PREPARATORY MEETING OF THE

COORDINATION GROUP ON SATELLITE DATA REQUIREMENTS FOR RA III AND RA IV

US National Center for Weather and Climate Prediction

College Park MD, USA

8 April 2013

MEETING REPORT

Welcome addresses (WMO, NOAA)

Stephan Bojinski (WMO) welcomed participants in this meeting which, taking the opportunity of the collocated NOAA Satellite Conference 2013, aimed at preparing the work of a coordination group on satellite data requirements for WMO Region III (South America) and Region IV (North and Central America, and The Caribbean). He thanked NOAA for hosting the meeting at its new National Center for Weather and Climate Prediction. Fred Branski and Chuck Wooldridge (NOAA) thanked all participants for their attendance of the meeting as well as of the NOAA Satellite Conference 2013 later in the week.

Participants introduced themselves in a tour-de-table (Annex 1 has the list of participants). Luiz Machado was then unanimously accepted as chairman for the meeting, and the draft agenda was accepted as proposed (Annex 2).

1. Meeting background, objectives, and context (WMO)

Stephan Bojinski (WMO) gave a briefing on background and objectives of the meeting. These consist of preparing the work of a standing coordination group on satellite data requirements for RA III and RA IV by reviewing existing requirements for satellite data access and exchange, and making recommendations on the group's terms of reference, composition, working modalities, and support structure.

This work builds on existing coordination activities within the region, and on the international framework for integrated global data dissemination promoted by WMO. Defining region-based user requirements for satellite data access, and coordinating integrated means for data dissemination serving these requirements is consistent with the WMO-backed Integrated Global Data Dissemination Strategy (IGDDS) which is an element of the WMO Information System (WIS).

Requirements[1] identified by the NOAA-INPE-WMO-led Task Team on Satellite Data Requirements (TT-SDR) established in June 2009, chaired by Luiz Machado (INPE), and completed its work in 2011, have contributed to improved, tailored dissemination of satellite data and products in RA III and RA IV. In its report, the Team prepared an inventory of dissemination systems available in Regions III and IV (e.g., GEONETCast-Americas) with details on their coverage, data rate, and provisions for sustainability of these systems. The Team had noted that several dissemination capabilities were available, however, these were often not integrated, none of them included all datasets required by the region, and that there were issues regarding sustainability.

Results from the 2012 WMO survey on the use of satellite data indicated that access to satellite data in near-real time, and data processing, were challenges that many Members in RA III and RA IV faced, apart from resource concerns. Furthermore, training in data analysis tools and in product interpretation, and the preparation to new generation satellites were considered insufficient. Both shortcomings corroborate the need for a well-organized and effective region-based satellite user group

[1] http://satelite.cptec.inpe.br/geonetcast/es/datareq.html

that maintains a close dialogue with the satellite operators. The WMO survey report was due for publication in May 2013.

In order to guide the work by region-based mechanisms for establishing satellite data requirements in all WMO Regions, the WMO Commission for Basic Systems (CBS) at its 15th session in September 2012 adopted the "*Procedure for Documenting Regional Requirements for Satellite Data Access and Exchange*"[2], encouraging the formation of standing coordination groups for the stated purpose in all WMO Regions.

The CBS Procedure has recommendations for such a group:

- Lead of group shall be a recognized space-based applications specialist in the region;
- Membership to reflect regional and sub-regional diversity and fields of expertise involved in WMO and co-sponsored Programmes (e.g., drawn from the WMO CBS Expert Team on Satellite Utilization and Products (ET-SUP), from Centres of Excellence in the WMO-CGMS Virtual Laboratory for Education and Training in Satellite Meteorology);
- Team to review sources of regional needs, including from GEO SBAs;
- Team collectively to strive to represent interests of whole region;
- Main satellite providers for region shall be invited to participate in Team activities (e.g., NOAA, EUMETSAT in Regions III and IV);
- Terms of Reference of the Team to be decided by the Regional Association, based on a template maintained by the WMO secretariat[3]; template sets scope, purpose, duration, methodology, reporting scheme
- Team eventually to encompass expression of non-satellite-related user requirements

