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| **World Meteorological Organization** |  | **ICG-WIGOS/TT-WMD-5/Doc.**6.2(1) |
| **INTER-COMMISSION COORDINATION GROUP ON WIGOS (ICG-WIGOS)** **TASK TEAM ON WIGOS METADATA (TT-WMD)*****FIFTH SESSION*** |  | Submitted by: | J. Klausen |
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| Agenda Item: | 6.2 |

**Updates to WMD Code Tables**

*(Submitted by J. Klausen)*

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| **SUMMARY AND PURPOSE OF DOCUMENT**The document presents a list of changes to the content of some WMDS code tables recommended for approval to the TT-WMD.  |

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1. **Proposed changes to the code table 1-02 on measurement units**
	1. **Additional measurement units**

Problem: Additional variable units are in use but not available in WMDS code list for

* Number concentration
* Mass concentration

Suggested solution: New entries in code table 1-02

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **#** | **Name\_Short** | **Name\_Long** | **Source** | **WMO306\_CD** |
| 140 | cm-3 | Number per cubic centimetre |  |  |
| 141 | m-3 | Number per cubic metre |  |  |
| 142 | mg m-3 | Milligram per cubic metre |  |  |
| 143 | µg m-3 | Microgram per cubic metre |  |  |
| 144 | ng m-3 | Nanogram per cubic metre |  |  |

* 1. **Inconsistencies/duplicate entries**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **#** | **Name\_Short** | **Name\_Long** | **Source** | **WMO306\_CD** |
| 23 | °C | degree Celsius | Derived SI | 60 |
| 52 | °C | degrees Celsius | WMO conventional | 350 |

Temperature measurements can be expressed in degree Celsius. The table currently contains 2 units, one from the Derived SI and one from the WMO conventional for degree Celsius. It is suggested to consolidate this and drop one entry.

1. **Proposed changes to the code table 4-02 on “Surface Cover Classification Scheme”**

**2.1 Include GlobCover2.3 as additional surface cover classification scheme (update code table 4-02 and new code table 4-01-07)**

Include GlobCover2.3 as additional classification scheme in category 4: environment - as it is up-to-date (2009) and comes with higher (300 m) resolution than Global Land Cover 2000 (LCCS).

<http://due.esrin.esa.int/page_globcover.php>

| **#** | **Name** | **Definition** |
| --- | --- | --- |
| 4-02-07 | Surface cover type (GlobCover2.3) | Global Land Cover classification 2.3 (2009), <http://due.esrin.esa.int/page_globcover.php> |

Code table 4-01-07

Code table title: Surface Cover types (GlobCover2.3

| **#** | **Name** | **Definition** | **WMO306\_CD** |
| --- | --- | --- | --- |
| 4-01-07-11 | Post-flooding or irrigated croplands (or aquatic) |  |  |
| 4-01-07-14 | Rainfed croplands |  |  |
| 4-01-07-20 | Mosaic cropland (50-70%) / vegetation (grassland/shrubland/forest) (20-50%) |  |  |
| 4-01-07-30 | Mosaic vegetation (grassland/shrubland/forest) (50-70%) / cropland (20-50%) |  |  |
| 4-01-07-40 | Closed to open (>15%) broadleaved evergreen or semi-deciduous forest (>5m) |  |  |
| 4-01-07-50 | Closed (>40%) broadleaved deciduous forest (>5m) |  |  |
| 4-01-07-60 | Open (15-40%) broadleaved deciduous forest/woodland (>5m) |  |  |
| 4-01-07-70 | Closed (>40%) needleleaved evergreen forest (>5m) |  |  |
| 4-01-07-90 | Open (15-40%) needleleaved deciduous or evergreen forest (>5m) |  |  |
| 4-01-07-100   |  Closed to open (>15%) mixed broadleaved and needleleaved forest (>5m) |  |  |
| 4-01-07-110   |  Mosaic forest or shrubland (50-70%) / grassland (20-50%) |  |  |
| 4-01-07-120   |  Mosaic grassland (50-70%) / forest or shrubland (20-50%) |  |  |
| 4-01-07-130   |  Closed to open (>15%) (broadleaved or needleleaved, evergreen or deciduous) shrubland (<5m) |  |  |
| 4-01-07-140   |  Closed to open (>15%) herbaceous vegetation (grassland, savannas or lichens/mosses) |  |  |
| 4-01-07-150   |  Sparse (<15%) vegetation |  |  |
| 4-01-07-160   |  Closed to open (>15%) broadleaved forest regularly flooded (semi-permanently or temporarily) - Fresh or brackish water |  |  |
| 4-01-07-170   |  Closed (>40%) broadleaved forest or shrubland permanently flooded - Saline or brackish water |  |  |
| 4-01-07-180   |  Closed to open (>15%) grassland or woody vegetation on regularly flooded or waterlogged soil - Fresh, brackish or saline water |  |  |
| 4-01-07-190   |  Artificial surfaces and associated areas (Urban areas >50%) |  |  |
| 4-01-07-200   |  Bare areas |  |  |
| 4-01-07-210   |  Water bodies |  |  |
| 4-01-07-220   |  Permanent snow and ice |  |  |
| 4-01-07-230   |  No data (burnt areas, clouds,…) |  |  |

