WORLD METEOROLOGICAL ORGANIZATION

RA II/WG/PIW/DOC. 5
(26.VI.2003)

REGIONAL ASSOCIATION II
(ASIA)

ITEM 5

ENGLISH ONLY

WORKING GROUP ON PLANNING AND IMPLEMENTATION OF THE WWW IN REGION II
FOURTH SESSION

MOSCOW, 10-13 SEPTEMBER 2003

STATUS OF WWW IMPLEMENTATION AND OPERATIONS

Regional Aspects of the GOS

(Submitted by the Secretariat)

Summary and purpose of document

This document provides information on the implementation of the surface-based and space-based components of the GOS in RA II.

ACTION PROPOSED

The group is invited to take into account the information provided in the document when considering improvements to be made in the implementation of the GOS in the Region.

DISCUSSION

SURFACE-BASED SYBSYSTEM OF THE GOS

Regional Basic Synoptic Network (RBSN)

1. During intersessional period the number of RBSN surface stations has been increased from 1195 to 1234. According to the results of the annual global monitoring of the operation of the WWW, the percentage of SYNOP reports actually received at MTN centres remained the same (82%) during the period 1999-2002. The number of upper-air stations included in RBSN decreased from 334 (1999) to 327 in 2002. The percentage of TEMP reports received during this period in comparison with expected reports from RBSN stations has shown a clearly positive trend starting from 52% in 1999 and amounting to 62% in 2002. The major reason in the improved availability of observational data was promptly coordinated and action was taken by the Members concerned, the Secretariat and donor countries. However, the existing gaps in the observational data coverage continued to be mainly due to deficiencies in the operations of both observing and telecommunication networks, high cost and lack of consumables and spare parts especially in developing countries and in countries with economies in transition. Further details on the RBSN performance are given in the report of the Rapporteur on the Regional Aspects of the GOS (see Doc. 6.1).

Other networks, including sea stations

2. The total number of ships recruited by Members of the Association has increased slightly during the intersessional period. The number recruited by 14 Members totaled 2037 in 2002, compared to 1898 in 1998. The number of SHIP reports received at MTN centres in the region has not changed significantly during the past six years.

3. At the same time, there has been a continuing increase in the deployment of other types of sea stations. In April 2003, the total number of active drifting buoys deployed by operators from five countries was unchanged, at 57, compared with the same month in 1998. In addition, of course, a substantial number of drifting buoys deployed by operators from countries in other regions were also reporting from waters within the region. At the same time, agencies in three countries in Region II were operating, on average, 33 moored buoys within regional waters in 2002. Implementation of the Argo project of sub-surface profiling floats is now well underway. In April 2003, 184 floats were deployed operationally by five Members of the Association. Reports from the great majority of all these different automated sea stations are exchanged in real time on the GTS.

4. As far as upper air observations are concerned, six Japanese ships equipped with upper-air sounding equipment were operational during 2002. Fully automated systems within the Automated Shipboard Aerological Programme (ASAP) are considered as a fully operational component of the WWW, with 22 units being operated on ships in other parts of the world, primarily on the North Atlantic. However, none are so far operational in Region II.

5. It will be recalled that the aim of the WMO Aircraft Meteorological Data Relay (AMDAR) Panel is to enhance the upper air component of the WWW Global Observing System though cooperation with Members in the acquisition, exchange and quality control of meteorological observation from aircraft using automated systems. About 150 000 AMDAR observations per day are currently being exchanged on the GTS representing nearly a three-fold increase in volume compared to 1998 when the Panel was established. Cg-XIV (May 2003) stressed that AMDAR had proved to be a very cost-effective data source that responded to the needs of WMO programmes and brought benefits to end-users. Congress recognized the low cost of AMDAR observations compared to radiosonde soundings, the potential of such systems to improve data coverage in data-sparse areas, and the improvements to NWP attributed to the assimilation of such observations.

6. One of the high priority tasks of the AMDAR programme of particular interest to Region II is the implementation of the Middle East AMDAR Pilot Project led by Saudi Arabia. The successful evaluation of this is expected to evolve into a full-fledged Regional AMDAR Programme that would involve a number of countries in the Region II. Currently, more than 20 Saudia MD90 aircraft equipped with AMDAR system are reported to be generating routinely AMDAR observations converted in to FM42 format that are being evaluated before their dissemination through the GTS. In addition to the Middle East High Priority Pilot Project, AMDAR Observations can also be obtained from aircraft of foreign airlines equipped with AMDAR system flying in the Region subject to paying the costs for the transmission of the data to the airlines concerned. In this regard and on request, the AMDAR Panel would provide the assistance needed to liaise with the airlines or Organisations concerned. In order to assist Members in their efforts to implement AMDAR programmes, the Panel has published an AMDAR Reference Manual (WMO-No. 958) in early 2003.

