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QUantifying the Aerosol Direct and Indirect Effect over Eastern Mediterranean from Satellites (QUADIEEMS): Overview and preliminary results

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An overview and preliminary results from the research implemented within the framework of QUADIEEMS project are presented. For the scopes of the project, satellite data from five sensors (MODIS aboard EOS TERRA, MODIS aboard EOS AQUA, TOMS aboard Earth Probe, OMI aboard EOS AURA and CALIOP aboard CALIPSO) are used in conjunction with meteorological data from ECMWF ERA-interim reanalysis and data from a global chemical-aerosol-transport model as well as simulation results from a regional climate model (RegCM4) coupled with a simplified aerosol scheme. QUADIEEMS focuses on Eastern Mediterranean [30^oN-45N^o, 17.5^oE-37.5^oE], a region situated at the crossroad of different aerosol types and thus ideal for the investigation of the direct and indirect effects of various aerosol types at a high spatial resolution. The project consists of five components. First, raw data from various databases are acquired, analyzed and spatially homogenized with the outcome being a high resolution (0.1x0.1 degree) and a moderate resolution (1.0x1.0 degree) gridded dataset of aerosol and cloud optical properties. The marine, dust and anthropogenic fraction of aerosols over the region is quantified making use of the homogenized dataset. Regional climate model simulations with REGCM4/aerosol are also implemented for the greater European region for the period 2000-2010 at a resolution of 50 km. REGCM4's ability to simulate AOD_{550} over Europe is evaluated. The aerosol-cloud relationships, for sub-regions of Eastern Mediterranean characterized by the presence of predominant aerosol types, are examined. The aerosol-cloud relationships are also examined taking into account the relative position of aerosol and cloud layers as defined by CALIPSO observations. Within the final component of the project, results and data that emerged from all the previous components are used in satellite-based parameterizations in order to quantify the direct and indirect (first) radiative effect of the different aerosol types at a resolution of 0.1x0.1 degrees. The procedure is repeated using a 1.0x1.0 degree resolution, in order to examine the footprint of the aerosol direct and indirect effects. The project ends with the evaluation of REGCM4's ability to simulate the aerosol direct radiative effect over the region. QUADIEEMS is co-financed by the European Social Fund (ESF) and national resources under the operational programme Education and Lifelong Learning (EdLL) within the framework of the Action "Supporting Postdoctoral Researchers".