# Variables in SAMD Product Standard

## Variables sorted according abbreviation (<var>-tag)

## Variable naming

The variable naming follows the principles given in the actual NetCDF Climate and Forecast (CF) Metadata Conventions version as far as possible. This especially means that the definition of the coordinate arrays and data arrays bases on this standard. For many variables, an attribute **standard_name**, a name and applicable units are defined there, as well as representations of coordinate systems. However, since
it was developed for model data, not all observational data are covered. This especially means that we cannot provide the standardized name and attribute standard_name for all variables. For those variables a special **long_name** is mandatory instead of standard_name.

Find list of variables sorted according:

- CF-Standard_name /long_name attribute
- variable abbreviation

| Variable abbreviation | Variable description |
|---|---|
| aae | Aerosol Angström exponent |
| aot | Aerosol optical thickness |
| apec | Aerosol particle extinction coefficient |
| azi | Sensor azimuth angle |
| aziv | Sensor azimuth angle velocity |
| beta | Attenuated backscatter coefficient |
| buoy | Buoyancy |
| cape | CAPE |
| cin | CIN |
| ciwvi | Path of integrated ice water |
| cli | Cloud ice content (height resolved) |
| cllw | Cloud liquid water content (height resolved) in kg m-3 |
| clm | Cloud mask |
| clt | Cloud fraction (total) |
| clw | Cloud water content (height resolved) in kg kg-1 |
| clwvi | Path of integrated cloud liquid water |
| conccn | Aerosol number concentration |
| cth | Cloud thickness (liquid clouds) |
| dbz | Radar reflectivity factor |

| Variable abbreviation | Variable description |
|---|---|
| dnc | Drop number concentration |
| dnccli | Ice crystal number concentration |
| drlw | Drizzle liquid water (height resolved) |
| dv | Doppler velocity |
| hfls | Latent heat flux |
| hfsoil | Soil heat flux (downward) |
| hfss | Sensible heat flux |
| hua | Absolute humidity |
| humr | Humidity mixing ratio |
| hur | Relative humidity |
| hus | Specific humidity |
| intensity | Backscatter intensity |
| iwc | Frozen phase water content (height resolved) |
| kdp | Radar specific differential phase |
| lat | Latitude |
| ldr | Radar linear depolarization ratio |
| lon | Longitude |
| lwc | Liquid water content (height resolved; cloud + rain) |
| ndvi | Normalized Difference Vegetation Index |
| otc | Cloud optical thickness |
| otcli | Cloud optical thickness due to ice water |
| otclw | Cloud optical thickness due to liquid water |
| pa | Pressure |
| pbc | Particle backscatter coefficient |
| pct | Cloud top pressure |
| pdr | Particle depolarization ratio |
| pec | Particle extinction coefficient |
| phidp | Radar integrated differential phase |
| pia | Path integrated attenuation |
| plr | Particle lidar ratio |
| prcon | Convective precipitation |
| precip | Precipitation |
| prw | Path of integrated water vapor |
| reffcli | Effective radius of cloud ice particles |
| reffclw | Effective radius of cloud liquid particles |
| rhohv | Radar co-polar correlation function |
| rlds | LW broadband downwelling radiation (surface) |
| rlus | LW broadband upwelling radiation (surface) |
| rr | Rain rate |
| rsd | Solar radiation flux (atmosphere) |

