# MosaicGPS Receiver in Geostationary Orbit – On Orbit Performance Analysis


## Abstract

GNSS space receivers are widely used for onboard autonomous navigation of spacecraft platforms in low Earth orbit. The use of GNSS receivers on geostationary satellites has been the topic of multiple studies but mainly based on simulation. Actual on-orbit data from receivers in this environment is still very limited.

Airbus' MosaicGPS receiver is used as an experiment on the Hispast 36W-1 mission which was launched on 27 January 2017 into geostationary transfer orbit and then raised into geosynchronous orbit.
The GPS receiver experiment consists of a GPS L1C/A single frequency receiver using two antennas with opposite boresights and dedicated low noise amplifiers in each antenna-receiver chain.
The Mosaic receiver was powered on already at the beginning of the transfer phase and provided data throughout the complete transfer allowing for evaluation of GPS signal tracking behavior and measurement accuracy for the various phases of the transfer using the two antennas alternatively.
After reaching the final geostationary orbit the satellite attitude was fixed to Earth pointing switching permanently to the Earth mounted GPS antenna.
While giving a few results on the transfer orbit behavior the paper will focus on the results of the on-station operation of the receiver. It will give a short overview of the MosaicGPS receiver technology and then provide results and analysis of the received signals, their signal strengths, number of satellites that can be tracked at the same time and its variation over the orbit. The achieved position, velocity, and time performance will be analysed and compared to the simulations performed on ground prior to the launch and show the accuracy of the assumptions and the margins of these assumptions wrt reality. This allows to verify and give confidence in the on-ground simulations as well as provides information for improvements of the verification models used.
The paper concludes with an outlook of the use of next generation GNSS receivers in geosynchronous orbits as well as for the transfer towards such orbits.