Sahara dust effect on solar UV radiation components

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1. Trajectories

Based on archived three-dimensional pressure and wind fields from the DWD global model GME trajectories for August 19, 2012 for 7 days backwards at Lindenberg (52.2086°N, 14.1213°E, 127 m asl) indicate an uplift of air from levels close to the desert surface in the central Sahara region (south and southwest Algeria and Mali) on August 13 to August 14 and transport to the middle troposphere (5 km height) over Central Europe

- 550 hPa trajectory to Lindenberg for 168 h backwards in time (red)
- air descends to heights close to the desert surface at 400 m asl (green) 4 days before arrival, and moves westward over more than 500 km by up to 50 km/h speed
- Tindouf had 8.7 km visibility, a maximum temperature of 45°C, and a dew point of 8°C (minimum relative humidity 5%)

2. Solar radiation at Lindenberg

i) VIS/NIR IRRADIANCE COMPONENTS

- Aerosol optical depth - LibRadtran model 10-min results
  SZA: solar zenith angle

GLOBAL: no change from am to pm
DIFFUSE: increase by 36 W m⁻² (= 34% at SZA 45°) from am to pm
DIRNOR: decrease by 75 W m⁻² (SZA 45°) to 140 W m⁻² at high SZA from am to pm

References