

WORLD METEOROLOGICAL ORGANIZATION

**COMMISSION FOR INSTRUMENTS
AND METHODS OF OBSERVATION**

**CIMO MANAGEMENT GROUP
Tenth Session**

Brussels, Belgium

19 to 20 October 2012

FINAL REPORT



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EXECUTIVE SUMMARY

The tenth session of the CIMO Management Group (CIMO-MG-10) was held from 19 to 20 October 2012, in Brussels, Belgium.

The meeting decided on a strategy to ensure that the CIMO Expert Teams and Theme Leaders actively contribute to meeting the objectives/activities identified in the WIGOS Implementation Plan.

The meeting reviewed the progress of the CIMO Expert Teams and Theme Leaders to ensure the progress and provide clarifications in case of need. It also addressed a number of issues related to the work of the commission that needed special attention, such as the procedures for organizing Regional Pyrheliometer Intercomparisons, procedures for the update of the CIMO Guide, the procedure for the reporting of CIMO Testbeds and Lead Centres and collaboration with ISO.

The meeting decided to establish task teams to address the issues of aircraft observations, the future of the World Radiometric Reference and the update of the Cloud Atlas.

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. REPORT OF THE PRESIDENT

3. UPDATE ON AND INTERACTION WITH OTHER WMO PRIORITIES AND PROGRAMMES IMPORTANT FOR CIMO ACTIVITIES

- Decision of WMO Executive Council and constituent bodies requiring follow-up by CIMO
- WIGOS
- GFCS

4. EVALUATION OF THE PROGRESS ACHIEVED IN THE WORK PROGRAMMES, AND PLANS UNTIL CIMO-2014 SESSION

- 4.1 OPAG Standardization and Intercomparisons
 - Expert Team on Standardization
 - Expert Team on New In-Situ Technologies
 - Expert on Instrument Intercomparisons
 - Theme Leader on Aircraft Measurements
- 4.2 OPAG Remote Sensing and New Technologies
 - Expert Team on Operational Remote Sensing
 - Expert Team on New Technologies and Testbeds
 - Theme Leaders on Radio-Frequency Protection
 - Theme Leader on Satellite Observations
- 4.3 OPAG Capacity Building
 - Expert Team on Regional Instrument Centres
 - CIMO Guide Editorial Board
 - Theme Leaders on Training Material and Training Activities
 - Theme Leader on Radiosonde Performance Monitoring
 - Theme Leader on Surface-based Instrument Performance Monitoring

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

- 5.1 Procedure for Organizing Regional Pyrheliometer Intercomparisons
- 5.2 CIMO Guide
- 5.3 Other Pertinent Issues
 - Cloud Atlas
 - Radiofrequency coordination
 - Competencies
 - Respond to AMDAR structure change
 - Management of CIMO Trust Fund
 - Relationship with Regional Associations

- 6. INTERCOMPARISON**
- 7. COLLABORATION WITH ISO**
- 8. NOMINATION AND MONITORING OF CIMO TESTBEDS AND LEAD CENTRES**
- 9. OTHER BUSINESS**
- 10. CLOSURE OF THE SESSION**

GENERAL SUMMARY

1. ORGANIZATION OF THE SESSION

1.1 Opening of the Session

1.1.1 The tenth session of the Commission for Instruments and Methods of Observation (CIMO) Management Group (MG-10) was opened on Friday, 19 October 2012 at 8:30, by the President of CIMO, Prof. Bertrand Calpini. 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.

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. REPORT OF THE PRESIDENT

2.1 The president reported on his activities as CIMO president since the CIMO MG-9 meeting. He participated in a number of meetings and missions to coordinate and promote CIMO activities. These included:

- Sixteenth WMO Congress, Geneva, Switzerland, 16 May – 3 June 2011,
- European Conference on Application of Meteorology EMS, Berlin, Germany, 12 – 16 September 2011,
- Inter-Commission Coordination Group (ICG) on WIGOS, Geneva, Switzerland, 26 – 30 September 2011,
- Final Baltrad Meeting, Talin, Estonia, 6 – 8 December 2011,
- GRUAN ICM-4, Tokyo Japan, 5 – 9 March 2012,
- Task Team on WIGOS Implementation Plan (TT-WIP), First Session, Geneva, Switzerland, 27 – 30 March 2012,
- WMO Executive Council, Sixty-fourth session, Geneva, Switzerland, 27 June - 3 July 2012,
- GAW, KMD, Nairobi, Kenya, 4-7 July 2012,
- WRC Davos, Davos, Switzerland, 25-26 July 2012,
- Commission for Basic Systems, Fifteenth Session, Jakarta Indonesia, 10 – 15 September 2012,
- CIMO TECO-2012, Brussels, Belgium, 16-18 October 2012.

He highlighted a number of topics relevant to these meetings that would have to be addressed later during the meeting.

2.2 He noted that the meeting would have to revise the first 2 years of work carried out by CIMO with its new structure and consider any improvement as required. He stressed the need to ensure targeted activities expected from CIMO expert team members with clear results-oriented deliverables. The CIMO MG shall concentrate on defining and supporting important milestones, in close alignment with the on-going WIGOS and WIS objectives, and by prioritizing the work with the view of gaining efficiency in the final CIMO and IMOP Programme activities.

2.3 In a continuous effort for CIMO to bridge the gaps between research and operational observations the president has been involved in the activities of the European Cooperation in Science and Technology COST and its Weather Intelligence for Renewable Energy (see

<http://www.wire1002.ch/>), which is the largest European initiative in the domain of renewable energy (26 countries). He recommended that CIMO should consider addressing the topic of meteorological observations applied to renewable energy in particular for solar and wind power plants applications:

- Low cost Direct Normal Irradiance (DNI) sensors are applied for solar power plants: they require calibration against reference instruments. The inter-comparison of DNI instruments against BSRN reference radiation measurements recently performed in MeteoSwiss Payerne (Summer 2012) has proven huge interest from the solar community, with preliminary results showing limitation both in time response as well as absolute accuracy. Such DNI limitations have implications for the real time regulation of solar power plant and Smart grid infrastructure.
- Doppler Wind lidar are becoming standard observations for real time operation of wind turbines but also during the initial recognition step of a new wind power plant site. WMO CIMO is involved in the elaboration of the new wind lidar ISO standard. The wind lidar technology has additionally major significance for aeronautic security issues

3. UPDATE ON AND INTERACTION WITH OTHER WMO PRIORITIES AND PROGRAMMES IMPORTANT FOR CIMO ACTIVITIES

3.1 The Meeting was informed on the latest development of other WMO priorities and programmes, such as WIGOS and GFCS. The Meeting was also informed of relevant decisions of the WMO Executive Council and other WMO constituent bodies that may need follow-up by CIMO.

WIGOS

3.2 The WIGOS framework Implementation Plan, which was approved by EC-64, describes a range of activity areas in which actions will be required to achieve the timely and successful implementation of the WIGOS framework. CIMO has been identified as the lead technical commission for a number of these actions and as a contributor to several others. The MG reviewed the WIP and agreed that CIMO should play a significant role in the development of WIGOS, in particular in the domain of metadata and in developing as required, WIGOS standards, procedures and practices, including the update of the WMO regulatory material.

3.3 The meeting requested all the CIMO Expert Teams and Theme Leaders to review the WIP and to identify which of the WIP activities/deliverables they were contributing to through the tasks of their respective workplan. The meeting requested all the CIMO MG members to closely liaise with the ET and TL under their responsibility to ensure they carry out this by end of the year.

3.4 The meeting further requested all CIMO ET and TL to identify additional activities they could carry out to address the WIP activities and recommended that the Secretariat supports them in this process, so that a consolidated list of CIMO ET/TL tasks supporting the WIP could be submitted to the CIMO President by end of May for review and approval.

3.5 The meeting requested Volker Kurz in its position as Head of the CIMO Editorial board to closely liaise with all ETs and TLs on the updates of the WMO Technical Regulations, providing them with the draft of the updated Technical Regulations agreed by the WIGOS Task Team on Regulatory Material, to review it, ensure the soundness and the completeness of its content, and proposal for additions, if appropriate.

GFCS

3.6 The GFCS Implementation Plan (IP) will be considered by an extraordinary session of the World Meteorological Congress in Geneva during late October 2012. It is expected

that CIMO's contribution to GFCS would mainly be through its contribution to WIGOS, which essentially comprises the Observations and Monitoring Pillar of the GFCS.

3.7 The meeting expressed concerns that GFCS was presently focussing on the political aspects and not sufficiently recognizing the importance of the measurements in deriving climate services. The meeting encouraged the CIMO president to clarify this at the occasion of the 2012 WMO Extraordinary Congress and to ensure that the structures that will be put in place do not duplicate the work of existing WMO technical commissions, like CIMO, which will anyway be supporting GFCS.

CBS-XV

3.8 The fifteenth session of the Commission for Basic Systems (CBS-XV, Jakarta, Indonesia, 10-15 Sept. 2012) noted the limitations of humidity sensors needed for high quality data at both extremes of the humidity range (fire weather, aviation and agricultural applications). It requested CIMO to consider evaluating by intercomparison the performance of different humidity measurement systems at the extreme ends of humidity (<5% >95%) ranges. The meeting welcomed the proposal of Bruce Forgan to coordinate a feasibility study for such an intercomparison with the experts of the CIMO OPAG on Standardization and Intercomparison for consideration by the next session of the CIMO MG.

