

IAF EARTH OBSERVATION SYMPOSIUM (B1)
Earth Observation Systems (2)

Author: Dr. Kashyapa Naren Athreyas
Nanyang Technological University, Singapore, Republic of, kashyapa@ntu.edu.sg

Prof. Erick Lansard
Satellite Research Center, Nanyang Technological University (NTU), Singapore, Republic of,
erick.lansard@ntu.edu.sg

Mr. Wee Seng Lim
Nanyang Technological University, Singapore, Republic of, LimWS@ntu.edu.sg

PAVING THE WAY FOR OPERATIONAL CONSTELLATIONS IN VERY LOW EARTH ORBIT : THE
ELITE SMALL SATELLITE DEMONSTRATOR

Abstract

In the recent years, the very low earth orbit (VLEO) mission concepts are getting popular owing to the advantages it brings. VLEO is considered to be below 400 km in general, and as the satellites orbit closer to the surface, the earth observation data can be more accurate than the data from LEO. The image resolution can be better for the same camera technology, the radio wave applications will experience lower ionospheric disturbances, and the scientific data collection in those altitudes will help to improve the atmospheric models. However, there a significant challenge in orbiting at such altitudes, which is the atmospheric drag, changing ionospheric environment and atomic oxygen. Atmospheric drag increases exponentially in the atmosphere as the altitude decreases, and in those regimes, the drag forces are significant enough to shorten the lifetime of the satellite orbit exponentially. The higher drag also challenges the attitude control systems' ability to keep the satellite stable. This paper discusses the mission and system design of ELITE mission which is aiming to demonstrate sustained flight in VLEO while capturing high resolution imaging. The paper will explore on the methods to use the data from ELITE for designing the future missions for applications such as radar, lidar, and formation flying etc. Details on complexity of the mission design for such applications will be discussed.