Land Surface Temperature Climate Change Initiative: Overview and Progress

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Introduction

Land Surface Temperature (LST) CCI aims to provide an accurate view of global land surface temperatures over the past 20 to 25 years by using archived data from a variety of satellites to produce long-term satellite records for climate.

User Requirements

Key user feedback from the LST_cci User Workshop, held virtually 24-26 June 2020, includes:

❖ A growing use of uncertainty information.
❖ Need for improved cloud masking in the products.
❖ Gridded data at the highest possible spatial resolution should be available.
❖ Software and documentation needed to help users propagate LST data and uncertainties.
❖ Updating Climate Data Records to near real time.

Outputs

Seamless end-to-end processing chains deliver both thermal infrared (TIR) and microwave (MW) products.
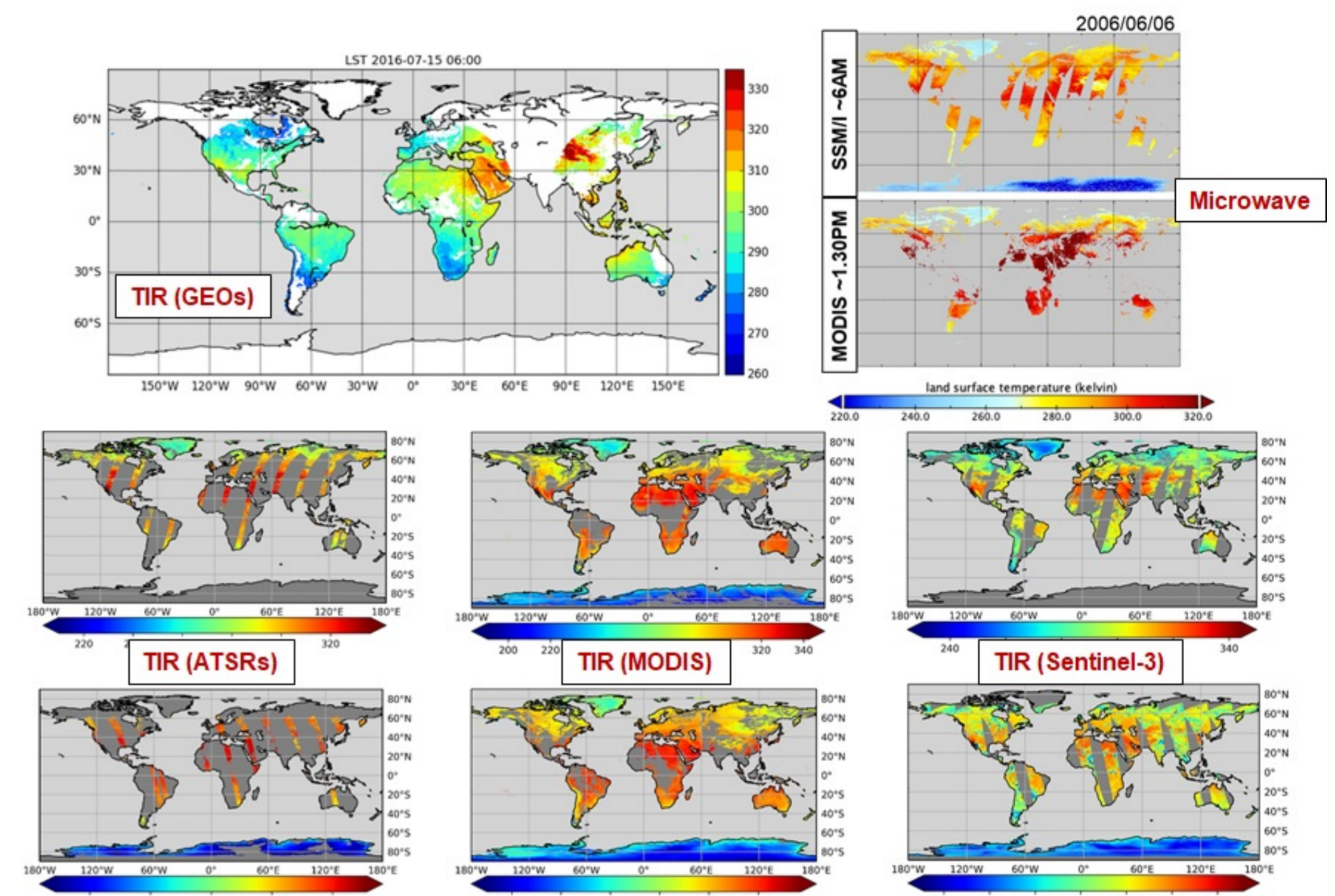