| Variable abbreviation | Variable description |
|---|---|
| rsds | SW broadband downwelling radiation (surface) |
| rssr | Reflected solar spectral radiance |
| rsus | SW broadband upwelling radiation (surface) |
| rtd | Total downwelling radiation |
| rtu | Total upwelling radiation |
| rv | Radial or fall velocity (away from instrument) |
| sle | Surface longwave emissivity |
| sst | Sea surface temperature |
| stat | Station number new |
| surfalb | Surface albedo |
| sw | Radar spectral width |
| ta | Temperature |
| tb | Brightness temperature |
| tcb | Cloud base temperature |
| tct | Cloud top temperature |
| ts | Surface temperature |
| vdr | Volume depolarization ratio |
| vec | Volume extinction coefficient |
| vis | Visibility |
| w | Vertical wind velocity |
| wdir | Wind direction |
| wl | Wavelength of radiation |
| wspeed | Wind speed |
| zal | Aerosol layer heights |
| zcb | Cloud base altitude |
| zdr | Radar differential reflectivity |
| zgct | Cloud top altitude (geometric height above geoid) |
| zmla | Atmospheric boundary layer height |
| zmlaa | ... derived from aerosol profile |
| zmlaw | ... derived from wind profile |
| zsl | Altitude above mean sea level |
| zth | Cloud top height (distance above surface) |

# Variables sorted according the CF-"standard_name" attribute and "long_name" attribute respectively

| CF- standard_name OR long name | Variable description | VAR tag | Unit | in CF: YES or NO |
|---|---|---|---|---|
| aerosol layer height | Aerosol layer heights | zal | m | n |
| air_pressure | Pressure | pa | Pa | y |
| air_pressure_at_cloud_base | Cloud base pressure | pcb | Pa | y |
| air_pressure_at_cloud_top | Cloud top pressure | pct | Pa | y |
| air_temperature | Temperature | ta | K | y |
| air_temperature_at_cloud_top | Cloud top temperature | tct | K | y |
| altitude | Altitude above mean sea level | zsl | m | y |
| angstrom_exponent_of_ambient_aerosol_in_air | Aerosol Angström exponent | aae | 1 | y |
| atmosphere optical thickness due to ice water | Cloud optical thickness due to ice water | otcli | 1 | y |
| atmosphere_boundary_layer_thickness | Atmospheric boundary layer height | zmla | m | y |
| atmosphere_convective_inhibition | CIN | cin | J kg-1 | y |
| atmosphere_mass_content_of_cloud_ice | Path of integrated ice water | ciwvi | kg m-2 | y |
| atmosphere_mass_content_of_cloud_liquid_water | Path of integrated cloud liquid water | clwvi | kg m-2 | y |
| atmosphere_mass_content_of_water_vapor | Path of integrated water vapor | prw | kg m-2 | y |
| atmosphere_optical_thickness_due_to_ambient_aerosol | Aerosol optical thickness | aot | 1 | y |
| atmosphere_optical_thickness_due_to_cloud | Cloud optical thickness | otc | 1 | y |
| atmosphere optical thickness due to cloud liquid water | Cloud optical thickness due to liquid water | otclw | 1 | n |
| atmosphere optical thickness due to cloud ice water | Cloud optical thickness due to ice water | otcli | 1 | n |
| backscatter intensity | Backscatter intensity | intensity | 1 | n |
| brightness_temperature | Brightness temperature | tb | K | y |
| buoyancy | Buoyancy | buoy | N | n |
| cloud base temperature | Cloud base temperature | tcb | K | n |
| cloud mask | Cloud mask | clm | 1 | n |
| cloud_area_fraction | Cloud fraction (total) | clt | 1 | y |
| cloud_base_altitude | Cloud base altitude | zcb | m | y |
| cloud_top_altitude | Cloud top altitude (geometric height above | zgct | m | y |

