

**WORLD METEOROLOGICAL ORGANIZATION  
CONSULTATIVE MEETINGS ON HIGH-LEVEL POLICY  
ON SATELLITE MATTERS**

**IGEOLAB FOR HIGHLY ELLIPTICAL ORBIT FOCUS GROUP**

**SECOND SESSION**

**GENEVA, 9-10 OCTOBER 2007**



**FINAL REPORT**

## **WMO General Regulations 42 and 43**

### **Regulation 42**

Recommendations of working groups shall have no status within the Organization until they have been approved by the responsible constituent body. In the case of joint working groups, the recommendations must be concurred with by the presidents of the constituent bodies concerned before being submitted to the designated constituent body.

### **Regulation 43**

In the case of a recommendation made by a working group between sessions of the responsible constituent body, either in a session of a working group or by correspondence, the president of the body may, as an exceptional measure, approve the recommendation on behalf of the constituent body when the matter is, in his opinion, urgent, and does not appear to imply new obligations for Members. He may then submit this recommendation for adoption by the Executive Council or to the President of the Organization for action in accordance with Regulation 9(5).

## **EXECUTIVE SUMMARY**

The second session of the International Geostationary Laboratory for Highly Elliptical Orbit (IGEOLAB HEO) Focus Group was held in the WMO Headquarters in Geneva, from 9 to 10 October 2007. Dr D. Hinsman, Acting Director of the World Weather Watch Department and Director of the WMO Space Programme opened the session; and on behalf of the Secretary-General, extended a welcome to all the participants at the session. The Co-chairmen of the IGEOLAB HEO Focus Group, Professor V. Asmus, Director of State Research Centre "Planeta", and Professor G. Polishchuk, Designer General and Director General of the RF Enterprise "Lavochkin Association", addressed the session. The Group reviewed progress achieved since its first session (Moscow, April 2007) and discussed other agenda items which included the WMO Space Programme overview, reports of Satellite Operators, WMO operational data requirements for IGEOLAB HEO missions, status of the Arktica Project, proposals for international cooperation in the context of IGEOLAB HEO missions. Based on the results of discussions and following the recommendation by the first session of the Focus Group, the session endorsed the Protocol (Appendix III) which reflects major deliberations and recommendations of the meeting.

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## **1. ORGANIZATION OF THE SESSION**

### **1.1. Opening of the session** (Agenda Item 1.1)

The International Geostationary Laboratory for Highly Elliptical Orbit (IGEOLAB HEO) Focus Group held its second session in the WMO Headquarters in Geneva, from 9 to 10 October 2007. The session was opened at 10.00 a.m. on Tuesday, 9 October 2007, by Dr D. Hinsman, Acting Director of the World Weather Watch Department and Director of the WMO Space Programme, who extended a warm welcome to all the participants at the session. He wished the meeting success and emphasized the importance of the activities of the Focus Group. Professor V. Asmus, Director of State Research Centre "Planeta" and Co-chairman of the IGEOLAB HEO Focus Group, welcomed participants on behalf of the higher management of Roshydromet and underlined the importance of continuous monitoring of the polar regions from space for various users worldwide. Professor G. Polishchuk, Designer General and Director General of the RF Enterprise "Lavochkin Association" and Co-chairman of the IGEOLAB HEO Focus Group, addressed the session. He stressed the role of the Focus Group in facilitating planning and implementation of a dedicated satellite system(s) providing observations and communications over the polar regions and noted the progress in planned activities since the first session of the Group held in Moscow, 24 April 2007. He wished participants a successful meeting. Dr D. Hinsman was unanimously elected chairman of the meeting. The list of participants is given in Appendix I.

### **1.2. Adoption of the agenda** (Agenda item 1.2)

The session adopted the agenda as reproduced in Appendix II.

### **1.3. Working arrangements** for the session (Agenda Item 1.3)

The session agreed to its working hours and schedule.

## **3. WMO SPACE PROGRAMME OVERVIEW**

Dr D. Hinsman briefed the session on WMO Space Programme ongoing activities and near-term plans related to IGEOLAB based on the outcome of the 7<sup>th</sup> session of Consultative Meetings on High-level Policy on Satellite Matters (CM-7) and Cg-XV deliberations. In particular, he noted that CM-7 had agreed to extend the IGEOLAB concept to include Highly Elliptical Orbits (HEO).