Figure 1: Example level-3 products: Geostationary TIR (top-left); Microwave (top-right); Polar-orbiting TIR for multiple sensors (bottom)

Current LST CCI Products:

Sensor	Level	Res.	Time
ATSR_2	L2P	1 km	1 Aug 1995 – 22 Jun 2003
	L3C	0.05°	
AATSR	L2P	1 km	24 Jul 2002 – 8 Apr 2012
	L3C	0.05°	
Terra MODIS	L2P	1 km	24 Feb 2000 –31 Dec 2018
	L3C	0.05°	
Aqua MODIS	L2P	1 km	4 Jul 2002 – 31 Dec 2018
	L3C	0.05°	
Sentinel 3A	L2P	1 km	29 Oct 2016 – 31 Dec 2018
	L3C	0.05°	
SEVIRI	L3C	0.05°	1 Jan 2008 – 31 Dec 2010
SSM/I	L3C	0.25°	1 Jan 1998 – 31 Dec 2015
ATSR CDR	L3C	0.05°	1 Aug 1995 – 8 Apr 2012

Validation

Validation of LST CCI products utilises in situ data contained within a multi-sensor matchup dataset (MMDB) built on core matchup code and harmonised data format.

Validation shows relatively small biases particularly at night and for TIR.
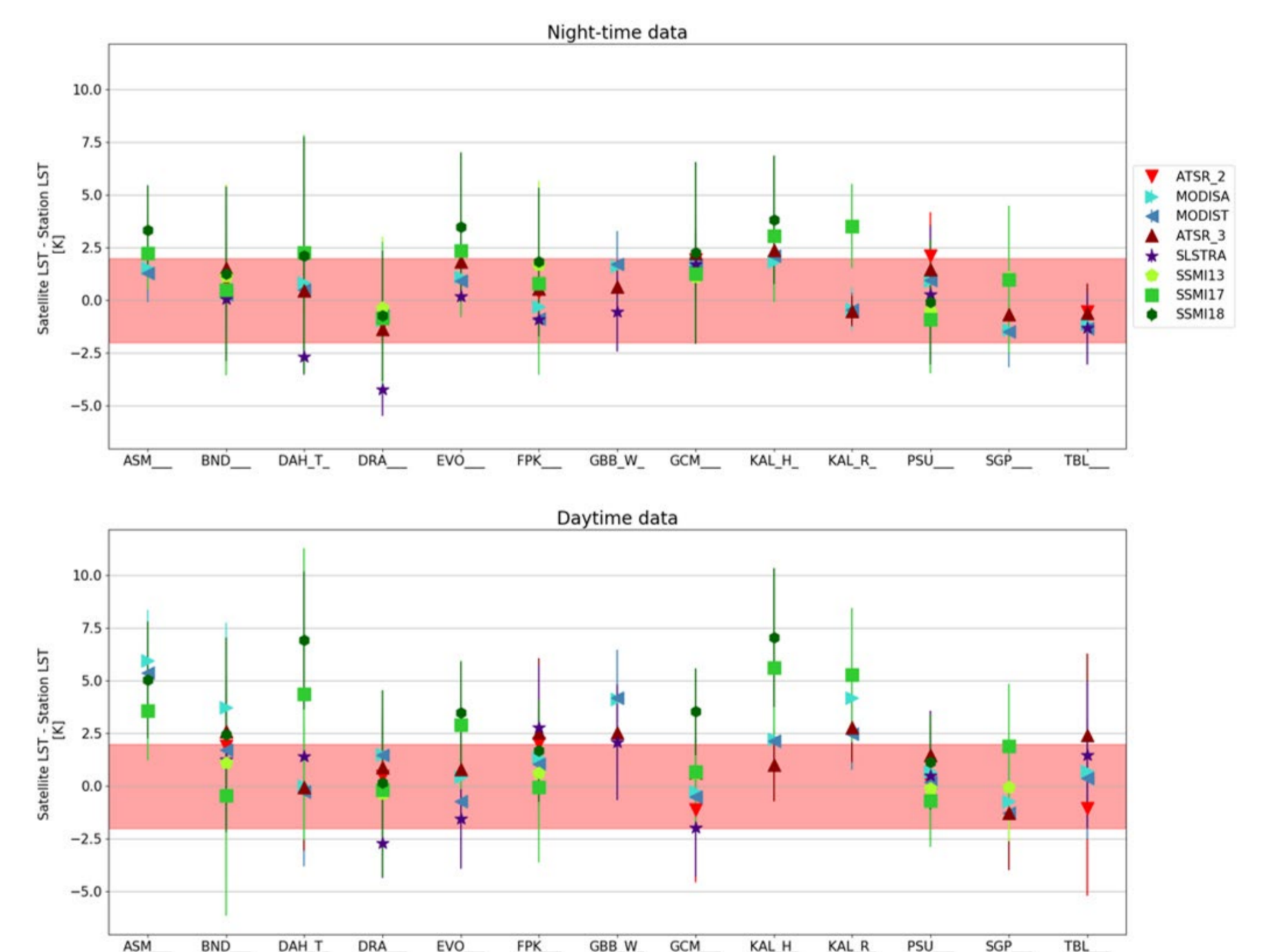