1. **Proposed changes to the code table 1-01 “observed variable – measurand”**

Code table 1-01

Code table title: Observed Variable

| **#** | **Name** | **Definition** | **WMO306\_CD** |
| --- | --- | --- | --- |
|  | Total lightning density |  |  |
|  | Cloud to ground lightning density |  |  |
|  | Light scattering coefficient, PM25 |  |  |

1. **Proposed changes to code table 5-02 “Measurement/observing method”**

A number of entries presently used in OSCAR/Surface need to be deprecated (marked ~~as shown~~), because they describe instruments, rather than methods, or because they do not group methods sufficiently well. Instead, several new entries (marked in red) are suggested. This concerns methods for temperature, pressure, humidity, ozone, and radiation measurements. Further, some more WMO\_306\_CD entries are suggested.

Code table 5-02

Code table title: **Measurement/observing method** [Code table under development]

| **#** | **Name** | **Definition** | **WMO306\_CD** |
| --- | --- | --- | --- |
| ~~61~~ | ~~\Atmosphere\Temperature\Remote-sensing, active\Active~~ |  |  |
| ~~229~~ | ~~\Atmosphere\Aerosol\In situ\Optical properties\Light scattering~~ |  |  |
| ~~156~~ | ~~\Atmosphere\Ozone\Remote-sensing, passive\Microwave radiometry~~ |  |  |
| ~~189~~ | ~~\Atmosphere\Ozone\Remote-sensing, passive\SAOZ (UV-vis diode array spectrometer)~~ |  |  |
| ~~58~~ | ~~\Atmosphere\Ozone\Remote-sensing, passive\(Optical) filter Instrument~~ |  |  |
| ~~78~~ | ~~\Atmosphere\Ozone\Remote-sensing, passive\Brewer~~ |  |  |
| ~~106~~ | ~~\Atmosphere\Ozone\Remote-sensing, passive\Dobson~~ |  |  |
| ~~153~~ | ~~\Atmosphere\Ozone\Remote-sensing, passive\Microtops~~ |  |  |
| ~~32~~ | ~~\Atmosphere\Radiation\In situ~~ |  |  |
| ~~72~~ | ~~\Atmosphere\Radiation\In situ\BSRN compliant instrument~~ |  |  |
| ~~101~~ | ~~\Atmosphere\Radiation\In situ\Direct solar~~ |  |  |
| ~~263~~ | ~~\Atmosphere\Radiation\In situ\Direct solar\Bimetallic actinograph~~ |  |  |
| ~~264~~ | ~~\Atmosphere\Radiation\In situ\Direct solar\Pyrheliometer (direct solar, broadband)~~ |  |  |
| ~~145~~ | ~~\Atmosphere\Radiation\In situ\Longwave~~ |  |  |
| ~~265~~ | ~~\Atmosphere\Radiation\In situ\Longwave\Pyrgeometer (global, infrared)~~ |  |  |
| ~~180~~ | ~~\Atmosphere\Radiation\In situ\Pyrradiometer (total global, UV+IR)~~ |  |  |
| ~~192~~ | ~~\Atmosphere\Radiation\In situ\Shortwave~~ |  |  |
| ~~266~~ | ~~\Atmosphere\Radiation\In situ\Shortwave\Pyranometer (global solar, broadband)~~ |  |  |
| ~~267~~ | ~~\Atmosphere\Radiation\In situ\Shortwave\Spectral pyranometer~~ |  |  |
| ~~268~~ | ~~\Atmosphere\Radiation\In situ\Shortwave\UV/vis spectrometry/radiometry~~ |  |  |
| ~~197~~ | ~~\Atmosphere\Radiation\In situ\Sunphotometry/Filter Radiometry~~ |  |  |
| ~~54~~ | ~~\Atmosphere\Radiation\Remote-sensing, passive~~ |  |  |
| ~~151~~ | ~~\Atmosphere\Radiation\Remote-sensing, passive\Microtops~~ |  |  |
| 341 | \Atmosphere\Radiation\Photoelectric effect (photodiode) | The photoelectric effect (or photoemission) describes the property of certain materials to emit electrons or other free carriers as a function of irradiance.  | photoelectricity |
| 342 | \Atmosphere\Radiation\Thermoelectric effect (thermocouple, thermopile) | The thermoelectric effect is the direct conversion of temperature differences to electric voltage and vice versa resulting from thermally connecting two different metals. | thermoelectricity |
