

Recommendation for Committee Decision

Prepared by: Working Group C on Information Dissemination and Capacity Building

Date of Submission: 30 September 2021

Issue Title: Establishment of the Project Team “Space Weather Monitoring using Low-Cost Receiver Systems”

Background/Brief Description of the Issue:

Space weather refers to conditions in space (the Sun, solar wind, magnetosphere, ionosphere, or thermosphere) that can influence the performance and reliability of space borne and ground-based technological systems. Ionospheric irregularities at equatorial, auroral, and middle latitudes constitute a major category of space weather effects that need to be better characterized and understood.

Field experiences of past several years showed that it was difficult to promote and deploy receiver systems at large scale for space-weather:

- Existing space-weather receivers are expensive
- Antenna costs are additional costs

If low-cost receiver systems, developed using hardware platforms such as Arduino, RaspberryPi, Android device, can be used for space weather monitoring, this may solve several problems related with receiver system cost, large scale deployment, hands-on training, and education activities.

As several research reports show that it is possible, it is necessary to explore to what level it can be used for space weather monitoring using low-cost receiver systems.

Discussion/Analyses:

The University of Tokyo has already developed a low-cost receiver system for high-accuracy positioning that gives accuracy of 20 – 70 cm and performances are quite satisfactory. This allowed large-scale deployment. Other low-cost receiver systems may also be available.

Low-cost does not mean only receiver and antenna costs, but also the system as a whole, including low-cost data-logging devices. For example, such as:

- RaspberryPi device, Arduino or other Single Board Computers
- Android Device (Smart-phone or Tablet)

Easy to use and deploy system:

- System for working environment not only in the research centers with people having technical knowledge.

Experience from the International Space Weather Initiative (ISWI) instrument network, trying to develop space weather science in Africa, showed that the network in Africa requires further enhancement. Therefore, low-cost receiver systems would aid developing further a low-cost monitoring network for science using GNSS, shedding light on space weather.

Recommendation of Committee Action:

To establish the project team within the WG-C to implement prototype systems to explore the possibilities of using low-cost receiver systems for space weather monitoring.

Members Consensus Reached _____ **X** _____; **No Consensus Reached** _____

Chairperson Signature: _____ **Date:** _____