



## KOMPSAT-5 PROGRAM

This document is to report the KOMPSAT-5 program as a part of CGMS-38-KMA-WP-12. The first occultation mission in the Korean space program, KOMPSAT-5, is scheduled for launch in 2011. KOMPSAT-5 will have a dual frequency GPS receiver to generate precision orbit determination data and occultation data. This document describes the introduction of KOMPSAT-5 and GPS Radio Occultation Mission Characteristics.

## 1. KOMPSAT-5 Program

The KOMPSAT (Korean Multi-Purpose SATellite) program is a government funded space program which was started in the mid 90's. The first satellite of the KOMPSAT program was launched in 1999 and the second satellite was launched in 2006. Currently, KOMPSAT-3 and KOMPSAT-5 (Figure 1) are under development at the same time and KOMPSAT-5 will be launch in 2011.

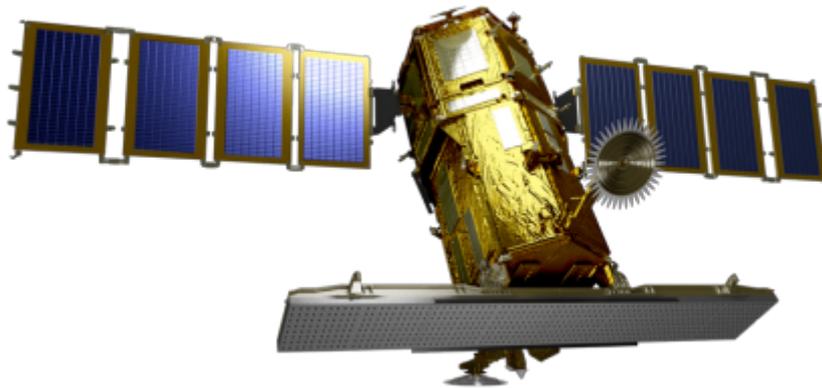


Figure 1. KOMPSAT-5

The main mission of KOMPSAT-5 is the Earth Observation by using a Synthetic Aperture Radar (SAR). In Figure 2, the KOMPSAT-5 program architecture is described. KARI (Korea Aerospace Research Institute) is a primary contractor of KOMPSAT-5 development and SAR Payload operation. KASI (Korea Astronomy and Space Science Institute) is in charge of the development of Atmosphere Occultation and Precision Orbit Determination (AOPOD) secondary payload which includes a dual frequency GPS receiver and a laser retro reflector Array (LRRRA). Figure 3 shows the KOMPSAT-5 dual frequency GPS receiver and LRRRA. A dual frequency GPS receiver will be used for generation of POD (Precision Orbit Determination) data and GPS Radio Occultation (RO) science data. The LRRRA is used for POD validation of KOMPSAT-5.

