ICON Data Product 3.3: Nighttime Oplus

This document describes the data product for ICON Nighttime Oplus; 48-day windows of data from the L2.5 v06 product are collected into longitude, latitude, and local time bins. Mean and standard deviations of each parameter are reported in this file, which is in NetCDF4 format.

This describes the data product for ICON Level 3 Night O+ climatology (DP 3.3),
which is in NetCDF4 format.
These files are named ICON_L3-3_FUV_Night_vXXrZZZ.NC, where vXX shows the version number
and ZZZ shows the revision number of this file. Each individual file nominally contains the data for the entire mission.
The L3 FUV Night Limb files are produced from the L2.5 ICON FUV Night files.
All variables within the file are described in their Var_notes attribute. The data are identified in one of 2 var_types: data – which
contains the primary data product and support data – which contains parameters used in the retrieval such as geometry etc. that may also
be useful in any analysis of this data.
The dimensions of the data also indicate its type. For example, anything with epoch as a dimension means there is 1 value corresponding
to each instrument exposure.

History

Version 001, First release version based on latest current L2.5 files. S. L. England, B. Thurairajah

Dimensions

NetCDF files contain **variables** and the **dimensions** over which those variables are defined. First, the dimensions are defined, then all variables in the file are described.

The dimensions used by the variables in this file are given below, along with nominal sizes. Note that the size may vary from file to file. For example, the "Epoch" dimension, which describes the number of time samples contained in this file, will have a varying size.

Dimension Name	Nominal Size
Epoch	107
ICON_L3_Dates	48
ICON_L3_LocalTime	48
ICON_L3_Latitude	13
ICON_L3_Longitude	24
ICON_L3_Altitude	90

Variables

Variables in this file are listed below. First, "data" variables are described, followed by the "support_data" variables, and finally the "metadata" variables. The variables classified as "ignore_data" are not shown.

data

Variable Name	Description	Units	Dimensions
ICON_L33_O_PLUS_DENSITY	Binned O+ Density Mean value of FUV nighttime O+ Density, taken over all good quality L2 datapoints in a 48-day time-span, as a function of altitude,longitude, latitude, time. Derived from ICON_L24_Disk_ON2	1/cm^3	Epoch, ICON_L3_LocalTime, ICON_L3_Latitude, ICON_L3_Longitude, ICON_L3_Altitude
ICON_L33_DATAPOINTS	Number of data points Number of data points in each 48 day average, as a function of altitude,longitude, latitude, time	dimensionless	Epoch, ICON_L3_LocalTime, ICON_L3_Latitude, ICON_L3_Longitude, ICON_L3_Altitude
ICON_L33_SIGMA_O_PLUS_DENSITY	Sigma O+ Density 1 standard deviation of the good O+ density values used to compute the mean, as a function of altitude,longitude, latitude, time	1/cm^3	Epoch, ICON_L3_LocalTime, ICON_L3_Latitude, ICON_L3_Longitude, ICON_L3_Altitude

support_data

Variable Name	Description	Units	Dimensions
EPOCH	Milliseconds since 1970-01-01 00:00:00 UTC Time corresponding to the middle of each 48 day average, in milliseconds since Jan 1 1970.	milliseconds	Epoch
ICON_L33_DATES	Date YYYY-MM-DD format Dates used in each 48 day bin, in string format, in the format: 2017-05-27	string	Epoch, ICON_L3_Dates
ICON_L33_LOCALTIME	Local Time Bin Local time binned in 0.5 hour intervals, local time +/- 0.25 hours.	hours	ICON_L3_LocalTime
ICON_L33_LATITUDE	Latitude Bin Latitude of the O+ data, binned in 5 degree intervals, latitude +/- 2.5 degrees. Derived from ICON_L25_O+_Profile_Latitude	degrees	ICON_L3_Latitude

Variable Name	Description	Units	Dimensions
ICON_L33_LONGITUDE	Longitude Bin Longitude of the O+ data, binned in 15 degree intervals, longitude +/- 7.5 degrees. Derived from ICON_L25_O+_Profile_Longitude	degrees	ICON_L3_Longitude
ICON_L33_ALTITUDE	Bionned altitude grid Altitude of the O+ data, binned in 4 km intervals, altitude +/- 2.0 km. Derived from ICON_L25_O+_Profile_Altitude	km	ICON_L3_Altitude

Acknowledgement

This is a data product from the NASA Ionospheric Connection Explorer mission,
an Explorer launched at 21:59:45 EDT on October 10, 2019, from Cape Canaveral AFB in the USA.
Guidelines for the use of this product are described in the ICON Rules of the Road (http://icon.ssl.berkeley.edu/Data).

