SEVIRI Daily Minimum and Maximum Surface Temperatures

Daily minimum and maximum surface temperatures have been estimated using data from the Spinning Enhanced Visible and Infrared Imager (SEVIRI) onboard the Metosat Second Generation (MSG) satellite platform, which is the operational weather satellite at 0 degrees longitude/latitude. Both the land surface skin temperature (LSTmin and LSTmax) and and estimated air temperature (Tmin and Tmax) are provided in this data set, with Tmin and Tmax being derived from the LSTmin and LSTmax data through an empirical regression-based approach. Fifteen-minute LST data from SEVIRI are used to estimate daily LSTmin and LSTmax. These LST data are then regressed with observed daily vegetation fraction, latitude, urban fraction, elevation and distance from coast against collocated station Tmin and Tmax data from ECA&D (http://eca.knmi.nl/). Separate regression models are produced for Tmin and Tmax for a rolling 11-day window to account for temporal variation in the relationships between air temperature and the regression predictor variables. The derived regression coefficients are applied to every available SEVIRI LSTmin/max observation for the central day in the analysis window, providing estimates of Tmin and Tmax where station data are unavailable. Assessing both the model residuals and using independent station data from the UK and Germany not used in the regression formulation suggests that for most days, at least 50% of the estimated LSATs are within 3 °C of collocated station observations, with around 80% within 4 °C and 90% within 5 °C. Results for Tmax are better than for Tmin. The mean bias of the satellite-estimated LSATs oscillates around zero and shows little seasonal variation, although the variance is noted to be lower during summer months. The satellite data sets used for the regression are sourced from the Land Surface Analysis Satellite Applications Facility (LSA SAF; http://landsaf.meteo.pt/), with 300-m land cover data from GlobCover (http://due.esrin.esa.int/globcover/) used to provide an estimate of the urban fraction and distance from coast parameters used in the regression.

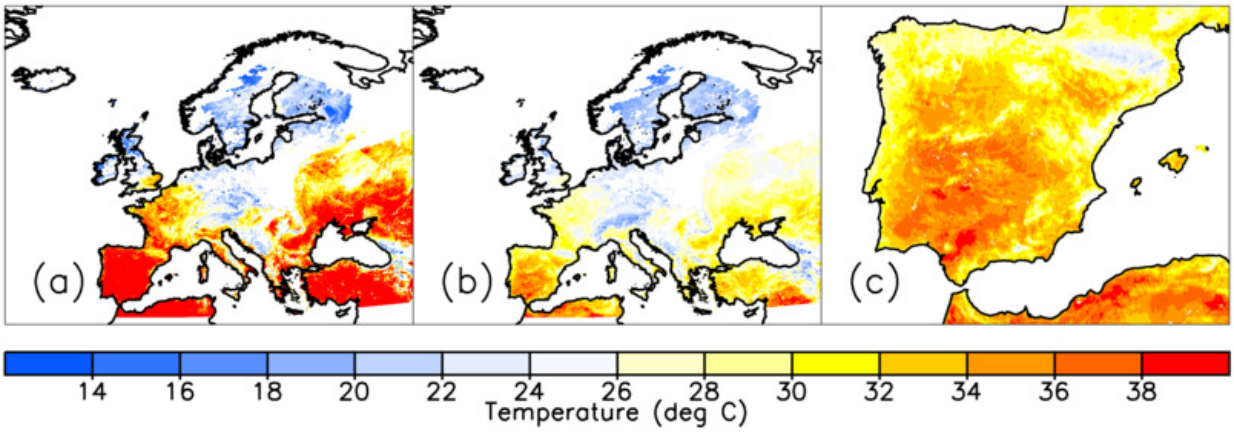

Figure 1: Example of satellite temperature data on 21 August 2013 showing (a) LSTmax, (b) Tmax, (c) Tmax for the Iberian Peninsular and north-western Africa.

Infobox

SPECIFICATIONS

Output data sets
Minimum land surface skin temperature
Maximum land surface skin temperature
Minimum land surface air temperature
Maximum land surface air temperature

Data
Spatial resolution: ~4-10 km
Temporal resolution: Daily
Grid: SEVIRI native pixel (Irregular grid)
Format: NetCDF

Availability
Area: Europe
Time period: 2012-2013

Freely available for non-commercial and educational research

Validation
Assessment of regression model residuals, and validation using independent station observations.

Outlook
2009-2011 data to be made available shortly. Updated regularly in line with new release of SEVIRI and ECA&D data. Planned future extension of analysis to Africa. Further validation / evaluation by EURO4M and users.

Description and Validation
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