Satellite Status**

The mission swap from Meteosat‑6 to Meteosat‑7 is planned for June 3 1998, 8:30 UTC. Meteosat‑5 has arrived at 63° E to support INDOEX.

**3.1.1.2 METEOSAT ‑5**

On 14 January 1998 the drift maneuvers to start the eastward drift of Meteosat‑5 to its new location over the Indian Ocean were carried out. Such a drift orbit is near circular and lies some 40 km below the geostationary orbit altitude. The spacecraft's drift rate is around 0.5 deg/day. Gravitational effects will gradually increase the drift rate to around 0.7 deg/day during the relocation period. The relocation took about 125 days corresponding to an arrival on station on 18 May 1998. During May and June some intensive testing is foreseen at this new position in order to be ready for the start of the INDOEX service in early July 1998.

The orbital inclination of Meteosat‑5 is around 1.9° and slowly increasing. The present hydrazine reserve will allow nominal station keeping maneuvers and attitude control until the end of 1999. From the INDOEX position Meteosat‑5 will disseminate only A‑format HRI images according to a special dissemination schedule.

It should be noted that the high orbital inclination of this satellite will make the direct reception of INDOEX image data more difficult, especially for PDUS user stations with large antennas (greater than around 2.5 meter diameter). Depending upon the geographical location and the type of reception station, periodic antenna re‑pointing may be necessary at certain times of the day to ensure full 24 hour direct reception. Some of the re‑pointing activities may, however, be avoided by using either a smaller antenna size or, in the case of a larger antenna, by defocusing the antenna feed.

It is for this reason that, in addition to the images broadcast by Meteosat‑5, hourly INDOEX X‑formats will be broadcast via the prime mission (Meteosat‑7) satellite at 0°.

**3.1.1.3 METEOSAT‑6**

Meteosat‑6, located at 0° is currently the operational spacecraft supporting all missions, namely, image taking, image dissemination, including the relay of foreign satellite data from the two American GOES satellites, the Japanese GMS and the Russian GOMS satellites. In addition to these imaging missions, Meteosat satellites continue to support the Data Collection System (DCS) and the Meteorological Data Dissemination (MDD) mission.

The orbital inclination of the satellite is 0.27° and slowly decreasing. The present hydrazine reserve will allow normal orbit and attitude control until the middle of the year 2001. To compensate for the radiometric anomaly of the WV and IR channel onboard Meteosat‑6 on‑ground correction software is used to correct the image data.

From 3 June 1998 onwards, Meteosat‑6 will be the standby spacecraft.

**3.1.1.4 METEOSAT‑7**

Following its successful launch in September 1997, Meteosat‑7 went through an intensive commissioning phase lasting until November 1997. In this testing period, every on‑board system was thoroughly checked out with the ground segment, including a full end to end test involving image taking and the derivation of meteorological products. Meteosat‑7 remains as an in orbit standby satellite until 3 June 1998 when, as mentioned previously, it is planned that it will become the operational spacecraft at 0°.

The orbital inclination of Meteosat‑7 is around 1.59° and decreasing. Following a very accurate launch and orbit injection with the Ariane‑4 rocket, the present hydrazine reserve will allow normal orbit and attitude control until the middle of the year 2004.

**3.1.2 OPERATIONAL MISSION STATUS**

**3.1.2.1 Imagery**

The new 0°‑dissemination schedule with hourly INDOEX data is available on the EUMETSAT Internet pages http://www.eumetsat.de.

**3.1.2.2 Meteorological Products**

In common with the rest of EUMETSAT Operations, the main recent MPEF event was the commissioning of Meteosat‑7. The validation of MPEF processing and products from the new satellite started in mid‑September 1997 and was completed by the end of November 1997.

Concerning actual operations, two new products, Expanded Low‑resolution cloud motion Winds in BUFR code and clear sky Water Vapour Winds, were introduced as test products and validated during 1997, as a joint activity involving the EUMETSAT MPEF team, a EUMETSAT research fellow at ECMWF and ECMWF research and operations departments. The validation was highly successful and impact experiments performed in December 1997 at ECMWF showed a positive impact on the ECMWF forecast from these two products. These new wind products are extracted 16 times per day based on 1 ½ hourly time periods.

The new BUFR wind products are encoded with quality indicators and other information about the extraction process using new unified BUFR templates, which were developed in 1997 as a joint effort between EUMETSAT, ECMWF and NOAA/NESDIS. These templates cover wind and radiance products from geostationary satellites and were presented to the meeting of the WMO CBS WGDM Subgroup on Data Representation and Codes in April 1998, for recommendation as global templates for the exchange of these products on the GTS. The unified BUFR templates will also be applied for the new high resolution water vapour winds product which is currently being prototyped and which will be available on the GTS for validation with ECMWF and interested NWP centres in the second half of 1998.

For the INDOEX mission on Meteosat‑5, a full range of operational products will be produced and distributed.

Further information regarding the new BUFR wind products is available on http://www.eumetsat.de ‑> Operational Services ‑> Meteorological Products. Here you also find information about the abbreviated headers for all products, both from 0° and from INDOEX.

**3.1.2.3 Communications Infrastructure**

The EUMETSAT link to the DWD RTH has been upgraded to 64 kb/s to support the transfer of higher‑resolution forecast data from ECMWF and to support the extra data and products transferred for the INDOEX mission.

**3.1.3 METEOSAT SECOND GENERATION**

The launch of MSG‑1 is planned for October 2000.

Three Satellite Applications Facilities (SAFs) have been started in the framework of the MSG programme through cooperation agreements between EUMETSAT and member states. The nowcasting SAF, hosted by Spain, will produce a software package to support the use of MSG data for nowcasting applications. The Ocean and Sea‑ice SAF, hosted by France, will produce a range of ocean and ice products, based on MSG and NOAA data. The Ozone SAF, headed by Finland, will produce a range of Ozone products, initially based on ERS/GOME data and later also on MSG/SEVIRI data. It is not currently planned that any of these SAFs will use NOAA data operationally, other than locally received HRPT data.

**3.1.4 EUMETSAT POLAR SYSTEM**

The EPS programme is still under final approval, but both ESA and EUMETSAT councils have given authorization to proceed with the main industrial activities. The planning assumes a launch of METOP‑1 in 2003.

Four SAFs are planned for the EPS system. They cover NWP applications, Land applications, GRAS and Climate. It is not currently planned that any of these SAFs will use NOAA data operationally, other than locally received HRPT data.