Figure 2: Validation of LST CCI products vs. in situ observations: night-time (top); daytime (bottom)

Time Series

Figures 3 and 4 show the first 18-year time series from the Terra-MODIS LST CCI Product.
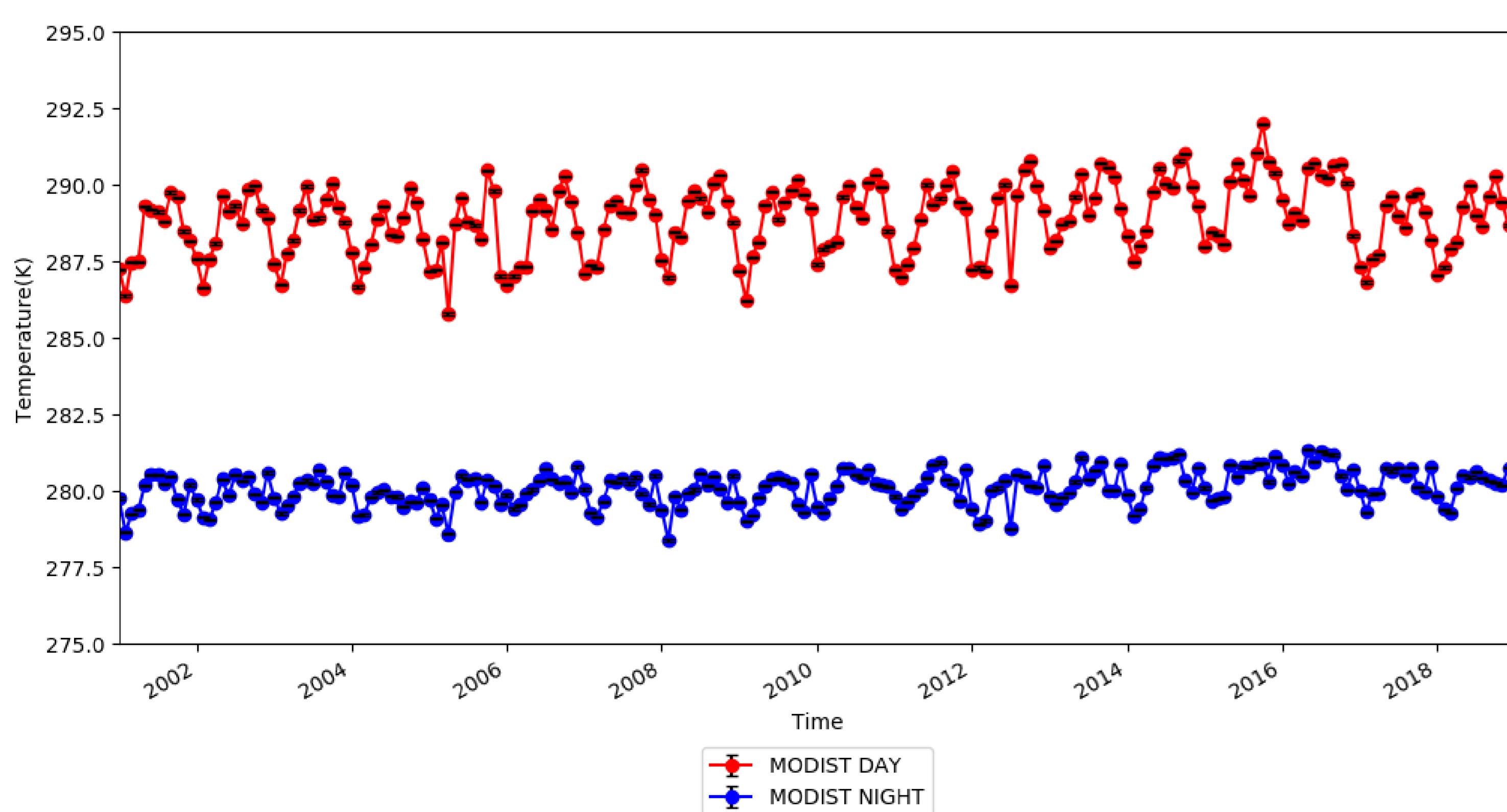

