PyTrx: a Python-based monoscopic terrestrial photogrammetry toolset for glaciology

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Terrestrial photogrammetry is a growing method for deriving measurements from contemporary and historical imagery of glacial environments, providing unique insights into glacier change at a high spatio-temporal resolution. However, the potential usefulness of terrestrial image data is currently limited by the unavailability of user-friendly toolsets that contain all the photogrammetry processes required. PyTrx is presented here as a Python-alternative toolset to widen the range of monoscopic photogrammetry (i.e. from a single viewpoint) toolsets on offer to the glaciology community. The toolset holds core photogrammetric functions for template generation, feature-tracking, object identification, image registration, and georectification (using a planar projective transformation model), which can be performed on both contemporary and historical imagery. Examples of PyTrx’s applications are demonstrated using contemporary time-lapse imagery, including ice flow velocities, surface areas of supraglacial lakes and meltwater plumes, and glacier terminus profiles.