



KOMPSAT-5 PROGRAM

This document is to report the KOMPSAT-5 program as a part of CGMS-37-KMA-WP-15. The first occultation mission in the Korean space program, KOMPSAT-5, is scheduled for launch in 2010. 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.

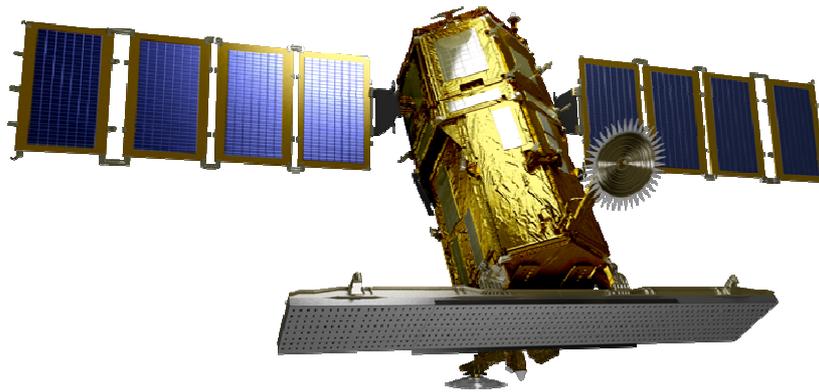


Figure 1. KOMPSAT-5

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) system which includes a dual frequency GPS receiver and a laser retro reflector Array (LRRA). Figure 3 shows the KOMPSAT-5 dual frequency GPS receiver and LRRA. A dual frequency GPS receiver will be used for generation of POD (Precision Orbit Determination) data and GPS Radio Occultation (RO) science data. The LRRA is used for POD validation of KOMPSAT-5.