In a letter dated 2 November 2012 to all Members and key satellite providers in Regions III and IV, the Secretary-General of WMO informed on the results of the TT-SDR and invited Members in RA III and RA IV to nominate candidates for a standing regional coordination group. By the time of the meeting, WMO had received nominations by seven Members (Argentina, Brazil, Canada, Colombia, Chile, Trinidad and Tobago, Venezuela) and two satellite operators (CONAE, EUMETSAT).

NOAA confirmed that a formal response by the US to this letter nominating a US representative was planned.

Formal endorsement of the coordination group on satellite data requirements in Region III and IV is being sought by RA IV at its 16th session (12-19 April 2013, Curaçao; see item 6), and subsequently by RA III at its 16th session in 2014 (tentative venue: Asunción, Paraguay).

The meeting was invited to make recommendations, for consideration by RA IV.

2. Status of documenting satellite data access requirements in RA III and RA IV

Luiz Machado summarized different data access mechanisms in the region (both RA III and RA IV): Direct Readout is an option for only few countries (Brazil, Argentina); ftp is broadly available but with bandwidth limitations for NRT and applications requiring large data volumes; GEONETCast-Americas and EUMETCast-Americas using Digital Video Broadcast (DVB) technology are possible solutions but needed (i) additional data streams made available (e.g., calibrated radiances for data assimilation), and (ii) confirmed sustainability. He recalled the existing requirements identified by the region through TT-SDR. These depend on the country-specific needs, the climatological context and regional socio-economic priorities.

He raised the following points to be considered by a future region-based group which were briefly discussed here and under agenda item (6):

[2] Recommendation 5 (CBS-15), CBS-15 Abridged Final Report
[3] http://www.wmo.int/pages/prog/sat/documents/SAT-GEN_RegSatReqCoordGroup-ToR-Recomm.pdf

a) Which user communities are represented?
User communities include “specialized” users with access to Direct Readout, requiring large data volumes and using raw data (“level 1”); “general” users mainly interested in products (“level 2” and above) of medium complexity and volume; “basic” users interested for example in simple low-rate imagery; all user types have different needs for accessing, visualizing and analyzing data;

Participants commented that a per-country mapping of satellite users along these three user categories should be undertaken. Involvement in this process of national GEO focal points should be considered.

b) What is the status of the region regarding data access?
The group should keep track of the status of data dissemination and reception technologies in the region (e.g., by using questionnaires or other mechanisms); it should also monitor the status of data dissemination systems, and related plans for the next generation of satellites; such evidence should be established through regular communication with the satellite operators;

c) What are the satellite data and information requirements of the region?
Ascertaining these requirements should build upon the work accomplished by the TT-SDR; effective mechanisms for capturing these requirements should be established, including assignment of priorities, and sufficient detail to be actionable by satellite operators;

d) How can sustained data dissemination systems be achieved that meet user requirements?
Arrangements should be sought for (a) sustainable data dissemination system(s); make recommendations regarding the integration of different dissemination systems; and explore avenues for sharing resources (including in-kind) and costs;

e) What is structure and composition of the group?
Luiz stressed that the group needed committed members that were recognized in this function by their home institutions; nominated members on the group should strive for representing the needs of their country, as well as those of neighbouring countries; the group should also, as needed, invite experts on an ad-hoc basis;

It was noted that adequate interfaces to other satellite user requirements mechanisms should be ensured, such as North America Europe Data Exchange- Asia-Pacific Satellite Data Exchange and Utilization (NAEDEX-APSDEU) and non-satellite data users in a regional WMO Integrated Global Observing System (WIGOS) framework;

f) How will the group be supported?
Working and support arrangements of the Team should include: technical support, web presence, an online discussion forum, preparation and conduct of regular meetings (virtual and face-to-face), compilation of documents and data; the group should take advantage of regional events such as the NOAA Satellite Conference 2013.