**3.1.5 ELECTRONIC INFORMATION SYSTEM**

The EUMETSAT WWW pages can be found on the web site: http://www.eumetsat.de, and have been enhanced significantly over the last months. The information available on these pages includes latest operational news, METEOSAT orbital information, calibration information and limited amounts of near‑realtime image data. It is also planned to significantly expand the information on MSG and EPS, to also provide more information to the EUMETSAT user community about the future operational services.

**3.2 UK Met Office Telecommunications – David Tinkler**

**3.2.1 Met. Office Communication Computer Systems**

**3.2.1.1 NETLINK**

The NETLINK computer system is responsible for:

The operational transfer of files of data between computers on the Met. Office Central

Data network (CDN) and computers on external networks.

Acting as a two-way gateway converting between WMO bulletin traffic (as used on the

GTS) and files (as used within the Met. Office).

The present NETLINK configuration is shown below:

**Node Details**

|  |  |  |
| --- | --- | --- |
| **Node Name** | **Model** | **Description** |
| NETTLE | VAX 4500 | Main NETLINK Computer running DECNET and TCP/IP protocols |
| TEAZLE | VAX 4500 | Back-up Computer for NETTLE |
| ROUTRC | DEMSA | DEC Router. Provides X25 access for transmissions to and from NETTLE. |
| UKMO1 | CISCO 4500 | Multi-Protocol Router including DECNET and TCP/IP |
| UKMO2 | CISCO 4500 | Back-up for UKMO1 |

**Link Details**

Links from UKMO1

|  |  |
| --- | --- |
| **Link Name** | **Description** |
| ECMWF | 2MBits/Sec link to ECMWF running DECNET and TCP/IP. |
| CMC DORVAL | 32/16 KBits/Sec Frame Relay Link to the Canadian Meteorological Service (CMC). Uses TCP/IP and X25 within IP. |
| METEO-FRANCE | 128KBits/Sec Link to Meteo-France. Uses TCP/IP and X25 within IP. |
| METCAS | 2MBits/s to Met. Office Commercial Accounting System (METCAS). Uses DECNET and TCP/IP. |
| TROPICS | 256KBits/s link to TROPICS . Uses X25. |
| NESDIS | 32/16 KBits/Sec Frame Relay link to NESDIS. Uses TCP/IP. |
| AUSTRALIAN BoM | 19.2 KBits/Sec Link to the Australian Bureau of Meteorology (BoM). Uses X25 and TCP/IP within X25. |

Links from UKMO5

|  |  |
| --- | --- |
| **Link Name** | **Description** |
| NOAA-TOC | 9.6 KBits/Sec TCP/IP Test Link. Not used at present |

Links from ROUTRC

|  |  |
| --- | --- |
| **Link Name** | **Description** |
| NESDIS | 9.6 KBits/s link to NESDIS. Uses X25 . |
| EODC | 64 KBits/s link to the Earth Observation Data Centre. Uses X25. |
| TROPICS | 64KBits/s link to TROPICS. Uses X25. |

Since the last meeting the following developments have taken place:

A Frame Relay link to NESDIS has been established. At present it has a Committed Information

Rate (CIR) 32KBits/Sec from NESDIS to UKMO and 16KBits/Sec in the other direction. It is

currently being used to receive SSM/I data from NESDIS and will be used to receive the ATOVS

data. Once the ATOVS data is flowing the speed from NESDIS to UKMO will be increased to a

CIR of 64KBits/Sec.

The link to the Canadian Met. Service (CMC) has also been changed to Frame Relay and

operates at the same speeds as the NESDIS link. This has enabled UKMO to receive hourly

GOES images from CMC.

Since the NESDIS Frame Relay link was established work has started on moving the data

currently being sent on the SNA and X25 experimental links over to the Frame relay link. When

completed, this will allow the entire 64Kbits/Sec link to NOAA-TOC to be used for GTS traffic

to the Met. Office message switch.

The routers UKMO1 and UKMO2 have been upgraded from CISCO MGS/4 to CISCO 4500 and

a Year 2000 compliant version of the CISCO operating system has been installed.

During the rest of 1998 the NETLINK system will be made Year 2000 compliant. This involves:

Procurement of replacement Alpha computers running a Y2K compliant version of the VMS

operating system and layered products.

Ceasing all of the X25 transfers made by NETLINK, this includes transferring all the TROPICS

data transfers from X25 to FTP.

Producing an inventory of all in-house developed code on the system and checking each module

for Y2K compliance.

It is intended that these projects will be completed by December 1998 before the start of end-to-end testing in 1999.

**3.2.1.2 TROPICS**

The TROPICS system at Bracknell is a multi-computer Tandem K2000 Himalaya system which is used to meet our national and international message switching needs. As such it supports a large number of communications links ranging from low speed asynchronous connections to 64KBits/s synchronous lines and Ethernet LANs. The main messages are transferred via asynchronous and X.25 circuits but there is also support for messaging via telex, ISO TP4 (over LAN) and X.400. Initial operational use of FTP has just begun and the service should be widely available later this year. Support of data exchange using TCP sockets should also be available later this year. Most connections are permanent leased circuits but Public X.25 data networks and ISDN are also supported.

Since the last meeting the TROPICS message switch has been upgraded to an eight processor system with 128MBytes of memory per processor running the Non-Stop Kernel D33 release of operating system. Currently the system is switching 1.6 million half-messages per day which is about 3.3 GBytes. Peak rates are around 54 half-messages per second which is about 150KBytes/sec.

With regard to the "alpha-numeric observational" and GRIB channels between Bracknell and Washington the following tables show the change in daily traffic rates since the last meeting :-

|  |  |  |
| --- | --- | --- |
| **Date** | **Washington to Bracknell** | **Bracknell to Washington** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Data (Mb) | Msgs | Data (Mb) | Msgs |
| 4th May 1994 | 9.1 | 14515 | 8.2 | 12854 |
| 18th Oct 1994 | 8.2 | 14771 | 8.3 | 12718 |
| 19th April 1995 | 8.5 | 14091 | 8.9 | 13250 |
| 17th April 1996 | 9.2 | 14256 | 9.1 | 13651 |
| 14th May 1997 | 9.6 | 15535 | 10.4 | 14662 |
| 11th May 1998 | 13.2 | 16524 | 11.0 | 15884 |

**Table 1 Alpha-Numeric Channel**

|  |  |  |
| --- | --- | --- |
| **Date** | **Washington to Bracknell** | **Bracknell to Washington** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Data (Mb) | Msgs | Data (Mb) | Msgs |
| 4th May 1994 | 17.3 | 6820 | 22.5 | 11386 |
| 18th Oct 1994 | 63.5 | 17086 | 22.9 | 11751 |
| 19th April 1995 | 70.3 | 18865 | 65.2 | 22934 |
| 17th April 1996 | 72.8 | 19455 | 75.9 | 23463 |
| 14th May 1997 | 75.6 | 19220 | 77.3 | 23007 |
| 11th May 1998 | 80.1 | 19932 | 66.5 | 16259 |

**Table 2 GRIB Channel**

The data volumes continue to grow steadily except for the GRIB data to Washington. In July 1997 GRIB0 data was removed from this link because it had been replace by GRIB1 and thinned GRIB data.

