ICON Data Product L0P: MIGHTI Ancillary Products

This document describes the data product for Ancillary Products for MIGHTI Data Processing, which is in NetCDF4 format.

The MIGHTI ancillary data file contains information on the ICON observatory as well as MIGHTI specific information. This includes the poiniting, position, and velocity of the ICON observatory. It also includes information on the status of the observatory such as maneuvers, being in or out of the Earth's shadow, and calibrations. Pertinent information for the MIGHTI instrument is included such as locations and details at the MIGHTI tangent points. These files are combined with the MIGHTI Level 1 data to produce Level 2 data. For clarification, variables named 'MIGHTI_A' are for MIGHTI-A, variables named 'MIGHTI_B' are for MIGHTI-B, and variables named MIGHTI are either for the spacecraft or the MIGHTI instrument indicated in the file name. The TIMETABLE dimension refers to the start, middle, and end of the MIGHTI integration time. ECEF is Earth-centered, Earth-fixed reference frame. ECI is Earth-centered inertial reference frame. We use the J2000 ECI frame. LVLH is local-vertical, local-horizontial. We have two LVLH modes: normal and reverse. LVLH Normal is when the spacecraft is looking north with latitude tangent locations between ~12 S and ~42 N. LVLH Reverse is when the spacecraft is looking south with latitude tangent locations between ~42 S and ~12 N.

History

Version 03, Created by MIGHTI Ancillary Processor v3.0.2 on Thu, 08 Oct 2020, 2020-10-08T16:38:25.000 UTC

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`	2119
`HORIZONTAL`	3
`VERTICAL`	3
`VECTORS`	3
`TIMETABLE`	3

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.

support_data

Variable Name	Description	Units	Dimensions
Epoch	Milliseconds since 1970-01-01 00:00:00 UTC at middle of measurement integration. Number of milliseconds since 1970-01-01 00:00:00 UTC at the middle of the measurement integration.	milliseconds	Epoch, TIMETABLE
ICON_ANCILLARY_MIGHTI_TIME_GPS	Milliseconds since 1980-01-06 00:00:00 TAI (coincident with UTC) at middle of reading. Number of milliseconds since 1980-01-06 00:00:00 TAI at the middle of the measurement integration.Taken from L0P MIGHTI data file.	milliseconds	Epoch
ICON_ANCILLARY_MIGHTI_TIME_UTC_STRING	Date and Time in UTC format ISO 8601 formatted UTC timestamp (at middle of reading). E.g., 2017-05-27 00:00:00.380Z	UTC	Epoch, TIMETABLE
ICON_ANCILLARY_MIGHTI_SC_POSITION_ECEF	Spacecraft Position in ECEF Coordinates Position of spacecraft in ECEF at the start, middle, and end of each exposure.	km	Epoch, TIMETABLE, VECTORS
ICON_ANCILLARY_MIGHTI_SC_VELOCITY_ECEF	Spacecraft Velocity in ECEF Spacecraft velocity in ECEF cooridinates at the start, middle, and end of each exposure.	m/s	Epoch, TIMETABLE, VECTORS
ICON_ANCILLARY_MIGHTI_LATITUDE	WGS84 Latitude of Spacecraft Position (Geodetic) Geodetic Latitude of Spacecraft in WGS84 at the start, middle, and end of each exposure.	degrees	Epoch, TIMETABLE
ICON_ANCILLARY_MIGHTI_LONGITUDE	WGS84 Longitude of Spacecraft Position (Geodetic) Geodetic Longitude of Spacecraft in WGS84 at the start, middle, and end of each exposure.	degrees	Epoch, TIMETABLE
ICON_ANCILLARY_MIGHTI_ALTITUDE	WGS84 Altitude of Spacecraft Position (Geodetic) Geodetic altitude of the spacecraft in WGS84 at the start, middle, and end of each exposure.	km	Epoch, TIMETABLE
ICON_ANCILLARY_MIGHTI_VNORTH	North Velocity of Spacecraft North component of the spacecraft velocity in WGS84 at the start, middle and end of each exposure	m/s	Epoch, TIMETABLE

