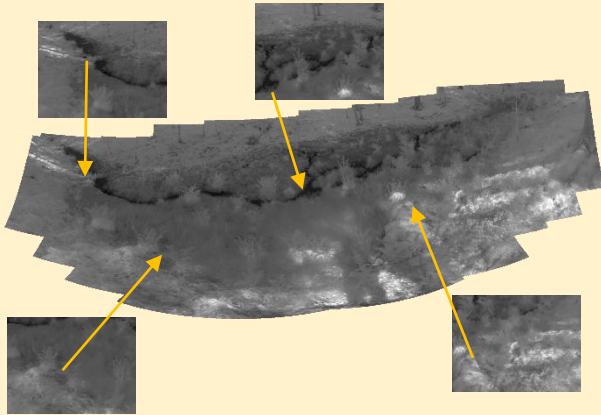**1 Image conversion**

- Transform the images or video frames to a file format that is compatible with panorama software *(e.g. TIFF with a linear, grey temperature scale identical for all single images and video frames)*

Note: save images and videos without embedded colour bar or any other disturbing element

2 Generation of panorama images (PI)

- Mosaic single images or video frames with existing open-source or fee-based panorama software *(e.g. PTGui, ICE)*
- Manually adjust image alignment and overlaps if needed

Note: save PI in a format that allows for the denotation of blank values originating from the non-rectangular shape of the created panorama (e.g. TIFF including transparency values)
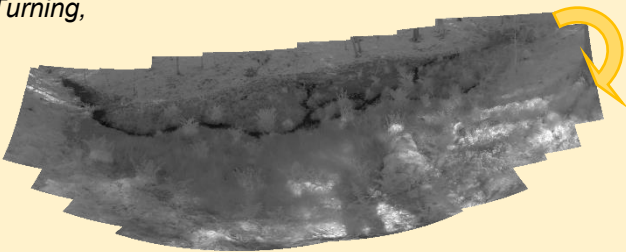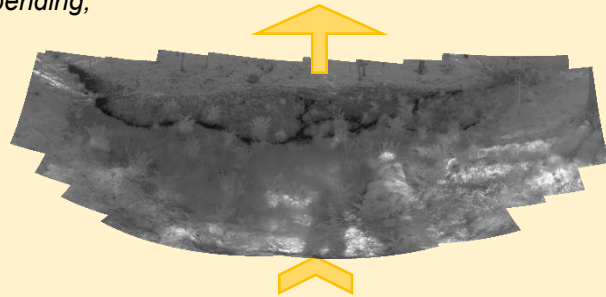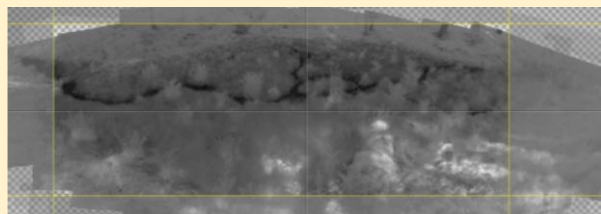
3 Co-registration of panoramas

- Select a reference panorama (RPI) with identifiable, permanent existing features (e.g. stones, course of stream bed) and without extreme wet or dry conditions
- Identify corresponding locations between PI and RPI, spread over the entire image area
- Apply a co-registration algorithm (e.g. implemented in ArcGIS, Matlab, PTGui) that adapts the projection and field of view of the PI to the RPI without modifying the RPI
- Cut PI to the same section with the same pixel extent as the RPI

Note: co-registration is eased and distortion reduced if the projection and field of view of PI and RPI are similar before applying a co-registration algorithm (→ adjust projection to RPI before saving created PI, step 2)

Turning,

bending,

cutting ....

Stream section of 5.5m

to the same perspective and size as reference panorama RPI