BACKGROUND PAPER

Enhancing Earth observation and meteorology through efficient spectrum management

According to UN forecasts, by 2050, the world's population will reach 9 billion people. The task of ensuring the basic essential needs of humanity - water, food, adequate living conditions - becomes critically important in the face of gradual depletion of natural resources, climate change, and the increasing number of natural disasters. Recognizing the urgent need to develop measures to overcome potential crises, leaders of the global community have established 17 Sustainable Development Goals (SDGs), for which optimal management mechanisms should be found, reducing consumption through efficient use of resources and ensuring the protection of our planet's natural ecosystems.

Within the framework of achieving the SDGs, special importance is placed on Earth observation and meteorological systems. They make a direct or indirect contribution to the achievement of all Goals without exception. Additionally, data obtained through the use of relevant remote sensing systems are indispensable for monitoring the results of actions taken. For example, about 30 out of 232 indicators developed to monitor the progress of SDGs achievement can only be assessed using data obtained from Earth remote sensing satellites.

From the perspective of using radio frequency spectrum, it is pertinent to note that in this case, it is necessary not only to provide access to this natural resource for the relevant complex of radio systems but also to guarantee complete radio silence in bands used globally for studying various characteristics of the atmosphere and Earth's surface through controlling emissions of natural origin.

For over 140 years, starting with the International Telegraph Union and the International Meteorological Organization in the late 1800s, which respectively become the ITU and WMO in the 1950s, there has been fruitful collaboration and partnership between the global meteorological and telecommunication agencies. While WMO focuses its efforts on meeting the needs for making and disseminating weather, climate, water, and related environmental observations and corresponding services and applications, ITU, as international steward of the radio spectrum, allocates the necessary radio frequencies to allow the interference-free operation of radio-based space and terrestrial systems and applications employed for weather, water and climate monitoring.

More effective communication of the added value of the economic and societal benefits provided by existing and future meteorological observations needs to be developed. Future spectrum management must be based on careful balance of public and private interests to define a worldwide harmonized way for efficient spectrum use and requires more active involvement of meteorological agencies in the decision-making process.

The seminar aims:

- to increase awareness of national meteorological or hydrological services of the importance of meteorological related spectrum protection and the growing need for their participation in national and international spectrum management activities;

- to provide spectrum managers and state telecom administrators an overview of contemporary meteorological applications' use of radio spectrum and their future development as well as to illustrate the socio-economic importance of these services within the context of the SDGs;

- to encourage information exchange between national meteorological and hydrological services and national regulatory authorities.

The regular WMO-ITU Seminar is intended to kick-off a post-World Radiocommunication Conference (WRC) 2023 cycle. The following topics are to be discussed:

- *Overview of WMO and ITU activities for Earth observation and meteorology*, and meteorological and hydrological infrastructure that underpins weather and related environmental services worldwide.
- *Radio technologies of Earth observations and meteorology*: A general overview of existing radio systems and new technological development will be considered.
- Space agencies outlook: Consideration of current and future missions, applications, existing and future spectrum requirements.
- *Economic value of Earth observation, Societal Benefits, and Empowering Decision Making*.
- *Impact of RFI on spectrum use for Earth observation*: The situation with the degradation of measurements and interference cases, especially in passive bands, should be highlighted, and possible ways to keep the spectrum clean, such as regulation, monitoring, reporting, enforcement, to be discussed.
- *Results of WRC-23 and preparation for WRC-27*: Lessons to be learned for future conferences are to be discussed to improve preparation for the next WRC. Preliminary discussion of agenda items of the future WRC targeted at defining interests and potential threats to the spectrum used by Earth observation and meteorological agencies to define priorities and strategies for the next study cycle.

The seminar is opened for specialists from state regulatory bodies, national meteorological or hydrological services, frequency management and space agencies, R&D institutions, equipment developers and manufacturers from CIS countries.