3. Satellite data provider perspectives

David Benner (NOAA NESDIS) summarized data dissemination mechanisms from current NOAA satellites. He noted that:

- S-NPP has High Rate Data (HRD) broadcast through its X-band capability, and so will JPSS-1; for JPSS-2, a Low Rate Data (LRD) dissemination capability is also planned;
- GEONETCast-Americas currently allows access to selected data products; Benner stated that this capability could be changed in terms of bandwidth and types of data; current support is however not operational (essentially through one person); current operating costs with 2Mbit/s bandwidth are 230K USD/year; options involving additional costs have been developed, including 12 Mbit/s bandwidth and 24/7 support;

- A solid set of user requirements is necessary and a pre-condition for a response by NESDIS as data provider; it was noted that the prospective regional group would provide a good forcing function for the evolution of GNC-A and other dissemination mechanisms
- NESDIS will follow up formally to nominate a member on the group

He also pointed out dedicated sessions on Direct Readout and data access at the NOAA Satellite Conference, as well as user feedback sessions on two days of the Conference.

Sally Wannop (EUMETSAT) summarized EUMETSAT dissemination services which include EUMETCast -Americas service (at 1.8 Mbit/s net bandwidth). In the future, funding commitments from the region were needed to ensure continuation of the EUMETCast South America Service (operating cost 200K EUR annually).

Luiz Machado (INPE) explained that INPE upload many of their products on EUMETCast-America and GNC-A. There was currently no legal framework for these contributions, and cooperation agreements with NESDIS and EUMETSAT were needed.

Estela Collini stated on behalf of SMN Argentina their intentions to use GNC-A for the distribution of their datasets (e.g., processed imagery, modelling output, volcanic ash advisories of VAAC for airline industry). Details on how to do this needed clarification.

The discussion brought up the following points:

Fred Branski (CBS President) observed that current DVB-S2 systems were under-used and under-resourced. A set of well managed, well maintained, well targeted user requirements would help drive the evolution of DVB-S systems. He recommended that RA III and IV strongly endorse the formation of the proposed regional group.

Luiz Machado asserted that one single data dissemination system would be desirable, with 4 Mbit/s bandwidth probably covering all user requirements. It would reach a large and growing number of users within and outside Brazil. Mikael Rattenborg pointed out that a DVB-S2 system can help extend the lifetime of ageing missions such as GOES-12, giving the example of Meteosat 5, 6, 7, and 8.

Kathy-Ann Caesar noted that solutions were available to meet regional user needs, and expressed appreciation for signs that providers such as NESDIS were willing to meet users half-way. She strongly encouraged the proposed group to be focussed and communicate well its needs.

Martin Medina informed the meeting that an initial proposal to the World Bank to install GNC-A receiving stations in Caribbean has not been successful.

4. WMO-NOAA Train the Trainers Workshop Summary

Kathy-Ann Caesar (CIMH) briefed the session on the WMO-NOAA Train the Trainers workshop held at NCWCP on 6-7 April 2013 and presented key concerns raised by participants in the workshop. These were:

- In Central and South America and the Caribbean, operational users of satellite data from GOES and other systems require a low-cost, operational and sustained data dissemination system building on GNC-A and EUMETCast. Arrangements for cost-sharing, e.g. of bandwidth fees, should be developed with urgency.

- Training on the use of satellite data and associated visualization, processing and analysis tools should be made available, taking into account the different needs and skills of satellite data users. Training should in particular involve preparing users from the region for GOES-R.

- The proposed standing coordination group for satellite data requirements in RA III and IV should establish user needs for data, products, training, and associated issues (e.g., data formats). The group should ensure linkage to and follow-up by satellite providers at the appropriate level, and represent the needs of a wide variety of users in the region.

