

Surface heterogeneity as seen from SUMO

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SUMO



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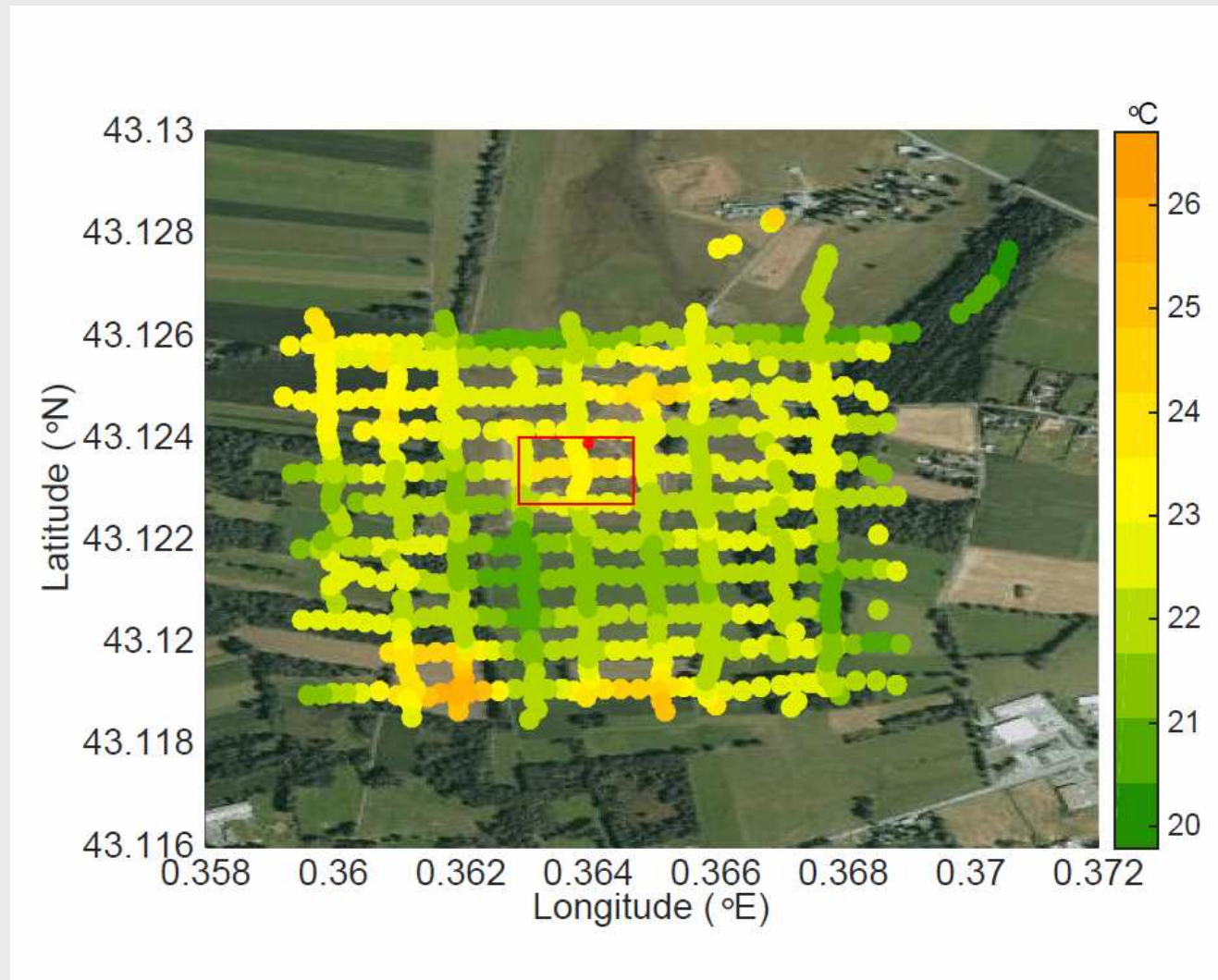
Geofysisk institutt
Universitetet i Bergen

How can we potentially use SUMO for that?

