

Abstract

The assimilation of observations indicative of quantitative cloud and precipitation characteristics is desirable for improving weather forecasts. For many fundamental reasons, it is a more difficult problem than the assimilation of conventional or clear-sky satellite radiance data. These reasons concern nonlinearity of the required observation operator (forward model), non-normality and large variances of representativeness, retrieval, or observation-operator errors, validation using new measures, dynamic and thermodynamic balances, possible limited predictability, etc. Some operational weather prediction systems already assimilate precipitation observations, but much more research and development remains. The apparently critical, fundamental, and peculiar nature of many issues regarding cloud and precipitation assimilation implies that their more careful examination will be required for accelerating progress.