| 343 | \Atmosphere\Radiation\Absolute-cavity radiometry | An absolute cavity traps almost all incoming radiation and converts it into heat, which is then measured. | absoluteCavity |
| 344 | \Atmosphere\Radiation\Differential methods | Differential methods relate temperature differences of two different materials exposed to the same irradiance or of a single material exposed to different irradiances with the irradiance. | differentialMethod |
| 345 | \Atmosphere\Radiation\Photoelectric effect (photodiode)\Broadband | The photoelectric effect is used with filters selecting a large wavelength range or even no filter and hence a large part of the spectrum is measured. | photoelectricityBroadband |
| 346 | \Atmosphere\Radiation\Thermoelectric effect (thermopile)\Broadband | The thermoelectric effect is used with filters selecting a large wavelength range or even no filter and hence a large part of the spectrum is measured. | thermoelectricityBroadband |
| 347 | \Atmosphere\Radiation\Absolute-cavity radiometry\Broadband | The absolute cavity is used with filters selecting a large wavelength range or even no filter and hence a large part of the spectrum is measured. | absoluteCavityBroadband |
| 348 | \Atmosphere\Radiation\Differential methods\Broadband | A differential method is used with filters selecting a large wavelength range or even no filter and hence a large part of the spectrum is measured. | differentialMethodBroadband |
| 349 | \Atmosphere\Radiation\Photoelectric effect (photodiode)\Spectral | The photoelectric effect is used after separating the wavelengths with a grating or eventually a prism, and subsequently measuring the irradiance in narrow spectral ranges. | photoelectricitySpectral |
| 350 | \Atmosphere\Radiation\Thermoelectric effect (thermopile)\Spectral | The thermoelectric effect is used after separating the wavelengths with a grating or eventually a prism, and subsequently measuring the irradiance in narrow spectral ranges. | thermoelectricitySpectral |
| 351 | \Atmosphere\Radiation\Absolute-cavity radiometry\Spectral | The absolute cavity is used after separating the wavelengths with a grating or eventually a prism, and subsequently measuring the irradiance in narrow spectral ranges. | absoluteCavitySpectral |
| 352 | \Atmosphere\Radiation\Differential methods\Spectral | A differential method is used after separating the wavelengths with a grating or eventually a prism, and subsequently measuring the irradiance in narrow spectral ranges. | differentialMethodSpectral |
| 353 | \Atmosphere\Ozone\Remote-sensing, passive\UV radiometry\multiband filter | Radiometric methods using optical filters to select multiple wavelengths for detection | multibandFilterUVRadiometry |
| 354 | \Atmosphere\Ozone\Remote-sensing, passive\UV radiometry\multiband spectral | Radiometric methods using gratings or prisms to select multiple wavelengths for detection | multibandSpectralUVRadiometry |
| 355 | \Atmosphere\Ozone\Remote-sensing, passive\UV radiometry\full spectrum spectral | Radiometric methods where gratings or prisms are used to sweep an entire spectral range with high spectral resolution | fullSpectrumSpectralUVRadiometry |
| 356 | \Atmosphere\Humidity\Remote-sensing, passive\GNSS retrieval | An inversion technique applied to GNSS ground receivers | gnssIntegratedWaterVapor |
| 357 | \Atmosphere\Pressure\Radiosonde (GNSS tracking) | Pressure is derived from the altitude of a radiosonde above sea level as determined using a GNSS receiver | gnssPressure |