The line utilisation has risen since last year, this is due to the CPU upgrades that took place in the Bracknell message switch.

**3.2.2** **Communication Links**

**3.2.2.1 Links to NOAA**

There are two links to NOAA, a Frame Relay link to NOAA NESDIS and a 64KBits/sec leased line to the Telecommunications Operations Centre (TOC).

**3.2.2.2 Links to NOAA-TOC**

The link to NOAA-TOC is split into five separate channels using multiplexers as shown below

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Speed Bits/sec** | **Protocol** | **US End** | **Met. O End** | **Data** |
| 9.6K | SDLC | NESDIS | COSMOS | Stratospheric Sounding Unit (SSU) |
| 9.6K | X25 | NESDIS | ROUTRC | ERS-2 Data & Experimental Satellite Products |
| 9.6K | TCP/IP | OSO | UKMO5 | IP Test Link |
| 19.2K | X25 | OSO | TROPICS | GTS |
| 4.8K | X25 | OSO | TROPICS | T4 Fax Products |

An IP test link running at 9.6KBits/Sec was established and has been used to test data transfers to and from NESDIS before the Frame relay link direct to NESDIS was established

The present usage of the links is shown in Appendix A. The GTS link is still heavily utilised. In the plan presented last year the intention was to increase the speed of the GTS link to 38.4KBits/Sec and run TCP/IP and X25 in IP on the circuit, however, during the course of establishing the test link it was discovered that the cards in the multiplexers cannot support speeds of more than 19.2 KBits/Sec.

It is planned to move the data currently being transferred on the SSU and X25 experimental links over to the NESDIS Frame Relay link to NESDIS leaving the 64KBits/Sec link NOAA-TOC to be used for the transfer of GTS data.

**3.2.2.3 Links to NOAA-NESDIS**

The Frame Relay link to NOAA-NESDIS is currently being used for the transfers of SSM/I satellite data. Following the successful launch of NOAA-K the ATOVS satellite data will also be sent on this link. ATOVS data will be pushed from the CEMSCS server at NESDIS using TCP/IP protocols. Incoming ATOVS data will be sent from NETTLE to a separate computer on the UKMO LAN called the GPA for processing.

The ATOVS data (raw and processed) will be passed to ECMWF and Meteo-France using existing links. Details of ATOVS data links to DWD have yet to be agreed.

**3.2.2.4 Links to ECMWF**

The 2MBits/Sec link to ECMWF is used to transmit files of data between UKMO and ECMWF using a mixture of TCP/IP and DECNET protocols. This data includes GTS Data, numerical modelling products and satellite data. UKMO users can also submit jobs to run on the ECMWF Cray and access data on ECMWF computer systems using their MARS and METVIEW software.

Over the next year it is planned to replace the use of DECNET by TCP/IP.

**3.2.2.5 Links to Meteo-France**

A 128KBits/Sec link has been established between UKMO and Meteo-France. It was installed so that GOES and GMS satellite data can be sent to Lannion via Meteo-France. This data is then sent from Lannion to METEOSAT for rebroadcast. Satellite sounding data such as the SSM/I and ATOVS data will be sent to Meteo-France using this link. GTS and RADAR data currently transferred on separate links using X25 will be moved to the IP link in the very near future using X25 encapsulated in IP.

**3.2.2.6 Other International Links**

In an effort to gain routine, reliable access to global imagery from geostationary satellites, the Met. Office has implemented links as described briefly below. The approach has generally sought to identify mutual benefit from the exchange of satellite data and, hence, sharing of the costs involved.

**3.2.3.1 Australian Met. Service**

A 19.2 KBits/sec dedicated link has been established between the UK Met. Office and the Australian Bureau of Meteorology (BoM) in Melbourne. It is being used for the exchange of data in WMO bulletin format with TROPICS and files of satellite data (METEOSAT from UK and GMS from Australia) with NETLINK.

**3.2.4.1 Canadian Met. Service**

A 32 KBits/Sec Frame Relay link has been established between the UK Met. Office and the Canadian Met. Service (CMC) in Dorval. It is being used for the exchange of data in WMO bulletin format with TROPICS and files of satellite data (METEOSAT from UK and GOES from Canada) with NETLINK.

**3.3 UK Met Office Applications – Bruce McPherson**

**3.3.1 TOVS**

NOAA‑12 and NOAA‑14 temperature products from NESDIS (BUFR RTOVS) continued to

be routinely monitored.

The clear column brightness temperatures in the BUFR RTOVS messages have also continued

to be monitored against equivalent quantities calculated from the short range (6 hour) global

forecast. These brightness temperatures are used as input to the UKMO Observation

Processing System (OPS), in which a one‑dimensional variational analysis (1DVAR) is

performed to provide a temperature and humidity profile as a local interface between the

radiance data and the NWP assimilation system. The radiance product from the RTOVS

system was introduced successfully, and NOAA‑11 products were used to replace NOAA‑12

when the latter failed. Some impact experiments looking at different assimilation weights in

the southern hemisphere were performed, but these gave mixed results. In limited area models

the NESDIS retrieved temperature profiles in the BUFR TOVS messages continue to be

assimilated. A switch from RTOVS radiance product to level 1B radiances is being

considered, as level 1B radiances will be processed for ATOVS data.

Processing of SSU data has continued in the context of our operational stratospheric analyses.

**3.3.2 ATOVS**

A Memorandum of Understanding has been signed on behalf of UK Met. Office and NESDIS

for the transfer of ATOVS radiance and product data files from NESDIS to UK Met. Office.

