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STATUS OF WWW IMPLEMENTATION AND OPERATIONS

Regional Aspects of the GOS – Surface-based Subsystem

(Submitted by the Secretariat)

Summary and purpose of document

This document provides information on the implementation and operations of the surface-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 and operations of the GOS in the Region.

References:

1. Abridged Final Report with Resolutions from the Thirteenth Session of Regional Association II (Asia), WMO-No. 981.

REGIONAL ASPECTS OF THE GOS – SURFACE-BASED SUBSYSTEM

Regional Basic Synoptic Network (RBSN)

1. Since the last session of RA II Working Group on Planning and Implementation of World Weather Watch (RA II/WG/PIW), Moscow, Russian Federation, 10 – 13 September 2003, and in accordance with the decision of the Thirteenth session of the Regional Association II (Asia), Hong Kong, China, 7 – 15 December 2004, which approved a total of 1315 surface synoptic stations in RBSN, the number of stations has reduced to 1313 stations during the last Annual Global Monitoring (AGM) period in October 2006. However, the number of upper-air stations in the RBSN has remained unchanged at 321 stations. The RBSN (surface) consists of 1313 stations out of which 111 (85 in 2004) are Automatic Weather Stations (AWS), a significant increase of 31 % during the intersessional period. The RBSN (upper-air) consists of 321 stations out of which 3 (none in 2004) are autosonde launching stations.

2. The status of implementation of RBSN of surface and upper-air stations, according to information provided by Members, is presented in Tables I and II, respectively.

3. The level of implementation of surface stations in the region that make 8 observations per day (complete observational programme) has decreased to around 88 % in 2006 compared to 90 % prior to the approval of a revised RBSN in 2004. The percentage of non-operational stations (silent) increased to 3 % (45 stations) in 2006 compared to 2 % (18 stations) in 2004.

4. The level of implementation of upper-air stations making 2 soundings per day has remained consistent at around 76 % (radiowind) and 82 % (radiosonde) during the period 2004 - 2006. Further details on the RBSN performance are given in the reports of the Rapporteur on the Regional Aspects of the GOS (Doc. 5.1) and quantitative monitoring results (Doc. 4 3).

Table I

Status of implementation of RBSN surface stations in RA II as of **October 2006** (AGM period) compared to those in 2004 - 2005. The stations report every three hours, every six hours and, less frequently, as committed by Members in Weather Reporting (WMO-No. 9) Volume A

Year	1 Number of stations making observations at both the main and the intermediate standard hours per day (complete programme)	2 Number of stations making observations only at the main standard hours or additionally at some intermediate hours per day (but not the complete programme)	3 Number of stations making at least one or more observations per day (but not the complete programme)	4 Number of stations not yet established or otherwise non-operational (silent)	Total number of stations in the RBSN (1+2+3+4)
	Region II				
2004	1118 (90%)	43 (3%)	55 (4%)	18 (2%)	1234
2005	1148 (87%)	51 (4%)	69 (5%)	47 (4%)	1315
2006	**1153 (88%)**	**46 (4%)**	**69 (5%)**	**45 (3%)**	**1313**
Global 2006	*2985 (72%)*	*371 (9%)*	*567 (14%)*	*212 (5%)*	4135

Note: Main standard hours - 0000, 0600, 1200, 1800 UTC; Intermediate hours – 0300, 0900, 1500, 2100 UTC

Table II

Status of implementation of RBSN upper-air stations in RA II as of **October 2006** (AGM period) compared to those in 2004 - 2005. The stations make observations at 2 main standard hours or less frequently, as committed by Members in Weather Reporting (WMO-No. 9) Volume A (W = Radiowind, R = Radiosonde)

Year	1 Number of stations making observations at the two main standard hours per day		2 Number of stations making at least one observation at the main standard or at intermediate hours per day		3 Number of stations not yet established or otherwise non-operational (silent)		Total number of Stations in the RBSN (1+2+3)	
	Region II							
	W	R	W	R	W	R	W	R
2004	251 (77%)	242 (82%)	37 (11%)	42 (14%)	40 (12%)	11 (4%)	328	295
2005	234 (73%)	230 (82%)	47 (15%)	42 (15%)	40 (12%)	10 (4%)	321	282
2006	**244 (76%)**	**230 (82%)**	**32 (10%)**	**42 (15%)**	**45 (14%)**	**10 (4%)**	**321**	**282**
Global 2006	603 (70%)	547 (69%)	180 (21%)	205 (26%)	83 (10%)	46 (6%)	866	798

Note 1: All radiosonde (R) stations are also included in the total number of radiowind (W) stations - they are not independent. The difference provides the number of upper-air stations that make wind observations only, a total of 39 stations in RA II (2006).

