

Each file contains data for one day of observation.

File names include the year, the month and the day of observation. Their structure is:

IASI_PLATFORM_L2_NH3_YYYYMMDD_ULB-LATMOS_VERSION.nc

where:

PLATFORM = METOPA, METOPB or METOPC, YYYY = year, MM = month, DD = day, VERSION = VX.Y.Z where X.Y is the version number of the retrieval code and Z the version number of the NetCDF file production

The format of the files is NetCDF4.

The structure of the file header (eg for 1st January 2020) is as follows:

```
netcdf IASI_METOPA_L2_NH3_20200101_ULB-LATMOS_V4.0.0 {
dimensions:
    time = 1286391 ;
    levels = 15 ;
    midlevels = 14 ;
variables:
    double time(time) ;
        time:long_name = "UTC observation time" ;
        time:units = "days since 1970-01-01 00:00:00" ;
        time:standard_name = "time" ;
        time:coordinates = "longitude latitude" ;
    int AERIStime(time) ;
        AERIStime:long_name = "UTC observation time" ;
        AERIStime:units = "seconds since 2007-01-01 00:00:00" ;
        AERIStime:standard_name = "time" ;
        AERIStime:seconds_between_19700101_and_20070101 = 1167606000. ;
        AERIStime:coordinates = "longitude latitude" ;
    float levels(levels) ;
        levels:long_name = "altitude of the vertical levels separating the different vertical layers, above
ground level" ;
        levels:units = "kilometer" ;
        levels:positive = "up" ;
    float midlevels(midlevels) ;
        midlevels:long_name = "altitude of the middle of each vertical layer, above ground level" ;
        midlevels:units = "kilometer" ;
        midlevels:positive = "up" ;
    float solar_zenith_angle(time) ;
        solar_zenith_angle:long_name = "solar zenith angle at the Earth\'s surface for the pixel center" ;
        solar_zenith_angle:units = "degree" ;
        solar_zenith_angle:standard_name = "solar_zenith_angle" ;
        solar_zenith_angle:coordinates = "longitude latitude" ;
    float satellite_zenith_angle(time) ;
        satellite_zenith_angle:long_name = "Metop zenith angle at the Earth\'s surface for the pixel
center" ;
        satellite_zenith_angle:units = "degree" ;
        satellite_zenith_angle:standard_name = "sensor_zenith_angle" ;
        satellite_zenith_angle:coordinates = "longitude latitude" ;
    float ground_height(time) ;
        ground_height:long_name = "ground height" ;
        ground_height:units = "kilometer" ;
        ground_height:standard_name = "ground_level_altitude" ;
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    ground_height:comment = "This quantity is derived from the National Geophysical Data Center
TerrainBase Global DTM Version 1.0 (https://www.ngdc.noaa.gov/mgg/gravity/1999/data/global/tbase/),
interpolated to the center of the IASI pixel" ;
    ground_height:coordinates = "longitude latitude" ;
float orbit_number(time) ;
    orbit_number:long_name = "Metop orbit number" ;
    orbit_number:units = "no unit" ;
    orbit_number:missing_value = NaNf ;
    orbit_number:coordinates = "longitude latitude" ;
float scanline_number(time) ;
    scanline_number:long_name = "scanline number in the Metop orbit" ;
    scanline_number:units = "no unit" ;
    scanline_number:missing_value = NaNf ;
    scanline_number:coordinates = "longitude latitude" ;
float pixel_number(time) ;
    pixel_number:long_name = "pixel number in the current scanline" ;
    pixel_number:valid_range = 1.f, 120.f ;
    pixel_number:units = "no unit" ;
    pixel_number:missing_value = NaNf ;
    pixel_number:coordinates = "longitude latitude" ;
float ifov_number(time) ;
    ifov_number:long_name = "field of view number in the 2 x 2 observation matrix" ;
    ifov_number:valid_range = 1.f, 4.f ;
    ifov_number:units = "no unit" ;
    ifov_number:missing_value = NaNf ;
