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## Algorithmic Differentiation for Cloud Schemes

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Numerical models in atmospheric sciences do not only need to approximate the flow equations on a suitable computational grid, they also need to include subgrid effects of many non-resolved physical processes. Among others, the formation and evolution of cloud particles is an example of such subgrid processes. Moreover, to date there is no universal mathematical description of a cloud, hence many cloud schemes were proposed and these schemes typically contain several uncertain parameters. In this study, we propose the use of algorithmic differentiation (AD) as a method to identify parameters within the cloud scheme, to which the output of the cloud scheme is most sensitive. We illustrate the methodology by analyzing a scheme for liquid clouds, incorporated into a parcel model framework. Since the occurrence of uncertain parameters is not limited to cloud schemes, the AD methodology may help to identify the most sensitive uncertain parameters in any subgrid scheme and therefore help limiting the application of Uncertainty Quantification to the most crucial parameters.