Note 2: Main standard hours - 0000, 1200 UTC; Intermediate hours – 0600, 1800 UTC

Regional Basic Climatological Network (RBCN)

5. During the intersessional period the number of climatological stations in the RBCN has remained unchanged and consists of 663 CLIMAT and 182 CLIMAT TEMP reporting stations as approved by XIII-RA II (Dec. 2004). The status of implementation of RBCN climatological stations according to information provided by Members is presented in Table III. The level of implementation of stations reporting CLIMAT has shown a positive increase up to 87 % in 2006 compared to 82 % prior to the approval of a revised RBCN in 2004. Stations reporting CLIMAT TEMP has increased up to 76 % from 64 % during the same period. More details on the RBCN performance are given in the reports of the Rapporteur on the Regional Aspects of the GOS (Doc. 5.1) and quantitative monitoring results (Doc. 4 3).

Table III

The status of Implementation of RBCN climatological stations in RA II as of **October 2006** (AGM period) compared to those in 2004 - 2005, as committed by Members in Weather Reporting (WMO-No. 9) Volume A

Year	CLIMAT			CLIMAT TEMP		
	Number of reports/stations implemented	Number of stations not reporting / operational	Total number of reporting stations in the RBCN	Number of reports/stations implemented	Number of stations not reporting / operational	Total number of reporting stations in the RBCN
	Region II					
2004	487 (82%)	106 (18%)	593	124 (64%)	70 (36%)	194
2005	562 (85%)	101 (15%)	663	136 (75%)	46 (25%)	182
2006	**578 (87%)**	**85 (13%)**	**663**	**139 (76%)**	**43 (24%)**	**182**
Global 2006	2235 (80%)	553 (20%)	2788	441 (83%)	89 (17%)	530

GCOS Upper-Air Network /GUAN) and GCOS Surface Network (GSN)

6. Both the GUAN and the GSN in Region II work generally very well, still some improvement is needed as discussed below.

7. All 31 GUAN stations in the Region are working. Most operate on a two soundings per day basis (the GCOS target requirement) and 4 operate on a single sounding per day (the GCOS minimum requirement). None of the stations routinely achieve 5 hPA heights although most routinely achieve at least 10 hPa. The GCOS minimum requirement is 100 hPa. All GUAN stations in the Region meet the GCOS minimum requirement making this one of the best performing Regions.

8. The single biggest deficiency in the GUAN in RA II is the lack of GUAN stations in India. The GCOS Secretariat and the Indian Meteorological Department (IMD) have been discussing a project that would allow some of the Indian upper air stations to use alternate radiosondes for some time (until IMD new radiosonde is developed and completed comparison tests). This would allow as many as four Indian stations to be designated as GUAN thus substantially improving the geographic coverage in the Region. The project will possibly be implemented by the end of 2007.

9. There are 261 GSN stations in the region and all but about 25 routinely report, the level of implementation being 96 %. The most common problem is that the monthly CLIMAT reports are not received. This problem is addressed through working with the national GCOS focal points. Members where additional improvement is needed include India, Turkmenistan, Myanmar, and Viet Nam. Many Members have not yet submitted historical daily and monthly data to the GCOS archive and this remains the largest single deficiency in the usefulness of GSN in RA II.

10. The CBS Lead Center for GCOS for the Region is Iran and it has actively sought to make contact with the designated focal points to improve the GSN and GUAN networks.

11. From the GCOS point of view, GSN and GUAN should follow the observing guidelines for both quality and timeliness, submit the monthly CLIMAT, provide the historical data to the designated archives, and to identify a GCOS focal point.

