LAND SURFACE TEMPERATURE DOWNSCALING ALGORITHMS
OVER A CHINESE INLAND RIVER BASIN

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1. Abstract

The Downscaling Algorithms: a Tool for
Improving the Quality of Remote Sensing Data

2. Case Study & Remotely-sensed data

3. Downscaling Algorithms

4. Test dates

5. Global Results

6. Results by landcover

7. Conclusions

5. Global Results

6. Results by illumination degree

7. Conclusions

For each of the 11 test dates a 30m resolution image has been created for path 133, rows 31-32-33 in three different ways:
1) Resampling the 200m resolution MODIS image for that day
2) Applying the STARFM algorithm
3) Applying the DisTrad algorithm

Given a tolerance (in this case 3 and 6) and threshold (T), the MODIS and Landsat pixels that fall into the bands (2, 3, 4, 5, 6) are considered valid when the condition is satisfied (3).

Looking at average errors and RMSEs, it appears that the STARFM and DisTrad algorithms have similar trends of high errors during the height of growth season (around mid-summer), and the MODIS have a much lower trend during the same period. This can be interpreted as the MODIS having a higher resolution and capturing more detail in the vegetation, while the STARFM and DisTrad algorithms have a lower resolution and are interpolating the data from the available pixels.

Overall, the early-to-rain seasons show the worst performances for practically all methods, probably because of the considerate vegetation of that period. Later vegetated periods (early, spring and autumn) trend to be better.

For every pixel, the RMSE trends for the whole basin (as seen before) have been left in dashed lines, as a reference value. For each of the three methods, the average in the average RMSE, confirming the suggestion of the previous paragraph, the error increases as the season goes on. The error happens in summer, although with a shift of about one month between STARFM and MODIS-NDVI. The results show an intermediate behaviour between crop and pixels. The display less obviously, the latter category, in particular, is the best seasonal of all (in accordance with the validation with in situ data), while the MODIS and STARFM-NDVI have a similar trend.

Finally, some results have also been classified by illumination degree. The presence of shadowed pixels, in fact, could strongly affect the methods that include neighborhood information (such as STARFM). As mentioned before, the MODIS-NDVI has a lower RMSE than the STARFM-NDVI because the MODIS-NDVI can capture more detail in the vegetation, while the STARFM-NDVI has a lower resolution and is interpolating the data from the available pixels.

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