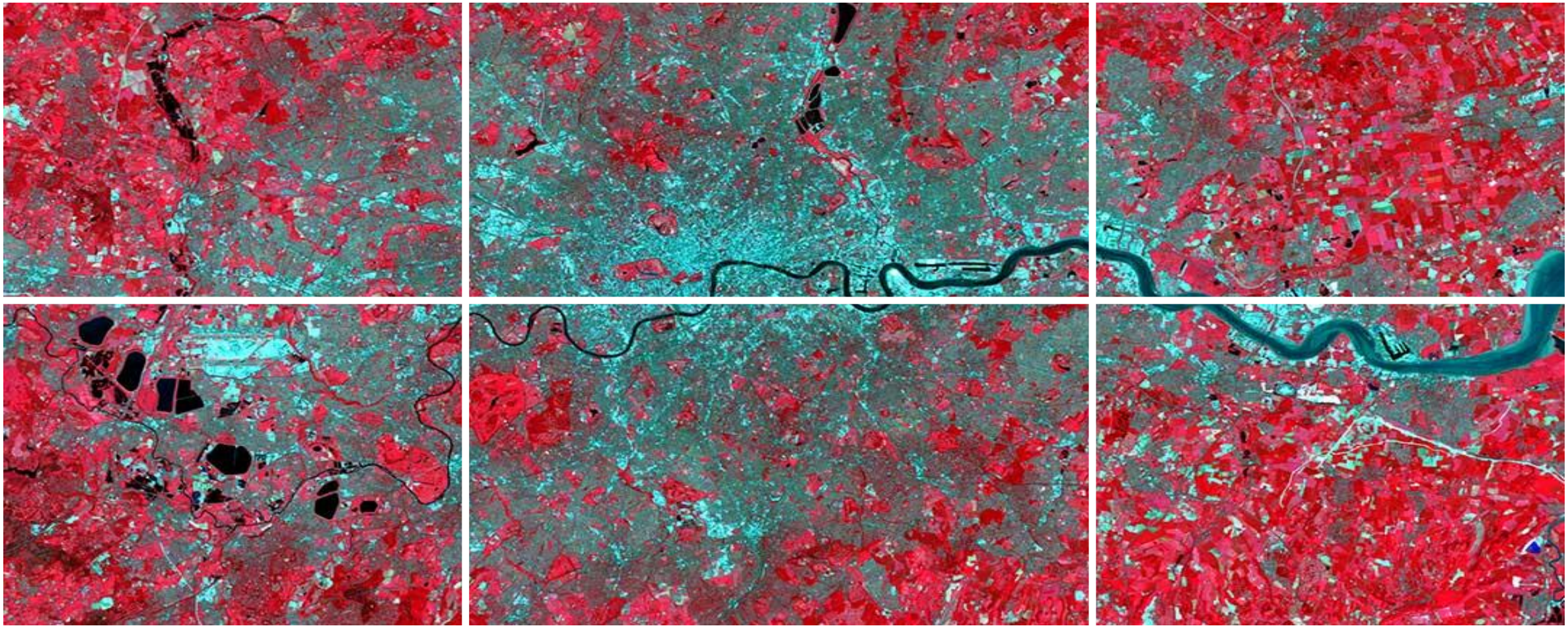

On the selection of precipitation products for the regionalisation of hydrological model parameters

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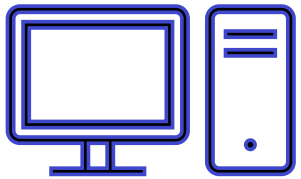
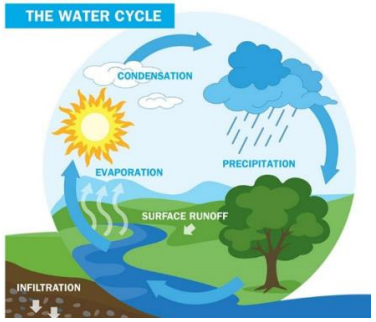
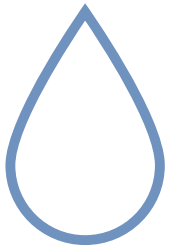
Background

Daily streamflow

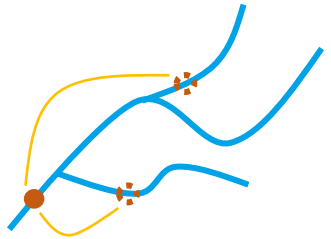


Hydrological models





Regionalisation



Precipitation

Aims and scope of the study

There is no precise evaluation on how the selection of a particular P product can affect the performance of the existing regionalisation techniques.

