DMP DU PROJET "IASI FLUX AND TEMPERATURE"

Plan de gestion de données créé à l'aide de DMP OPIDoR, basé sur le modèle "ERC DMP" fourni par Conseil européen de la recherche (European Research Council, ERC).

PLAN DETAILS

Plan title	DMP du projet "IASI Flux and Temperature"
Fields of science and technology (from OECD classification)	
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PROJECT DETAILS

Project title: IASI Flux and Temperature

Abstract: For the last few years, the record for the hottest month since modern meteorology observations began has been beaten several times. This, along with the recent so-called “hiatus” in the warming trend and the Paris climate agreement, has attracted scientific and public attention to the question of how reliable is the historical temperature record. Although the role of satellites in observing the variability and change of the Earth system has increased in recent decades, remotely-sensed observations are still underexploited to accurately assess climate change fingerprints. The IASI - Flux and Temperature (IASI-FT) project aims at providing new benchmarks for top-of-atmosphere radiative flux and temperature observations using the calibrated radiances measured twice a day at any location by the IASI instrument on the suite of MetOp satellites. The main challenge is to achieve the stringent accuracy and stability necessary for climate studies, particularly for climate trends. The development of innovative algorithms and statistical tools is proposed, to generate climate data records at the global scale, of (1) spectrally resolved outgoing radiances, (2) land and sea skin surface temperatures, and (3) temperatures at selected altitudes. Time series of these quantities are compared with *in situ* and other satellite observations, when available, atmospheric reanalyses, and climate model simulations. The observed trends are analyzed at seasonal and regional scales in order to disentangle natural (weather/dynamical) variability and human-induced climate forcings. This project, while clearly research-oriented, will lead towards an operational integrated observational strategy for the Earth climate system, given that the IASI program started in 2006 and will last until 2040 at least.

Funding

- Conseil européen de la recherche (European Research Council, ERC) : 742909

Research outputs :

1. IASI-derived sea surface temperature (Jeu de données)
2. IASI SKIN TEMPERATURE
3. IASI ATMOSPHERIC TEMPERATURE PROFILES (Dataset)
4. IASI OUTGOING LONGWAVE RADIATION

Contributors

Name	Affiliation	Roles
Cathy Clerbaux - https://orcid.org/0000-0003-0394-7200		• Coordinateur du projet • Personne contact pour les données (IASI ATP,

IASI SST, IASI SkT, IASI OLR)

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SUMMARY

Project Acronym

IASI-FT

Project Number

742909

Provide a dataset summary *(Several datasets may be included into a single DMP)*

Four products are developed within the IASI-FT project: IASI Sea Surface Temperature (SST), IASI Skin Temperature (SkT), IASI Atmospheric Temperature Profiles (ATP) and IASI Outgoing Longwave Radiation (OLR).
1) IASI Sea Surface Temperature (SST) is a monthly (L3), 1x1 degree global dataset of skin temperatures over the sea derived from the IASI satellite radiances data. The data was computed using Planck's law and simple atmospheric corrections (Parracho et al., 2021).
The dataset consists of monthly mean NETCDF files of around 600 KB each. One file per month. The land and sea ice grid points are filled using NaN. Unit : Kelvin.
2) IASI Skin Temperature (SkT) is a monthly (L3), 1x1 degree global dataset of skin temperatures over land derived from the IASI satellite radiances data. The data was computed using artificial neural networks over a selected set of IASI radiance channels, trained with ERA5-skin temperature product. Emissivity is also used as input in the neural network (Safieddine et al., 2020). This method was applied to the whole IASI time series to produce a homogeneous skin temperature data record from Sept. 2007 to the present.
The dataset consists of monthly mean TXT files of around 350 KB each (~total 52 MB for the 200709-201912 period). Each file is a grid organized by latitude (-90 to 89 °N) and longitude (-180 to 180 °E). Night and day data are separated based on the local time of IASI's overpass at each grid point. The sea grid points are filled using NaN. Unit : degree Celsius. Separator : comma.
3) IASI Atmospheric Temperature Profiles (ATP) is a daily 1°x1° global dataset of atmospheric temperatures derived from all IASI radiance observations. The temperatures profiles are given on 11 static pressure levels from 750 to 2 hPa. The method used to retrieve atmospheric temperatures from IASI radiances is detailed in Bouillon et al., 2021. It relies on an Artificial Neural Network (ANN) trained with 450 000 observations (IASI observations and NOAA-CO2 in input, ERA5 observations in output. The trained ANN was applied to reprocessed IASI L1C data, in order to produce a homogeneous atmospheric temperature record from 2008 to present. The dataset consists of daily mean NETCDF files of around 3 MB each (total 14 GB for the 2008-2017 period available to date). Each file includes the gridded daily atmospheric temperature profiles (day and night mixed together). Missing values are set at NaN. Size of the