Considerable effort has been devoted to preparations for the reception and exploitation of

ATOVS data from NOAA‑K. We have collaborated with other groups in Europe (in France,

the Netherlands, ECMWF and EUMETSAT) to develop an ATOVS and AVHRR processing

package. Our contribution to this package is mainly through the development of a

preprocessing module. Work is progressing well and an initial system should be in place in

good time for the launch of NOAA‑K.

Work has continued with NESDIS on the definition of the global ATOVS data sets to be

provided by NESDIS to European centres:

‑the ATOVS products file, containing NESDIS retrieved products and clear column brightness

temperatures

‑level 1B data for AMSU‑A, AMSU‑B and HIRS

‑ AVHRR GAC products on the HIRS grid (for use in the processing and quality control of HIRS

data).

We understand that an ATOVS product file in the same format but at lower horizontal

resolution will also be distributed on the GTS.

Initially we plan to process the level 1B brightness temperatures, using a subset of channels

similar to the current TOVS channels. In this way we intend to achieve operationally

continuity for the NWP system in the transition from TOVS to ATOVS, whilst allowing time

to test the processing of new channels within the 1DVAR system. However we also plan to

continue research and development with a view to exploiting the increased information by

using all the brightness temperatures in the global ATOVS level 1B data sets. A parallel

system will be implemented to exploit direct read‑out, locally received ATOVS data for the

European/N. Atlantic area (which will be available earlier than the equivalent data from the

global data sets).

Preparations are under way to develop a new three‑ and four‑dimensional variational data

assimilation system (3D/4DVAR) within which the TOVS/ATOVS radiances will be used

directly.

**3.3.3 Advanced Infrared Sounders (IASI/AIRS)**

Preparations for processing advanced sounder data have begun. The impact of correlated

observation and forward model errors on IASI retrieval information is being studied, as part

of a European initiative led by EUMETSAT and CNES. Informal discussions have been held

with NCEP and NESDIS staff on plans for near real‑time processing and distribution of AIRS

data. We have a strong requirement for both AIRS retrieval (temperature and humidity)

products, and a subset of radiance information (circa. 200‑500 channels).

**3.3.4 SSM/I**

Orbit‑by‑orbit brightness temperatures are being received routinely via ECMWF and are

processed nightly, using the 1DVAR code ported from ECMWF and adapted to the UKMO

global NWP model. Initial results are encouraging and work is under way to interface the

1DVAR software to our operational system in preparation for impact experiments and

possible operational use during the coming year.

It is planned to very soon switch data transfer to the Washington‑Bracknell frame‑relay link

(with onward transmission to ECMWF and other centres). Initially the data will not be BUFR

encoded, and will be passed from UKMetO to ECMWF for BUFR encoding before being

returned to UKMetO. A BUFR encoded product from NESDIS will be used as soon as it

becomes available (poc: Chris Duda), and this product will include zenith and azimuth angles.5.

Scatterometers Operational monitoring and assimilation of ERS‑2 scatterometer data has

continued.

Collaboration between European centres and NOAA was well advanced to receive NSCAT

data in BUFR when the ADEOS satellite failed in July 1997. It is hoped that a similar

collaboration will allow QuickScat data to be successfully obtained shortly after launch.

**3.3.6 Altimeters**

The seasonal forecasting group have intercompared monthly mean DUCAS delayed mode

altimeter data with tide gauge data in the equatorial Pacific ocean. The agreement is good.

**3.3.7 SST Products**

No progress in last 12 months.

**3.3.8 Sea‑ice Products**

Plan to use the NCEP sea ice analysis.

**3.3.9 Cloud‑tracked Winds**

All GOES IR cloud‑tracked winds, except those over land below 500 hPa, have been

assimilated into the global model since April 1996. Routine monitoring is carried out and

feedback given to NESDIS if any anomalies are seen. On 2 March 1998 NESDIS turned off

the low‑resolution GOES winds, despite a continuing requirement from UKMetO who, along

with other centres, were not ready to assimilate the high‑res products. As a consequence no

GOES wind products were assimilated from 2 March to 21 April. From 21 April 1998, we

began to assimilate GOES IR high‑density winds in all regions except in the NH (north of

20N) and over land at low levels (less than 700 hPa). These files are received via a non‑

operational FTP link, as we are still not in a position to use the GTS product. We're not in

receipt of GOES WV winds. We are interesting in receiving other products e.g. winds

generated from GMS imagery, pre‑auto editor GOES winds).

**3.3.10 Imagery ‑ Polar Orbiters**

It is planned to use AMSU‑B imagery to identify areas of precipitation.

The requirement for mapped AVHRR GAC imagery has been clarified and passed to Chris

Duda at NESDIS (six hourly 10km resolution composites).

**3.3.11 Imagery ‑ Geostationaries**

The UKMO‑CMC communications link has been upgraded allowing faster delivery of GOES

imagery to EUMETSAT. There has been some effort put into obtaining either INSAT or FY‑2

digital imagery over the last year. The importance of this has reduced somewhat with

Meteosat‑5 at 65E providing digital imagery from July 1998 to December 1999, however it

seems likely that UKMO may be able to obtain FY‑2 imagery (via AusBoM) in the

medium‑term. No progress has been achieved in obtaining INSAT imagery.

**3.3.12 Wind Profiler Data**

No progress to report.

**3.3.13 ACARS Data**

All available ACARS data is assimilated into the operational global model.

**3.3.14 Tropical Cyclone Data**

Whilst the use of digital format data (e.g. BUFR, BTAB) is desirable as input to the UKMO

TC bogus scheme, the system has successfully run with the automatic ingestion of plain text

messages from NHC, Miami. Therefore conversion of these messages to BTAB format is now

considered low priority. Last year NHC added the ATCF identifier to their plain text

advisories which enabled UKMO TC guidance messages to automatically include this

identifier. This enabled the US ATCF system to automatically process UKMO guidance. This

arrangement appeared to work well and NHC received the 12‑hourly UKMO TC guidance

messages during the 1997 hurricane season.

**3.4.0 ECMWF – Roger Saunders and Horst Boettger**

**3.4.1. Introduction**

This report gives a summary of recent progress on operational matters related to the use of meteorological data, current research activities and the future applications planned at ECMWF. The report mainly deals with satellite data but reference to the use of other data sets will also be made.

**3.4.2 Operational Aspects**

**3.4.2.1 Data Acquisition via Internet**

While the provision of a large number of data sets from servers has been a much welcome enhancement of the observational data available for research and routine use in recent years, the operational use of these data is on occasions severely compromised by the unreliability of the Internet as a means of access. All data which are considered for operational use need to be transferred for transmission via operational links, preferably in standard BUFR format.

