



## **Towards an integrated determination of thermodynamic density and gravity parameters using accelerometer measurements on board of low-orbit satellite missions**

Jürgen Kusche (1), Ehsan Forootan (1), Anno Löcher (1), Christina Henze (1), Klaus Börger (2), and Judith Schall (1)

(1) University of Bonn, Institute of geodesy and Geo-information, Astronomical Physical Mathematical Geodesy, Bonn, Germany (forootan@geod.uni-bonn.de), (2) German Space Situational Awareness Centre (GSSAC), Mühlenstraße 89, 47589 Uedem, Germany

The aim of this study is to develop an integrated approach, which allows a) to measure the neutral density of the thermosphere using orbit and accelerometer information from various satellite missions and b) to relate them to operational atmospheric models. The satellite missions to be considered will include low-orbit satellites CHAMP, GRACE, GOCE and SWARM; laser-ranging satellites such as LAGEOS; as well as altimetry satellites such as Topex/Poseidon and Jason 1-2. On the other hand different atmospheric models, including Jacchia-Bowman, MSIS 86, MSISE 90, and NRLMSISE-00 models, will be investigated with respect to their sensitivity to geomagnetic activity and sunspot cycle etc. and they will be used to determine a theoretical acceleration due to air drag. Subsequently, we will compare the “computed” atmospheric density with the total mass density (“observed” atmospheric density) retrieved from accelerometer measurements made on board the satellites during their operational period. Based on these results we finally will develop a method – a so called “integrated approach” – that allows the joint determination of thermospheric, instrumental, and gravitational parameters, as well as their respective errors and correlations.