AMDAR Observations

12. The global AMDAR programme continues to make progress on implementing national and regional AMDAR programmes and to improve AMDAR coverage in data sparse areas. The AMDAR Programme now exchanges approximately 220,000 to 250,000 observations per day on the GTS.

13. In RA II, AMDAR Program is operational in Saudi Arabia (with limited progress), China, Japan, Hong Kong China and Korea. Hong Kong China has six reporting aircrafts with approximately 900 observations per day. The high priority task for the implementation of the Middle East AMDAR Pilot Project led by Saudi Arabia has leveled off somewhat, although the Saudi Arabian AMDAR programme has four Saudi Arabian Airlines MD90 reporting aircrafts with other MD90 aircraft in Saudi Arabian Airlines fleet still waiting to be fitted with appropriate AMDAR software. The Saudi Arabia Meteorological Service, according to the AMDAR Focal Point, is continuing to coordinate efforts with local airlines in Saudi Arabia and with countries from around the region, including Egypt and the Islamic Republic of Iran.

14. The E-AMDAR Programme, as part of its contribution to the WWW programme, is providing AMDAR data from European airlines to Members in the RA II, users including the Middle East, China and eventually India.

Marine Observations

15. Implementation of marine observing systems is coordinated through the Observations Programme Area of the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM). The Observations Coordination Group (OCG) of JCOMM is implementing its strategic workplan for the period 2002 to 2010 in support of the Global Ocean Observing System (GOOS) and the Global Climate Observing System (GCOS). Specific targets for each of the components of the observing system have been defined in such a way that the system should be completed by the end of this period. The workplan is consistent with the GCOS *Implementation Plan for the Global Observing System for Climate in support of the UNFCCC* (GCOS-92). Although this baseline system is designed to meet climate requirements, marine services in general will be improved by implementation of the systematic global observations called for by the GCOS-92 plan. The system is supporting global weather prediction, global and coastal ocean prediction, marine hazard warning, marine environmental monitoring, naval applications, and many other non-climate uses.

Ship based observations

16. RA-II is relatively active with regard to marine observations with VOS programmes operated by a number of Members. For example, Hong Kong, China, India, Japan, Malaysia, and Singapore have submitted input for the 2006 Ship Observations Team (SOT) annual report. The issue of availability of VOS ship position and identification data on public web sites is still a matter of concern to ship owners and masters, especially in RA-II for ship security reasons, and therefore to the NMHS in RA-II because the issue can potentially impact the VOS programme and the number of recruited vessels reporting their data routinely onto the GTS. WMO recognizes their concerns and has adopted Resolution 7 (EC-LVIII) and Resolution 7.7 (EC LIX) authorizing Members to implement ship's call sign masking schemes. Japan has implemented a scheme where the ship's identification is replaced by the generic letters "SHIP" in FM-13 SHIP reports. To permit quality monitoring by third parties, and particularly by the CBS RSMC, Exeter, responsible for the quality monitoring of marine data, JMA has put in place a parallel distribution system to provide for the original data.

17. The main concentration of the ASAP operations continues to be over the Northern Atlantic (5153 launches in 2006). However, an important contribution is also made by Japanese research ships operating primarily in the North Western Pacific areas and seas adjacent to Japan (938 launches in 2006). Radio sondes generally provided better high vertical resolution information than the aircraft data (AMDAR) over the oceans. The fourth Session of the Ship Observations Team (SOT), Geneva, Switzerland, 16-21 April 2007, noted that radio sondes data are particularly needed for the calibration of the satellite products, especially in the North Pacific and the Southern Hemisphere. The transition of high vertical resolution data will be achieved by the migration from TEMP-SHIP to BUFR. However, this remains a concern because TEMP-SHIP files are much smaller and less expensive to transmit from ships via Inmarsat-C than BUFR reports.

