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# The detection and assimilation of clouds in infrared radiances

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The potentially extreme impact of cloud on infrared observations represents a huge challenge to the successful exploitation of these data for NWP. This impact of cloud is illustrated in practical exercises where cloud is introduced to the RTTOV radiance simulations. The lecture then considers two options to handle clouds in the observations. The first option is the detection (and rejection) of cloud affected data, and the lecture introduces a variety of algorithms, from simple window channel checks to complex pattern recognition, that may be used to identify when a particular scene is contaminated by cloud. The additional use of collocated imager diagnostics (e.g. AVHRR/IASI) for scene homogeneity is also described. Potential pitfalls when cloud detection algorithms can go wrong are discussed - for example when emission from the underlying surface is poorly modelled. The second option (as an alternative to the wasteful rejection of cloudy data) is the explicit treatment of cloud as part of the analysis control vector - where parameters describing the cloud are estimated from the observed spectra simultaneously with other atmospheric variables such as temperature and humidity. The large magnitude of the cloud signal, non-linearity of Jacobians and the complexity of the cloud parameters are presented as significant scientific issues. The operational ECMWF scheme treating overcast cloudy radiances with an extremely simple parametric description of cloud is presented. Prospects for a complex treatment of cloud for all-sky infrared radiances - fully interactive with the forecast model physics are discussed.

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