

WORLD METEOROLOGICAL ORGANIZATION
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IGEOLAB FOR HIGHLY ELLIPTICAL ORBIT FOCUS GROUP

THIRD SESSION

GENEVA, SWITZERLAND

27 JANUARY 2010

FINAL REPORT





DISCUSSION

The third meeting of the IGEOLAB Focus Group for Highly Elliptical Orbits (HEO) was held in WMO Headquarters, Geneva, on 27 January 2010, with participation of Canada (Canadian Space Agency and Environment Canada), EUMETSAT, Finland (Finnish Meteorological Institute), the Russian Federation (ROSCOSMOS and ROSHYDROMET) and the WMO Secretariat.

Following the introduction of participants, the WMO Secretariat summarized the WMO perspective on HEO missions, recalling the International Polar Year, the outcome of the third World Climate Conference, and the ongoing effort towards establishing both a Global Cryosphere Watch and a Global Framework for Climate Services (GFCS). It was highlighted that the Vision for the GOS in 2025 called for operational pathfinder missions Visible and Infrared imagery in HEO.

The Russian Federation presented the status and plans for the Arktica mission that is being jointly developed by ROSCOSMOS and ROSHYDROMET. It was noted that a decision had been made in 2009 to study this project. The payload would include a multispectral scanner (MSU-GS) providing imagery for meteorological applications, and a Space Weather instrument suite (GGAK-E). In the currently proposed plan, two satellites would be launched either in 2013 or in 2015.

Canada presented its plans for the Polar Communications and Weather Satellite (PCW) which would have three core missions: telecommunications, meteorological/environmental monitoring and Space Weather, with a possibility of additional payload to enhance the core mission. In the currently proposed plan, two satellites would be launched in 2016.

The meeting discussed the status of user requirements and clarified that, while each project was already fairly advanced in identifying its system requirements, there was still an opportunity to refine the user requirements in terms of products to be generated.

Finland recalled its longstanding interest for missions in HEO and expressed its readiness to support such a project through an existing ground station. EUMETSAT expressed its interest for the outcome of ongoing studies , and namely on the estimated benefit of improving the imaging cycle beyond the current and planned refresh cycle of geostationary satellites.

The meeting then reviewed the potential areas for cooperation among the two projects, Arktica and PCW at various levels: exchanging experience on critical issues, sharing payload or ground facilities, instrument cross calibration, data exchange, scientific issues linked to algorithm and product processing, coordination of operations to form a constellation in HEO, and coordination between geostationary and HEO missions. The meeting was pleased to note a broad agreement on the scope of potential cooperation. The outcome of this discussion is summarized in the attached Appendix I.

The Russian Federation proposed to host a meeting with Canadian representatives in April 2010 at the ROSCOSMOS facilities in Moscow in order to initiate such cooperation without delay. Canada extended an invitation to the Russian Federation to join the User and Science Team which has been developed for PCW.

The participants agreed that the meeting was very successful in outlining a way forward for cooperation between the Arktica and PCW projects. It recommended that the outcome of the meeting be brought to the attention of the tenth session of WMO Consultative Meetings on High-level Policy on Satellite Matters (CM-10) and that CM-10 be invited to express its support.

**OUTCOME OF THE IGEOLAB HEO MEETING
held in WMO Headquarters, Geneva, on 27 January 2010**

1. Canada and the Russian Federation both have plans for missions in Highly Elliptical Orbits (HEO), (PCW and Arktica, respectively) in the 2013-2016 time frame. These missions will address important requirements from WMO Members. Following guidance given by the WMO Consultative Meetings on High-level Policy on Satellite Matters and preliminary discussions held in the context of IGEOLAB meetings, this is viewed as an important area of potential cooperation.
2. The strong interest of such missions for WMO was recognized in the Vision for the GOS in 2025 adopted by the sixty-first session of the WMO Executive Council (EC-LXI). Because of the complementary advantages of geostationary, Low-Earth Orbit (LEO) and HEO orbits, the Vision calls for operational pathfinders of Visible and Infrared imagery missions in HEO in order to monitor with sufficient temporal resolution the following phenomena "Winds and clouds at high latitudes; Sea ice; High latitude volcanic ash plumes; Snow cover; Vegetation; Fires". The Vision also mentions the need to monitor Space Weather. HEO missions can play an important role in this respect.
3. Furthermore, in the context of the WMO Integrated Global Observing System (WIGOS), there is a strong requirement to pursue integration of observing systems, fostering in particular:
 - Harmonization/standardization of instrument characteristics and calibration,
 - Data formats and exchange procedures,
 - Product definition and quality management, and
 - System implementation planning and optimization.
4. Canada, the Russian Federation and the WMO Space Programme have identified a number of areas that could benefit from cooperation among the two missions, either as cooperation between the respective lead agencies, or as a wider cooperation involving the global user community.
5. There is scope for cooperation between the two missions on technical issues such as, but not limited to, radiation and thermal environment mitigation to ensure spacecraft lifetime, accommodation of secondary payloads, and launching.
6. Opportunities should be explored to coordinate the implementation of the two missions as an international constellation, where each party would keep full control of its respective system, but would strive to:
 - Coordinate operations in order to achieve a shorter refresh cycle and increase overall robustness and availability of the constellation,
 - Take advantage of simultaneous viewing of common areas by HEO and geostationary satellites to improve temporal resolution of observations, and
 - Perform sensor inter-calibration of HEO, LEO and geostationary satellites, e.g. in the context of GSICS, in order to improve the quality, consistency and usefulness of the data acquired.
7. Cooperation in a wider framework is necessary, with user involvement, to:
 - Conduct joint scientific activities towards defining harmonized requirements and improved algorithms and processing, and
 - Harmonize data formats and exchange procedures.
8. Both Canada and the Russian Federation are seeking endorsement from WMO for these undertakings which represent major investments for their countries. The tenth session of WMO

