

ICON Data Product 0P: IVM Ancillary Products

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

The IVM ancillary data file contains information on the ICON observatory as well as IVM specific information. This includes the pointing, 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 IVM instrument is included such as unit vectors and magnetic footpoint parameters. These files are combined with the IVM Level 1 data to produce Level 2 data. 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-horizontal. 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 02, Created by IVM Ancillary Processor v2.0.4 on Thu, 08 Oct 2020, 2020-10-08T16:09:19.000 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	21600
VECTORS	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	<p>Milliseconds since 1970-01-01 00:00:00 UTC at middle of measurement integration.</p> <p>Number of milliseconds since 1970-01-01 00:00:00 UTC at the middle of the measurement integration. Taken from LOP IVM data file.</p>	milliseconds	EPOCH
ICON Ancillary IVM Time GPS	<p>Milliseconds since 1980-01-06 00:00:00 TAI (coincident with UTC) at middle of reading.</p> <p>Number of milliseconds since 1980-01-06 00:00:00 TAI at the middle of the measurement integration.</p>	milliseconds	EPOCH
ICON Ancillary IVM Time UTC	<p>ISO 8601 formatted UTC timestamp (at middle of reading).</p> <p>ISO 8601 formatted UTC timestamp (at middle of reading). E.g., 2017-05-27 00:00:00.380Z</p>	string	EPOCH
ICON Ancillary IVM SC Position ECEF	<p>ECEF Spacecraft Position</p> <p>Position of spacecraft in ECEF coordinates.</p>	km	EPOCH, VECTORS
ICON Ancillary IVM SC Velocity ECEF	<p>ECEF Spacecraft Velocity</p> <p>Velocity of spacecraft in ECEF coordinates.</p>	m/s	EPOCH, VECTORS
ICON Ancillary IVM SC Position ECI	<p>ECI Spacecraft Position</p> <p>Position of spacecraft in ECI, J2000, coordinates.</p>	km	EPOCH, VECTORS
ICON Ancillary IVM SC Velocity ECI	<p>ECI Spacecraft Velocity</p> <p>Velocity of spacecraft in ECI, J2000, coordinates.</p>	m/s	EPOCH, VECTORS
ICON Ancillary IVM Latitude	<p>WGS84 Latitude of Spacecraft Position (geodetic)</p> <p>Geodetic latitude of spacecraft in WGS84</p>	degrees North	EPOCH
ICON Ancillary IVM Longitude	<p>WGS84 Longitude of Spacecraft Position (geodetic)</p> <p>Geodetic longitude of spacecraft in WGS84</p>	degrees East	EPOCH
ICON Ancillary IVM Altitude	<p>WGS84 Altitude of Spacecraft Position (geodetic)</p> <p>Geodetic Altitude of Spacecraft in WGS84.</p>	km	EPOCH
ICON Ancillary IVM VNorth	<p>North Velocity of Spacecraft</p> <p>North component of the spacecraft velocity vector derived from WGS84.</p>	m/s	EPOCH