- surface temperature estimates by the downward directed IR sensor
 - detection of leveled position of the aircraft
 - need for correction of atmospheric absorption and emission (flight altitude and atmospheric humidity)
 - with the sensor used, we get an average value over a circle with diameter corresponding to the flight level (i.e. minimum of 65 m during BLLAST)
- air temperature fluctuations at the flight level of SUMO
 - no fast sensor flown during BLLAST
 - the slow sensors (SHT25 and Pt1000) have typical sensor time constants of several seconds
- different signatures in the turbulence data from the 5-hole probe on SUMO over different surface/vegetation types
 - we have not yet come so far; only limited number of flights available for that purpose

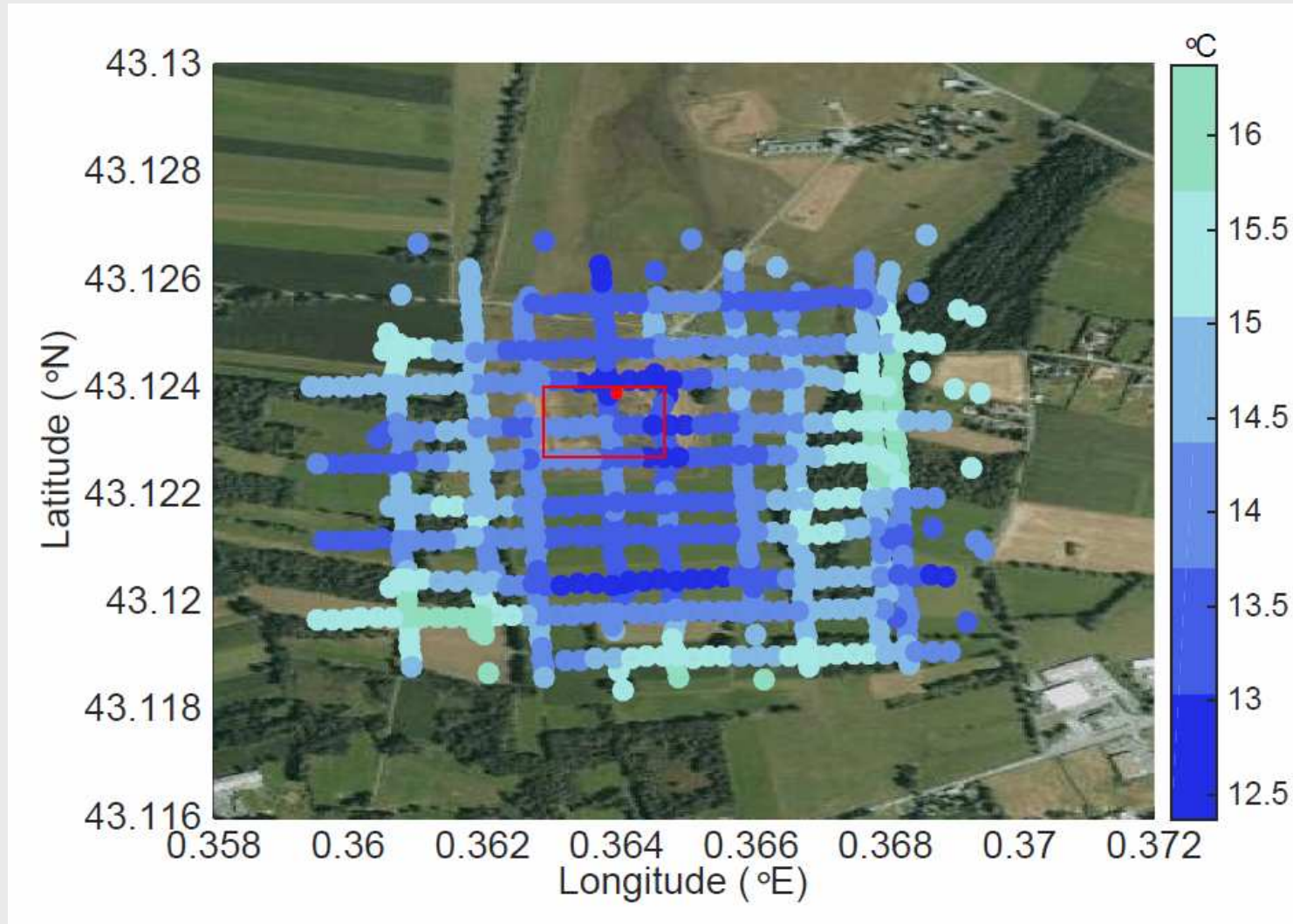
SUMO surface temperature survey – evening ssh

