



Direct observation of two dimensional trace gas distributions with an airborne imaging DOAS instrument

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The airborne imaging differential optical absorption spectroscopy (iDOAS) was invented to observe the distribution of several trace gas i.e. NO₂, SO₂, HCHO, glyoxal, H₂O and O₄. The iDOAS spectrometer measures scattered and reflected sunlight in the ultraviolet and visible wavelengths, along a line perpendicular to the aircraft track. Combined with the aircraft's forward motion this produces a two-dimensional image. The high spatial resolution of the instrument ($\approx 70 \times 100 \text{ m}^2$) allows a map of vertical columns to be made.

First tests of aircraft instrument in October 2006 in the Highveld (South Africa) showed strong variations of NO₂ column densities in the immediate vicinity of various sources. The observed patterns can be used to separate different sources, which are located close together. Moreover for individual sources the emission flux or the strength of chemical reactions can be estimated. This also includes the possibility of lifetime approximations. All these issues addressed are very important aspects for model validation on a regional scale.

Obviously highly resolved traces gas patterns are useful for satellite comparisons concerning the inner pixel variations. In August 2007 additional measurements were performed, including some special flights for satellite validation. However, the analysis

is still in progress hence only preliminary data can be presented.