4. EVALUATION OF THE PROGRESS ACHIEVED IN THE WORK PROGRAMMES, AND PLANS UNTIL CIMO-2014 SESSION

4.1 OPAG Standardization and Intercomparisons

Expert Team on Standardization

4.1.1 The meeting was informed about the progress of the Expert Team on Standardization. Additional information relevant to the collaboration of this ET with ISO was also provided to the meeting as reported in Section 7 of this report. Furthermore, in the context of the development of common ISO-WMO standards, the WMO Executive Council, at its sixty-fourth session (EC-64, 25 June – 3 July 2012) noted that the siting classification should be carefully developed, taking into account the situation of, and the possible impact on, National Meteorological and Hydrological Services (NMHSs).

4.1.2 A discussion session on the siting classification and on the experience made by the NMHSs which have implemented it, or are in the process of implementing it was organized during the 2012 WMO Technical Conference on Meteorological and Environmental Instruments and Methods of Observation (Brussels, Belgium, 16-18 October 2012). This discussion was very well attended and showed a great support to the siting classification. It was generally agreed that this classification was needed and useful.

4.1.3 The MG recalled that the differences in users' requirements forces NMHSs to have stations classified in different categories - it would neither be realistic nor relevant versus such requirements to have class 1 stations everywhere. However, the classification is very valuable as it provides meta information that is essential for the different types of data users (eg. for climate / forecast / or security real-time applications) and furthermore a mean to improve instrument siting, forcing to think about it, and possibly on simple ways to improve it and ensure it remains appropriate for the expected purpose of the station (f.ex. preventing growth of trees). Furthermore, it is very valuable in assessing the potential of third-party data, which NMHSs are now increasingly using.

4.1.4 The meeting agreed that:

- Focus should be placed at first on the "socialization" of the siting classification: clarifying the use and the purpose of the classification by possibly adding a preamble and footnotes.

- The actual values/classes should not be changed at this stage. However this may have to be reconsidered once a clear reply will have been received from ISO on the process to follow to achieve a common standard and on whether ISO request modifications to the standard.
- Persons who actively participated in the TECO-2012 discussion session should be invited to take part in the further development of the siting classification and related material.
- Site protection is a related matter that will also need to be addressed in the future as Members are showing increasing interest/concern for this topic.

4.1.5 The meeting requested the CIMO president to inform the presidents of technical commissions and of regional associations of this development and to invite them to nominate focal point in case of interest.

4.1.6 The meeting noted there was a strong demand for low-cost automatic weather stations and recognized they could be valuable for specific applications. However, it stressed that their operation and maintenance may not be low-cost at all. Also, the infrastructure (cables, etc.) needed for their installation may in some cases be much more expensive than the stations themselves. The meeting recommended that such information be included in the draft IOM report providing guidelines to assist in the automation of manual observations.

Expert Team on New In-Situ Technologies

4.1.7 The meeting was informed about the progress of the work of the Expert Team on New In-Situ Technologies (NIST) and challenges it was facing. The meeting provided some guidance to the ET as provided below.

4.1.8 To address the ET-NIST Task 1, the meeting agreed that the "new in-situ technologies" that should be considered are technologies that are ready or almost ready for operational use. It recognized that the extend of this task could be very large and suggested that the team prepares a table with a list of new technologies, and some key information on their capabilities/performance/potential, such as information on their traceability (traceable to SI, to a recognized standard, not traceable...), uncertainty, mean time between calibration, operational constraints, etc.... Specific recommendations on those technologies that are the most promising could be extracted from it. That table should then be updated in the next inter-sessional period.

4.1.9 In the context of the ET-NIST Task 2, the meeting noted that CBS requested that CIMO considers recommending the use of standardized AWS algorithms to ensure interoperability of different AWS systems. It welcomed the work of the ET on that topic, but also recognized that previous attempts to obtain algorithms had been made, but had failed because of the proprietary nature of the algorithms.

4.1.10 Related to the topic of ET-NIST Task 4, the meeting noted the presentation made during TECO-2012 on the comparison between the World Radiometric Reference (WRR) and SI. Over the years, five comparisons were made. The first three had shown good agreement between the two scales within the stated uncertainties, while the latter two showed a difference of 0.3% between the two scales. This difference was attributed to stray-light effects affecting the earlier comparisons.

4.1.11 The meeting recognized that there was a fundamental difference between measurements in the atmosphere and in the laboratory. The WRR was established to serve as reference for measurements in the atmosphere. The Manual on the Global Observing System (WMO-No. 544) requests that pyr heliometric measurements be expressed in accordance with the WRR, as a WMO standard practice. This reference has been in place for over 30 years.

4.1.12 The meeting was concerned about the possible discrepancy between the WRR and SI, about the wide-ranging implications that a change of the reference for radiation measurements would have, and about the timeliness to operate such a change.

4.1.13 The meeting therefore decided to establish a Task Team on the WRR to assess the implication that a change of the reference for radiation measurements would have and to study the timeliness of such an action. The Task Team should include representatives of interested user communities, such as climatologists, representatives of the BSRN and possibly of the BIPM and renewable energy community. The outcome of ET-NIST Task 4.1 should be provided to the Task Team on the WRR. The Task team should report to the next session of the CIMO-MG, so that a recommendation could be submitted to the next CIMO session (2014) for consideration.

4.1.14 The meeting requested Bruce Forgan and the Secretariat to finalize the membership and Terms of Reference of the Task Team on the WRR, for approval by the CIMO President.

Expert on Instrument Intercomparisons

4.1.15 The meeting was informed about the progress of the work of the Expert Team on Instrument Intercomparisons and welcomed the progress made (see also Section 6 of this report). It commended the chair for his work and that of the team.

4.1.16 The meeting recognized that there were now stronger requirements for sunshine measurements coming from the solar energy community. This implies a different approach to sunshine measurements, so that they can be used to assess the response of solar collectors. The meeting recommended that Mr Vuerich writes an IOM report on the outcomes of the sunshine intercomparison he carried out together with MeteoFrance and address in it the ability of instruments to meet the needs of the solar energy community.

4.1.17 The meeting was informed about discussions on a possible intercomparison of radiation instruments, which would also be relevant to address the requirements of the solar energy community. It recognized that in this area too, the requirements are changing in view of the needs of new users of the data. Indeed, the solar community requires information on the incoming solar energy on a very short time-scale for initially managing their power-plants but mainly in view of the interconnected “smart grid” energy distribution and the penetration of highly time dependent renewable energy in the general energy power distribution’s debate. .

4.1.18 The meeting recommended that for every intercomparison proposal, as the one mentioned above, a feasibility study should be carried out. It should identify among others the expected outcomes from the intercomparison, which community would be benefiting from these outcomes and its relevance to CIMO.

4.1.19 The meeting recognized that an intercomparison of whole sky camera would be of interest to pace the traceability of cloud amounts. It recommended that the ET, in collaboration with interested experts, prepares a feasibility study for an intercomparison of cloud cover, including ceilometers and whole sky cameras.

Theme Leader on Aircraft Measurements

4.1.20 The meeting was informed about the progress of the work of the Theme Leaders on Aircraft Measurements.

4.1.21 AMDAR decided to discontinue the AMDAR Manual and to put the relevant information in other WMO documents, such as the CIMO Guide. Dr van der Meulen indicated that additional discussions and review of the updated chapter of the CIMO Guide on Aircraft Observations would be needed, in collaboration with CBS ET-AIR.

4.1.22 Additional information concerning the establishment of a Task Team on Aircraft-based Observations is available in section 5.3 below. The meeting requested that the TT address the traceability of Aircraft Measurements as a priority.

4.2 OPAG Remote Sensing and New Technologies

Expert Team on Operational Remote Sensing

4.2.1 No status update on the work of the Expert Team on Operational Remote Sensing was provided to the meeting by the responsible OPAG Chair. The meeting was concerned about this potential lack of coordination and requested him to provide a report on the ET work progress to the CIMO President by end of May 2013.

4.2.2 The meeting was informed about some activities of this team by the Secretariat and presented with the report of its joint meeting with the CBS Expert Team on Surface-based Remotely-Sensed Observations held in December 2011 in Geneva.

Expert Team on New Technologies and Testbeds

4.2.3 The meeting was informed about the progress of the work of the Expert Team on New Technologies and Testbeds and that its meeting, originally scheduled for November 2012 had to be postponed to March 2013 because of a conflict of date with important WIGOS activities.

Theme Leaders on Radio-Frequency Protection

4.2.4 The meeting was informed about the progress of the work of the Theme Leaders on Radio-Frequency Protection and was pleased that the TLs were attending the SG-RFC meetings to ensure appropriate coordination on issues of relevance to CIMO.

4.2.5 The meeting recognized that CIMO's primary contribution should be in safeguarding the frequencies for the measurement part, like for radars and wind profilers. WMO identified 15 agenda items of the next ITU that would be relevant for its activities. The meeting recommended that the TLs go through them and identify whether specific guidance is required for some of them and request the relevant CIMO ETs to provide them with this guidance.

Theme Leader on Satellite Observations

4.2.6 No status update on the work of the Theme Leader of Satellite Observations was provided to the meeting by the responsible OPAG Chair. The meeting was concerned about this potential lack of coordination and requested him to provide a report on the ET work progress to the CIMO President by end of May 2013.

4.3 OPAG Capacity Building

Expert Team on Regional Instrument Centres, Calibration and Traceability

4.3.1 The meeting was informed about the progress of the work of the Expert Team on Regional Instrument Centres, Calibration and Traceability.

4.3.2 The meeting was provided with a draft questionnaire about alternatives to dangerous and obsolete instruments used in National Meteorological Hydrological Services (NMHSs) developed by the ET members. The meeting agreed that such a questionnaire would provide very valuable information and should be distributed to all WMO Members once finalized by the ET. The meeting recommended to include a question on whether the information provided on the webpage providing links to documents on mercury (<http://www.knmi.nl/samenw/geoss/wmo/mercury/>) was fulfilling their need for information

and how it could be improved. The meeting also recommended including some questions on the use of chemicals for hydrogen production in the questionnaire.