7. The AMDAR Panel closely monitored activities being carried out to obtain an operational humidity sensor as well as other measurements and sensors including those for icing and turbulence. Furthermore, in relation to ongoing support for and sustainability of AMDAR Panel activities, EC-LV invited CBS and CAeM to develop a mechanism to more fully integrate the AMDAR programme into the WWW. The Council also agreed that activities should be initiated under the WWW and the Aeronautical Meteorology Programmes for training to facilitate the availability and use of AMDAR data in areas where they were currently not available, in particular in developing countries

Regional Basic Climatological Network (RBCN)

8. Following the recommendation of EC-LII (May 2000), the study, initiated by the Secretary-General, to identify the reasons for low availability of CLIMAT and CLIMAT TEMP reports, had shown that the conditions leading to low availability of reports were many and varied. Among the most frequently occurring are the following:

- The stations were completely "silent" (no SYNOP or TEMP reports);
- The stations were operational, but CLIMAT and CLIMAT TEMP reports were not generated;
- The reports were generated and provided, but for (a) different (nearby) station(s) rather than for the stations requested;
- The reports were generated, but not properly communicated to the associated Regional Telecommunication Hub (RTH);
- The reports were communicated, but not according to WMO formatting and coding procedures;
- The reports were in good order, but transmission *between* RTHs failed;
- The monitoring procedures between centres may be different, causing different results for the availability of the reports.

9. Based on the positive experience gained in RA IV, the study suggested that a separate Regional Basic Climatological Network (RBCN) should be developed for each Region. This network should include GSN and GUAN stations supplemented by other CLIMAT and CLIMAT TEMP reporting stations needed to meet regional requirements as requested by Cg-XIII. An appropriate procedure for defining such networks had been developed by the WG on Planning and Implementation of the WWW in RA VI in collaboration with GCOS and in coordination with CBS.

10. CBS-XII (November-December 2000) felt that the establishment of RBCN would provide a valuable justification for maintaining a minimum number of CLIMAT reporting stations, and these RBCN stations could serve as a target list for WWW monitoring. CBS-XII also requested the RTHs to provide regular information on availability of the reports from their zones of responsibility during the WWW monitoring. Following the recommendations of the Executive Council and CBS, the sessions of XII-RA II (September 2000), XIII-RA III

(September 2001), XIII-RA-IV (March-April 2001), XIII-RA V (May 2002), XIII-RA VI (May 2002) and XIII-RA I (November 2002) considered and agreed to the concept of defining a separate RBCN for their regions and adopted appropriate resolutions. Based on the approved list of RBCN stations (as of July 2003), all regions, including the Antarctic, comprised a total of 3 086 stations, constituting the following regional breakdown:

RBCN	RA I	RA II	RA III	RA IV	RA V	RA VI	ANTARCTIC	TOTAL
CLIMAT	616	593	344	242	188	520	72	2 575
CLIMAT TEMP	19	194	49	72	74	91	12	511

11. More recent WWW monitoring results based on the approved lists of RBCN stations showed that the availability of CLIMAT and CLIMAT TEMP reports was not satisfactory, providing the global average of only 49 per cent and 53 per cent respectively. The density of reports was particularly low in Regions I, II and III. In order to increase the availability of CLIMAT messages, further efforts by Members should be made to ensure that their operational observing stations compiled and transmitted the CLIMAT/CLIMAT TEMP messages according to existing regulations. Following the above recommendations, the Secretariat initiated preparation of special guidance material related to the operational procedures and practices to be used by observers and technicians in compiling and transmitting CLIMAT and CLIMAT TEMP messages over the GTS. It is planned that this document (40-50 pages with illustrations, tables and graphics) will be posted on the WMO Web site for review by the CBS/OPAG/IOS members and then circulated to Members. For better implementation of the above guidance material in the practice, it is also foreseen to organize training workshops in the regions concerned.

SPACE-BASED SYBSYSTEM OF THE GOS AVAILABLE IN RA II

12. The space-based component of the GOS is now comprised by satellites of three types: operational meteorological polar-orbiting and geostationary satellites and environmental R&D satellites. Details for current and planned operational meteorological satellites are given below.

13. With regard to constellation of R&D satellites, this includes NASA's Aqua, Terra, NPP, TRMM, QuikSCAT and GPM missions, ESA's ENVISAT, ERS-1 and ERS-2 missions, NASDA's ADEOS II and GCOM series, Rosaviakosmos's research instruments on board ROSHYDROMET's operational METEOR 3M N1 satellite, as well as on its future Ocean series and CNES's JASON-1 and SPOT-5.

