Cosmic-ray exposure and Space weather information during aircraft operation

Kazuaki ASADA

1 Airline Pilots’ Association of Japan

Effects of exposure to cosmic-ray during aircraft operation are divided into exposure of aircrew and operational impact.


Impacts of space weather on aircraft operations can be classified into communications and navigations.

For communication, it includes difficulties on HF radio due to Dellinger Phenomenon while flying out of range of VHF coverages as international flight. And also includes difficulties on SATCOM voice communication and Controller Pilot Data Link Communication (CPDLC) in oceanic region.

Modern navigation by Global Navigation Satellite System (GNSS) is becoming mainstream. GNSS are used all phase of aircraft operation during on the ground, departure, en-route, and approach. Future of operations aim high category precision approach using automatic approach and landing by GNSS even extremely low visibility until stop on runway. Cosmic-ray re-write the data in memory known as soft error on electronic equipment onboard aircrafts.

Use of Space Weather forecast, how to provide the information to aircrew and how to make decisions are urgent consideration.

For these problems International Airways Volcano Watch Operations Group (IAWOPSG) which one of operations group of International Civil Aviation Organization (ICAO) is making draft "Concept of Operations (ConOps) for international space weather information in support of international air navigation”. Adoption of ConOps is targeted for ICAO/WMO divisional meeting in 2014.