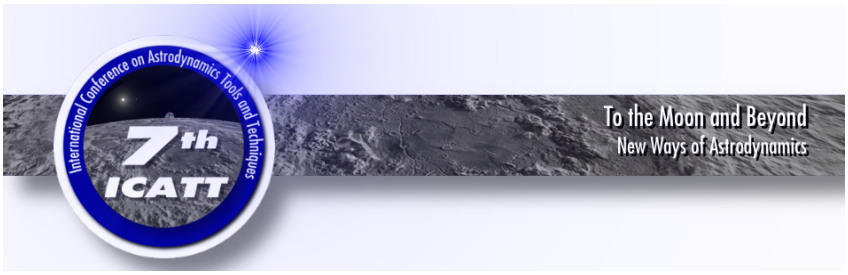

Contribution ID: **21** Type: **Oral presentation at the conference**

Operational Orbit Determination for the Eumetsat GEO fleet based on optical observations.

Friday, 9 November 2018 14:00 (30 minutes)

The Eumetsat GEO fleet has successfully performed its orbital determination using ranging-only data from three different ground-based tracking stations. Data from two different ground stations is used for each of the satellites. For more than 15 years, these results have been used for manoeuvre planning, after manoeuvre calibration and collision risk assessment. Since June 2018, an effort has been undertaken to enhance the orbit determination procedures with optical observations, with the objective of assessing the suitability of using optical data to perform the operational orbit determination, and determining the suitability of routine orbit determination and manoeuvre calibration using mixed data from ranging stations and telescopes. The optical measurements are provided currently by the Deimos Sky Survey (DeSS) telescopes, using additional sensors (coordinated by Deimos Space) as a backup in case of adverse weather conditions or technical issues. The processing of the measurement data is being performed by two separate teams at Eumetsat and at Deimos. This paper describes the processing chain put in place at Deimos for performing the observations and the processing of measurement data, and summarises the findings related to the aforementioned objectives after several months of routine observations.

Each spacecraft in the fleet is observed with optical sensors at least twice every week (in two observation slots), with each slot spanning at least 15 minutes, and with a minimum separation of two hours between slots. A software processing chain based around several Deimos tools has been put in place to plan the observations (SHUX), perform the observations (ITOX), automatically process and resolve the images (TRAX), split tracks (TRACA), and finally perform the orbit determination (TRADE).

The orbit determination is automatically performed weekly with the TRADE by means of a Batch Least Squares approach with a two-week rolling window. In absence of manoeuvres, this allows determining the solar radiation pressure coefficient while maintaining consistency with the previously computed orbits. When a manoeuvre is scheduled, optical observations are taken as soon as possible after the manoeuvre itself. In this case, the paper shows that the orbit determination with optical information only provides results comparable with the nominal range-only orbits.

Finally, the TRADE tool is modified to process range-only measurements from ground-based ranging stations along with optical measurements. A comparison of the quality of the solutions obtained with different combinations of measurements from different sensors is provided.

Summary

Primary author: Mr DOMÍNGUEZ, Raúl (Deimos Space)

Co-authors: Mr NOMEN, Jaime (Deimos space); Mr OLIVIERO, Dario (Deimos space); SÁNCHEZ-ORTIZ, Noelia (DEIMOS Space); Mr KLINC, Milan (Eumetsat); Mr PESSINA, Stefano (Eumetsat)

Presenter: Mr DOMÍNGUEZ, Raúl (Deimos Space)

Session Classification: Orbit Determination and Prediction Techniques #1

Track Classification: 13: Orbit Determination and Prediction Techniques