UNIVERSITY OF TWENTE.

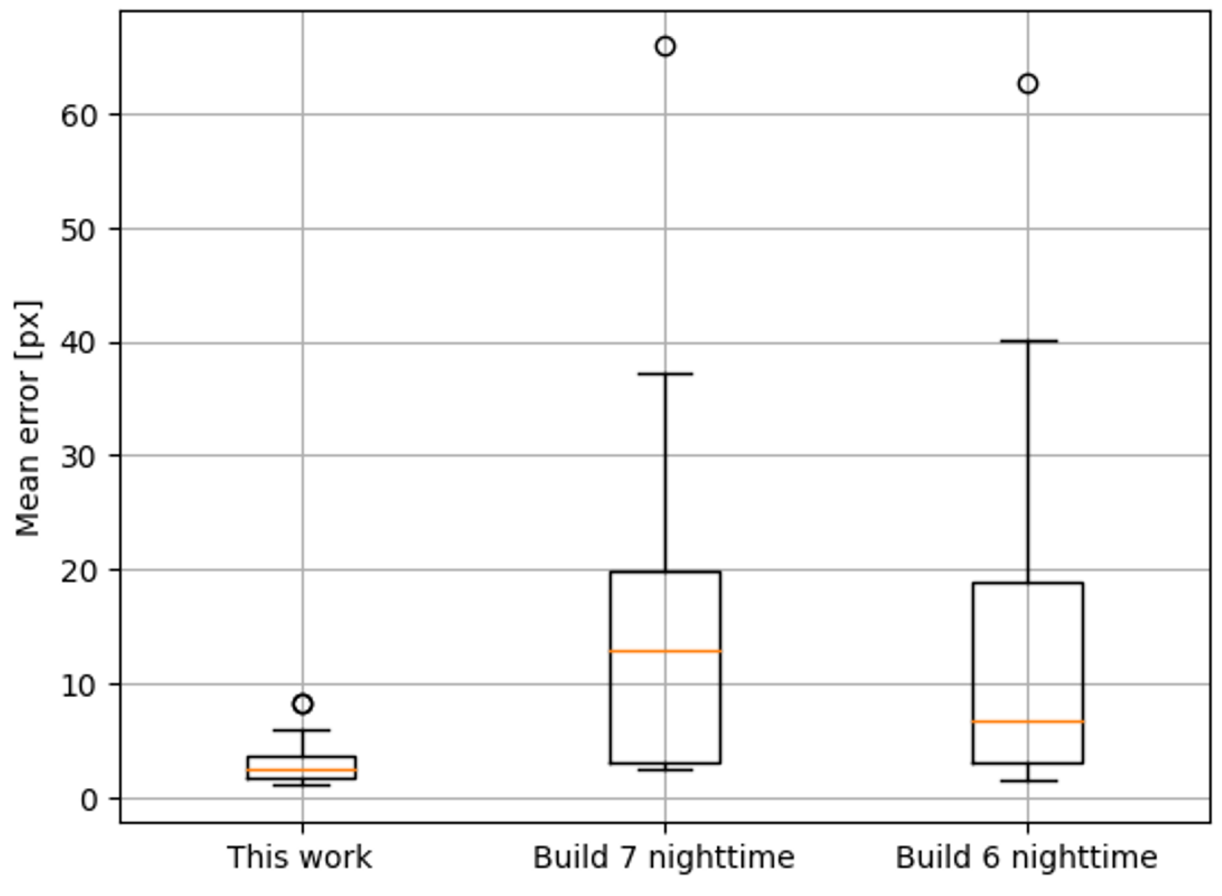
IMPROVING GEOLOCATION OF NIGHTTIME ECOSTRESS IMAGERY OVER AREAS WITH DYNAMICALLY CHANGING LANDCOVER

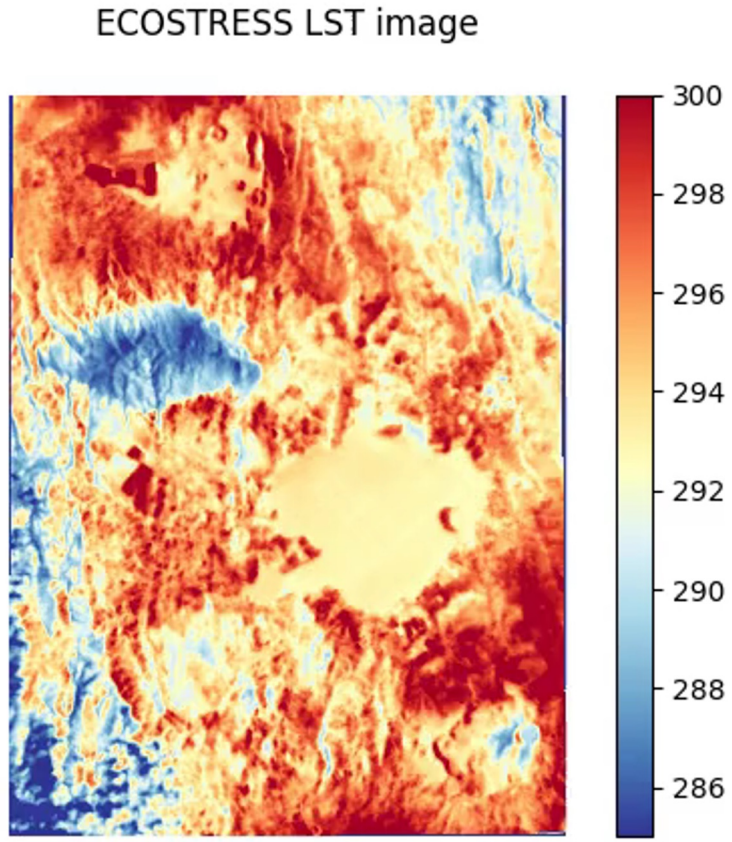
Agnieszka Soszynska, Harald van der Werff, Jan Hieronymus, and Chris Hecker