4.3.3 The meeting recommended that ET-RIC reviewed the CIMO Guide, ensuring the dangers of mercury are clearly stated, reducing the emphasis on the use of obsolete instruments using mercury, and towards making clear that mercury should preferably not be used in the field.

4.3.4 The meeting was pleased that three ET members took part as lecturers in the Training Workshop on Metrology that was held for English-speaking RA-V countries in Melbourne, Australia (5-9 December 2011) and thanked them for their contribution.

4.3.5 The meeting agreed with the proposal from USA to replace Dr Bill Burnett by Dr Richard Crout, as member of the ET.

CIMO Guide Editorial Board

4.3.6 The meeting was informed about the progress of the work of the CIMO Guide Editorial Board.

4.3.7 The meeting noted that the web-search tool for the CIMO Guide and other related WMO standards addressing observations had been investigated thoroughly and had led to the conclusion that it could not be easily programmed by the WMO IT Department: currently WMO is seeking for an overall IT solution rather than an individual one for a specific technical commission, with the risk of postponing the realization of such search tool as this was requested in 2010 during the Helsinki CIMO session.. The meeting was concerned that this solution may not be appropriate and requested Dr Kurz to continue closely following this issue.

4.3.8 Additional decisions relevant to the CIMO Guide and the work of the Editorial Board are provided under section 5.2.

Theme Leaders on Training Material and Training Activities

4.3.9 The meeting was informed about the progress of the work of the Theme Leaders on Training Material and Training Activities. It was concerned that there was apparently an absence of communication with one Theme Leader and requested the Secretariat to try to contact Mr Buyukbas to re-establish the link with him.

4.3.10 The meeting recalled that the TLs should not work in isolation, but be in contact with all CIMO ETs to collect the relevant material. It urged the relevant OPAG Chairs to be in frequent contact with them, possibly through teleconference, or webex conference which could be organized with the support of the Secretariat.

4.3.11 One of the Theme Leaders identified a number of documents providing training material on the use, maintenance and calibration of instruments in Chinese. The meeting noted that WMO had six working languages and that Chinese was one of them. Such documents are therefore relevant for the activities of WMO if CMA uses them to train its staff. The meeting recommended that the Regional Instrument Centre of China, includes links to those documents on its website, which is itself linked to the CIMO website. This would ensure that the documents are accessible and would be maintained by staff having the appropriate language knowledge. The meeting recommended that a similar approach be followed for material in other WMO languages.

4.3.12 The meeting was concerned about this potential lack of coordination between the TLs and the ETs and requested Mr Garcia to provide a report on the TL work progress to the CIMO President by end of March 2013.

Theme Leader on Radiosonde Performance Monitoring

4.3.13 The meeting was informed about the progress of the work of the Theme Leaders on Radiosonde Performance Monitoring. The meeting was pleased that progress had been achieved and that a major deliverable was expected for December 2012.

4.3.14 The meeting noted that the radiosonde catalogue had not yet been updated on the WMO website and reiterated its recommendation that Mr Kats considers visiting Mr Oakley, who used to be preparing this catalogue to benefit from his experience toward completing this update.

Theme Leader on Surface-based Instrument Performance Monitoring

4.3.15 No status update on the work of the Theme Leader on Surface-based Instrument Performance Monitoring was provided to the meeting by the responsible MG member. He indicated a problem of communication with the theme leader.

4.3.16 The meeting was concerned about this potential lack of coordination and requested the vice-president to provide a report on the TL work progress to the CIMO President by end of May 2013.

4.3.17 The MG recalled that at its last session (Geneva, 5-8 April 2011) it had requested its members from Australia, Germany and United States to provide Mrs PEI with a contact person from their countries and recommended that each of them prepare a report on their country's approach. The meeting recommended that the Theme Leader also liaise with Stuart Goldstraw to ensure her work would not duplicate the work being carried out under CBS and be closely coordinated with it.

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

5.1 Procedure for Organizing Regional Pyrheliometer Intercomparisons

Regional Pyrheliometer Comparisons

5.1.1 At its last session the MG expressed concerns about the fact that only one Regional Radiation Centre (RRC) organized regular Regional Pyrheliometer Comparisons (RPCs) and requested a review of the procedures in place for organizing RPCs.

5.1.2 Bruce Forgan presented an analysis of the situation, reviewing the occurrence of RPCs, the possible reasons for the low numbers of RPCs and possible alternative to RPCs for meeting the requirements of WMO Members, in the context of the changes that occurred since the establishment of Regional Radiation Centres (RRCs).

5.1.3 The meeting recalled that CIMO had used a mechanism, consisting of International Pyrheliometer Comparisons (IPCs), and Regional Pyrheliometer Comparisons (RPCs) to provide the 'continuous chain of comparisons' necessary for traceability of solar energy measurements to the WRR (and hence SI units) for WMO Members. It recognized that RPCs are intimately tied to Regional Radiation Centres (RRCs); there cannot be a RPC without a sponsoring RRC. However, the meeting recalled that according to the CIMO Guide, pyrheliometers must be calibrated by comparison using the sun as the source with a pyrheliometer that has traceability to the World Standard Group (WSG). Therefore, any calibration which has the proper traceability to the WSG is valid. In particular, the results from intercomparisons that provide such traceability to the WSG (not necessarily RPCs), or such calibrations provided by accredited laboratories would also be acceptable.

5.1.4 The meeting principally agreed with the main conclusions of Dr Forgan's analysis:

- a) CIMO continues to endorse the WRC/PMOD and its hosting of the IPCs and its activities associated with solar radiometric traceability;
- b) CIMO encourages current RRCs to maintain their status within WMO through adherence to the guidelines published in the CIMO Guide, Part I, Annex 7C;
- c) CIMO encourages the capability and capacity functions of the Regional Instrument Centres to have sessions on radiation metrology and traceability;
- d) In regard to RRCs, Annex 7C of the CIMO Guide should be modified to require a RRC to either hold a RPC (not at an IPC) or calibrate at least one solar instrument from a Member of the Region between IPCs;
- e) Each Regional Association's RRC be endorsed for the next relevant inter-sessional period only after it provides evidence that each RRC conforms to the processes in the Annex 7C (especially (d) above). The mechanism to provide this evidence and get endorsement should be clarified;
- f) CIMO and WMO continues to encourage RRCs to hold RPCs and accepts any other comparison that can demonstrate it provides traceability to the WRR for a Member; and
- g) CIMO liaises with GAW and the WCRP to ensure that future solar data archived in the WRDC are traceable to the WRR.

5.1.5 The meeting requested Bruce Forgan, in collaboration with the CIMO president and the Secretariat, to develop a structured approach, reflecting its deliberations and based on the report provided by Dr Forgan to the meeting, to be submitted for approval by the next CIMO session, which accounts for the required changes in practices and required modifications of the CIMO Guide.

5.1.6 The meeting recommended that the general process should be included in the CIMO Guide, while another (version-controlled) document could be established to reflect the status of the RRCs and be updated more frequently.

5.2 CIMO Guide

5.2.1 The meeting reviewed the recommendations made by the CIMO Guide Editorial Board (EdBd).

5.2.2 CIMO had considered developing a Manual on Instruments and Methods of Observations (Manual on IMO) and had requested the EdBd to consider the appropriateness to develop such a manual in the context of the development of the WIGOS regulatory documents (in particular in the context of the WIGOS Manual). The EdBd recognized that the development of new manuals required significant costs and resources. Furthermore, developing a new Manual on IMO in addition to the Manual on WIGOS would be contrary to the aim of WIGOS to strive for integration. The meeting agreed with the recommendation of the EdBd not to develop a separate Manual on IMO, but to contribute relevant standard practices elevated from the CIMO Guide to the Manual on WIGOS, or to the WMO Technical Regulations. It requested the Chair of the Editorial Board, Dr Kurz, to ensure that CIMO would have the ownership and responsibility for updating the part(s) of the WMO regulatory documents where these practices are described.

5.2.3 The CIMO Guide is expected to be a generic document and to be as homogeneous as possible in the presentation it makes of the various observing technologies. In view of the large number of experts that contribute to the updating process of the CIMO Guide, editing principles would help them in drafting their contributions in a homogeneous way. Furthermore, such guidelines would also help in achieving a consensus on the final revised text and so would shorten the development and review process of new updates. The meeting adopted the guidelines for the edition of the CIMO Guide provided in [Annex II](#), which were prepared by the CIMO Guide Editorial Board, based on those that were used for the Sixth Edition of the CIMO Guide (1996) and recommended that the Secretariat post them on the CIMO/IMOP website.

5.2.4 The principles used in updating of the CIMO Guide were reviewed by the CIMO Guide Editorial Board to clarify to all possible contributors the review and approval processes for

changes to the CIMO Guide and how contributions could be submitted for consideration. Furthermore, these principles should ensure proper coordination with other technical commissions in charge of updating some chapters, while keeping the procedures as light as possible to avoid unnecessarily delaying the updating process. The meeting agreed with the proposal of the CIMO Guide Editorial Board provided in [Annex III](#) and recommended that the Secretariat post them on the CIMO/IMOP website.

5.2.5 A request has been received by the Secretariat to clarify which pressure reduction formula should preferably be used to reduce atmospheric pressure measured at a station to mean sea level. The meeting recognized that it would be desirable to provide a clear recommendation on the use of a single formula. However, it also noted that this could have significant implications for Members. The CIMO Management Group therefore requested CIMO Expert Team on Standardization to consider developing a technical report on the implication of the use of a single formula and a recommendation on which formula should be used. It also recommended that Jitze van der Meulen presents this issue to the WIGOS Task Team on Regulatory Material in view of the implications it could potentially have for Members, and its relevance to other technical commissions.

