



Earth  
Space  
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Future

## In-Orbit-Demo of New Space Technologies A Flight Opportunity with KAP

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**Abstract** The success of Kayser-Threde's test satellite MAQSAT-B2 on Ariane L521 in February 2005 (2<sup>nd</sup> Ariane 5 ECA qualification flight) and its instrument platform equipped with experiments, sensors and an autonomous telemetry system has led to the development of a new autonomous experiment platform called KAP. KAP stands for Kayser-Threde Arianespace Platform and is a direct spin-off product out of Kayser-Threde's Ariane 5 post projects and experience. The main idea is to use the available remaining payload capacity of the launcher to provide a flexible and low-cost test facility for scientific experiments and In-Orbit Demonstration of new technologies remaining attached to the launcher upper stage. KAP is a fully autonomous kit providing the complete necessary infrastructure (power, data acquisition and telemetry) to minimize constraints and interactions with the launch vehicle increasing significantly the possibility for regular flight opportunities.

Two different mission scenarios are foreseen. One with KAP only being working during the launcher mission itself (called short mission), the other as medium mission to be switched on after upper stage passivation for up to 7 days in orbit. Different accommodations for KAP are foreseen in order to ease its integration. KAP can either be mounted on an additional load carrying raising cylinder located underneath the launcher payload adaptor (MFD type), or integrated on a platform for auxiliary payloads (ASAP-5 type).

The technical concept for both mechanical and electrical subsystems for space segment and ground support equipment is mainly based on existing and space qualified technologies from the successful MAQSAT-B2 project and Kayser-Threde's sounding rocket programme TEXUS/MAXUS. In particular the data acquisition and telemetry unit as back bone of the KAP experimental payload infrastructure is a direct adaptation from these programmes to the specific mission needs. Finally, also the downlink scenario and ground segment is specified for a complete mission scenario.

### KAP – Kayser-Threde Arianespace Platform

#### Kayser-Threde's Ariane 5 Experience



MAQSAT-B2 on L521 – Maquette Satellite

#### Demonstration Mission in 2008

The demonstration mission on Ariane ASAP-5 into GTO is scheduled for August 2008. This mission has six available empty seats for a potential integration of further experiments and the KAP Kit besides two micro-satellites already fixed as passengers on that mission.

For that demonstration flight Kayser-Threde has agreed with Arianespace to have a minimum interfacing mission scenario to the launcher and a maximum re-use of existing design and ground equipment to lower the risk and to have the necessary flexibility due to the existing schedule constraints.

Nevertheless, it is planned to realize a duration of 7 days to provide maximum in-orbit mission time for the experimenter community.

A dedicated Call for Interest for the KAP-DM and the KAP programme to be continued step by step on the European Launcher will be published in ESA-EMITS in the 2<sup>nd</sup> quarter of 2007. This Call of Interest will include all necessary information (User Manual, KAP Policy, etc.) about the KAP-DM and gives an outlook on the 2009 and beyond planning.

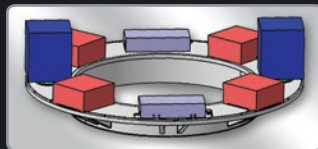
This shall allow for all experimenters to raise its interest without any obligations. Kayser-Threde together with ESA will evaluate all proposals and contact all interesting experimenters to discuss the next steps. It is planned to invite all experimenters to the 2<sup>nd</sup> KAP Customer Day in July 2007.

#### KAP Accommodation

Raising cylinder configuration with KAP Kit mounted on internal platform



Platform for auxiliary payloads configuration



Potential configuration of demo mission on ASAP-5 in 2008

#### KAP General Mission Scenario

NAME	DURATION	MAJOR CHARACTERISTICS
KAP-SM (short mission)	3 hours	Online data transfer with 100 kbps, power via batteries, 25W average payload power (50W peak power), antennas attached outside of the fairing or VEB
KAP-MM (medium mission)	3 days nominal and 7 days maximum	Data storage and data transfer during playback with 25kbps to ground, power via batteries, 25W average payload power (50W peak power)

#### KAP Flights in 2009 and beyond

Kayser-Threde has identified further flight opportunities in 2009 and beyond to secure a regular and reliable flight programme not only on Ariane 5 but also on other launchers like SOYUZ and VEGA. Main objective is to provide access to LEO which is of main interest for the auxiliary passenger community. In addition, an optional CubeSat-separation will be integrated. The idea for the KAP concept is to standardize the interfaces to the experiments as far as possible and only adapt the KAP equipment w.r.t. the external interfaces to the respective launcher and mission requirements. Finally the KAP programme shall serve as an efficient access-to-space facility for auxiliary payloads using the complete European launcher family.

#### KAP Payload – Potential Customers

The KAP family shall provide flight opportunities for a wide range of technology and scientific experiments:

- Solar arrays
- Navigation equipment
- Gyros
- GPS, GALILEO equipment
- Electronics
- Electronic drift analyzer
- Lasers
- Thermal equipment
- Antennas
- Telemetry experiments
- Star sensors
- Video experiments
- Mechanisms
- Communication technology
- Propulsion technology
- Sloshing experiments
- Deployables
- Separation devices
- Plasma analyzer
- Measurement devices
- Biological experiments
- Material probes
- etc.

#### Why doing In-Orbit Demonstration?

Definition of Technology Readiness Level to be passed before entering of a new technology into real service

