

WORLD METEOROLOGICAL ORGANIZATION

**COMMISSION FOR INSTRUMENTS
AND METHODS OF OBSERVATION**

**CIMO MANAGEMENT GROUP
Eleventh Session**

Payerne, Switzerland

10 to 14 March 2014

FINAL REPORT



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EXECUTIVE SUMMARY

The Eleventh session of the CIMO Management Group (CIMO-MG-11) was held from 10 to 14 March 2014, in Payerne, Switzerland.

The meeting reviewed the work done by all CIMO Expert Teams, Task Teams and Theme Leaders since CIMO-XV and focussed its work on planning for the next inter-session period. The meeting reviewed the contribution of CIMO to WIGOS and how it should be contributing and cooperating with other WMO technical commissions, regional associations and programmes.

The meeting reviewed its working mechanisms and working structure and decided on some modification to further improve its efficiency and remove ambiguities in the focus of specific expert teams.

The meeting reviewed and advised on the arrangements for the preparation and conduction of CIMO-16 and TECO-2014.

AGENDA

- 1. ORGANIZATION OF THE SESSION**
 - 1.1 Opening of the Session
 - 1.2 Adoption of the Agenda
 - 1.3 Working Arrangements for the Session

- 2. WORK PROGRAMME OF THE COMMISSION – EVALUATION OF PROGRESS, FUTURE ACTIVITIES AND RECOMMENDATIONS TO CIMO-16**
 - 2.1 Report of the President
 - 2.2 OPAG Standardization and Intercomparisons
 - 2.3 OPAG Remote-Sensing and New Technologies
 - 2.4 OPAG Capacity Building
 - 2.5 Other activities

- 3. ALIGNEMENT OF CIMO'S ACTIVITIES TO WIGOS PRIORITIES, WMO STRATEGIC PLANNING AND OTHER CROSS-CUTTING ACTIVITIES AND PROGRAMMES**
 - 3.1 CIMO Key Role in WIGOS Implementation
 - 3.2 CIMO Contribution to Disaster Risk Reduction
 - 3.3 CIMO and WMO Strategic Planning
 - 3.4 Cooperation with other Technical Commissions and Regional Associations
 - 3.5 CIMO Working Mechanisms
 - 3.6 Future Working Structure of CIMO

- 4. ISSUES RELATED TO PLANNING, COORDINATION AND MANAGEMENT OF COMMISSION ACTIVITIES**
 - 4.1 Arrangements for CIMO-16
 - 4.2 Arrangements for TECO-2014
 - 4.3 CIMO Testbeds and Lead Centres
 - 4.4 Other Pertinent Issues
 - Discussion on Future Intercomparison Activities
 - IOM Reports
 - Certificates and Awards
 - CIMO Trust Fund.

- 5. OTHER BUSINESS**

- 6. CLOSURE OF THE SESSION**

GENERAL SUMMARY

1. ORGANIZATION OF THE SESSION

1.1 Opening of the Session

1.1.1 The eleventh session of the Commission for Instruments and Methods of Observation (CIMO) Management Group (MG-11) was opened on Monday, 10 March 2014 at 9:00, by the president of CIMO, Prof. Bertrand Calpini. He welcomed all the participants to the MeteoSwiss Aerological Station of Payerne. The list of participants is given in [Annex I](#).

1.1.2 The Director of the WMO Observing and Information Systems Department, Dr Wenjian Zhang, welcomed the participants on behalf of WMO. He stressed the importance of the coming session of the WMO Executive Council, as it will be reviewing the main documentation that will be submitted to Congres-17. He stressed the key role played by CIMO for the development of WIGOS. He thanked MeteoSwiss for the hospitality and for the excellent facilities provided for the meeting.

1.2 Adoption of the Agenda

The meeting adopted the Agenda as reproduced at the beginning of this report.

1.3 Working Arrangements for the Session

The working hours and tentative timetable for the meeting were agreed upon.

2. WORK PROGRAMME OF THE COMMISSION – EVALUATION OF PROGRESS, FUTURE ACTIVITIES AND RECOMMENDATIONS TO CIMO-16

2.1 Report of the President

2.1.1 The president reported on some key activities of CIMO, and of his participation in activities related to CIMO that took place in the last 2 years. These included TECO-2012, CIMO MG-10, ICG-WIGOS-3, the meetings of the President of Technical Commissions (PTC), and of the Presidents of Technical Commissions and Regional Associations (PTC-PRA).

2.1.2 The president recalled that the CIMO Technical Conference TECO-2012 was organized together with the Meteorological Technology World Exhibition 2012. Altogether, 270 people attended TECO-2012 over the three days duration of the conference. After the conference, a survey of the conference participants was organized by the CIMO secretariat. The results of the survey were very positive and helped in understanding what worked well and what could be improved. He recommended that a similar survey be organized in the context of TECO-2014.

2.1.3 The president thanked the Russian Federation for its kind invitation to host the WMO Technical Conference on Meteorological and Environmental Instruments and Methods of Observation (TECO-2014) in St. Petersburg from 7 to 9 July 2014, followed by the sixteenth session of CIMO (CIMO-16, 10-16 July 2014). TECO-2014 will be held conjointly with the Exhibition of Meteorological Instruments, related Equipment and Services (METEOREX-2014) and the National Meteorological Congress of Russian federation.

2.1.4 The president participated in the third Inter-Commission Coordination Group on the WMO Integrated Global Observing System ICG-WIGOS-3 (10-14 Feb 2014, Geneva) as co-chair together with Dr Sue Barrell. He noted the clear progress made by WIGOS since the last ICG-WIGOS meeting in 2013, in particular through the work performed by the Inter-Commission Task Teams with representatives of international partner organizations to address WIGOS regulatory material issues (TT-WRM), and improvement of WIGOS Metadata (TT-WMD). He presented the specific contributions of CIMO in WIGOS with the

review of the CIMO Guide to separate guidance from mandatory material, and to collaborate with other technical commissions in preparing the new edition of the CIMO guide (including contributions on Atmospheric chemistry with CAS, Marine Observations with JCOMM, a new Part on Satellite Observations with CBS and satellite experts, and Soil moisture with GCOS experts). The president of CIMO expressed his great appreciation to the work performed by Dr Sue Barrell in her strong engagement and leadership in ICG-WIGOS.

2.1.5 During the PTC and PTC-PRA meetings in January 2014, and at the ICG-WIGOS-3 meeting in February 2014 the president of CIMO informed the meetings about the willingness of CIMO to develop the new edition of the International Cloud Atlas (ICA) as the world's authoritative, primary source of cloud classification, web based and fully comprehensive with the most up-to-date information. This project attracted a lot of attention and support from all parties in WMO. As it was not listed initially in the CIMO work plans 2011-2014, nor in the WMO Regular Budget, it would require supplementary resources and a specific endorsement during the CIMO-16 session.

2.1.6 The president of CIMO informed the meeting that MeteoSwiss will be directly involved in a partnership with WMO Observation Department together with the Swiss External Affairs Department for the technical development of the WIGOS-OSCAR surface database initially, and later OSCAR satellite on the same IT technical platform to be provided and operated by MeteoSwiss.

2.1.7 As in 2013, the president recalled the absolute need for targeted activities expected from our expert team members with clear result-oriented deliverables. The CIMO MG shall concentrate on defining and supporting important milestones, in close alignment with the ongoing WIGOS and WIS objectives, and by prioritizing the work with the view of gaining efficiency in the final *CIMO and IMOP Programme activities*. He noted that in view of the high expectations that WMO Members and programmes have for CIMO and the large number of requests for collaboration, participation and support, the management of the commission requires significant work to ensure it meets those expectations, providing significant contributions to the WMO community. In this context, he stressed that in the future he would expect all CIMO MG members to take an even more active role in supporting and promoting the commission activities, both within and outside the commission.

2.1.8 He welcomed the progress made by CIMO in collaborating with other technical commissions and regional associations. He stressed the need to look for synergies to avoid duplication of work and ensure CIMO's outputs meet user requirements.

2.1.9 The president underlined that with the vision of the Global Framework for Climate Services (GFCS) to enable society to better manage the risks and opportunities arising from climate variability and change, and its pillar related to observations and their related quality assessment, the GFCS framework is seeking for an improved coordination of ongoing activities (cross-cutting activities) relevant to GFCS within and among technical commissions. The president expressed his concern to seek for synergies with the current working structures in WMO and CIMO when considering the future development of GFCS. In this context, the meeting also recognized the need to better inform meteorological data users on the whole observational process associated with the production of data, so that they better understand the data quality issues.

2.1.10 He participated in a number of meetings and missions to coordinate and promote CIMO activities. These included:

- LEOS 4th OASIS Conference: lidar and remote sensing and traceability issue, Tel-Aviv, Israel, 18-21 February 2013
- 5th GRUAN Implementation Meeting (ICM-5), Amsterdam, The Netherlands, 24-26 February 2013,
- ICG-WIGOS-2, Geneva, Switzerland, 19-23 March 2013,
- Sixty-fifth session of the Executive Council (EC-65), Geneva, Switzerland, 15-23 May 2013,

- IMEKO TC19, Lecce, Italy, 02-03 June 2013,
- SPICE IOC-4, Davos, Switzerland, 16-17 June 2013,
- IBCS-1, Geneva, Switzerland, 01-05 July 2013,
- DACA -13, Davos, Switzerland, 10-12 July 2013,
- Review EMPR, London, United Kingdom, 20-21 October 2013.

2.2 OPAG Standardization and Intercomparisons

2.2.1 The meeting reviewed the progress made by the expert teams (ET), task team (TT) and theme leaders (TL) of the OPAG Standardization and Intercomparison. In particular, the OPAG Co-Chairs reported on the achievements of the teams, the problems encountered and recommendations proposed by the ETs for submission to CIMO-16 for approval and on the topics relevant to the work of the ETs that should be taken into consideration in the development of CIMO's future work plan. The details of those reports are not included in this report, but only the main decisions and points of concerns addressed during the discussion are summarized below.

2.2.2 One of the tasks of the CIMO Expert Team on Standardization was related to Metadata Standards. The Chair of the ET-Standardization is also the chair of the WIGOS Task Team on the WIGOS Metadata Standard. The meeting stressed that a clear linkage between the work of both teams is needed to ensure a consistent approach and to ensure that both tasks complement each other.

2.2.3 The meeting appreciated the work done by ET-Standardization in developing guidance on the implementation of the siting classification through a list of questions and answers. It also appreciated the plan of ET-Standardization to share the various practices in use by WMO Members to assess a site and define the classes of each sensor. However, the meeting recognized that further work should be done in this field towards implementing the classification in a consistent manner and developing a generic guidance document to that effect.

2.2.4 As far as tasks requiring coordination with other technical commissions are concerned, the meeting felt that there is a risk that the needed feedback is not received. It therefore recommended that the Secretariat provides support in formalizing the interactions with other technical commissions toward getting appropriate feedback from those relevant communities. Such an example is the need to collaborate with the Commission for Hydrology on the standard for the classification of instruments for rainfall intensity measurements.

2.2.5 The meeting recognized that collaboration with ISO on the development and update of relevant standards would be one of the main issues that ET-Standardization would have to face in the coming inter-sessional period. Collaboration on the siting classification and the wind lidar standards will require active engagement of CIMO experts to ensure they meet the requirement of the meteorological community. It was also recognized that some of the ISO standards managed by ISO TC 180/SC1 had been based on an earlier version of the CIMO Guide, while the requirements for the update of these standards is coming mainly from the interests of the industry. WMO's interest in these standards is not to specify precise instrument classes, as it is up to the users to identify their requirements, but in specifying how to ensure specific requirements can be met. In this precise case, the meeting therefore felt that to ensure best use is made of CIMO experts' time, the role of CIMO experts should be in providing specific information/feedback addressing mainly the metrological aspects of those standards based on requests from the Chair of the ISO TC 180/SC1 committee.

2.2.6 The meeting recognized the effort made and challenges encountered by the Expert Team on New In-Situ Technologies (ET-NIST) in reviewing new technologies and techniques for measurements of interest to the hydro-meteorological community. The main challenge with this topic is the reluctance of instrument developers to share information prior to the commercialization of instruments and the low response rate of surveys. While MG-11 recognized the relevance of seeking and publishing such information, it agreed that in view of

the challenges faced with this activity, this task should have a lower profile in the ET workplan and should rather be carried out through information exchange among the CIMO experts than through wide surveys having very low response rates.

2.2.7 The meeting also recognized the recurrent challenges faced in collecting algorithms used in automatic weather observing systems (AWOS) and in making proposals for their standardization as a contribution to WIGOS. In this case again, the reluctance of manufacturers and Members in publishing or openly sharing their algorithms prevents CIMO from assessing their performance and working on their standardization. Therefore, the meeting agreed that it would not be worth to continue this activity in the future. In the case of the instruments used for present weather observations, the meeting consequently recommended to rather update the CIMO Guide, stating their shortcomings. The meeting also recognized that carrying out relevant instrument intercomparisons was one way of circumventing this problem and providing really valuable information to Members on the performance of those systems.