| 358 | \Atmosphere\Wind\Radiosonde (GNSS tracking) | Horizontal and vertical components of wind are derived from the positional changes of a radiosonde as determined using a GNSS receiver | gnssWind |
| 198 | \Atmosphere\Radiation\~~In situ\~~Sunshine ~~duration~~recorder | A sunshine recorder is a device that records the amount of sunshine at a given location, either by using the sun direction itself as a time-scale (e.g., Campbell-Stokes) or by using some form of clock (e.g., Jordan, Marvin) | sunshineRecorder |
| 81 | \Atmosphere\Humidity\In situ\Capacitive method | Humidity measurements based on dielectric properties (capacity) of a material | capacitiveHumidity |
| 250 | \Atmosphere\Humidity\In situ\Capacitive method\Thin film capacitance | Humidity measurements based on dielectric properties (capacity) of a thin film | thinFilmCapacitance |
| 100 | \Atmosphere\Humidity\In situ\Dewpoint determination | Humidity measurements based on the determination of dewpoint temperature | dewpoint |
| 251 | \Atmosphere\Humidity\In situ\Dewpoint determination\Chilled mirror |  | dewpointChilledMirror |
| 252 | \Atmosphere\Humidity\In situ\Dewpoint determination\Lithium chloride (LiCl) |  | dewpointLithiumChloride |
| 131 | \Atmosphere\Humidity\In situ\Hygrometer |  | hygrometer |
| 253 | \Atmosphere\Humidity\In situ\Hygrometer\Hair hygrometer/hygrograph |  | hairHygrometer |
| 254 | \Atmosphere\Humidity\In situ\Hygrometer\Hygrometer [general] |  | hygrometer |
| 255 | \Atmosphere\Humidity\In situ\Hygrometer\IR absorption hygrometer |  | irAbsorptionHygrometer |
| 256 | \Atmosphere\Humidity\In situ\Hygrometer\Optical hygrometer |  | opticalHygrometer |
| 257 | \Atmosphere\Humidity\In situ\Hygrometer\UV absorption hygrometer (Lyman-á) |  | lymanAlphaHygrometer |
| 337 | \Atmosphere\Humidity\In situ\Laser-based | Laser-based methods to determine water vapor concentration in the atmosphere. | laserBasedHumidity |
| 338 | \Atmosphere\Humidity\In situ\Laser-based\Tunable diode laser spectroscopy (TDLS) |  | tdlsHumidity |
| 178 | \Atmosphere\Humidity\In situ\Psychrometer |  | psychrometer |
| 258 | \Atmosphere\Humidity\In situ\Psychrometer\Electrical aspiration (Frankenberger type) |  | frankenbergerPsychrometer |
| 259 | \Atmosphere\Humidity\In situ\Psychrometer\Mechanical aspiration |  | mechanicalPsychrometer |
| 44 | \Atmosphere\Humidity\Remote-sensing, active |  | activeRemoteSensingHumidity |
| 143 | \Atmosphere\Humidity\Remote-sensing, active\Light detection and ranging (Lidar) |  | lidarHumidity |
| 181 | \Atmosphere\Humidity\Remote-sensing, active\Radio acoustic sounding system (RASS) |  | rassHumidity |
| 51 | \Atmosphere\Humidity\Remote-sensing, passive |  | passiveRemoteSensingHumidity |
| 152 | \Atmosphere\Humidity\Remote-sensing, passive\IR radiometry\~~Microtops~~multiband filter |  | multibandFilterIRRadiometry |
| 155 | \Atmosphere\Humidity\Remote-sensing, passive\Microwave radiometry |  | microwaveRadiometryHumidity |
| 66 | \Atmosphere\Pressure\In situ\Aneroid barometer (evacuated capsule) |  | aneroid |
| 73 | \Atmosphere\Pressure\In situ\Barometer, mercury column |  | mercuryBarometer |
| 74 | \Atmosphere\Pressure\In situ\Barometer, mercury-free column |  | mercuryFreeBarometer |
| 111 | \Atmosphere\Pressure\In situ\Electronic pressure transducer (silicon diaphragm) |  | pressureTransducer |
| 132 | \Atmosphere\Pressure\In situ\Hypsometer (water boiling point) |  | hypsometer |
| 150 | \Atmosphere\Pressure\In situ\Microbarometer (dewar) |  | microbarometer |
| 174 | \Atmosphere\Pressure\In situ\Pressure balance (piston) |  | pressureBalance |
