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Can Neural Networks Close GRACE data-gaps?

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There are several gaps in the set of monthly GRACE solutions, caused by an insufficient number of valid range-rate observations during the missing month.
One method to close these gaps is to consider the monthly solutions as time series and interpolate or extrapolate the missing monthly solutions.
While some of the coefficients in the monthly solutions show a regular behaviour
and can be interpolated by trigonometric polynomials, other coefficients have a rather chaotic time evolution. Therefore, more sophisticated prediction method are needed to model this chaotic behaviour.
Since in many fields neural networks can do miracles, they are also tested with regard to their capability to predict monthly GRACE solutions.
A moving set of 12 months GRACE solutions is used to train the network. The the network predicts the solution of the 13th month.
The the prediction is compared with the known solution of the 13th month. All coefficients, which can be predicted with at least 3 significant digits are labeled as predictable coefficients. The remaining coefficients are estimated from a part of the GRACE data of the 13th month. The predicted and the estimated coefficients are combined to a complete solution. It turns out that the error degree variances of this complete solution is lower the the error degree variance of a full GRACE solution with a reduced number of observations.