CO$_2$ retrieval over clouds: The OCO methodology applied to SCIAMACHY.

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Data obtained from the Scanning Imaging Absorption Spectrometer for Atmospheric CHartographY (SCIAMACHY) sensor were used to infer the carbon dioxide column-averaged mixing ratio over liquid water clouds over ocean. The methodology will be applied on the future Orbiting Carbon Observatory (OCO) sensor, which will be launched in 2008. Before retrieving the carbon dioxide column-averaged mixing ratio over clouds, cloud properties such as cloud optical depth, cloud effective radius and cloud top pressure must be known. Cloud optical depth and cloud effective radius were included as a priori in the inversion using Moderate Resolution Imaging Spectroradiometer (MODIS) level 3 cloud products. The O$_2$-A band around 0.76 μm and the weak CO$_2$ absorption band around 1.58 μm were used to infer the cloud top pressure and the CO2 column-averaged mixing ratio, respectively, based on the Differential Optical Absorption Spectroscopy (DOAS) technique. The methodology has been applied over two different regions, one in the northern hemisphere and one in the

southern hemisphere, both with a high frequency of occurrence of low water clouds. Results were compared with the CarbonTracker model output and discussed.