5.2.6 The chapter on Rocket Observations was not updated since the Sixth Edition of the CIMO Guide and no update is presently in progress. The meeting agreed with the EdBd that these techniques are not anymore in operational use for meteorological observations, but possibly still for research purposes. The meeting therefore agreed to remove this chapter from the next major edition of the CIMO Guide. It requested the MG members to inform the Secretariat if they become aware that those techniques are still in operational use in some countries, and if so provide the contacts of relevant experts to update it.

5.2.7 The meeting noted that no chapter of the CIMO Guide had been deleted earlier and that such deletion would have to be reflected somewhere in the Guide. The meeting requested the CIMO Guide Editorial Board to develop a tracking procedure for chapters of the CIMO Guide that were deleted.

5.2.8 Most of the CIMO Guide chapters are starting with the description of old technologies and ending with new technologies. The meeting was of the opinion that it would be more appropriate to have at the beginning of the chapter the recommended method and at the end the older technologies, but recognized that it would require considerable work. This could possibly also be solved by including a table at the beginning of the chapters indicating the relative uncertainty for each of the described methods. The meeting requested the CIMO Guide Editorial Board to develop a proposal to guide authors on how to address this matter.

5.3 Other Pertinent Issues

5.3.1 Based on a recommendation from the CIMO Guide Editorial Board, the meeting reconsidered the possible development of a webportal providing links to numerous document sources in support of capacity building, as a follow-up and extension of the former "AWS portal" (<http://www.wmo.int/pages/prog/www/IMOP/WebPortal-AWS/Index.html>). It recognized that such a task was beyond the capability of one person, but that all CIMO ETs should be proposing links to relevant documents under their area of responsibility. It proposed that the CIMO Secretariat sets up a webpage which could include all these links.

Cloud Atlas

5.3.2 As recommended by CIMO MG-9 (5-8 April 2011), a meeting was held on 23 September 2011 at the WMO Headquarters to discuss the need for revision and digitization of the Cloud Atlas. The meeting, was chaired by Prof Bertrand Calpini, President of CIMO, co-chaired by Mr Jeff Wilson (D/ETR) and included the participation of members of the Coordinating Committee of the Standing Conference of Heads of Training Institutions, Paul Hardaker (CEO of the Royal Meteorological Society), Eliane Thürig-Jenzer of MeteoSwiss, and WMO Secretariat staff representing CIMO and Publications.

5.3.3 The main points agreed by the cloud atlas meeting were as follows:

- There is a strong need to digitize the Cloud Atlas so that it can be made available on the web.
- There may be a need to include additional images (and potentially replacement images) in the new version.
- There may be merit in adding new functionality to the publication.
- The basic document, once updated, should be 'locked in stone' so that it serves as a reliable global standard in the years to come.

The cloud atlas meeting consensus was that the primary task of updating/digitizing the Cloud Atlas should be led by CIMO and should be completed during 2014, while the development of training aid for cloud identification should be led by another Task Team under the Education and Training Programme.

5.3.4 The CIMO MG addressed these topics and was in agreement with the main findings of the cloud atlas meeting.

5.3.5 The CIMO MG was also informed that a number of requests had been received by the Secretariat on the possible existence / need for recognition of a new type of cloud.

5.3.6 The meeting recognized that though the number of observers was diminishing, human observers were likely to continue playing an important role for years, especially in developing countries. It also noted that, as one part of the Cloud Atlas is an Annex to WMO Technical Regulations (WMO-No. 49) regulating practices that shall be followed by Members, it had to be considered as a standard and needed to be maintained as such. NMHSs frequently have developed their own documents for internal use, however these are based on the WMO Cloud Atlas.

5.3.7 The meeting agreed to do a feasibility study for the update of the cloud atlas. It requested the Secretariat to support the president in finalizing the Terms of Reference of a Task Team, establishing its membership and supporting its work. The Terms of Reference of the Task Team on the Cloud Atlas, as finalized by the CIMO President and the Secretariat are included in [Annex IV](#).

5.3.8 The meeting requested that the outcomes of the Task Team work should be submitted to the CIMO MG by end of May 2013 for its consideration and decision on a possible follow-up. The meeting noted that no funds had been planned in the regular budget of this financial period to finance this activity and that it would have to be considered in due time.

Competencies

5.3.9 The meeting addressed the development of competencies for personal performing observations, maintenance and calibration of instruments that was assigned to the Theme Leaders on Training Material and Training Activities and to the Expert Team on Regional Instrument Centres, Calibration and Traceability. The meeting noted that this was particularly relevant in the context of ICAO certification of NMHSs, but was concerned about the scope that this activity could have. It requested both groups, to work on this task as a matter of priority, addressing first measurements taken by observers. It recognized that a number of the MG members were presently going through this process in their respective institutes and would be in a much better position to provide effective support in this development, once they would have completed the process at the national level.

Relationship with AMDAR

5.3.10 The Executive Council requested that CBS and CIMO provide support for the completion of integration of AMDAR into the WWW Programme as a contributing element to WIGOS through the development of an appropriate working structure and work programme under CBS and CIMO that will ensure the further development of AMDAR based on continued use and maintenance of the AMDAR Trust Fund.

5.3.11 The AMDAR Panel Management Group (APMG) proposed to establish two expert teams, one under CBS and the other one under CIMO to substitute the work of the AMDAR Panel. The CBS team would be taking on the aircraft-based observations programme development role, whilst the CIMO team should have responsibility for the technical and standards-related aspects that have previously been addressed by the Science and Technical Sub-group of the AMDAR Panel which would be too much a responsibility and workload for the present CIMO Theme Leader on Aircraft Measurements. At its fifteenth session (Jakarta, Indonesia, 10-15 Sept. 2012), the Commission for Basic Systems established an Expert Team on Aircraft Based Observing Systems (ET-ABO) accordingly.

5.3.12 Furthermore, it is planned that the AMDAR Panel will cease to operate at the time of its final session (Boulder, Colorado, 5-9 November 2012); while the AMDAR Trust Fund will continue to exist to support activities related to aircraft-based observations under the new governance.

5.3.13 The meeting agreed in principle with the proposed Terms of Reference for the AMDAR Trust Fund that would support the ongoing work of the aircraft-based observations programme, and that would be jointly managed by the WMO Secretary-General and the CBS and CIMO presidents, or their representatives.

5.3.14 The meeting supported the proposal of the APMG to establish two teams, under CBS and CIMO. For procedural reasons, the meeting decided to establish a Task Team on Aircraft-based Observations within CIMO rather than an expert team which would require changing the CIMO structure and agreed to reconsider this at the time of the next CIMO session in 2014. The meeting decided that the activities of this Task Team and of its possible successor would have to be funded by the AMDAR Trust Fund.

5.3.15 Draft Terms of Reference and Tasks for the CIMO team were presented to the meeting. The meeting recommended modifying those ToRs, making them similar in structure to those of the CBS team so as to show the shared responsibilities of the two teams in supporting the AMDAR programme, but also clarifying the scope of the work supported by each team. The meeting agreed that both teams should collaborate but requested that the responsibility of both teams be clearly defined and differentiated. The ToRs of the CIMO team should cover among other the traceability of the measurement, the quality of measurements and relevant capacity building/training activities. The Task Team should develop a founded recommendation to the next session of the CIMO MG on the possible requirement to establish an Expert Team rather than a Task Team under CIMO, taking into consideration the present structure of CIMO and balance between the scope of the other CIMO ETs activities.

5.3.16 The meeting requested the Secretariat to finalize the membership and Terms of Reference of the Task Team on Aircraft-based Observations in collaboration with the CIMO President and the OPAG Standardization and Intercomparison co-chairs. The Terms of Reference of the Task Team, as finalized by this group are included in V. The Task Team will be reporting to Jitze van der Meulen.

5.3.17 The meeting agreed that CIMO TT and CBS ET members could participate in the meeting of the other team, if appropriate and needed.

Relationship with Regional Associations

5.3.18 The WMO President requested all technical commissions to provide suggestions to improve the interaction between the Regional Associations (RA) and the Technical Commissions and a dedicated meeting will be held on this matter on Sunday 28 October 2012, the day prior to the beginning of the WMO Extraordinary Congress. The Management Group considered ways to improve the interactions between CIMO and the RAs. It recognized that all regions were represented in the CIMO MG and agreed that it was the responsibility of each MG member to be in close contacts with their relevant RA and doing their utmost to attend their RA sessions as part of their national delegation. This would

provide a direct link between CIMO and the RAs, help to inform the RAs of relevant CIMO activities, and better understand the RA requirements for guidance.

5.3.19 Mr Garcia informed the meeting about the installation of a lidar network in Argentina for monitoring aerosols and volcanic ash. Research and operational services are working together to set-up this project, as clear instructions will be needed for the technicians who will normally be operating such instruments.

5.3.20 The MG welcomed this information as the experience gained through this project would be of relevance for other NMHSs and CIMO. The meeting proposed to include Dr Pablo Ristori (Argentina), the expert in charge of this project, to serve as a member of the CIMO Expert Team on New Technologies and Testbeds and to attend its coming meeting scheduled for March 2013. This would also strengthen the participation of RA-III experts in CIMO activities, which would be most appreciated. The meeting requested Mr Garcia, the president of CIMO and the Secretariat to contact relevant persons and work towards formalizing this collaboration.

6. INTERCOMPARISON

SPICE

6.1 The meeting was informed of the progress of the WMO Solid Precipitation Intercomparison Experiment (SPICE). The intercomparison is planned to start for the winter 2012/13 and to last for at least two winter seasons. Fifteen sites have been selected for participation and instruments provided by 18 manufacturers and WMO Members will be included in the experiment. Conducting the intercomparison according to the planned schedule will be extremely challenging because of a number of factors, such as the limited human resource available at each of the sites to support the intercomparison, four sites are new and will have to be build before the onset of the winter, the distribution of instruments from the Instrument Providers has been slower than expected, and the difficulty in intervening at very remote sites.