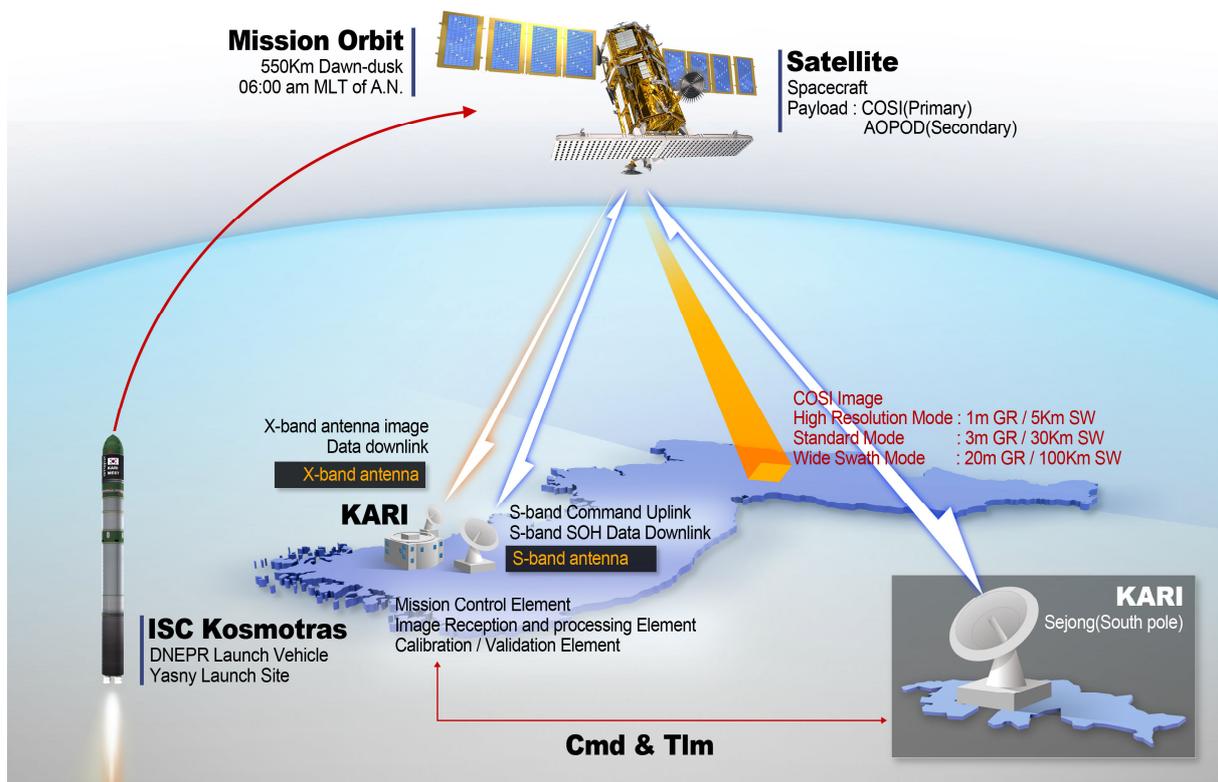


Figure 2. KOMPSAT-5 Program Architecture

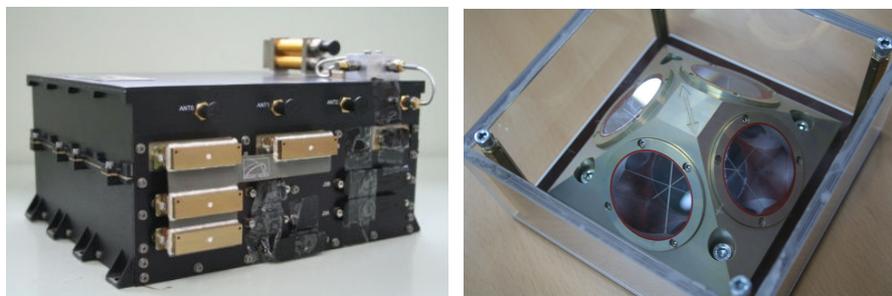


Figure 3. Spaceborne GPS Receiver and LRR

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 14.5 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, KOMPSAT-5 contacts the ground station twice a day. The occultation data from KOMPSAT-5 will be released twice a day regularly. The limitation of S-band telemetry downlink rate of KOMPSAT-5 restricts the amount of occultation data which can be downloaded to the ground station. Current estimation of maximum amount of occultation data is 30MB/day. 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. Figure 4 describes the external interface of KROPS. In figure 4, K5 MCE is the KOMPSAT-5 Mission Control Element which receives the occultation and POD data from the spacecraft. KASI operates the IGS (International GNSS Service) Global Data Center (GDC) and the occultation data will be archived in the KASI GDC.

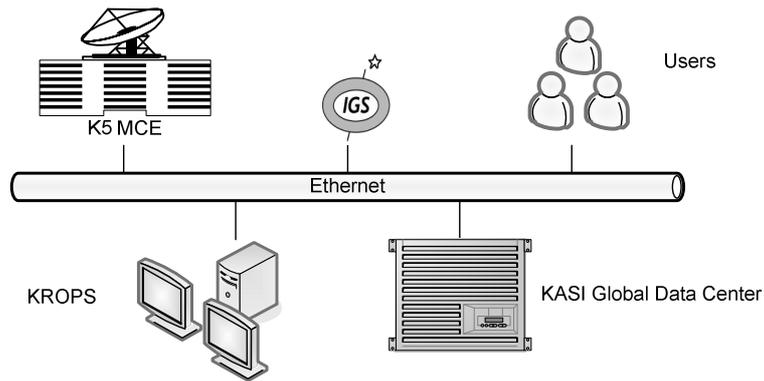


Figure 4. External interface of KOMPSAT-5 RO data

- RO Data Perspective

RO data are useful to the areas on space environment, atmospheric science, and meteorological applications. Recently, the assimilation of RO data on weather forecasting and climate analysis is a key issue of the international RO user community. Since 2007, NOAA (National Ocean and Atmosphere Administration) of US and some other countries has been utilizing the RO data for the operational weather forecasting. KOMPSAT-5 RO data are expected to contribute a global RO sounding coverage and international user community.