2.2.8 Concerning the task of incorporating the outcome of the COST 727 Action on the measurement of icing on structures, the authors and the WMO Secretariat are trying to get agreement of COST on a joint copyright to publish the final report as an IOM report. Though this issue is not solved yet, the meeting recognized the importance of updating the CIMO Guide with respect to the outcome of this action. Also, the meeting noted that there were no clear user requirements for measurement of icing within the WMO Rolling Review of Requirements (RRR), while such requirements are obviously required from the energy network operators. The meeting therefore recommended that CBS considers seeking relevant user requirements from the energy community and possibly even considers introducing a new application area to address their specific requirements.

2.2.9 The meeting noted that the topic of providing guidance on the transition from traditional instruments to automatic weather stations (AWS) had been raised by a number of expert teams, it felt that a lot of work had already been done and published on the subject and that it would rather need proper referencing than being redeveloped. It also noted the continuous request for guidance on this subject received by Members and felt it would best be addressed by organizing an international conference on AWS in the next inter-sessional period, in the context of WIGOS (see also para 4.4.23-26).

2.2.10 Since data communications is often a significant issue in ensuring continued reporting from stations in some developing countries ET-NIST proposed considering drafting guidance material for the CIMO Guide on the range of communication techniques that can be used to report data, and their advantages and disadvantages (cost, reliability). Though CIMO did provide some guidance related to communication with AWSs, the meeting felt that developing generic information on communication systems would not be CIMO's responsibility, as its focus is to provide guidance on how to achieve the measurement of a specific quantity.

2.2.11 The meeting noted that many ETs had tasks related to radiation measurements, and felt it was not making effective use of the experts' time. It therefore decided to consider reassigning them to one specific task team, when reviewing its working structure (see Sect. 3.6). The task team will have to assess whether there is a difference between the World Radiometric Reference (WRR) and the International System of Units (SI) and determine how to proceed to ensure continuity of radiation records in the future, if needed.

2.2.12 In the context of standardization of observational practices, the meeting recalled that CIMO is working on variables, rather than on specific instrument types. It needs to focus on requirements stated by the users rather than on a precise type of technology. Originally, CIMO focused on traditional variables, like temperature, pressure, while nowadays, it should be considering new types of variables and products of interest to Members, such as rain fields for example that can be measured by a variety of observing systems. CIMO could consider developing guidance to Members on how to combine information originating from

different observing systems (in this case weather radar and rain gauges at least) to obtain the rain field. The meeting therefore recommended to assign a task to ET-Standardization related to integrated observation.

2.2.13 The meeting recommended that all ETs be invited to express which types of products achieved through integrated observations could be standardized, so that the CIMO MG could prioritize such activities towards contributing them to the development and implementation of WIGOS. The meeting noted that additional financial resources might be available within WIGOS to support such targeted activities.

2.2.14 The meeting proposed to task ET-NIST to investigate the automatic cloud reporting and assessing whether traceable cloud measurement were feasible.

2.2.15 The meeting appreciated that the Chair of CIMO ET Instrument Intercomparison (ET-II) had been very active in coordinating activities with the ET members as well as in liaising with other ETs and relevant parties. The meeting recommended that in the future, all CIMO ETs be encouraged, or possibly tasked, to have stronger interactions with other ETs, as some tasks require knowledge input from a wide range of experts.

2.2.16 The intercomparison of instruments for measuring infrared radiation that were held in conjunction with the International Pyrheliometer Intercomparison (IPC) in Davos, in 2010 showed that such intercomparisons were possible and do improve the traceability of infrared measurement. It demonstrated the significant improvement achieved on the uncertainty of infrared radiation measurements. The meeting supported the recommendation of the Expert Team on Instrument Intercomparisons that international intercomparison of sensors measuring infrared radiation be formally recognized by CIMO and organized regularly in conjunction with IPC to enhance the traceability of measurements to the World Infrared Standard Group and to promote capacity development of participants to standardization of procedures and practices in this field.

2.2.17 The meeting agreed that links to publications providing the results of intercomparisons carried out by independent parties be provided on the CIMO website even if they were not formally organized within CIMO, nor published as IOM reports. This would give them some recognition and ensure that Members have access to important results achieved through them.

2.2.18 The meeting was informed of the proposal of Croatia to carry out a regional intercomparison of reference pyranometers of the WMO RA VI Members. The meeting was supportive of this activity, but recommended considering the aspects of capacity building that could be organized in conjunction with this intercomparison to improve the quality of radiation measurement in the sub-region. The meeting noted that some CIMO experts had provided some technical recommendations for the conduction of the intercomparison and requested the Secretariat to provide them to the project leader for his consideration in the preparation of the intercomparison.

2.2.19 Though there were very few experts with expertise on radiosondes in this inter-sessional period, the meeting was pleased that significant work had been performed by John Nash in developing updated chapters for the CIMO Guide on upper-air measurements and also in preparing an IOM report sharing his wide knowledge on the subject.

2.2.20 The meeting noted that CIMO intercomparisons are focussing on newly developed instruments that are suitable for operational use. There is one exception to that, which is the regularly conducted IPC in Davos, which intercompare reference instruments to provide the basis for the traceability of radiation measurements world-wide.

2.2.21 The meeting noted the proposal for future global intercomparisons provided by ET-II and decided to have further discussions on possible future intercomparisons under Agenda item 4.4 (see para 4.4.1-12). It recognized that CIMO could only organize a limited number of intercomparison within one inter-sessional period because of the work load this represents for experts, as well as for the Secretariat and because of the funds required to organize

meetings for the preparation and analysis of these intercomparisons. It therefore recommended to organize at most 2 global intercomparisons per inter-sessional period, beside the regularly organized IPC that is almost fully supported by the World Radiation Centre. The meeting also recalled the need for detailed planning of global intercomparisons through an appropriate feasibility study including a detailed intercomparison plan and proposed analysis methodology.

2.2.22 The Task Team on Aircraft-based Observations was established following CIMO MG-10 (2012) to continue, in collaboration with the CBS Expert Team on Aircraft Observations (ET-ABO), the activities that used to be carried out by the AMDAR Panel. The tasks that were to be carried out by the Theme Leader were merged into the new list of tasks and work plan of this task team. The meeting was pleased to note that the Task Team was active and reiterated the relevance of its work for CIMO.

2.2.23 The meeting agreed with the proposal from the Task Team that given the ongoing nature of the work of the team, the Task Team should be replaced by an Expert Team on Aircraft-based Observations (ET-AO) for the next CIMO inter-sessional period, with a similar ongoing functionality as a component of the Aircraft-based Observations Programme (ABOP) in cooperation with CBS ET-ABO. The meeting noted that, because of the limited funds available to CIMO, most CIMO ETs are meeting only once in an inter-sessional period and are dealing with a variety of observing systems. It therefore expected that the meetings of ET-AO would be jointly funded by the AMDAR Trust Fund and WMO Regular Budget to enable it to have more frequent meetings and to avoid merging it into another CIMO ET. The meeting also recommended that the Secretariat looks at cost-effective and programme-effective ways of conducting meetings of both (CIMO and CBS) teams.

2.2.24 The meeting reviewed the draft future workplan of all ETs. It agreed that the MG, with support from the Secretariat, would prepare draft work plans for each ET prior to the CIMO-16 session (see also Sect. 3.5) and that it would finalize the prioritization of activities by correspondence.

SPICE

2.2.25 The project leader of the Solid Precipitation Intercomparison Experiment (SPICE), Rodica Nitu, provided a status report on the progress of SPICE to the MG. SPICE has been recognized as a demonstration project of Global Cryosphere Watch (GCW). The meeting congratulated the whole SPICE team for the important work carried out to date. It was pleased that the project team was wide and welcoming the contribution of all sites to contribute to the overall project and data analysis, and that it was holding regular teleconferences to ensure the progress of the work.

2.2.26 The SPICE IOC has identified two major risks that could impact on the timely delivery of the expected SPICE results. These are 1) not delivering the planned results if not acquiring a comprehensive and representative data set, as a consequence of the project being limited to two winter seasons and 2) delaying the publishing of the SPICE Final Report for one or more years, as a result of very limited capacity currently dedicated to analysis of the results and to writing of the report.

2.3 The SPICE IOC sought the support from the CIMO MG for:

- Extending the duration of the intercomparison from two to three winter seasons (winter seasons: 2012/2013, 2013/2014, 2014/2015 in both Northern and Southern Hemispheres; Final Report in 2016);
- Securing resources to support the data analysis (total of two person-years are required for the completion of the data analysis and report writing).

2.3.1 The CIMO MG supported the proposed extension of the project, but recommended to the IOC not to enlarge the project anymore at this stage with new sites and/or new instruments that would further delay the completion of the project.

2.3.2 The CIMO MG supported the proposal to hire a data analyst to work closely with the project team and to support it in completing the data analysis. The meeting noted that funds required should be coming principally from the CIMO Trust Fund in view of the limited funds available in the WMO regular budget to support CIMO intercomparison activities. It therefore recommended all CIMO MG members and all the SPICE team members to identify potential contributions to the CIMO Trust Fund. It also encouraged manufacturers to provide financial contributions to this effect in order to ensure the timely delivery of the final report, so that they could benefit from the SPICE results as early as possible. The meeting recommended that the Secretariat liaise closely with the SPICE Project Leader and the Chair of the SPICE Data Analysis Team to identify the best suitable candidate for this work.

2.3.3 The meeting recommended that the SPICE-IOC identifies in the Final Reports those sites where the experiment should be continued as a matter of priority beyond the formal duration of the experiment because of their potential for delivering critical additional results, and possibly specifying their precise potential, rather than supporting evenly the continuation of all sites. It also recommended to manufacturers to donate their instruments to those sites which plan to continue the experiment, so that they could be tested over a longer period.

2.4 OPAG Remote-Sensing and New Technologies

2.4.1 The meeting reviewed the progress made by the expert teams, and theme leaders of the OPAG Remote Sensing and New Technologies, and their recommendations, in the same way as it did for the OPAG Standardization and Intercomparisons.

2.4.2 The meeting appreciated the work done by ET Operational Remote Sensing (ET-OpRS) and noted that it covered a very wide scope of activities, which are all of high relevance to Members' concerns and to WIGOS. However, the meeting stressed the importance of ensuring that the outcome of the ET activities can be shared with all WMO Members through appropriate publications and relevant update of the CIMO Guide. Many national studies that are relevant to the task of the ET were published. The meeting therefore recommended that a list of such publications be made, and to link them from the CIMO/IMOP website as soon as possible. This would ensure that Members have access to most up-to-date information, while relevant IOM reports and update of the CIMO Guide are being developed.

2.4.3 The meeting also recommended considering options to ensure that the present phase of the Radar Quality Control and Quantitative Precipitation Intercomparison (RQI) could be finalized during the course of this year and to organize relevant activities (meetings) as a priority within CIMO.

2.4.4 Taking into account the wide scope of ET-OpRS, the meeting proposed that 3 Task Teams be established by CIMO-16 within the ET (for radars, wind profilers, and lightning detection systems) so that the focus of their meetings would be more targeted and that experts can achieve a clear outcome at the end of the meeting.

2.4.5 The meeting welcomed the significant work that was done in developing a fully revised version of the CIMO Guide Chapter on Radar Measurements.

2.4.6 The meeting noted that the scope of the activities of the ET New Technologies and Testbeds (ET-NTTB) was also very wide and decided to carefully prepare its next inter-sessional workplan to make it more focused. It also noted that most work had been carried out at the time of the ET-NTTB meeting and agreed that the responsible OPAG Chair should in the future liaise more closely with ET-NTTB, to better monitor its work and encourage its members to pursue its activities throughout the inter-sessional period.

2.4.7 Following the recommendation from ET-NTTB, the Secretariat developed websites for each Testbeds and Lead Centre (see further details in Sect. 4.3).

2.4.8 Giovanni Martucci presented the recent progress made on the development of the common ISO-WMO standard on wind lidars. The preparation of the International Standard

draft ISO/TC 146/SC 5/WG 6 N 178 “Air quality — Environmental meteorology — Part 2: Ground based remote sensing of wind by heterodyne pulsed Doppler lidar”, has been recently discussed during a workshop held at MeteoSwiss Payerne on the 31 January 2014. Under the motivation of creating an international reference for coherent pulsed Doppler LIDAR wind products and to ensure and foster future commercial activities related to this technology, end users and vendors have met to make an actual progress toward the finalization of this draft standard. In order to respond to these needs a new outline has been created for the draft, Editorial Board and a Review Board have been constituted and challenging deadlines have been agreed with the aim of finalizing an advanced draft to be ready for presentation at the time of TECO-2014, in July 2014.

2.4.9 The meeting agreed on the importance of having a liaison between CIMO and Steering Group on Radiofrequency Coordination (SG-RFC) through the Theme Leader on Radiofrequency Protection. It recommended that the Theme Leader sends the WMO position paper that is prepared in advance of each ITU radiofrequency conference to all CIMO expert teams to get their feedback, so as to be able to defend their views during the SG-RFC meeting. It was also proposed that the Theme Leader, in collaboration with all the CIMO ETs, develop a list of systems that are relying on specific radio-frequency bands, specifying the range of these bands that would help in the liaison process, as a complement to the document that is developed by SG-RFC.

