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Reanalyses Ensemble DA

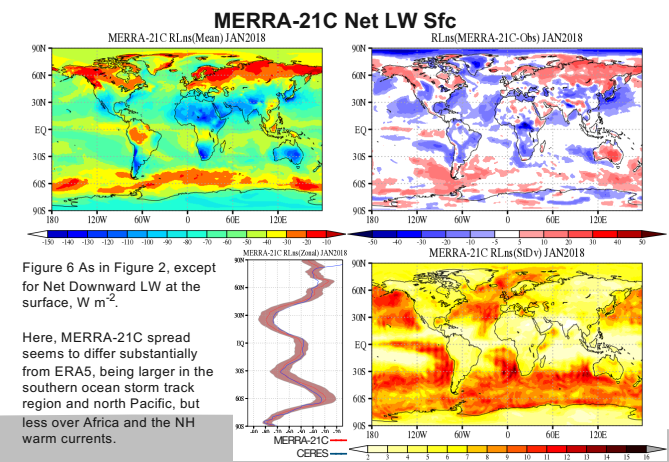
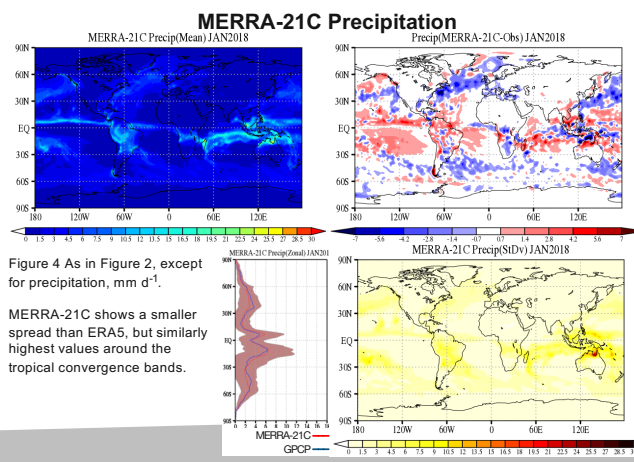
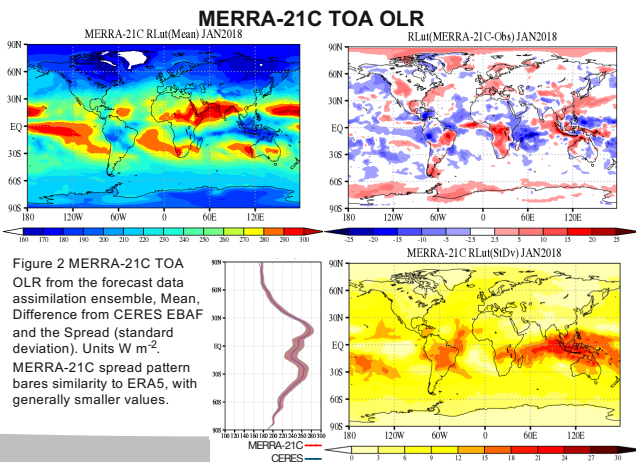
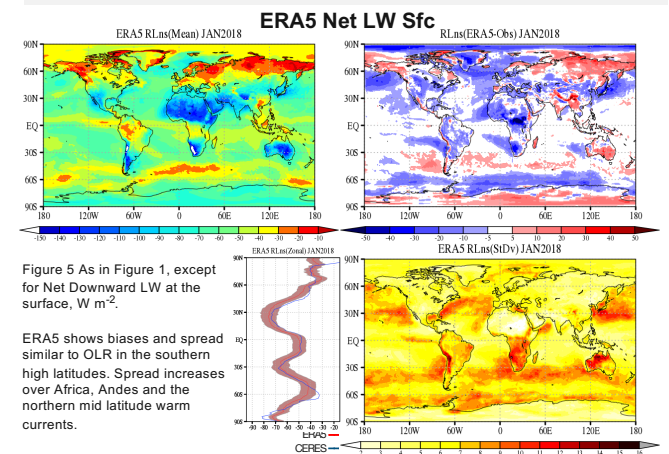
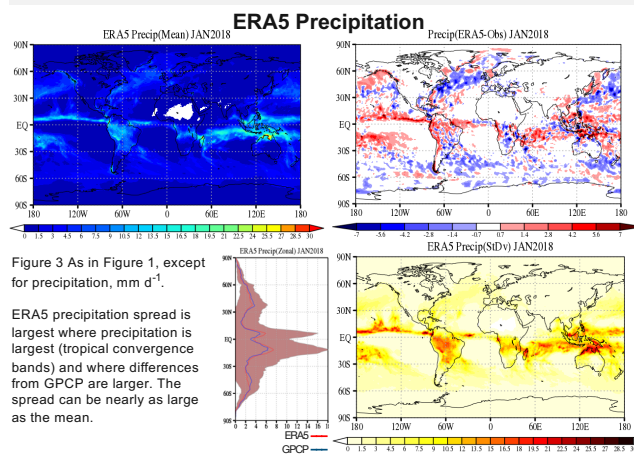
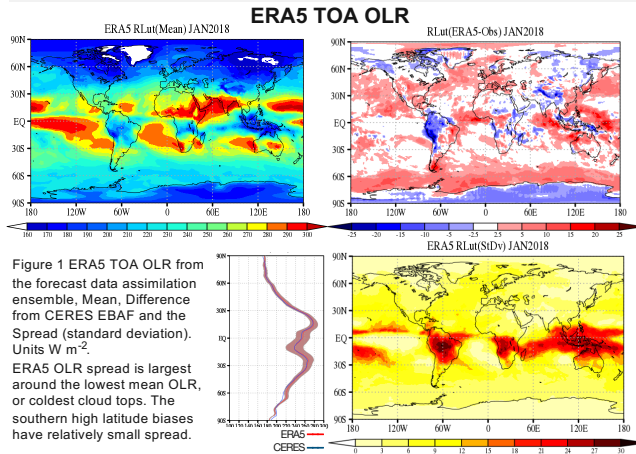
The latest 4D data assimilation techniques use an ensemble approach which provides a spread of the weather forecast for the deterministic analysis. This paper presents an initial comparison of two such reanalyses focusing on physical terms of the global water and energy cycles. We choose for this test, terms with reference observations so the difference from observations can be compared with the spread of the forecast ensemble. It should be noted that the state variables are assimilated and the physical terms are model diagnostics.

Methods and Data

ERA5 provides 10 members and the spread of the ensemble analysis for most of the available output. A new experimental reanalysis called Modern Era Retrospective-analysis for Research and Application – 21st Century (MERRA-21C) provides the variance from a 32-member ensemble. MERRA-21C has only just begun, so limited times are available at present. We compare TOA outgoing longwave radiation (OLR) and Net Surface Longwave with CERES EBAF and also Precipitation with GPCP.

Discussion

While this is just one month, some differing characteristics become apparent. Several structural differences may influence the spread, included spatial resolution and forecast cycling (ERA5 12hr, MERRA-21C 6 hour). MERRA-21C larger ensemble size may contributing to a smaller spread. However, Net Surface LW radiation spread is larger in MERRA-21C. As the MERRA-21C processes further in time, we will evaluate the seasonality and interannual variability of the energy and water cycle to understand the information provided by the spread.



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