ECOSTRESS Science Meeting November 2022

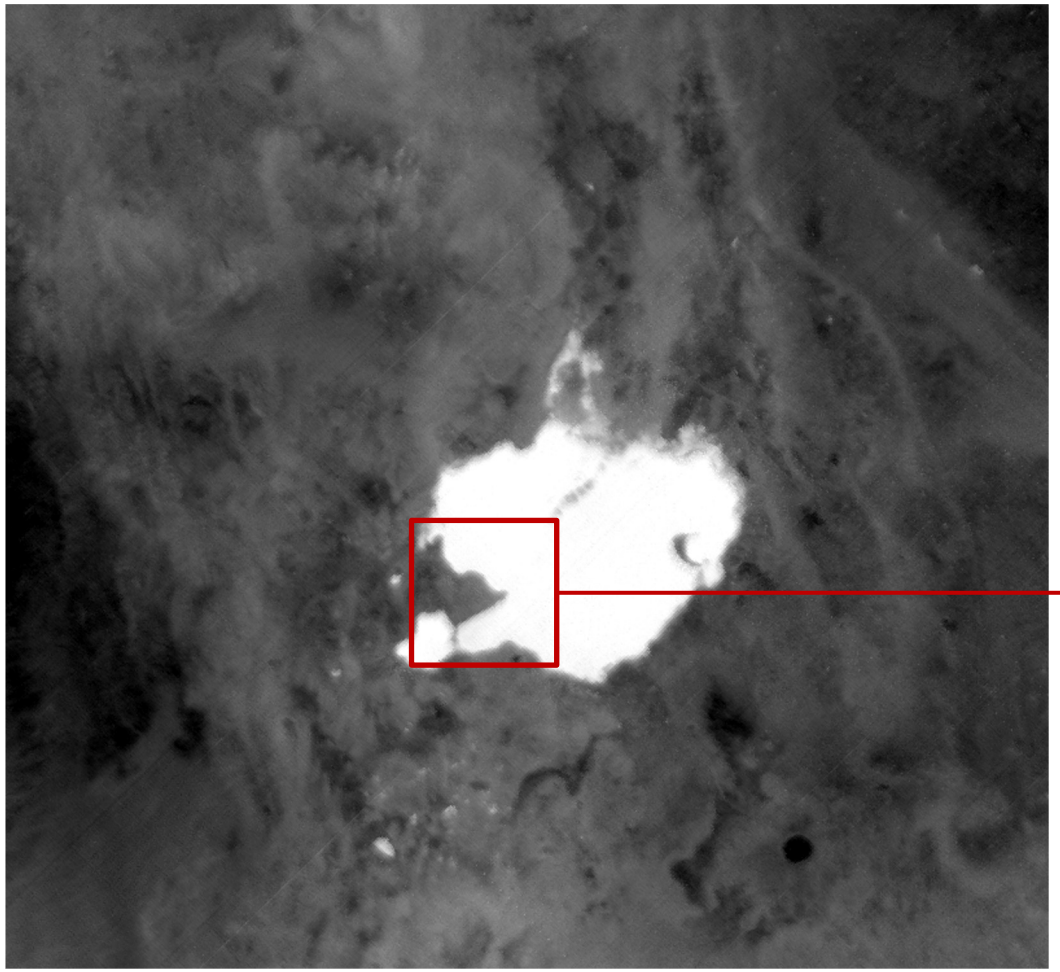
ITC FACULTY OF GEO-INFORMATION SCIENCE AND EARTH OBSERVATION