Variable Name	Description	Units	Dimensions
ICON_ANCILLARY_MIGHTI_VEAST	East Velocity of Spacecraft East component of the spacecraft velocity in WGS84 at the start, middle, and end of each exposure.	m/s	Epoch, TIMETABLE
ICON_ANCILLARY_MIGHTI_VDOWN	Down (perpendicular to local Earth surface) velocity of Spacecraft Down component of the spacecraft velocity in WGS84 at the start, middle, and end of each exposure.	m/s	Epoch, TIMETABLE
ICON_ANCILLARY_MIGHTI_TANGENTPOINTS_MAGNETIC_LATITUDE	Magnetic Latitude at Tangent Points Quesi-Dipole Magnetic Latitude at the tangent points for 9 points that define the center & outside edges (sides and corners). at the start, middle, and end of each exposure. These values are obtained from passing the geodectic latitudes, longitudes, and altitudes from ICON_ANCILLARY_MIGHTI_TANGENTPOINTS_LATLONALT into apexpy Python module. For details on apexpy see: https://apexpy.readthedocs.org/	degrees	Epoch, TIMETABLE, VERTICAL, HORIZONTAL
ICON_ANCILLARY_MIGHTI_TANGENTPOINTS_MAGNETIC_LONGITUDE	Magnetic Longitude at Tangent Points Quesi-Dipole Magnetic Longitude at the tangent points for 9 points that define the center & outside edges (side and corners).at the start, middle, and end of each exposure. These values are obtained from passing the geodectic latitudes, longitudes, and altitudes from ICON_ANCILLARY_MIGHTI_TANGENTPOINTS_LATLONALT into apexpy Python module.For details on apexpy see: https://apexpy.readthedocs.org/	degrees	Epoch, TIMETABLE, VERTICAL, HORIZONTAL
ICON_ANCILLARY_MIGHTI_SC_SZA	Spacecraft Solar Zenith Angle Solar zenith angle at the spacecraft at the start, middle, and end of each exposure.	degrees	Epoch, TIMETABLE
ICON_ANCILLARY_MIGHTI_LST	Local Solar Time Local solar time at the spacecraft at the start, middle, and end of each exposure	hours, decimal	Epoch, TIMETABLE
ICON_ANCILLARY_MIGHTI_SC_XHAT	Spacecraft X-unit Vector in ECEF Components (Ram Direction) Unit vector in ECEF for the spacecraft x-axis (nominal Ram direction) at the start, middle, and end of each exposure.	dimensionless	Epoch, TIMETABLE, VECTORS
ICON_ANCILLARY_MIGHTI_SC_YHAT	Spacecraft Y-unit Vector in ECEF Components (Starboard Direction) Unit vector in ECEF for the spacecraft y-axis (nominal Starboard direction) at the start, middle, and end of each exposure.	dimensionless	Epoch, TIMETABLE, VECTORS

Variable Name	Description	Units	Dimensions
ICON_ANCILLARY_MIGHTI_SC_ZHAT	Spacecraft Z-unit Vector in ECEF Components (Nadir Direction) Unit vector in ECEF for the spacecraft z-axis (nominal Nadir direction) at the start, middle, and end of each exposure.	dimensionless	Epoch, TIMETABLE, VECTORS
ICON_ANCILLARY_MIGHTI_SUN_STATUS	Spacecraft Sun/Shadow Status Code Spacecraft sun/shadow status code (1 = shadow, 0 = sun) at the start, middle, and end of each exposure.	binary	Epoch, TIMETABLE
ICON_ANCILLARY_MIGHTI_ORBIT_NUMBER	Orbit Number Integer Orbit Number at the start, middle, and end of each exposure.	integer	Epoch, TIMETABLE
ICON_ANCILLARY_MIGHTI_SLEW_STATUS	MIGHTI Attitude System Status Code Binary Coded Integer where 1: LVLH Normal Mode 2: LVLH Reverse Mode 4: Earth Limb Pointing 8: Inertial Pointing 16: Stellar Pointing 32: Attitude Slew 64: Conjugate Maneuver 128: Nadir Calibration 256: Lunar Calibration 512: Stellar Calibration 1024: Zero Wind Calibration 2048-32768: SPARE	binary	Epoch
ICON_ANCILLARY_MIGHTI_TANGENTPOINTS_LATLONALT	Tangent Locations in WGS84 (Latitude, Longitude, Altitude) Latitude, longitude and altitude in WGS84 of tangent points for 9 points that define the center & outside edges (sides and corners) of the field of view at the start, middle, and end of each exposure.	mixed	Epoch, TIMETABLE, VECTORS, VERTICAL, HORIZONTAL
ICON_ANCILLARY_MIGHTI_TANGENTPOINTS_ECEF	Tangent Locations in ECEF Locations in ECEF of tangent points for 9 points that define the center & outside edges (sides and corners) of the field of view at the start, middle, and end of each exposure.	km	Epoch, TIMETABLE, VECTORS, VERTICAL, HORIZONTAL
ICON_ANCILLARY_MIGHTI_TANGENTPOINTS_SZA	Tangent Points Solar Zenith Angle Solar zenith angle at the tangent points for the 9 points that define the center & outside edges (sides and corners) of the field of view at the start, middle, and end of each exposure.	degrees	Epoch, TIMETABLE, VERTICAL, HORIZONTAL
ICON_ANCILLARY_MIGHTI_TANGENTPOINTS_LOS_COROTATION	Tangent Points LOS Corotation Velocity Corotaion velocity at the tangent points projection into the line of sight for the 9 points that define the center & outside edges (sides and corners) of the field of view at the start, middle, and end of each exposure.	m/s	Epoch, TIMETABLE, VERTICAL, HORIZONTAL

