



UK Health
Security
Agency

Earth Observation Temperature Records and their Potential use in Public Health Applications

EOCIS (= Earth Observation Climate Information Service)
AIP (= Actionable Information Project)

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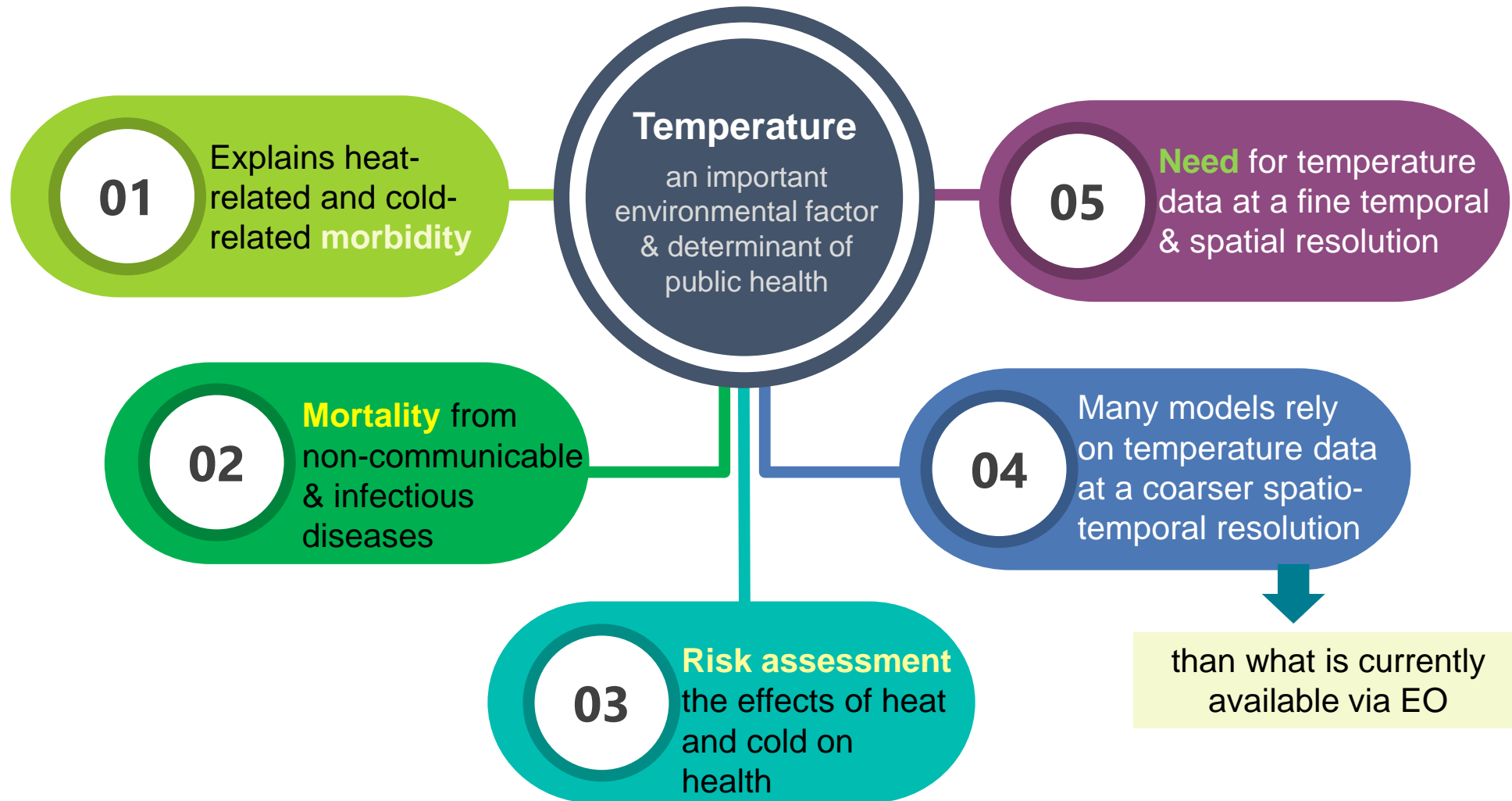
Contents

- Background (Public Health & Earth Observations)
- Objectives of EOCIS AIP Project
- Methodology
- Findings
- Relevant UKHSA subject areas & data requirements
- Future Developments

Project Overview

- The “*Earth Observation Temperature Records and their Potential use in Public Health Applications*” was an Earth Observation Climate Information Service (**EOCIS**) Actionable Information Project (**AIP**).
- UKHSA was involved in this EOCIS funded project.
- Partners: University of Leicester; Assimila (EO consultancy).
- Time period: October 2023 – March 2024.
- The purpose of these slides is to present a high-level and accessible overview of the project and its findings.

