



Comparison of Satellite-Derived Land Surface Temperature and Air Temperature from Meteorological Stations on Pan-Arctic Scale

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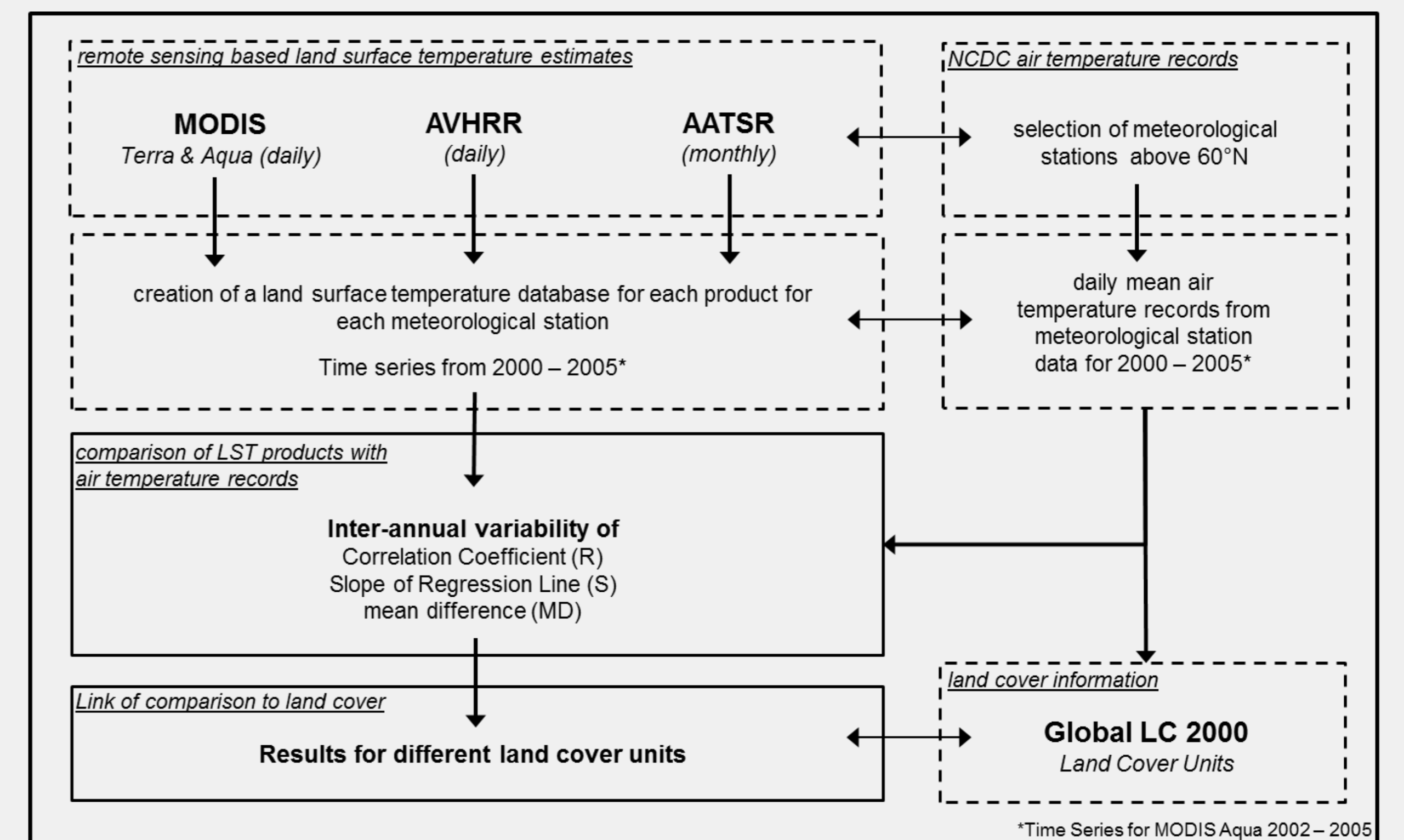
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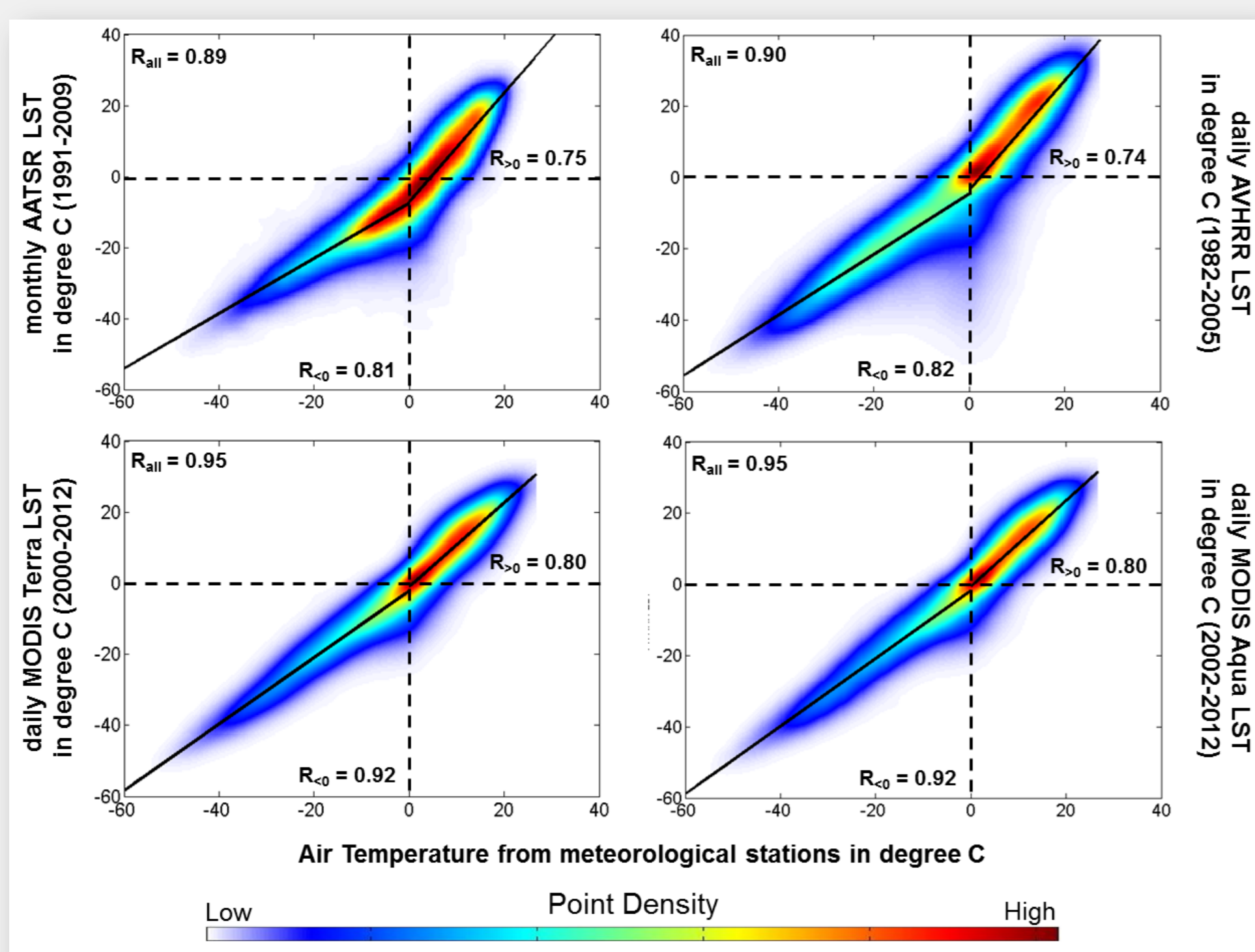
Background