**3.4.2.2 ACARS**

With the introduction of the new AIRINC processing system last year the number of reports received has increased by about a factor of ten.

**3.4.2.3 Profilers**

These continue to be received regularly from the US and European networks, with feedback information on quality sent monthly to NOAA.

**3.4.2.4 TOVS**

RTOVS are now received on the GTS in BUFR format and used operationally instead of TOVS. There have been improvements in the timeliness of the data reception in recent months.

**3.4.2.5 GOES**

GOES 8/9 high density SATOB winds are now in use. It is planned to change these to BUFR format later this year. NESDIS is expected to use the BUFR templates and table entries agreed at the recent meeting of the CBS Working Group on Data Management/Subgroup on Data Representation and Codes. The coverage has been irregular in recent times with entire segments missing from the disc of the satellite view. Figures 1 to 4 illustrate the lack of data and show the daily data reception rates in May 1998 for the two -satellites for each of the four data assimilation cycles 00,06,12, and 18 UTC.

**3.4.2.6 SSM/I and SST**

**3.4.3 Recent developments on use of Satellite data at ECMWF**

The new 4D variational analysis which takes account of the observation time became operational at ECMWF from the end of November 1997. This new data assimilation system allows better use to be made of the satellite data. Recent developments in the use of satellite data at ECMWF on described briefly below.

**3.4.3.1 TOVS**

The NOAA-11/14 RTOVS radiances are assimilated globally in 4DVAR and can now modify the model fields at all levels. RTOVS retrievals are now only used to define the background temperature profile above 1 OhPa for the 1 DVAR retrieval. After the failure of the NOAA- 12 HIRS at the end of May 97, during July/August 1997 NOAA-12 MSU radiances were used successfully until NOAA-l l data became available. RTOVS NOAA-l l SSU radiances are no longer used as it was learnt that they are NOAA- 14 SSU radiances remapped to the NOAA- 11 locations and so contain no additional independent information. The new RTOVS radiance product has allowed assimilation of HIRS-8 radiances and use of MSU- 1 for quality control of the MSU-2 radiances. The routine radiance monitoring has demonstrated that to date the RTOVS radiances are more stable when compared with the model first guess than the TOVS-120 radiances. The radiance monitoring plots are emailed to interested parties (including NESDIS) once a month.

More of the TOVS channels are now used over land and this has been shown to be beneficial to the Northern Hemisphere forecasts. A summary of the current use of TOVS data together with the observation errors assumed in lDVAR are given in Table 1. The remaining channels not used over land have a significant sensitivity to the surface parameters and a major effort is now required to improve our representation of the relevant surface parameters in the model to enable their assimilation.

Experiments are also continuing (initially at NCEP) to investigate using the global level 1B (A)TOVS radiances. The results using 1 B HIRS and MSU radiances at NCEP showed positive impacts on both the analyses and forecasts and so the system became operational at NCEP in January 98. It is planned to introduce a similar system at ECMWF later this year for ATOVS and TOVS 1B radiances.

**3.4.3.2 SSM/I data**

The assimilation of orbit by orbit retrievals of total column water vapour (TCWV) from the SSM/I radiances using a 1 DVAR retrieval have been more successful with 4DVAR than 3DVAR and as a result F-13 data is now used operationally at ECMWF. The SSM'I TCWV data slightly moisten the model analyses in the Tropics (by a few percent) as shown in Fig 5. It is planned to add F-14 data soon.

The. retrievals of surface wind speed and cloud liquid water path are also 1~lotted each day for comparisons with the equivalent model parameters. Problems with data transfer over the Internet were frequently being experienced but the transfer of the data on the dedicated UKMO line has now been implemented.

Assimilation of surface wind speed is now being considered particularly for the re-analysis before scatterometer data became available. It is planned to exploit data from the Tropical Rainfall Monitoring Mission to help to improve precipitation estimates from SSM/I. The precipitation estimates from TMI may also be used to directly affect the model initial state through the adjoins of the convection scheme. There is a proposal from NASA to make TRMM data available in near real time which may allow the possibility of assimilation of TMI radiances.

The mapped SSM/I sea-ice product continues to be used for defining the sea-ice coverage of the model. It is still copied via the Internet.

**3.4.3.3. Scatterometer Data**

The ERS-2 winds and raw backscatter measurements continue to be monitored by comparing with the corresponding model first guess values. There have been no significant incidents to note over the past year with the ERS-2 data and the winds have been assimilated throughout the period.

The impact study of the scatterometer winds during a period when there were several Hurricanes in the tropical Atlantic has continued using 4DVAR. The benefits of assimilating scatterometer winds for tropical cyclone forecasting is evident as shown in Fig 6.

There are plans to monitor and ultimately assimilate QSCAT winds as soon as they become available routinely at ECMWF. It is hoped they will be made available in a similar format to that planned for NSCAT.

**3.4.3.4 Cloud Motion Winds**

We continue to work in collaboration with all major wind-producing centres (NESDIS, EUMETSAT, JMA and the Indian Meteorological Agency) to monitor existing data sets and investigate the quality and impact of new wind data sets.

Experimental data sets in BUFR from NESDIS and EUMETSAT which contain quality indicators have been used in data assimilation experiments to investigate if "lower quality" winds normally not available in the operational SATOB data can still have a beneficial impact on the model analyses. Initial results suggest that more of the EUMETSAT winds can be used than currently provided operationally in the SATOB code. The GOES RFI quality indicator was not found to be well correlated with the RMS fit to the model first guess. Experiments are now underway using the NORPEX special cloud motion wind data sets. Initial results show improved medium range forecasts over N. America when the NORPEX data are included in the assimilation.

**3.4.3.5 Ozone Assimilation**

The capability to start assimilating total column ozone and/or profiles into the ECMWF model is now in place. Near real time data from TOYS, GOME and SBUV are all being considered for possible assimilation to modify the model first guess ozone field. The top of the model is being extended from l OhPa to 0.1 hPa to facilitate this and the number of levels is being increased to at least 50 to mainly cover the stratosphere.;

**3.4.3.6 Observing System Experiments**

A new set of forecast impact studies have recently been carried out with the new 4DVAR assimilation system with and without various components of the observing system. The results shown in Figure 7 are broadly similar to those obtained with 3DVAR. Atmospheric motion winds, AMWs, TOVS radiances and both data sets are withheld from the assimilation and the impact on the forecasts assessed. If both AMWs and TOVS are withheld the medium range forecasts over the southern hemisphere and tropics lose over a day in predictive skill. Even over the northern hemisphere a significant loss in skill (~8 furs) was demonstrated without the satellite data. As with 3DVAR the degradation in the forecast scores increased consistently as more satellite data sets are removed.