Variable Name	Description	Units	Dimensions
ICON_ANCILLARY_MIGHTI_SC_LOS_VELOCITY	Spacecraft LOS Velocity in ECI Spacecraft velocity in ECI, J2000, projected into the line of sight for 9 points that define the center & outside edges (sides and corners) of the field of view at the start, middle, and end of each exposure.	m/s	Epoch, TIMETABLE, VERTICAL, HORIZONTAL
ICON_ANCILLARY_MIGHTI_FOV_UNITVECTORS_ECEF	FOV Unit Vectors in ECEF Unit look vectors in ECEF for the 9 look directions that define the center & outside edges (sides and corners) of the field of view at the start, middle, and end of each exposure.	dimensions	Epoch, TIMETABLE, VECTORS, VERTICAL, HORIZONTAL
ICON_ANCILLARY_MIGHTI_TANGENTPOINT_DISTANCE	Distance to Tangent Points Line of sight distance to the tangent points for the 9 points that define the center & outside edges (sides and corners) of the field of view at the start, middle, and end of each exposure.	km	Epoch, TIMETABLE, VERTICAL, HORIZONTAL
ICON_ANCILLARY_MIGHTI_HORIZONTAL_BORESIGHT_SUN_ANGLE	Horizontal Boresight to Sun Angle Angle between the Sun and the image horizontal direction (perpendicular to the boresight) at the start, middle, and end of each exposure.	degrees	Epoch, TIMETABLE
ICON_ANCILLARY_MIGHTI_VERTICAL_BORESIGHT_SUN_ANGLE	Vertical Boresight to Sun Angle Angle between the Sun and the image vertical direction (prependicular to the boresight) at the start, middle, and end of each exposure.	degrees	Epoch, TIMETABLE
ICON_ANCILLARY_MIGHTI_TOTAL_BORESIGHT_SUN_ANGLE	Total Boresight to Sun Angle Magitude of the angle between the Sun and the boresight of the instrument at the start, middle, and end of each exposure.	degrees	Epoch, TIMETABLE
ICON_ANCILLARY_MIGHTI_FOV_AZIMUTH_ANGLE	FOV Celestial Azimuth Celestial Azimuth angle for the 9 points that define the center & outside edges (sides and corners) of the field of view at the start, middle, and end of each exposure.	degrees	Epoch, TIMETABLE, VERTICAL, HORIZONTAL