    ifov_number:coordinates = "longitude latitude" ;
float latitude(time) ;
    latitude:long_name = "latitude of ground pixel center" ;
    latitude:units = "degrees_north" ;
    latitude:valid_range = -90.f, 90.f ;
    latitude:standard_name = "latitude" ;
    latitude:coordinates = "longitude latitude" ;
float longitude(time) ;
    longitude:long_name = "longitude of ground pixel center" ;
    longitude:units = "degrees_east" ;
    longitude:valid_range = -180.f, 180.f ;
    longitude:standard_name = "longitude" ;
    longitude:coordinates = "longitude latitude" ;
short hour(time) ;
    hour:long_name = "UTC observation hour of the day" ;
    hour:units = "hour" ;
    hour:valid_range = 0s, 23s ;
    hour:coordinates = "longitude latitude" ;
short minute(time) ;
    minute:long_name = "UTC observation minute of the hour" ;
    minute:units = "minute" ;
    minute:valid_range = 0s, 59s ;
    minute:coordinates = "longitude latitude" ;
short second(time) ;
    second:long_name = "UTC observation second of the minute" ;
    second:units = "second" ;
    second:valid_range = 0s, 59s ;
    second:coordinates = "longitude latitude" ;
float cloud_coverage(time) ;
    cloud_coverage:long_name = "cloud coverage in the ground pixel (from IASI L2)" ;
    cloud_coverage:valid_range = 0.f, 100.f ;
    cloud_coverage:units = "%" ;
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        cloud_coverage:missing_value = NaNf ;
        cloud_coverage:coordinates = "longitude latitude" ;
float Tskin(time) ;
    Tskin:long_name = "skin temperature (from IASI L2)" ;
    Tskin:units = "K" ;
    Tskin:missing_value = NaNf ;
    Tskin:coordinates = "longitude latitude" ;
float T0km(time) ;
    T0km:long_name = "atmospheric temperature at the surface" ;
    T0km:units = "K" ;
    T0km:missing_value = NaNf ;
    T0km:standard_name = "surface_temperature" ;
    T0km:comment = "Data originates from IASI Level 2" ;
    T0km:coordinates = "longitude latitude" ;
float PBL_height(time) ;
    PBL_height:long_name = "planetary boundary layer height" ;
    PBL_height:units = "kilometer" ;
    PBL_height:missing_value = NaNf ;
    PBL_height:standard_name = "atmosphere_boundary_layer_thickness" ;
    PBL_height:comment = "Data originates from global ERA5 reanalysis" ;
    PBL_height:coordinates = "longitude latitude" ;
float ThalfPBL(time) ;
    ThalfPBL:long_name = "temperature at half the planetary boundary layer height" ;
    ThalfPBL:units = "K" ;
    ThalfPBL:missing_value = NaNf ;
    ThalfPBL:comment = "Data originates from IASI Level 2" ;
    ThalfPBL:coordinates = "longitude latitude" ;
float HRI(time) ;
    HRI:long_name = "hyperspectral range index (HRI) of NH3" ;
    HRI:units = "no unit" ;
    HRI:missing_value = NaNf ;
    HRI:coordinates = "longitude latitude" ;
float emissivity(time) ;
    emissivity:long_name = "emissivity" ;
    emissivity:units = "no unit" ;
    emissivity:missing_value = NaNf ;
    emissivity:comment = "This value applies to the spectral range in which the target species is
calculated. Primary data originates from doi:10.1364/AO.47.004649 and doi:10.1109/JSTARS.2013.2238892" ;
    emissivity:standard_name = "surface_longwave_emissivity" ;
    emissivity:coordinates = "longitude latitude" ;
float nh3_total_column(time) ;
    nh3_total_column:long_name = "retrieved NH3 total column in mole per square meter" ;
    nh3_total_column:units = "mol m-2" ;
    nh3_total_column:missing_value = NaNf ;
    nh3_total_column:multiplication_factor_to_convert_to_molecules_per_cm2 = 6.02214076e+19 ;
    nh3_total_column:coordinates = "longitude latitude" ;
float nh3_total_column_random_uncertainty(time) ;
    nh3_total_column_random_uncertainty:long_name = "random total uncertainty on the total
column" ;
    nh3_total_column_random_uncertainty:units = "mol m-2" ;