**3.4.3.7 Studies for IASI (Improved Atmospheric Sounding Infrared)**

As part of the IASI pre-mission definition studies a fast radiative transfer model for simulating IASI clear sky radiances has been developed. It computes the entire IASI radiance spectrum within a few seconds on a UNIX workstation. Using this fast model a simulated IASI clear sky radiance data set derived from a model "nature run" for Feb 97 is being prepared.

It is planned to use the same model for AIRS if radiance assimilation is contemplated. ECMWF has a definite interest to get AIRS radiances/retrievals in near real time for assimilation.

**3.4.3.8. ECMWF 40 Year Re-analysis**

Plans continue to carry out a 40 year re-analysis of the atmosphere and surface from 1958 to 1997 using the ECMWF 3DVAR assimilation system at T159 resolution. Satellite radiance data sets such as HIRS, MSU, SSU and VTPR 1B radiance data are all being collected from NCAR for assimilation in the new re-analysis.

**3.5 DWD Applications – Thomas Boehm**

**3.5.1 Main Events in NWP Since the Last Report**

**3.5.1.1 Data Preprocessing**

The entire pre-processing for incoming observations from the GTS was moved from

proprietary systems (DEC/CYBER) to UNIX-based open systems. Unfortunately, this process

went not as smoothly as anticipated and resulted in numerous occasions with missing or corrupt

data being provided to the NWP system.

**3.5.1.2 Analysis**

The usage of water vapor winds from all satellites (above 400 hPa) since March 1998.

High density winds from GOES are being used with an thinning mechanism (depending on model

resolution; the amount is reduced by factor 2 for the Global Model analysis.)

**3.5.1.3 Model System**

After the successful installation of the Cray C98 and the implementation of the operational NWP system on this platforms several extensions of the NWP system have been carried out:

Early run of the global model GM, i.e. the early runs up to hours for 00 and 12 UTC will consist

of all three models GM (global Model), EM (European Model) and DM (Germany Model).

Additional 48-in-forecasts of GM, EM and DM based on the 18 UTC analysis

Significant extension of the Deutschland-Modell (DM), namely 163\*163 grid points and 30 layers

3.5.2 **Data Usage**

**3.5.2.1. SATEM**

NESDIS 500km retrievals-are the sole source of sounding information in NWP at DWELL. -

Temperature products from NESDIS are; continued to be routinely monitored. On average 20 % of

the profiles are rejected by the QC system.

RTOVS products:

After operational introduction of the pre-processing, the RTOV-SATEM data were carefully

Once these problems were corrected, a 4 week long parallel assimilation without using RTOV-

SATEMs was run. Forecast impact showed a small benefit of using the NESDIS soundings up to day

5 into the forecast range in the Northern hemisphere and in Europe. Beyond day 6, the SATEMs

slightly deteriorated the forecasts. In the southern hemisphere, the impact was large and positive

throughout.

**3.5.2.2 TOVS / ATOVS**

DWD is interested in the ATOVS NESDIS PRODUCTS file. Studies are foreseen before

operational usage.

AAPP (ATOVS and AVHRR Processing Package):

AAPP-software developed by the EUMETSAT ATOVS Development Group is implemented

and successfully tested. The package performs the ingestion and pre-processing tasks for locally

receive data and is also capable of processing global data from NESDIS.

Local HRPT reception: No progress is to report.

**3.5.2.3 Atmospheric Motion Vectors**

**3.5.2.3.1 GOES High Density Winds**

Problems occurred after the data have been packed in large bulletins. They have been solved by an

interim solution. Reception has in the past often been incomplete.

Inspection of the high density winds shows the winds being nearly homogenous in information

content within a search box (70km x 70km x 40 hPa). Therefore no information is lost applying the

thinning mechanism (acting on search boxes).

Within a search box the wind direction is identical for 33% of the data and 67% lie within +/-5

degree difference the wind speed is identical for 33% of the data and 67% lie within (0.0,1.5) m/s

speed difference. For the wind vector 28% of the data tie within (0.0-1.5) m/s vector difference and

67% lie within (0.0 3.5) m/s, A data assimilation experiment using high density winds instead of the

former low resolution ones showed a small positive impact within the day 3 - day 6 forecast range.

**3.5.2.3.2 METEOSAT / GOES (low density) Winds**

Comparison of GOES (low density) and METEOSAT winds showed significant differences over the

two satellite overlapping Atlantic area. A negative speed bias can be found for METEOSAT water

vapor winds, as well as some out layers in the upper atmosphere (statistics based on increments

between observation and 6-hourly forecast; period of comparison May 1997).

**3.5.2.3.3 Locally Generated Vectors by DWD**

DWD is deriving wind vectors from METEOSAT images to generate interpolated images between

METEOSAT time slots and to extrapolate images for nowcasting applications.

**3.5.2.4 Global Digital Geostationary Images**

The via METEOSAT retransmitted images from GOES and GMS are being used for weather

monitoring and quality control of global NWP.

**3.5.2.5 NCEP SST Gridded Field**

1°- data are used operationally with access through Internet.

**3.5.2.6 SEA-ICE Products**

DWD receive the NIC sea-ice products once a week with access to Internet. A "ridded ice

concentration product would be desirable.

DWD is interested in monitoring the NCEP sea-ice analysis with a view to operational use.

**3.5.2.7 ACARS Data**

The data are used after a thinning mechanism in a vertical resolution of 40 hPa and horizontal

resolution of approximately 70km in the global analysis.

**3.5.3 Progress In Telecommunications**

**3.5.3.1 General**

The main tasks in the last year were:

Upgrade of the telecommunication links to 64 kBit/s (at least) as part of the WMO

strategy to upgrade the GTS.

Preparation of the infrastructure for the coming RMDCN-network.

Preparation of the systems to year 2000 compliance.

**3.5.3.2 Systems**

The fault-tolerant communications computer (Stratus Continuum) is in operation for more than two

years. It provides stability and adequate performance for today an the near future at significantly

reduced costs, compared to the former infrastructure.

The MSS (Message Switching System) and AFD (Automatic File Distributor) software packages run

operationally stable and are upgraded continuously.

An MSS-Upgrade was installed, which provides automatic NCDF-dissemination of T4­

products.

