

Development Status of NASA's TriG GNSS Science Instrument

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JPL is developing NASA's next generation GNSS receiver for precise orbit determination and remote sensing. The TriG Receiver is derived from the NASA/JPL BlackJack receiver design, which has flown on over 16 spacecraft with over 115 years of successful operations. The TriG offers significantly enhanced capability to track more GNSS signals for both navigation and ionospheric science. Both the legacy and new signals from GPS as well as new GNSS signals from Galileo and GLONASS can be processed by the TriG. The ability to track multiple GNSS satellite signals will improve both precision orbit determination and the quality and quantity of the radio occultation measurements.

The TriG receiver features several innovations including digital beam steering to produce multiple simultaneous high-gain beams, wideband open loop tracking, and “time delayed” digital signal processing logic for improved open-loop signal processing. These innovations improve precision for RO in the upper atmosphere while also supporting the wider range in delay and Doppler shift necessary for full RO retrieval in the lower troposphere. The TriG receiver is implemented in scalable 3U compact-PCI form factor and is software reconfigurable, enabling optimization to meet specific mission requirements and spacecraft resource constraints post-launch. We will present the current development status and some recent test results towards meeting some of the more stringent requirements including power, tracking performance and differential delay stability.