| 330 | \Atmosphere\Radiosonde with composite method tracking |  | radiosondeCompositeTracking |
| 327 | \Atmosphere\Radiosonde with NAVAID |  | radiosondeNAVAID |
| 328 | \Atmosphere\Radiosonde with radar tracking |  | radiosondeRadarTracking |
| 329 | \Atmosphere\Radiosonde with radiotheodolite tracking |  | radiosondeRadiotheodoliteTracking |
| 76 | \Atmosphere\Temperature\In situ\Bimetal thermometer | A bimetal strip made of two tightly bonded metals curls in proportion to its temperature due to different thermal expansion coefficients. | bimetalThermometer |
| 144 | \Atmosphere\Temperature\In situ\Liquid-in-glass thermometer (mercury-free) | The level of a mercury-free liquid contained in a capillary changes due to thermal expansion and is related to temperature. | mercuryFreeThermometer |
| 149 | \Atmosphere\Temperature\In situ\Mercury-in-glass thermometer | The level of mercury contained in a capillary changes due to thermal expansion and is related to temperature. | mercuryThermometer |
| 179 | \Atmosphere\Temperature\In situ\Pyranometer (measurement of IR radiation) |  | pyranometer |
| 188 | \Atmosphere\Temperature\In situ\Resistance thermometer, thermistor | The electrical resistance of a conducting material is related to ist temperature. | thermistor |
| 195 | \Atmosphere\Temperature\In situ\Sonic thermometer |  | sonicThermometer |
| 201 | \Atmosphere\Temperature\In situ\Thermocouple, thermophile |  | thermocouple |
| 202 | \Atmosphere\Temperature\In situ\Thermometer/-element [general] |  | thermometer |
| 269 | \Atmosphere\Temperature\Remote-sensing, active\~~Active\~~Light detection and ranging (Lidar) profiler |  | lidarTemperatureProfiler |
| 182 | \Atmosphere\Temperature\Remote-sensing, active\Radio acoustic sounding system (RASS) |  | rassTemperatureProfiler |
| 154 | \Atmosphere\Temperature\Remote-sensing, passive\Microwave profiler |  | microwaveTemperatureProfiler |
| 60 | \Atmosphere\Wind\In situ\(Ultra)sonic anemometer |  | sonicAnemometer |
| 63 | \Atmosphere\Wind\In situ\Aerovane (wind vane with propeller) |  | aerovane |
| 65 | \Atmosphere\Wind\In situ\Anemometer [general] |  | anemometer |
| 95 | \Atmosphere\Wind\In situ\Cup anemometer |  | cupAnemometer |
| 96 | \Atmosphere\Wind\In situ\Cup anemometer (3 or 4 cups) |  | cupAnemometer34 |
| 112 | \Atmosphere\Wind\In situ\Estimation from visual observation |  | visualWind |
| 130 | \Atmosphere\Wind\In situ\Hot wire anemometer |  | hotWireAnemometer |
| 175 | \Atmosphere\Wind\In situ\Pressure plate (solid blade) |  | pressurePlate |
| 176 | \Atmosphere\Wind\In situ\Pressure tube |  | pressureTube |
| 177 | \Atmosphere\Wind\In situ\Propeller anemometer |  | propellerAnemometer |
| 214 | \Atmosphere\Wind\In situ\Wind sock (textile tube) |  | windSock |
| 215 | \Atmosphere\Wind\In situ\Wind vane (solid blade) |  | windVane |
| 332 | \Atmosphere\Wind\Pilot balloon with optical tracking) |  | pilotBalloonWind |
| 331 | \Atmosphere\Wind\Radiosonde (tracking unspecified) |  | radiosondeWind |
| 184 | \Atmosphere\Wind\Remote-sensing, active\Radio detection and ranging (Radar) profiler |  | radarWindProfiler |
| 196 | \Atmosphere\Wind\Remote-sensing, active\Sound detection and ranging (Sodar) profiler |  | sodarWindProfiler |
| 142 | \Atmosphere\Wind\Remote-sensing, ~~passive~~active\Light detection and ranging (LIDAR) profiler |  | lidarWindProfiler |
| 243 | \Atmosphere\Aerosol\Remote-sensing, active\Optical properties\Light detection and ranging (Lidar) profiler |  | lidarAerosolProfiler |