grids: 90 lines (from -89.5 to 89.5 °N), 180 columns (from -179.5 to 179.5 °E), 11 aisles (pressure levels: 2, 7, 10, 30, 20, 70, 100, 200, 400, 550 and 750 hPa). Unit: K.
4) The IASI spectrally resolved Outgoing Longwave Radiation product (IASI OLR) is a monthly (L3), 2x2 degree global dataset of spectral OLR derived from the clear-sky IASI satellite radiance measurements in the range 645-2300 cm-1 at the 0.25 cm-1 native spectral sampling of the L1C spectra. The algorithm for the conversion of the spectra to the OLR is detailed in Whitburn et al. (2020, Journal of Climate). It relies on precalculated angular distribution models (ADMs) constructed for over 140,000 different scene types (characterized by surface and atmospheric parameters). These were selected from one year of Copernicus Atmosphere Monitoring Service (CAMS) reanalysis data. The method was applied to reprocessed IASI L1C data, in order to produce a homogeneous spectral OLR dataset from 2008 to present. The dataset consists of monthly mean NETCDF files of around 500 MB each (total 64.5 GB for the 2008-2017 period available to date). Each file includes the gridded spectral OLR calculated separately for day and nighttime IASI observations. Missing values are set at NaN. Size of the grids: 91 lines (from -90 to 90 °N), 181 columns (from -180 to 180 °E), 6621 aisles (between 645 and 2300 cm-1 by step of 0.25 cm-1). Unit: W · m-2 · cm-1.

FAIR DATA AND RESOURCES

IASI-DERIVED SEA SURFACE TEMPERATURE

1. Making data findable

Data is available for download at: https://iasi-ft.eu/data-access/SST/
DOI: 10.21413/iasi-ft_metopa_sst_l3_latmos-ulb
10.21413/iasi-ft_metopb_sst_l3_latmos-ulb
and 10.21413/iasi-ft_metopc_sst_l3_latmos-ulb

2. Making data openly accessible

The gridded monthly mean SST dataset are available at https://iasi-ft.eu/data-access/SST/
Data is made available as netcdf files prodiving all the needed information into each file.

3. Making data interoperable

Question sans réponse.

4. Increase data reuse

The data will remain re-usable for the foreseeable future.
No embargo is foreseen.
Data is compared with other reference datsets.

5. Allocation of resources and data security

Question sans réponse.

IASI SKIN TEMPERATURE

1. Making data findable

Data is available for download at: https://iasi-ft.eu/data-access/SkT/
DOI: 10.21413/iasi-ft_metopa_skt_l3_latmos-ulb
10.21413/iasi-ft_metopb_skt_l3_latmos-ulb
and 10.21413/iasi-ft_metopc_skt_l3_latmos-ulb

2. Making data openly accessible

The gridded monthly mean Skin Temperature dataset are available at https://iasi-ft.eu/data-access/SkT/
Data is made available as TXT files and can therefore be accessed by anyone, and used in all data analysis software.

3. Making data interoperable

Question sans réponse.

4. Increase data reuse

The data will remain re-usable for the foreseeable future.
No embargo is foreseen.
Data is compared with other reference datsets.

5. Allocation of resources and data security

Question sans réponse.

IASI ATMOSPHERIC TEMPERATURE PROFILES

1. Making data findable

Data is available for download at: https://iasi-ft.eu/data-access/ATP/
DOI:10.21413/iasi-ft_metopa_atp_l3_latmos-ulb and 10.21413/iasi-ft_metopb_atp_l3_latmos-ulb

2. Making data openly accessible

ATP dataset is available at https://iasi-ft.eu/data-access/ATP/
Data is made available in netcdf files (one file per day).

3. Making data interoperable

Question sans réponse.

4. Increase data reuse

The data will remain re-usable for the foreseeable future.
No embargo is foreseen.
Data is compared with other reference datsets.

5. Allocation of resources and data security

Question sans réponse.

IASI OUTGOING LONGWAVE RADIATION

1. Making data findable

Data is available for download at: https://iasi-ft.eu/data-access/OLR/
DOI: 10.21413/iasi-ft_metopa_olr_l3_ulb-latmos, 10.21413/iasi-ft_metopb_olr_l3_ulb-latmos and 10.21413/iasi-ft_metopc_olr_l3_ulb-latmos

2. Making data openly accessible

The gridded monthly mean OLR dataset are available at https://iasi-ft.eu/data-access/OLR/
Data is made available as NETCDF files.

3. Making data interoperable

Question sans réponse.

4. Increase data reuse

The data will remain re-usable for the foreseeable future.
No embargo is foreseen.
Data is compared with other reference datsets.

5. Allocation of resources and data security

Question sans réponse.