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Monitoring vegetation using DOAS satellite observations

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Vegetation-cycles are of general interest for many applications. Be it for harvest-predictions, global monitoring of climate-change or as input to atmospheric models. From novel spectrally resolving UV/vis satellite instruments (like GOME or SCIAMACHY) the spectral signatures of different types of vegetation can be identified and analysed. Although the spatial resolution of GOME and SCIAMACHY observations is much coarser than those of conventional satellite instruments for vegetation monitoring, our data sets on different vegetation types add new and useful information, not obtainable from other sources.

Common vegetation indices are based on the fact that the difference between Red and Near Infrared reflection is higher than in any other material on Earth's surface. This gives a very high degree of confidence for vegetation-detection. The spectrally resolving data from GOME and SCIAMACHY provide the chance to concentrate on finer spectral features throughout the red and near infrared spectrum. We look at these features using a technique known as Differential Optical Absorption Spectroscopy (DOAS). Although originally developed to retrieve information on trace gases, it can also be used to gain information on vegetation. Another advantage is that this method automatically corrects for atmospheric effects. This renders the vegetation-information easily comparable over long time-spans.

In addition, high-frequency-structures from vegetation also effect the retrieval of tropospheric trace-gases and aerosols.

To optimize vegetation monitoring with DOAS we produce spectrally resolved reference spectra from different vegetation types using our own instrumentation. We analyze the effect of different Pigments on high-frequency-structures of the DOAS Retrieval. Applying these results we investigate how well we can distinguish vegetation types from space.