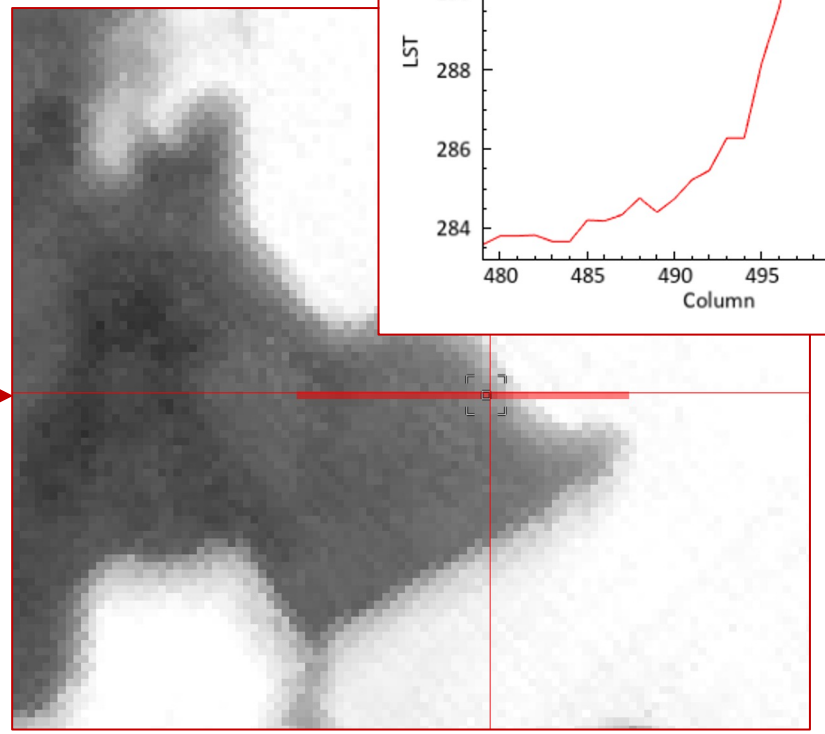
NIGHTTIME GEOREFERENCING ACCURACY

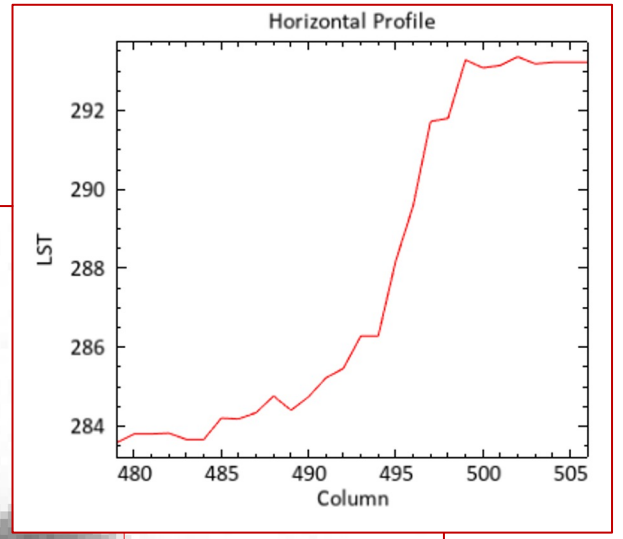




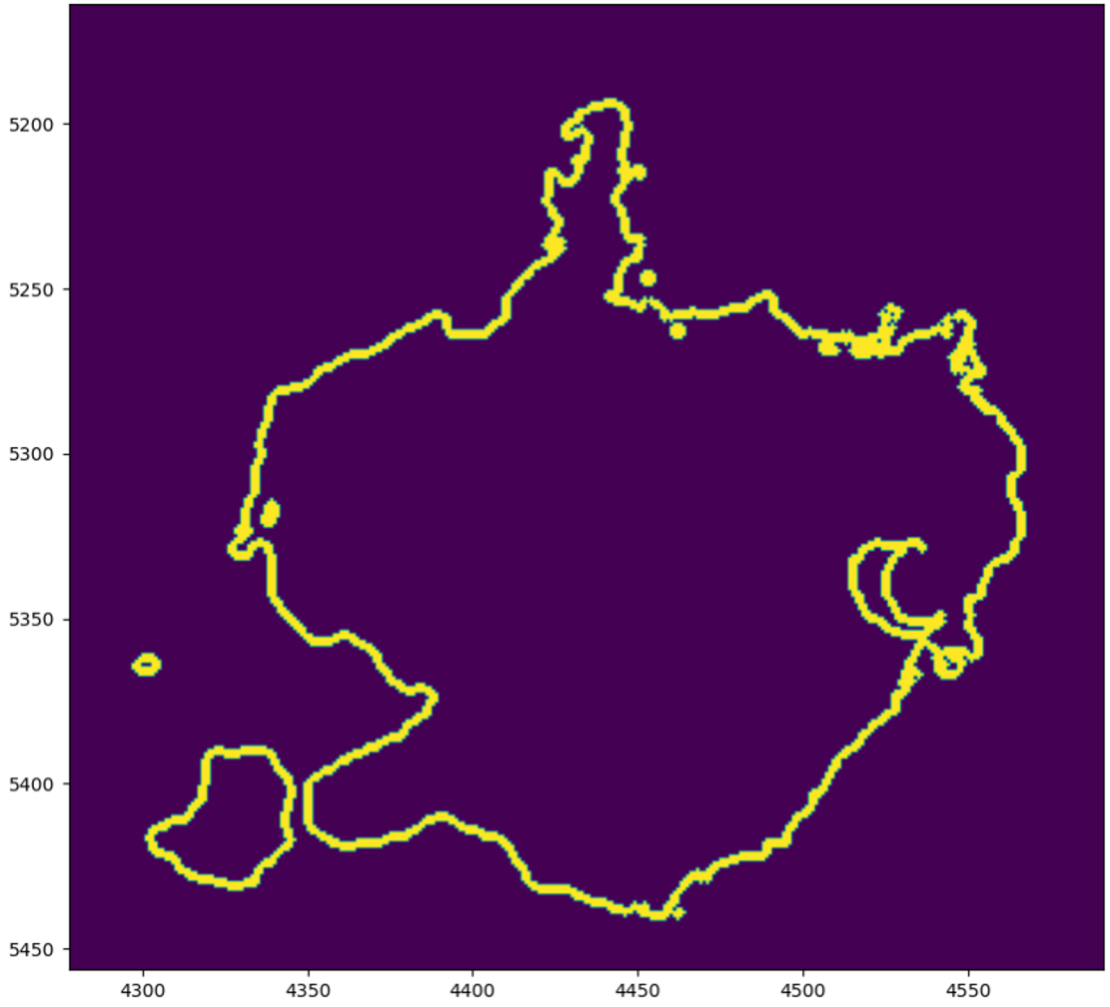
MANUAL CORRECTION CHALLENGES

