



Signal, orbit, and clock analysis of GPS III SV01

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Modernization of the Global Positioning System (GPS) foresees the launch of 32 new generation block III satellites. These satellites are expected to provide an improved positioning accuracy with a 1 m user range error at 24 h. They have improved anti-jamming capability and transmit the new civil L1C signal. GPS III SV01 built by Lockheed Martin was launched on 23 December 2018 with a Falcon 9 rocket from Cape Canaveral into an elliptical transfer orbit. Within the following days, the orbit was circularized and the spacecraft moved close to slot 3 in orbit plane F. Transmission of the legacy C/A- and P-code signals on L1 and L2 started on 9 January 2019.

This contribution analyzes the quality of the GPS III signals based on receiver tracking data and observations with a 30 m high gain antenna. Based on the Interface Control Document specifications of minimum received signal power, a higher transmit power is expected for the L2C, L2M, and L5 signals than on previous generations of GPS satellites. Precise orbits and clocks of GPS III SV01 are estimated from observations of a global tracking network. The quality of these products is assessed and compared to that of older GPS satellites. Furthermore, the short-term stability of the GPS III SV01 rubidium clock is analyzed by means of one-way carrier phase analysis of stations connected to a highly stable hydrogen maser and compared to other GNSS satellite clocks.