



A Lagrangian climatology of stratosphere-troposphere exchange derived from the ERA-40 data set - its features and limitations

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A Lagrangian diagnostic for identifying stratosphere-troposphere exchange (STE) is applied to the ERA40 data set and other existing data sets from the ECMWF. In principle, availability of the ERA40 data set offers for the first time the possibility to investigate STE on multi-decadal time periods with relatively high resolution. The climatologies for mass and ozone STE fluxes show preferred regions of stratosphere-to-troposphere transport (STT) and troposphere-to-stratosphere transport (TST) in the mid-latitudes. This emphasizes the importance of synoptic-scale atmospheric flow systems for STE.

Furthermore, different ECMWF data sets are used to assess the sensitivity of STE fluxes to the underlying meteorological data set. The experiments show a certain dependence of the integrated mass fluxes to the data assimilation system used (optimum interpolation vs. variational methods) and (less important) the spatial and temporal resolution of the input data. In contrast, the geographical patterns of STE mass fluxes are not very sensitive to the input data. Shifts in the assimilated data types, e.g. from the terrestrial based observing system in the earlier parts of the ERA40 to the current, satellite-dominated earth observing system, hampers a trend analysis and adds non-negligible uncertainties to estimates of STE. This is shown by analysis of data from an observation system experiment in the late ERA40 period. First results will also be shown from an STE investigation of selected months of the new, improved "Intermediate ECMWF Re-Analysis (ERAinterim)".