Automatic quality-control on historic high-frequency tide-gauge data in the Caribbean

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We present automatic quality control (QC) for tide gauges, including generalised comparison of instrument channels, fitting and predicting tides using irregular high-frequency data. There are many tide gauges around the world for which research-quality data is not available for sea-level studies, including gauges that are maintained primarily for tsunami monitoring. In some cases high-frequency data is available for download through the Intergovernmental Oceanographic Commission (IOC) http://www.ioc-sealevelmonitoring.org, but manual QC has been too labour intensive. As part of the Commonwealth Marine Economies programme, we have developed a single Matlab package for QC of tide-gauge data from the IOC. A key element of this is the ability to fit tides to irregular data, at an early stage in the process. We are testing the method in the Lesser Antilles in the Caribbean, where little attention has historically been paid to the tides, which are around 1 m. We show that even here, understanding the tide assists with analysing high-frequency sea-level responses to nearby hurricanes, and compare regional surge model results for case studies of Hurricanes Irma and Maria in 2017.