



Assimilation of nonlinear retrievals

P.J. van Leeuwen

University of Reading, DARC, Department of Meteorology, Reading, United Kingdom (p.j.vanleeuwen@reading.ac.uk, +441183788905)

There has been considerable debate until very recently on the possibility of assimilating linear retrievals without damaging the analysis with the prior information. It is now understood that that problem can be solved quite easily, although the literature is not that easy to follow.

Here we present an extremely simple explanation using Bayes theorem. Furthermore, the exploration is extended to nonlinear retrievals in nonlinear (and linear) data assimilation schemes, again following Bayes theorem. It is shown that direct assimilation can be broken up in two steps using standard conditional probability density functions, a retrieval and the assimilation of the retrieval. By dividing the retrieval pdf by its prior all information that relates directly to the parameters of the retrieval prior is lost, and hence is not assimilated into the numerical weather prediction model, neatly solving the assimilation of nonlinear retrievals problem.

The theory is illustrated by a simple example of a nonlinear retrieval for a nonlinear data-assimilation problem exploring efficient particle filters.