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Simulation and comparison of angular radiances of a convective cloud reconstructed from MISR measurements

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Currently, most retrieval algorithms use 1D radiative transfer theory and the homogeneous cloud assumption to obtain the cloud properties. This assumption has been questioned several times and it has been shown that significant errors can be introduced. In particularly, in the case of deep convective clouds, the saturation of radiances could lead to an underestimation of the total liquid water content of the cloud. In this study, we present a step forward to simulate the radiances of an isolated convective cloud and then make a first evaluation of this kind of error. An isolated convective cloud in the Pacific Ocean has been selected. The cloud morphology has been reconstructed with the use of the multi-angular capabilities of MISR. A Monte-Carlo model was then used, to reproduce the angular pattern of the "cloud free pixels" observed by MISR. Afterwards, the radiances along the cloud envelop were simulated. Different assumptions were made for the cloud composition and microphysics and the radiances were then compared with the measurements in order to get closer to the spatial and angular observations of MISR.