6.2 Two major risks have been identified which could impact the ability of delivering the expected project results:

- Risk of not acquiring a comprehensive and representative data set (delays in site configuration, availability of representative events)
- Lack of capacity to conduct a thorough analysis and report results meaningful to the community of users.

The SPICE International Organizing Committee (IOC) is considering a risk mitigation strategy that would consist of extending the duration of the experiment and in securing resources to support the data analysis, subject to the support of the CIMO Management Group.

6.3 The meeting appreciated that the SPICE project team would prepare progress reports to the attention of the MG on a yearly basis. It was impressed by the extent of the project and the work done to date, and noted the inherent challenges of coordinating such a project. It requested the SPICE IOC to do all possible to conduct the experiment as originally planned. Considering the complexity of the project and the significant investments made by Members to set-up sites specifically for it, the meeting was in principle supportive of extending the intercomparison in case of need to ensure optimal benefit from the project for WMO Members and decided it would consider the extension of the project based on the outcomes of the first winter, taking into consideration the plans of the IOC for conducting the experiment and the data analysis.

6.4 In view of the very limited funds available in the WMO regular budget to support CIMO activities, the meeting requested the CIMO Management Group members, as well as the SPICE project team members to lobby for contributions to the CIMO Trust Fund, in particular for hiring a data analyst for SPICE. It requested the Secretariat to support this in putting a strong focus on SPICE in the 2013 call for contributions to the CIMO Trust Fund.

Other intercomparisons

6.5 The meeting was informed on the progress of the Radar Quality Control and Quantitative Precipitation Intercomparison. It noted that the project was at the stage of selecting the participants in the intercomparison and that some delays had been encountered due to the availability of key contributors to the project. It encouraged the project team to organize the intercomparison so that the final results/report would be available at the next session of CIMO in 2014.

6.6 Recent studies showed the potential of ceilometers (principally used for detecting cloud layers in the atmosphere and for determining the cloud base height) to provide profiles of aerosol volume backscattering coefficients in the boundary layer and identify elevated layers. A COST action (follow-up of EGCLIMET) called TOPROF (Towards Operational ground based PROFiling with ceilometers and microwave radiometers for improving weather forecasts), has been submitted for decision in November 2012 to the COST office. On a related matter, the CIMO MG was approached to initialize an intercomparison of ceilometer and automatic lidar under the aegis of WMO with the goal of defining minimum specifications for cloud and aerosol recognition and a quantitative analysis of the cloud base height and aerosol properties under the same observation conditions. The meeting was pleased to hear about the COST action plans and recognized the need to avoid duplicating the work carried out under TOPROF. It therefore recommended that the authors of the proposal to CIMO inform the MG on these developments and possibly submit an updated proposal to its next session, if appropriate.

6.7 The meeting had preliminary discussions on the needs and possibilities to organize radiosonde intercomparisons in the coming years. It noted that such intercomparisons would likely have to put a stronger emphasis on other measurement systems than in the past and recognized that CIMO Testbeds could provide a valuable support in such undertakings.

6.8 The meeting recommended that all intercomparison proposals should be accompanied by a feasibility study, focussing on the parameter to measure rather than on the instruments to be compared, before it could decide embarking on it. In view of the complexity of organizing large intercomparisons, the MG recommended to ensure every intercomparison is focused and targeted, so that they could be conducted and evaluated in a timely fashion.

7. COLLABORATION WITH ISO

7.1 The meeting was informed that the WMO Secretary-General approached ISO to seek its concurrence to further develop two standards as common ISO-WMO standards. These are the Siting Classification for Surface Observing Stations on Land (developed by WMO, approved by CIMO-XV and published in the CIMO Guide) and the standard on Ground-based Remote Sensing by Doppler Wind Lidars (ISO/WD 28902-2) being developed by ISO.

7.2 The meeting noted that in the context of the Working Arrangements between WMO and ISO, the word "standard" is meant as defined by ISO/IEC Guide 2:2004¹. In this context, a standard is a document describing a procedure to be followed and does not have the meaning of a WMO standard practice, which requires Members to implement it. ISO standards are voluntary, as long as they are not stated in regulatory documents, such as the WMO Technical Regulations and Manuals. The Siting Classification for Surface Observing

¹ According to ISO/IEC Guide 2:2004 a standard is a document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context

NOTE Standards should be based on the consolidated results of science, technology and experience, and aimed at the promotion of optimum community benefits.

Station on Land mentioned above is published in the CIMO Guide and consequently has the status of a practice/procedure that Members are invited to follow.

7.3 At the time of the meeting, no formal reply had been received by ISO yet. However, representatives of the ISO TC146/SC5 "Meteorology" who were present at TECO-2012 reiterated their interest in collaborating with CIMO on the further development of common standards. The meeting welcomed this information and strongly supported collaboration with ISO for the further development of these two standards as common ISO-WMO standards.

8. NOMINATION AND MONITORING OF CIMO TESTBEDS AND LEAD CENTRES

8.1 The Terms of Reference for CIMO Testbeds and Lead Centres (TB&LC) adopted by the Fifteenth Session of CIMO requests them to provide at least one report every 2 years to the CIMO Management Group. The meeting decided that the 2012 report of the CIMO TB&LC would be due by 31 January 2013. The next report (2013) will be due before the next session of the CIMO Management Group that will take place sometime in 2014 in preparation of the CIMO XVI session. (The exact date will be defined at a later stage.)

8.2 In order to simplify the procedure for review of TB&LC as much as possible and to ensure all the information required for the assessment be available in due time, the meeting approved the template for reporting of TB&LC as provided in [Annex VI](#). It also approved the template for the submission of new TB&LC, provided in [Annex VII](#). The meeting requested all TB&LC to use these forms and provide their 2012 report to the WMO Secretariat by 31 January 2013.

8.3 The meeting tasked the Task Team (TT) it had established to evaluate the proposals of CIMO Testbeds and Lead Centres to also carry out the review of the TB&LC outcomes. It reviewed the membership of the TT, which from now on will consist of Bruce Forgan (Chair), Bruce Baker, Bruce Hartley and Heng Zhou.

9. OTHER BUSINESS

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

9.2 The meeting welcomed the initiative of the European Metrology Research Programme (EMRP) Meteomet (Metrology for Meteorology – Metrology for pressure, temperature, humidity and air-speed in the atmosphere). It recognized it had a very ambitious and relevant work programme and recommended that the CIMO ETs and TLs collaborate with this project to ensure they address the CIMO's concerns, to avoid duplication of activities and to help disseminate their results, if appropriate.

9.3 The meeting welcomed that proposal of the president that Dr Jörg Klausen MeteoSwiss would act as a contact with CAS reporting to the president of CIMO.

9.4 The Rolling Review of Requirements samples information that should be reflected in the Operational Measurement Uncertainty Requirements and Instrument Performance published in the CIMO Guide (Part I, Chapter 1, Annex 1D), if appropriate. The meeting requested Jitze van der Meulen to develop a proposal towards harmonizing the content of these two sources of information and to present it to the next session of the CIMO Management Group.

9.5 TECO 2012 was organized in Brussels, Belgium from 16 to 18 October 2012, in conjunction with the Meteorological Technology World Expo. The meeting recommended that all participants be requested to complete a questionnaire/survey aimed at ascertaining the strengths and weaknesses of TECO-2012, so that the information obtained can be used to make improvements for future Technical Conferences. This should be carried out as a web-survey based on the draft questionnaire provided in [Annex VIII](#). The meeting further recommended that the chairman of HMEI be invited to provide the view of HMEI members.

9.6 The actions identified in this report are listed in [Annex IX](#).

10. CLOSURE OF THE SESSION

The session closed on Saturday, 20 October 2012 at 17:04 hours

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GUIDELINES FOR DRAFTING UPDATES/ NEW EDITIONS OF THE CIMO GUIDE (2012)

(Based on the guidelines used for the Sixth Edition)

1. A degree of standardisation for the chapter headings was rather strictly applied to the chapters of Part I. The outline of the headings is in the Annex to this document. Headings in Parts II and III are much more flexible. When a new chapter is drafted for Part II to IV, its structure should be, as far as possible, consistent with the other chapters of that Part.
2. The *CIMO Guide* is intended primarily for national meteorological services, but many other organisations and institutions also make use of it, and its purpose is to give guidance on the most effective practices for meteorological measurements and observations, to achieve a standard quality. Emphasis is given to practical advice on techniques which are well established and in regular use. The theoretical basis of the techniques should be outlined in the text, supported by references to background literature. Manufacturers are also using the *CIMO Guide* as guidance for their own products.
3. The level of technical detail and the content should be appropriate for the intended readers of the *CIMO Guide*. These are taken to include:
 - supervisors of observations programs in meteorological and related services, both at the managerial and technical/operations levels,
 - people with scientific background in other fields in research institutions, government agencies etc who need to make meteorological measurements,
 - teachers, instructors and students in a wide range of studies.
4. The *CIMO Guide* deals only with techniques in routine use. Techniques that are rare may be included so long as they are fully operational. Techniques under development or in use only at specialised centres or not easily documented may be alluded to and referenced but not described at length.
5. The *CIMO Guide* should give practical advice on aspects of meteorological observations and measurements, especially those that are known from experience in meteorological operations but are not commonly published or otherwise readily available.
 - Advice should be given on uncertainty, reliability and other aspects of performance, with comprehensive discussion of sources of error.
 - It is desirable to give advice in general terms on management considerations, such as unusual demands on resources that a particular observational technique may incur, or particular difficulties in implementation.
 - Well-documented comparisons or evaluations of instruments should be described or referenced.
 - Recommendations or decisions of the Commission for Instruments and Methods of Observation must be included.
6. It is not practicable to give in the *CIMO Guide* detailed advice on operations and equipment, especially for the complex systems described in Part II and IV. For such systems the *CIMO Guide* provides an outline, and an introduction to the literature, for the well-informed non-specialist. It should give a perspective on the technique in the general context of meteorological observing systems, and advice on the practice and practicability of the technique.