| CF- standard_name OR long name | Variable description | VAR tag | Unit | in CF: YES or NO |
|---|---|---|---|---|
| | geoid) | | | |
| convective_precipitation_amount | Convective precipitation | prcon | kg m-2 | y |
| distance from sensor to center of each range gates along the line of sight | Range | range | m | n |
| doppler velocity | Doppler velocity | dv | m s-1 | n |
| downward_heat_flux_in_soil | Soil heat flux (downward) | hfsoil | W m-2 | y |
| downwelling_radiance_per_unit_wavelength_in_air Alias: downwelling_spectral_radiance_in_air | Reflected solar spectral radiance | rssr | W m-2 | y |
| downwelling_shortwave_flux_in_air | Solar radiation flux (atmosphere) | rsd | W m-2 | y |
| drop number concentration | Drop number concentration | dnc | m-3 mm-1 | n |
| effective radius of cloud ice particles | Effective radius of cloud ice particles | reffcli | m | n |
| effective_radius_of_cloud_liquid_water_particle | Effective radius of cloud liquid particles | reffclw | m | y |
| equivalent_reflectivity_factor | Radar reflectivity factor | dbz | dBZ | y |
| geopotential_height | Geopotential height | zg | m | y |
| height | Height | height or zag | m | y |
| height_at_cloud_top | Cloud top height (distance above surface) | zth | m | y |
| humidity_mixing_ratio | Humidity mixing ratio | humr | 1 | y |
| latitude | Latitude | lat | degree_north | y |
| longitude | Longitude | lon | degree_east | y |
| mass concentration of frozen water in air | Frozen phase water content (height resolved) | iwc | kg m-3 | n |
| mass_concentration_of_cloud_liquid_water_in_air | Cloud liquid water content (height resolved) | cllw | kg m-3 | y |
| mass_concentration_of_liquid_water_in_air | Liquid water content (height resolved; cloud + rain) | lwc | kg m-3 | y |
| mass_concentration_of_drizzle_in_air | Drizzle liquid water (height resolved) | drlw | kg m-3 | y |
| mass_concentration_of_water_vapor_in_air | Absolute humidity | hua | g m-3 | y |
| mass_fraction_of_cloud_ice_in_air | Cloud ice content (height resolved) | cli | 1 | y |
| mass_fraction_of_cloud_liquid_w | Cloud water content | clw | 1 | y |

| CF- standard_name OR long name | Variable description | VAR tag | Unit | in CF: YES or NO |
|---|---|---|---|---|
| ater_in_air | (height resolved) | | | |
| mixing layer height from aerosol profile | Atmospheric boundary layer height derived from aerosol profile | zmlaa | m | n |
| mixing layer height from vertical wind profile | Atmospheric boundary layer height derived from wind profile | zmlaw | m | n |
| normalized range corrected signal OR range corrected backscatter signal | Normalized range corrected signal (lidar) | beta_raw | 1 | n |
| normalized_difference_vegetation_index | Normalized Difference Vegetation Index | ndvi | 1 | y |
| number_concentration_of_ambient_aerosol_in_air | Aerosol number concentration | conccn | m-3 | y |
| number_concentration_of_ice_crystals_in_air | Ice crystal number concentration | dnccli | m-3 | y |
| nyquist frequency | Nyquist frequency | nqf | s-1 | n |
| nyquist velocity | Nyquist velocity | nqv | m s-1 | n |
| particle backscatter coefficient | Particle backscatter coefficient | pbc | m-1 sr-1 | n |
| particle depolarization ratio | Particle depolarization ratio | pdr | 1 | n |
| particle extinction coefficient | Particle extinction coefficient | pec | m-1 | n |
| particle lidar ratio | Particle lidar ratio | plr | sr | n |
| path integrated attenuation | Path integrated attenuation | pia | dBZ | n |
| precipitation_amount | Precipitation | precip | kg m-2 | y |
| radar co-polar correlation function | Radar co-polar correlation function | rhohv | 1 | n |
| radar differential reflectivity | Radar differential reflectivity | zdr | dBZ | n |
| radar integrated differential phase | Radar integrated differential phase | phidp | deg | n |
| radar linear depolarization ratio | Radar linear depolarization ratio | ldr | dB | n |
| radar specific differential phase | Radar specific differential phase | kdp | deg km-1 | n |
| radar spectral width | Radar spectral width | sw | m s-1 | n |
| radial_velocity_of_scatterers_away_from_instrument | Radial velocity or fall velocity | rv | m s-1 | y |
| radiation_wavelength | Wavelength of radiation | wl | m | y |

