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A new global GPS dataset for testing and improving modelled GIA uplift rates

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1. Motivation
- Providing an observational estimate of vertical land motion (VLM) due to global glacial isostatic adjustment (GIA).
- Developing a novel fully-automatic post-processing strategy to deal with the challenges of GPS time series analysis and, in general, for GIA purposes in particular (see Fig. 1).
- Comparing our data-based solution, GlobalMass (GM) GPS dataset, with 13 global GIA solutions (see Figs. 2 and 3).

2. Data: GPS VLM and GIA models
- **Global GPS data set**
  - GPS time series provided by the Nevada Geodetic Laboratory (NGL: http://geodesy.unr.edu).
  - Up-components for >15,700 sites (IGS08 reference framework).
  - List of jump locations provided.
- **GPS VLM for GIA**
  - **Outlier Detection**
    - Median filter based on the jump detection.
  - **Elastic Correction**
    - Median filter based on the jump detection.

3. Method: Post-processing strategy
- **1. Post-processing GPS time series**
  - Outlier Detection
  - Jump Detection
  - Atmospheric Correction
  - Trend and Bias Estimation
- **2. Post-processing GPS VLM for GIA**
  - GIA model based Station Selection
  - Elastic Correction
  - Median filter based Station Selection
  - Rotational Pole Change Correction

4. Results:
   (a) Novel GPS data set
   (b) Comparison to global GIA forward models

5. Conclusions and Outlook
   **Conclusions**
   - The final GM GPS dataset provides a clean GIA signal for more than 4000 sites and, thus, can be used to assess GIA forward models, as well as to improve them.
   - Significant disagreements are found in comparison to 13 GIA forward models, especially for Antarctica and Greenland resulting from uncertain mantle rheology and (recent) ice loading history, as well as errors in the GPS data set.
   - The performance of different GIA models varies considerably between regions.

   **Outlook**
   - A Bayesian statistical framework will be used to combine the GM GPS data set, along with data on ice mass, hydrothermal mass and sea level changes and, as well as prior information from geophysical models, to allow new insights about the different contributors to sea level rise on a basin and global scale.

   **More details**

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