

Stratéole 2: A Unique Super Pressure Balloon Campaign For Long Duration, Quasi-Lagrangian, Chemical And Dynamical Measurements In The Tropical Tropopause Layer.

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Stratéole 2, is a long duration scientific ballooning campaign to study the Tropical Tropopause Layer (TTL) and lower stratosphere, organized by CNES and LMD in France and planned for 2017 – 2019. This campaign presents a rare opportunity to make long duration physical and chemical measurements of the TTL and lower stratosphere from nearly Lagrangian balloon platforms. This experiment builds on the super pressure balloon platform that was successfully used during the VORCORE and Concordiasi missions in the Antarctic and Pre-Concordiasi mission at the equator. The balloon constellation will follow constant density surfaces, with two flight levels planned at pressure levels near 50 and 75 hPa. The project will consist of two intense field campaigns during consecutive years, with approximately 20 balloon launches per campaign. Flight durations in excess of 3 months are expected, providing extensive zonal sampling over latitude band of 10°N to 15°S. The instrument payload will include measurements of water vapor, ozone, particle size distributions, vertical temperature profiles, μ LIDAR cloud measurements and GPS radio occultation measurements of water vapor and temperature profiles.

The scientific goals of Stratéole 2 include topics related to the chemistry, dynamics and transport in the TTL. Examples include dehydration processes and the thermal structure of the TTL, which will be investigated using flight level measurement of water vapor, high-resolution temperature profiles through the TTL, and microphysical measurements of cloud particles with a μ LIDAR. The dynamics of the equatorial stratosphere, in particular the relationship between the QBO and generation and propagation of gravity waves in TTL are also a focus of the campaign. Flight level measurements of meteorology and the balloon displacement, in combination with temperature profile measurements will deliver an unprecedented view of wave frequency and phase spectra, and the zonal coverage of the observations will highlight geographical asymmetry in wave activity. In situ measurements of aerosol size distributions, ozone and methane will be useful for investigating transport, particularly in relation to the Asian Monsoon, and for satellite and model validation. Stratéole 2 is in the advanced planning stages, and we are exploring synergies with other equatorial observational, theoretical and modeling studies.