Consultative Meetings on High-level Policy on Satellite Matters (CM-10) will be informed on progress made on HEO and invited to express its support.

9. Acknowledging the ongoing development of a Space Treaty between Canada and the Russian Federation, it was agreed to initiate the preparation of a Memorandum of Understanding between the relevant agencies (e.g. ROSCOSMOS and ROSHYDROMET from the Russian Federation, CSA and EC from Canada), which would define specific technical topics and a framework for cooperation.

10. Points of contacts were designated in both projects, as follows:

For the Russian Federation:

- Mikhail Novikov, Chief of Directorate of Automatic Spacecraft and Control Systems, ROSCOSMOS, and
- Vasily Asmus, Director of PLANETA

For Canada:

- Guennadi Kroupnik, Acting Director, Satellite Communications Projects, CSA, and
- Mike Manore, Director of Space-based Monitoring, Environment Canada.

11. A longer-term construct will ultimately be selected to address “multilateral” issues:

- IGEO LAB is a good framework for ad-hoc exploratory discussions, but once specific cooperation themes have been identified a more appropriate operational mechanism should be chosen;
 - Both CEOS and CGMS were mentioned as international collaboration mechanisms among space agencies, noting the recent work of CEOS on virtual constellations and the role of CGMS for technical coordination of operational meteorological constellations;
 - ROSCOSMOS, ROSHYDROMET and WMO are members of CGMS. CSA and EC are not currently members of CGMS but CSA is welcome to join and could be assisted by EC;
 - CGMS and WMO sponsor GSICS and the International Winds Working Group (IWWG) which are adequate forums to address specific themes (calibration, winds respectively);
 - The User & Science Team of PCW is comprised of experts in a number of fields, and additional participants from the Russian Federation are invited to join.
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APPENDIX II

AGENDA

1. OPENING OF THE SESSION
 - 1.1 Introduction
 - 1.2 Adoption of the agenda
 - 1.3 Working arrangements
 2. WMO PERSPECTIVE ON HEO RELEVANCE
 3. STATUS OF ARKTICA PROJECT
 - 3.1 Project goals and driving user requirements
 - 3.2 On-board instruments
 - 3.3 Data transmission, processing, storage and exchange
 - 3.4 Open issues (technical, scientific, financial)
 - 3.5 Overall project status and milestones
 4. STATUS OF PCW (POLARSAT) PROJECT
 - 4.1 Project goals and driving user requirements
 - 4.2 On-board instruments
 - 4.3 Data transmission, processing, storage and exchange
 - 4.4 Open issues
(technical, scientific, financial, international cooperation)
 - 4.5 Overall project status and milestones
 5. INTERNATIONAL USER PERSPECTIVES FOR HEO MISSIONS
 6. POTENTIAL AREAS OF COOPERATION
 - 6.1 Critical technical issues
 - 6.2 Payload, subsystems and/or ground facilities
 - 6.3 Instrument cross-calibration
 - 6.4 Data exchange
 - 6.5 Scientific issues: International Science Team
 - 6.6 Operations (Virtual constellation in HEO)
 - 6.7 Harmonization between HEO and GEO missions
 - Cross-calibration of GEO and HEO missions
 - Potential benefits of imaging the same areas from HEO and GEO
 7. WAY FORWARD
 - 7.1 Multilateral framework (IGEOLAB)
 - 7.2 Bilateral cooperation actions
 8. CLOSURE OF THE SESSION
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