



ADM-Aeolus: ESA's Novel Wind Mission

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The European Space Agency is developing a direct detection Doppler Wind Lidar to observe wind profiles from space, as part of its Earth explorer programme. The Atmospheric LAsER Doppler INstrument (ALADIN), on-board the ADM-Aeolus satellite, is a pulsed UV Lidar with high spectral resolution capability. It shall deliver single line-of-sight wind measurements from 24 vertical layers (0 to 30 km) from each of its two channels; one molecular (clear air) and one particle (aerosol and cloud backscatter) channel. ALADIN will measure the zonal component of the wind field in clear and particle-rich air (aerosol layers and transparent clouds), and down to the top of optically dense clouds. In addition to the wind profiles, ADM-Aeolus will also deliver cloud and aerosol related information such as height profiles of backscatter and extinction coefficients, scattering ratios and Lidar ratios. From these parameters further products can be derived, such as cloud-top height, multi-layer clouds and aerosol stratification, cloud and aerosol optical depths (integrated light-extinction profiles), and some information on cloud/aerosol type (Lidar ratio). The satellite will fly in a polar dusk/dawn orbit, providing a global coverage of ~16 orbits per day. The wind measurements (Level 1b) will be delivered near-real-time (NRT) together with a stand-alone Level 1-2 algorithm and will be effectively assimilated into operational numerical weather prediction (NWP) models. The cloud and aerosol related products will be provided off-line. The mission is scheduled for launch in late fall 2015.

Impact studies have shown that the largest impact of Aeolus is expected in regions with few other direct wind profile observations, e.g. over the oceans, in the Tropics and in the Southern Hemisphere. Climate monitoring based on reanalysis data are expected to benefit from Aeolus observations through improvements of NWP analyses. One example is the detection of wind driven circulation changes in Arctic regions. Climate model processes involving wind dynamics, such as convectively coupled tropical waves, El Niño circulations and Monsoons, could be validated with tropical wind profiles from Aeolus.

The status of the Aeolus mission and its data products will be presented together with results from impact studies and the potential for assimilation of Aeolus's spin-off products.

In addition an outlook is given for the current status and planning of pre and post-launch activities including relevant CAL/VAL preparations.