An assessment is made of the global hydrological cycles from eight current atmospheric reanalyses and their depiction of changes over time. The focus is on the mean ocean, land and global precipitation $P$, the corresponding evaporation $E$, their difference corresponding to the surface freshwater flux $E-P$, and the vertically integrated atmospheric moisture transports. Using the model-based $P$ and $E$, the time and area average $E-P$ for the oceans, $P-E$ for land, and the moisture transport from ocean to land should all be identical but are not close in most reanalyses, and often differ significantly from observational estimates of the surface return flow based on net river discharge into the oceans. Their differences reveal outstanding issues with atmospheric models and their biases. Most reanalysis models, the exception being MERRA, have too intense water cycling over the ocean although ocean-to-land transports are very close to observed. Precipitation from reanalyses that assimilate moisture from satellite observations exhibits large changes identified with changes in the observing system, as new and improved temperature and water vapor channels are assimilated, and are much improved after 2002. Discrepancies in the hydrological cycle components arise from analysis increments that can add or subtract moisture. The large-scale moisture budget divergences are more stable in time and similar across reanalyses than other estimates of $E-P$. Results are consistent with the view that recycling of moisture is too large in models, the lifetime of moisture is too short, and that major improvements are needed in model treatment of moisture.