

## **The Implementation Plan for the evolution of the GOS in Region II**

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In this document, some considerations for the evolution of the GOS of Region II are summarized, the relevant EGOS-IP recommendations addressing the evolution of surface based sub-systems of GOS of the region are identified, and the general outlines to implement these recommendations and actions are generated along with some specific actions toward the implementation of the identified recommendations. Furthermore, a Strategic Plan toward the integration of WMO Observing Systems of Region II is summarized as well.

### **I. INTRODUCTION**

1. RA II consists of 35 members whose meteorological observing networks differ in content, density and quality. Some members are maintaining a very good level of observing network both on land and in ocean, while some other members still have problems to make routine observations even in their RBSN or RBCN stations due to their economic difficulties or wars. Therefore, the specific attentions should be paid to the areas where the coverage or the availability cannot meet the basic requirements.
2. In preparing the Implementation Plan the Expert Team on the Evolution of the GOS relevant to the OPAG/IOS noted that the redesign of the GOS included several special considerations and issues that involved developing countries. In some areas of Region II the current GOS system simply does not exist because of some deficiencies (failure to catch up with rapid technological developments, poor economic environment, difficulties in establishing stations in remote or uninhabitable areas and water bodies, inadequate or lack of telecommunication facilities and capacities for the operation and maintenance of equipment, high cost of consumables especially for upper air stations, lack of qualified personnel) whereas in other areas it could be improved. When looking at candidate observing systems, consideration must be given not only to NWP but also to many other applications, including human forecasting.
3. The evolution of the GOS in RA II must address some of the issues that fall into the following three categories: (a) lack of public infrastructure such as electricity, telecommunication, transport facilities etc., (b) lack of expertise from people to do the job, training, etc., and (c) funding for equipment, consumables, spare parts, manpower, etc. The lack of infrastructure and expertise may be the result of a lack of funding.
4. The evolution must take into account upgrading, restoring, substitution and capacity building (especially in the use of new technologies). Two aspects need to be considered: the use of the data and the production of the data. It is possible that some countries do not and will not be able to produce the data and will therefore only be users of data. To help RA II countries produce data for international exchange, due consideration must be given to the three issues previously identified, i.e. public infrastructure, expertise and funding.
5. Possible approaches towards the evolution of the GOS were identified by the EGOS-IP, which recommended for developing countries observing systems that were less dependent on infrastructure, expertise, and funding, such as satellite, AMDAR, and AWSs. However, a minimum set of reliable RAOBs would be required both as a backbone to the upper air network, and also to validate the satellite observations with enough height and accuracy. Migration towards the BUFR code (as a reliable representation of the data) is required.

6. If resources are available, the highest priority should go to (a) maintaining the RBSN and RBCN, noting that GUAN stations are part of the RBSN, and (b) to rehabilitate observing sites in critical locations.

7. One of the most important activities of the Regional Rapporteur on the GOS in RA II is the follow-up of the implementation of the relevant recommendations of the Implementation Plan addressing the above issues regarding the evolution of the GOS in the Region, through the updating of the appropriate comments and mandatory actions (completed, continuing or new) and the deadline for the completion of the actions.

The appropriate recommendations relevant to the evolution of the GOS in RA II address mainly the aspects of the production of the conventional data of the surface based subsystem network (RBSN) and in situ observing systems.

## **II. IDENTIFIED RELEVANT EGOS-IP RECOMMENDATIONS ADDRESSING THE EVOLUTION OF SURFACE BASED SUB-SYSTEMS OF THE GOS IN RA II**

8. Each of the 44 recommendations of the IP is accompanied by an action that calls upon a range of bodies to undertake the action including “WMO Members” among other bodies. In order to help RA II Members to understand their responsibilities in the implementation of the recommendations, it is important to identify the EGOS-IP recommendations which address relevant aspects of the issues affecting the evolution of the GOS in Region II. These recommendations for the evolution of the GOS in Region II are as follows:

**G1 Distribution** – (a).Some observations made routinely are not distributed in near real-time but are of interest for use in meteorological applications.

(b) Observational data that are useful for meteorological applications at other NMHSs should be exchanged internationally, taking into account Res. 40 (Cg-XII). Examples include high resolution radar measurements (i.e. products, both reflectivity and radial winds, where available) to provide information on precipitation and wind, surface observations, including those from local or regional mesonets, such as high spatial resolution precipitation networks, but also other observations, such as soil temperature and soil moisture, and observations from wave rider buoys. WMO Members summarize the data available in their regions and strive to make these data available via WMO real time or near-real-time information systems, whenever feasible.

