

WORLD METEOROLOGICAL ORGANIZATION

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COMMISSION FOR BASIC SYSTEMS  
OPEN PROGRAMME AREA GROUP ON INTEGRATED OBSERVING SYSTEMS

EXPERT TEAM ON SATELLITE UTILIZATION AND PRODUCTS

ITEM: 15

SEVENTH SESSION

GENEVA, SWITZERLAND, 27-30 MAY 2013

Original: ENGLISH

## **International Radio Occultation Working Group Matters**

*(Submitted by the IROWG co-chairs and the Secretariat)*

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### **Summary and Purpose of Document**

This paper reports on the main activities of IROWG for the years 2012 up to early 2013. Results of the second workshop of the International Radio-Occultation Working Group (28th March - 3rd April 2012, Stanley Hotel in Estes Park, CO, USA) are shortly summarized and more recent activities such as the presentations at CGMS-40, and the RO-CLIM project under SCOPE-CM are briefly presented. Further information is available at <http://www.irowg.org/workshops.html>.

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### **ACTION PROPOSED**

The seventh session is invited to note the status of IROWG matters and to provide comments as appropriate.

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## DISCUSSION

### Introduction

The main IROWG activities for the covered time interval include:

- IROWG organized its second workshop
- IROWG was represented at the CGMS-40 meeting
- The ROTrends group submitted a SCOPE-CM proposal RO-CLIM
- Planning for the joined OPAC/IROWG-3 workshop

### Second IROWG Workshop

The workshop took place at the Stanley Hotel in Estes Park, CO, USA from 28th March to 3rd April 2012. It was attended by more than 70 scientists. All major centres providing and/or assimilating data were present. In total, three working papers were prepared for submission to CGMS-40:

- Report from the 2nd International Radio Occultation Workshop, CGMS-40 EUM-WP-01
- Status of the global Radio Occultation Observing System, CGMS-40 EUM-WP-02
- Climate related Processing and Potential of Radio Occultation Data, CGMS-40 EUM-WP-03

The first working paper summarizes the workshop, including actions and recommendations, while the second and third one respond to CGMS-39 actions. All working papers are available at <http://www.irowg.org/workshops.html>.

The RO community at IROWG-2 focused on three main recommendations to convey to CGMS:

- There is a need for an operational continuity plan for radio occultation – including troposphere and ionosphere – to provide a daily availability of at least 10,000 occultations;
- There is an urgent need to fill a data gap, using research or opportunity satellites, or commercial sources (if available) for the near term, but this should not replace a long-term continuity plan to provide operational GNSS radio occultation data;
- CGMS agencies should engage in re-processing of radio occultation data to maximize their utility in anchoring climate reanalyses.

Please refer to the website above for the full list of recommendations and actions.

### IROWG at CGMS-40

Two presentations were given at CGMS-40, one covering the working papers to the Working Group II: Satellite Data and Products, the other to the Plenary meeting, on a general overview and plans of IROWG. Several actions and recommendations were expressed that include IROWG activities, they are extracted from the CGMS-40 draft report (current activities addressing these actions/recommendations are in *italic* behind the ->):

- Actions:
  - WMO to coordinate impact studies, through the CBS, in order to update and refine its requirements for GNSS radio-occultation (e.g. number of occultations/day, distribution in space) (40.6). -> *EUMETSAT looking into funding such a study in 2014*
  - CGMS to convene through the IROWG an ad-hoc meeting on the global GNSS-RO constellation, inviting all interested CEOS agencies (40.23). -> *Option to report early outcome of Action 40.6 at CEOS end 2014*
- Recommendations:
  - CGMS, via the IROWG, to support the development and use of GNSS radio-occultation for ionospheric monitoring (40.41). -> *a IROWG-3 space weather sub-group meeting can discuss further steps*

- CGMS members are invited to participate in the 3rd workshop of the International Radio Occultation Working Group, taking place near Graz, Austria from 5 - 11 September 2013. In particular, colleagues from China, India, Russia are invited to report on their radio occultation activities (40.22). -> *China, Russia invited (no response received), discussion with India on possible contribution on Megha-Tropiques is evaluated*
- CGMS agencies should engage in reprocessing of radio/occultation data to maximize their utility in anchoring climate reanalyses (40.23). -> *e.g. EUMETSAT re-processing within ERA-CLIM at ECMWF*

### **SCOPE-CM RO-CLIM Proposal**

The ROTrends group, which includes all major radio occultation processing centres, agreed to submit a proposal to the SCOPE-CM Call for Project Proposals, called RO-CLIM. The RO-CLIM covers a time span of 5 years from January 2014 onwards and aims to generate two data sets with different maturity levels. One starts from the data generated within the ROTrends project, the second one is an extension of the ROTrends data to include more recent radio occultation observations.

1. In particular, the first data sets is based on the existing CHAMP ROTrends data set. Higher maturity will be achieved by:
  - a. Software Readiness: the underlying code at the different centers is well tested, however smaller improvements or minor bug fixes are expected to be found within the project, furthermore an estimate of the structural uncertainty will be derived;
  - b. Meta Data: data is already available in netCDF 3 format, however further increments to get this data set to maturity level 6 are required;
  - c. Documentation: the primary documentation is available as ASCII files on a dedicated ftp server and through the listed references. There is however no operational algorithm description for each center;
  - d. Validation: extensive validation and publication in peer reviewed journals is already available, further maturity is expected when cross-checking the early CHAMP data set against the more recent missions as processed in the extended ROTrends data set; further validation is performed by cross-checking the data set against re-analysis or climate model data;
  - e. Public Access: currently, all data is on an ftp site, the documentation and accessibility will be enhanced by a web based dedicated project page;
  - f. Societal Impacts: better accessibility, and the extended data set will also benefit the maturity of the CHAMP based data.
2. The second data set, which will become available in the later phases of the RO-CLIM project aims to provide an extended ROTrends data set with at least COSMIC, Metop/GRAS data included, starting from lower maturity. The generation of this data set will first require building up expertise at the different centers to process the different instruments, and will include at least 2 centers that start the processing at level 0 and provide level 1A data for other centers. The different instrument data at level 1A can be processed fairly similarly, thus there are no major code developments expected for centers starting at level 1A. More development work is however expected in order to start processing from level 0. In addition, re-analysis and climate model based simulated occultations will be generated and processed / gridded in the same manner as the instrument data set.

### **Joint OPAC/IROWG-3 workshop**

The third IROWG workshop will be held jointly with the OPAC-5 one, on 5th-11th September 2013, in Austria. Invited speakers have been selected, and general registration is open (for further info, please refer to: <http://www.irowg.org/workshops.html>).

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