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# Aerosol Lidar observations and model calculations of the Planetary Boundary Layer evolution over Greece, during the March 2006 Total Solar Eclipse

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Abstract. An investigation of the Planetary Boundary Layer (PBL) height evolution over Greece, during the solar eclipse of 29 March 2006, is presented. Ground based observations were carried out using lidar detection and ranging devices and ground meteorological instruments, to estimate the height of the mixing layer (ML) before, during and after the solar eclipse in northern and southern parts of Greece exhibiting different sun obscuration. Data demonstrate that the solar eclipse has induced a decrease of the PBL height, indicating a suppression of turbulence activity similar to that during the sunset hours. The changes in PBL height were associated with a very shallow entrainment zone, indicating a significant weakening of the penetrative convection. Heat transfer was confined to a thinner layer above the ground. The thickness of the entrainment zone exhibited its minimum during the maximum of the eclipse, demonstrative of turbulence mechanisms suppression at that time. Model estimations of the PBL evolution were additionally conducted using the Comprehensive Air Quality Model with extensions (CAMx) coupled with the Weather Research and Forecasting model (WRF). Model-diagnosed PBL height decrease during the solar eclipse due to vertical transport decay, in agreement with the experimental findings; vertical profiles of atmospheric particles and gaseous species showed an important vertical mixing attenuation.

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