The exchange of bulletins using TCP/IP sockets was successfully tested with RTH Melbourne and

is operational internally.

DWD provides a mirror of the WMO-FTP-server.

**3.5.3.3 Links**

The FAX\_Europa satellite distribution was successfully upgraded to 256 kBit/s in February

1998 (former rate: 64 kBit/s).

The migration of the international links to a capacity of 64 kBit/s is in progress.

In cooperation with the partners first links providing TCP/IP and X.25 over TCP/IP became

operational in autumn 1997 (Switzerland: leased line, Israel: Frame-Relay Network).

The links to Toulouse and Bracknell are in migration.

**3.6 Meteo France – Bruno Lacroix**

**3.6.1 Main Events Since Last Meeting**

**3.6.1.1 Migration of ARPEGE/ALADIN to VPP700E**

A parallel suite with test versions of global and regional models is running on Fujitsu VPP700E (26 processors with 2Gb memory each). The scores are neutral until 72hour range (same configuration of the models as on Cray C90/8) and the change is to be operationally done on 29th June 1998.

**3.6.2.0 Progress in Telecommunications**

**3.6.2.1 WMO Links**

The Toulouse-Bracknell 128 KBits link (also described in the UKMO telecoms status report ), using TCP/IP protocol, is fully operational and the 64kbits/s link is closed (3rd June 1998). The main goal is to transfer the geostationary satellites imagery received at Bracknell (GMS from Melbourne, GOES from Dor­val) to Meteosat via Lannion (Toulouse-Lannion 384 KBit/s dedicated link) for redistribution among EUMET­SAT countries. This relay has been used operationally since May 7, 1997, with the distribution of 3-hourly Vi­sible and Infra-Red imagery from GMS and GOES-W (GOES-E being already received directly at Lannion and retransmitted to Meteosat). Some other data, like SSM/I, TOVS and ATOVS, are also candidates on this link.

However the most important event, next year, will be the establishment of RMDCN (Regional Meteoro­logical Data Collection Network) among the countries of WMO RA-VI and ECMWF. It is supposed to become operational mid-1999.

**3.6.3.0 Use of US data**

**3.6.3.1 TOVS**

**3.6.3.1.1 SATEM 500**

Monitored and used in the NWP system. Up to now it is the sole source of TOVS data used in the NWP operational assimilation, but this should change at the end of 1 998 because of our new 3D-Var assimi­lation scheme which allows to make use of radiances. They are used in the form of 7 layers over sea, and 3 layers in the stratosphere only (above 100hPa), over land. Meteo-France does not use the SATEM Precipitable Water Content, but we will try to as soon as possible.

**3.6.3.1.2 TOVS 120**

Meteo-France plans to assimilate the cloud cleared radiances from TOVS120 as replacement to SATEM retrievals with the 3D-Var analysis. The first step is to compute the coefficient to unbias the calculated and observed radiances. We use the same scheme as ECMWF, but the coefficients are different (like our two models). It is a new activity that will enable us to use and monitor TOVS and ATOVS chapels.

**3.6.3.2** **Level** **1b** **HIRS3.6.3.2.1 Global Data Set on Research Mode**

The data received at ECMWF are then picked up and transferred to Toulouse. Ozone computations and comparison to other sources (ground stations, TOMS) are performed now globally. One other goal is to compute a global ozone climatology.

**3.6.3.2.2 RHIRS in Operational Mode**

Ozone maps derived from HIRS for the forecasters are produced daily. The features they depict are close to a potential vorticity map, with a good resolution over the Atlantic (as compared to a NWP analysis), so very useful in predicting cyclogeneses that are the main meteorological event affecting western Europe.

No more data have been received since April 1998.

**3.6.3.3 GOES**

SATOBs (InfraRed and Water Vapour) monitored and used with a thinning (1 over 4) since Spring 1998 to cope with high resolution data in ARPEGE analysis. A clever shining has to be done.

**3.6.3.4 DMSP**

**3.6.3.4.1 SSM/I**

The tests on orbit-by-orbit BTs reception is going on. There were some problems of reliability in the last months.

Plan to use ice limits to improve the SST analysis in the polar areas.

Plan to use integrated water vapor.

**3.6.3.5 ACARS**

Used operationally (wind and temperature) in the NWP assimilation, but with a shining (1 over 5) since 22th December 1997 and the ascending and the descending phases are not used. They are monitored by identifier (more than 700 registered), just a very few ones in the blacklist (less than 5).

Work is going on to perform a clever thinning.

**3.6.3.6 Profilers**

Their usefulness is linked to the capacity of NWP system to assimilate frequent observations. This is related to the transition to a 4D-Var system, which is expected at Meteo-France by 2000 (1997-98 at ECMWF). For the time being the work on wind profilers has a relatively low priority: all the main actions on data assimilation at Meteo-France have delays so the wind profiler usage also.

**3.6.4.0 French Data**

**3.6.4.1 Profiler(s)**

The VHF 52.05 MHz profiler installed end 1995 at La Ferte-Vidame (110km SW from Paris),has been declared not operational. A problem has been identified in the antenna, which produced interferences on the signal and intermittent unrealistic winds. A new configuration will be proposed. We can't expect 365 days/year observations for the moment. — ret o t one ITS

**3.6.4.2** **Air** **France Aircraft**

AMDAR messages on the GTS coming from units based on ACARS. Daily more

than 1500 obser­vations, corresponding to 40 to 50 ascending phases. No cruise phase

data are produced. There are sometimes some bias in temperature, which are

communicated to the Air France company.

**4 Concluding Remarks**

Rob Mairs thanked the group for an efficient and productive meeting.

## 5 Next Meeting

## 

##### The 12th meeting of the Working Group on US-Europe Data Exchange will be held in the 2nd

week of May 1998 at ECMWF, Reading.

**Actions open after the 11th Meeting**

Actions from 8th Meeting

**European Requirements**

ECMWF to help evaluate new ATOVS and scatterometer products and provide feedback.

**Action: ECMWF**

### Actions from 9th Meeting

#### European Requirements

ATOVS (1.2.1) Retrievals and Clear Radiances in BUFR

* NOAA to provide AMSU-B radiances , retrievals, and confirm the method of distribution.

Action: NESDIS (Closed)

Actions as a result of Teleconference:

* ECMWF requested file server access to the RTOVS in new BUFR format that NESDIS has prepared for NCEP.

Action: NESDIS

* Inform European Centers when new RTOVS BUFR format is available for analysis.

