STATEMENT AT THE OPENING OF THE

2nd SPACE FOR HYDROLOGY WORKSHOP

SURFACE WATER STORAGE AND RUNOFF: MODELLING, IN-SITU DATA AND REMOTE SENSING

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Dear Colleagues,
Ladies and Gentlemen,

It is my pleasure to open the second Space for Hydrology Workshop organized by the European Space Agency together with WMO. Participants from many parts of the world represent a wide spectrum of scientists and users of terrestrial and remote-sensing information with the aim to improve models, predictions and forecasting in hydrology and water resources.

Multi-platform observations have the highest potential to provide ever more accurate and timely observations that are crucial for decision-making at regional and national levels and also for the quantitative understanding of the water cycle under conditions of change. An improved description of the global water cycle, especially the yet insufficiently known continental part, is of major importance for the assessment and eventually better management of water resources available for human consumption and activities (agriculture, urbanization, hydroelectric energy resources), as well as for climate prediction.

The subject of this workshop has links to a number of WMO programmes, most notably the Hydrology and Water Resources Programme, and the Satellite Programme including WMO's Global Observing System.

Through its Hydrology and Water Resources Programme, WMO promotes water-resources assessment and provides the forecasts needed to plan water storage, agricultural activities and urban development. It supports an integrated, multidisciplinary approach to water-resources management. Measurement of hydrological variables, including the quantity and quality of both surface- and groundwater are provided by National Hydrological Services and are essential for the effective management of water resources and exchange of hydrological data. In many parts of the world, flooding is a major problem and proper flood management is needed to reduce the impact of flooding. Accurate and reliable data are most important for formulating integrated water resources management strategies. To assist countries in maintaining their systems for acquiring water-related information and for disseminating it to decision-makers and various stakeholders, WMO developed the World Hydrological Cycle Observing System (WHYCOS) Programme. It supports Members, especially developing countries, in establishing an accurate, timely and accessible knowledge base for forecasting and the sustainable development of their freshwater resources. There is thus a significant potential for the use of space-based hydrological observations by WHYCOS and in particular its efforts in the establishment of regional, objective-driven hydrological information networks in transboundary river basins.

If implemented, the Hydrological Applications Runoff Network (HARON), facilitated by GEO and planned to be operated by WMO and the Integrated Global Water Cycle Observations (IGWCO) theme, will integrate in its global observation strategy space-based hydrological observations in the context of a global baseline observing system.

The WMO Space Programme coordinates environmental satellite matters and activities throughout all WMO Programmes and provides guidance on the potential of remote-sensing techniques in meteorology, hydrology and

related disciplines and applications. It aims at continuously improving the provision of data, products and services from operational and R&D satellites contributing to the Global Observing System (GOS), as well as facilitating and promoting the wider availability and meaningful use of these data, products and services around the globe. The GOS is the most important programme of WMO for observing, recording and reporting on the weather, climate and the related natural environment for the preparation of operational forecast and warning services and related information. It also makes substantial contribution to enabling the delivery of increasingly accurate and reliable warnings of severe events related to weather, water, climate and the related natural environment throughout the world.

I would like to mention in this context that the Space Programme also maintains the CEOS-WMO database of user requirements and observing capabilities, including hydrology, which serves as a reference for designing observing systems and derived products.

Ladies and gentlemen, remote sensing techniques can now be used to monitor the water balance of large river basins on time scales ranging from weeks to months: among these, the most promising are satellite altimetry on surface waters providing water levels, and space gravity missions providing estimates of spatial-temporal variations of terrestrial water storage in soils (soil wetness and groundwater) as well as in lakes and reservoirs. To be used in conjunction with in situ observations and hydrological modeling, these observations from space have the potential to significantly improve our understanding of hydrological processes affecting large river basins in response to natural processes, human activities and climate variability and change. There is also an immense potential to improve Land Surface Models using data streams from both terrestrial and space-based observations of the critical elements of the water cycle to provide global hydrological datasets (soil moisture, water storage, river discharges, etc.) that could be used for model evaluation and use. The combination of observations from GRACE, satellite altimetry, and other space-based systems e.g. active and passive microwaves, SAR Interferometry, visible and radar imagery offer potential for the development of a wide range of hydrological products for a large user community.

Especially in areas with sparse in-situ observation networks, improved satellite monitoring will be essential to obtain critical information on surface water quantity and quality as well as groundwater resources, soil moisture and precipitation. The same holds for the space-based monitoring of the earth's snow and glacier fields as these are extremely sensitive to climate variations and important sources of water supply in many countries world-wide.

However, despite all these technological and methodological developments, there is an important challenge: To mainstream satellite-based observations in operational water resources management and forecasting services, dedicated efforts are required for creating awareness and capacity in National Meteorological and Hydrological Services to actually make use of satellite products on a daily routine basis and for critical assessments. Likewise, valuable feed-back is required from these services to the space organizations in terms of requirements for space-based observations that would result in the design and operation of new and tailor-made missions and derived observational and model products in support of hydrology and water resources management.

Ladies and gentlemen, I would like to assure you of WMO's continued support in your endeavors within the scope of relevant programme activities of the organization. In this regard I wish you an effective exchange of knowledge and know-how. Let me also express my expectation that concrete recommendations from workshop participants will be documented that could be followed up by the different programmes of WMO for the benefit of its Members.