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## Error identification in orbital laser altimeter data by machine learning

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Orbital Laser altimeters deliver a plethora of data that is used to map planetary surfaces [1] and to understand interiors of solar system bodies [2]. Accuracy and precision of laser altimetry measurements depend on the knowledge of spacecraft position and pointing and on the instrument. Both are important for the retrieval of tidal parameters. In order to assess the quality of the altimeter retrievals, we are training and implementing an artificial neural network (ANN) to identify and exclude scans from analysis which yield erroneous data. The implementation is based on the PyTorch framework [3]. We are presenting our results for the MESSENGER Mercury Laser Altimeter (MLA) data set [4], but also in view of future analysis of the BepiColombo Laser Altimeter (BELA) data, which will arrive in orbit around Mercury in 2025 on board the Mercury Planetary Orbiter [5,6]. We further explore conventional methods of error identification and compare these with the machine learning results. Short periods of large residuals or large variation of residuals are identified and used to detect erroneous measurements. Furthermore, long-period systematics, such as those caused by slow variations in instrument pointing, can be modelled by including additional parameters.

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