

Interactive comment on “Observations of convective clouds generated by solar heating of dark smoke plumes” by L. Klüser et al.

L. Klüser et al.

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The statement 'Smoke plumes have the ability to change the atmospheric heat content due to absorption and reduced reflection of solar radiation. By these means they can alter the temperature profile of the atmosphere and trigger convective clouds' referred to results of further studies (e.g. Rudich et al., 2003) while we concentrate on the edge-effect. To overcome any confusion regarding the presented results, we have changed this statement in the abstract to make clear that we describe the edge-effect.

Surely cloud masking is imperfect over land, but anyhow the method presented is appropriate by taking the darkest pixels (by means of reflectivity) of the sixteen-days period without smoke. However, this 'reference field' should not be regarded as the true surface reflectance, as shadows of the clouds (of which occurrence has been shown for the reference period at a clear minority of days) contribute to its values, which are

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not accounted for in Eq. (1). These cloud shadows are visible in the images of the reference field values, which we have added to the paper. We also have computed the reflectance variance of cloud-free conditions for every pixel. Variance values for the pixels of the reference field are about 0.01 at their maximum (along the coastline) and about 0.004 at maximum for inland pixels contaminated by cloud shadows. Thus the effect of cloud shadows and possibly other aerosol contaminations is very small compared to the effect of the smoke plume and convective clouds on the difference between HRV-reflectance of 17 July 2006 and the reference field. To visualise the (small) cloud shadow effect onto the reference field values we have additionally included images of the reference field for the four image acquisition times.

One can see some structures in the grayscale image (mainly along the coastlines and in the northern part of the image), for which the difference from Eq. (2) is positive, which means that those pixels are brighter on 17 July than the darkest pixel of the reference period is. This is an effect to which e.g. cloud shadows from the reference period contribute to a high degree. But the image sequence clearly shows, that the darkening by the smoke plume as well as the brightening by clouds present on 17 July 2006 has a much stronger influence on the magnitude of the reflectance difference than cloud shadows and maybe aerosol effects of the clearsky period.

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