Variable Name	Description	Units	Dimensions
ICON Ancillary_IVM_VEAST	East Velocity of Spacecraft East component of the spacecraft velocity vector derived from WGS84.	m/s	EPOCH
ICON Ancillary_IVM_VDOWN	Down (Perpendicular to Local Earth Surface) Velocity of Spacecraft Down component of the spacecraft velocity vector derived from WGS84.	m/s	EPOCH
ICON Ancillary_IVM_MAGNETIC_LATITUDE	Magnetic Latitude of Spacecraft Position Quasi-dipole magnetic latitude of the spacecraft position. These values are obtained from passing the geodetic latitudes, longitudes, and altitudes from ICON Ancillary_IVM_LATITUDE, ICON Ancillary_IVM_LONGITUDE, and ICON Ancillary_IVM_ALTITUDE into apexpy Python module. For details on apexpy see: https://apexpy.readthedocs.org/	degrees North	EPOCH
ICON Ancillary_IVM_MAGNETIC_LONGITUDE	Magnetic Longitude of Spacecraft Position Quasi-dipole magnetic longitude of the spacecraft position. These values are obtained from passing the geodetic latitudes, longitudes, and altitudes from ICON Ancillary_IVM_LATITUDE, ICON Ancillary_IVM_LONGITUDE, and ICON Ancillary_IVM_ALTITUDE into apexpy Python module. For details on apexpy see: https://apexpy.readthedocs.org/	degrees East	EPOCH
ICON Ancillary_IVM_SZA	Solar Zenith Angle at Spacecraft Solar Zenith Angle at the spacecraft.	degrees	EPOCH
ICON Ancillary_IVM_LST	Local Solar Time at Spacecraft Local Solar Time at spacecraft.	hour	EPOCH
ICON Ancillary_IVM_SC_XHAT_ECEF	Spacecraft X Unit Vector in ECEF (Ram Direction) Spacecraft x-axis (nominal Ram direction) unit vector in ECEF.	dimensionless	EPOCH, VECTORS
ICON Ancillary_IVM_SC_YHAT_ECEF	Spacecraft Y Unit Vector in ECEF (Starboard Direction) Spacecraft y-axis (nominal Starboard direction) unit vector in ECEF.	dimensionless	EPOCH, VECTORS
ICON Ancillary_IVM_SC_ZHAT_ECEF	Spacecraft Z Unit Vector in ECEF (Nadir Direction) Spacecraft z-axis (nominal Nadir direction) unit vector in ECEF.	dimensionless	EPOCH, VECTORS
ICON Ancillary_IVM_SC_XHAT_ECI	Spacecraft X unit Vector in ECI (Ram Direction) Spacecraft x-axis (nominal Ram direction) unit vector in ECI, J2000.	dimensionless	EPOCH, VECTORS

Variable Name	Description	Units	Dimensions
ICON Ancillary_IVM_SC_YHAT_ECI	Spacecraft Y Unit Vector in ECI (Starboard Direction) Spacecraft y-axis (nominal Starboard direction) unit vector in ECI, J2000.	dimensionless	EPOCH, VECTORS
ICON Ancillary_IVM_SC_ZHAT_ECI	Spacecraft Z Unit Vector in ECI (Nadir Direction) Spacecraft z-axis (nominal Nadir direction) unit vector in ECI, J2000.	dimensionless	EPOCH, VECTORS
ICON Ancillary_IVM_INSTRUMENT_XHAT_ECEF	Instrument X Unit Vector in ECEF (Ram Direction) IVM x-axis (nominal Ram direction) unit vector in ECEF.	dimensionless	EPOCH, VECTORS
ICON Ancillary_IVM_INSTRUMENT_YHAT_ECEF	Instrument Y Unit Vector in ECEF (Starboard Direction) IVM y-axis (nominal Starboard direction) unit vector in ECEF.	dimensionless	EPOCH, VECTORS
ICON Ancillary_IVM_INSTRUMENT_ZHAT_ECEF	Instrument Z Unit Vector in ECEF (Nadir Direction) IVM z-axis (nominal Nadir direction) unit vector in ECEF.	dimensionless	EPOCH, VECTORS
ICON Ancillary_IVM_INSTRUMENT_XHAT_ECI	Instrument X Unit Vector in ECI (Ram Direction) IVM x-axis (nominal Ram direction) unit vector in ECI, J2000.	dimensionless	EPOCH, VECTORS
ICON Ancillary_IVM_INSTRUMENT_YHAT_ECI	Instrument Y Unit Vector in ECI (Starboard Direction) IVM y-axis (nominal Starboard direction) unit vector in ECI, J2000.	dimensionless	EPOCH, VECTORS
ICON Ancillary_IVM_INSTRUMENT_ZHAT_ECI	Instrument Z Unit Vector in ECI (Nadir Direction) IVM z-axis (nominal Nadir direction) unit vector in ECI, J2000.	dimensionless	EPOCH, VECTORS
ICON Ancillary_IVM_COROTATION	ECI Earth Corotation Velocity Components in IVM Coordinates Component of Earth's corotation velocity vector projected into the IVM instrument axes by taking the dot product of the corotation vector with the instrument's axes and multiplying the Y and Z components by negative 1 (but not the X component by convention).	m/s	EPOCH, VECTORS
ICON Ancillary_IVM_SUN_XY_PLANE_ANGLE	Angle Between Sun and IVM XY Plane Angle between the Sun and IVM instrument XY plane.	degrees	EPOCH
ICON Ancillary_IVM_SUN_XZ_PLANE_ANGLE	Angle Between Sun and IVM XZ Plane Angle between the Sun and IVM instrument XZ plane.	degrees	EPOCH
ICON Ancillary_IVM_MTB_STATUS	Magnetic Torquer Bar Firing Status If the magnetic torquers are active during any part of the measurement, it is recorded as active for whole measurement. Decoded from spacecraft housekeeping file: ICON_LO_Spacecraft_Housekeeping-MTB_2020-01-20_v01r000.CSV	binary	EPOCH