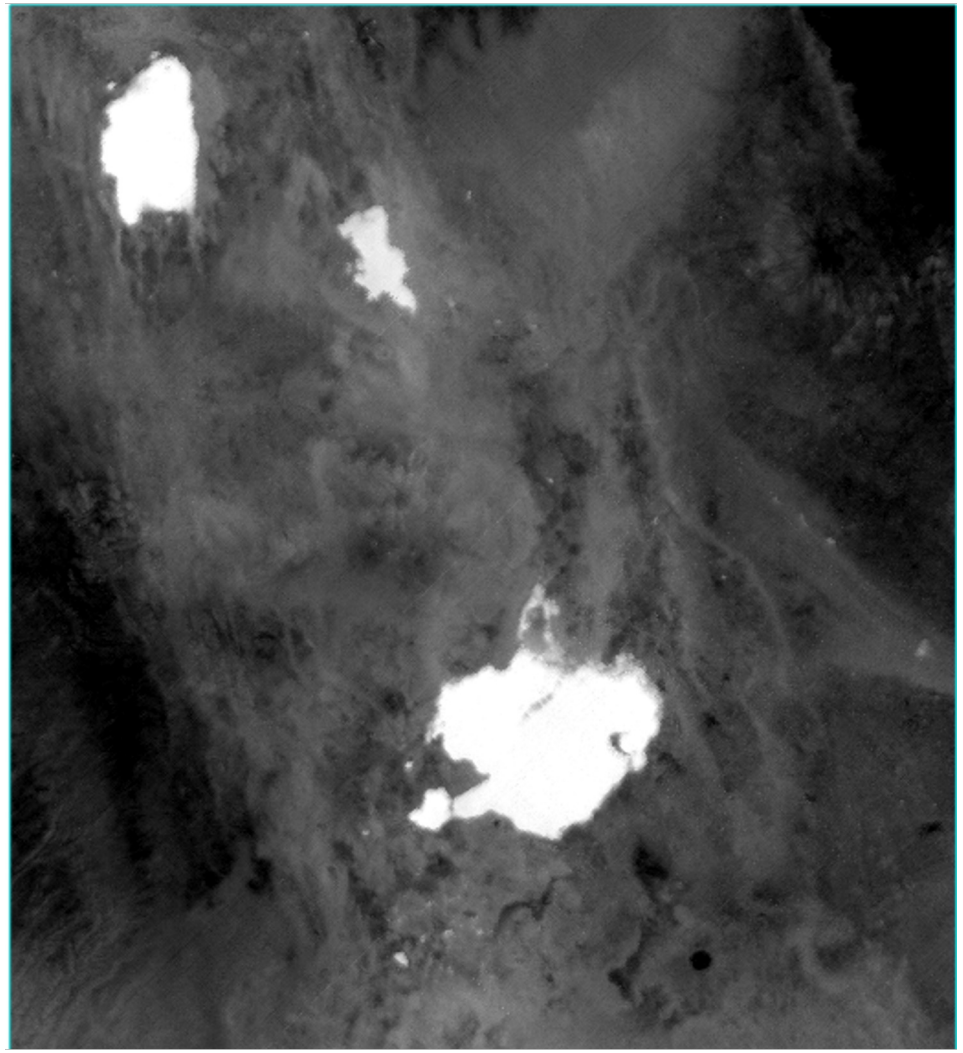






OUR SOLUTION - OBJECT BASED MATCHING

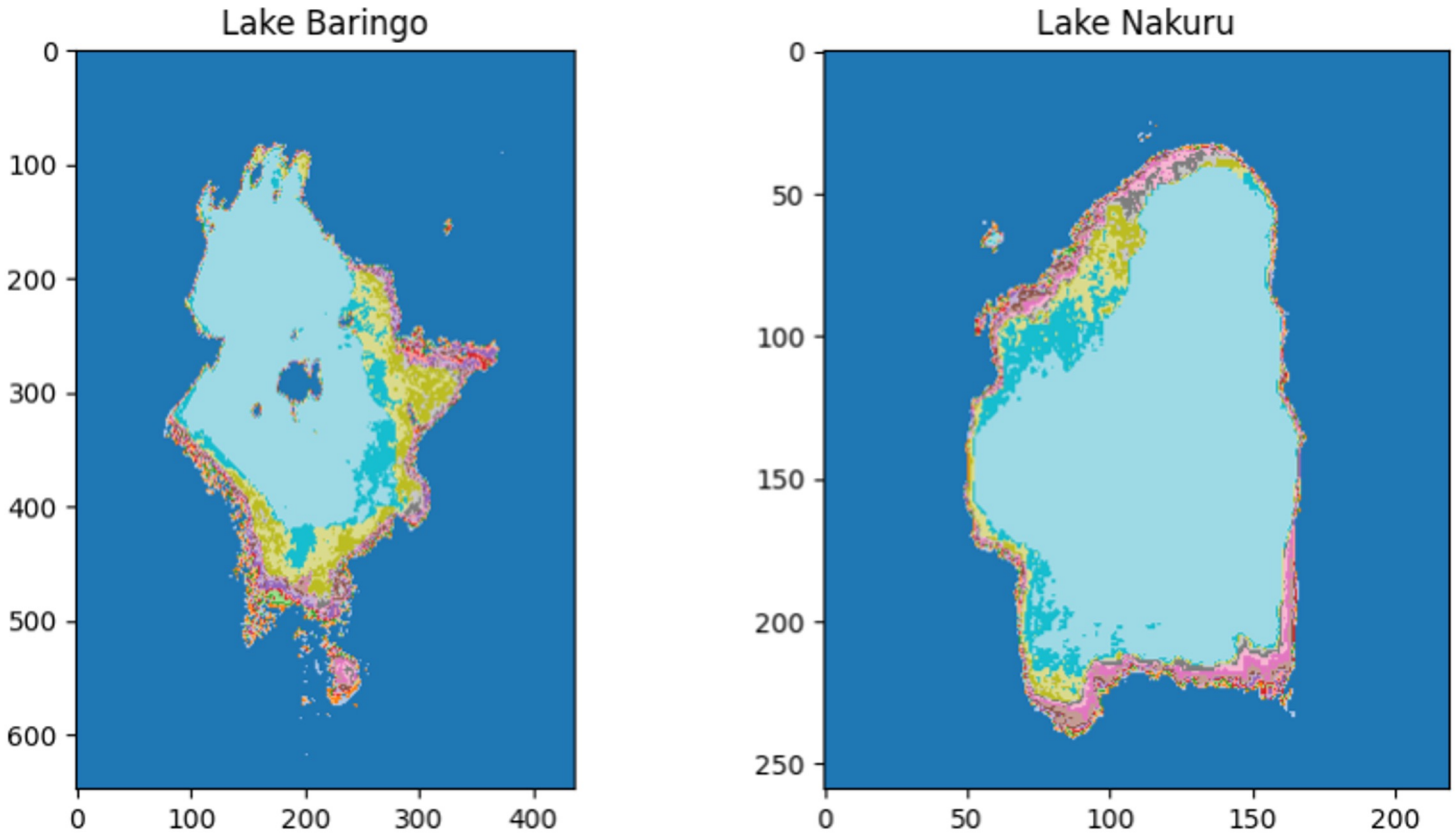




ITC