To analyse how the choice of gridded daily precipitation products affects the relative performance of three well-known parameter regionalisation techniques

Feature Similarity

Spatial Proximity

Parameter Regression

Methods

1. Selection of P products

1. CR2MET (0.05°)
2. RF-MEP (0.05°)
3. ERA5 (0.28°)
4. MSWEPv2.8 (0.10°)

2. Calibration and verification

Calibration
(2000 – 2014)
Particle Swarm Optimization (KGE)

Verification 1
(1990 – 1999)

Verification 2
(2015 – 2018)

3. Regionalisation procedure

Feature Similarity
Transfers calibrated parameter sets from donor catchments based on similarity between climatic and geomorphological features

Spatial proximity
Assumes that climatic and physical characteristics are relatively homogeneous.

Parameter regression
Detects relationships between model parameters and catchment characteristics.

Results

- Feature similarity performed the best.
- The order of the products changed compared to calibration.
- Parameter regression performed the worst.
- ERA5 performed well despite of its relatively coarse resolution.

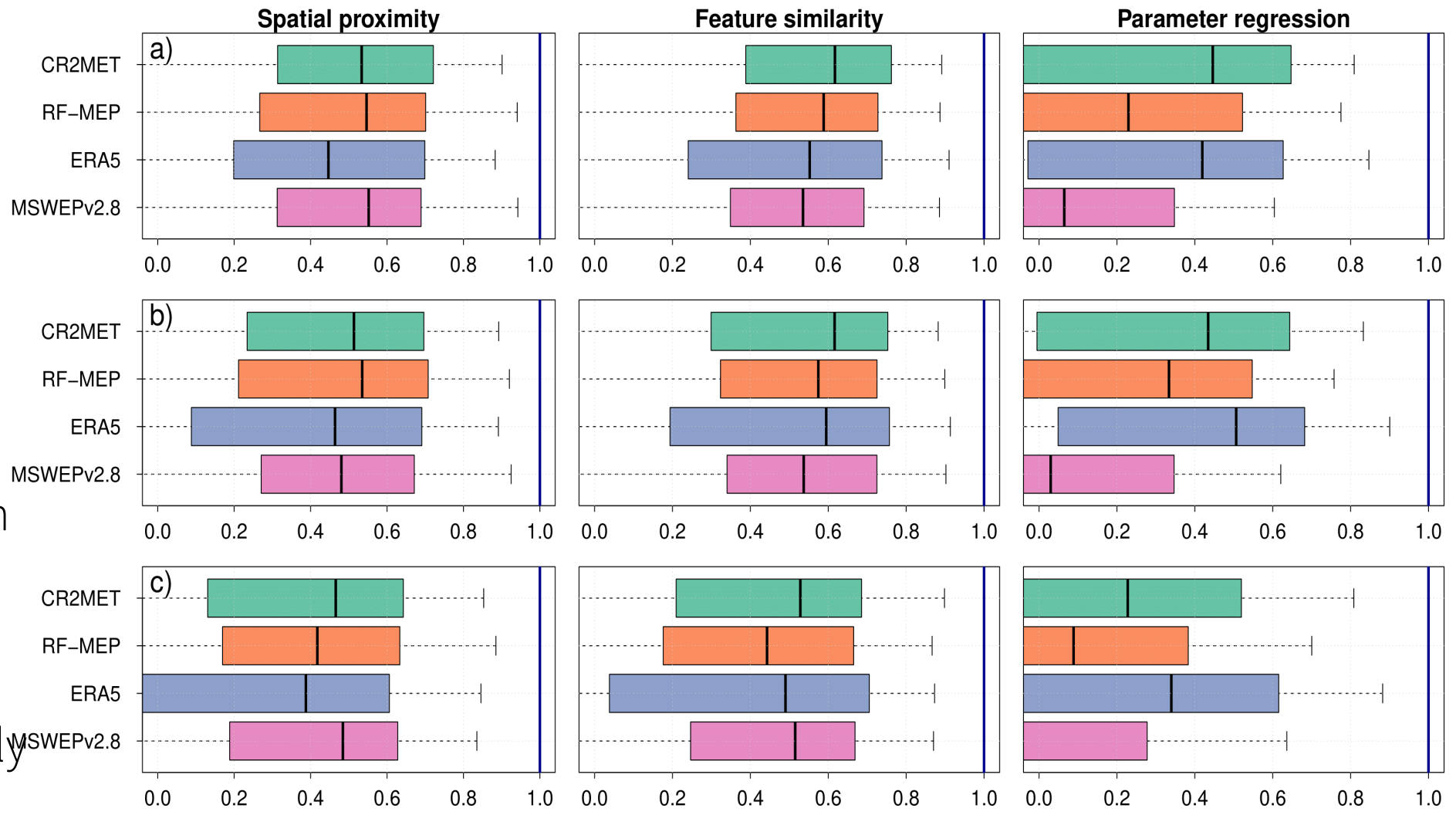


Figure 2: Leave-one-out cross-validation results for the three regionalisation methods applied with different P products

Results

- The Far North presented the worst regionalization performance.
- The performance of the products varied but the spatial distribution of the performance was similar.
- The best performances for all methods were observed over the Central Chile and South regions.

