

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)  
Future Space Transportation Systems Verification and In-Flight Experimentation (6)

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## HIGH ALTITUDE UAV DEVELOPMENT AND FLIGHT TESTING

**Abstract**

A flying wing UAV has been developed for operations in the altitude range of 20-35 km. The UAV can carry a payload of 1 kg and a glide ratio of 30:1 has been demonstrated through both theoretical predictions and test flights and can operate beyond radio range communication. A portable ground station ensures radio communication on VHF/UHF and S-band. A full system block diagram of the system is discussed. The UAV has been developed for a variety of applications including atmosphere probing and radiosonde recovery. Several test flights have been performed in Finland as part of an InGOS campaign at the Finnish Meteorological Institute including one test flight from 26.9 km altitude. A good agreement is found between the flight data from this test flight and a 6 DOF model of the UAV. A full low cost inertial autopilot has been developed and used on the test flights. Discussion of the autopilot and system engineering approach for the UAV is done in the framework of the current project. Comparison of various flight performances for various test flight envelopes is performed through the usage of inflight telemetry recorded onboard and received real time on the ground. Future test flights and applications are discussed in the view of supporting space based missions (e.g. Sentinel missions).