Variable Name	Description	Units	Dimensions
ICON Ancillary_IVM_SUN_STATUS	Spacecraft Sun/Shadow Status Code Data is from predictive ephemeris. 0 = spacecraft in Sun, 1 = spacecraft in Earth Shadow.	binary	EPOCH
ICON Ancillary_IVM_ORBIT_NUMBER	Orbit Number Integer Orbit Number.	integer	EPOCH
ICON Ancillary_IVM_ATTITUDE_STATUS	Slew or Off-Point 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_IVM_SPACE_ENVIRONMENT_REGION_STATUS	Space Environment Region Status Standardized for several missions, not all codes are relevant for ICON 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

Variable Name	Description	Units	Dimensions
ICON_ANCILLARY_IVM_A_STATUS	<p>IVM-A Status</p> <p>Binary Coded Integer where</p> <ul style="list-style-type: none"> 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 <p>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.</p>	binary	EPOCH
ICON_ANCILLARY_IVM_B_STATUS	<p>IVM-B Status</p> <p>Binary Coded Integer where</p> <ul style="list-style-type: none"> 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 <p>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.</p>	binary	EPOCH

Variable Name	Description	Units	Dimensions
ICON_ANCILLARY_IVM_A_ACTIVITY	<p>IVM-A Activity</p> <p>Binary Coded Integer where:</p> <ul style="list-style-type: none"> 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 <p>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.</p>	binary	EPOCH
ICON_ANCILLARY_IVM_B_ACTIVITY	<p>IVM-A Activity</p> <p>Binary Coded Integer where:</p> <ul style="list-style-type: none"> 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 <p>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.</p>	binary	EPOCH
ICON_ANCILLARY_IVM_INSTRUMENT_VELOCITY_ECEF	<p>Spacecraft ECEF Velocity in Instrument Coordinates</p> <p>Component of spacecraft velocity in ECEF projected into IVM instrument axes by taking the dot product of the spacecraft velocity vector and the IVM axes in the ECEF frame.</p>	m/s	EPOCH, VECTORS
ICON_ANCILLARY_IVM_INSTRUMENT_VELOCITY_ECI	<p>Spacecraft ECI Velocity in Instrument Coordinates</p> <p>Component of spacecraft velocity in ECI projected into IVM instrument axes by taking the dot product of the spacecraft velocity vector and the IVM axes in the ECI frame.</p>	m/s	EPOCH, VECTORS
ICON_ANCILLARY_IVM_SC_MLT	<p>Magnetic Local Time at Spacecraft</p> <p>Magnetic Local Time at the spacecraft.</p>	hour	EPOCH