**G2 Documentation** – All observational data sources should be accompanied by good documentation including metadata, careful QC and monitoring.

**G3 Timeliness and completeness** – There should be a timely distribution of radiosonde observations with all observation points included in the message, together with the time and position of each data point; information on instrument calibration prior to launch and information on sensor type. Appropriate coding standards should be used to ensure that the content (e.g vertical resolution) of original measurements sufficient to meet the user requirements is retained during transmission.

**G4 Baseline System** – Provide comprehensive and uniform coverage with at least 12-hour frequency of temperature, wind and moisture profiles over mid latitude continental areas and coastal regions. In tropical regions, the wind profile information is particularly important.

**G6 Ozone sondes** – Near real-time distribution of ozone sonde data is required for calibration and validation of newly launched instruments and for potential use in NWP.

**G9 AMDAR** - AMDAR technology should provide more ascent/descent profiles with improved vertical resolution, where the vertical profile data from radiosondes and pilot balloons are sparse as well as into times that are currently not well observed such as during night times.

**G13 Ground-based GPS measurements for total water vapour** – Develop further the capability of ground-based GPS systems for the inference of vertically integrated moisture towards operational implementation. Ground-based GPS processing (ZTD and PW, priority for ZTD) should be standardised to provide more consistent data set. Data should be exchanged globally.

**G20 More profiles in the tropics** – Temperature, wind and if possible the humidity profile measurements (from radiosondes, PILOT and aircrafts) should be enhanced in the tropical belt, in particular over Africa and tropical America.

### **III. GENERAL OUTLINES TO ADDRESS THE IDENTIFIED RECOMMENDATIONS AND ACTIONS**

The following general outlines should be taken into account during the implementation of EGOS-IP recommendations in RA II:

9. The evolution in RA II, and in developing countries in general, must take into account upgrading, restoring, substitution and capacity building (especially in the use of new technologies), taking into account both the use of the data and the production of the data. It is possible that some countries do not and will not be able to produce the data and will therefore only be users of data. To help countries produce data for international exchange, due consideration must be given to the three issues previously identified, i.e. public infrastructure, expertise and funding.

10. The highest priority for each RA II Member should go to a) maintaining and upgrading its national surface component of the RBSN and RBCN, with emphasis on the implementation of the best practices of the GSN and b) to rehabilitate observing sites in critical locations through the deployment of AWSs (viable and cost effective compared to manned stations).

11. The production of vertical profiles by AMDAR in many data sparse areas is worthy testing.

12. It is imperative and essential to conduct OSEs to study the impact of additional observations (e.g AMDAR) in areas in RA II of sparse conventional observations (e.g RAOB) and discuss possible observing system experiments to explore enhancing the observations in these areas. This is in fact a requirement to study the impact of all AMDAR data in RA II on the global NWP.

13. It is necessary to establish an expert team on AMDAR issues so as to develop a regional programme and coordinate the related matter. A AMDAR Programme in RA II is proposed to be established to facilitate to the progress of collection and use of the AMDAR data. A regional AMDAR panel is also proposed to be set up to better understand the requirement and develop the optimization schemes of the programme The name of the programme is supposed to be A-DAMADR.

14. Migration toward the table driven codes (BUFR and CREX) as a reliable representation of the data is expected.

#### **IV. SPECIFIC ACTIONS TOWARD THE IMPLEMENTATION OF THE IDENTIFIED RECOMMENDATIONS**

15. High priority should be given by the Region and the WMO Secretariat to include operational stations in Volume A to be part of the RBSN/RBCN and to maintain a minimum RAOB network with acceptable performance within data sparse areas in RA II

16. Make full use of AMDAR ascent/descent data at major airports. Thus high priority should be given by the Region, the WMO Secretariat and the AMDAR Panel to help region II to coordinate the AMDAR activities and develop a regional AMDAR programme.

17. Members are urged to distribute, as quick as possible, certain type of observations made routinely in near real-time but not distributed worldwide. These information are of interest for use in other meteorological applications

- a) Observations made by Pilot sounding – In the tropics, the wind profile information is considered to be of particular importance.
- b) Observations made with high temporal frequency should be distributed globally at least hourly. Examples include regular aviation observations (METAR, SPECI, high resolution Radar observations, AWSs, Buoys Hourly SYNOP, precipitation and wind from local or regional mesonet, soil moisture and temperature.
- c) The need for good metadata exchange in support of observational data sometimes in real-time is essential..