Responsibility for the mission science falls to the Principal Investigator, Dr. Thomas Immel at UC Berkeley:
Immel, T.J., England, S.L., Mende, S.B. et al. Space Sci Rev (2018) 214: 13. https://doi.org/10.1007/s11214-017-0449-2
Immel, T.J., England, S.L., Harding, B.J. et al. Space Sci Rev (2023) 219: 41. https://doi.org/10.1007/s11214-023-00975-x

Responsibility for the validation of the L1 data products falls to the instrument lead investigators/scientists.
EUV: Dr. Martin Sirk and Dr. Eric Korpela : https://doi.org/10.1007/s11214-023-00963-1, and
https://doi.org/10.1007/s11214-017-0384-2
FUV: Dr. Harald Frey : https://doi.org/10.1007/s11214-023-00969-9, and https://doi.org/10.1007/s11214-017-0386-0
MIGHTI: Dr. Christoph Englert : https://doi.org/10.1007/s11214-023-00971-1, https://doi.org/10.1007/s11214-017-0358-4,
and https://doi.org/10.1007/s11214-017-0374-4
IVM: Dr. Roderick Heelis : https://doi.org/10.1007/s11214-017-0383-3

Responsibility for the validation of the L2 data products falls to those scientists responsible for those products.
* Daytime O/N2 ratio : Dr. Robert Meier : https://doi.org/10.1007/s11214-018-0477-6
* Daytime (EUV) O+ profiles: Dr. Andrew Stephan : https://doi.org/10.1007/s11214-022-00933-z, and
https://doi.org/10.1007/s11214-017-0385-1
* Nighttime (FUV) O+ profiles: Dr. Farzad Kamalabadi : https://doi.org/10.1007/s11214-018-0502-9
* Neutral Wind profiles: Brian Harding : https://doi.org/10.1007/s11214-017-0359-3, and
https://doi.org/10.1029/2020JA028947
* Neutral Temperature profiles: Dr. Michael Stevens : https://doi.org/10.1007/s11214-022-00935-x, and
https://doi.org/10.1007/s11214-017-0434-9
* Ion Velocity Measurements : Dr. Roderick Heelis : https://doi.org/10.1007/s11214-017-0383-3

Additional theoretical work in support of these products was supported by Dr. Robert Meier
Daytime O/N2 product https://doi.org/10.1029/2020JA029059
Daytime (EUV) O+ profiles : https//doi.org/10.1029/2023JA031533

Additional validation work was performed by Dr. Jonathan Makela, Dr. Gilles Wautelet, and Dr. Yen-Jung (Joanne) Wu:
Neutral wind profiles : https://doi.org/10.1029/2020JA028726
Nighttime (FUV) O+ profiles : https://doi.org/10.1007/s11214-023-00970-2
Daytime (EUV) O+ profiles : https://doi.org/10.1007/s11214-022-00930-2
Ion Velocity Measurements : https://doi.org/10.1007/s11214-023-00993-9

Responsibility for Level 4 products falls to those scientists responsible for those products.
* Hough Modes : Dr. Chihoko Cullens : https://doi.org/10.1186/s40645-020-00330-6 and
https://doi.org/10.1007/s11214-017-0401-5
* TIEGCM : Dr. Astrid Maute : https://doi.org/10.1007/s11214-017-0330-3
* SAMI3 : Dr. Joseph Huba : https://doi.org/10.1007/s11214-017-0415-z

Pre-production versions of all above papers are available on the ICON website.
http://icon.ssl.berkeley.edu/Publications

Overall validation of the products is overseen by the ICON Project Scientist, Dr. Scott England.

NASA oversight for all products is provided by the Mission Scientist, Dr. Jeffrey Klenzing (2018-2022)
and Dr. Ruth Lieberman (2022-present).

Users of these data should contact and acknowledge the Principal Investigator Dr. Immel and the party directly responsible for the data product (noted above)
and acknowledge NASA funding for the collection of the data used in the research with the following statement : "ICON is supported by NASA’s Explorers Program through contracts NNG12FA45C and NNG12FA42I".

These data are openly available as described in the ICON Data Management Plan on the ICON website (http://icon.ssl.berkeley.edu/Data).

This document was automatically generated on `2025-05-20 12:19` using the file:
`ICON_L3-3_Nighttime_Oplus_v01r000.NC`
Software version: `ICON L3.3 Nighttime Oplus v01r000`