Variable Name	Description	Units	Dimensions
ICON_ANCILLARY_IVM_SC_B_X	X Component of the Magnetic Field at the Spacecraft X-component of the magnetic field from IGRF at the spacecraft position, expressed in the ECEF frame.	nT	EPOCH
ICON_ANCILLARY_IVM_SC_B_Y	Y Component of the Magnetic Field at the Spacecraft Y-component of the magnetic field from IGRF at the spacecraft position, expressed in the ECEF frame.	nT	EPOCH
ICON_ANCILLARY_IVM_SC_B_Z	Z Component of the Magnetic Field at the Spacecraft Z-component of the magnetic field from IGRF at the spacecraft position, expressed in the ECEF frame.	nT	EPOCH
ICON_ANCILLARY_IVM_NORTH_FOOTPOINT_LAT	Latitude of North Footpoint of Geomagnetic Line at 150 km from IGRF Latitude location of the magnetic footpoint in the Northern Hemisphere at 150 km. These data were interpolated using a tricubic algorithm from IGRF and ephemeris data then linearly interplotted to IVM times.	degree s	EPOCH
ICON_ANCILLARY_IVM_NORTH_FOOTPOINT_LON	Longitude of North Footpoint of Geomagnetic Line at 150 km from IGRF Longitude location of the magnetic footpoint in the Northern Hemisphere at 150 km. These data were interpolated using a tricubic algorithm from IGRF and ephemeris data then linearly interplotted to IVM times.	degree s	EPOCH
ICON_ANCILLARY_IVM_NORTH_FOOTPOINT_ALT	Altitude of North Footpoint of Geomagnetic Line at 150 km from IGRF Altitude location of the magnetic footpoint in the Northern Hemisphere at 150 km. These data were interpolated using a tricubic algorithm from IGRF and ephemeris data then linearly interplotted to IVM times.	km	EPOCH
ICON_ANCILLARY_IVM_SOUTH_FOOTPOINT_LAT	Latitude of South Footpoint of Geomagnetic Line at 150 km from IGRF Latitude location of the magnetic footpoint in the Southern Hemisphere at 150 km. These data were interpolated using a tricubic algorithm from IGRF and ephemeris data then linearly interplotted to IVM times.	degree s	EPOCH
ICON_ANCILLARY_IVM_SOUTH_FOOTPOINT_LON	Longitude of South Footpoint of Geomagnetic Line at 150 km from IGRF Longitude location of the magnetic footpoint in the Southern Hemisphere at 150 km. These data were interpolated using a tricubic algorithm from IGRF and ephemeris data then linearly interplotted to IVM times.	degree s	EPOCH

Variable Name	Description	Units	Dimensions
ICON_ANCILLARY_IVM_SOUTH_FOOTPOINT_ALT	Altitude of South Footpoint of Geomagnetic Line at 150 km from IGRF Altitude location of the magnetic footpoint in the Northern Hemisphere at 150 km. These data were interpolated using a tricubic algorithm from IGRF and ephemeris data then linearly interplotted to IVM times.	km	EPOCH
ICON_ANCILLARY_IVM_NORTH_FOOTPOINT_ZON_ECEF_X	ECEF X-Component of Zonal Drift Direcrtion at Northern Footpoint At the northern footpoint this is the x-component of the unit vector for zonal ion drifts expressed in the ECEF frame.	dimensi onless	EPOCH
ICON_ANCILLARY_IVM_NORTH_FOOTPOINT_ZON_ECEF_Y	ECEF Y-Component of Zonal Drift Direcrtion at Northern Footpoint At the northern footpoint this is the y-component of the unit vector for zonal ion drifts expressed in the ECEF frame.	dimensi onless	EPOCH
ICON_ANCILLARY_IVM_NORTH_FOOTPOINT_ZON_ECEF_Z	ECEF Z-Component of Zonal Drift Direction at Northern Footpoint At the northern footpoint this is the z-component of the unit vector for zonal ion drifts expressed in the ECEF frame.	dimensi onless	EPOCH
ICON_ANCILLARY_IVM_SOUTH_FOOTPOINT_ZON_ECEF_X	ECEF X-Component of Zonal Drift Direction at Southern Footpoint At the Southern footpoint this is the x-component of the unit vector for zonal ion drifts expressed in the ECEF frame.	dimensi onless	EPOCH
ICON_ANCILLARY_IVM_SOUTH_FOOTPOINT_ZON_ECEF_Y	ECEF Y-Component of Zonal Drift Direction at Southern Footpoint At the Southern footpoint this is the y-component of the unit vector for zonal ion drifts expressed in the ECEF frame.	dimensi onless	EPOCH
ICON_ANCILLARY_IVM_SOUTH_FOOTPOINT_ZON_ECEF_Z	ECEF Z-Component of Zonal Drift Direction at Southern Footpoint At the Southern footpoint this is the z-component of the unit vector for zonal ion drifts expressed in the ECEF frame.	dimensi onless	EPOCH
ICON_ANCILLARY_IVM_NORTH_FOOTPOINT_MER_ECEF_X	ECEF X-Component of Meridional Drift Direction at Northern Footpoint At the northern footpoint this is the x-component of the unit vector for meridional ion drifts expressed in the ECEF frame.	dimensi onless	EPOCH
ICON_ANCILLARY_IVM_NORTH_FOOTPOINT_MER_ECEF_Y	ECEF Y-Component of Meridional Drift Direction at Northern Footpoint At the northern footpoint this is the y-component of the unit vector for meridional ion drifts expressed in the ECEF frame.	dimensi onless	EPOCH