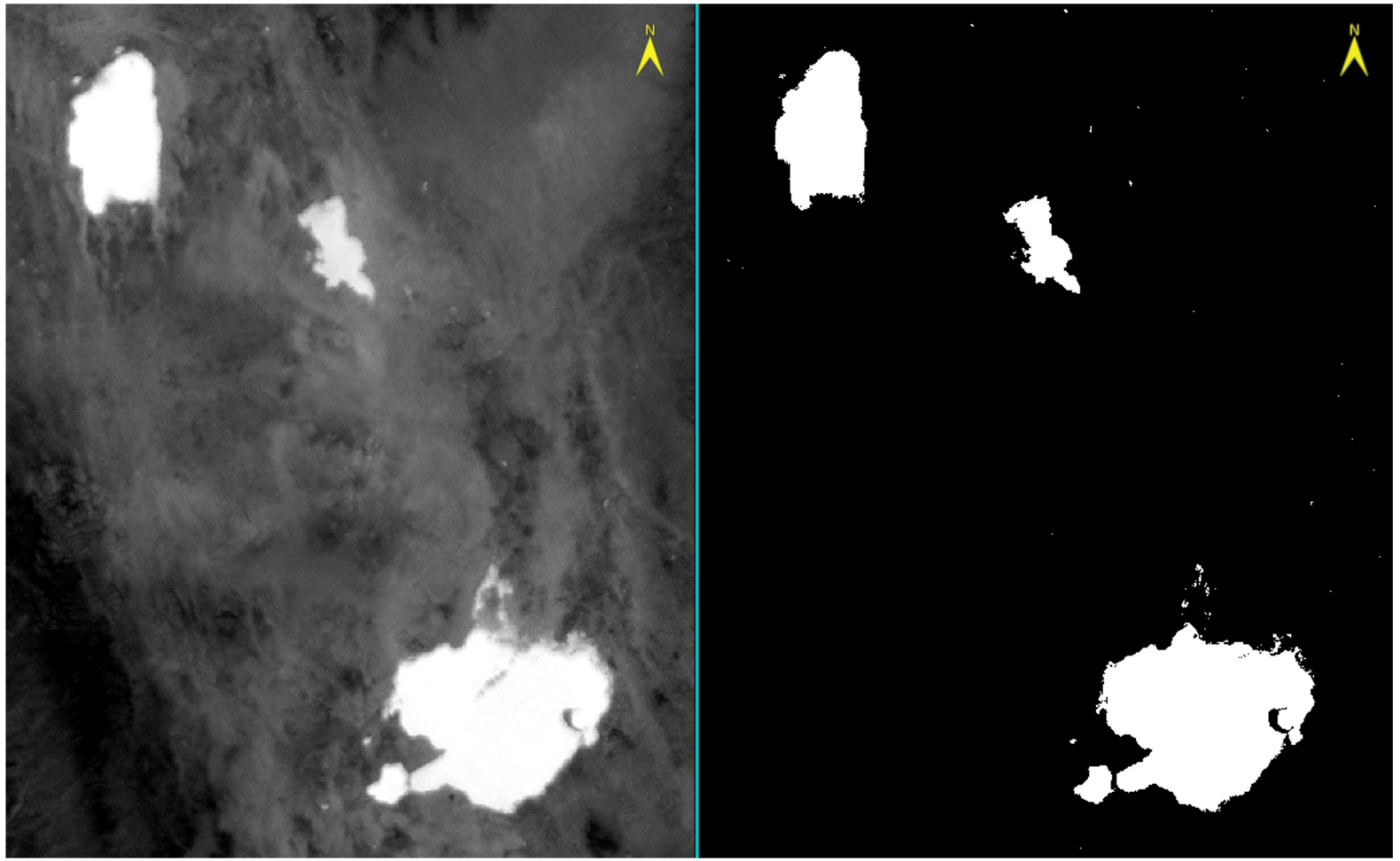
UNIVERSITY OF TWENTE.

DYNAMIC CHANGES IN LAKE LEVELS



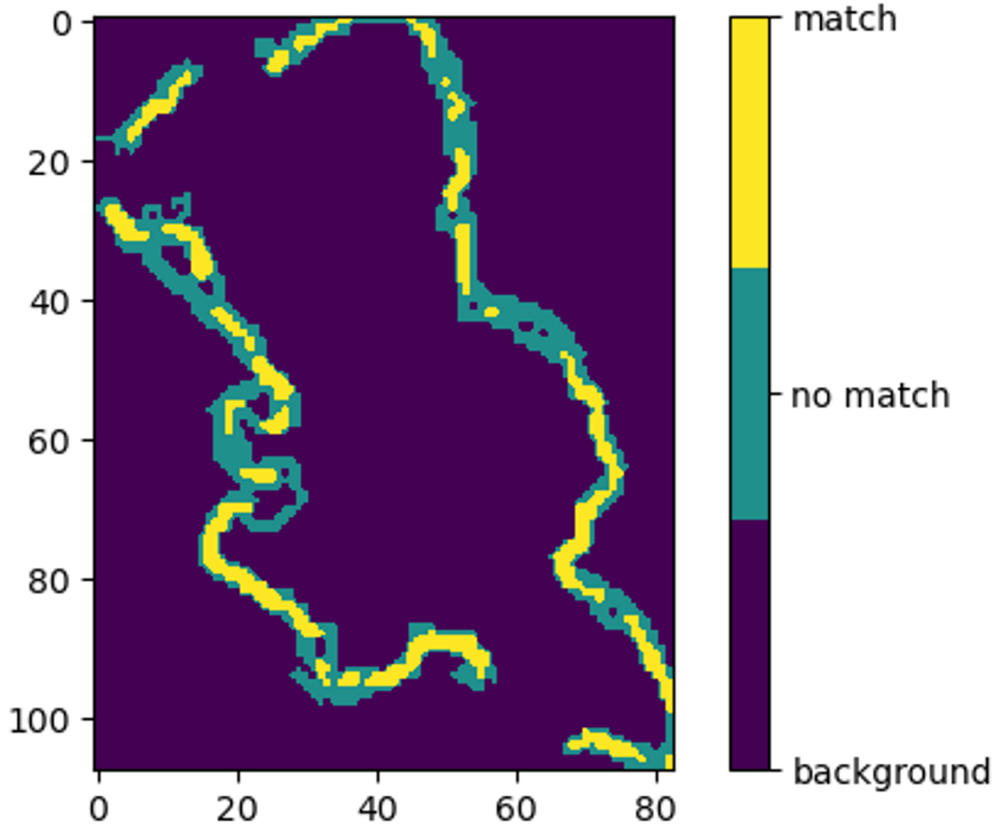
Lake level changes between 2018 and 2022