2.4.10 In order to improve the liaison of the Theme Leader with the CIMO ETs, the meeting recommended considering inviting him to attend the meeting of one expert team of the CIMO OPAG remote-sensing. The meeting also recommended that the president of CIMO considers attending the next World Radiofrequency Conference to support WMO in the safeguarding of frequency bands relevant to meteorological instruments.

2.5 OPAG Capacity Building

2.5.1 The meeting reviewed the progress made by the expert teams, and theme leaders of the OPAG Capacity building, and their recommendations, in the same way as it did for the other two OPAGs.

2.5.2 The survey on obsolete and dangerous instruments carried out by ET-RIC revealed that mercury-based instruments are still widely used. The UNEP Minamata Convention that is planned to enter in force in 2020 will have significant consequences for Members using mercury-based instruments in their networks. From that date, the manufacture, import and export of products containing mercury (including meteorological instruments, such as barometers and thermometers) shall not be allowed anymore. The meeting noted the need to sensitize Members to this, so that they could prepare themselves to introduce alternative instruments in their networks as early as possible.

2.5.3 The meeting noted that RICs are called to play an important role in WIGOS by ensuring the quality of observations, as stated in the regional WIGOS implementation plans. There is therefore a strong need to encouraging and supporting RICs in fulfilling their mandates. The major role of RICs is to provide to Members of their region, the traceability of their reference standards. The meeting welcomed the webpages that were developed for individual RICs based on the information they provided and that are giving information to Members on the service they can provide and on their capabilities.

2.5.4 The meeting noted and appreciated the progress made in developing a strategy to improve the traceability of instruments through field verifications. Instrument traceability plays a key role for many application areas, ranging obviously on the assessment of climate variability and changes, but also to aspects that may have strong economic and legal impacts in the context of issuance of warnings for severe weather to protect lives and livelihood for example. The meeting noted that it would be essential to remind Members about their duties to ensure the traceability of their instruments. The meeting recommended that a formal recommendation be drafted and submitted to CIMO-16 to strengthen the need

for ensuring instrument traceability and requesting Members to demonstrate how they are doing it. Such a recommendation/resolution could possibly even be submitted to Congress.

2.5.5 The meeting also recommended updating the CIMO Guide to clarify that instruments need to be calibrated over the entire operational range in which they are used. Moreover instruments should be calibrated at various temperatures within the expected temperature range to demonstrate appropriate temperature compensation.

2.5.6 The meeting was pleased that the Preliminary 2014 Edition of the CIMO Guide was ready for Members' review. It includes a number of updates and/or fully revised chapters that were developed and reviewed by CIMO Expert Teams. Significant contributions to this effort were also provided by experts from the Commission for Basic Systems (CBS), the Commission for Atmospheric Science (CAS), and the Joint Commission for Oceanography and Marine Meteorology (JCOMM) and other experts.

2.5.7 Some errors were identified during the finalization of translated versions of the CIMO Guide. In order to ensure a proper version control of the CIMO Guide, the meeting recommended, that one edition should be the same in all language. Therefore, errors identified during the finalization of translated version should not be corrected in these translations, but only in the next editions/updates. The meeting also recommended that a change process be implemented to ensure that errors could be corrected in a regular manner, when they are identified.

2.5.8 The meeting noted the practice that has been used in developing the update of the WMO Technical Regulations and of the Manual in WIGOS, which consists in avoiding duplication of material between documents. It stressed the need to adopt a very careful approach when removing material from the CIMO Guide to include it into the WMO Technical Regulations and WIGOS Manual to ensure the overall context of the practices described in the CIMO Guide remain clearly understandable and in their context.

2.5.9 During the preparation of the Preliminary 2014 Edition of the CIMO Guide, the Editorial Board noted some discrepancies between the practices used in the CIMO Guide and some other WMO publications, concerning the use of quantities, units and symbols, as well as editorial practices. The meeting agreed with the Editorial Board that uniform, world-wide accepted practices should be applied throughout all WMO publications (Technical Regulations, Guides, Manuals, Reports...), even more, when such practices have been promulgated by organizations with which WMO has signed working arrangements or memorandum of understanding. The meeting therefore proposed that the following recommendation be submitted for consideration to the WMO Executive Council:

- General principles concerning the use of quantities, units and symbols, throughout all WMO publications, should be in accordance with the International System of Units (SI), published and regularly updated by the International Bureau of Weights and Measures (BIPM, 2006), the Quantities and Units, defined by International Organization for Standardization (ISO, 2009) and the Symbols, Units, Nomenclature and Fundamental Constants in Physics, described by International Union of Pure and Applied Physics (IUPAP, 1987). Variables not defined as an international symbol by the above mentioned documents, but commonly used in meteorology should be used as stated in the International Meteorological Tables, published by World Meteorological Organization (WMO, 1966).
- WMO Style Guide should be updated in accordance with the Recommendation above and applied as general editorial practices for the future editions of all WMO publications.

2.5.10 The meeting agreed that all international reference systems, like SI, time (UTC), location (WGS84), altitude (MSL to be referenced to the geoid EGM96) should be endorsed by WMO Cg (if not done already) and published in the starting chapters of the WMO Technical Regulations (as stated by EC for some). The meeting recommended that such

coordination be done through ICG-WIGOS and checked by the CIMO MG during the review of the WIGOS regulatory material.

2.5.11 In spite of the huge work done by all CIMO experts to update the CIMO Guide, there are some topics that will still have to be addressed in the coming years. These include, among others:

- Reorganization of the chapters that describe mercury instruments to ensure these are not presented as first option.
- Develop update of Part II, Ch 5 “Special Profiling Techniques for the Boundary Layer and the Troposphere”.

2.5.12 The meeting requested the Secretariat to develop a list of outstanding actions related to updating of the CIMO Guide that should preferably be addressed in the coming inter-sessional period.

2.5.13 The calculus (adopted by Cg) to derive level II from level I data can be found in a number of WMO documents, like the CIMO Guide (cf. Annex in the humidity chapter for the relation between temperature, relative humidity and dew point temperature). Other sources are the Annexes to Vol I of the WMO TR (WMO-No 49), the Guide to the GOS, the WMO Meteorological tables and WMO technical reports to which TR is referring to. The meeting recognized the need to incorporate all these formulas into one single document and felt that CIMO should be proposing a solution for this in the context of WIGOS. It recommended that this be considered as a task for the CIMO Editorial Board to come to a consistent reference on the calculus of meteorological variables attached to the TR.

2.5.14 The meeting noted a request received from the Commission for Climatology for clarification on which formula should be used for the computation of sea level pressure, as presently 2 formulas are recommended for use.

2.5.15 The meeting appreciated the extensive work performed by the Theme Leader on Radiosonde Performance Monitoring and commended him for his work.

2.5.16 The meeting recommended including the activities of the Theme Leader on Surface-based Instrument Performance Monitoring into the most relevant expert team to ensure the person leading this task has more interaction with other experts and work in a more motivating environment.

2.5.17 The meeting noted that some progress had been done on the development of competencies for staff by ET-RIC, but that it needed to be widened to encompass also the competencies required to cover the entire observational process. As this is a clearly defined task, it felt this activity could probably best be brought to an end by establishing a specific Task Team on this matter.

2.6 Other activities

International Cloud Atlas

2.6.1 The Final Report and Recommendations of the CIMO Task Team on Review of the International Clouds Atlas (TT-ICA) were considered at a teleconference of the CIMO Management Group on 16 January 2014. MG had agreed in principle with the recommendation from TT-ICA to carry out an extensive revision and update of the ICA to make it the undisputable web-based global reference standard for the classification and reporting of clouds and meteors. It had agreed that satellite observations of clouds could be included in the metadata, but stressed that the identification of clouds by satellite is a separate topic, not to be covered in the ICA. However, the MG had noted that no funding was presently available to support this activity. It had also requested TT-ICA to refine its proposal and include intermediate milestones (associated with clear deliverables, and costing) that could be addressed as independent/successive modules.

2.6.2 The proposal to update the ICA was presented to the meeting of the President of Technical Commissions (20-21 January 2014, Geneva), to the meeting of the President of Technical Commissions and Regional Associations (22 January 2014, Geneva), as well as to ICG-WIGOS-3 (10-14 March 2014). All of them strongly supported this proposal.

2.6.3 The proposal was also presented to the WMO Publication Board on 3 March 2014. The Board emphasized the need to retain integrity of the ICA as WMO's global international standard – part of the WMO Technical Regulations, and agreed that a public-private partnerships (PPP) could provide the way forward for financing the new Atlas

2.6.4 As requested by CIMO MG, TT-ICA refined the work plan for the update of the ICA. It is divided in two main parts, each of them consisting of a number of self-contained and sequenced activities, to enable work to be carried out in bites, either in parallel or sequentially as resources for successive activities become available. Phase 1 tasks to be completed between June 2014 and April 2015, prior to the WMO Congress in May 2015, and work that would take place after Congress as Phase 2.

2.6.5 The meeting reviewed the plan and fully agreed with it. It noted that it would be essential to keep as many experts as possible from the original TT-ICA to carry out this work and commended them for the work done to date. The meeting strongly supported the idea of completing phase I prior to Congress and to have a draft website ready for demonstration to all WMO Members at this occasion. The meeting also recommended that a clear reference to the TT-ICA be introduced in the WMO regulatory material (Technical Regulations).

TECO-2012

2.6.6 TECO-2012 was organized in Brussels, Belgium, from 16 to 18 October 2012. The conference was held in parallel with the Meteorological Technology World Expo 2012. In total, there were 270 different participants over the three days, with between 200 and 240 in attendance each day. A survey of the participants of TECO-2012 was organized shortly after the conference. It revealed that participants were generally happy with the balance of the oral and poster presentations.

2.6.7 The main problems encountered were the background noise from the exhibition, as the auditorium was located within the exhibition hall and had no roof, and the apparent inattention of the participants to the posters, despite lengthened breaks to enable time for poster viewing.

2.6.8 The meeting therefore recommended that TECOs should in the future be held in a closed auditorium and that special attention needed to be paid to attracting participants to viewing the posters. This could take different form, such as the specific location of the posters, dedicated poster sessions, short oral presentation of some or all the posters, etc.

2.6.9 The special discussion session that was organized during TECO-2012 on the subject of the Siting Classification for Observing Stations on Land was very well attended and worked well. Such sessions could be organized in the future to address specific topics, in particular during TECOs preceding a session of CIMO.

3. ALIGNMENT OF CIMO'S ACTIVITIES TO WIGOS PRIORITIES, WMO STRATEGIC PLANNING AND OTHER CROSS-CUTTING ACTIVITIES AND PROGRAMMES

3.1 CIMO Key Role in WIGOS Implementation

3.1.1 Dr Wenjian Zhang briefed the meeting on the status of development of WIGOS and about the main outcomes of ICG-WIGOS-3 (10-14 February 2014).

3.1.2 CIMO has been a major contributor to the WIGOS development, in particular through:

- ICG-WIGOS: The CIMO president co-chairs this key WIGOS steering group and Dr van der Meulen has recently been appointed as the CIMO Focal Point on DRR;
- TT-WMD: CIMO provides the chair of this group, which has developed a draft standard for Core WIGOS Metadata;
- TT-WRM: CIMO has contributed a key role to the development of WIGOS regulatory material through the Chair of the CIMO Guide Editorial Board, who is a member of this Task Team. Notably, the CIMO Guide has been closely examined and several candidate requirements elevated to regulatory status by their inclusion in the WIGOS regulatory material.
- TT-ICA: This development is fully consistent with a WIGOS strategy to promote global standardization in observation. ICG-WIGOS has broadly supported a new edition of ICA as a WIGOS project with a strong capacity development aspect.
- CIMO Guide Editorial Board: with the cooperation of numerous experts from within and beyond the commission, a new edition of the CIMO Guide will be submitted for approval to CIMO-16. This is a significant contribution to the development of WIGOS regulatory material.

3.1.3 CIMO also contributed to the development of WIGOS through many other initiatives, including among others collaboration with ISO towards developing common WMO-ISO standards, collaboration with COST initiatives that promote standardization, plans to organize a workshop to address future mechanisms for improving the standardization of remote sensing observational systems and techniques and through its other activities, that are almost all directly contributing to WIGOS.

3.1.4 The meeting noted that the draft WIGOS regulatory material (changes to WMO Technical Regulations and the new WIGOS Manual) will soon be available for detailed review by the technical commissions which would have to be completed by 30 June 2014. The meeting noted the importance of this review, which should consist in reviewing both the specific CIMO contributions, as well as the overall consistency of the overall content of the documents. It agreed to conduct this review in the following manner:

- Dr Kurz will provide the document to all CIMO MG members, pointing out all the parts that have been contributed by CIMO as well as any comment or concern he might have on the proposed documents by 15 April 2014.
- All CIMO MG members shall review the document and provide their detailed comments to the president and the other CIMO MG members by 15 May 2014.
- The president will develop a consolidated version of all comments and provide it to all CIMO MG members by 31 May 2014.
- All CIMO MG members shall review the consolidated version of the comments and provide any final comments to the president by 15 June 2014.
- The president to transmit the final CIMO view to the WIGOS Project Office by 30 June 2014.

3.1.5 The meeting was informed that the WIGOS Core Metadata Standard was available for detailed review by the technical commissions. The meeting encouraged the CIMO MG members to review that document and to provide their comments to the WIGOS TT-Metadata by the deadline of 15 May 2014, if possible. The meeting recognized that there was not sufficient time to organize a formal review within CIMO.