Variable Name	Description	Units	Dimensions
ICON_ANCILLARY_IVM_NORTH_FOOTPOINT_MER_ECEF_Z	ECEF Z-Component of Meridional Drift Direction at Northern Footpoint At the northern footpoint this is the z-component of the unit vector for meridional ion drifts expressed in the ECEF frame.	dimensionless	EPOCH
ICON_ANCILLARY_IVM_SOUTH_FOOTPOINT_MER_ECEF_X	ECEF X-Component of Meridional Drift Direction at Southern Footpoint At the Southern footpoint this is the x-component of the unit vector for meridional ion drifts expressed in the ECEF frame.	dimensionless	EPOCH
ICON_ANCILLARY_IVM_SOUTH_FOOTPOINT_MER_ECEF_Y	ECEF Y-Component of Meridional Drift Direction at Southern Footpoint At the Southern footpoint this is the y-component of the unit vector for meridional ion drifts expressed in the ECEF frame.	dimensionless	EPOCH
ICON_ANCILLARY_IVM_SOUTH_FOOTPOINT_MER_ECEF_Z	ECEF Z-Component of Meridional Drift Direction at Southern Footpoint At the Southern footpoint this is the z-component of the unit vector for meridional ion drifts expressed in the ECEF frame.	dimensionless	EPOCH
ICON_ANCILLARY_IVM_NORTH_FOOTPOINT_FA_ECEF_X	ECEF X-Component of Field Aligned Drift Direction at Northern Footpoint At the northern footpoint this is the x-component of the unit vector for field aligned ion drifts expressed in the ECEF frame.	dimensionless	EPOCH
ICON_ANCILLARY_IVM_NORTH_FOOTPOINT_FA_ECEF_Y	ECEF Y-Component of Field Aligned Drift Direction at Northern Footpoint At the northern footpoint this is the y-component of the unit vector for field aligned ion drifts expressed in the ECEF frame.	dimensionless	EPOCH
ICON_ANCILLARY_IVM_NORTH_FOOTPOINT_FA_ECEF_Z	ECEF Z-Component of Field Aligned Drift Direction at Northern Footpoint At the northern footpoint this is the z-component of the unit vector for field aligned ion drifts expressed in the ECEF frame.	dimensionless	EPOCH
ICON_ANCILLARY_IVM_SOUTH_FOOTPOINT_FA_ECEF_X	ECEF X-Component of Field Aligned Drift Direction at Southern Footpoint At the Southern footpoint this is the x-component of the unit vector for field aligned ion drifts expressed in the ECEF frame.	dimensionless	EPOCH
ICON_ANCILLARY_IVM_SOUTH_FOOTPOINT_FA_ECEF_Y	ECEF Y-Component of Field Aligned Drift Direction at Southern Footpoint At the Southern footpoint this is the y-component of the unit vector for field aligned ion drifts expressed in the ECEF frame.	dimensionless	EPOCH
ICON_ANCILLARY_IVM_SOUTH_FOOTPOINT_FA_ECEF_Z	ECEF Z-Component of Field Aligned Drift Direction at Southern Footpoint At the Southern footpoint this is the z-component of the unit vector for field aligned ion drifts expressed in the ECEF frame.	dimensionless	EPOCH

