FM-CW radar project: goals and a new installation in Peru

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An FM-CW (Frequency Modulated Continuous Wave) radar is a type of HF (High Frequency) radar. The FM-CW radar can measure the range of target as well as Doppler shift for reflected radio waves from the target (e.g., ionized layer). From the observed Doppler shift, we can estimate east-west electric field in the ionosphere. Poole (1985) and Poole and Evans (1985) first used FM-CW radar for Doppler observation. Nozaki and Kikuchi (1987, 1988) made improvements to the design. We have installed three FM-CW stations along the Japanese longitude, at Japan, Russia and Philippine, in order to measure the electric fields that penetrate the ionosphere (Yumoto, 2006). Our new FM-CW radar is being installed in Peru in this year. This FM-CW observation will give the opportunity of the simultaneous ionospheric observation at the Japan local time and the opposite side of Japan (for example dayside and nightside). ICSWSE (International Center for Space Weather Science and Education, Kyushu University) also has the ground-based magnetometer network (MAGDAS) on the world including Peru MAGDAS chain. With the both magnetometer and FM-CW observations, we try to understand the energy transfer and propagation process from the polar to equatorial regions, in the terms of the coupling the solar-magnetosphere-ionosphere-atmosphere.
Our goals are, (i) to estimate EEJ (Equatorial Electrojet) structure including the generation, variance and modulation of EEJ, (ii) to understand the electrodynamics of EEJ and the generation mechanism of the Equatorial spread F (ESF) associated with Plasma Bubbles (PBs) and (iii) to reveal the generation mechanisms of ULF pulsation waves at the lower and equatorial latitudes.
We will give the detail and current status of FM-CW radar project.

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