7. The *CIMO Guide* does not explicitly describe national practices and observing networks, and neither does it mention particular manufacturers or suppliers nor their observing networks.
8. Relevant material in WMO Manuals and other Guides should be referenced. Usually it should not be reproduced or re-stated, but there may be some instances where basic material should appear in the *CIMO Guide* as well as in other WMO documents.
9. The following practices have been adopted for references to literature.
 - Reviewed and readily available papers and documents are preferred, but are not always sufficient. The Instrument and Observing Methods Reports issued by WMO may be useful references if suitable material does not appear elsewhere. Reports of conferences and in-house papers are often too transient or inaccessible to be very useful and should be used only if necessary and if no other material is available.
 - Recent general and review papers are particularly useful, and recent papers which contain other references to lead the reader into the literature.
 - References are particularly appropriate in the sections dealing with scientific discussion of methods of measurement and sources of error, and for discussion of performance and results of evaluations. They are also appropriate for advice on advanced techniques.
10. Glossaries are not used: readers may be assumed to be familiar with normal scientific and technological terminology, and specialist terms should be defined in the text where appropriate. However, some key vocabulary should be introduced to promote uniform terminology. The terminology used in the *CIMO Guide* has to conform to the internationally adopted standards. These are in particular the *International Meteorological Vocabulary* (WMO-No. 182) and the *International Vocabulary of Metrology – Basic and General Concepts and Associated Terms*, <http://www.bipm.org/en/publications/guides/vim.html>)
11. Uncertainties of instruments and systems should be expressed in compliance with the GUM (*Evaluation of measurement data – Guide to the expression of uncertainty in measurement*, <http://www.bipm.org/en/publications/guides/gum.html>)
12. Reporting practices should not be included in the *CIMO Guide*, but in the Manual on Codes (WMO-No. 306).
13. The presentation of the material should follow the WMO Style Guide and the WMO Editorial checklist available under: http://www.wmo.int/pages/prog/lsp/lsp_res_en.html
14. Pictures may be included, but require obtaining written agreement of the copyright holders.

SCHEMATIC HEADINGS FOR CHAPTER x of PART I

Contents (1)

- x.1 **General** Put introductory text here if it is required, then...
- x.1.1 **Definitions (2)**
- x.1.2 **Units and/or scales**
- x.1.3 **Meteorological requirements (3, 4)**
- x.1.4 **Methods of measurement (4, 5)**
- x.2 Quantity and/or technique and/or sensor and/or instrument no. 1 (6)
- Use paragraph numbers x.2.1, x.2.3.4
- x.3 Quantity/technique/sensor/instrument no. 2
- Etc. If there are only 2 techniques, go to...
- x.4 *Additional headings (6)*
- x.5 " "
- Etc
- x.last **References**
- Annex x.A (7)*
- Annex x.B*
- Etc

NOTES

- Bold** means this layout has been used in all chapters of Part I.
- Italic* means very flexible.
- (1) A list of chapters will appear at the front of the volume. A list of headings (down to x.a.b.c) will appear at the front of each chapter.
- (2) This means definitions specific to this chapter.
- (3) Includes applications for the data, reference to WMO documents, etc., and requirements for desirable and achievable accuracy which are not covered in Chapter 1 of Part I.
- (4) As they apply to the whole chapter. Subsets of these may appear in subsequent sections on particular techniques.

- (5) General principles, overview of systems, physics and chemistry, as appropriate.
- (6) In principle, for each quantity/technique/instrument it should be possible to find, somewhere in the chapter, general or specific information on:

- description (including the scientific principle)*
- procedures*
- exposure and siting*
- standards*
- sources of error*
- comparisons/calibration in field/laboratory*
- corrections*
- maintenance.*

These will not all be necessary for all cases, and they can be in sections like x.2 or in more general sections like x.4. This is all very flexible, and at the author's discretion.

- (7) Annexes can include almost anything that is inconvenient elsewhere in the text, eg formal statements of requirements or procedures, formulae, constants, detailed tables, etc.

PROCEDURES FOR UPDATING THE CIMO GUIDE

Generalities

1. Updates/revisions of the Guide are initiated as soon as a sound proposal is submitted.
2. Proposals (apart from minor changes and typos) have to be included **in track-change mode** in the MS-Word file of the most recent version of the CIMO Guide. (The author of the proposal should contact the Secretariat to get the most up-to-date MS-word file of the corresponding chapter).
3. Proposals for updates of the CIMO Guide have to be submitted to the CIMO Guide Editorial Board, with copy to the Secretariat.
4. CIMO Expert Teams (ET) and Theme Leaders (TL) are responsible for developing updates of the CIMO Guide incorporating the relevant outcomes of their ET/TL work programme and for identifying technical aspects needing to be updated within their Terms of Reference, while the CIMO Guide Editorial Board should address aspects relating to the homogeneity of the CIMO Guide and identifying areas/parts that need to be completely rewritten. ETs are encouraged to inform HMEI (hmei(at)wmo.int) when they are working on an up-date or a specific revision to incorporate relevant contributions from manufacturers.
5. People interested in contributing to on-going revisions or reviewing/commenting draft updates should liaise with the relevant ET, as listed on the CIMO/IMOP website.
6. Some chapters of the Guide (such as for example Marine Observations (JCOMM), Satellite Part (ET-SAT/CBS), Measurement of Ozone and Measurement of Chemical Composition (CAS)), are maintained/updated by other Technical Commissions or groups and will be handled accordingly.
7. Proposals for improvement are also welcome from experts outside of the CIMO expert teams/theme leader membership. Proposals from manufacturers are also welcome and should preferably be submitted through the HMEI representative on the CIMO Guide Editorial Board to ensure they are neutral and not biased towards the systems of some companies.

General approval steps (*shown in track change with respect to the version presently in force and provided in Doc. 4*)

The principles below summarize the approval of updates/new edition of the CIMO Guide and are illustrated in the attached diagram.

- a) Responsibility for coordinating updates/revisions resides with the CIMO Guide Editorial Board;
- b) Proposals for changes must be submitted to the CIMO Guide Editorial Board and the Secretariat, which will direct it to the relevant CIMO Expert Team;
- c) Soundness of proposal is reviewed / corrected /further developed by the relevant Expert Team, in collaboration with the author of the proposal;
- d) In the case of proposals submitted by other Technical Commissions or groups, the CIMO president will appoint a CIMO authority (likely Expert Team Chair or MG members) to review and provide approval on the scientific and technical content of the document and its relevance and consistency to the CIMO Guide in the context of WIGOS;

For major updates only:

- e) *The CIMO Guide Editorial Board coordinates activities with the Secretariat when addressing substantial updates/revisions, especially when a paid pre-editor is required or when a task to update/revise a particular part of the Guide is needed to be addressed by an expert requiring payment;*

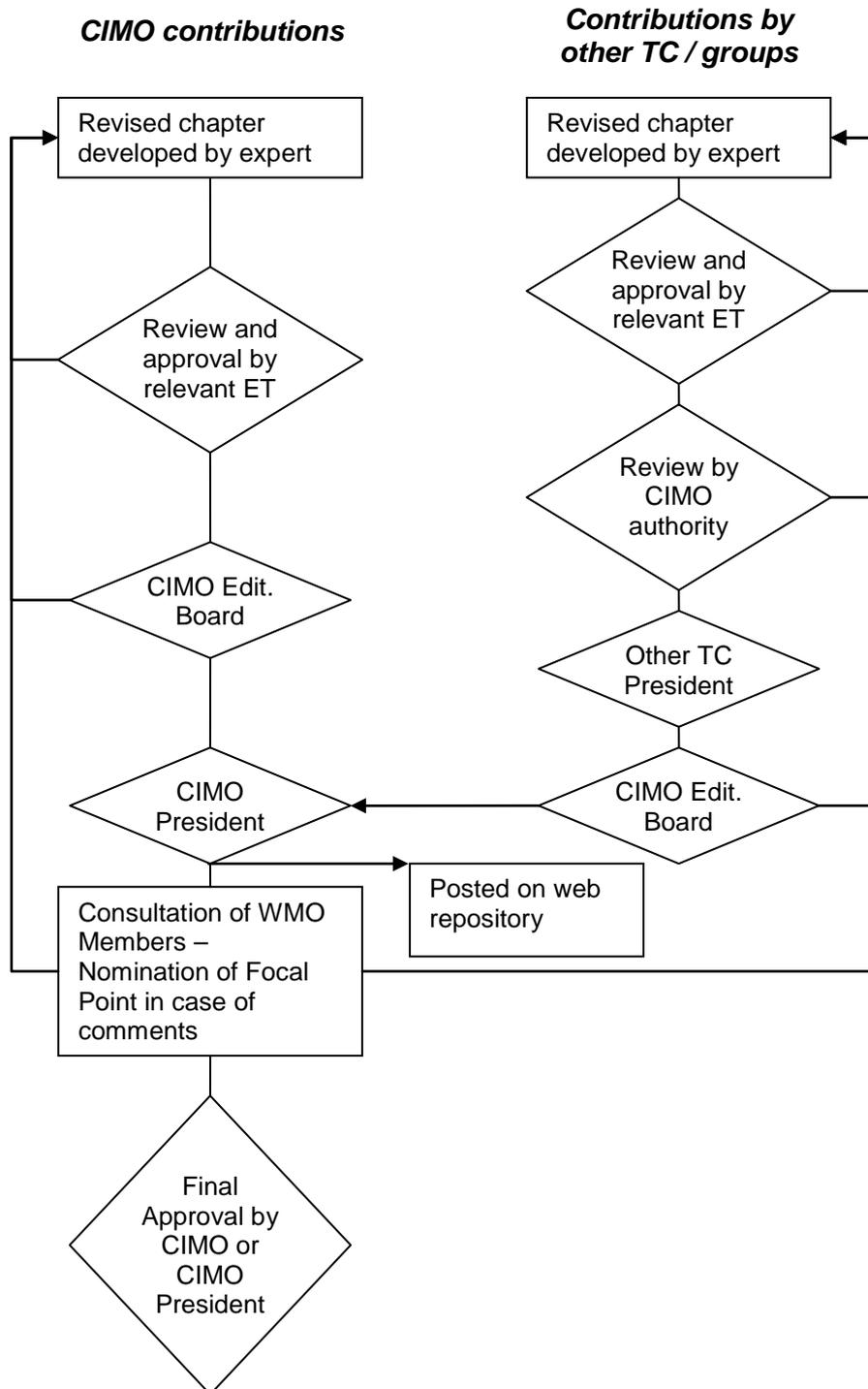
- f) *Technical editors are selected by the relevant OPAG co-chairpersons and approved by the president of CIMO;*
- g) The CIMO Guide Editorial Board ensures conformity of the proposal with the editorial guidelines and submits updates/revisions to the Secretariat in a form of tracked text of the current version. The Secretariat assures, in this way, the traceability to older versions;
- h) The CIMO president approves preliminary issue of updates/new editions on behalf of the CIMO-MG for a general consultation of **all** WMO Members;
- i) Preliminary issues are posted on a web repository after approval by the CIMO President. People wanting to comment on them should provide their comment to the Permanent Representative of their country.
- j) The Permanent Representatives of **all** WMO Members² are requested to provide their comments to the preliminary issue, as well as a focal point to solve any divergence of views. Comments are reviewed and consolidated by authors, relevant ET or the technical editors, as appropriate, in collaboration with the CIMO Guide Editorial Board and Secretariat;
- k) The consolidated updates/revisions are approved for publication by CIMO, or by the CIMO president³ with the support of the CIMO Management Group on behalf of the Commission between sessions;
- l) The Secretariat publishes the Guide as a new edition or updated edition;
- m) A report is provided to regular sessions of CIMO for information.