Towards improved standardization of surface-based observing systems

3.1.6 Global improvements in the quality and traceability of observational data from basic observational instrumentation have resulted from the implementation of standardized

calibration, maintenance and operational procedures, thanks to the establishment of the WMO Regional Instrument Centres and Regional Radiation Centres. WMO Members are increasingly transitioning from manual to automated observations for more than the basic measurements, yet similar success in ensuring global data quality has not yet been accomplished for the more complex associated observing equipment (such as ceilometers, visimeters, weather radars, radar wind profilers, lidars, etc).

3.1.7 To address these issues, and explore options for improving the global situation with regard to standardization of surface-based observing systems and techniques, it was proposed to organize a Scoping Workshop on this subject. The meeting reviewed a draft proposal (see [Annex II](#)) and fully supported the concept of organizing such a workshop. It also recommended having a discussion session on this topic during TECO-2014 towards finalizing the plan for the workshop. The meeting also recommended inviting the representatives of relevant CIMO Testbeds to this workshop.

3.1.8 The meeting stressed the need to identify the quantities to be measured from remote-sensing systems for which Members want to achieve traceability in the future (which specific measurand are Members interested in), and whether to address remote-sensing systems as stand-alone systems, or as part of an integrated operational observing system/network.

3.2 CIMO Contribution to Disaster Risk Reduction

3.2.1 Disaster Risk Reduction (DRR) is a priority for WMO because protection of lives, property and livelihoods are at the core of the priorities of the WMO Members and the National Meteorological and Hydrological Services (NMHS). The DRR programme involves cooperation between all WMO technical commissions, regional associations and NMHSs.

3.2.2 A workshop and a coordination meeting were held in 2013 in which Jitze van der Meulen represented CIMO. In this context, it was noted that CIMO provides guidelines and standards to provide stable, reliable instruments and systems, which are designed to withstand the extreme environmental impacts to be expected. An essential constraint is that the observing systems are well maintained, inspected and managed.

3.2.3 Within this CIMO may play a pro-active role. However, CIMO is not a technical commission with a DRR related sub-programme. In fact CIMO is supportive only and will act in the overall framework of the DRR Programme as it did in the past. The meeting noted that during the two events mentioned above and held in 2013, it was recognized that DRR activities for CIMO are expected more or less to be on specific requests only depending on specific needs of projects.

3.3 CIMO and WMO Strategic Planning

3.3.1 Congress-XVI adopted the WMO Strategic Plan 2012-2015. The WMO Operating Plan 2012–2015 provides details on key outcomes, deliverables and activities to be implemented to achieve results defined in the WMO Strategic Plan, with the resources provided under WMO Results-Based Budget, and activities of technical commissions and regional associations to be implemented through in-kind support. The strategic and operational planning for the period 2016-2019 follow the same structure. Technical commissions were requested to develop their own Operating Plans in support of the implementation of the WMO Strategic Plan 2016-2019.

3.3.2 The meeting noted that the technical commission operating plans, come as complement/additions to the part of the operating plan developed by the Secretariat, which includes all the activities that are funded by the WMO regular budget. For sake of effectiveness and clarity, the meeting decided to follow the same approach as was used for the CIMO 2012-2015 Operating Plan, and to include in it only activities that are linked with specific contributions provided by Members that are not directly visible from the part of the operating plan addressing the regular budget activities. Therefore the CIMO Operating Plan

should be seen as a complement to the regular-budget activities associated with CIMO already included in the WMO Operating Plan. The meeting reviewed and approved the CIMO Operating Plan provided in [Annex III](#).

3.4 Cooperation with other Technical Commissions and Regional Associations

3.4.1 The president was pleased about the good cooperation that took place between CIMO and other WMO technical commissions in the last years. This was the case for example for the update of the CIMO Guide, for the development of common WMO-ISO standards and for SPICE.

3.4.2 Some technical commissions have approached CIMO with specific proposals for collaboration/request for support, while some others were relayed through decisions of the WMO Executive Council. Main proposals were discussed as summarized below.

3.4.3 The meeting noted that all regional associations (RA) had put a strong focus on RICs and related activities in their WIGOS RA Implementation Plans. The meeting agreed that CIMO MG members should take an active role in liaising with and identifying the requirements for support from their respective regional associations.

3.4.4 Regional Association VI (RA-VI, Europe) proposed collaboration between RA-VI and CIMO addressing observations at mountain stations. Specific problems that those stations are facing include the measurement of wind in icing conditions and of precipitation, as well as logistical problems related to power supply and telecommunications, in particular in the context of the automation of such stations. The meeting welcomed the proposal from the president to host such a workshop in Switzerland and agreed to jointly organize a workshop on the challenges of operating instruments in the mountainous conditions with RA-VI.

3.4.5 The Commission for Agricultural Meteorology (CAgM) approached CIMO to perform the characterization of farmer rain gauges used in Africa and provide guidance on how to improve those gauges. In this context, EC-65 emphasized the urgent need of improvement in rainfall observation networks in rural areas of developing countries (Metagri project). The Council encouraged a special coordinated effort from CAgM, CHy, CIMO and possibly CCI to develop standards for simple plastic raingauges to be used by farmers to improve the network of rainfall observations in areas where there are gaps and to contribute to the objectives of the WMO Integrated Global Observing System (WIGOS), with special regard to the quality of observations and the standardization of instruments and methods in rural and agrometeorological networks. The Secretariat arranged to put in contact the representatives from the Metagri project with those of the CIMO Lead Centre on Precipitation Intensity, which was interested in supporting this project.

3.4.6 The meeting clarified that CIMO is not developing standards for raingauges, but best practices for their use. The meeting recommended that the Metagri project specifies the technical requirements for its project, so that appropriate guidelines and best practices could be developed in collaboration with CIMO experts. The outcome of the investigation of these gauges would indeed strongly depend on whether they are aimed at identifying a certain accumulation or at performing high quality measurements for the identification of climate change, or other. The meeting agreed that it would be appropriate for CIMO to contribute to this project as it represents a clear user request in the field of instruments and methods of observation and appreciated the interest shown by the CIMO Lead Centre on Precipitation Intensity to lead the collaboration on this matter. The meeting recommended that the CIMO president provides a support letter to the Lead Centre on this matter.

3.4.7 The meeting noted the need to collaborate with the Commission for Aeronautical Meteorology (CAeM) to ensure that the development on observing technologies being carried out within ICAO be in line with the content of the CIMO Guide.

Centennial Observing Stations

3.4.8 The Executive Council, at its Sixty-fifth session, noted the support of ICG-WIGOS for centennial observations at specific sites and urged Members to sustain relevant observation programmes as an invaluable scientific heritage for future generations. While fully acknowledging Members' sole responsibilities for national observations, the Council requested CCI, jointly with GCOS and CIMO, to investigate existing site certification mechanisms, network criteria and monitoring principles and to set up an appropriate WMO mechanism for the recognition of centennial observing stations, based on a minimum set of objective assessment criteria.

3.4.9 The purpose of this designation is to support Members' efforts to maintain observational programmes at selected sites for decades or even centuries, and emphasized the outstanding importance of historically uninterrupted long and homogeneous time series of data as reference for long-term analyses of climate variability and change. It is also of special relevance considering the fact that the number of observing stations has been decreasing world-wide in the last decades.

3.4.10 Two experts (one from the climate domain and one representing CIMO) prepared draft criteria for a potential WMO designation of centennial observing stations. The meeting reviewed those draft criteria and strongly supported the general principles, but recognized that more work was needed to finalize those criterias. The meeting made the following recommendations:

- Invite WCRP to join the process.
- Only high quality station should be selected.
- Follow a very careful approach in defining the criteria, as the designation of a station which would later turn out not to be a high quality station may be very detrimental to the climate and weather communities.
- Consider including additional criteria, such as on the wider environment (f.ex. urbanization around the station) that is not captured by the siting classification.
- Include metadata information on the type of instruments used.
- Be very stringent on the future criteria.

3.4.11 The meeting noted that wide Members engagement for this mechanism was needed and decided to organize a discussion session on this topic during TECO-2014.

Alignment of practices used in CIMO Guide, RRR and EGOS-plan

3.4.12 The meeting noted that WMO had 3 databases/tables, which provides information related to observational requirements besides other information specific to each of these tables. Each of them (Rolling Review of Requirements / OSCAR database, CIMO Guide Annex 1D of Chapter 1 Part I, Manual on the Global Observing System Appendix III.1 and III.2) has a specific purpose and history. They are sometimes making use of different terminology to express similar concepts.

3.4.13 Requirements like physical range, the resolution to be reported, required measurement uncertainty **are not** defined by CIMO itself but stated by other programmes, while the information on achievable measurement uncertainty is provided by CIMO.

3.4.14 The list with required measurement uncertainties was endorsed by CBS and published in the Guide to the GOS (WMO-No. 488, Appendix III.1, Functional specifications for automatic weather stations and Appendix III.2, Basic set of variables to be reported by standard automatic weather stations for multiple users).

3.4.15 For the evolution of the GOS, the Manual of the GOS (WMO-No. 544) defines a Rolling Review of Requirements (RRR, which is in the process of being transferred to the

WIGOS Manual) process from which the Observing Systems Capabilities Analysis and Review tool (OSCAR) is derived, which attempts to capture observational requirements to meet the needs of all WMO programmes. OSCAR contains an extensive set of variables, each with required measurement uncertainties, different for each Application area. The requirements are technology free and valid for both surface based and space based observations.

3.4.16 Expression of uncertainties in the CIMO Guide follows the BIPM rule with $k=2$ (95% confidence interval), the OSCAR database follow the $k=1$ rule (67% confidence interval), which is comparable to RMS-error in an number of cases (in the past accuracy was defined in OSCAR in terms of RMS error, which is popular within the satellite and NWP community but not in line with scientific practices, which follow BIPM rules developed within ICSU). IPET OSDE should provide explanation on use $k=1$ within OSCAR to avoid misunderstanding.

3.4.17 The meeting recognized that these databases should be made consistent and should be making use of the same terminology and practices. The meeting noted that the RRR database included 3 levels (goals, breakthrough and threshold), while the CIMO Guide is providing only one level of uncertainty. The meeting requested the CIMO Guide Editorial Board to develop a proposal on how to align the 3 database to ensure their consistency and to ensure that the CIMO Guide includes the most up-to-date user requirements. Particular attention should be given to clearly stating the measurement ranges and measurement uncertainties.

3.5 CIMO Working Mechanisms

3.5.1 The meeting reviewed the working mechanisms that had been put in place by CIMO MG to identify problems as early as possible and to provide support to the ETs that experienced problems or needed guidance towards further improving the effectiveness of CIMO. The following mechanism had been adopted by CIMO MG-9.

- On a 6-monthly basis (end of June and end of November) the ET chairs should update the column "Status" and "Comments" of the ET workplan and send it to the responsible MG member with copy to the Secretariat. The column status would be filled with the percentage of achievement for each individual subtask.
- Prior to each session of the Management Group, the ETs will be requested to provide a more detailed report using a template similar to the template that was used for CIMO-MG-7.

3.5.2 Though the concept of regular feedback by the ET was in principle good, it did not function as expected. The meeting therefore recommended that the Secretariat steps in, requesting the ET Chairs to provide their feedback to the OPAG Chair for the requested deadline. However, the meeting recognized that it was not the responsibility of the Secretariat to chase those reports that were not provided as expected.

3.5.3 Most of the work of the ETs seems to be done shortly prior to, during and after a physical meeting of an expert team, as well as around planned teleconferences. The use of teleconferences has proven to be very useful in many instances, helping in achieving results, being cost-effective and saving travel cost and time. The meeting therefore encouraged all ETs to have regular teleconferences preferably, at least twice per year to support information exchange among the ET members, to achieve expected results and to spread out the work load over the 4 years period.

3.5.4 In spite of the proposal from CIMO-XV that each ET should hold a teleconference, with the responsible MG member, in the six months following CIMO-XV, and of the repeated offers from the CIMO Secretariat to organize such teleconferences, some ETs had no single meeting (neither face to face, nor by teleconference) during more than 2 years, which strongly hampered the progress of one ET in completing its assigned activities. The meeting

therefore recommended that additional help be provided by the Secretariat, if feasible, and allowed the Secretariat to be much more prescriptive in scheduling regular teleconferences of all ETs, even without such request from the ETs, to support the MG in monitoring their progress.

3.5.5 The interaction between the ETs and the CIMO Guide Editorial Board functioned in general well. The same is true for the liaison between the ETs and the ET-Instrument Intercomparison, which also had a coordinating role. The experience made with the Task Team on the International Cloud Atlas which was established for a short duration with a clear mandate was very positive.

3.5.6 The performances of the ETs do not only depend on the capability of its individual members, but also strongly depend on the chairing skills of the ET Chair and on his/her communication skills. It seems to be crucial that the ET Chair is confident enough in his use of the English language, both to chair meetings and teleconferences, but also to provide clear guidance and instructions to the other ET members, both orally and in written form. The meeting therefore recommended to the Secretariat to pay special attention to this point, while developing the questionnaire for potential future experts.