02.07.2011 at 17:40 UTC



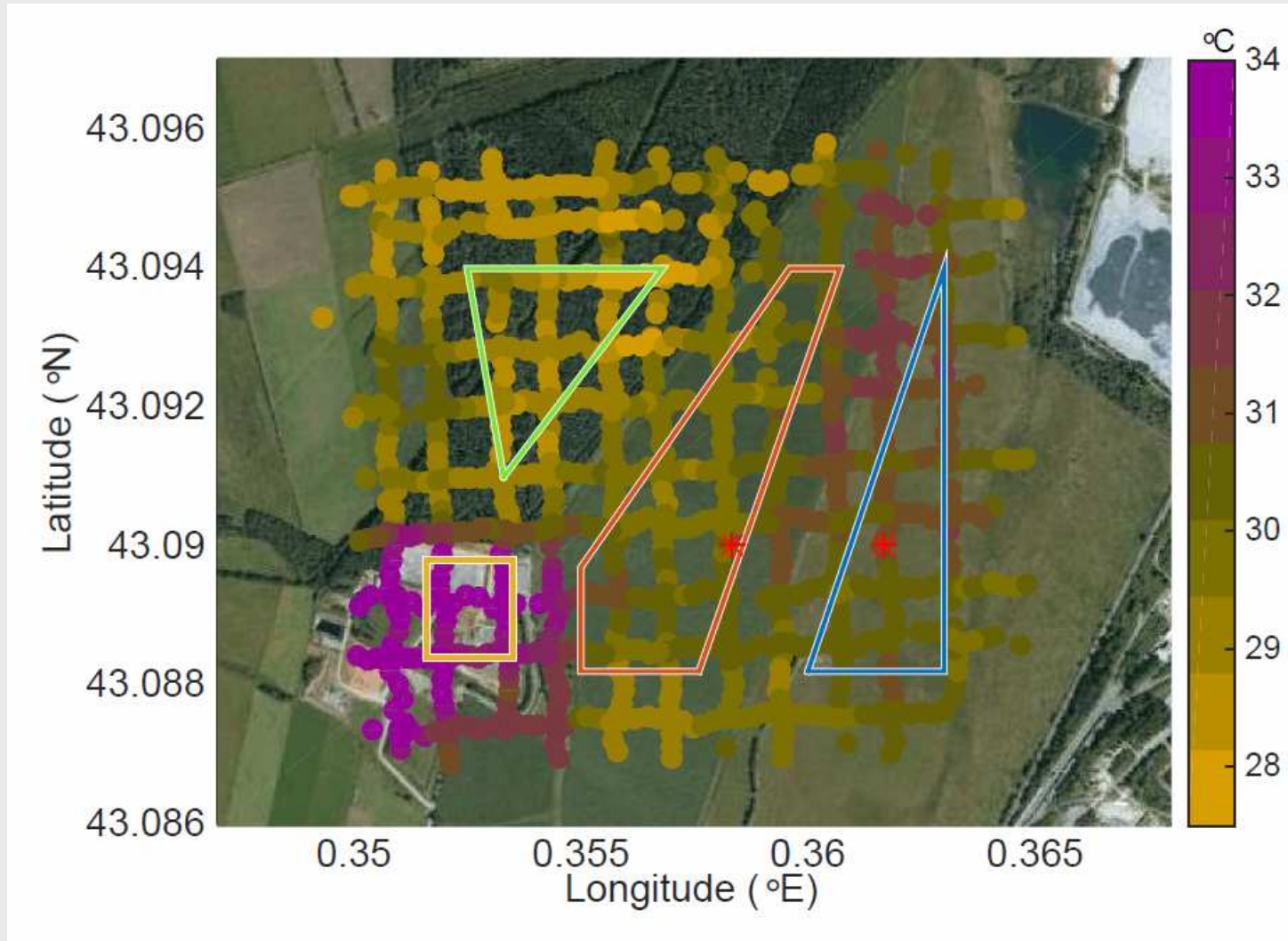
SUMO surface temperature survey – night ssh

