SMALL SATELLITE MISSIONS SYMPOSIUM (B4)
Small Space Science Missions (2)

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DEVELOPING A CONSTELLATION OF THREE MICRO-SATELLITES FOR GREEN HOUSE GASES MONITORING

Abstract

Coupling our investigations in the current 'hot' issues of climate changes with our understanding of the better use of small satellite remote sensing, we came to concentrate on the monitoring of greenhouse gases (GHG) in the atmosphere across the world. It is our hope, through these studies that we may build a constellation of three Micro-satellites to assist WMO and world nations for the monitoring and control of GHG emissions, in accordance with domestic and international environment policies and agreements.

The three greenhouse gases monitoring Micro-satellites will be on Sun-Synchronous orbit and form a constellation to provide best land coverage and at least 250 cloud-free measurements in an area of 500km x 500 km each month. The Spatial Heterodyne Spectrometer with Infrared sensor array on-board each satellite could provide detailed spectral images of CO, CO, CH4 and H2O in a spatial resolution of 1 km x 1 km.

In this paper, the scientific needs and orbital considerations for this constellation are introduced in the beginning. Following the discussions of the Microtechnology application in both payload design and small spacecraft design, The conceive, design and implement of whole space systems are described. The engineering modules (most are structural, thermal, electronic and electrical module, control module) of this modulated, standardized, generic spacecraft bus are developed for not only this mission but also for other scientific purposes. Some of the iteration, fabrication and validation are completed. Furthermore, using the concurrent design engineering approach, the spacecraft design optimization is under development while mission operating system including ground stations and control centre are studied. The initial consideration of the mission operation is briefly described in the end.