Public Health Rationale



Earth Observation Background

01

The **EOCIS** – Global Land Surface Temperature (**LST**) production system ingests L1 input data from a variety of satellite sources, derived from **IR**

02

Auxiliary data is acquired from ECMWF, Copernicus and NASA models

03

The UK-wide spatial resolution is 0.01° , corresponding to approximately 1km

04

Each grid point is visited daily at approx. 10am GMT

05

Land Surface Temperature has different characteristics to Air-Temperature (typically observed via weather-stations)

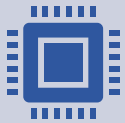
06

These maps are used to predict temperature where there are gaps in surface records.

Objectives of the Project



Scope the user needs and requirements from UKHSA teams, related to temperature information that can be derived from EO datasets;

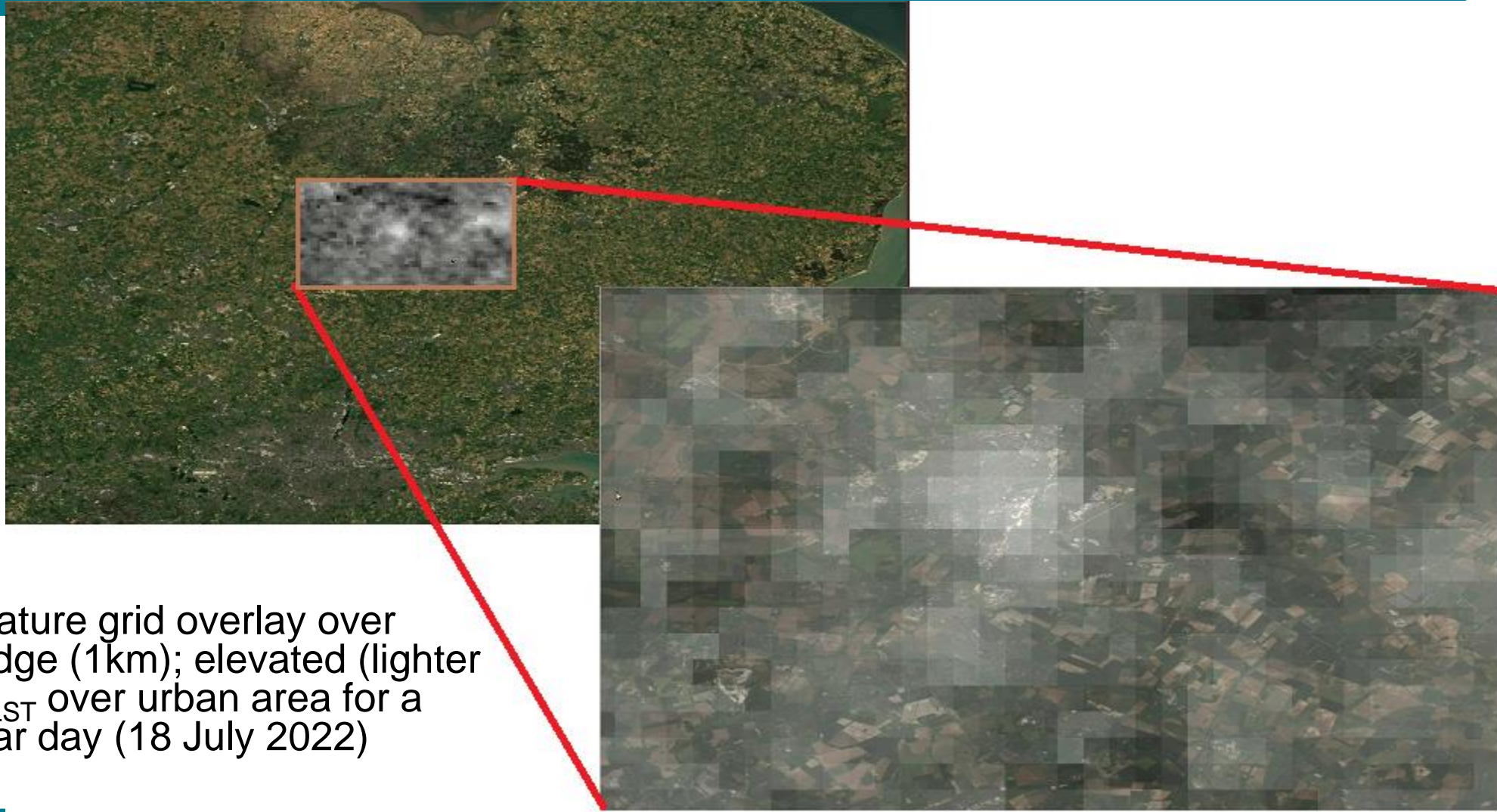


Data transformation, i.e. generating an LST gap-free time series from 2018 to 2022 that can be used to perform a spatial variability analysis when assessing vulnerability & risks; examining the benefits of having high-resolution temperature data;



