ESA supported airborne and ground-based campaigns constitute an essential element in the development and operation of satellite missions, providing the opportunity to test novel observation technologies, acquire representative data for the development of the mission concepts, processors and use cases, as well as in their calibration and validation phases once in orbit.

For the Aeolus Doppler Wind Lidar satellite mission, ESA has implemented a campaign programme that started in 2007 and has continued beyond the launch of the mission on 22. August 2018. Building on the successful WindVal-I and –II campaigns with DLR’s A2D and 2µm Doppler Wind Lidar systems on-board the DLR Falcon aircraft, a number of validation campaigns have been successfully implemented: WindVal-III in November 2018, AVATAR-E in May 2019, and AVATAR-I in September 2019. In addition, ESA supported the CNES pre-Stratéole-2/TAPAPA campaign with eight stratospheric balloons having been launched from the Seychelles in November/December 2019 providing unique upper level wind data in the Tropics. The validation by stratospheric balloons has been extended in the frame of a collaboration with Loon LLC for a test case covering the months August and September 2019.

As the largest impact of the Aeolus observations is expected in the Tropics, and in particular over the Tropical oceans, ESA, in close collaboration with NASA and European partners, is currently implementing a Tropical campaign in July 2021. With its base in Cape Verde the activity comprises both airborne and ground-based activities addressing the tropical winds and aerosol validation, as well as a wide range of science objectives. The location is unique as it allows the study of the Saharan Aerosol layer, African Easterly Waves and Jets, the Tropical Easterly Jet, as well as deep convection in ITCZ and tropical cyclogenesis, with a focus on the impact of Saharan dust on microphysics in tropical cloud systems. The campaign builds on remote and in-situ observations from
aircraft (DLR Falcon-20, the Safire Falcon-20, the NASA DC-8 and an Aerovizija/UNG light aircraft) and drone systems, as well as an extensive aerosol and cloud measurement programme with a range of lidar, radar and radiometer systems coordinated by NOA.

This paper will provide a summary of the Aeolus campaign activities, focussing on the completed and planned post launch campaigns.