3.5.7 The meeting also agreed that it would be helpful if a short summary of duties could be prepared, clarifying the role of MG members and ET Chairs and to distribute it to the newly appointed members just after the CIMO session, so that they are clearly aware of what is expected of them during the intersessional period, and that they are clear on their responsibilities as ET Chairs, and MG members.

3.5.8 Finally, during this intersessional period, the time between the CIMO-XV session (2-8 Sept. 2010) and the CIMO MG-9 meeting (5-8 April 2011) was essentially devoted to the preparation of the ET workplans. This long delay in effectively starting the work of the ETs/TLs could be significantly reduced if draft workplans would be available before CIMO-16 session. This would enable on one hand, that the experts apply to the expert team to which they could best contribute (knowing in advance most of the tasks of the ETs and not only its Terms of Reference). On the other hand, it would be possible for the ET to internally perform the task allocation and start its work directly after the CIMO session. The meeting therefore agreed to develop draft workplans for all CIMO ETs prior to the call for experts. The draft workplans would not be submitted to approval to CIMO-16, but just provided for information. ETs should finalize the workplans, allocating tasks among themselves by mid-September 2014 and approval of these plans by CIMO MG should be done around end of September 2014, either by correspondence or by teleconference.

3.6 Future Working Structure of CIMO

3.6.1 The meeting recalled that the CIMO Structure and the CIMO Terms of Reference had been significantly modified at CIMO-XV to reflect the evolving priorities of Members and the expected contribution from CIMO to WIGOS: The meeting recognized that the new structure had worked quite well and therefore decided to make only minor adjustments to it, to clarify some ambiguities and be more efficient. It also decided not to propose modification of the Terms of Reference of the Commission.

3.6.2 The meeting recognized that the concept of Theme Leaders had in most cases not been very successful and decided to move the tasks expected from a number of Theme Leader to Expert Teams in order for the relevant experts to work in a more stimulating environment. It decided to keep two theme leaders (Radio-frequency Protection and Radiosonde Performance Monitoring) because of the interactions they have with other stakeholders outside of the commission, but to endeavor inviting them to attend the meeting of at least one CIMO ET meeting to strengthen their internal linkages with the rest of the commission and to provide them with a more motivating work environment.

3.6.3 The meeting decided to assign the relevant functions and tasks of the Theme Leader on Training Material and Training Activities to the OPAG Capacity Building Co-chairs.

3.6.4 In order to ensure a good connection between the Testbeds (TB) and Lead Centres (LC) and the rest of the CIMO structure, it was agreed that each TB & LC representative should be affiliated to a specific ET by the CIMO MG as ex-officio member and should be providing its regular report to that expert team. TB&LC representatives should be invited to attend meetings of the relevant ET. However, the overall performance of TB&LC should remain the responsibility of the CIMO MG.

3.6.5 The meeting also agreed that the functions of Focal Points (FP) nominated to liaise between the commission and other commission or programmes (such as DRR focal point, FP on Climate observations, EC-PORS FP) should be assigned preferably to CIMO MG members.

3.6.6 The meeting decided to modify the structure of CIMO according to the diagram provided in [Annex IV](#), to adapt the Terms of Reference of the CIMO OPAGs, CIMO MG and CIMO ET&TLs as provided in [Annex V](#) and to request the Secretariat, in collaboration with the president, to further refine them following the guidance expressed during the meeting's discussion to remove remaining ambiguities.

4. ISSUES RELATED TO PLANNING, COORDINATION AND MANAGEMENT OF COMMISSION ACTIVITIES

4.1 Arrangements for CIMO-16

4.1.1 CIMO-16 will be held in St. Petersburg, Russian Federation, from 10 to 16 July 2014 in conjunction with TECO-2014 and METEOREX-2014. The meeting expressed its thanks to Russian Federation for offering to host CIMO-16. The meeting reviewed the draft provisional agenda for CIMO-16 and agreed on the version provided in [Annex VI](#).

4.1.2 The president informed the meeting that he would be chairing the session and would be requesting the help of CIMO MG members for the various agenda items, as appropriate.

4.1.3 The documents for CIMO-16 will be prepared by the Secretariat, supported by the CIMO MG members. The Secretariat will inform each of them on the contributions they need to provide and the deadline for providing them so that they could be translated and made available to all WMO Members in time for the session.

4.2 Arrangements for TECO-2014

4.2.1 TECO-2014 will be held in St. Petersburg, Russian Federation, from 7 to 9 July 2014. The CIMO president established an International Programme Committee (IPC) responsible for its organization that is mainly composed of MG members. The IPC is chaired by Dr Bruce Forgan, who is the conference director. The meeting reviewed the draft proposal for TECO-2014 and approved the draft plan for the conference provided in [Annex VII](#).

4.2.2 Following the positive experience made at TECO-2012, three discussion sessions will be organized focusing on topics of particular current interest to the CIMO community. The topics of these sessions will be:

- Future International Intercomparisons,
- Centennial Stations and Siting and Sustained Performance Classifications,
- How to improve the global quality and traceability of observational data from surface-based systems (see Section 3.1 of this report).

4.2.3 The meeting recommended that oral presentations be reserved for the winners of the Vaisala Awards.

4.2.4 The meeting welcomed the offer from Dr Jitze van der Meulen to create a website with the presentations made during the conference.

4.2.5 The meeting recommended that in the future more efforts be made to increase the visibility of TECO, by further advertising and promoting TECO, including developing a specific website, well in advance, providing information like the composition of the scientific organizing committee, etc.

4.3 CIMO Testbeds and Lead Centres

4.3.1 The meeting recalled that 4 CIMO Testbeds (TB) and 3 CIMO Lead Centres (LC) had been nominated. This had been done following a clearly specified process. The terms of reference of TB&LC also clearly specify their reporting requirements.

4.3.2 Bruce Forgan informed the meeting on the overall performance of the TB&LC, as assessed from the reports they provided. To date, all TB&LC have provided at least one report. Some of them reported extensive work, while others provided very little information/results.

4.3.3 The meeting was informed that the Secretariat had prepared individual webpages for each of the TB&LC to help them share their developments with CIMO experts and more widely WMO Members, and to help CIMO ETs to identify relevant material produced by TB&LC. These webpages were developed based on the information provided in the original submissions, as well as in the first report they provided. They are at the moment not yet linked to the CIMO/IMOP website, as approval of their content will be requested from the relevant TB&LC before making them live.

4.3.4 The meeting welcomed this initiative and recommended that the Secretariat aims at making these pages publicly available prior to the CIMO-16 session. It also requested the Secretariat to publish on these pages the 2-yearly reports provided by the TB&LC and to inform the CIMO-16 session accordingly. The meeting further recommended that TB&LC be invited to make presentations on their results during the second half of CIMO-16.

4.3.5 The Terms of Reference of TB&LC specify that they are reporting to CIMO via an expert team specified by the CIMO MG. One CIMO expert team was identified by CIMO-XV to carry out this liaison role. However, in view of the variety of topics addressed by the TB&LC it seems that it would be more appropriate to specify this liaison on a case by case basis, depending on the work focus of each TB&LC and the topics addressed by specific CIMO expert teams. The nominated TB&LC representatives should be considered as ex-officio members of the expert team it is associated with, and encouraged to participate in its work and invited to attend its meetings, as appropriate.

4.3.6 The meeting was concerned about the wide range of quality suggested by the reports. It requested Bruce Forgan to liaise with them, prior to the CIMO-16 session to ensure they meet the expectations of TB&LC. The meeting also felt that the reporting mechanism needed to be clarified and formalized: Though TB&LC are associated with specific ETs for ensuring the outcome of their work is properly included in CIMO's work, they are officially reporting to the CIMO MG and a CIMO MG member should be designated as focal point for this task. For the time being, Bruce Forgan is assuming this function. The role of the Secretariat is to prompt TB&LC for their reports and to forward them to the CIMO MG focal point.

4.3.7 CIMO-XV had agreed on a designation process for the establishment of future CIMO TB&LC. The meeting recommended that WMO Members be encouraged to provide new submissions either leading to CIMO-16 or later. In the eventuality that some proposal would be received by the time of CIMO-16, the president would establish a Task Team to review them during the session in accordance with the designation process. Members should also be informed of the plan to make websites on TB&LC available shortly. The meeting further recommended that all TB&LC be contacted to determine whether they would be able to continue providing the service expected from TB&LC.

4.3.8 In order to ensure that TB can best contribute to the CIMO activities, the meeting recommended inviting them to the planned workshop aimed at improving the quality of modern instrumentation, like weather radars, etc. based on their work focus.

4.4 Other Pertinent Issues

Possible future intercomparison activities

4.4.1 The meeting considered possible future intercomparison activities. In this context it recalled the discussions it had under Agenda Item 2.2 (see Sect. 2.2) limiting the number of intercomparisons that can be realistically organized within an inter-sessional period. The meeting also recognized the need to ensure that CIMO addresses the main interest of WMO Members and therefore recommended organizing a discussion session during TECO-2014 to identify the priorities of Members for future intercomparisons and to clearly identify the aims of those intercomparisons for which feasibility studies should be carried out within CIMO.

4.4.2 Rolf Philippona made a presentation on Upper-Air Measurement Uncertainty and Radiosonde Intercomparisons.

4.4.3 A short history of WMO/CIMO radiosonde comparisons shows tremendous improvements of upper-air radiosonde measurements from 1950 to 2010. The results of the last CIMO intercomparison in Yangjiang, China, in 2010 represent the present quality status of modern radiosondes. Daytime measurements still show large differences that are due to the radiation errors. Motivated by these results, investigations of the radiation error were made at MeteoSwiss over the last years using shaded and unshaded temperature sensors in flight. Temperature sensors of different diameters were also exposed to artificial light in a vacuum chamber at the observatory of Lindenberg. These experiments allowed determining a new radiation error correction curve for the Swiss SRS-C34 radiosonde. Furthermore, shortwave and longwave radiation profiles were measured through the atmosphere using radiosondes, which allowed determining the radiation budget on radiosonde sensors and helped to explain and to interpret nighttime and daytime radiation errors.

4.4.4 The new daytime radiation error correction curve of the SRS-C34 brings the Swiss sonde much closer to the other sondes that were compared in the China campaign. Furthermore, double soundings made at Payerne between the Meteolabor SRS-C34 and the Vaisala RS92 radiosonde show the same differences between the two radiosondes as they were observed during the China intercomparison. The fact, that the differences between the two sondes are confirmed shows that the differences do not depend on the measurement location and that the two sondes are stable. Double soundings between two same sondes allow reproducibility tests, which provide important information on the instrument uncertainty. Double soundings combined with intercomparisons with other radiosonde types are essential for radiosonde characterization and for overall uncertainty determination. Such campaigns allow determining the uncertainty of individual sonde types and for all measured upper-air parameters like: Altitude, Pressure, Temperature, Rel. Humidity, Wind Direction and Wind Speed.

4.4.5 While the quality of upper-air temperature measurements is quite advanced, there is still large potential for improvements on humidity measurements. Raman Lidar measurements may be helpful to improve humidity measurements in the upper troposphere. The proposal from Meteoswiss to consider carrying out an international radiosonde intercomparison would allow determining the uncertainty for individual sonde types if double soundings would be made for all sonde types. Furthermore, it would demonstrate the radiosonde quality status including the new radiosondes that appeared on the market, and would integrate other upper-air measurement systems that are available nowadays.

4.4.6 The meeting was impressed by the results obtained and commended Meteoswiss for these results.

4.4.7 The meeting agreed that further investigations are needed to understand observed differences between measurements made with pressure sensors and those made with GPS sensors. Such investigations should be carried out before all manufacturers stop producing sondes having pressure sensors. Better understanding performances of radiosondes is very important, specially with regard to climate variability in the upper atmosphere and also because radiosonde measurements are key for anchoring satellite observations, which are the main source of information for NWP models. They also play a very important role in investigating and understanding the performances of other remote-sensing technologies.

4.4.8 The meeting recommended performing a feasibility study and a clear intercomparison plan for such an intercomparison and to consider this intercomparison as a candidate for the coming inter-sessional period.

4.4.9 Mrs Florence Besson made a presentation on the experience gained in MeteoFrance on the intercomparison of lidars and ceilometers for volcanic ash measurements and on the need to carry out an intercomparison of instruments able to measure volcanic ash within WMO. In this context, the meeting recalled the request from the aeronautical community to improve volcanic ash detection and quantification.

4.4.10 The MeteoFrance intercomparison was performed at two sites in southern France, which encounter aerosol events. The drivers for performing this intercomparison were twofold: the detection and identification of volcanic ash from the ground to 12 km; and distinguishing volcanic ash from sand aerosols or clouds. The instruments that were intercompared included lidars, ceilometers, the balloon-borne LOAC system, and SAFIRE aircraft measurements. Comparison of the measurements with the output of numerical weather prediction models were also performed. Ceilometers were not able to detect the aerosols layers well enough to meet MeteoFrance requirements.

4.4.11 The meeting recognized the relevance of this topic for CIMO and that it should be properly considered when prioritizing possible future CIMO intercomparisons. It agreed that an in-depth feasibility study should be carried out before embarking on such an intercomparison. The specific aim of the intercomparison should be first clearly defined (should it be focusing on the capabilities of ceilometers for measuring volcanic ash, or should it be addressing more generally the topic of volcanic ash/and or other aerosol detection).