Variable Name	Description	Units	Dimensions
ICON_ANCILLARY_MIGHTI_SPACE_ENVIRONMENT_REGION_STATUS	Space Environment Region Status Standarized for several missions, not all codes are relevant to ICON. Binary Coded Integer where 1: Earth Shadow 2: Lunar Shadow 4: Atmospheric Absorption Zone 8: South Atlantic Anomaly 16: Northern Auroral Zone 32: Southern Auroral Zone 64: Periapsis Passage 128: Inner & Outer Radiation Belts 256: Deep Plasma Sphere 512: Foreshock Solar Wind 1024: Solar Wind Beam 2048: High Magnetic Field 4096: Average Plasma Sheet 8192: Bowshock Crossing 16384: Magnetopause Crossing 32768: Ground Based Observatories 65536: 2-Day Conjunctions 131072: 4-Day Conjunctions 262144: Time Based Conjunctions 524288: Radial Distance Region 1 1048576: Orbit Outbound 2097152: Orbit Inbound 4194304: Lunar Wake 8388608: Magnetotail 16777216: Magnetosheath 33554432: Science 67108864: Low Magnetic Latitude 134217728: Conjugate Observation	binary	Epoch
ICON_ANCILLARY_MIGHTI_A_STATUS	MIGHTI-A Status Binary Coded Integer for view status of MIGHTI-A where 1: Earth Day View 2: Earth Night View 4: Calibration Target View 8: Off-target View 16: Sun Proximity View 32: Moon Proximity View 64: North Magnetic Footpoint View 128: South Magnetic Footpoint View 256: Science Data Collection View 512: Calibration Data Collection View 1024: RAM Proximity View 2048-32768: SPARE Activity is what the spacecraft was commanded to do while status is the spacecraft's natural state of operations. This means that activity should always be used over status if they differ, but will almost always be the same.	binary	Epoch

Variable Name	Description	Units	Dimensions
ICON_ANCILLARY_MIGHTI_B_STATUS	MIGHTI-B Status Binary Coded Integer for view status of MIGHTI-B where 1: Earth Day View 2: Earth Night View 4: Calibration Target View 8: Off-target View 16: Sun Proximity View 32: Moon Proximity View 64: North Magnetic Footpoint View 128: South Magnetic Footpoint View 256: Science Data Collection View 512: Calibration Data Collection View 1024: RAM Proximity View 2048-32768: SPARE Activity is what the spacecraft was commanded to do while status is the spacecraft's natural state of operations. This means that activity should always be used over status if they differ, but will almost always be the same.	binary	Epoch
ICON_ANCILLARY_MIGHTI_A_ACTIVITY	MIGHTI-A Activity Binary Coded Integer for activity in MIGHTI-A where 1: Earth Day Activity 2: Earth Night Activity 4: Calibration Target Activity 8: Off-target Activity 16: Sun Proximity Activity 32: Moon Proximity Activity 64: North Magnetic Footpoint Activity 128: South Magnetic Footpoint Activity 256: Science Data Collection Activity 512: Calibration Data Collection Activity 1024: RAM Proximity Activity 2048-32768: SPARE Activity is what the spacecraft was commanded to do while status is the spacecraft's natural state of operations. This means that activity should always be used over status if they differ, but will almost always be the same.	binary	Epoch

Variable Name	Description	Units	Dimensions
ICON_ANCILLARY_MIGHTI_B_ACTIVITY	MIGHTI-B Activity Binary Coded Integer for activity in MIGHTI-B where 1: Earth Day Activity 2: Earth Night Activity 4: Calibration Target Activity 8: Off-target Activity 16: Sun Proximity Activity 32: Moon Proximity Activity 64: North Magnetic Footpoint Activity 128: South Magnetic Footpoint Activity 256: Science Data Collection Activity 512: Calibration Data Collection Activity 1024: RAM Proximity Activity 2048-32768: SPARE Activity is what the spacecraft was commanded to do while status is the spacecraft's natural state of operations. This means that activity should always be used over status if they differ, but will almost always be the same.	binary	Epoch
ICON_ANCILLARY_MIGHTI_HORIZONTAL_BORESIGHT_ECEF	Horizontal Boresight in ECEF Unit look vector for the image horizontal direction (perpendicular to the boresight) in ECEF at the start, middle, and end of each exposure.	dimensionless	Epoch, TIMETABLE, VECTORS
ICON_ANCILLARY_MIGHTI_VERTICAL_BORESIGHT_ECEF	Vertical Boresight in ECEF Unit look vector for the image vertical direction (perpendicular to the boresight) in ECEF at the start, middle, and end of each exposure.	dimensionless	Epoch, TIMETABLE, VECTORS
ICON_ANCILLARY_MIGHTI_BORESIGHT_ECEF	Boresight in ECEF Unit vector of the nominal boresight (center of instrument FOV) in ECEF at the start, middle, and end of each exposure.	dimensionless	Epoch, TIMETABLE, VECTORS
ICON_ANCILLARY_MIGHTI_HORIZONTAL_BORESIGHT_ECI	Horizontal Boresight in ECI Unit look vector for the image horizontal direction (perpendicular to the boresight) in ECI, J2000, at the start, middle, and end of each exposure.	dimensionless	Epoch, TIMETABLE, VECTORS
ICON_ANCILLARY_MIGHTI_VERTICAL_BORESIGHT_ECI	Vertical Boresight in ECI Unit look vector for the image vertical direction (perpendicular to the boresight) in ECI, J2000, at the start, middle, and end of each exposure.	dimensionless	Epoch, TIMETABLE, VECTORS
ICON_ANCILLARY_MIGHTI_BORESIGHT_ECI	Boresight in ECI Unit vector of the nominal boresight (center of instrument FOV) in ECI, J2000, at the start, middle, and end of each exposure.	dimensionless	Epoch, TIMETABLE, VECTORS

