



Horizon 2020

H2020-EO-2014 New ideas for Earth-relevant Space Applications

EUSTACE

(Grant Agreement 640171)



EU Surface Temperature for All Corners of Earth

Deliverable D4.5

Connection of final data products to data services (CEDA / ESGF)

Deliverable Title	<i>Connection of final products to data services (CEDA/ESGF)</i>	
Brief Description	<i>Connection to other data services (including ESGF, OpenDap and other relevant services) will increase the accessibility to the data and thus forms an important role in the dissemination and exploitation of EUSTACE results (Task 4.3).</i>	
WP number	4.5	
Lead Beneficiary	<i>Alison Waterfall, STFC</i>	
Contributors		
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	<input type="checkbox"/>	<i>DEM – Demonstrator, Pilot, Prototype</i>
	<input type="checkbox"/>	<i>DEC – Dissemination, Exploitation or Communication</i>
	<input checked="" type="checkbox"/>	<i>O - Other</i>
Dissemination Level/ Audience	<input checked="" type="checkbox"/>	<i>PU - Public</i>
	<input type="checkbox"/>	<i>CO - Confidential, only for members of the consortium, including the Commission services</i>

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0.1	19/03/2019	Alison Waterfall	For review
0.2	08/04/2019	Alison Waterfall	Updated
1.0	29/05/2019	Nick Rayner	Final



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1. Executive Summary

The EUSTACE data products have been catalogued in the CEDA archive, with individual download pages pointing to the source of the data. Details of these are provided in this document. Most of the final EUSTACE data products have been archived for long term curation and access in the CEDA archive. Two products, the European homogenised data and the gridded European dataset, which also form part of the European Climate Assessment & Dataset (ECA&D) project are made available via ECA&D, as these products will continue to be updated and / or improved.

The datasets have not been published to ESGF. Although this was foreseen in the Description of Action, experience from other projects demonstrates the process for including data in ESGF to be overly involved and as it was mainly desirable for the later gridded products this was not feasible in the timescale of the project. Also, for the non-gridded EUSTACE products, the ESGF is not a useful dissemination mechanism. However, data will be made available via OpenDAP through the CEDA archive, allowing the data to be used with external services.

2. Project Objectives

With this deliverable, the project has contributed to the achievement of the following objectives (DOA, Section B1.1):

No.	Objective	Yes	No
1	Intensively develop the hitherto immature use of Earth Observation estimates of Earth's surface skin temperature to enable new Climate Data Records of the surface air temperature Essential Climate Variable (ECV) to be created, for all locations over all surfaces of Earth (i.e. land, ocean, ice and lakes), for every day since 1850. EUSTACE will achieve this by: combining information estimated from multiple satellites with surface air temperature measurements made <i>in situ</i> and creating complete analyses of surface air temperature, through the application of novel statistical in-filling methods.		x
2	Integrate these new daily surface air temperature Climate Data Records into a range of applications in Earth System Science and Climate Services and research, amongst others. EUSTACE will achieve this via the active and continuous engagement of trail-blazer users, and the provision of products through already-existing user community data portals and service mechanisms, in standard formats.	x	
3	Undertake and report detailed research into the relationships between surface skin temperature estimated from Earth Observation satellite measurements and surface air temperature observed <i>in situ</i> by conventional measurements, over all surfaces of the Earth, including the polar regions. This is likely to provide information useful for refining coupling in Earth system models.		x

4	Create a sustainable, automated system at an appropriate level of maturity for the potential production of the products beyond the lifetime of the project. To enable this, EUSTACE will also identify Earth Observation and conventional data streams that could be used to update the surface air temperature Climate Data Records in the future, including those from Sentinel missions.		x
5	Extensively validate the new surface air temperature Climate Data Records against independent, surface-based reference data, sourced by the project for this purpose.		x
6	Develop and report new, consistent, validated estimates of uncertainty both in already-existing Earth Observation surface skin temperature estimates and in the new surface air temperature Climate Data Records, at all locations and times across the Earth's surface.		x
7	Develop links with related activities within Europe and beyond to help to ensure the execution of a joined-up work programme, the Copernicus Services and to enable the provision of requirements for the future surface skin temperature and surface air temperature observing system.		x
8	Other – not directly linked to one of the above objectives		x

3. Detailed Report

The EUSTACE data products have been catalogued in the CEDA archive, with individual download pages pointing to the source of the data. Most of the final EUSTACE data products have been archived for long term curation and access in the CEDA archive. Two products, the European homogenised data and the gridded European dataset, which also form part of the European Climate Assessment & Dataset (ECA&D) project are made available via ECA&D, as these products will continue to be updated and / or improved.