18. Members operating ground based GPS measurements for total water vapour are urged to collect these data and exchange them.

19. In order to ensure a timely data delivery of radiosonde observations of the Region, Members are urged to generate vertical resolution sounding data in BUFR and CREX and implement the transmission as soon as possible, following the technical specifications defined by CBS in the Guidance for Migration. The delivery of the profile data in several stages may be necessary to accommodate the interests of other applications.

#### **V. STRATEGIC PLAN TOWARD THE INTEGRATION OF WMO OBSERVING SYSTEMS**

20. The upcoming session of the Working Group on Planning and Implementation of the WWW in Region II, which will be held this year should discuss the above identified IP recommendations and their associated actions; Surface and space based components of the GOS and how it will respond to issues affecting the evolution of the GOS in RA II and how the Region will contribute to the development of future integration of the WMO observing systems.

21. The first step in the framework of the implementation plan of the IP is the identification of relevant recommendations of the plan addressing the major issues.

22. The second step consisted to the translation of the relevant IP recommendations into general outlines and specific recommendations and actions destined to the next session of RA II, and essential for members to achieve the recommended changes to the GOS, or to be in some way associated with the efforts to achieve those changes.

23. Finally, the third step is the formulation of a proposal of a strategic plan for the evolution of the GOS, which will enable RA II Members to realise the changes (general and specific actions of the IP) in their contribution to the GOS and to the future development of an integration of WMO Observational System.

24. Some examples of the funding programmes to enable Members implement changes in their contribution to the integration of WMO Observation Systems:

- a) Participation in projects/experiments to demonstrate and motivate the adoption for the changes to observing systems. In relation to new systems for instance, it is often helpful to witness the feasibility and usefulness of an operational system before committing the resources needed. One mean of doing this is through participation in projects or experiments (THORPEX).
- b) The collaboration with other Members to form a grouping or sub-regional programme to implement cost-effective changes to observing systems. There are many examples of countries working together to more efficiently tackle changes to observing programmes including EUCOS, ASECNA (for synoptic and aviation applications). It is essential for the WMO Secretariat to assist such groupings to come together and shape plans that enable Members to better achieve their desired observation programmes.
- c) Most of the above specific actions could be tackled by a grouping of countries in a manner that require less resources than for each country to tackle the actions alone. Furthermore, with regard to the production of conventional data, to tackle the changes the proposed regional strategic plan with the supports of WMO, NEPAD, Economic Groupings.

25. Furthermore, with regard to the conventional basic data to be exchanged internationally, this regional strategic plan will address: .

- a) The feasibility of the creation of a regional or sub-regional programme managing the evolution of the GOS as EUCOS in Europe, NAOS in America and COSNA in the North Atlantic.
- b) The organization and funding of major programmes of specific observations over data sparse regions in developing countries.
- c) The full involvement of the Regions in the THORPEX Programme through the establishment of an Asian Regional THORPEX Committee (both operational and research components) and in the planned GEOSS activities, in cooperation with WMO Programmes and Projects in order to enable the Region to have a full cross-benefit with the WWW Programme.
- d) In many areas in developing countries the current GOS simply does not exist because of many major deficiencies;
- e) There is a need to establish funding mechanisms or programmes to sustain the production and the achievement of high level performance of the exchange of good quality conventional meteorological, climatological and environmental data;
- f) Many stations proposed to be within the RBSN especially for the upper-air component are not implemented;
- g) Failures to catch up with rapid technological developments;
- h) Poor economic environment and difficulties to establish stations in uninhabited areas;
- i) Inadequate or lack of telecommunication facilities, lack of capacities for the operation and maintenance of equipment;
- j) High cost of consumables especially for upper air stations;

- k) Lack of qualified personnel; the Class IV training is less and less provided;
- l) Lack of public infrastructure and expertise being the result of the lack of funding and lack of involvement, support, attention and awareness in the matters of meteorological services (climate, weather) by the public officials (governments and regional economic groupings);
- m) Lack of efficient synergy and working arrangements between OPAG-IOS, the Rapporteur on regional aspects of the GOS, the Regional Association decision making bodies (President), WMO Regional Offices (Regional Directors) in solving the issues addressing the evolution of the GOS in the Region;