OUR SOLUTION – USE UP-TO-DATE REFERENCE



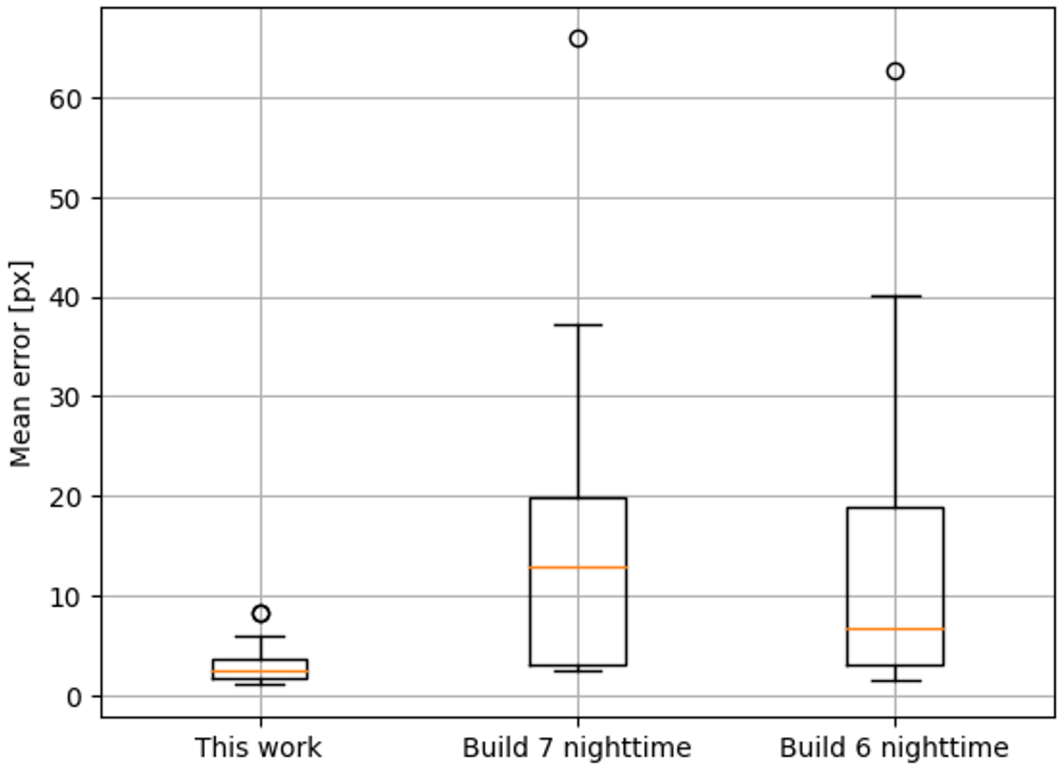
ECOSTRESS 18.05.2020 Sentinel-2 SCL water mosaic 05.2020

GEOREFERENCING CORRECTION ALGORITHM



1. **Object based matching**
   instead of pixel based (or spectrum based)
2. **Up-to-date reference**
   to account or dynamic land cover changes
3. **Specially designed for nighttime thermal IR**
   by accounting for diurnal LST cycle characteristics

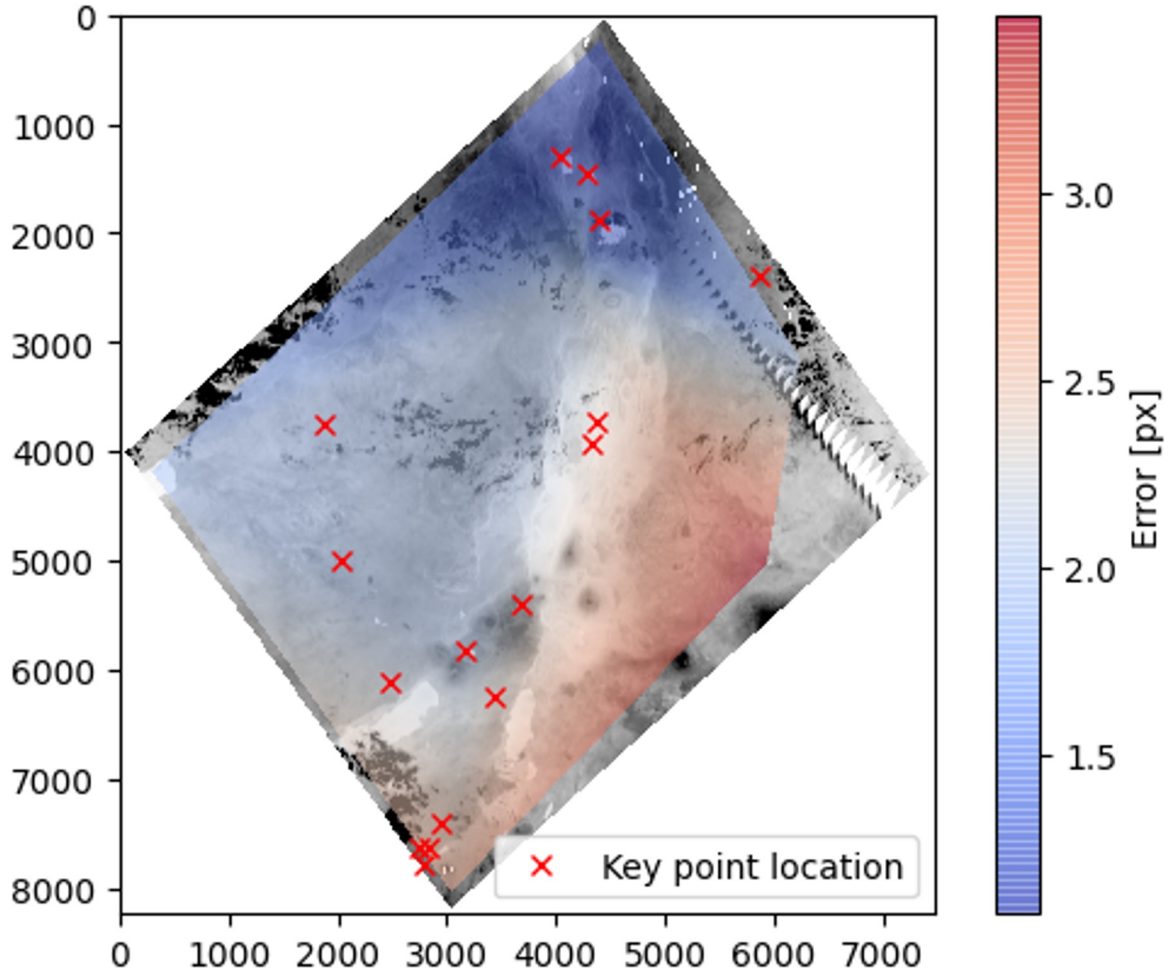
GEOREFERENCING CORRECTION ACCURACY



Accuracy tested by manual setting of ground control points (GCP)

	This work	Build 7	Build 6
Mean error [px]	3.1	9.3	13.7
Median error [px]	2.7	8.6	13.7
Standard deviation of error [px]	1.6	3.6	1.6