14. With regard to ground receiving stations, 34 Members of the region (100%) were equipped with polar-orbiting receivers (APT and HRPT) and 32 Members (94%) were equipped with geostationary (WEFAX and HR) receivers. Based on WWW goals, RA-II Members have achieved an overall implementation for ground receiving equipment of 94%.

Polar-orbiting satellites

CMA Status Report

FY-1C

15. The polar orbiting meteorological satellite FY-1C was launched on 10 May 1999. This three-axis stabilized satellite has been operating for 3 years.

FY-1D

16. The polar orbiting meteorological satellite FY-1D was launched on May 15 2002. As the last satellite in the FY-1 series, FY-1D is similar to FY-1C in terms of transmission. After an in-orbit check, FY-1D became fully operational.

NOAA/NESDIS Status Report

NOAA-17

17. NOAA-17 was launched on 24 June 2002. NOAA-17 is currently in post launch verification and is planned to be operational late September and will replace NOAA-15 as a primary spacecraft.

NOAA-16

18. NOAA-16 was launched on 21 September 2000. By March 2001, NOAA-16 was designated as the operational replacement for NOAA-14. As such, it operates in an orbit with a 13:53 p.m. ascending node (afternoon orbit) and utilizes a similar set of instruments as NOAA-17.

NOAA-15

19. NOAA-15 was launched on 13 May 1998. By July 1998, NOAA-15 was designated as the operational replacement for NOAA-12. As such, it operates in an orbit with a 7:30 am descending node (morning orbit) and utilizes the same set of instruments as NOAA-16 except the SBUV.

NOAA-14

20. NOAA-14, which was launched in December 1994, is the secondary operational afternoon (ascending node) spacecraft.

Russian Federation Status Report

Meteor-3 N5

21. Meteor–3 N5 is in polar orbit inclined at approximately 82 degrees. This satellite has operated well beyond its lifetime and has limited capabilities. Data from the MR-900 imager (resolution 2 km, swath width 2600 km, spectral band 0.5-0.7 μm) are available through direct broadcast in APT mode (137 MHz).

Meteor-3M N1

22. The first polar orbiting satellite, Meteor-3M N1, of the new series of meteorological satellites was successfully launched from Baikonur by a Zenit–2 launcher on 10 December 2001. Meteor-3M N1 operated in sun-synchronous orbit inclined at 99.6 degrees. Its equator crossing time (ascending node) is 09:15 a.m. The payload of Meteor-3M N1 includes the scanning instrument MR-2000M (0.5-0.8 μm), scanning IR radiometer KLIMAT (10.5-12.5 μm), MW scanning radiometer MIVZA (5 channels in the range 20-94 GHz), MW conical scanning radiometer MTVZA (20 channels in the range 18.7-183.3 GHz), high resolution scanning instrument MSU-E (3 channels in the range 0.5-0.9 μm with spatial resolution 38 m), UV – band instrument SFM-2, complex of heliogeophysical instruments (KGI-4C, MSGI-5EI) and sensor SAGE – III (USA, NASA). Radiometers MIVZA and MTVZA have limited capabilities, due to technical problems related to these instruments scanning mode. Meteor-3M N1 data direct broadcast in raw format is carried out in 1.7 and 8.2 GHz bands. The on-board 466 MHz transmitter is no longer functioning. Due to this reason, the satellite has limited capabilities for MR-2000M and KLIMAT data direct broadcasts.

Geostationary satellites

CMA Status Report

FY-2B

23. FY-2B is the second Chinese geostationary meteorological satellite. It was launched on June 25 2000 by a Long-March 3 vehicle from Xichang Satellite Launch Center. The satellite is spin-stabilized and stationed at 1050E. On 1 January 2001, the FY-2B was declared operational and started broadcasting S-VISSR and WEFAX images. Some equipment in the satellite must be switched off during the autumn and spring eclipses (92 days per year in all) due to energy limitations. Therefore, the number of images has been reduced to 25 and WEFAX broadcasting to 14 per day. The working state of FY-2B's transponder is susceptible to small changes in temperature and must be kept precisely within a very narrow range around 8.4 C degrees. There is a large demand upon the energy supply to maintain this condition. Therefore, during eclipse period when the energy supply is diminished, FY-2B has to cease image transmission completely to conserve enough energy for safe management of the satellite.