Variable Name	Description	Units	Dimensions
ICON_ANCILLARY_IVM_NORTH_FOOTPOINT_ZON_DRIFT	Translating Scalars of Zonal Ion Drifts at Northern Footpoint Scalars for translating zonal ion drifts (meridional E fields) measured at the spacecraft down to the northern footpoint.	dimensionless	EPOCH
ICON_ANCILLARY_IVM_NORTH_FOOTPOINT_MER_DRIFT	Translating Scalars of Meridional Ion Drifts at Northern Footpoint Scalars for translating meridional ion drifts (zonal E fields) measured at the spacecraft down to the northern footpoint.	dimensionless	EPOCH
ICON_ANCILLARY_IVM_SOUTH_FOOTPOINT_ZON_DRIFT	Translating Scalars of Zonal Ion Drifts at Southern Footpoint Scalars for translating zonal ion drifts (meridional E fields) measured at the spacecraft down to the southern footpoint.	dimensionless	EPOCH
ICON_ANCILLARY_IVM_SOUTH_FOOTPOINT_MER_DRIFT	Translating Scalars of Meridional Ion Drifts at Southern Footpoint Scalars for translating meridional ion drifts (zonal E fields) measured at the spacecraft down to the southern footpoint.	dimensionless	EPOCH
ICON_ANCILLARY_IVM_EQU_ZON_DRIFT	Translating Scalars of Zonal Ion Drifts at Equator Scalars for translating zonal ion drifts (meridional E fields) measured at the spacecraft down to the magnetic equator.	dimensionless	EPOCH
ICON_ANCILLARY_IVM_EQU_MER_DRIFT	Translating Scalars of Meridional Ion Drifts at Equator Scalars for translating meridional ion drifts (zonal E fields) measured at the spacecraft down to the magnetic equator.	dimensionless	EPOCH
ICON_ANCILLARY_IVM_APEX_HEIGHT	Modified APEX Height Modified APEX height of the spacecraft position.	km	EPOCH
ICON_ANCILLARY_IVM_NORTH_FOOTPOINT_QD_LAT	Quasi-dipole Latitude of Northern Footpoint Calculated value of quasi-dipole latitude of northern footpoint from IGRF.	degrees	EPOCH
ICON_ANCILLARY_IVM_NORTH_FOOTPOINT_QD_LON	Quasi-dipole Longitude of Northern Footpoint Calculated value of quasi-dipole longitude of northern footpoint from IGRF	degrees	EPOCH
ICON_ANCILLARY_IVM_SOUTH_FOOTPOINT_QD_LAT	Quasi-dipole Latitude of Southern Footpoint Calculated value of quasi-dipole latitude of southern footpoint from IGRF	degrees	EPOCH
ICON_ANCILLARY_IVM_SOUTH_FOOTPOINT_QD_LON	Quasi-dipole Longitude of Southern Footpoint Calculated value of quasi-dipole longitude of southern footpoint from IGRF	degrees	EPOCH

Variable Name	Description	Units	Dimensions
ICON Ancillary IVM Quality Flag ICON Ancillary IVM Quality Flag	<p>Quality Flag</p> <p>Binary Coded Integer where</p> <ul style="list-style-type: none"> 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 <p>STATE_NO_DATA: No telemetry available for this time period. States are propagated from the last valid solution.</p> <p>STATE_UNCONVERGED: The GOODS KF solution is unconverged and should not be used. States are propagated from the last valid solution.</p> <p>STATE_LOW: The GPSR solution is better than the GOODS solution (The position accuracy is worse than 150 m, 1-sigma)</p> <p>STATE_MEDIUM: The GOODS solution is better than the GPSR solution (The position accuracy is better than 150 m, 1-sigma)</p> <p>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).</p> <p>AD_NO_DATA: No telemetry available for this time period. Attitude is copied from the last valid solution.</p> <p>AD_DIVERGING: Tolerances on the diagonal elements of the covariance matrix diverging and exceeds 9.9e9 asec² for attitude sigma and 9.9e9 asec²/sec² for rate sigma or negative values</p> <p>AD_NOT_STARTED: KF has not started processing measurements</p> <p>AD_CONVERGING: KF is in state of updating measurements and filter started to converge</p> <p>AD_COARSE_CONVERGED: Tolerances on the diagonal elements of the covariance matrix converging and below 200K asec² for x, y and 1000K for z in tracker frame for attitude and 10 asec²/sec² for x, y and z for rate</p> <p>AD_FINE_CONVERGED: Tolerances on the diagonal elements of the covariance matrix converging and below 1000 asec² for x, y and z in tracker frame for attitude and 1 asec²/sec² x, y and z for rate</p> <p>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.</p>	binary	EPOCH

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.
<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.

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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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