Lunar, Mars, Near-Earth Asteroids, Deep Space Exploration (2)
Lunar, Mars, Near-Earth Asteroids, Deep Space Exploration - IP Session (IP)

Author: Dr. Ambili Kailasam Madathil
Vikram Sarabhai Space Centre (VSSC), India

Dr. RAJ KUMAR CHOUDHARY
Vikram Sarabhai Space Centre, ISRO, Thiruvananthapuram, India
Ms. Arya Ashok
Vikram Sarabhai Space Centre, ISRO, Thiruvananthapuram, India

RELEVANCE AND THE SCOPE OF THE DEVELOPMENT OF PHYSICS BASED MODELS FOR THE PLANETARY ATMOSPHERE/IONOSPHERE.

Abstract

Exploration of the Planetary ionosphere and understanding the system is always an exciting topic for the scientific community as it tells not only about the current state of the Planet but also throws light on the past and the future of the planetary system itself. Hence series of Planetary missions are lined up by the Space Exploration Agencies in the near future including lander missions, sample return missions, robotic explorations etc. The essential component that must accompany these observational studies are the development of the Planetary ionospheric models. This is the only tool that can be utilized along with the observations to understand the Planetary ionospheric system as a whole. Hence in the last decade, enormous efforts have been done to develop the first principle ionospheric models for the Earth, Venus, Mars and the Moon. The Three Dimensional Lunar Ionospheric model developed for the Moon explains the origin and the evolution of the lunar plasma at different solar activity conditions as observed by the Langmuir Probe onboard Chandrayaan-3 lander and the Dual Frequency Radio Science Experiment onboard Chandrayaan-2 orbiter. The model could trace the origin of plasma on the Moon and it confirmed the presence of CO_2 and H_2O in the lunar exosphere. The above results gave a different outlook to the Lunar plasma and the composition of the Lunar exosphere itself.

The in-house developed One Dimensional Venus Ionospheric Model could explain many interesting features of the Venus ionosphere as observed by the radio science experiment conducted by the Akatsuki mission of Japan. The important results are (a) the origin and the evolution of different layers in the Venus (b) the role of minor neutrals in the formation of the Venus ionosphere around 100 km (c) Compression of the atmosphere of the Venus at large Solar Zenith angles etc. The above results confirms the importance and the necessity of the development of the Ionospheric models along with the observational data base.