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Investigation of the effect of contrails on direct and diffuse irradiance

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In the present study we investigate the effect of contrails on direct, and diffuse shortwave radiation. This investigation is performed using continuous hemispherical fish eye photographs of the sky, diffuse and direct short wave measurements and spectral irradiance measurements. These measurements have been performed at the solar observatory Kanzelhöhe (1540 m.a.s.l) located in the southern part of Austria during a period of one and half year. The time resolution of the measurements is one minute, which allows to accurately follow the formation -eventually the disappearance- or the movement of the contrails in the sky.
Using the fish eye photographs we identified clear sky days with a high contrail persistence.
We especially look at situations where the contrails were shading the sun.
First results show that contrails shading the sun may reduce the global radiation by up to 60%. In general we however observe that during days with a high contrail persistence the diffuse irradiance is slightly increased. Finally a statistic of the contrail persistence during the period of measurement is presented and conclusions as to the relevance for the energy balance at Kanzelhöhe are drawn.