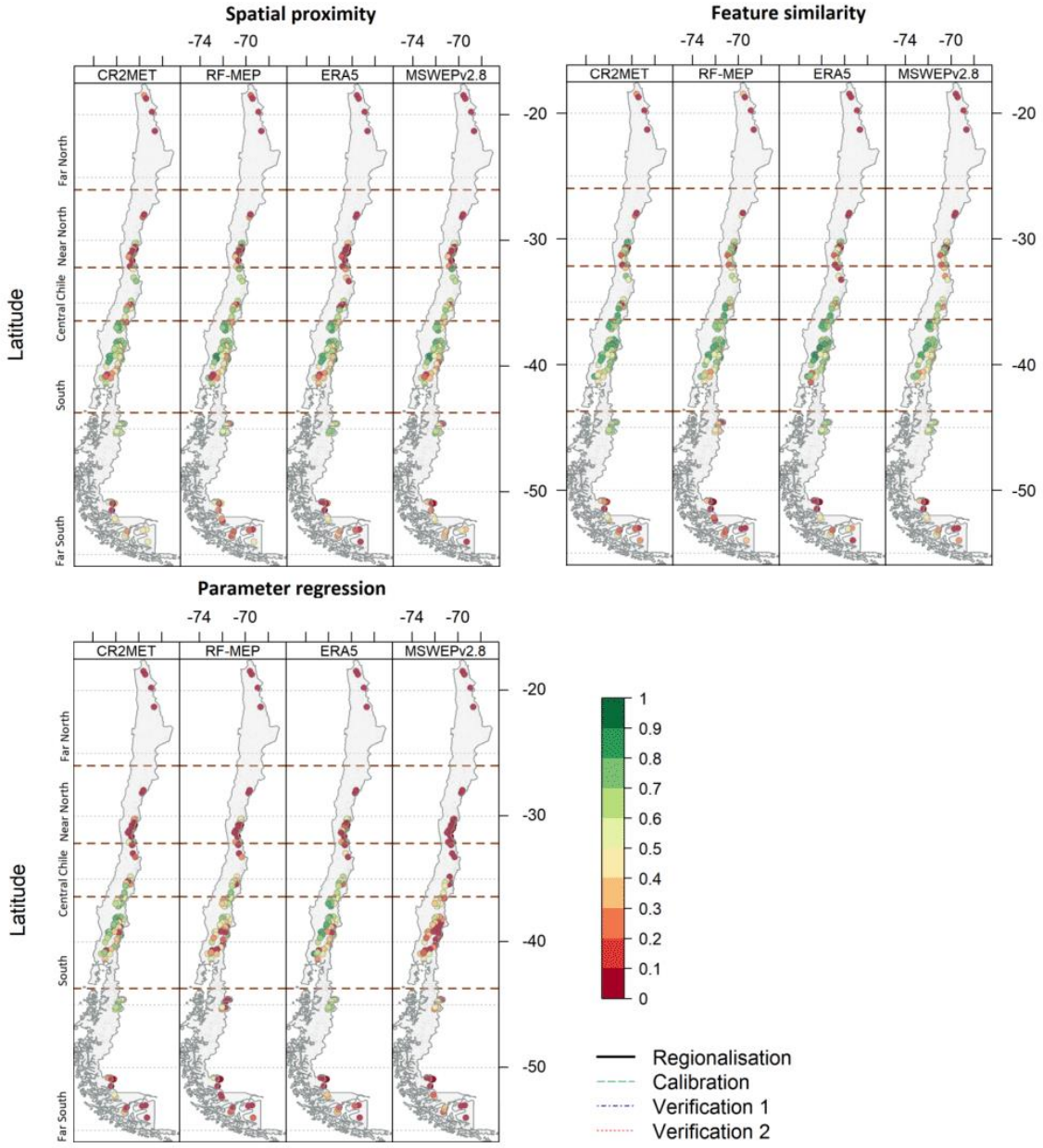


Figure 3: Spatial performance of the leave-one-out cross-validation results for the three regionalisation methods for Verification 1.

Main findings

1. The performance of the P products varied between the independent calibration and verification and regionlisation.

2. The P products corrected with daily gauge observations did not necessarily yielded the best hydrological model performance.

3. The spatial resolution of the P products did not noticeably affect model performance.

4. The TUWmodel was able to compensate, to some extent, the differences between P products through model calibration by adjusting the model parameters.

5. Feature similarity was the best performing regionalisation technique, regardless of the choice of gridded P product or hydrological regime.

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Thank you for your attention!