| 244 | \Atmosphere\Aerosol\Remote-sensing, passive\Optical properties\Sun-tracking photometry |  | suntrackingPhotometry |
| 24 | \Atmosphere\Clouds\Human observation |  | humanCloudObservation |
| 140 | \Atmosphere\Clouds\Remote-sensing, active\Laser-based methods |  | laserBasedCloud |
| 245 | \Atmosphere\Clouds\Remote-sensing, active\Laser-based methods\Ceilometer |  | ceilometer |
| 41 | \Atmosphere\Dynamics\Numerical model | All numerical models used to characterize atmospheric dynamics | numericalModelingAtmosphericDynamics |
| 104 | \Atmosphere\Dynamics\Numerical model\Dispersion | Langrangian dispersion modeling of atmospheric dynamics | dispersionModelingAtmosphericDynamics |
| 246 | \Atmosphere\Dynamics\Numerical model\Dispersion\Flexpart (dispersion modeling) | A Langrangian particle dispersion model | flexpart |
| 206 | \Atmosphere\Dynamics\Numerical model\Trajectories | Langrangian trajectory modeling of atmospheric dynamics | trajectoryModelingAtmosphericDynamics |
| 247 | \Atmosphere\Dynamics\Numerical model\Trajectories\Flextra (trajectory modeling) | Flextra is a Langrangian trajectory model | flextra |
| 248 | \Atmosphere\Dynamics\Numerical model\Trajectories\Hysplit (trajectory modeling) | Hysplit is a Langrangian trajectory model | hysplit |
| 249 | \Atmosphere\Dynamics\Numerical model\Trajectories\Lagranto (trajectory modeling) | Lagranto is a Langrangian trajectory model | lagranto |
| 208 | \Atmosphere\Dynamics\Numerical model\Transport modeling (model unspecified) |  | transportModelingAtmosphericDynamics |
| 68 | \Atmosphere\Evaporation\In situ\Atmometer |  | atmometer |
| 113 | \Atmosphere\Evaporation\In situ\Evaporation pan and/or tank |  | evaporationPan |
| 146 | \Atmosphere\Evaporation\In situ\Lysimeter |  | lysimeter |
| 69 | \Atmosphere\Lightning\Remote-sensing, passive\Atmospherics ("sferics") detection |  | sfericsDetection |
| 10 | \Atmosphere\Micrometeorology |  | micrometeorology |
| 77 | \Atmosphere\Micrometeorology\In situ\Bowen-ratio method |  | bowenRatio |
| 97 | \Atmosphere\Micrometeorology\In situ\Cuvette |  | cuvette |
| 103 | \Atmosphere\Micrometeorology\In situ\Disjunct eddy covariance method |  | disjunctEddyCovariance |
| 105 | \Atmosphere\Micrometeorology\In situ\Dissipation method |  | dissipation |
| 108 | \Atmosphere\Micrometeorology\In situ\Eddy accumulation method |  | eddyAccumulation |
| 109 | \Atmosphere\Micrometeorology\In situ\Eddy covariance method |  | eddyCovariance |
| 123 | \Atmosphere\Micrometeorology\In situ\Flux variance method |  | fluxVariance |
| 79 | \Atmosphere\Ozone\In situ\Brewer-GDR |  | brewerGDRSonde |
| 80 | \Atmosphere\Ozone\In situ\Brewer-Mast Sonde |  | brewerMastSonde |
| 84 | \Atmosphere\Ozone\In situ\Carbon-Iodine Sonde (KC Sonde) |  | carbonIodineSonde |
| 107 | \Atmosphere\Ozone\In situ\ECC Sonde (Electrochemical concentration cell) |  | eccSonde |
| 135 | \Atmosphere\Ozone\In situ\Indian Sonde |  | indianSonde |
| 166 | \Atmosphere\Ozone\In situ\Ozone sonde (unspecified) |  | ozoneSondeUnspecified |
| 171 | \Atmosphere\Ozone\In situ\Potassium iodide (KI) method |  | potassiumIodideSonde |
| 210 | \Atmosphere\Ozone\Remote-sensing, passive\Umkehr method |  | umkehr |
| 340 | \Atmosphere\Ozone\Remote-sensing, passive\UV ~~spectro~~radiometry |  | uvRadiometry |
| 336 | \Atmosphere\Trace gas\Remote-sensing, passive\Microwave radiometry |  | microwaveRadiometry |
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