Proposal for chapters maintained by other Technical Commissions follow the same principles, using the relevant groups of those commissions. In such cases, the approval of the proposal by the president of that Technical Commission is also required in addition to the approval by the president of CIMO.

² According to WMO General Regulation 66, consultation shall be that of Members represented on the commission. Here a wider consultation of all WMO Members is proposed to ensure even wider endorsement of the proposal, and in particular that the consultation covers the membership of other relevant WMO technical commissions for those chapters not maintained by CIMO itself.

³ According to WMO General Regulations 77, the CIMO president may approve a proposal on behalf of CIMO (provided among others that 90 days were allowed for replies and that no objections were received).

Diagram summarizing the approval process
(for additional details, see accompanying text)



TERMS OF REFERENCE OF THE CIMO TASK TEAM ON THE CLOUD ATLAS

1. Review the current Cloud Atlas and assess the desirability and its suitability for simple reproduction (as is) in digital form on-line
 2. Ascertain the suitability / need for revision of the graphical decision aid currently contained in Vol. I, Part II (II.8.3).
 3. Perform a web-survey of alternative existing forms of cloud atlas, and briefly summarize their key features, strengths and weaknesses.
 4. Survey WMO Members on their requirements for revision of the Cloud Atlas (basic need, desired features)
 5. Assess opportunities for enhancement of the WMO Cloud Atlas afforded by publication in digital form.
 - a. In particular, assess opportunities afforded for inclusion of more imagery, allowance for clouds appearing differently (e.g. looking down on clouds from alpine location), or being classified differently in different climatic/meridional regimes (e.g. Cu2 in tropics = Cb in polar region).
 - b. Specifically, determine the need for additional new cloud classifications to be included in the CA (such as asperatus and anthropo-) and the feasibility of reporting these.
 - c. Specify the metadata that should accompany each image in a new CA.
 - d. Design a template for an individual cloud image (format, accompanying description, metadata, etc)
 6. Summarize work of the TT (ToRs 1-5)
 - a. Prepare a summary report including a recommendation to CIMO MG with regard to revision of the CA
 - b. Provide a Project Proposal to the CIMO Management Group for the recommended solution (Include a description of the recommended steps involved, and estimate the resources required (time, staff, funding)).
-

**TERMS OF REFERENCE OF THE CIMO TASK TEAM ON AIRCRAFT-BASED
OBSERVATIONS**

- (a) Develop and manage the workplan and associated activities of the TT-AO, as well as the budget for the corresponding expenditure of the AMDAR Trust Fund in line with the Trust Fund's Terms of Reference, in collaboration with CBS ET-Aircraft-Based Observations;
 - (b) Oversee the scientific and technical development and maintenance aircraft-based observing systems, from a point of view of instruments and methods of observation, and inform the Commission of latest developments;
 - (c) Work closely with ET-A1 in conducting the development and maintenance of technical standards associated with aircraft-based observations, and provision of related specifications to meet user requirements; and,
 - (d) Provide the technical review of approved aircraft-based humidity capabilities,
 - (e) Liaise closely with ET-A3 for testing and validation of the AMDAR system and aircraft based humidity sensors.
 - (f) Provide input for updates of the CIMO Guide relevant to aircraft-based observations, including identification of standards for inclusion in the CIMO Guide and other WMO regulatory documents
 - (g) Assist and provide support for training and outreach activities to support the use of aircraft-based observations
-

Template for Regular Reporting of CIMO Testbeds and Lead Centres

(expand the cells as required to properly reflect your activities)

Terms of Reference for CIMO Testbeds and Lead Centres are available under:
<http://www.wmo.int/pages/prog/www/IMOP/Testbeds-and-LC.html>

Name of Testbed / Lead Centre	
Location of Testbed / Lead Centre	

Contact Person for the Testbed/Lead Centre	
Courtesy Title	Mr / Ms / Mrs / Dr / Prof / Eng / etc
Family name	
First name	
Full Postal Address	
Country	
Tel. number(s)	
Fax number(s)	
Email(s)	
Has contact person changed in last 2 years?	Yes / No
If yes, who was the previous contact person?	

Report on Activities
<p>Main activities that TB/LC carried out in the last 2 years for which results are already available:</p> <ul style="list-style-type: none"> • ... • • •
<p>Main activities that TB/LC carried out in the last 2 years for which results will soon be available:</p> <ul style="list-style-type: none"> • ... • • •

<p>Which guidance documents/standard procedures were developed during the last 2 years (please include full reference and web-link if available)?</p> <ul style="list-style-type: none">•••
<p>Which IOM reports / peer-reviewed publications were published in the last 2 years (please include full reference and web-link if available)?</p> <ul style="list-style-type: none">•••
<p>Title(s) of IOM report(s) presently being developed by your Testbed/Lead Centre: (please specify level of development: draft, ready for review, ...)</p> <ul style="list-style-type: none">••
<p>Has your Testbed/Lead Centre collaborated with one or more CIMO Expert Teams in developing guidance material? Yes/No</p>
<p>If yes, with which CIMO Expert Team(s)?</p>

<p>Capacity Building and Training Activities</p>
<p>Which capacity building/training activities have been carried out by the Testbed in the last 2 years?</p> <ul style="list-style-type: none">•••
<p>Has your testbed developed a twinning activity / special relationship with a companion station/site from a developing country? Yes/No</p>
<p>If yes, with which station/site?</p>
<p>Is your Testbed/Lead Centre making an oral/poster presentation at this year's TECO? Yes / No (If yes, please specify Title(s) and Author(s) of the presentation(s))</p> <ul style="list-style-type: none">••

Recent Changes in Circumstance	
<p>Have there been any recent changes in your Test Bed/Lead Centre's capabilities? If so, please specify:</p> <ul style="list-style-type: none"> • • • 	
<p>Have there been any recent changes in your Test Bed/Lead Centre's infrastructure? If so, please specify:</p> <ul style="list-style-type: none"> • • 	
<p>Have there been any recent changes in your staffing? If so, please specify, and advise whether replacement staff have the required competencies:</p> <ul style="list-style-type: none"> • • 	

Future Plans	
<p>What are your plans for the next two years?</p> <ul style="list-style-type: none"> • • • 	
<p>Is your Testbed/Lead Centre able to continue in the role of a Test Bed/Lead Centre during the coming two years?</p>	<p>Yes / No</p>

Other relevant information (other activities of special interest to CIMO, etc...)
<ul style="list-style-type: none"> • • •

Date
Name of Person Filling the Form

Template for Submission of New CIMO Testbeds and Lead Centres

(expand the cells as required to properly reflect your activities)

Terms of Reference for CIMO Testbeds and Lead Centres are available under:
<http://www.wmo.int/pages/prog/www/IMOP/Testbeds-and-LC.html>

Name of Testbed / Lead Centre (should reflect focus area of TB/LC)	
Location of Testbed / Lead Centre	

Contact Person for the Testbed/Lead Centre	
Courtesy Title	Mr / Ms / Mrs / Dr / Prof / Eng / etc
Family name	
First name	
Full Postal Address	
Country	
Tel. number(s)	
Fax number(s)	
Email(s)	

Activities
<p>What are the main activities presently carried out by your proposed TB/LC relevant to your proposal?</p> <ul style="list-style-type: none"> • ... • • •
<p>In case your proposed TB/LC published reports / peer-reviewed publications in the last 4 years (please include full reference and web-link if available)?</p> <ul style="list-style-type: none"> • • •

Infrastructure, Capabilities and Staffing, etc.
Describe your main Test Bed/Lead Centre's capabilities: <ul style="list-style-type: none">•••
Describe your main Test Bed/Lead Centre's infrastructure: <ul style="list-style-type: none">••
Describe the Test Bed/Lead Centre's staffing that will support the TB/LC activities: <ul style="list-style-type: none">••
Describe the resources of your TB/LC? <ul style="list-style-type: none">••
Is quality management system implemented at your TB/LC? Yes/No
If yes, please specify?