- Satellite-based temperature measurements are an important indicator for global climate change studies over large areas
- Records from MODIS, AVHRR and (A)ATSR are providing long-term time series information
- this study shows the comparison of LST products from (A)ATSR, MODIS and AVHRR with an in-situ Tair database provided by the National Climate Data Center (NCDC) north of 60° latitude
- The arctic environment is highly vulnerable to modifications in the climate system
- Predictions are indicating a significant increase of temperature conditions in the arctic regions for the upcoming century
- This leads to changes in permafrost temperature regimes, snow cover, sea ice, vegetation activities and phenological dynamics

Data and Methodology



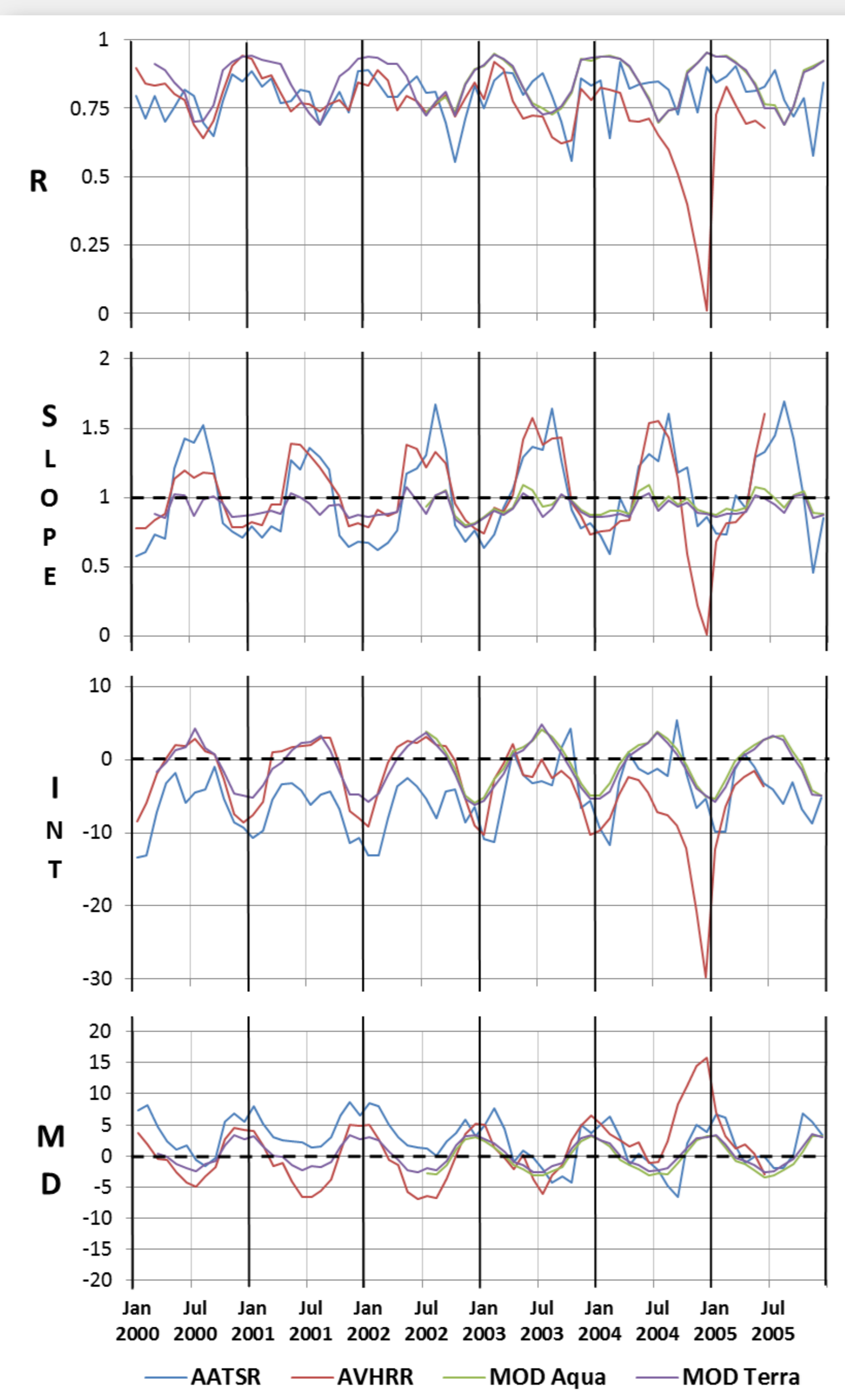
LST vs. Tair



Comparison of (A)ATSR, AVHRR, MODIS Terra and MODIS Aqua land surface temperature estimates and air temperature records from meteorological stations.