Buoys

18. A number of RA-II Members are participating in the Data Buoy Cooperation Panel (DBCP) and some of its Action Groups. India is maintaining a network of about 25 moored buoys in the Arabian Sea and the Bay of Bengal, is participating in the International Buoy Programme for the Indian Ocean (IBPIO) and is contributing to the DBCP Trust Fund. Japan provides for 18 TRITON buoys deployed in the Western Tropical Pacific and Eastern Tropical Indian Oceans as a contribution to the Tropical Moored Buoy Implementation Panel (TIP). DBCP Action Groups where RA-II Members are particularly active include:

- The Tropical Moored Buoy Implementation Panel (India, Japan). Tropical Pacific Ocean array is complete with 76 moorings. Implementation of the Indian Ocean Array is progressing (target is 47 moorings).

- The Global Drifter Programme (India, Japan, Republic of Korea. The global array is completed with about 1250 drifters maintained in operations. While about 450 of the drifters now report air pressure, it is planned to equip all 1250 drifters with barometers by 2010.
- The OCEAN Sustained Interdisciplinary Timeseries Environment observation System (OceanSITES) (Japan, India)
- International Buoy Programme for the Indian Ocean (IBPIO) (India)
- WCRP-SCAR International Programme for Antarctic Buoys (IPAB) (Japan)
- International Arctic Buoy Programme (IABP) (China, Japan, Russian Federation). There are currently 150 buoys deployed in the Arctic Ocean. For the International Polar Year (IPY), the Participants of the IABP plan to deploy over 170 buoys, which provide critical atmospheric, sea ice, and upper ocean hydrographic measurements on various space and time scales that cannot be obtained by other means. Challenges will be to maintain some of the momentum obtained during the IPY, and maintaining the array. The Eurasian side of the Arctic Ocean appears to be data sparse. With the reduction of the sea ice extend due to global warming, development of seasonal ice buoys is becoming essential.

19. At its twenty-second Session (DBCP-22), La Jolla, USA, October 2006, the DBCP noted improvements in coverage over the Asian Region. GTS delays had substantially improved in the Indian Ocean thanks to the resumption of routine operations of the Argos LUT in La Réunion. The Panel also recommended that RA-II Members actively participate in the DBCP-PICES North Pacific Data Buoy Advisory Panel (NPDBAP) which goal is to maintaining a buoy network North of 30N in the Pacific Ocean at an horizontal resolution of 5 degree by 5 degree (i.e. about 120 barometer drifters).

20. The Twenty-Third Session of the DBCP is planned in Jeju, Republic of Korea, 15-19 October 2007.

Argo

21. The Argo profling float network is now nearing completion with 2856 floats operational in July 2007 (95%) for a target of 3000. Participating RA-II Members include China, India, Japan, the Republic of Korea, and the Russian Federation. All operational floats report their data in real time onto the GTS (TESAC and BUFR format) and via the two Global Data Centres (GDAC) in France and USA (netCDF format). Most Argo national programs continue to be supported by research funding, which poses difficulties for sustaining the observations over decadal timescales. Mechanisms for long-term support are required. Support from operational agencies and users are needed to justify the long term funding.

Ships of opportunity (XBT programme)

22. Regarding the XBT network managed by the SOOPIP under the JCOMM SOT, between 2004 and 2006 there has been a gradual decrease in the annual number of XBT observations transmitted in real-time to the national data centers, from just over 25,000 in 2004 to about 18,000 in 2006. The target for 2010 is to sample 26 high density ship lines (4 transects per year a high horizontal res.) and 25 frequently repeated ship lines (18 transects per year at low horizontal res.). Significant progress has been made in improving the quality of the XBT observations (automated systems, improved real time QC), and in enhancing the real-time transmission of XBT observations in high vertical resolution. OOPC is now planning to organize a conference focused on global ocean observations, in about 2009, ten years after the OceanObs99 conference that defined the implementation strategy for the SOOPIP, Argo, and the Tropical moored buoy array in support of upper ocean thermal applications. Efforts remain to be made in the Ship Of Opportunity Programme to sample lines according to the requirements expressed by the Upper Ocean Thermal Review. Line where particular emphasis needs to be made include IX-06 (La Réunion / Mauritius - Malacca Straits), IX-07 (Cape of Good Hope - Persian Gulf), IX-08 (Bombay – Mauritius), IX-09S (Fremantle - Sri Lanka), and PX-11 (Flores Sea – Japan).