## **4. REPORT OF CO-CHAIRMEN OF THE IGEOLAB HEO FOCUS GROUP**

Professor Polishchuk presented a report on activities carried out since the first meeting of the Focus Group held in Moscow on 24 April 2007.

## **5. REPORTS BY SATELLITE OPERATORS**

Ongoing and planned national activities by Canada, USA and the Russian Federation relevant to the IGEOLAB HEO concept were presented to the meeting. The Canadian Space Agency presented a concept of the Polar Communications and Weather Mission (PCW). The presentation provided mission objectives, preliminary user requirements, and mission architecture. The Russian Space Agency presented an overview of the Russian Federation Earth observation satellite programme for 2006 to 2015 and current status of the "Arktica" Project. The Focus Group was informed that copies of all presentations would be available at:

<http://www.wmo.int/pages/prog/sat/meetings/IGEOLAB-HEO-FG-2.html>.

## **6. WMO OPERATIONAL DATA REQUIREMENTS FOR IGEOLAB HEO MISSION**

The session reviewed the status of the WMO/CEOS User Requirements for Observations and Observing System Capabilities databases. The session noted the value of the high level observational requirements contained in the WMO database and agreed that they should serve as a basis for more detailed mission level requirements for future HEO missions.

## **7. STATUS OF ARKTICA PROJECT**

The session was briefed by Russian experts on the status of the "Arktica" project. The presentation contained a detailed update on applications and goals of the project, on-board instruments, data transmission and coverage, ground facilities, data processing, storage and exchange.

## **8. IGEOLAB PLANNING AND IMPLEMENTATION; REVIEW OF PROPOSALS FOR INTERNATIONAL COOPERATION**

Based on the results of discussions and following the recommendation by the first session of the Focus Group (Moscow, 24 April 2007), the second session reviewed proposals related to the planning and implementation of IGEOLAB with emphasis on user requirements, satellite systems capabilities, and feasible technical solutions. Both Finland and the Nansen Centre in St Petersburg strongly supported the need for an operational high latitude space system for environmental monitoring including NWP. The Focus Group noted that the Joint Committee for IPY had strongly supported the Arktica mission as a legacy for IPY 2007-2008. Finally, the session endorsed the Protocol which is reproduced in Appendix III.

## **9. CLOSURE OF THE SESSION**

In closing the session, the chairman congratulated the participants on accomplishing significant progress in a very short time and wished them all well in their future endeavours. The Special Advisor noted the significant progress during the session. All participants expressed thanks to WMO for hosting the session. The session closed at 13:30 p.m. on 10 October 2007.

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APPENDIX I

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APPENDIX II

**AGENDA**

1. **OPENING OF THE SESSION**
  2. **ORGANIZATION OF THE SESSION**
    - 2.1 **Adoption of the agenda**
    - 2.2 **Working arrangements**
  3. **WMO SPACE PROGRAMME OVERVIEW**
  4. **REPORT OF CO-CHAIRMEN OF THE IGEOLAB HEO FOCUS GROUP**
  5. **REPORTS BY SATELLITE OPERATORS**
    - 5.1 **US National Global Operational Environmental Satellite System (NGOESS)**
    - 5.2 **Russian Federal Space Agency activities in Support of Hydrometeorology and Climate**
    - 5.3 **Other reports**
  6. **WMO OPERATIONAL DATA REQUIREMENTS FOR IHEO MISSION**
  7. **STATUS OF ARKTICA PROJECT**
    - 7.1 **Applications requirements and goals of the project**
    - 7.2 **On-board instruments**
    - 7.3 **Data transmission and coverage**
    - 7.4 **Ground facilities**
    - 7.5 **Data processing, storage and exchange**
  8. **IGEOLAB PLANNING AND IMPLEMENTATION; REVIEW OF PROPOSALS FOR INTERNATIONAL COOPERATION**
  9. **CLOSURE OF THE SESSION**
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**Protocol**

for the Second Session of the International Geostationary Laboratory on Highly Elliptical Orbits Focus Group (IGEOLAB HEO FG) to assess potential joint activities on the "Arctica" and Canadian Space Agency HEO Projects