4.4.12 The meeting noted that the results of such an intercomparison would also be very important in proving ground-truth measurements for the calibration of satellite products related to ash clouds and that various operational systems (possibly also portable systems) could be considered in such an intercomparison. The meeting further noted that the GAW research community has extensive expertise with lidars that could be of relevance for such an intercomparison, while recognizing that the focus of CIMO's work would be to investigate the capabilities of systems that can be used operationally to measure aerosols in NMHSs. The meeting also noted the work made by E-Profile to coordinate the information exchange, but stressed the need for other activities to help in understanding the content of the information measured by ceilometers and lidars.

IOM Reports

4.4.13 The meeting was informed about the status of IOM reports published in the last years, or in the process of finalization. It agreed to keep the same procedure for reviewing the IOM reports in the future to ensure they meet the expected level of quality: all IOM reports have to be reviewed by either a CIMO MG member or another expert nominated by the CIMO president. The meeting recommended that this practice be listed on the IOM report webpage. The meeting also recommended that all new reports be printed on a CD and distributed to all WMO Members ahead of CIMO-16.

Awards

4.4.14 The "Professor Dr Vilho Väisälä Awards" are granted on a biennial basis. According to the guidelines for granting those awards, the submissions can be made by WMO Permanent Representatives only. It seems that a number of experts are only informed about these awards very close to, or past the deadline for submissions. The meeting recommended that the guidelines for granting the award be revised to possibly enable other channels of submissions, which would result in a larger number of submissions (possibly allowing CIMO MG members and expert team chairs to submit proposals) and even higher recognition of the award. The meeting also recalled that the second award had been created to encourage instrument work in developing countries and countries with economies in transition, but that only few submissions were originating from such countries. The meeting therefore recommended that the Secretariat revise, in collaboration with Vaisala, the guidelines for granting the awards.

Certificates

4.4.15 The practices in use in the WMO technical commissions to award recognition to the experts who volunteered to devote their time to undertake the activities planned by the commissions vary greatly. Until now, CIMO has only been delivering Certificates for Outstanding Services (only 8 such certificates were delivered to date), while other technical commissions issued a variety of types of certificates (outstanding contributions, leadership, contribution level) to its experts, recognizing the contributions from many experts.

4.4.16 The meeting recognized the importance of ensuring consistency between the approach followed by the different technical commissions, as had been recommended by EC-LX, but noted that no such common scheme had been developed, nor agreed to date and that technical commissions were free to choose their own approach.

4.4.17 The meeting considered which practice could be followed by CIMO in the future. It agreed that it was needed to properly recognize the important contributions delivered by experts. It noted the low value of certificates that are delivered to almost all experts of the commission, but also noted that they are important for motivating experts, help experts to get the support of their hierarchies to continue investing time into their CIMO work, and the special importance that such certificates can have for experts of developing countries.

4.4.18 The meeting did not come to a decision on the approach to be followed by CIMO and decided to hold a teleconference to agree on the way forward before CIMO-16.

Collaboration with ISO

4.4.19 The meeting was informed about the status of specific collaboration between CIMO and ISO.

4.4.20 ISO agreed to collaborate on the further development (towards developing a common WMO-ISO standard) of the Siting Classification for Surface Observing Station on Land that was approved by CIMO-XV and is published in the Guide on Meteorological Instruments and Methods of Observation (WMO-No. 8, CIMO Guide, Part I, Chapter 1, Annex 1B, <http://www.wmo.int/pages/prog/www/IMOP/CIMO-Guide.html>). ISO Technical Committee 146 "Air Quality" / Sub-Committee 5 "Meteorology" (ISO TC146/SC5) is the relevant ISO Technical Committee for this collaboration, but the work is lead by CIMO ET-Standardization. Some WMO technical commissions nominated focal points to represent the interests of their commissions in this development. The Draft International Standard (DIS) was approved within ISO following the ISO fast-track procedure in December 2013. CIMO ET-Standardization has addressed all the comments received throughout this procedure and prepared the Final Draft International Standard (FDIS) which will be submitted for approval within ISO as well as within WMO (at the occasion of CIMO-16, July 2014) as it is slightly different from the present version that had been approved by CIMO-XV (2010).

4.4.21 The development of the draft ISO standard "Ground-based remote sensing by Doppler wind lidar" was initiated by ISO TC146/SC5. CIMO experts have been nominated to contribute to this development toward publishing it as a common WMO-ISO standard. This standard is still in the preparatory stage and Meteoswiss is playing an active role in trying to speed up its finalization (see details in para 2.4.8).

4.4.22 Finally, ISO TC180 "Solar Energy" is maintaining a number of standards relevant to CIMO, some of them having originally been based on material from the CIMO Guide. TC 180 recently decided to establish two working groups to revise two of its standards (ISO 9060:1990, *Solar energy - specification and classification of instruments for measuring hemispherical solar and direct solar radiation* and ISO 9845-1, *Solar energy - Reference solar spectral irradiance at the ground at different receiving conditions - Part 1: Direct normal and hemispherical solar irradiance for air mass 1,5*). As the main requirement to update those standards seem to be coming from the industry to include modern type instruments, the meeting felt that CIMO would not need to take an active role in this update, but that it would be sufficient if the CIMO Task Team on Radiation would work together with ISO TC180/SC1 Chairperson, Dr Wolfgang Finsterle, to determine which contributions the working groups would require from CIMO and organize for the provision of this information to ISO. (see also para 2.2.5 of this report for further details)

AWS Workshop/Conference

4.4.23 Automatic observations, .i.e. without interventions of any observer, are a major topic within the IMOP Programme and already have been so for many decades. In spite of the information provided on the subject in the CIMO Guide, in IOM reports and on the AWS portal, which in principle enables Members to formulate functional specifications on AWSs providing weather observing systems, with acceptable performance and quality, Members complain from negative experiences with automatic observing systems, limited sustainability and performances.

4.4.24 The "International Conferences on Experiences with Automatic Weather Stations in Operational Use within National Weather Services" (ICEAWS), which were organized to exchange experiences with AWS systems and performance of AWS networks were providing an appropriate forum for knowledge transfer between Members, but the last one was organized in 2006.

4.4.25 The meeting recognized that technologies are constantly changing, new equipment become available, integration from more sensors on the same instrumental platforms becomes common practices, so that there is a potential for organizing such conferences with a view to specific outcomes.

4.4.26 The meeting recommended that such conferences be revived and agreed that CIMO should take an active role in stimulating their organization, helping to find NMHSs willing to host them, but with limited support from WMO. It further recommended that a theme be given to each conference and that it be concluded with a conference statement, making recommendations on specific aspects to be addressed in the future.

5. OTHER BUSINESS

5.1 The meeting reiterated that all CIMO ETs and TLs should follow the GUM for all matters of their work related to uncertainties.

5.2 The meeting noted that many meteorological observation data users (including some scientists working on climate change) are not aware of the issues related to data quality. It would therefore be important to develop relevant outreach material (flyers) that would help in making observational data users understand the complexity of the process needed to generate the information (one number) and all the other relevant information that is linked to

it and affects the data quality. The meeting recommended that the commission reinforces its capacity development and outreach activities, it encouraged the CIMO MG members to be active in this field, explaining this challenges to data users and proposed that relevant experts collaborate with the Secretariat in developing high-level outreach material relevant to CIMO's key messages and activities (such as traceability, data quality, safety of staff in use of dangerous material, etc.).

6. CLOSURE OF THE SESSION

The session closed on Friday 14 March 2014 at 16:40 hours

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DRAFT PLAN FOR THE CIMO/WIGOS SCOPING WORKSHOP ON STANDARDIZATION OF SURFACE-BASED OBSERVING SYSTEMS AND TECHNIQUES

1. *Workshop Objective*

To explore potential mechanisms for improving the global quality and traceability of observational data from surface-based systems.

2. *Workshop Aims*

- To explore mechanisms for achieving improved standardization of calibration, maintenance, and operational (algorithms etc) procedures for surface-based observing systems as a WIGOS Standardization initiative.
- To explore mechanisms for ensuring optimal communication of such standardized procedures to Members, as a WIGOS Capacity Development initiative.

3. *Desired Outcome*

- A proposal for establishment of a pragmatic and sustainable mechanism within CIMO for the increased global standardization of surface-based observing programmes.

4. *Possible Mechanisms*

4.1 The following potential mechanisms could be explored at the workshop, to ascertain the most promising way forward:

- Expand the role of the RICs to include remote sensing instrumentation?
- Expand the RIC concept to embrace 'distributed RICs', with individual centres within one RIC dealing with a particular type of instrumentation?
- Leave the RICs as is, but establish similar but parallel Regional Remote Sensing Calibration Capacity?
- Leave the RICs as is, and instead simply deal with this via accelerated development of the CIMO Test Bed / Lead Centre model?
- Rely on the efforts of individual Members to improve their situation nationally, and focus on improved communication and sharing of best practices?
- A combination of the above?
- Other?

5. *Workshop Participants*

5.1 To properly address the aims of the workshop, input will be required from a wide range of subject matter experts who are currently involved in standardization of observations. It is anticipated that these would be drawn from:

- Strategic planners of observing quality systems and/or managers of RICs/RMICs:
 - Morocco (Merrouchi)
 - Kenya (Karanja)
 - China
 - Japan (Nakashima)

- Argentina (Garcia)
- Barbados
- Philippines
- Australia (Forgan, Breakout Chair)
- France
- Slovenia (Groselj)
- USA
- Regional representatives
 - RA 1 (South Africa)
 - RA 2 (Korea)
 - RA 3 (Brazil)
 - RA 4 (Canada, Joe, Breakout Chair)
 - RA 5 (Indonesia)
 - RA 6 (Switzerland, Haefele, e-Profile)
- Representatives of key observing systems / organizations
 - ECMWF (Anderson)
 - EUMETNET (Klink)
 - Baltrad (Michelson)
 - CIMO Test Bed Representative
- Representatives of each of the major remote-sensing observation techniques (weather radar, profilers, lidars, Microwave radiometers, Lightning)
- WMO secretariat support

5.2 It is anticipated that those with double roles will be identified as far as possible, so that the total number of participants is less than 30.

5.3 It will also require the participation of several competent leaders, who would be asked to chair breakout sessions during the workshop (Calpini, Dibbern, Forgan, Joe).

6. Workshop Programme

6.1 The provisional plan involves a 3-day workshop, with the following tentative programme:

- Day 1, AM:
 - Opening, Welcome, Introduction, Context Setting. (90 minutes)
 - Presentations from RIC Developed Country, RIC Developing Country, RMIC, TB/LC,
- Day 1, PM:
 - Presentations on needs of various Remote Sensing networks (e-profile, radar, lidar, etc)
 - Presentation(s) on Regional needs
- Day 2, AM:
 - Plenary think tank. Suggesting ideas and initial exploration of each

- Breakout groups to explore individual options
 - Day 2, PM:
 - Breakout Groups continued.
 - Day 3, AM:
 - Plenary, Reports from breakout groups.
 - Discussion
 - Day 3, PM:
 - Summary, Conclusions.
 - Draft Workshop Report.
-

