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| --- | --- | --- | --- | --- | --- | --- |
| ECV | Product | Definition | Meas.units | OSCAR variable | Definition | Meas.units |
| Surface Wind Speed and direction  **(updated by Shinya, Imke and Liz)** | Wind speed | Ratio of the distance covered by the air to the time taken to cover it. It is one component of wind velocity, the other being wind direction. **Measured at 10m** | m/s | Wind vector over the surface (horizontal) | Horizontal vector component (2D) of the 3D wind vector, conventionally measured at 10 m height. | m/s |
| Wind direction | Direction from which wind is blowing, measured clockwise  from north | Degree N |
| Precipitation  **(updated by Phil)** | Accumulated precipitation (over 24h) | Integration of precipitation rate reaching the ground over several time intervals. The reference requirement refers to integration over 24 h | mm | Accumulated precipitation (over 24h) | Integration of precipitation rate reaching the ground over several time intervals. The reference requirement refers to integration over 24 h | mm |
| Temperature (surface) | Air temperature (at surface) | Air temperature measured **at 2 m above surface** | K | Air temperature (at surface) | Air temperature measured at 2 m above surface | K |
| Pressure (surface) | Air Pressure at surface | Pressure of the air column **measured at 2 m above surface** | hPa | Air Pressure at surface | Pressure of the air column measured at 2 m above surface | hPa |
| Water vapour (surface)  **(updated by Roger)** | Air specific humidity  (at surface)(g/kg) | Air specific humidity **measured at 2 m** above surface. The specific humidity is the ratio between the mass of water vapour and the mass of moist air. | g/Kg | Air specific humidity (at surface)(g/kg) | Air specific humidity measured at 2 m above surface. The specific humidity is the ratio between the mass of water vapour and the mass of moist air. | g/kg |
| Dew Point Temperature  (no corresponding variable in OSCAR) | temperature to which air must be cooled to become saturated with water vapor | K |
| Surface Radiation Budget  **(Phil-definition as in OSCAR)** | (Surface ERB LW)  Downward long-wave irradiance at Earth surface | Flux density of radiation emitted by the gases, aerosols and clouds of the atmosphere to the Earth's surface | W/m2 | Downward long-wave irradiance at Earth surface | Flux density of radiation emitted by the gases, aerosols and clouds of the atmosphere to the Earth's surface | W/m2 |
| (Surface ERB SW)  Downward short-wave irradiance at Earth surface | Flux density of the solar radiation at the Earth surface | W/m2 | Downward short-wave irradiance at Earth surface | Flux density of the solar radiation at the Earth surface | W/m2 |
| Temperature (upper air)  **(updated by Peter)** | T in the Boundary layer | 3D field of the atmospheric temperature in the BL | K | Atmospheric Temperature | 3D field of the atmospheric temperature | K |
| T in the free troposphere | 3D field of the atmospheric temperature in the troposphere | K |
| T in the tropopause layer | 3D field of the atmospheric temperature in the tropopause layer | K |
| T in the stratosphere | 3D field of the atmospheric temperature in the stratosphere | K |
| Wind speed and direction (upper-air)  **(updated by Shinya)** | Wind speed | Ratio of the distance covered by the air to the time taken to cover it. It is one component of wind velocity, the other being wind direction | m/s | Wind (horizontal) | 3D field of the horizontal vector component (2D) of the 3D wind vector | m/s |
| Direction | Direction from which wind is blowing, measured clockwise  from north | Degrees N |
| Water Vapour (upper air)  **(updated by Roger)** | Specific humidity in  lower troposphere | 3D field of the specific humidity in the atmosphere. The specific humidity is the ratio between the mass of water vapour and the mass of moist air. | g/Kg | Specific humidity | 3D field of the specific humidity in the atmosphere. The specific humidity is the ratio between the mass of water vapour and the mass of moist air. | g/kg |
| Specific humidity in upper troposphere |
| Specific humidity in stratosphere |
|  |  |  |  |  |  |
| Total column-water vapour | Total amount of water vapour present in a vertical atmospheric column. | Kg/m2 | Integrated Water Vapour (IWV) | Total amount of water vapour present in a vertical atmospheric column. | Kg/m2 |
| **No Comments for the ECV following this line** | | | | | | |
| Earth Radiation Budget | Top-of-atmosphere ERB longwave | Flux density of terrestrial radiation emitted by the Earth surface and the gases, aerosols and clouds of the atmosphere at the top of the atmosphere | W/m2 | Upward long-wave irradiance at TOA | Flux density of terrestrial radiation emitted by the Earth surface and the gases, aerosols and clouds of the atmosphere at the top of the atmosphere | W/m2 |
|  |  |  |  |  |  |
| Top-of-atmosphere ERB shortwave (reflected) | Flux density of solar radiation, reflected by the Earth surface and atmosphere, emitted to space at the top of the atmosphere | W/m2 | Upward short-wave irradiance at TOA | Flux density of solar radiation, reflected by the Earth surface and atmosphere, emitted to space at the top of the atmosphere | W/m2 |
| Total solar irradiance | Flux density of the solar radiation at the top of the atmosphere. | W/m2? | Downward short-wave irradiance at TOA | Flux density of the solar radiation at the top of the atmosphere | W/m2 |
