The two main approaches for estimating the ITRF initial coordinates and velocities from time series of coordinates and earth orientation parameters provided by the individual space techniques are (a) the simultaneous treatment (stacking) of all data and (b) the separate stacking for each technique, followed by a combination step where the ITRF parameter estimates from every technique are merged into the final estimates. The conditions for the equivalence of both approaches are investigated within the framework of the standard assumptions of the Gauss-Markov model for best uniformly unbiased prediction, taking into account the inherent rank defects of the data due to the arbitrary definition of the reference system. In addition the merits of each approach are outlined for the case of departure from the Gauss-Markov model assumptions, such as the presence of biases and incorrect covariance matrices of the input data.