

Preparation of the 45th session of the UN-COPUOS Scientific and Technical Sub-Committee, February 2008, Vienna

Activities of Member States:

Annual report on German space activities, here: reports on research on space debris, including information on practices that had proved effective in minimizing the creation of space debris

International Activities

In 2007, Germany actively participated to the preparation of relevant Space Debris mitigation guidelines, regulations, requirements, and standards; in particular to the UN-COPUOS STSC Mitigation Guidelines, the IADC Mitigation Guidelines, the European Code of Conduct of Space Debris Mitigation (signed by ASI, BNSC, CNES, DLR, and ESA), and to the ECSS and ISO development of debris mitigation standards.

Activities on German Space Agency Level

On programmatic level, the German Space Agency DLR has tailored the National Space Debris Mitigation Guidelines from the European Code of Conduct of Space Debris Mitigation to German space projects needs. Application to the DLR projects EnMAP - "Environmental Mapping and Analysis Program" and TET - "Technologie Erprobungs Träger" (Technology Test Carrier) is under investigation and in preparation for the latter respectively. Information of German industry to promote the National Mitigation Guidelines within the frame of a Quality Assurance and Product Safety Workshop is envisaged for February 2008.

German Space Debris Mitigation Research Activities

Research activities in Germany related to Space Debris Mitigation in general cover various aspects, such as space debris observation technology, space debris environmental modelling and technologies to protect space systems from space debris and to limit a new generation of space debris. Financing is ensured either via the German national space budget directly or via the European Space Agency ESA. In 2007, research activities were initiated and carried out respectively as follows:

- Development of the calorimetric impact detector AIDA (Advanced Impact Detector Assembly) for the On-Orbit Measurement of Small Orbiting Debris and Meteoroids

- Development of a flight unit of the calorimetric impact detector AIDA
- Improvement of the hypervelocity impact test facility for the simulation of space debris impacts on spacecrafts
- Material investigation for the simulation of the fragmentation of spacecrafts during re-entry
- Analyses of economical aspects and sustainability of space debris mitigation measures.

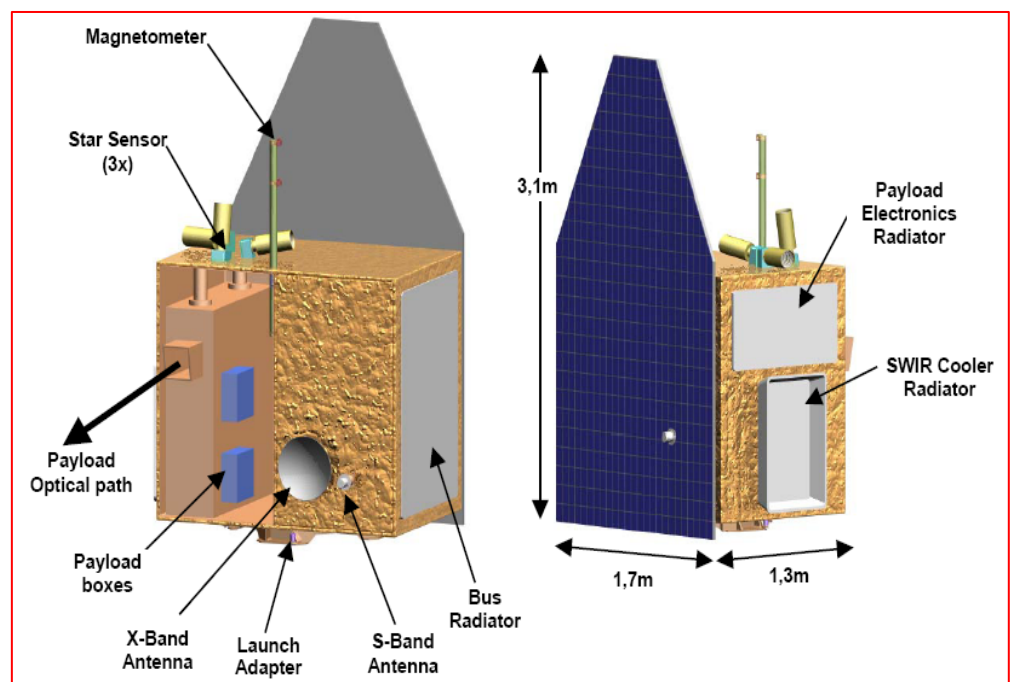
Investigation of Application of National Space Debris Mitigation Guidelines to German Space Missions

- EnMAP - “Environmental Mapping and Analysis Program”

EnMAP is a German hyperspectral satellite mission with 200 channels within the broad spectral range from 420 nm to 2,450 nm and high ground resolution of 30 m. EnMAP will be carried by a dedicated small satellite based on existing state-of-the-art bus technology (modified TerraSar bus) and will be sent into an orbit approximately 650 km above the surface of the Earth.

The main tasks of the EnMAP mission is related to the global determination of ecosystem

parameters as well as biophysical, biochemical, and geochemical variables. EnMAP as well incorporates analysis capability for post natural disasters and environmental pollution of land and water. The mission data will be used for the preparation of future commercialization and operative services.



The project is realized under German leadership with international partners.

The application of the National Space Debris Mitigation Guidelines, tailored from the European Code of Conduct of Space Debris Mitigation to the needs of the project, to EnMAP is under investigation.

The work packages comprise analysis of end-of-life measures (in particular the analysis of the passivation process and the implementation of disposal manoeuvre/s) and re-entry safety measures (in particular the assessment of debris stemming from the spacecraft potentially reaching Earth's surface, the investigation of the related casualty risk to population and properties on ground, and assessment of the related risk of possible harmful contamination of the Earth environment).

- TET - "Technologie Erprobungs Träger" (Technology Test Carrier)

The goal of the programme is to qualify new technological solutions for their application in space projects. It focuses on the in-flight demonstration and verification of components and spacecraft subsystems such as power generation, guidance, navigation and control.

The German Space Agency DLR provides flight opportunities for novel technologies on various platforms and satellites. The core element of the programme is the micro-satellite TET. TET is a German-built satellite with an overall mass of about 120 kg (payload capacity of about 40 kg).

TET will be launched to the low earth orbit. The planned mission duration is one year. DLR provides the TET satellite in addition to the assembly, integration, and test of the system, the mission operations and the data transfer to the user.

The application of the National Space Debris Mitigation Guidelines, tailored from the European Code of Conduct of Space Debris Mitigation to the needs of the project, will be investigated within the frame of TET, focussing on the issues prevention measures (e.g. mission related objects, fragmentation), end-of-life measures (e.g. passivation, de-orbiting, disposal), and re-entry safety.

