

ICON Data Product 3.3: Winds and Temperatures

This document describes the data product for ICON MIGHTI combined winds and temperature; 48-day windows of data (stepped 48 days) from the L3.1 v01 product are collected into altitude, longitude, latitude, and local time bins. Mean and standard deviations of each parameter are reported in this file. More details about the instrument can be found in <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>, which is in NetCDF4 format.

This describes the data product for ICON Level 3 ICON MIGHTI Wind and Temperature climatology (DP 3.3), which is in NetCDF4 format.

The file is named ICON_L3-3_MIGHTI_TUV_vXXrZZZ.NC, where vXX shows the version number and ZZZ shows the revision number of this file. This file contains the data for the entire mission.

The L3-3 MIGHTI TUV files are produced from the L3-1 ICON MIGHTI Combined Wind and Temperature 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 the dimensions of the arrays (latitude, longitude etc.)

The dimensions of the data also indicate its type.

History

Version 001, First release version based on latest current L3.1 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	105
ICON_L33_Dates	48
ICON_L33_LocalTime	48
ICON_L33_Latitude	15
ICON_L33_Longitude	24
ICON_L33_Altitude	45

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_ZONAL_WIND	Zonal Wind: Zonal component of the horizontal wind. Positive Eastward Mean value of zonal wind, taken over all good quality L31 datapoints in a 48-day time-span, as a function of longitude, latitude, time. Derived from ICON_L31_ZONAL_WIND	m/s	Epoch, ICON_L33_LocalTime, ICON_L33_Latitude, ICON_L33_Longitude, ICON_L33_Altitude
ICON_L33_MERIDIONAL_WIND	Meridional Wind: Meridional component of the horizontal wind. Positive Northward. Mean value of meridonal wind, taken over all good quality L31 datapoints in a 48-day time-span, as a function of altitude, longitude, latitude, time. Derived from ICON_L31_MERIDIONAL_WIND	m/s	Epoch, ICON_L33_LocalTime, ICON_L33_Latitude, ICON_L33_Longitude, ICON_L33_Altitude
ICON_L33_Temperature	Temperature Mean value of temperature, taken over all good quality L31 datapoints in a 48-day time-span, as a function of altitude, longitude, latitude, time. Derived from ICON_L31_TEMPERATURE	K	Epoch, ICON_L33_LocalTime, ICON_L33_Latitude, ICON_L33_Longitude, ICON_L33_Altitude
ICON_L33_Data points_Wind	Number of data points for zonal and meridional winds Number of data points in each 48 day average of zonal and meridional winds, as a function of altitude, longitude, latitude, time	dimensionless	Epoch, ICON_L33_LocalTime, ICON_L33_Latitude, ICON_L33_Longitude, ICON_L33_Altitude
ICON_L33_Data points_Temperature	Number of data points for temperature Number of data points in each 48 day average of temperature, as a function of altitude, longitude, latitude, time	dimensionless	Epoch, ICON_L33_LocalTime, ICON_L33_Latitude, ICON_L33_Longitude, ICON_L33_Altitude
ICON_L33_Sigma_Zonal_Wind	Sigma Zonal Wind 1 standard deviation of the good zonal wind values used to compute the mean, as a function of longitude, latitude, time	dimensionless	Epoch, ICON_L33_LocalTime, ICON_L33_Latitude, ICON_L33_Longitude, ICON_L33_Altitude
ICON_L33_Sigma_Meridional_Wind	Sigma Meridional Wind 1 standard deviation of the good meridional wind values used to compute the mean, as a function of altitude, longitude, latitude, time	m/s	Epoch, ICON_L33_LocalTime, ICON_L33_Latitude, ICON_L33_Longitude, ICON_L33_Altitude

Variable Name	Description	Units	Dimensions
ICON_L33_Sigma_Temperature	Sigma Temperature 1 standard deviation of the temperature values used to compute the mean, as a function of altitude, longitude, latitude, time	K	Epoch, ICON_L33_LocalTime, ICON_L33_Latitude, ICON_L33_Longitude, ICON_L33_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_Included_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_L33_Dates
ICON_L33_Altitude	WGS84 altitude of each wind or temperature sample Altitude grid used by the forward model, in WGS.	km	ICON_L33_Altitude
ICON_L33_LocalTime	Local Time Bin Local time binned in 0.5 hour intervals, local time +/- 0.25 hours..	hours	ICON_L33_LocalTime
ICON_L33_Latitude	Latitude Bin Latitude of the MIGHTI data, binned in 5 degree intervals, latitude +/- 2.5 degrees. Derived from ICON_MIGHTI_L31_Latitude	degrees	ICON_L33_Latitude
ICON_L33_Longitude	Longitude Bin Longitude of the MIGHTI data, binned in 15 degree intervals, longitude +/- 7.5 degrees. Derived from ICON_MIGHTI_L31_Longitude	degrees	ICON_L33_Longitude

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), Dr. Ruth Lieberman (2022-2025) and Dr. Doug Rowland (2025 - 2026).

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 2026-06-29 10:44 using the file:
ICON_L3-3_Wind_Temperature_v01r001.NC
Software version: ICON L3.3 Wind Temperature v01r001