GEOREFERENCING CORRECTION VALIDATION

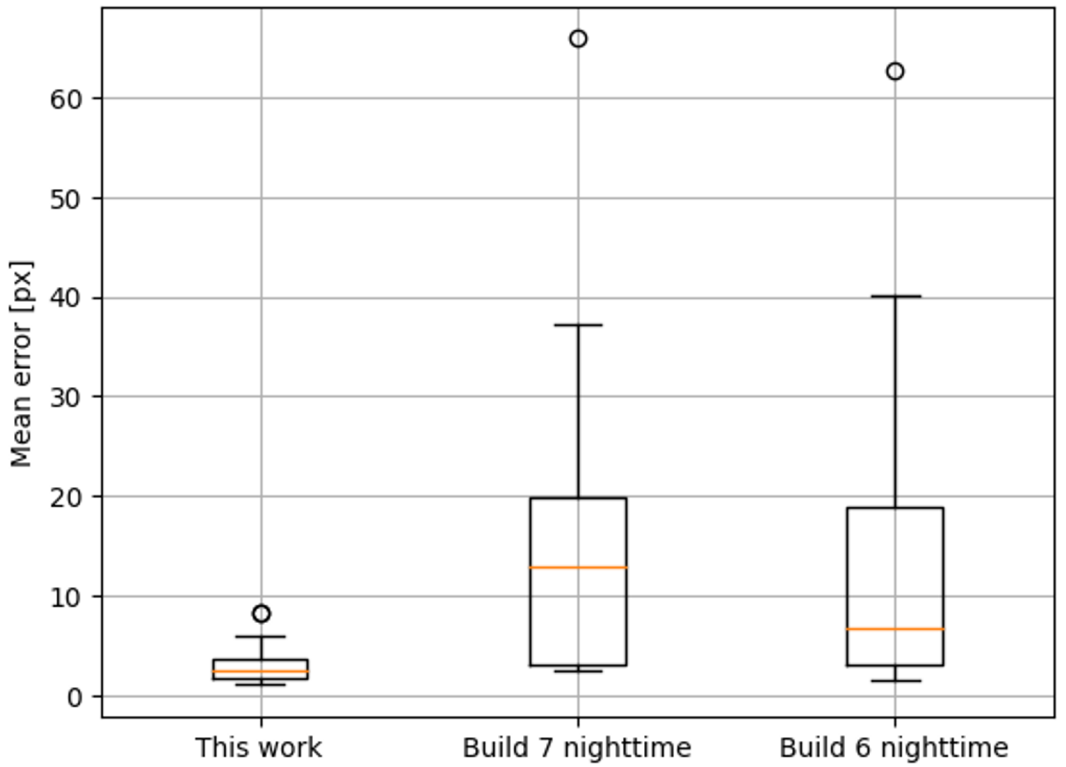


Main source of errors:

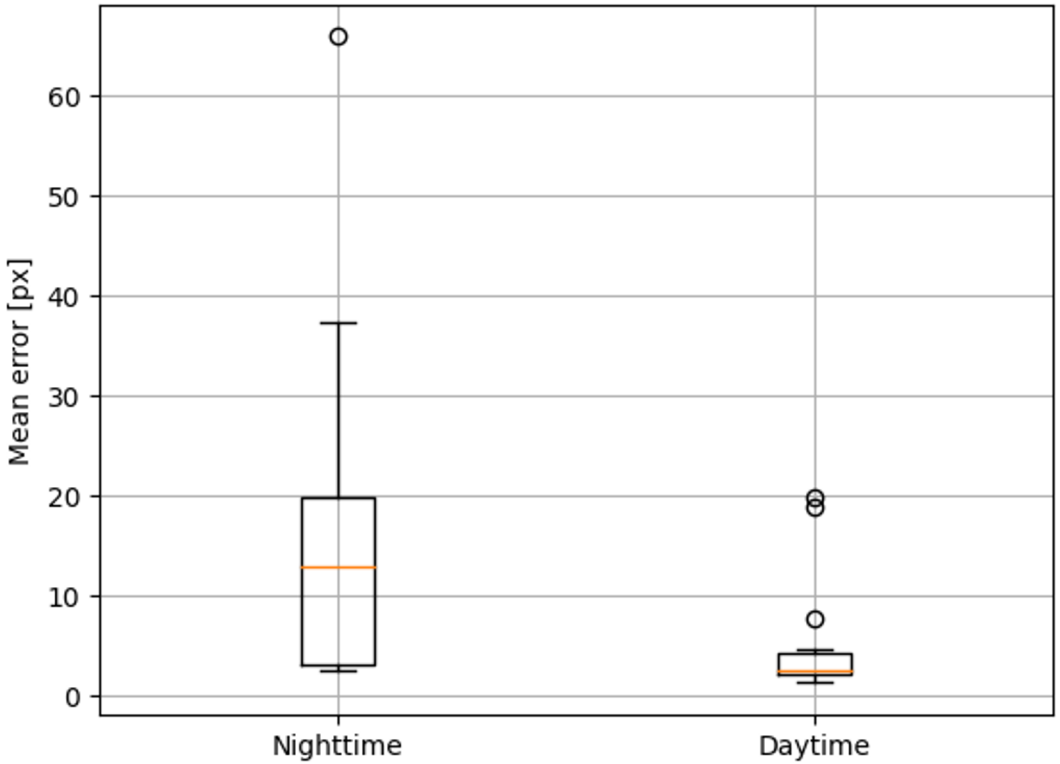
- Inaccurate cloud masks
- Tie points located in only one part of the image
- Rapid land cover changes not accounted for in the monthly mosaic
- Too few tie points