Figure 3: Monthly daytime (red) and night-time (blue) level-3 absolute LST for Terra-MODIS
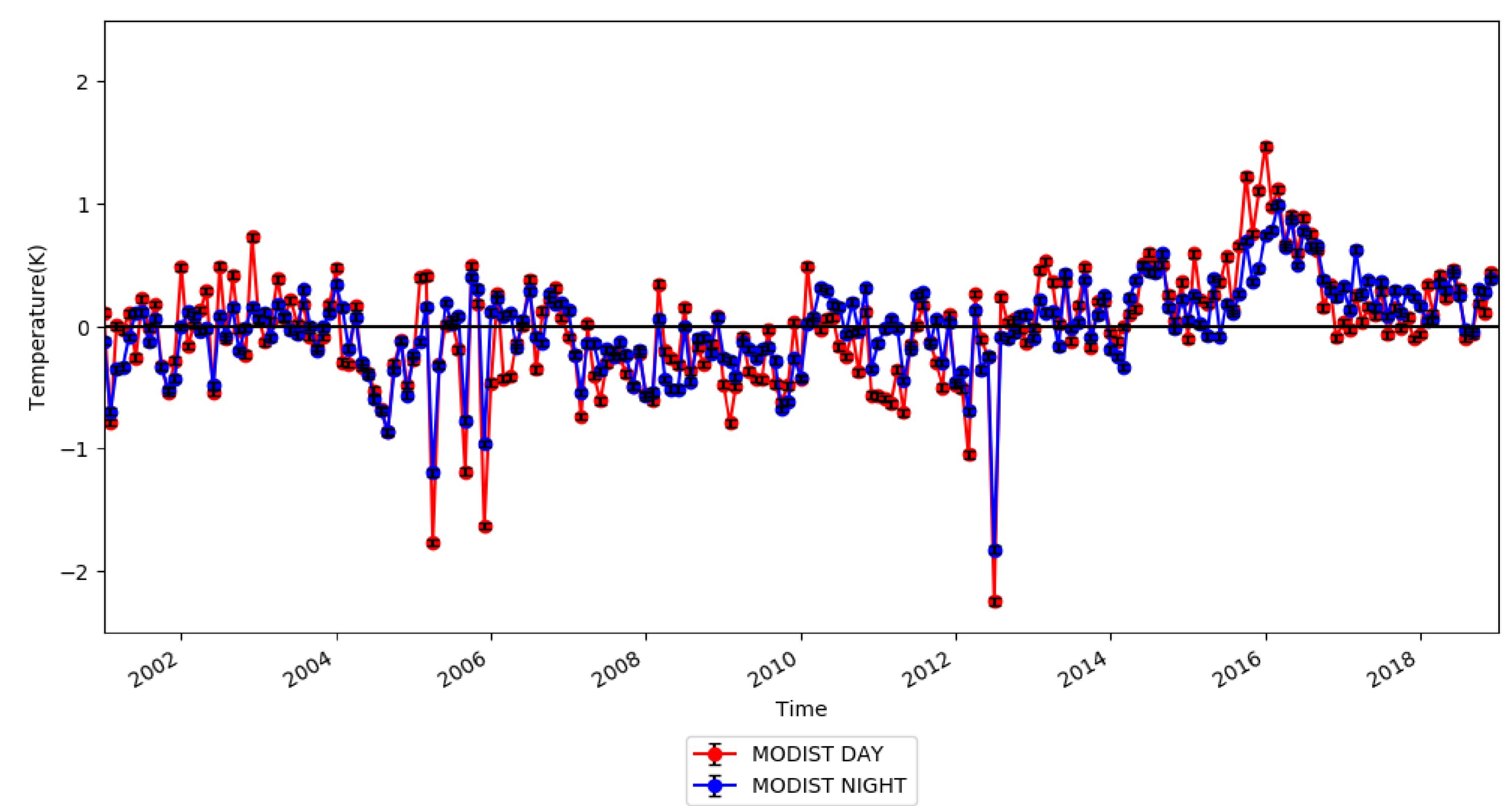

Figure 4: Monthly daytime (red) and night-time (blue) level-3 LST anomalies for Terra-MODIS

European Space Agency