| Solar spectral irradiance | Total Solar Irradiance (TSI); when measured as a function of wavelength it is the spectral irradiance |  | (no corresponding variable in OSCAR) |  |  |
| Lightning  **(will be updated at Lightning TT meeting)** |  | Total number of detected flashes in the corresponding time interval and the space unit. |  | Total lightning density | Total number of detected flashes in the corresponding time interval and the space unit. | dimensionless |
| Cloud Properties | Cloud amount | 2D field of fraction of sky filled by clouds. | % | Cloud cover | 2D field of fraction of sky filled by clouds. | % |
| Cloud Top Pressure | Missing def  Can we use cloud top height? |  | (no corresponding variable in OSCAR) |  |  |
| Cloud top height | Height of the upper surface of the cloud | km |
| Cloud Top Temperature | Temperature of the upper surface of the cloud | K | Cloud top temperature | Temperature of the upper surface of the cloud | K |
| Cloud Optical Depth | Effective depth of a cloud from the viewpoint of radiation propagation. |  | Cloud optical depth | Effective depth of a cloud from the viewpoint of radiation propagation. OD = exp(-K.Δz) where K is the extinction coefficient [km-1 ] and Δz the vertical path [km] betwen the base and the top of the cloud. | dimensionless |
| Cloud Water Path (**liquid and ice)** | LWP: A measure of the weight of the liquid water droplets in the atmosphere above a unit surface area on the earth, given in units of kg m-2 |  | (no corresponding variable in OSCAR) |  |  |
|  |  | Cloud liquid water (CLW) total column | Field of atmospheric water in the liquid phase (precipitating or not). | g/m2 |
|  |  | Cloud ice (total column) | Field of atmospheric water in the solid phase (precipitating or not) as total column. | g/m2 |
| Cloud effective particle radius (**liquid and ice)** | In OSCAR only liquid. Needs a definition | μm | Cloud drop effective radius | Size distribution of liquid water drops, assimilated to spheres of the same volume. Considered as both a 3D field throughout the troposphere and a 2D field at the top of cloud surface. | μm |
| Aerosols properties | optical depth | The AOD is the effective depth of the aerosol column from the viewpoint of radiation propagation | km | Aerosol Optical Depth | The AOD is the effective depth of the aerosol column from the viewpoint of radiation propagation: Vertical column integral of spectral aerosol extinction coefficient AOD = exp(-K. Δz) where K is the extinction coefficient [km-1 ] and Δz the vertical path [km] | km |
| single-scattering albedo | Missing def |  | (no corresponding variable in OSCAR) |  |  |
| layer height | Missing def |  | (no corresponding variable in OSCAR) |  |  |
| extinction coefficient profiles | 3D field of spectral volumetric extinction cross-section of aerosol particles |  | Aerosol Extinction Coefficient | 3D field of spectral volumetric extinction cross-section of aerosol particles | M-1 |
| Carbon Dioxide, Methane and other Greenhouse gases  Columns are defined for troposphere in ECV products, while total for OSCAR variable.  2 different products for CH4 profiles. | Tropospheric CO2 column | Field of total column of CO2 in troposphere |  | (no corresponding variable in OSCAR) |  |  |
| Tropospheric CO2 | 3D field of dry air mole fraction of CO2 = Carbon dioxide |  | CO2 | 3D field of dry air mole fraction of CO2 = Carbon dioxide | Mol/mol |
| Tropospheric CH4 column  (no correspondent variable in OSCAR) | Field of total column of CH4 in troposphere |  | (no corresponding variable in OSCAR) |  |  |
| Tropospheric CH4 | 3D field of dry air mole fraction of CH4 = Methane |  | CH4 | 3D field of dry air mole fraction of CH4 = Methane | Mol/mol |
| Stratospheric CH4 |  |  |  |  |  |
| Ozone  3 different products for ozone profiles.  Also: the 3 products are for:  -Troposphere  -lower and upper stratosphere  -upper stratosphere and mesosphere.  2 times upper-stratosphere? | Total column ozone | Field of total column of Ozone. |  | O3(Total column) | Field of total column of Ozone. | DU |
| troposphere Ozone  Or: Ozone profile in lower troposphere | 3D field of mole fraction of O3 in lower troposphere |  | O3 | 3D field of mole fraction of O3 ( Ozone) |  |
| Ozone profile in upper and lower stratosphere  Or: Ozone profile in upper **troposphere** and lower stratosphere | 3D field of mole fraction of O3 in stratosphere |  |  |  |  |
| Ozone profile in upper strato-and mesosphere | 3D field of mole fraction of O3 in upper stratosphere and mesosphere |  |  |  |  |
| Precursors (supporting the aerosol and ozone ECV)  Columns are defined for troposphere in ECV products, while total for OSCAR variable. | NO2 tropospheric column | Field of total column NO2 in troposphere |  | NO2 (Total column) | Field of total column NO2 = Nitrogen dioxide |  |
| SO2 tropospheric columns | 2D field of Total Column SO2 in troposphere |  | SO2 (Total column) | 2D field of Total Column SO2 = Sulfur dioxide | 1.3×10^15 molecules/cm^2 |
| HCHO tropospheric columns | 2D field of concentration of CH2O = HCHO = Formaldehyde. |  | HCHO (Total Column) | 2D field of concentration of CH2O = HCHO = Formaldehyde. | 1.3×1015 molecules.cm-2</sup |
| CO tropospheric column | Field of total column CO in troposphere |  | (no corresponding variable in OSCAR) |  |  |
| CO tropospheric profile | 3D field of dry air mole fraction of CO in troposphere |  | CO | 3D field of dry air mole fraction of CO = Carbon monoxide. | Mol/mol |