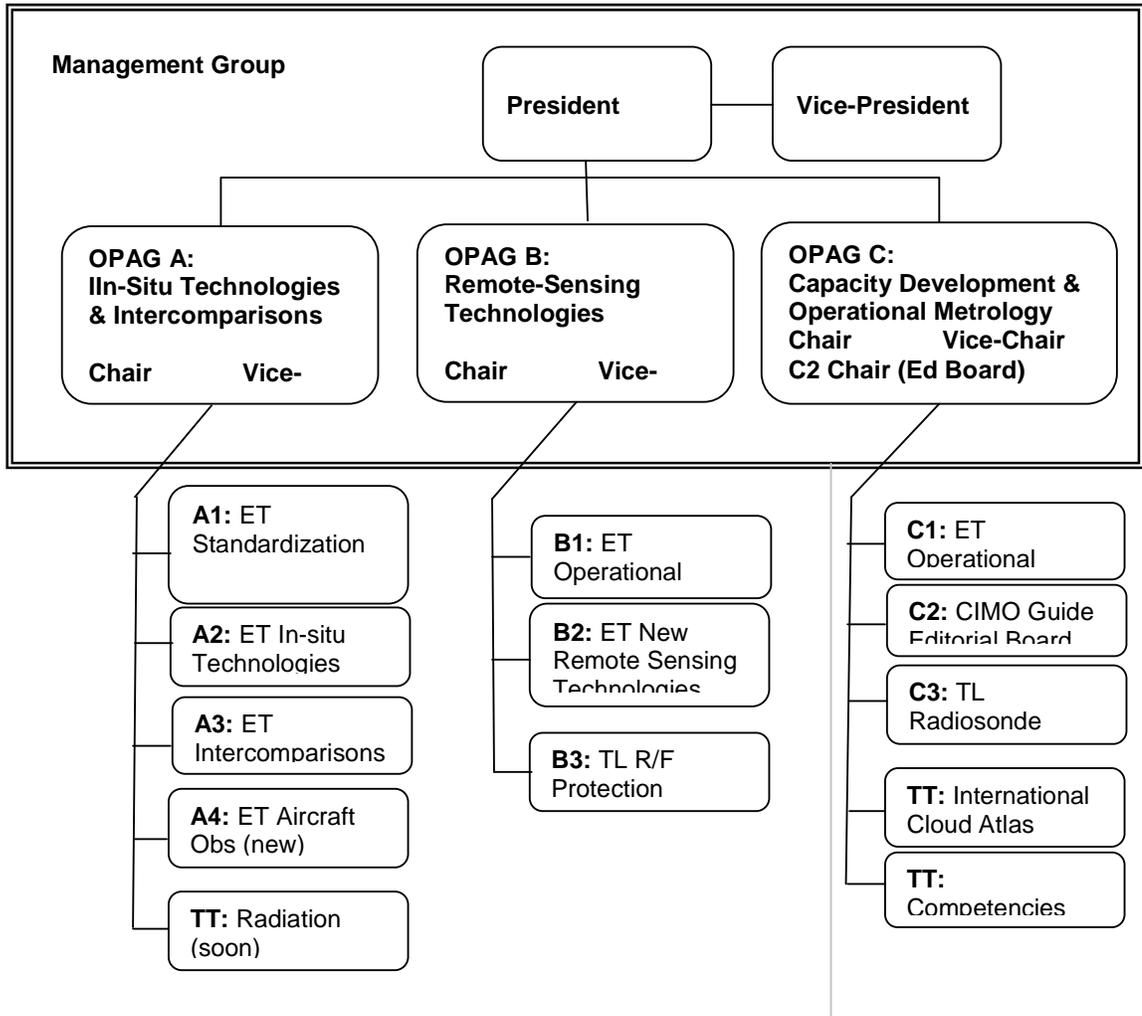
CIMO-MG-11, ANNEX III

CIMO OPERATING PLAN 2016-2019

Dept	Branch	ER	Key Outcome	Deliverable	Programme	Technical Commission	Activity	Y2016	Y2017	Y2018	Y2019
OBS	WIGOS	4	4.1	Report of SPICE Intercomparison	IMOP	CIMO	Intercomparison - SPICE	X			
OBS	WIGOS	4	4.1	Report of IPC-XII - Traceability of ref. pyrhelimeters	IMOP	CIMO	Intercomparison - IPC-XII	X			
OBS	WIGOS	4	4.1	Report of infrared radiometer intercomparison	IMOP	CIMO	Intercomparison of infrared radiometers	X			
OBS	WIGOS	4	4.1	Detailed plan for Intercomparison	IMOP	CIMO	Intercomparison feasibility study	X	X		
OBS	WIGOS	4	4.1	Report of Intercomparison	IMOP	CIMO	Intercomparison		X	X	X
OBS	WIGOS	4	4.1	Reports on Completed Instrument Tests	IMOP	CIMO	Testbeds	X	X	X	X
OBS	WIGOS	4	4.1	IOM Reports	IMOP	CIMO	Capacity Building				
OBS	WIGOS	4	4.1	Conference on Instruments & Methods of Obs.	IMOP	CIMO	TECO-2016 (Capacity building)	X			
OBS	WIGOS	4	4.1	Instrument Exhibition (METEOREX-2016)	IMOP	CIMO	METEOREX-2016	X			
OBS	WIGOS	4	4.1	Conference on Instruments & Methods of Obs.	IMOP	CIMO	TECO-2018 (Capacity building)			X	
OBS	WIGOS	4	4.1	Instrument Exhibition (METEOREX-2018)	IMOP	CIMO	METEOREX-2018			X	
OBS	WIGOS	4	4.1	Workshop on instrumentatation (challenges faced in mountain stations or AWS)	IMOP	CIMO	Workshop (Capacity Building)		X		
OBS	WIGOS	4	4.1	New web-based edition of ICA	IMOP	CIMO	Update of the International Cloud Atlas	X			

Note: This operating plan, comes as complement to the activities already listed in the Secretariat Operating Plan relevant to CIMO.

CIMO WORKING STRUCTURE



**TERMS OF REFERENCE OF THE CIMO MANAGEMENT GROUP, OPEN PROGRAMME
AREA GROUPS, AND EXPERT TEAMS**

TERMS OF REFERENCE OF THE CIMO MANAGEMENT GROUP

- a) To advise and help the president on all matters related to the work of the Commission;
 - b) To assist the president in planning and coordinating the work of the Commission its Open Programme Area Groups and Expert Teams;
 - c) To plan, coordinate and actively manage the work of the Commission, its Open Programme Area Groups, Expert Teams and Task Teams, including evaluating the progress achieved in the work programmes and advising on the new priority activities;
 - d) To monitor the implementation of the IMOP Programme in relation to the WMO Strategic Plans and advise the president on appropriate actions;
 - e) To advise the president on matters related to cooperation with other technical commissions, regional associations and other relevant international organizations and governmental or non-governmental bodies;
 - f) To coordinate the activities of the Commission with respect to other technical commissions, regional associations and WMO Cross-cutting programmes;
 - g) To mobilize experts to enable the work of the Commission to be achieved;
 - h) To keep under review the internal structure and working methods of the Commission and make necessary adjustments to the working structure during the intersessional period, for efficiency reasons and/or to meet emerging requirements of the Organization;
 - i) To keep under review the terms of reference of the Open Programme Area Groups and Expert Teams and make necessary adjustments;
 - j) To advise the president on designations of experts to carry out specific tasks as necessary between sessions of the Commission;
 - k) OPAG chairs will participate in the meetings of the ETs under their responsibility.
-

TERMS OF REFERENCE OF THE CIMO OPAGS

A. OPAG STANDARDIZATION AND IN-SITU TECHNOLOGIES

1. To promote developments in in situ surface, upper-air and radiation instruments and methods of observations suitable for all Members, including least developed countries, in liaison with the Association of Hydro-Meteorological Equipment Industry, National Meteorological and Hydrological Services and relevant scientific institutions;
2. To establish standards for instruments and methods of observation, including metadata, as required by the WMO Integrated Global Observing System (WIGOS) and WMO Programmes, and in cooperation with other international standardization organizations;
3. Provide leadership in the development and maintenance of the WIGOS Standards of Observations Reference Tool (SORT)
4. To develop guidance material for Members on the use and operations of in-situ instruments;
5. To organize instrument testing and intercomparisons;
6. To provide advice to the WMO Programmes and Members, as required;
7. To effectively liaise with the OPAG on Capacity-building for the publication of standards (CIMO Guide, CIMO and WIGOS Manuals, etc.) and for supporting relevant training activities;
8. To regularly inform Members on the achievements of the OPAG.

B. OPAG REMOTE-SENSING TECHNOLOGIES

1. To promote developments associated with the operation, development, testing and documentation of surface-based remote-sensing systems and their observational product generation , including coordination with other technical commissions;
2. To maintain an overview of all activities related to the operation, development, testing and documentation of surface-based remote-sensing systems and their observational product generation, including the progress of testbed operations;
3. To develop guidance material and standards on remote-sensing technologies that can be used operationally;
4. To provide advice to the WMO Programmes and Members, as required;
5. To effectively liaise with the OPAG on Capacity-building for the publication of standards (CIMO Guide, CIMO and WIGOS Manuals, etc.) and for supporting relevant training activities;
6. To regularly inform Members on the achievements of the OPAG.

C. OPAG CAPACITY DEVELOPMENT AND METROLOGY

1. To strengthen and develop capacity development activities related to instruments and methods of observations, including the development of guidance material on instrument calibration and maintenance, and measurement traceability;
2. To collaborate in organizing capacity-building activities with regional associations and other relevant WMO capacity-building activities;
3. To undertake all needed coordination activities and ensure the review and publication of standards (CIMO Guide, CIMO and WIGOS Manuals, common International Organization for Standardization/WMO standards, etc.);
4. To effectively liaise with the other OPAGs for the publication of standards and for supporting relevant training activities and to ensure that the work of this OPAG's theme leaders is coordinated with the expert teams of the other OPAGs;
5. Promote and assist in the achievement of improved world-wide traceability of all measurements to SI, by encouraging partnerships between RICs, strengthening their Quality processes, and developing relevant guidance material.
5. Provide advice to WMO Programmes and Members, as required.
6. To regularly inform Members on the achievements of the OPAG.

TERMS OF REFERENCE OF CIMO EXPERT TEAMS, THEME LEADERS AND FOCAL POINTS

A.1 Expert Team on Standardization

- 1 Provide specifications for instruments and observing systems in order to meet requirements from Members for the measurement of meteorological, climatological, marine, related geophysical and environmental variables.
2. Review, develop and update guidance material and standards related to instruments and methods of observation, including identification of standards for inclusion in the CIMO Guide. The development and identification of standards will be done in co-operation with other international standardization organizations, like ISO and BIPM.
3. Review outcomes of Lead Centres and coordinate inclusion of guidance material in IOM reports and the CIMO Guide on: standard procedures for all aspects of instrument use and operation; advice related to instrument use, operation, testing, verification and calibration; and the calculation of uncertainty for operational measurements.
- 4 Formulate proposals for metadata standards to be disseminated through WIS as required by WIGOS.
5. Develop proposals for metadata standards to be disseminated through WIS as required by WIGOS.
6. Provide CIMO advice to ICG-WIGOS on the design, development and maintenance of the WIGOS Standards of Observations Reference Tool (SORT)
6. Develop further basic procedures for quality assurance and management of observations, instrument maintenance, calibration and operation within WIGOS.
7. Coordinate with other technical commissions and WMO Programmes such as GFCS and DRR in reviewing siting, performance, classifications and metadata standards for systems and individual sensors.
8. Develop guidance material relevant to the ET ToRs, including proposals for updates of/new chapters for the CIMO Guide.
9. Establish Task Teams to address specific tasks, as appropriate, monitor Task Team work progress and report to CIMO-MG.

A.2 Expert Team on New In-situ Technologies

1. Review and publish performance results and recommendations relating to the state-of-the-art of operational in-situ instruments, their calibration and methods of observation and their observing system supporting infrastructure.
- 2 Monitor and report on progress in development and performance of new surface and upper-air in situ observation technologies and measurement techniques.
- 3 In view of the increased impact of extreme weather events, review and make proposals on:
 - Need for development of more robust instruments with greater resilience to extreme weather conditions and combinations of weather conditions;
 - Need for development of instruments with increased measuring range.
 - Investigation of performance of instruments in extreme climate.
- 4 Monitor progress and give guidance on observing technology associated with sustaining AWS network operations, including in extreme climate conditions.

5. Review development of new radiation reference instruments and update relevant guidance material.
6. Develop guidance material relevant to the ET ToRs, including proposals for updates of/new chapters for the CIMO Guide.
7. Establish Task Teams to address specific tasks, as appropriate, monitor Task Team work progress and report to CIMO-MG.

A.3 Expert Team on Instrument Intercomparisons

1. Prepare and prioritize proposals for instrument intercomparisons (in-situ surface, upper-air and marine) according to the CIMO Provisional Programme (2010–2014) and available funds, in particular taking into account the requirements of WIGOS.
2. Propose the membership of International Organizing Committees. These will appoint a Project Leader responsible for conducting a specific instrument intercomparison.
3. Plan, coordinate implementation, review and evaluate global and regional intercomparisons of instruments and methods of observation in collaboration with relevant manufacturers and the Hydro-Meteorological Equipment Industry Association (HMEI).
4. Develop guidance material relevant to the ET ToRs, including proposals for updates of/new chapters for the CIMO Guide.
5. Monitor progress of IOCs of International Intercomparisons and report to CIMO-MG.

A.4 CIMO Expert Team on Aircraft-based Observations

1. Develop and manage the work plan and associated activities of the expert team, including the budget for associated expenditure of the AMDAR Trust Fund in line with the Trust Fund's Terms of Reference and in collaboration with the CBS Expert Team on Aircraft-Based Observing Systems (ET-ABO);
2. Oversee and report to the Commission on the scientific and technical development of aircraft-based observing systems, including AMDAR, Mode-S, ICAO ADS and TAMDAR, particularly with respect to instruments and methods of observation;
3. Oversee and report to the Commission on the development, scientific testing and validation and intercomparison of existing and new methods of observation for aircraft-based observing systems, including humidity, turbulence and ice accretion.
4. Based on user requirements, oversee and conduct the development, maintenance and provision of technical standards and specifications associated with aircraft-based observations;
5. Compile and review updates and new material on aircraft-based observations for inclusion in the CIMO Guide and other WMO regulatory documents;
6. Conduct and provide support for training and outreach activities of the Commission and WMO to support the use of aircraft-based observations; and,
7. Work in collaboration and cooperation with other teams of the Commission and WMO on the above activities as appropriate and as necessary.

B.1 Expert Team on Operational Remote Sensing

ET will work on operational weather radars, wind profilers and lightning detection systems:

- 1 Review operation of current instrumentation identifying best practices, including instrument specifications, and siting (including network support infrastructure and preventive maintenance).
- 2 Review quality control procedures including standardization, calibration, signal processing, algorithms and product generation with close collaboration with users.
- 3 Facilitate activities associated with improving remote-sensing operations by initiating workshops on performance evaluation and product interpretation.
- 3 Review data exchange technologies and recommend mechanisms noting advantages and disadvantages of WIS.
- 5 Develop guidance material relevant to the ET ToRs, including proposals for updates of/new chapters for the CIMO Guide.
- 6 Review and update training material and support OPAG capacity-building.
- 7 Establish Task Teams to address specific tasks, as appropriate, monitor Task Team work progress and report to CIMO-MG.

