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The new GESLA-3 tide gauge data set and its quality control for tidal studies

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The Global Extreme Sea Level Analysis (GESLA) dataset contains, in its recently released version 3, a total of 5199 tide gauge records of hourly (or higher) temporal resolution, globally distributed and totalling more than 91000 years of data (www.gesla.org). This represents twice the number of observations compared to the former version of the database. The tide gauge records have been compiled from multiple data providers and so they have different levels of quality controls. Here we describe a set of tools to homogenise and quality control sea level observations from raw GESLA files, including adjustments of datum jumps and time shifts in the time series. We apply these tools to estimate tidal constituents from the extended in-situ dataset. The results are used to identify the river influences on coastal tide gauges and to map the spatial patterns of mean tidal ranges along densely monitored coastlines.