| CF- standard_name OR long name | Variable description | VAR tag | Unit | in CF: YES or NO |
|---|---|---|---|---|
| rainfall_rate | Rain rate | rr | m s-1 | y |
| range corrected backscatter signal OR normalized range corrected signal | Range corrected backscatter signal | beta_raw | 1 | n |
| relative_humidity | Relative humidity | hur | 1 | y |
| sea_surface_temperature | Sea surface temperature | sst | K | y |
| sensor azimuth angle velocity | Sensor azimuth angle velocity | aziv | degree s-1 | n |
| sensor elevation angle | Sensor elevation angle | ele | degree | n |
| sensor elevation angle velocity | Sensor elevation angle velocity | elev | degree s-1 | n |
| sensor_azimuth_angle | Sensor azimuth angle | azi | degree | y |
| sensor_band_central_radiation_frequency | Frequency band of sensor | freq_sb | s-1 | y |
| specific_convective_available_potential_energy | CAPE | cape | J kg-1 | y |
| specific_humidity | Specific humidity | hus | kg kg-1 | y |
| station number | Station number | stat | 1 | n |
| surface_albedo | Surface albedo | surfalb | 1 | y |
| surface_downwelling_longwave_flux_in_air | LW broadband downwelling radiation (surface) | rlds | W m-2 | y |
| surface_downwelling_shortwave_flux_in_air | SW broadband downwelling radiation (surface) | rsds | W m-2 | y |
| surface_longwave_emissivity | Surface longwave emissivity | sle | 1 | y |
| surface_temperature | Surface temperature | ts | K | y |
| surface_upward_latent_heat_flux | Latent heat flux | hfls | W m-2 | y |
| surface_upward_sensible_heat_flux | Sensible heat flux | hfss | W m-2 | y |
| surface_upwelling_longwave_flux_in_air | LW broadband upwelling radiation (surface) | rlus | W m-2 | y |
| surface_upwelling_shortwave_flux_in_air | SW broadband upwelling radiation (surface) | rsus | W m-2 | y |
| thickness_of_liquid_water_cloud | Cloud thickness (liquid clouds) | cth | m | y |
| time | Time | time | seconds since 1970-01-01 00:00:00 | y |
| total downwelling radiation | Total downwelling radiation | rtd | W m-2 | n |

| CF- standard_name OR long name | Variable description | VAR tag | Unit | in CF: YES or NO |
|---|---|---|---|---|
| total upwelling radiation | Total upwelling radiation | rtu | W m-2 | n |
| upward_air_velocity | Vertical velocity | w | m s-1 | y |
| visibility_in_air | Visibility | vis | m | y |
| volume depolarisation ratio | Volume depolarization ratio | vdr | 1 | n |
| volume extinction coefficient | Volume extinction coefficient | vec | 1 | n |
| volume_attenuated_backwards_scattering_function_in_air | Attenuated backscatter coefficient | beta | m-1 sr-1 | y |
| volume_extinction_coefficient_in_air_due_to_ambient_aerosol | Aerosol particle extinction coefficient | apec | m -1 | y |
| wind_from_direction | Wind direction | wdir | degree | y |
| wind_speed | Wind speed | wspeed | m s-1 | y |
| wind_speed_of_gust | Wind speed maximum (gust) | wspeed_max | m s-1 | y |
| zenith_angle | Zenith angle of beam direction | zenith | degrees | y |
| | | | | |

# File name conventions

Finally, a data set file should have a unique name consisting of seven parts as follows:
**<kkk>_<sss>_<instnn>_<ln>_<var>_<vnn>_YYYYMMDDhhmmss.nc**
where:

| | |
|---|---|
| **kkk** | kind of measurement type (supersites, full domain observation, campaign, ...) |
| **sss** | supersite (e.g. JOYCE, CESAR,...) or owner institute of the instrument or distributor of data |
| **instnn** | instrument or synergy product, retrieval algorithm plus numbering (starting with 00) |
| **ln** | HD(CP)² level of data post processing (starting with 1) |
| **var** | observation variable name |
| **vnn** | version of data set (starting with 00) |
| **YYYYMMDDhhmmss** | date & time of measurement related to UTC |