    nh3_total_column_random_uncertainty:missing_value = NaNf ;
    nh3_total_column_random_uncertainty:multiplication_factor_to_convert_to_molecules_per_cm2
= 6.02214076e+19 ;
    nh3_total_column_random_uncertainty:coordinates = "longitude latitude" ;
float nh3_total_column_systematic_uncertainty(time) ;
    nh3_total_column_systematic_uncertainty:long_name = "systematic total uncertainty on the total
column" ;

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nh3_total_column_systematic_uncertainty:units = "mol m-2" ;
nh3_total_column_systematic_uncertainty:missing_value = NaNf ;

nh3_total_column_systematic_uncertainty:multiplication_factor_to_convert_to_molecules_per_cm2 =
6.02214076e+19 ;
nh3_total_column_systematic_uncertainty:coordinates = "longitude latitude" ;
float nh3_total_column_random_uncertainty_excluding_vertical_profile(time) ;
nh3_total_column_random_uncertainty_excluding_vertical_profile:long_name = "random
uncertainty on the total column excluding uncertainties on the vertical distribution" ;
nh3_total_column_random_uncertainty_excluding_vertical_profile:units = "mol m-2" ;
nh3_total_column_random_uncertainty_excluding_vertical_profile:comment = "this is the random
uncertainty to be used when AVKs are applied" ;
nh3_total_column_random_uncertainty_excluding_vertical_profile:missing_value = NaNf ;

nh3_total_column_random_uncertainty_excluding_vertical_profile:multiplication_factor_to_convert_to_
molecules_per_cm2 = 6.02214076e+19 ;
nh3_total_column_random_uncertainty_excluding_vertical_profile:coordinates = "longitude
latitude" ;
float nh3_total_column_systematic_uncertainty_excluding_vertical_profile(time) ;
nh3_total_column_systematic_uncertainty_excluding_vertical_profile:long_name = "systematic
uncertainty on the total column excluding uncertainties on the vertical distribution" ;
nh3_total_column_systematic_uncertainty_excluding_vertical_profile:units = "mol m-2" ;
nh3_total_column_systematic_uncertainty_excluding_vertical_profile:comment = "this is the
systematic uncertainty to be used when AVKs are applied" ;
nh3_total_column_systematic_uncertainty_excluding_vertical_profile:missing_value = NaNf ;

nh3_total_column_systematic_uncertainty_excluding_vertical_profile:multiplication_factor_to_convert_t
o_molecules_per_cm2 = 6.02214076e+19 ;
nh3_total_column_systematic_uncertainty_excluding_vertical_profile:coordinates = "longitude
latitude" ;
float nh3_AvKnorm(time) ;
nh3_AvKnorm:long_name = "normalisation factor to be applied to the averaging kernel" ;
nh3_AvKnorm:units = "no unit" ;
nh3_AvKnorm:comment = "This variable is optional (but recommended in certain cases) for the
construction of the AVK" ;
nh3_AvKnorm:missing_value = NaNf ;
nh3_AvKnorm:coordinates = "longitude latitude" ;
float nh3_Zcolumn(time, midlevels) ;
nh3_Zcolumn:long_name = "retrieved NH3 total column in mole per square meter, assuming all
gas is located in a narrow altitude range specified by the altitude/midlevels dimension" ;
nh3_Zcolumn:units = "mol m-2" ;
nh3_Zcolumn:missing_value = NaNf ;
nh3_Zcolumn:comment = "These variables can be used to construct the AVK, optionally using the
nh3_AvKnorm. See Clarisse et al. (2023, AMT, submitted)" ;
nh3_Zcolumn:multiplication_factor_to_convert_to_molecules_per_cm2 = 6.02214076e+19 ;
nh3_Zcolumn:coordinates = "longitude latitude" ;
byte AMPM(time) ;
AMPM:long_name = "AM/PM flag based on local time" ;
AMPM:comment = "0 for AM data, 1 for PM data" ;
AMPM:flag_values = 0., 1. ;
AMPM:units = "no unit" ;
AMPM:coordinates = "longitude latitude" ;
byte LS_mask(time) ;
LS_mask:long_name = "land/sea mask flag" ;
LS_mask:comment = "0 for sea, 1 for land" ;
LS_mask:flag_values = 0., 1. ;
LS_mask:standard_name = "land_binary_mask" ;