Capacity Building and Training Activities
Which capacity building/training activities do you plan to carry out? <ul style="list-style-type: none">•••
Has your testbed developed a twinning activity / special relationship with a companion station/site from a developing country? Yes/No
If yes, with which station/site?

Future Plans
What are your plans for the next four years? <ul style="list-style-type: none">••

DRAFT QUESTIONNAIRE ON THE EVALUATION OF CIMO TECO-2012

Dear CIMO TECO 2012 participant,

We are striving to run TECO more efficiently and effectively each year. As a participant in TECO 2012, your opinion is important to us. Please take a few minutes to answer this short survey.

Thank you.

WMO Secretariat

Page 1: TECO Organization

1. You received the first TECO 2012 announcement:
 - in plenty of time to organize your participation
 - in just enough time to organize your participation
 - too late to comfortably organize your participation
2. The time allowed for you to submit an abstract for TECO 2012 after the first announcement was:
 - More than sufficient
 - Just enough
 - Insufficient
3. You received the call for papers:
 - in plenty of time to submit your paper on time
 - in just enough time to submit your paper on time
 - too late to submit your paper on time
4. If you received financial assistance from WMO to attend TECO 2012, you received this assistance:
 - in plenty of time to organize your travel
 - in just enough time to organize your travel
 - too late to comfortably organize your travel
5. What suggestions can you provide that might help us to improve the organization of the next TECO?

Page 2: TECO Scientific Balance

6. You found the overall balance (the topics covered) of the TECO scientific and technical papers to be:
 - excellent
 - about average for such a conference
 - poor
7. You found the quality of the TECO scientific and technical papers to be:
 - excellent
 - about average for such a conference
 - poor
8. You found the balance between oral and poster presentations to be:
 - excellent
 - about average for such a conference
 - poor
9. What suggestions can you provide that might help us to improve the scientific balance of the next TECO?

Page 3: TECO Venue and Host Organization (UKIP)

10. You found the auditorium for TECO 2012 (the Brussels Expo Centre) to be:
- very good
 - could be improved
 - not good
11. You found the poster layout for TECO 2012 (the Brussels Expo Centre) to be:
- very good
 - could be improved
 - not good
12. You found the management of the venue by UKIP to be:
- very good
 - could be improved
 - not good
13. You found the coffee/tea arrangements to be:
- very good
 - could be improved
 - not good
14. You found the meal arrangements to be:
- very good
 - could be improved
 - not good
15. You found access to the venue to be:
- very good
 - could be improved
 - not good
16. What suggestions can you provide that might help us to improve the venue for the next TECO?

Page 4: Overall Assessment

17. You found the duration of CIMO TECO 2012 to be
- ideal
 - too long
 - too short
18. This year alongside TECO, instead of Meteorex, a private organization ran the exhibition. This was:
- very good
 - could be improved
 - not good
19. Overall, you found your participation at TECO 2012 to be:
- Well worthwhile
 - Worthwhile overall
 - A waste of my time
20. If you have additional and specific suggestions for the improvement of any of the organizational aspects of CIMO TECO 2012, please share them with us.

Thank you for having participated in this survey!

CIMO-MG-10, Brussels, Belgium, 19-20 October 2012***ACTION SHEET*****Status: March 2013**

Action Nb	Para. of Fin. Report	Action required	Responsible	Deadline	Status/remarks
1	3.3	Review the WIP and identify which of the WIP activities/deliverables they contribute to through the tasks of their respective workplans. Closely liaise with the ET and TL under their responsibility to ensure they carry out this by end of the year	All ETs and TLs All CIMO MG members	May 2013 May 2013	
2	3.4	With support of Secretariat, identify additional activities needed to address the WIP activities	All ETs and TLs	May 2013	
3	3.4	Submit consolidated list of CIMO ET/TL tasks supporting the WIP to the CIMO President for review and approval	Secretariat	31 May 2013	
4	3.5	Closely liaise with all ETs and TLs on the update of the WMO Technical Regulations	Volker Kurz	Following meeting of WIGOS TT-RM	
5	3.8	Coordinate a feasibility study for evaluating by intercomparison the performance of different humidity measurement systems at the extreme ends of humidity range	Bruce Forgan	CIMO MG-11 (Q1 2014)	
6	4.1.5	Inform the presidents of technical commissions and of regional associations of the development of the Siting Classification and to invite them to nominate focal points	Bertrand Calpini	PTC-2012	
7	4.1.13	Establish a Task Team on the World Radiometric Reference	Secretariat	May 2013	
8	4.1.14	Finalize the membership and Terms of Reference of the Task Team on the WRR	Bruce Forgan in collab with Secretariat and	May 2013	

Action Nb	Para. of Fin. Report	Action required	Responsible	Deadline	Status/remarks
			CIMO President		
9	4.2.1	Provide a report on the work progress of the Expert Team on Operational Remote Sensing to the CIMO President	Heng Zhou	31 May 2013	
10	4.2.6	Provide a report on the work progress of the Theme Leader on Satellite Observations	Heng Zhou	31 May 2013	
11	4.3.7	Continue closely following the development of the web-search tool for the CIMO Guide and other related WMO standards addressing observations	Volker Kurz	Continuous, as needed until CIMO MG-11 (Q1 2014)	
12	4.3.9	Help in re-establishing link between CIMO-MG and Theme Leader on Training Material and Training Activities	Secretariat	31 December 2012	
13	4.3.10	Be in frequent contact with Theme Leader on Training Material and Training Activities	Mario Garcia	Continuous, as needed until CIMO MG-11 (Q1 2014)	
14	4.3.12	Provide a report on the work progress of the Theme Leader on Training Material and Training Activities	Mario Garcia	31 March 2013	
15	4.3.16	Provide a report on the work progress of the Theme Leader on Surface-based Instrument Performance Monitoring	Bruce Baker	31 May 2013	
16	4.3.17	Provide the name of a contact person from their countries on the matter of Surface-based Instrument Performance Monitoring	Bruce Baker, Bruce Forgan Volker Kurz.	31 April 2012	
17	5.1.5	Develop a structured approach related to the functions and roles of RRCs, and their periodic reendorsement, including relevant modifications of the CIMO Guide	Bruce Forgan in collab. with Bertrand Calpini and Secretariat	CIMO MG-11 (Q1 2014)	
18	5.2.2	Ensure that CIMO would have the ownership and	Volker Kurz	Meetings of	

Action Nb	Para. of Fin. Report	Action required	Responsible	Deadline	Status/remarks
		responsibility for updating relevant part(s) of the WMO regulatory documents where practices "elevated" from the CIMO Guide are described		WIGOS Reg. Material (June 2013)	
19	5.2.3	Post guidelines for updating the CIMO Guide on the website	Secretariat	31 April 2013	
20	5.2.4	Post process for updating the CIMO Guide on the website	Secretariat	31 April 2013	
21	5.2.5	Present issue of recommending a single formula for pressure reduction to mean sea level to WIGOS TT Regulatory Material	Jitze van der Meulen	June 2013	
22	5.2.7	Develop a tracking procedure for chapters of the CIMO Guide that were deleted	Volker Kurz (with CIMO Guide EdBd)	CIMO MG-11 (Q1 2014)	
23	5.2.8	Develop a proposal to guide authors on how to present in the CIMO Guide the relative uncertainty that each method can achieve (chapterwise)	Volker Kurz (with CIMO Guide EdBd)	CIMO MG-11 (Q1 2014)	
24	5.3.1	Develop a webpage to include links relevant to capacity building material provided by all ETs, as an extension of the former AWS portal	Secretariat	Time permitting	
25	5.3.7	Finalize the Terms of Reference of the Task Team on the Cloud Atlas and establishing its membership	CIMO President in collab. with Secretariat	April 2013	
26	5.3.16	Finalize the membership and Terms of Reference of the Task Team on Aircraft-based Observations	Secretariat in collab with CIMO President, Jitze van der Meulen and Bruce Forgan	April 2013	
27	5.3.18	Be in close contacts with Regional Association (RA) of their region and strive at attending their RA sessions as part of their national delegation	All CIMO MG members	Continuous	
28	5.3.20	Investigate possibility for P. Ristori (Argentina) to	Mario Garci, Bertand Calpini &	December 2012	

Action Nb	Para. of Fin. Report	Action required	Responsible	Deadline	Status/remarks
		become a member of the CIMO ET-NTTB	Secretariat		
29	6.4	Put a strong focus on SPICE in the 2013 call for contributions to the CIMO Trust Fund	Secretariat	April 2013	
30	8.1	Liaise with Testbeds and Lead Centres to get their 2012 reports by 31 January 2013	Secretariat	December 2012	
31	8.1	Liaise with Testbeds and Lead Centres to get their 2013 reports before the next session of CIMO MG	Secretariat	December 2013	
32	8.3	Carry out the review of the TB&LC outcomes	B.Forgan, B. Baker, H. Zhou & B. Hartley	June 2013	
33	9.4	Develop a proposal towards harmonizing the content of the RRR and the Table of the CIMO Guide (Part I, Chapter 1, Annex 1D),	Jitze van der Meulen	CIMO MG-11 (Q1 2014)	
34	9.5	Carry out a web-based survey of TECO-2012 participants to ascertain strengths and weaknesses of TECO-2012	Secretariat	December 2012	