1. Members of IGEOLAB HEO FG listened to a report by Prof. Polishchuk from the Federal Enterprise "Lavochkin Association" on the Russian Federation's Arctica Project. Dr Kroupnik from the Canadian Space Agency (CSA) presented the status in the planning towards its Polar Communications and Weather (PCW) mission. Prof McConnell provided an analysis of an optional suite of instruments for a HEO mission, presented for consideration to CSA. Dr. Bajpai (NOAA) presented a long term vision for a national USA MEO mission. Mr Selin (Roscosmos) presented an overview of the Russian Federation Earth observation satellite programme for 2006 to 2015 and current status of the "Arctica" Project. Dr Hinsman, Director of the WMO Space Programme, described WMO's potential role to facilitate international science teams for spacecraft instruments, ground processing algorithms and validation mechanisms, and involvement in the user and ground segments.
2. The session confirmed the high importance for the development of space systems allowing continuous monitoring of the polar regions that would respond to user requirements and provide for an IPY Legacy.
3. The session noted that the space systems described in presentations provided by NOAA and CSA on their national vision/initiative would be valuable for MEO/HEO missions and required further elaboration. The session also noted that the Russian Federation Project is based on mature technologies and extensive heritage in use of Molniya type orbit.
4. The session noted the importance of Earth observations and communications components for the polar region. At the same time, the session also noted the considerable technical challenges if these two functions are implemented on the same platform.
5. Following discussion, the members of IGEOLAB HEO FG-2 agreed to the importance of the presented projects and recommended both the "Arctica" Project and CSA's PCW mission for further consideration in the framework of the IGEOLAB international concept.
6. Focus Group members reviewed the proposal by Roshydromet and Roscosmos to use Russian high-end modules of space hydrometeorological equipment and base orbital platform, launching facilities as well as ground infrastructure modules for SC control and data receipt and processing for "Arctica" project implementation. In particular, Focus Group members noted the Russian Federation's intention to use base modules being tested on Russian "Electro" and "Spektr" space systems that would reduce risk and cost of the "Arctica" Project and shorten its implementation.. The session also noted that there is a reserve available for other instruments up to 500 kg.
7. Implementation of the presented HEO missions will provide progress in the field of numerical weather forecasting especially in the polar regions. Such improvements will allow Northern countries to better forecast severe weather and climate anomalies which have considerable social and economic impacts.
8. Focus Group members agreed to recommend to their respective space agencies and meteorological services to consider international cooperation including joint manufacturing and use of equipment, software and information resources of "Arctica" space system.

9. The Russian Federation analyzed the Finnish proposal to provide an instrument to supplement already manifested instruments on the "Arctica" SC with a UV Auroral Imager for aurora studies, as well as proposal to use Finnish ground station. The Russian Federation agreed to review and discuss specific technical issues with Finland on a bilateral basis.
10. For the CSA's project, the session noted that it was following traditional satellite system development phases and was presently in Phase 0 to identify user and science needs and system feasibilities. CSA anticipates completion of Phase 0 in mid 2008 and to move into Phase A by the end of 2008.
11. The session noted the strong willingness on the parts of the Russian Space Agency and the Canadian Space Agency to consider higher-level cooperation in HEO missions and suggested that harmonization between the respective initiatives for HEO would offer advantages for the realization of a HEO mission and should be further explored.
12. Focus Group members recommend the following:
  - To hold a third IGEOLAB HEO FG session in March 2008, tentatively in Canada [TBC], to examine a consolidated set of user requirements, identify potential mission architectures and explore possible models of collaboration;
  - Canada and the Russian Federation were encouraged to start bilateral technical meetings as soon as possible, preferably prior to the March 2008 meeting;.
  - To carry out further work on international cooperation on bilateral and multi-lateral basis taking advantage of WMO's considerable expertise to facilitate international science teams for spacecraft instruments, ground processing algorithms and validation mechanisms, and involvement in the user and ground segments.

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