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Empirical Earth rotation model: a consistent way to evaluate Earth orientation parameters

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It is customary to perform analysis of the Earth's rotation in two steps: first, to present results of estimation of the Earth orientation parameters in the form of time series based on a simplified model of variations of the Earth's rotation for a short period of time, and then to process this time series of adjustments by applying smoothing, re-sampling and other numerical algorithms. Although this approach saves computational time, it suffers from self-inconsistency: total Earth orientation parameters depend on a subjective choice of the apriori Earth orientation model, cross-correlations between points of time series are cut, and results of an operational analysis per se have a limited use for end users. An alternative approach of direct estimation of the coefficients of expansion of Euler angle perturbations into basis functions is developed. These coefficients describe the Earth's rotation over entire period of observations and are evaluated simultaneously with station positions, source coordinates and other parameters in a single LSQ solution. Results of processing of the 22 year dataset of VLBI observations are presented and compared with results of a traditional approach.