- MODIS LST shows the highest agreement with Tair measurements
- (A)ATSR and AVHRR are resulting in a good agreement - tend to detect warmer and colder temperatures for the positive and negative temperature ranges
- (A)ATSR and AVHRR are characterized by outliers around the freezing point

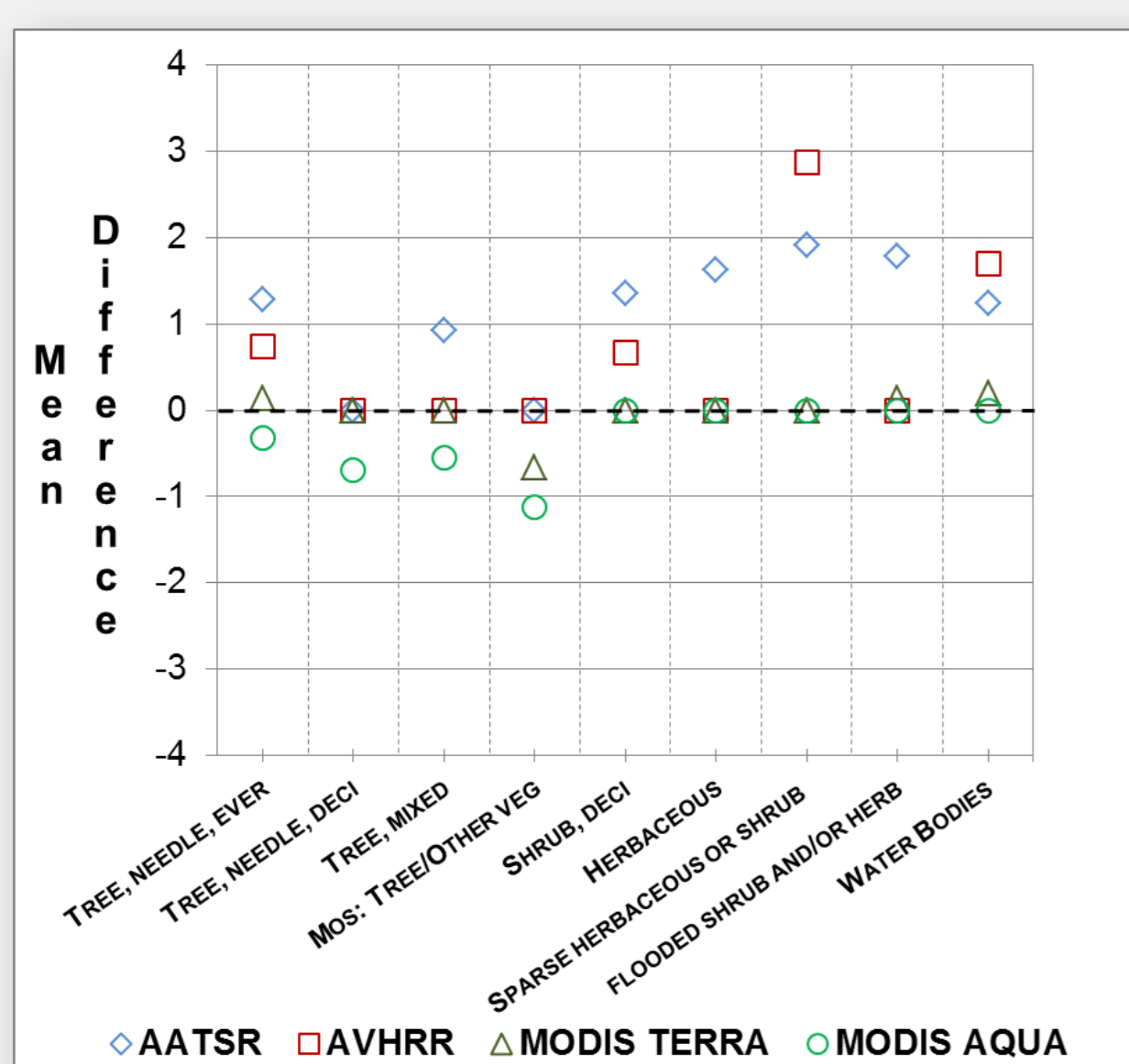
Inter-annual variability between 2000 and 2005



- higher agreements between LST and Tair can be found for the winter season with a decline towards the summer months
- MODIS has been identified to have a high inter-annual consistency
- AATSR seems to result in a larger intra-annual variability when compared to the other
- AVHRR shows a decrease of the agreement at the end of 2004

Inter-annual variability of the correlation coefficient (R), slope, intercept (INT) and mean difference (MD) for the time period of 2000 to 2005.

Link to Land Cover



- MD ranges between the products are low for tree cover classes
- Heterogeneous land surfaces, such as herbaceous and shrub lands, result in higher discrepancies between the LST products
- MODIS results in the lowest mean difference, emphasizing the quality of the LST product

Comparing LST and Tair for the time period of 2000 to 2005 for selected land cover classes.

Mean Difference between 2000 - 2005