Variable Name	Description	Units	Dimensions
ICON_ANCILLARY_MIGHTI_EARTH_SHADOW_TRANSITION_SECONDS	Number of Seconds Since Transitioning From Shadow to Sun. Number of seconds since the last spacecraft transition from Earth's shadow into sunlight has occured at the start, middle, and end of each exposure.	seconds	Epoch, TIMETABLE
ICON_ANCILLARY_MIGHTI_INSTRUMENT_STATUS	Instrument Calibration Status Code Binary Coded Integer for Instrument Calibration Status where 1: MIGHTI A/B Red Lamp Calibration 2: MIGHTI A/B Green Lamp Calibration 4: MIGHTI A Stellar Calibration 8: MIGHTI B Stellar Calibration 16: MIGHTI A Zero Wind Calibration 32: MIGHTI B Zero Wind Calibration 64: FUV Lamp Calibration 128: FUV Stellar Calibration 256: EUV Lunar Calibration 512: FUV Nadir Flat Field Calibration 1024: EUV Nadir Flat Field Calibration 2048-32768: SPARE	binary	Epoch
ICON_ANCILLARY_MIGHTI_A_RADIATOR_TEMPERATURE	MIGHTI-A Radiator Temperature Temperature of MIGHTI-A radiator as reported by the spacecraft housekeeping	degrees Celsius	Epoch
ICON_ANCILLARY_MIGHTI_B_RADIATOR_TEMPERATURE	MIGHTI-B Radiator Temperature Temperature of MIGHTI-B radiator as reported by the spacecraft housekeeping	degrees Celsius	Epoch
ICON_ANCILLARY_MIGHTI_CAMEL_TEMPERATURE	MIGHTI Camera Electronics Temperature Temperature of MIGHTI camera electronics as reported by the spacecraft housekeeping	degrees Celsius	Epoch
ICON_ANCILLARY_MIGHTI_SC_VOLTAGE	Spacecraft Bus Voltage Spacecraft bus voltage as reported by the spacecraft housekeeping	Volts	Epoch
ICON_ANCILLARY_MIGHTI_TANGENTPOINT_SCATTERING_ANGLE	Solar Scattering Angle of Tangent Points Angle between the (1) a vector from the Sun to the tangent point(s) and (2) a vector from the spacecraft to the tangent point(s). Found for the 9 points that define the center & outside edges (sides and corners) of the field of view at the start, middle, and end of each exposure.	degrees	Epoch, TIMETABLE, VERTICAL, HORIZONTAL
ICON_ANCILLARY_MIGHTI_TANGENTPOINTS_LST	Tangent Points Local Solar Time Local solar time at the tangent points for the 9 points that define the center & outside edges (sides and corners) of the field of view at the start, middle, and end of each exposure.	hours, decimal	Epoch, TIMETABLE, VERTICAL, HORIZONTAL