The final EUSTACE data products and their availability and licenses are summarised in the table below.

Short name	Descriptive Name	Dataset Link	Licence
Satellite skin temperatures			
Global satellite land surface temperature, v2.1	EUSTACE / GlobTemperature: Global clear-sky land surface temperature from MODIS Aqua on the satellite swath with estimates of uncertainty components, v2.1, 2002-2016	http://catalogue.ceda.ac.uk/uuid/0f1a958a130547febd40057f5ec1c837 doi:10.5285/0f1a958a130547febd40057f5ec1c837	Open
	EUSTACE / GlobTemperature: Global clear-sky land surface temperature from MODIS Terra on the satellite swath with estimates of uncertainty components, v2.1, 2000-2016	http://catalogue.ceda.ac.uk/uuid/655866af94cd4fa6af67809657b275c3 doi:10.5285/655866af94cd4fa6af67809657b275c3	Open
Global satellite ice surface temperature, v1.1	EUSTACE / AASTI: Global clear-sky ice surface temperature from the AVHRR series on the satellite swath with estimates of uncertainty components, v1.1, 2000-2009	https://catalogue.ceda.ac.uk/uuid/60b820fa10804fca9c3f1ddfa5ef42a1 doi:10.5285/60b820fa10804fca9c3f1ddfa5ef42a1	Open
Global satellite sea surface temperature, v1.2	EUSTACE / CCI: Global clear-sky sea surface temperature from the (A)ATSR series at 0.25 degrees with estimates of uncertainty components, v1.2, 1991-2012	https://catalogue.ceda.ac.uk/uuid/b8285969426a4e00b7481434291ad603 doi:10.5285/b8285969426a4e00b7481434291ad603	Open
Surface air temperatures from stations or in-situ data			
European station measurements	EUSTACE / ECA&D: European land station daily air temperature measurements, homogenised	https://catalogue.ceda.ac.uk/uuid/81784e3642bd465aa69c7fd40ffe1b1b	Non-commercial use only
Global Station Measurements	EUSTACE: Global land station daily air temperature measurements with non-climatic discontinuities identified, for 1850-2015	http://catalogue.ceda.ac.uk/uuid/7925ded722d743fa8259a93acc7073f2 doi:10.5285/7925ded722d743fa8259a93acc7073f2	Non commercial use only
Validation match up database, v1.0	EUSTACE: coincident daily air temperature estimates and reference measurements, for validation, 1850-2015, v1.0	https://catalogue.ceda.ac.uk/uuid/4b34a2c6890f4e518cacc88911193354 doi:10.5285/4b34a2c6890f4e518cacc88911193354	Non commercial user only

E-OBS	EUSTACE / E-OBS: Gridded European surface air temperature based on homogenised land station records since 1950	https://catalogue.ceda.ac.uk/uuid/b2670fb9d6e14733b303865c85c2065d	Non commer cial use only
Surface air temperature estimates from satellites			
Air temperature estimates from satellite, v1.0	EUSTACE: Globally gridded clear-sky daily air temperature estimates from satellites with uncertainty estimates for land, ocean and ice, 1995- 2016	https://catalogue.ceda.ac.uk/uuid/f883e197594f4fbaae6edebafb3fddb3 doi:10.5285/f883e197594f4fbaae6ede bafb3fddb3	Open
Surface air temperature estimates from statistical analysis			
Global air temperature estimates, v1.0	EUSTACE: Global daily air temperature combining surface and satellite data, with uncertainty estimates, for 1850-2015, v1.0	https://catalogue.ceda.ac.uk/uuid/468abcf18372425791a31d15a41348d9 doi:10.5285/468abcf18372425791a31 d15a41348d9	Open

Data are made completely available on an open licence (Open Government Licence <http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>) where possible. For the station datasets this was not possible, due to the licensing conditions of the input datasets, which meant they could only be made available for non-commercial use. These have been made available under a non-commercial government licence <http://www.nationalarchives.gov.uk/doc/non-commercial-government-licence/version/2/> (for the global station data and the match-up database), and under the ECA&D terms and conditions for the European datasets.

DOIs have been issued for all the datasets archived at CEDA (see table above).