

Space Active Experiments and Research for Spacecraft-Induced Environment in Japan

Active Experiments in space intend to understand the space environment by giving artificial stimuli to the environment and measuring the effects. This research includes an attempt to use the wallless outer space as a huge laboratory for the study of space plasma phenomena. The approach is different from the conventional observation of natural space environment. The results can be applied to space engineering and to control the space environment.

In Japan, research in this field has been conducted in the following fields using sounding rockets, scientific satellites, space shuttles, space stations, and nanosatellites.

- Exploration of the upper atmosphere wind and electromagnetic field by chemical releases*
- Research on the aurora mechanism by particle beam injections and experiments to reproduce space plasma phenomena*
- Research on the excitation mechanism of space plasma waves and remote sounding of plasma density profile by high-frequency radio wave radiation*
- Research on the interaction between high-intensity microwaves and space plasma in relation to the solar power satellites*
- Research on the interaction between high voltage and space plasma related to the research on high voltage solar cells and electrodynamic tethers*
- Research on the spacecraft-induced environment generated surrounding large space structures*

History of active space experiments and study of spacecraft environment in Japan

▲ Chemical release
▲ Particle beam injection
▲ RF wave injection
▲ Microwave Injection
▲ High voltage experiment
▲ Spacecraft-induced environment