Statement by David Grimes, PR of Canada and President of WMO

In an ad hoc statement to the meeting, David Grimes emphasized the importance of space-based observations in the implementation of WIGOS. He further said that

- Data acquisition capacities were not always available in the areas where needed most, especially in the oceans and in polar regions;
- There was an evolution of WMO from a focus on weather and extreme event forecasts, to fully include climate;
- The celebration of 50 years of World Weather Watch in 2013 marked a success based on observations, communications, and forecasting;
- New challenges associated with building a similarly successful system for climate were numerous, since a much larger range of geophysical variables and forecasts were involved.

He stressed the WMO emphasis on Global Cryosphere Watch and the value of coordinated satellite data acquisition for RA III and RA IV, given the presence of extended mountain ranges, the Arctic basin bordering RA IV, and the interest of many nations in Antarctica. The level of predictability of changes in polar regions was realized during the 2007-2008 International Polar Year, through better understanding of the various forcing and feedback mechanisms influencing the climate system. Better predictability and understanding of climate variability was dependent on integrated datasets with a strong contribution by satellites.

Wenjian Zhang (WMO) confirmed the importance of these points in stressing that regional requirements should encompass both weather and climate-related needs.

5. Presentation of users' perspectives

In advance of the meeting, users were asked to brief the meeting on (i) current and planned utilization of satellite data, (ii) details on currently used data reception mechanisms, (iii) needs for training and technical assistance, (iv) other challenges.

Estela Collini (Argentina) summarized satellite utilization by the National Meteorological Service (SMN) of Argentina: it included TRMM-derived precipitation datasets for model evaluation and merging with in-situ observational data, AIRS data for assimilation and derivation of CO2 products, first attempts to use ASCAT for inferring on soil moisture and ocean surface winds, and AMSR-E for soil moisture products. She noted the challenges associated with reconciling soil moisture products based on different sensors and algorithms. Operational products based on GOES were received using a GVAR system. AVHRR data are being received using an HRPT station, giving rise to the generation of a range of products including for volcanic ash monitoring. Needs for training and technical assistance are to be addressed in a plan on upgrading receiving systems (to accommodate data from the new generation of satellites, such as GOES-R) and on resolving issues related to processing images received by the new equipment. Acquisition of equipment for reception of GOES-R data should be planned together with other countries in the Region for better cost-effectiveness. The domain of the Volcanic Ash Advisory Centre Buenos Aires should be adequately covered by GOES-R imagery.

Olga Gonzalez (Colombia) joined the meeting by telephone and provided comments in writing. These can be summarized as follows: the Institute of Hydrology, Meteorology and Environmental Studies of Colombia (IDEAM) receives and uses GOES imager data for weather forecasting and, in case of signal interruption, relies on imagery made available on the internet by NOAA, NASA and INPE CPTEC. Visible, IR and water vapour channels of GOES are being analyzed for this purpose. A key interest of

IDEAM is to obtain and process products derived from satellite imagery, such as precipitation estimates, areas of fire potential, mapping of fog, and temperature profiles. There is also an interest in assimilating satellite data in weather model frameworks.

Luis Fernandez (Venezuela) stated that Venezuela operates a GVAR and GNC-A receiving stations to access satellite data including from GOES. He informed the meeting of a recently-launched environmental satellite operated by Venezuela. His institute started to work with McIDAS-V going beyond the use of simple imagery. Training was needed in the use of different satellite tools. He voiced uncertainty in estimating the cost implications when preparing for the upcoming new generation of GOES-R. Cooperation projects should be launched for attaining a regional solution.

Bryan Thomas (Trinidad and Tobago) informed that his service operates a satellite data receiver, Doppler radar systems, and automatic weather stations. In the main, changes were associated with the new generation of GOES-R; changes in the use of the ISCS communication system needed to be managed. He emphasized that despite improved capacity, the internet cannot be used as an operational data dissemination mechanism especially in case of a natural hazard. A primary, dedicated dissemination mechanism is required for this purpose. Training on the use of tools such as McIDAS-V was also necessary, as well as on interpretation of satellite imagery, the use of new equipment and new software. A flexible data format should be determined through which as much data as possible can be disseminated (e.g., from GOES-R) such that advanced users can make use of it.