CONCLUSIONS

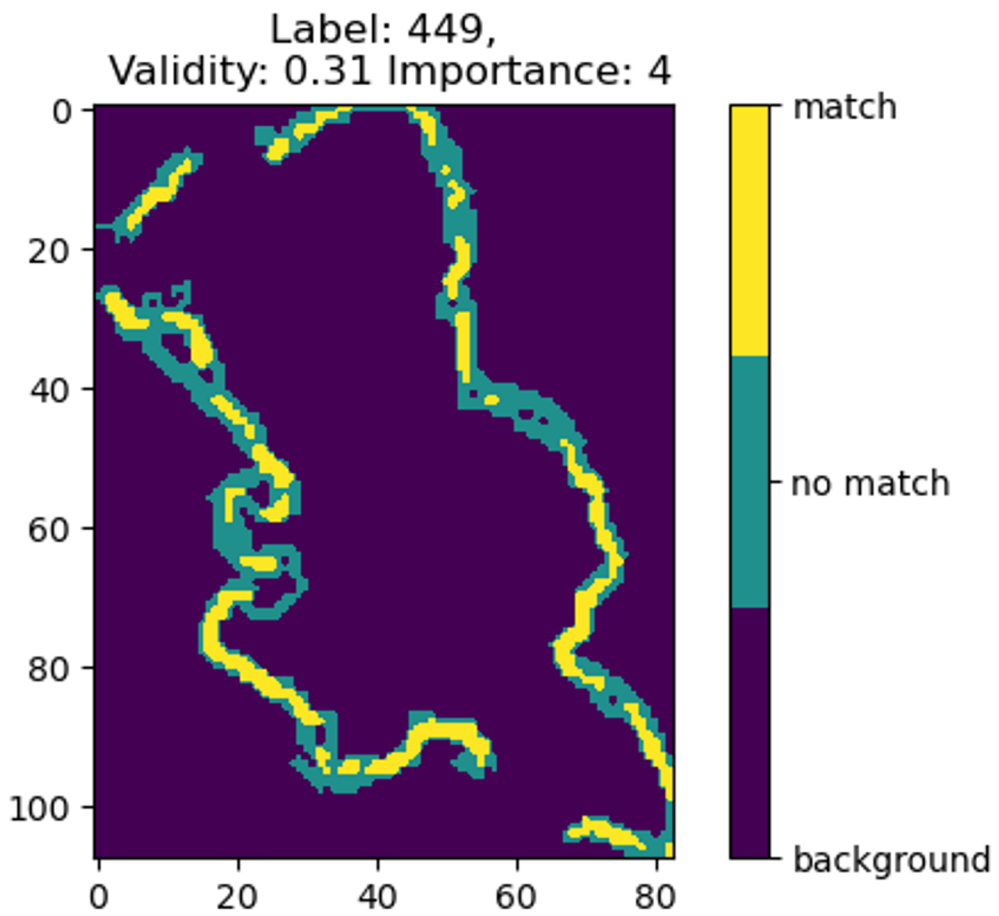
- Our method improves georeferencing correction by **10 pixels on average**
- It can be applied anywhere, where water bodies are present
- Published in pre-print server LINK
- Want to discuss? Find Agnieszka or Chris or write: a.soszynska@utwente.nl



GEOREFERENCING ACCURACY IN BUILD 7

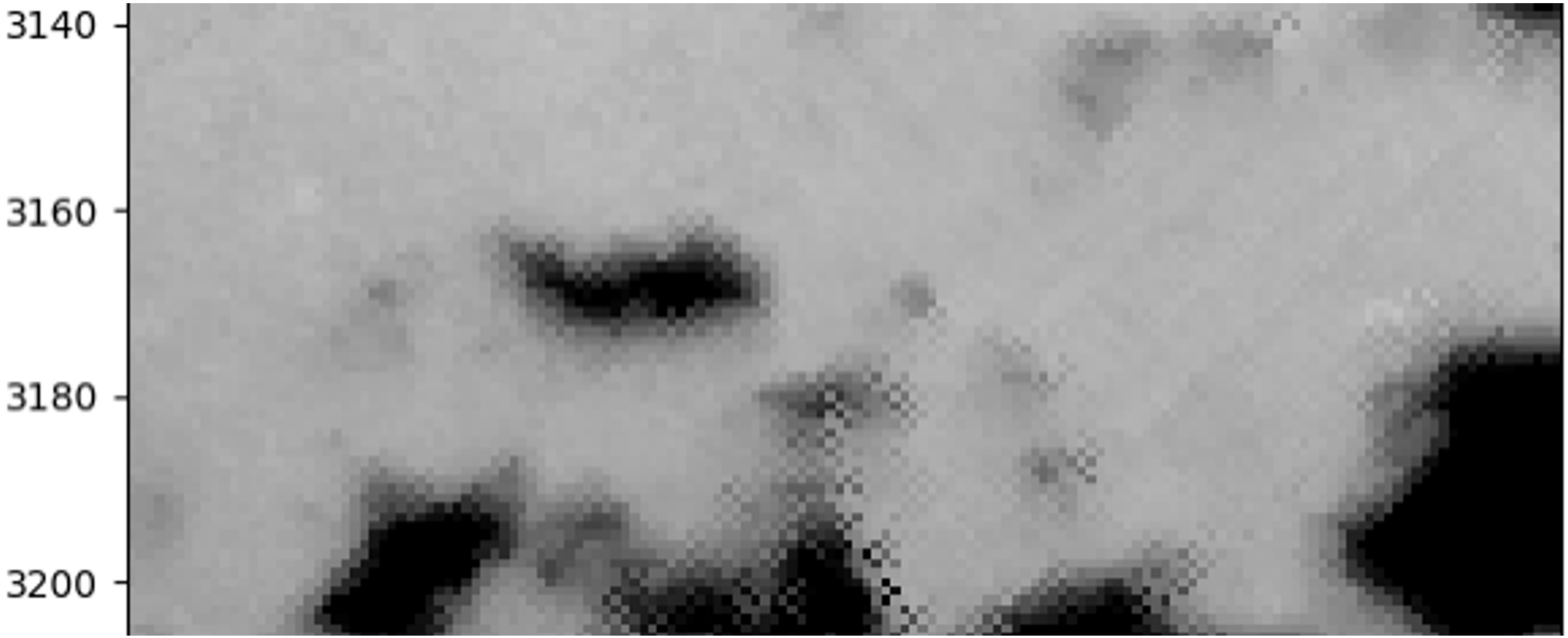


GEOREFERENCING CORRECTION ALGORITHM



1. **Prepare up-to-date water mask reference from Sentinel-2 SCL**
   - Reproject reference,
   - Label lakes,
   - Prepare reference edge image,
   - Mask clouds
2. **Prepare target ECOSTRESS image**
   - Prepare target edge image
   - Mask clouds
3. **Look for a match for each lake**
4. **Filter matches** (using validity and importance)
5. **Fit transformation parameters**
6. **Resample target image**

CHESSBOARD ARTEFACTS



LINK TO THE PRE-PRINT ARTICLE

ITC

UNIVERSITY OF TWENTE.