In-situ Observation Plans in Next Japanese Space Exploration Mission(FACTORS) for Ion Acceleration/Heating Processes in the Terrestrial Magnetosphere-Ionosphere Coupling System

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We have been leading recent Japanese space exploration missions based on the in-situ observations for the space plasma and the upper-atmospheric physics. Since the ERG(Arase) satellite was successfully launched a one and half years ago for the terrestrial radiation belt research, the next space exploration mission, called FACTORS, has been under discussion in order to realize the cutting-edge measurements for the wave-particle interaction analyses particularly on the ion acceleration/heading mechanisms causing the ion upflow/escape from the terrestrial ionosphere. We are now planning to launch multiple compact(100-200 kg) satellites for several types of formation flight configurations in the mid 2020s, and the mission objectives are a variety of the space-Earth coupling processes including the auroral phenomena in the broad sense and their upper-atmospheric response in the polar regions. The transverse ion acceleration(TAI) is also the major subject for our in-situ observations in the FACTORS mission. Because we have already established the measurement principle and the onboard technique in the ERG mission, we could apply the same quantitative approach also in the TAI observations in FACTORS, which is based on 3-D velocity vectors of detected plasma particles(ions) and plasma wave forms for direct estimate of the energy transport.