The Atlantic Meridional Overturning Circulation (AMOC) has an important influence on the today's climate. However, continuous decadal-scale observations of the AMOC are not existing. Therefore, available ocean observations are assimilated into numerical ocean models to estimate the AMOC's mean state and its variability. Even the entire oceanic database is too sparse to appropriately constrain oceanic data assimilation. Hence, different data assimilation products show rather different AMOC mean states and variability. To understand these differences, we consider a reversed data assimilation approach. We evaluate the principle ability of the adjoint technique to reproduce a given AMOC from a controlled setup using identical twin experiments. Without observational uncertainties an artificial perturbation producing an AMOC change should in principle be perfectly detectable in space and time. We investigate how far deviations between model and synthetic observations can be minimized in the presence of artificial observational uncertainties and non-linear numerical effects, as e.g. convective adjustment. The results are used to assess error estimates of present assimilation products and AMOC hindcast simulations.