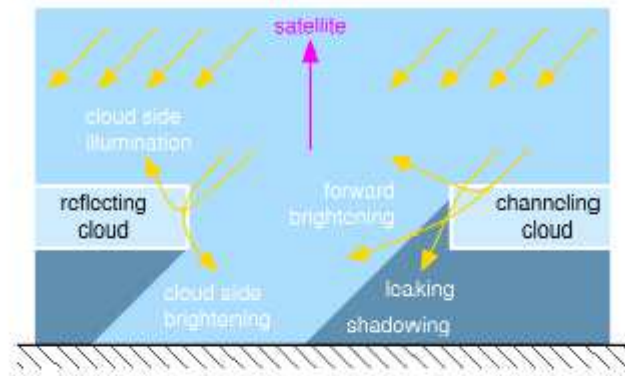
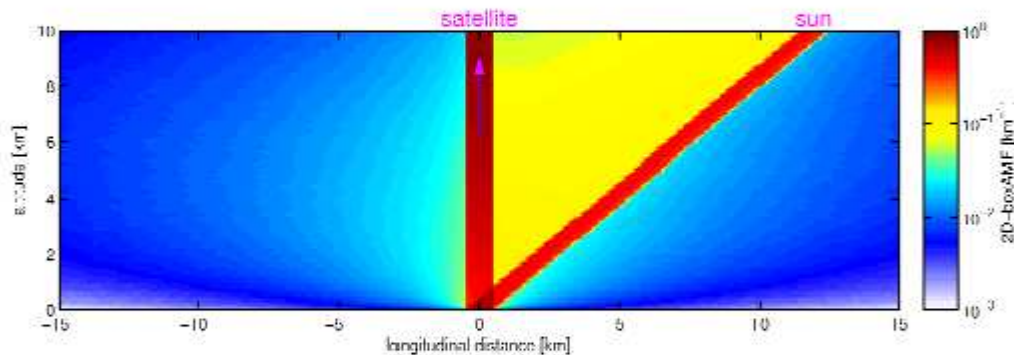


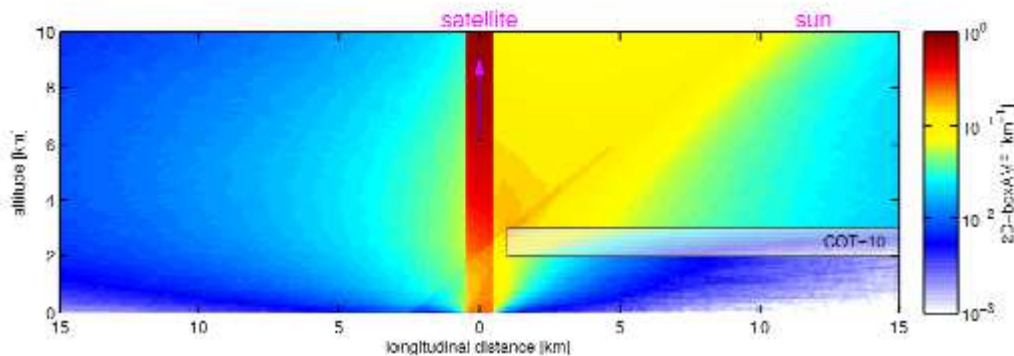
(a) 3D radiative transfer at cloud edges



(b) clear-sky 2D-boxAMF at 440 nm



(c) 2D-boxAMF at 440 nm with shadowing cloud



3D radiative properties become increasingly important as the resolution of satellite measurements increases: (a) The radiative transfer (RT) at cloud edges may have a brightening or darkening effect on the measured radiance, e.g. radiation is channeled into cloud shadow or cloud sides brighten the otherwise clear-sky scene. (b) At a wavelength of 440nm, the 2D box air-mass factor (boxAMF) of the clear-sky case illustrates the sensitivity distribution of DOAS measurements within and outside the geometric light path between satellite, surface and sun. (c) The sensitivity to near-surface trace-gas concentrations is decreased by the shadowing effect of a cloud with cloud optical thickness (COT) of 10, even though the geometric cloud fraction is zero (i.e. no cloud in the line-of-sight of the satellite). Furthermore, the sensitivity above the cloud is increased by a higher density of horizontal light-paths. Courtesy: Holger Sihler (MPIC).