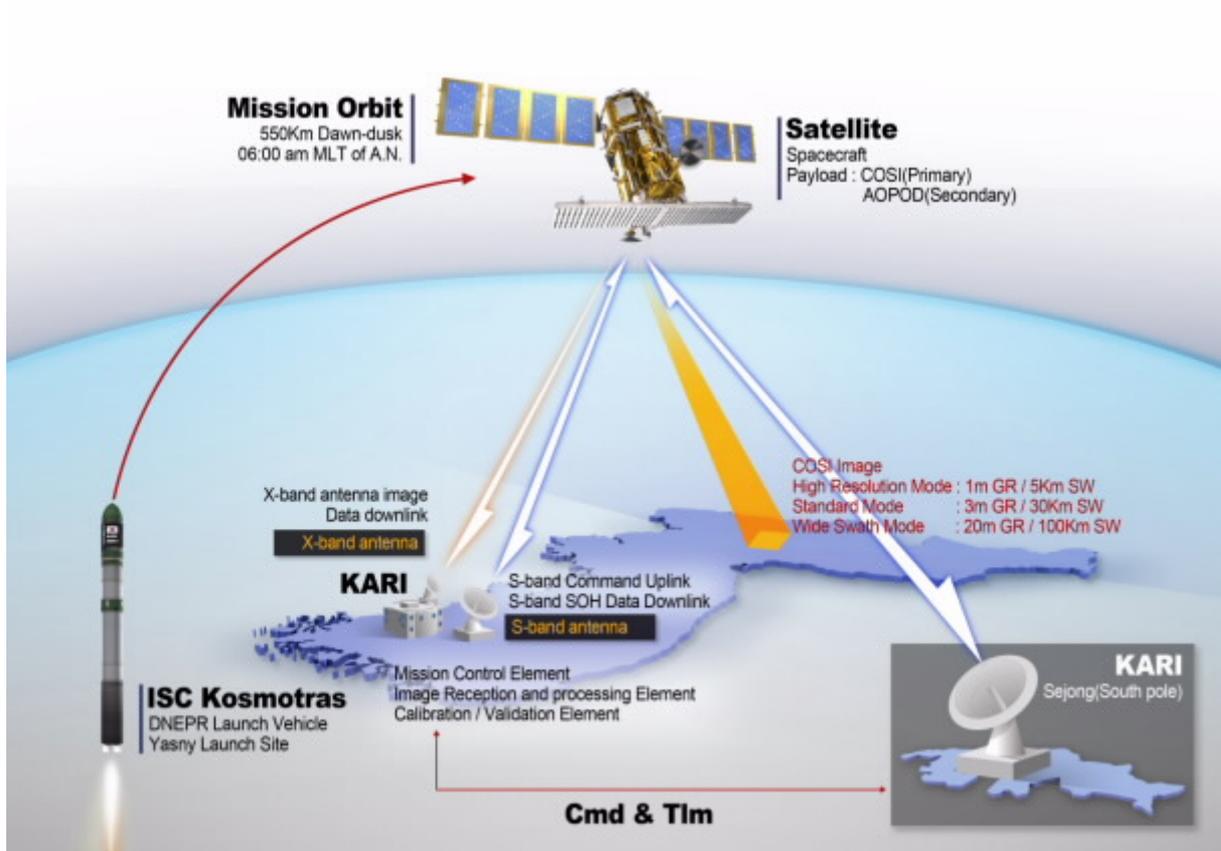


Figure 2. KOMPSAT-5 Program Architecture

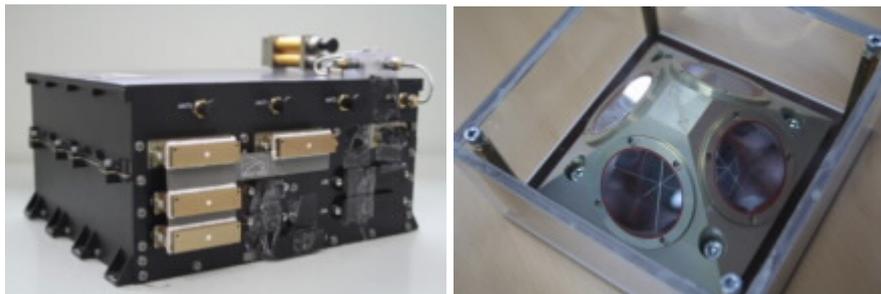


Figure 3. Spaceborne GPS Receiver and LRR

## 2. KOMPSAT-5 GPS Radio Occultation Mission

### (1) Occultation Characteristics

The mission orbit of KOMPSAT-5 is a sun-synchronous dawn-dusk circular orbit with an average altitude of 550 Km which provides about 15 revolutions per day. In table 1, the KOMPSAT-5 orbital elements are listed.

Table 1. Mission Orbit of KOMPSAT-5

Orbital Elements	Mean Values
Semi-Major Axis (km)	6928.114
Eccentricity	0.00107
Inclination (deg)	97.60
R.A of Ascending Node (deg)	339.73
Argument of Perigee (deg)	90.0
Mean Anomaly	270.0

For KOMPSAT-5, the occultation mission is a secondary mission. The KOMPSAT-5 has two occultation antennas for observation of a rising and setting occultation. The data from two POD antennas are utilized together with occultation data. The observed occultation data, approximately 600 events/day, will be stored in the Solid State Recorder (SSR) and collected by the spacecraft's 1553B bus interface. The Data downlink to the ground station is via S-band telemetry.

## (2) RO Data Publication and Application

- RO Data Publication and Processing

The RO data of KOMPSAT-5 will be released to public users. KOMPSAT-5 program operates one ground station located in Daejeon. The baseline period of data publication is twice a day since KOMPSAT-5 contacts the Daejeon ground station twice a day. In addition to the baseline policy, KARI and KASI are building up cooperation with NOAA(National Ocean and Atmosphere Administration, US) for a utilization of NOAA's polar ground station. Since the ground station of NOAA may contact KOMPSAT-5 in every orbit, the latency of data publication will be reduced to less than 3 hours. KASI plans to release raw data and processed products. KASI has been developed KROPS (KASI Radio Occultation Processing System) for processing the GPS radio occultation data and generating atmospheric profiles. Currently KASI and UCAR(University cooperation for atmospheric Research) are developing the near-real time data processing system for the KOMPSAT-5 data from NOAA's ground station. The data and processed products by KASI and UCAR will be stored and released to public users from KASI data center and UCAR data center. The data flow between KOMPSAT-5, KOMPSAT-5 ground station, NOAA ground station, KARI, and KASI is currently under construction.

- RO Data Perspective

Currently RO products became one of the key observation data for space environment, atmospheric science, and meteorological applications. Since 2007, many national meteorology agencies have assimilated the RO data to the operational weather forecasting. KOMPSAT-5 RO data are expected to contribute a global RO sounding coverage and international user community.