FY-2A

24. The first Chinese geostationary meteorological satellite, FY-2A, was launched on 10 June 1997. On 17 June 1997, FY-2A was located at 105°E. The satellite started operational imagery transmission on 1 January1998. The operation was disrupted on 8 April 1998 due to a defect in the satellite antenna de-spin subsystem that was designed to drive the S-band antenna to spin opposite to the spin of the satellite itself, and in so doing keep the antenna pointing toward the earth all times. Since 6 July 1998, FY-2A has had to work discontinuously everyday in order to reduce the heat caused by friction built up between the antenna and satellite. On 26 April 2000, FY-2A was moved to 86.5°E to make room for FY-2B. On 27 July 2000, the check out for FY-2A showed that after 3 years in orbit FY-2A remained in good condition except for the S-band antenna that cannot work continually during one day. FY-2A satellite was switched from aboard system A to system B (redundancy) successfully in the process and then system B was checked out thoroughly. The results showed the system B worked as well as system A. During the interruption of FY-2B transmission, a contingency plan was implemented to let the FY-2A work 4 hours a day in order to replace FY-2B in case the latter could not be recovered. A test was made on FY-2A, during which, FY-2A transmitted 6 full disc images, and undertook turn-around ranging 3 times. Since the FY-2B recovery, FY-2A has been placed in standby. It will remain in standby as long as FY-2B works nominally. In this configuration, the ground system performs only orbit control and eclipse management.

EUMETSAT Status Report

Meteosat-5

25. Meteosat-5 has been used in support of the Indian Ocean Data Coverage service since the formal start of EUMETSAT support to the INDOEX experiment on 1 July 1998. No DCP or MDD services have been provided via Meteosat-5. The orbital inclination of the satellite at the end of this reporting period was 5.19° and increasing. The remaining hydrazine fuel on board is estimated to be 5.23 kg, of which a 4kg reserve will be required to de-orbit the spacecraft at the end of its useful life.

Meteosat-6

26. Meteosat-6 has been used in support of Rapid Scanning Service, since the formal start on 18 September 2001. The inclination of the satellite was 2.21° and increasing. The remaining hydrazine fuel on board is estimated to be 8.62 kg, of which a 4kg reserve will be required to de-orbit the spacecraft at the end of its useful life.

Meteosat-7

27. Meteosat-7 has been used to provide the nominal 0° operational service. Black body calibrations are performed once per day on slot 24 outside eclipse season. Up to 4 black body calibrations are performed during the eclipse season.

MSG-1

28. MSG-1 was successfully launched on 28 August at 22.45 UTC. Ariane-5 performed a very accurate injection into orbit and the initial data indicate that the launch environment remained within specifications for MSG-1. All the nominal units of the satellite platform are working fine and, after the satellite went successfully through eclipses, the SEVIRI protective covers were jettisoned and the SEVIRI launch-locking device was released. EUMETSAT took over control of the spacecraft on 25 September 2002. The satellite commissioning started at the beginning of October, with Platform tests, followed by the Mission Communication tests. However, a power amplifier failure on board MSG-1 led to the non-activation of the dissemination mission. As a result, EUMETSAT is implementing an alternative dissemination system via telecommunication satellite services, based on digital Video Broadcast (DVB) techniques.

India Status Report

INSAT

29. INSAT is an operational multipurpose satellite system catering to the needs of three different services, viz television & radio broadcasting, communications and meteorology. The INSAT project is a joint venture of the Department of Telecommunications (DOT), the India Meteorological Department (IMD), Doordarshan and All India Radio (AIR). The responsibility for overall management and coordination of the INSAT system among the user agencies rests with the INSAT co-ordination committee (ICC). The 2nd generation of INSAT satellites (INSAT-2 series) was started in July 1992 with the successful launch of the first satellite of the series, INSAT-2A, on 10 July 1992. The 2nd satellite of INSAT-2 programme i.e., (INSAT-2B) was also launched successfully on 22 July 1993. All INSAT satellites are three-axis body stabilised spacecrafts. The last satellite of INSAT-2 series, INSAT-2E, was launched successfully on 3 April,1999. It has been operational since May 1999. It has a new payload, called the Charged Coupled Device (CCD) camera, capable of taking 1 km resolution images in 3 different spectral bands. The meteorological imaging capability has also been upgraded on this satellite, as compared to its predecessors, by providing a water vapour channel with 8 km resolution in the VHRR, the imaging instrument of the satellite. CCD images from INSAT-2E are also produced every three hours for operational use during daytime. More frequent images are also taken if the situation demands. However, due to some anomalies in the scan mechanism, the VHRR onboard INSAT-2E is not currently available for operational use.