Variable Name	Description	Units	Dimensions
ICON_ANCILLARY_MIGHTI_JITTER	Jitter Around Middle Time On the basis of the ECEF quaternion ephemeris, a 60-second window is found. Over that window a linear fit of the corrsponding Eular angles is found. A residual between the actual values and linear fit is calculated. The standard deviation of that residual is reported as the jitter. The closest ephemeris time to the MIGHTI middle time is used in this variable.	degrees	Epoch

Variable Name	Description	Units	Dimensions
ICON_ANCILLARY_MIGHTI_QUALITY_FLAG	Quality Flag Binary Coded Integer where 1: STATE_NO_DATA 2: STATE_UNCONVERGED 4: STATE_LOW 8: STATE_MED 16: STATE_HIGH 32: AD_NO_DATA 64: AD_DIVERGING 128: AD_NOT_STARTED 256: AD_CONVERGING 512: AD_COARSE_CONVERGED 1024: AD_FINE_CONVERGED 2048-32768: SPARE STATE_NO_DATA: No telemetry available for this time period. States are propagated from the last valid solution. STATE_UNCONVERGED: The GOODS KF solution is unconverged and should not be used. States are propagated from the last valid solution. STATE_LOW: The GPSR solution is better than the GOODS solution (The position accuracy is worse than 150 m, 1-sigma) STATE_MEDIUM: The GOODS solution is better than the GPSR solution (The position accuracy is better than 150 m, 1-sigma) STATE_HIGH: The GOODS solution is better than the GPSR solution, and meets its performance requirements (20 m position and 0.02 m/sec velocity, 1-sigma). AD_NO_DATA: No telemetry available for this time period. Attitude is copied from the last valid solution. AD_DIVERGING: Tolerances on the diagonal elements of the covariance matrix diverging and exceeds 9.9e9 asec^2 for attitude sigma and 9.9e9 asec^2/sec^2 for rate sigma or negative values AD_NOT_STARTED: KF has not started processing measurements AD_CONVERGING: KF is in state of updating measurements and filter started to converge AD_COARSE_CONVERGED: Tolerances on the diagonal elements of the covariance matrix converging and below 200K asec^2 for x, y and 1000K for z in tracker frame for attitude and 10 asec^2/sec^2 for x, y and z for rate AD_FINE_CONVERGED: Tolerances on the diagonal elements of the covariance matrix converging and below 1000 asec^2 for x, y and z in tracker frame for attitude and 1 asec^2/sec^2 x, y and z for rate Nominal value of 1040: STATE_HIGH (16) and AD_FINE_CONVERGED (1024). All values are a combination of a STATE value and an AD (attitude determination) value. It is up to the user to determine if data outside 1040 is usable. AD values NOT AD_FINE_CONVERGED should be suspect. STATE_HIGH is expected, but STATE_MED is possible during maneuvers.	binary	Epoch

Variable Name	Description	Units	Dimensions
ICON_ANCILLARY_MIGHTI_TOTAL_BORESIGHT_MOON_ANGLE	Total Boresight to Moon Angle Magitude of the angle between the Moon and the boresight for the instrument at the start,middle, and end of each exposure.	degrees	Epoch, TIMETABLE

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. Guidelines for the use of this product are described in the ICON Rules of the Road (https://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

Responsibility for the validation of the L1 data products falls to the instrument lead investigators/scientists.
* EUV: Dr. Eric Korpela : https://doi.org/10.1007/s11214-017-0384-2
* FUV: Dr. Harald Frey : https://doi.org/10.1007/s11214-017-0386-0
* MIGHTI: Dr. Christoph Englert : 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 and N2 profiles: Dr. Andrew Stephan : https://doi.org/10.1007/s11214-018-0477-6
* Daytime (EUV) O+ profiles: Dr. Andrew Stephan : 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: Dr. Jonathan Makela : https://doi.org/10.1007/s11214-017-0359-3
* Neutral Temperature profiles: Dr. Christoph Englert : https://doi.org/10.1007/s11214-017-0434-9
* Ion Velocity Measurements : Dr. Russell Stoneback : https://doi.org/10.1007/s11214-017-0383-3

Responsibility for Level 4 products falls to those scientists responsible for those products.
* Hough Modes : Dr. Chihoko Yamashita : 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.

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.

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 available on the ICON website (http://icon.ssl.berkeley.edu/Data).

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