Automatically and Consistently Detecting and Extracting SLR Measurements for Every Satellite Pass

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After each observed satellite pass, SLR return measurements must be identified and extracted from the surrounding noise points.

This task is made more difficult with weaker return signals, intermittent data flows and greater background noise levels due to sky brightness.

At the SGF, Herstmonceux, an operator manually selects regions of a range residual plot that contain visibly recognisable returns. This selected dataset is flattened by time and radial corrections to the reference orbit, filtered for high return rate levels and clipped so that normal points can be calculated. This task takes observer time and is only performed when the observing schedule allows.

A process for reliably and automatically extracting SLR returns is under development and testing at the SGF. Range returns are first recorded by track detection in real-time and these are used for an initial orbit correction solution using the orbitNP.py software, developed at the SGF. Applying these orbital corrections to the whole dataset produces flattened SLR residuals.

Selecting areas around SLR returns is achieved by considering the relative densities of surrounding residual points. A new return rate calculation method uses the interval between successive track points and the data is filtered for high and low return rates.

A continuously running, multi-process Python program organises the necessary calibration, track, prediction, status and meteorological files for each satellite pass in preparation for automatic data reduction.