METSAT

30. A new satellite METSAT was launched on 12 September 2002 and declared operational on 25 September 2002. This satellite has VHRR (Vis, IR & Water vapour) and a Data Relay Transponder (DRT) on board and is exclusively dedicated to meteorological services of the country. The imaging mission is working satisfactorily on the METSAT satellite and continues to be used operationally at 74oE longitude position. High resolution (1km) images in 3 channels are also available operationally from the CCD camera onboard INSAT-2E. Activities including image processing, derivation of meteorological products, data archival and dissemination of products to field stations for operational use are performed on an operational routine basis. VHRR images are normally received at three- hourly intervals. More frequent images are taken for monitoring the development of special weather phenomena as and when the situation demands. For the derivation of CMVs, half hourly

triplets at 00 UTC, 06 UTC and 12 UTC are also received from METSAT and the data processed. METSAT derived CMVs shall be available on GTS soon.

JMA Status Report

GMS-5

31. Geostationary Meteorological Satellite-5 (GMS-5), launched on 18 March 1995, has since been in continuous operation at 140 East degrees in geostationary orbit. The motor torque of the VISSR scanning mirror unit increased gradually and reached the criterion for operation change due to the lubricant build-up. Accordingly the observation area was reduced for the southernmost latitudes on 5 June 2000. Even after this measure, the motor torque around the south end of the observation increased steadily. As the torque reached again the said criterion the further reduction of the VISSR observation of the GMS-5 was carried out on 4 July 2001. The remaining propellant is 8.71kg as of 27 June 2002. At present, the North-South manoeuvre will not be carried out due to the lack of the fuel. On the other hand, the East-West, Spin rate manoeuvre and Attitude manoeuvre will be operated as scheduled. As of 1 August 2002, all the instruments on board GMS-5 other than VISSR and Solar array panel are functioning satisfactorily.

GMS-5 backup

32. Japan and the United States of America initiated the back-up operation of GMS-5 with GOES-9 on 22 May 2003. Advanced notification and implementation plans by JMA and NOAA/NESDIS have ensured that there have been no adverse impacts to operations in NMHSs in RA II. The backup of GMS-5 with GOES-9 is expected to continue until the initiation of MTSAT-1R normal operation, which is now scheduled in 2004. During backup, GMS-5 will remain stationed at the present position (140E degrees over the equator) and GOES-9 will be operated at 155E over the equator to observe the earth. The GMS-5 functions for data collection from DCPs and transmission of WEFAX signals to users will be continued as they are now. The provision of Earth image data is as follows:

1) SDUS users will be able to continuously receive the WEFAX broadcast through GMS-5 as they do now. The WEFAX broadcast will continue GOES-9 imagery. Neither modification nor change of your SDUD receiving facility is required.

2) The present S-VISSR high-resolution data broadcast service from GMS-5 to the MDUS users will cease in case of the backup of GMS-5 with GOES-9. It will be possible to receive the GVAR broadcast directly from GOES-9 with GVAR facility, but the characteristics of the GVAR broadcast are quite different from those of GMS S-VISSR broadcast. In considering such a circumstance, JMA will make available a portion of the high resolution data, namely the IR-1 channel (10.5-11.5 *m* in wave length) through Internet to the National Meteorological and Hydrological Service (NMHS), which has already registered the reception of S-VISSR broadcast from GMS-5 with JMA. This service will be provided to only one receiving station of the individual NMHS. Other stations including those outside the NMHS are requested to obtain the data from the station of the NMHS in their own country.

Russian Federation Status Report

GOMS-2

33. The next geostationary meteorological satellite, GOMS/Electro N2, development has continued. The satellite is planned to be launched in 2005 and be placed into geostationary orbit at 760 E. The spacecraft will be a three-axis stabilized platform. Besides the standard meteorological communication package (the DCS and the re-transmitters), the key payload will consist of the imager MSU-G (optical line-by-line scanning radiometer). It should provide image data in three visible and near IR channels (VNIR) and in 7 IR channels. The spatial

resolution in sub-satellite point will be approximately 1 km for VNIR and 4 km for IR channels. It is planned to investigate the possibilities to supplement MSU-G channels 11 (1.6 μm) and 12 (13.4 μm). In the case of technical problems successful solution, MSU-G with 12 channels should provide the information similar to MSG/SEVIRI. The second important mission objective of GOMS/Electro N 2 is the development and maintaining of a national data collection system (DCS). According to current planning, the DCS will be capable of operating with about 800 national DCP platforms. GOMS/Electro N 2 will also be equipped with a transponder for the geostationary Search & Rescue service of COSPAS/SARSAT.