19.06.2011 at 19:45 UTC

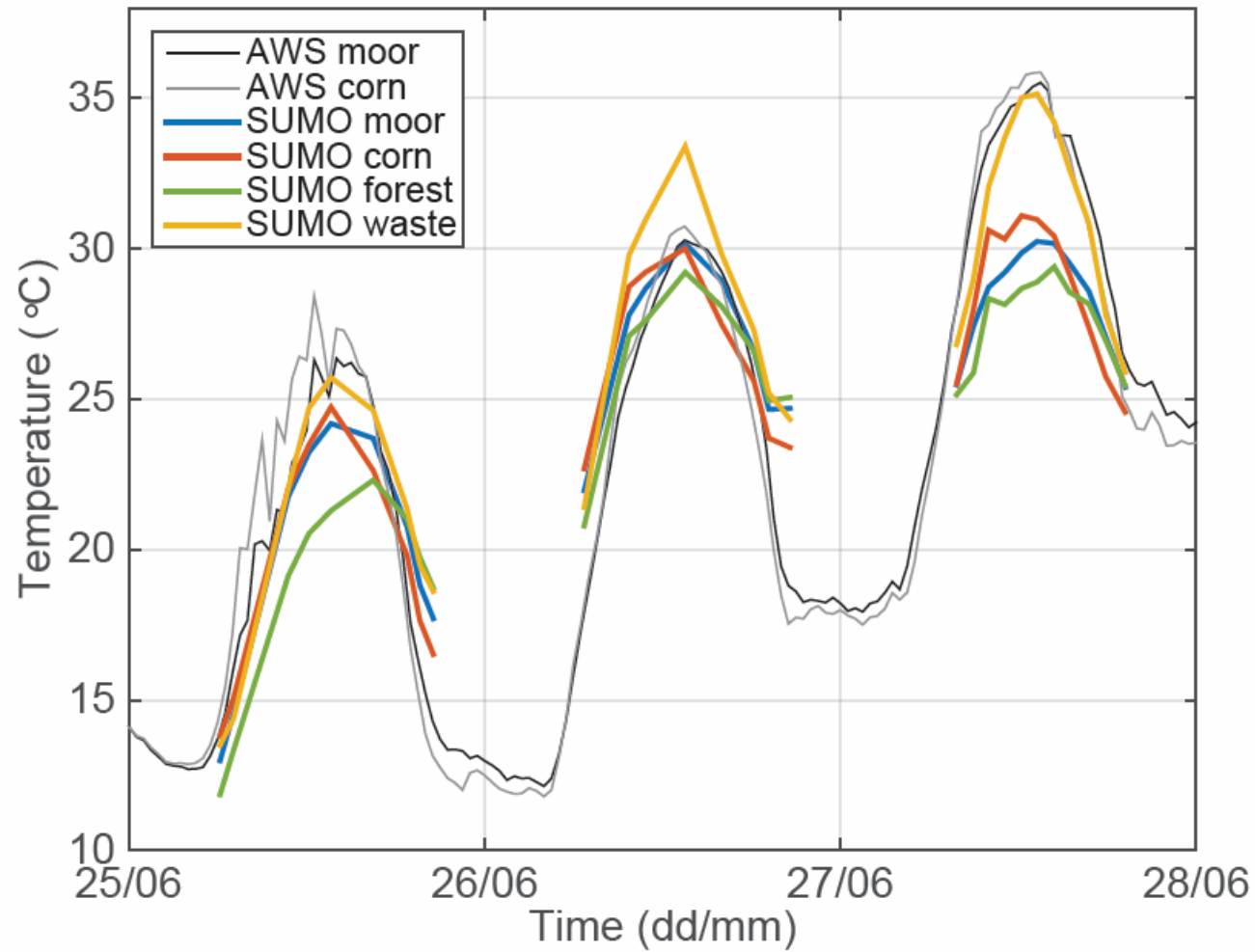


SUMO surface temperature survey – daytime site 2

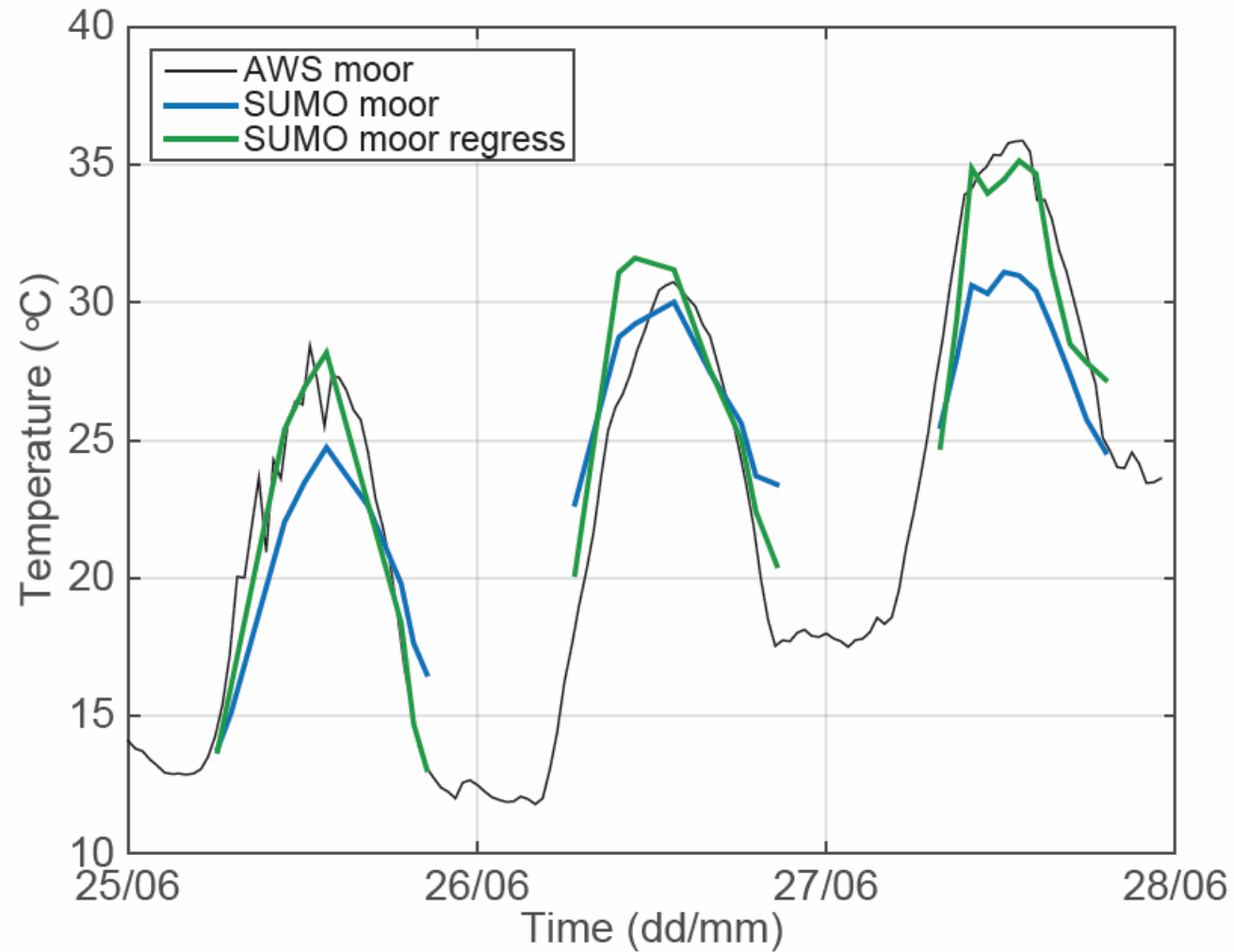
27.06.2011 at 13:15 UTC



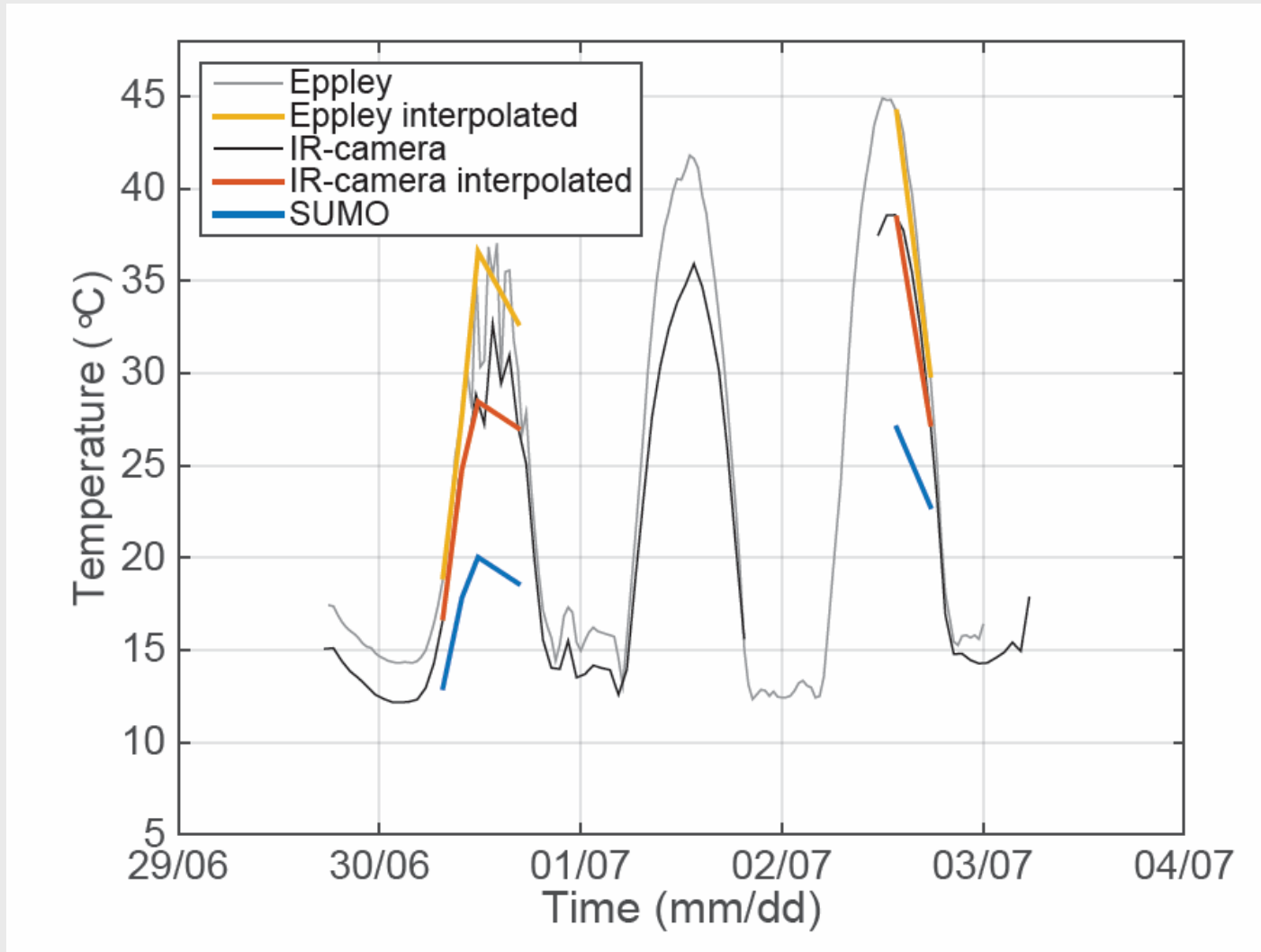
Derived time series for the different areas – SUMO raw



Derived time series for the different areas – SUMO corrected



Derived time series for the different areas – site 1 raw



Summary and outlook

- already a very simple multiple regression algorithm allows for the correction of a large portion of the absorption/emission error in the surface temperature estimate from SUMO
- the data set for site 1, including the IR camera mounted on the 60 m mast, allows for a more detailed investigation in the future
- homogenization of correction routines and parameters:
 - surface emissivity e (0.95..0.99) for the different surfaces
 - test and validation of different absorption/emission correction methods