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    LS_mask:units = "no unit" ;
    LS_mask:coordinates = "longitude latitude" ;
byte prefilter(time) ;
    prefilter:long_name = "prefilter quality flag" ;
    prefilter:comment = "0 = erroneous L1, 1 = valid L1" ;
    prefilter:flag_values = 0., 1. ;
    prefilter:units = "no unit" ;
    prefilter:coordinates = "longitude latitude" ;
byte postfilter(time) ;
    postfilter:long_name = "post retrieval quality flag" ;
    postfilter:comment = "post retrieval quality flag, flagging the observations with very limited
sensitivty to the target species. 0 = not recommended, 1 = recommended" ;
    postfilter:flag_values = 0., 1. ;
    postfilter:units = "no unit" ;
    postfilter:coordinates = "longitude latitude" ;

// global attributes:
    :title = "Daily IASI/Metop-A ULB-LATMOS ammonia (NH3) L2 product (columns) - version 4 Near
real time" ;
    :institution = "ULB-LATMOS" ;
    :id = "IASI_METOPA_L2_NH3_20200101_ULB-LATMOS_V4.0.0.nc" ;
    :product_version = "4.0.0" ;
    :history = "2023-04-13 07:29:44 - Product generated with retrieval code version 4" ;
    :summary = "This dataset contains Level-2 ammonia total columns retrieved with the ANNI-NH3-
v4 retrieval algorithm from IASI Level-1C observations and IASI Level-2 meteorological data" ;
    :source = "EUMETSAT IASI Level 1C data (version 4 up to 20100518, version 5 from 20100518 to
20110929, version 6 from 20110929 to 20130808, version 7 from 20130808 to 20170913, version 8 from
20170913), EUMETSAT IASI Level 2 (version 4 up to 20100914, version 5 from 20100914 to 20140930, version 6
from 20140930, version 6.1 from 20150924, version 6.3 from 20170620, version 6.4 from 20190514, version 6.5
from 20191204), ECMWF ERA5 global reanalysis" ;
    :references = "Reference to the ANNI retrieval: Clarisse et al. (2023, AMT, submitted), The IASI NH3
version 4 product: averaging kernels and improved consistency; Franco et al. (2018), A General Framework for
Global Retrievals of Trace Gases From IASI: Application to Methanol, Formic Acid, and PAN, J. Geophys. Res.-
Atmos., 123, 13,963–13,984, doi:10.1029/2018JD029633. Other specific references to the ANNI retrieval: Van
Damme et al. (2017), Version 2 of the IASI NH3 neural network retrieval algorithm: near-real-time and reanalysed
datasets, Atm. Meas. Tech., 10, 4905–4914, doi:10.5194/amt-10-4905-2017; Whitburn et al. (2016), A Flexible and
robust neural network IASI-NH3 retrieval algorithm, J. Geophys. Res.-Atmos., 121, 6581–6599,
doi:10.1002/2016JD024828." ;
    :geospatial_lat_min = "-90.0" ;
    :geospatial_lat_max = "+90.0" ;
    :geospatial_latitude_units = "degrees_north" ;
    :geospatial_lon_min = "-180.0" ;
    :geospatial_lon_max = "+180.0" ;
    :geospatial_longitude_units = "degrees_east" ;
    :time_coverage_start = "20200101T000000Z" ;
    :time_coverage_end = "20200101T235959Z" ;
    :Conventions = "CF-1.8" ;
    :standard_name_vocabulary = "NetCDF Climate and Forecast (CF) Metadata Convention version 80,
7 February 2022" ;
    :keywords = "satellite, observation, atmosphere, ammonia, NH3, level 2, column, agriculture,
fertilizers, livestock, biomass burning, industrial emission, air quality, IASI, Metop-A" ;
    :keywords_vocabulary = "GCMD Science Keywords" ;
    :platform = "Metop-A" ;
    :sensor = "IASI" ;
    :spatial_resolution = "12km at nadir" ;
    :creator_name = "L. Clarisse (Lieven.Clarisse@ulb.be), M. Van Damme
(Martin.Van.Damme@ulb.be) and P. Coheur (Pierre.Coheur@ulb.be)" ;

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:contact_email = "contact form at http://iasi.aeris-data.fr/contact/" ;  
:data_policy = "see https://iasi.aeris-data.fr/data-use-policy/" ;
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}
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