**Actions from 11th Meeting**

**United States Requirements**

2.1.2 METEOSAT SEM data

Action: NESDIS

* Clarify what are the SEM data

2.3 INDOEX

2.3.1 Imagery

Action: NESDIS/Meteo-France

* Explore obtaining full resolution INDOEX ½ hourly imagery and keep EUMETSAT informed.

Non-Satellite Data

3.1 Meteorologic model output fields

Action: NESDIS/NWS(OSO)

* Provide clarification of Navy’s requirements and data needs.

3.2 Oceanographic model output fields

Action: NESDIS/NWS(OSO)

* Provide clarification of Navy’s requirements.

Action: Meteo-France /UKMetO

* Provide what wave models are available.

3.4 Analyzed and forecast tropical cyclone tracks

Action: UKMetO

* Clarify how tropical cyclone track analysis and forecast data is currently being delivered to the National Hurricane Center (Ref 4.4).

3.5 Analyzed and forecast standard oceanographic output fields from the UKMO operational

* Forecasting Ocean/Atmosphere Model at model computational resolution.

Action: UKMetO

* Clarify what oceanographic output fields are available from UKMetO Forecasting Ocean/Atmosphere Model.

3.7 Surface observations

+

3.8 Fixed and drifting buoy, ship, tidal data , and ocean/littoral currents

+

3.9 PIREPS, AIREPS, SIGMETS, and AIRMETS

Action: UKMetO (3.7-3.9)

* Provide list of available data to OSO.

3.10 Weather Radar Data/Imagery

Action: NESDIS

* Obtain clarification from Air-Force of what Radar Data/Imagery is received and means of reception.

3.11 Rain, snowfall, snow depth observations

Action: NWS(OSO)/All European Centers

* All Centers should check what they are doing with the National Groups SYNOPS.

3.12 Sea surface temperatures, wind direction/speed, wave heights, sea ice

Action: NWS(OSO)

* OSO will clarify the requirement.

3.15 Aerosol measurements

Action: NESDIS

* Obtain clarification from Air-Force of aerosol requirements.

3.17 Wind Profiler data

Action: METEO-France/DWD

* Provide list of available profiler data and data format and make available on server.

Action: UKMetO

* Provide Operational profiler data on the GTS in BUFR format.

3.18 Solar observations and forecasts

Action: EUMETSAT

* Determine Solar observation activities in Europe

**European Requirements**

**1.1.3 Level IB TOVS data**

**Action: UKMetO**

* Transfer data to UKMetO new link.

1.1.6 RHIRS (restricted area. raw HIRS data)

Action: Meteo-France/UKMetO

* Investigate usage of the global 1B data to replace RHIRS.

1.3 Ozone retrieved profiles and/or total column from SBUV on NOAA

Action: UKMetO

* Move SBUV to UKMetO link when agreed with ECMWF

1.4 QSCAT Scatterometer Data

Action: UKMetO

* Review NASA NSCAT agreement for applicability and distribution of QSCAT data in BUFR within Europe. Request access for European Centers.

1.7.1 SSM/I Brightness Temperatures

Action: NESDIS

* Encode brightness temperatures in BUFR and add local satellite zenith angles and azimuth angles for each field of view for distribution and provide test data to ECMWF.

1.9 EOS data

1.9.1 AIRS data

Action: All

* Continue to share information on AIRS data definitions and data volume.

1.9.2 MODIS clear-sky radiance data

Action: NESDIS/NWS(NCEP)/ECMWF

* Define products and provide server access.

2.1.1 Ice/snow gridded field derived from SSM/I data

Action: UKMetO

* Provide Data on the NESDIS-UKMetO link

2.2.1 AVHRR SST retrievals as SATOBs

Action: UKMetO

* Provide acquisition of data on link and make available to Meteo-France and provide test data to DWD.

2.3 Mapped imagery

Action: UKMetO

* Acquire GAC composite 4x a day from NESDIS and inform the other European Centers.

3.1 GOES cloud track winds

3.1.1 Vis/IR winds and

3.1.2 Water vapor winds

Action: NESDIS/OSO

* Formulate an implementation plan for segmentation of GOES high density (HD) winds in BUFR.

Action: NESDIS

* Provide 3 hourly winds obs in BUFR.

Action: All European Centers

* Comment on Implementation plan

Action: All Centers

* Investigate how segmented BUFR products are to be handled.

Action: NESDIS/NWS(OSO)

* Confirm whether SATOBS will remain.

4.4 Tropical Cyclone Data

Action: All

* Centers that provide data should move to standard formats (BUFR or CREX).

4.5 NIC Sea-ice Product

Action: DWD

* Clarify format requirements with D.Benner.

4.6 Snow Cover Analysis for N. Hemisphere

Action: NESDIS

* Review snow cover product for S. Hemisphere.

4.8 US Hourly Surface Observations

Action: UKMetO/OSO

* Clarify what hourly bulletins are available at Bracknell.

4.9 US Soil Temperature Data on GTS

Action: ECMWF

* To provide information on server access of US soil temperature data to European Centers.

4.10 NCEP Sea-ice Analysis

Action: NWS(NCEP/OSO)

* Provide Sea-ice Analysis on GTS.

Other Actions:

Action: ECMWF (R. Saunders)

* Provide product list of near real- time ENVISAT data to NESDIS (G. Legg)

Action: NESDIS/ECMWF

* Teleconference within 6 months to review status of actions

**Appendix A**

**Utilisation of UK Met. Office Links to NWS and NESDIS**

Utilisation of the Present 19.2KBits/s GTS Link



Utilisation of the T4 Chart Link between Bracknell and Washington





**Appendix B**

List of WWW sites relevant to US-Europe data exchange activities:

**URL Description**

http://psbsgi1.nesdis.noaa.gov:8080/OSDPD/OSDPD.html

NESDIS products

http://www.eumetsat.de

EUMETSAT, go to Operations, MPEF

http://www.ecmwf.int

ECMWF

http://www.nws.noaa.gov/center.shtml

NWS, links to OSO product information

http://www.meto.gov.uk

UK Met Office

http://www.meteo.fr

Meteo France

http://orbit-net.nesdis.noaa.gov/ora/ht/ff

Soil Wetness products from NOAA

http://www.natice.noaa.gov

National Ice Center, sea-ice products

http://podaac.jpl.nasa.gov/topex

JPL TOPEX/POSEIDON

http://winds.jpl.nasa.gov

NSCAT