David Bradley (Canada) provided an overview of the current use of satellite data by Environment Canada through the Meteorological Service of Canada. Key applications served by satellite data are nowcasting/forecasting, ice monitoring, volcanic ash monitoring, NWP, public weather services, and research and development. A range of data sources are currently assimilated, including sounders, ASCAT, SSMIS, AMVs, MODIS and AVHRR polar winds, and GPS RO. 90% of all data assimilated are from satellites. Access to data is provided through the MSC satellite reception network (for GOES and HRPT), the GTS, internet and bilateral exchange with other institutions. Data is provided to the EUMETSAT EARS network. Most satellite-related training is done internally (on acquisition systems, data use, visualization systems and tools – NINJO). He noted that Canada is generally able to implement technical solutions to overcome challenges related to satellite data access. Still, there are some remaining challenges related to the high data volumes associated with the new generation of satellites, and finding sufficient human resources to support the exploitation of these satellite data.

Luiz Machado (Brazil) showed the situation of INPE as a user of satellite data. He described the range of receiving stations operated by INPE for GNC-A and EUMETCast-Americas, for polar orbiting satellites (HRPT – 3 stations, Aqua/Terra), and for GOES (GVAR – 2 stations). INPE uploads a range of environmental satellite products onto EUMETCast, on agriculture, weather, fire detection, and other land surface products. He also mentioned SigmaCast as an example for product visualization. In closing, he mentioned that INPE facilities could serve as a bridge to other countries in South America.

6. Future working arrangements

In addition to the points raised under item (2), the meeting briefly discussed possible milestones of a future region-based group on satellite data requirements:

In 2013, the group should:
- update existing requirements (including a mapping of user types and applications in all countries);
- update the list of existing and planned data distribution systems in the region;
- collect existing guidance material and documentation relevant to users;

In 2014, the group should:
- complete a region-based data dissemination plan, with cost/resource-sharing options.

WMO stressed that the group needed leadership from the region, including from the satellite providers and NOAA NESDIS in particular, in order to be functional and effective.

Summary and way forward / recommendation to RA IV-16 session

The meeting recommended that the upcoming 16th session of RA-IV endorse the establishment of a coordination group[4], which should:

- Establish and maintain user needs for satellite data, products and associated training;
- Involve satellite providers to ensure an effective user-provider dialogue and follow-up action;
- Guide implementation activities for a broad range of users in RA IV and RA III, including the promotion of user-friendly and affordable cost-sharing arrangements for data distribution;
- Serve as advisory group to a future RA-IV Task Team on WIGOS and WIS.

References

Meeting documents: http://www.wmo.int/pages/prog/sat/meetings/RA-3-4-SDR-PREP.php

TT-SDR documents (including initial set of user requirements):
http://satelite.cptec.inpe.br/geonetcast/es/datareq.html

[4] See RA IV-16/Doc. 4.4(2) (WMO Space Programme), http://raiv-16.wmo.int

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ANNEX 2: AGENDA

Time	Agenda item	Title	Responsible
8:30		Welcome	WMO, NOAA
8:45		Introduction of the participants	All
9:00	1	Meeting background, objectives, and context	WMO
9:20	2	Status of documenting satellite data access requirements in RA III / RA IV	Machado (Chair of former TT-SDR)
9:40	3	Satellite Data Provider perspectives	NESDIS, EUMETSAT, INPE, CONAE
10:20	4	WMO-NOAA Train the Trainers Workshop: Summary	Caesar
10:30		Break	
10:45	5	Presentation of users' perspectives	All concerned (5 minutes each)
11:15	6	Future working arrangements	All
11:45		Summary and way forward / recommendation to RA IV	WMO, NOAA
12:00		Adjourn	