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Explaining the behavior of these differences on the basis of the radiative transfer equation and of the expressions used to compute the various contributing elements (see Di Natale et al. 2020) is a very complicated issue. Despite of this complication, we see that the asymptotic behavior of the differences, for OD → 0 and for OD → ∞ is reasonable. Specifically, for OD → 0, i.e. for ice amounts getting closer and closer to zero, the cloud effect on the upwelling spectral radiance must get closer and closer to zero, thus the two compared methods should provide the same result, as confirmed by the lines of Fig. 1 corresponding to the smallest OD values. Conversely, in the presence of a very opaque cloud (OD>>1), the radiance should depend uniquely on the absorption and scattering processes occurring at the cloud top. Therefore, we expect the differences between the radiance predicted by the two methods to approach a wavenumber - dependent asymptotic value that does not change for any further increase of cloud OD. This behavior is actually confirmed looking at the lines of Fig. 1 that correspond to OD ≥ 30, they almost overlap. Note that the differences between the two methods increase for increasing OD, reach a maximum amplitude for OD ~ 2, then decrease to their asymptotic value achieved for OD >> 1.
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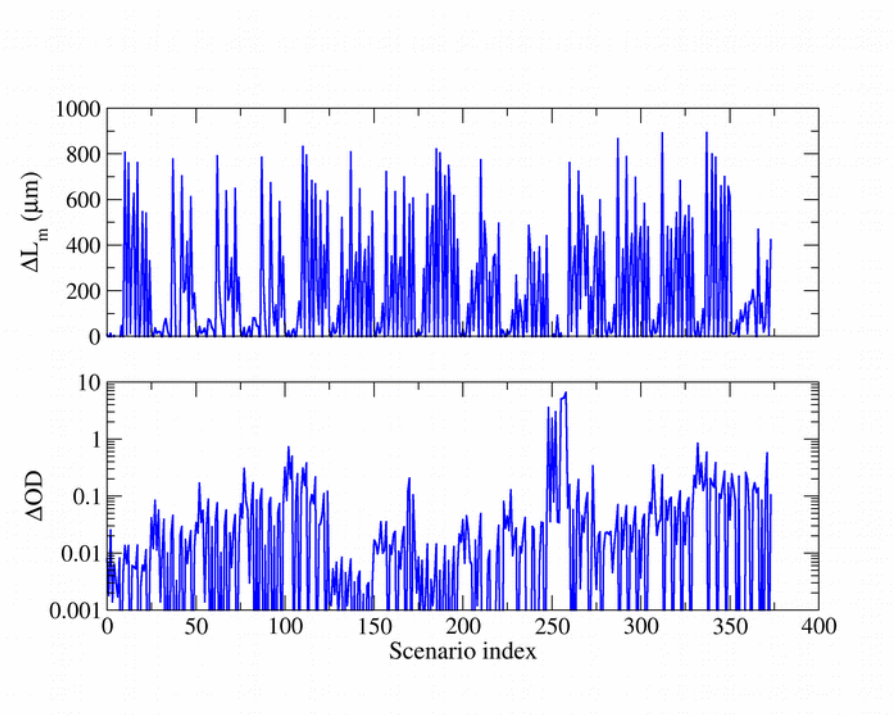

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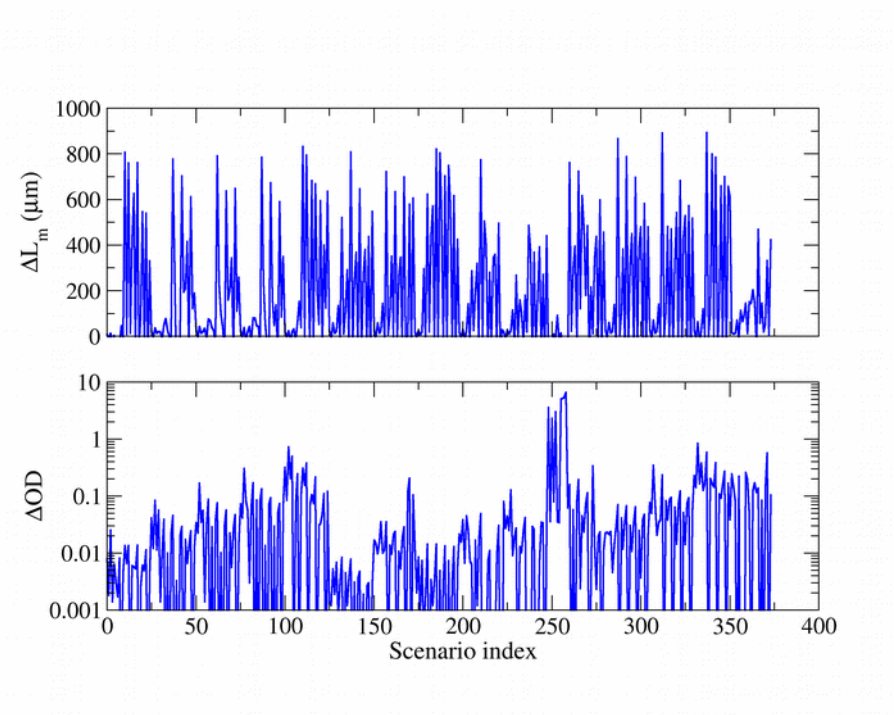

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