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The First VHF Radar in Thailand for Detecting Plasma Bubbles Near Dip Equator

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VHF radar was installed in Chumphon, Thailand to detect Equatorial Plasma Bubble (EPB) that causes radio Interference. It operational opening ceremony was done on 17th January 2020.

NICT has been delivering the daily "Space Weather Forecast" in Japan since 1988. Since 2002, NICT kicked off a cooperative research in the field of radio science with Southeast Asian countries. Regarding that, an ionospheric observation network, SEALION (SouthEast Asia Low-latitude IOnospheric Network), was established with various observation equipment in Thailand, Vietnam, Indonesia, and the Philippines to monitor ionosphere including the EPB.

EPB occurs around the magnetic equator and extends its boundary to higher latitude/ altitudes. EPB affects radio wave of satellite-based navigation and communications that propagates in its vicinity. Recently, GNSS has become an indispensable infrastructure in our society. To stimulate a safe use of GNSS-based technologies, plasma bubble effect on radio wave should be removed. To do so, one of the necessary steps is to have a system that can detect EPBs immediately after their generation. Chumphon is close to the magnetic equator where EPSs are expected to generate. Therefore, NICT has installed the VHF radar system in Chumphon, Thailand with the collaboration with KMITL. The radar system consists of 18 antennas equidistantly installed in the east-west direction at spacing of about 5m, using radio waves in the VHF band (39.65 MHz). This paper is to share an experience on the radar installation and its initial operation. The research team is looking forward to creating an innovation to improve availability and reliability of basic infrastructure that is based on GNSS.