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Land surface air temperature monitoring using a combination of satellite and in situ measurements

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Land surface air temperatures are sparsely observed in situ over much of the globe. Even in areas that are considered to be well observed, the density of instruments is usually not high enough to provide the spatial information that may be required for some applications (e.g. detailed characterisation of urban heat islands or heat stress during heat wave events). We present a new, high-resolution monitoring product for Europe that will provide estimates of daily maximum and minimum near-surface land air temperatures in near-real-time based on a combination of remotely-sensed and in situ data. A simple linear model is constructed that predicts air temperature from elevation and latitude, together with satellite-observed Land Surface 'skin' Temperature (LST) and vegetation fraction. The model is trained using collocated satellite and in situ observations at ground stations, and validated using an independent subset of in situ observations. The accuracy of the data set is approximately 1-3 degrees C. Although less accurate than conventional in situ-based air temperature data sets, our data set should provide timely and detailed spatial information that may be used to inform decision makers to more effectively target resources during heat wave events, for example. We present examples of this product during recent heat wave events over Europe. We also discuss future plans to extend the data set into data-sparse regions, such as parts of Africa, where observations of this type should be very valuable.