B.2 Expert Team on New Remote-Sensing Technologies and Testbeds

- 1 Monitor, evaluate and report on development and implementation of:
 - Microwave Radiometers, especially the quality of temperature measurements in the planetary boundary layer;
 - GPS Water Vapour Networks and quality of data in suitable intercomparison with other systems including radiosonde and microwave radiometer;
 - Raman water vapour lidar and specifically quality of absolute humidity measurements in the troposphere;
 - Wind-finding systems;
 - Meteorological lidar systems;
 - Cloud radars;
 - Instruments for the operational aerosol and volcanic ash measurements;
 - Other new technologies, such as meteor scattering radars.
- 2 Review outcomes of testbeds and coordinate inclusion of guidance material in IOM reports and the CIMO Guide on:
 - The performance of new surface based remote-sensing technology, including strengths and weaknesses, accuracy, reliability and cost effectiveness;
 - The principles for the optimal mix of surface based in situ and remote-sensing systems (interoperability) to improve both temporal and spatial capabilities for future operational upper air networks.
3. Review and update existing training material and support OPAG-capacity-building in the production of suitable training workshops, reference material and guidelines for all operational aspects of remote-sensing systems.
4. Establish Task Teams to address specific tasks, as appropriate, monitor Task Team work progress and report to CIMO-MG, if appropriate.

B.3 Theme Leader on Radio-frequency protection

- 1 Consider within CIMO issues related to radio-frequency protection activities for all operational upper-air and remote-sensing observing systems (radiosondes, weather radars, wind profilers, microwave radiometers, etc.).
- 2 Liaise with all CIMO expert teams in a view to collect and coordinate their requirements and consider WMO positions developed by CBS Steering Group on Radio-frequency Allocation (SG-RFC)
- 3 Liaise with CBS SG-RFC providing CIMO input on its requirements and expertise and supporting SG-RFC to maintain a WMO strategy for ensuring availability of radio-frequencies for meteorological applications.

C.1 Expert Team on Regional Instrument Centres, Calibration and Traceability

1. Develop a strategy and provide guidance towards ensuring worldwide traceability of measurements to the International System of Units (SI), including outreach material to sensitize on the need for and importance of instrument calibration and measurements traceability.
2. Promote further the partnership between RICs of developing and developed countries and encourage Members to use the system of internship in RICs in the various WMO Regions.
3. Strengthen the Quality Assurance of the RICs/RRCs as a crosscutting issue involving the regional and technical cooperation activities by:
 - Collaborating with RICs to define RIC functional capabilities;
 - Encouraging RICs to organize and/or participate in inter-laboratory comparisons;
 - Providing support in RIC evaluations;
 - Monitoring the RIC capabilities based on their yearly reports and 5-year evaluation and inform presidents of RAs;
 - Provide advice for certification and accreditation of RICs;
 - Monitoring RRC capabilities, provide support to RRC evaluations;
 - Developing guidance to improve RRC capabilities and the quality of radiation measurements in national radiation networks;
 - Collaborating with Regional Marine Instrumentation Centres (RMICs) and developing guidance material relevant to the terms of reference of the Expert Team, including updating the CIMO Guide to recognize the capabilities of RMICs.
4. With respect to capacity-building:
 - Review and provide guidance to develop the IMOP capacities of developing countries, in particular the development and fabrication of instruments;
 - Collaborate with testbed centres and lead centres and ensure that standards and specifications for new instruments and technologies are provided to RICs in order to promote effective access to such guidance materials and adaptation of the new technologies.
5. Develop guidance material relevant to the ET ToRs, including proposals for updates of / new chapters for the CIMO Guide.

C.2 CIMO Editorial Board

- 1 Coordinate activities for the periodic updating of the CIMO Guide, in collaboration with CIMO OPAGs, ETs, HMEI and the Secretariat, namely:
 - Develop guidelines for the updating of the CIMO Guide to ensure the uniformity of its presentation;
 - Collect proposals from user community for updates and revisions;
 - Identify areas to be updated, revised or completely rewritten and advise the CIMO-MG;
 - Identify experts for updating/revision of the relevant parts of the Guide and advise the CIMO-MG;

- Coordinate the work of experts on revisions to the Guide;
 - Arrange for approval of the updated/revised parts of the Guide according to a procedure approved by the CIMO-MG;
 - Provide updates/revisions in a form of track changes for consideration by the CIMO-MG and approval by the president of CIMO or a CIMO session;
 - Provide regular reports to the CIMO-MG and Secretariat;
- 2 Monitor the contents of the CIMO Guide for material that might be progressively transferred to the WIGOS Manual as standards mature.
 - 3 Review proposals for and manage review and revision of IOM draft reports.
 - 4 Review proposals for and advise ETs on the development of common ISO/WMO standards.
 - 5 Contribute to the development of the WIGOS Guide and Manual, as appropriate.

C.4 Theme Leader on Radiosonde Performance Monitoring

1. Arrange for the productions of monitoring reports on the systematic performances of radiosonde networks in GOS (Radiosonde catalogue and statistics).
2. Liaise with Members and HMEI on performance issues identified above.

CIMO Focal Point on Gender Issues

The CIMO Focal Point on Gender Issues shall be responsible for the following:

1. To gather and analyse details as required, of the role of women and men in the work of the Commission;
2. To liaise with the WMO Focal Point on Gender Issues and to jointly collect and disseminate information including studies and policies on the role of women in areas relevant to the Commission;
3. To collaborate with focal points on gender issues in other technical commissions;
4. To explore, document and make recommendations for addressing the need for capacity-building on gender mainstreaming in each region, pertinent to the Commission;
5. To submit reports in accordance with the requirements of the CIMO Management Group.

CIMO Focal Point for the Executive Council Panel of Experts on Polar Observations, Research and Services (EC-PORS).

The CIMO Focal Point for the Executive Council Panel of Experts on Polar Observations, Research and Services shall be responsible for the following:

1. To liaise with EC-PORS on issues related to instruments and methods of observation standardization, maintenance and operation, as well as to liaise with EC-PORS on IPD issues;
2. To provide guidance to the Commission on issues related to polar observations;
3. To identify experts that would have the appropriate background to contribute to relevant EC-PORS activities;
4. To submit reports in accordance with the requirements of the CIMO Management Group.

CIMO Focal Point on Climate Observation and Services.

The CIMO Focal Point on Climate Observation and Services shall be responsible for the following:

1. Liaise with other Commissions, WMO Programmes and co-sponsored programmes and the WMO Secretariat to address observational requirements for the GFCS that will be identified by the High-Level Task Force;
 2. Advise the Management Group on the Commission's role and activities needed to develop guidance material and standards on the issues of climate observations to meet the required quality and traceability of climate information and services;
 3. Identify and propose joint projects, activities and working mechanisms involving collaboration with CCI to assist Members in the development and implementation of WMO standards with focus on most critical issues such as the use of automatic weather stations (AWS) and remote-sensing observations in climate, and the difficulties encountered in solid precipitation observation.
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PROVISIONAL AGENDA FOR CIMO-16

- 1. OPENING OF THE SESSION**
 - 2. ORGANIZATION OF THE SESSION**
 - 2.1 Consideration of the report on credentials
 - 2.2 Adoption of the agenda
 - 2.3 Establishment of committees
 - 2.4 Other organizational matters
 - 3. REPORT BY THE PRESIDENT OF THE COMMISSION**
 - 4. DECISIONS AND FUTURE PRIORITIES RELATED TO STANDARDIZATION AND INSTRUMENT INTERCOMPARISONS**
 - 5. DECISIONS AND FUTURE PRIORITIES RELATED TO REMOTE SENSING AND NEW TECHNOLOGIES**
 - 6. DECISIONS AND FUTURE PRIORITIES RELATED TO CAPACITY DEVELOPMENT**
 - 7. CIMO'S ROLE IN WMO PRIORITY ACTIVITIES AND ITS COLLABORATION WITH WMO TECHNICAL COMMISSIONS AND PROGRAMMES**
 - 8. COLLABORATION WITH RELEVANT INTERNATIONAL ORGANIZATIONS**
 - 9. FUTURE WORK AND WORKING STRUCTURE OF THE COMMISSION AND STRATEGIC PLANNING**
 - 10. REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION AND OF RELEVANT RESOLUTIONS OF THE EXECUTIVE COUNCIL**
 - 11. ELECTION OF OFFICERS**
 - 12. DATE AND PLACE OF THE SEVENTEENTH SESSION**
 - 13. CLOSURE OF THE SESSION**
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PROVISIONAL PROGRAMME FOR TECO-2014

MONDAY, 07 JULY 2014		
09:00-10:00	REGISTRATION AND COFFEE	
10:00-11:00	O P E N I N G WELCOME & INTRODUCTION (TBA)	
SESSION 1A – DEVELOPMENTS IN OBSERVING TECHNOLOGIES <i>Chairperson: Dr Jitze Van der Meulen (Netherlands)</i>		
11:00-11:30	Keynote 1A	
11:30-11:45	1(1)	Under evaluation
11:45-12:00	1(2)	Under evaluation
12:00-12:15	1(3)	Under evaluation
12:15-12:30	1(4)	Under evaluation
12:30-14:00	LUNCH BREAK & POSTER SESSION	
SESSION 1B – DEVELOPMENTS IN OBSERVING TECHNOLOGIES <i>Chairperson: Prof Bertrand Calpini (Switzerland)</i>		
14:00-14:15	1(5)	Under evaluation
14:15-14:30	1(6)	Under evaluation
14:30-14:45	1(7)	Under evaluation
14:45-15:00	1(8)	Under evaluation
15:00-15:15	1(9)	Under evaluation
15:15-15:30	1(10)	Under evaluation
15:30-16:30	COFFEE / TEA BREAK & POSTER SESSION	
16:30-18:00	DISCUSSION SESSION 1: TOPIC TBA <i>Panel: ???</i>	
End of the first day		

TUESDAY, 08 JULY 2014**SESSION 1C – DEVELOPMENTS IN OBSERVING TECHNOLOGIES***Chairperson: Dr Volker Kurz (Germany)*

09:00-09:30

Keynote 1C

09:30-09:45	1(11)	Under evaluation	
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09:45-10:00 1(12) Under evaluation

10:00-10:15 1(13) Under evaluation

10:15-10:30 1(14) Under evaluation

10:30-11:00

COFFEE BREAK**SESSION 2A – DEVELOPMENTS IN STANDARDIZATION AND TRACEABILITY***Chairperson: Dr. Bruce Forgan (Australia)*

11:00-11:30

Keynote 2A

11:30-11:45 2(5) Under evaluation

11:45-12:00 2(6) Under evaluation

12:00-12:15 2(7) Under evaluation

12:15-12:30 2(8) Under evaluation

12:30-14:00

LUNCH BREAK AND POSTER SESSION**SESSION 3A – INTERCOMPARISONS***Chairperson: Dr Volker Lehmann (Germany)*

14:00-14:30

Keynote 3A

14:30-14:45 3(1) Under evaluation

14:45-15:00 3(2) Under evaluation

15:00-15:15 3(3) Under evaluation

15:15-15:30 3(4) Under evaluation

15:30-16:30

COFFEE / TEA BREAK & POSTER SESSION

16:30-18:00	DISCUSSION SESSION 2: TOPIC TBA <i>Panel: ???????</i>
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End of the second day

WEDNESDAY, 09 JULY 2014**SESSION 3B – INTERCOMPARISONS***Chairperson: Dr Alexander Gusev (Russian Federation)*

09:00-09:30

Keynote 3B

09:30-09:45	3(5)	Under evaluation	
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09:45-10:00

3(6)

Under evaluation

10:00-10:15

3(7)

Under evaluation

10:15-10:30

3(8)

Under evaluation

10:30-11:00

COFFEE BREAK**SESSION 3C – INTERCOMPARISONS***Chairperson: Mr Bruce Baker (USA)*

11:00-11:15

3(9)

SPICE Under evaluation

11:15-11:30

3(10)

SPICE Under evaluation

11:30-11:45

3(11)

SPICE Under evaluation

11:45-12:00

3(12)

SPICE Under evaluation

SESSION 4 – CAPACITY DEVELOPMENT AND SUPPORT TO OTHER PROGRAMMES*Chairperson: Mr Mario Garcia (Argentina)*

12:00-12:30

Keynote 4A

12:30-14:00

LUNCH BREAK AND POSTER SESSION**SESSION 4A – CAPACITY DEVELOPMENT AND SUPPORT TO OTHER PROGRAMMES***Chairperson: Mr Mario Garcia (Argentina)*

14:00-14:30

Keynote 4B

14:30-14:45

4(1)

Under evaluation

14:45-15:00

4(2)

Under evaluation

15:00-15:15

4(3)

Under evaluation

15:15-15:30

4(4)

Under evaluation

15:30-16:30

COFFEE / TEA BREAK & POSTER SESSION**16:30-18:00****DISCUSSION SESSION 3: TOPIC TBA***Panel: ????????***18:00 Conference Closure**