Design a pilot LST and Health Operational Service, describing how to maximise the use of LST data to generate key metrics at the required spatial and temporal resolutions.

Example of EOCIS data



Temperature grid overlay over Cambridge (1km); elevated (lighter grey) T_{LST} over urban area for a particular day (18 July 2022)

Methodology



Workshop

In November 2023, staff members from different UKHSA teams who work closely with temperature data, were invited to participate in a workshop where the characteristics of EO land-surface temperature (LST) was explained in detail, and the scope for the use of LST data in UKHSA was explored.



Interviews

Workshop participants (a total of 12 staff members) were subsequently interviewed for more in-depth discussion. The interviews were conducted with a semi-structured questionnaire of 17 questions during online meetings, to allow for discussions and capture detailed user requirements.



A number of questions from the requirements questionnaire were multiple choice and the results are summarised under “Findings – II”

Subject Areas Identified

The following UKHSA teams use temperature data:

Environmental Epidemiology Team

Environmental Hazards and Emergencies Department

Extreme Events and Health Protection Team

Climate and Health Assessment Team

Knowledge Mobilisation Team (Centre for Climate and Health Security)

Medical Entomology and Zoonoses Ecology Team

Gastrointestinal Infections Team

Real Time Syndromic Surveillance Team

Radiation Assessments Department

Findings - I

While staff in each of the teams use temperature & health data in different settings, the interviews offered insight into similarities in what kind of data and detail were required.

A

A wide diversity of spatial resolution was requested, with some applications benefiting from high resolution, while in other areas a moderate resolution would be sufficient.

B

Most users preferred daily outputs for the whole of the UK.



C

Most teams work with data in spreadsheet formats, like CSV, or GIS data (maps in shapefile or raster format). Only the most data-intensive applications used NetCDF formats.

D

Changes to methodologies: Re-calibration of impact models to use land-surface temperature may be a significant challenge, especially where usage of air-temperature data has been long established.

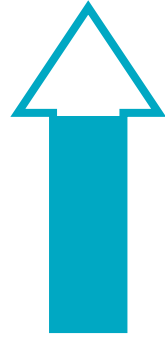
Findings - II

Summary of results from requirements questionnaire



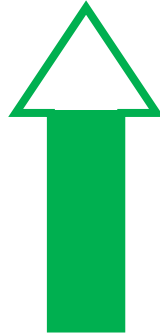
Data future needs

All respondents expect to have future needs for temperature data for public health use



Type of data

Most users were interested in both temperature & derived data combining temperature with other data



Data required

Most users required both land-surface- and air-temperature data



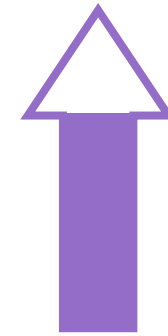
Challenges

Challenges for accessing data included ease of access/use, finding data, and quality assurance



Data format

Most users required land-surface temperature data in **CSV** format



Data access

Majority of users wanted access to EO data on an **ad-hoc** basis

Future Developments

EO data might be used in applications where precise temperature predictions & records are required to model impacts of temperature on various health end points.

Several work areas (vector-borne diseases, gastro-intestinal diseases, water-borne diseases) likely to benefit most from LST data, would like to explore the data in follow-on projects.

The pilot data stream was explored, potential hosting platforms will be investigated for suitability.

UKHSA are exploring hosting options and potential uses.

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Further References

- EOCIS – URL <https://eocis.org/>
- ESA – URL <https://climate.esa.int/en/projects/land-surface-temperature/>
- Copernicus – URL <https://documentation.dataspace.copernicus.eu/Data/SentinelMissions/Sentinel3.html>
- RAL Space – URL [https://www.ralspace.stfc.ac.uk/Pages/Sea-and-Land-Surface-Temperature-Radiometer-\(SLSTR\).aspx](https://www.ralspace.stfc.ac.uk/Pages/Sea-and-Land-Surface-Temperature-Radiometer-(SLSTR).aspx)