

## Proposal for new standard names to support CCMVal

The Chemistry-Climate Model Validation Activity for SPARC (CCMVal, <http://www.pa.op.dlr.de/CCMVal/>) will use a list of over 150 quantities, many of which are not in the standard name table. In order to structure the discussion of new names, the submission will be split into 4 parts: 1: chemical species not yet included in the standard name table, 2: whole atmosphere integrals of the species content, 3: tendencies and subregions of the atmosphere, 4: dynamical diagnostics.

### 1 New species [40]

These are atmospheric constituents with a clear physical definition. These will use the syntax “mole\_fraction\_of.....\_in\_air”. The names used are taken from the 2006 WMO/UNEP Scientific Assessment of Ozone Depletion.

| Component in standard name                   | Formula    |
|--|------------|
| mole_fraction_of_nitrous_oxide_in_air        | n2o        |
| mole_fraction_of_hydrogen_chloride_in_air    | hcl        |
| mole_fraction_of_cfc11_in_air                | cfcl3      |
| mole_fraction_of_cfc12_in_air                | cf2cl2     |
| mole_fraction_of_methyl_chloride_in_air      | ch3cl      |
| mole_fraction_of_methyl_bromide_in_air       | ch3br      |
| mole_fraction_of_cfc113_in_air               | cc12fcclf2 |
| mole_fraction_of_cfc113a_in_air              | cc13cf3    |
| mole_fraction_of_cfc114_in_air               | cclf2cclf2 |
| mole_fraction_of_cfc115_in_air               | cclf2cf3   |
| mole_fraction_of_carbon_tetrachloride_in_air | cc14       |
| mole_fraction_of_halon1301_in_air            | cbrf3      |
| mole_fraction_of_halon1211_in_air            | cbrclf2    |
| mole_fraction_of_halon2402_in_air            | c2br2f4    |
| mole_fraction_of_halon1201_in_air            | cbr2f2     |
| mole_fraction_of_atomic_chlorine_in_air      | cl         |
| mole_fraction_of_chlorine_monoxide_in_air    | clo        |
| mole_fraction_of_dichlorine_peroxide_in_air  | cl2o2      |
| mole_fraction_of_hypochlorous_acid_in_air    | hocl       |
| mole_fraction_of_chlorine_nitrate_in_air     | clono2     |
| mole_fraction_of_chlorine_dioxide_in_air     | oclo       |
| mole_fraction_of_inorganic_chlorine_in_air   | cly        |
| mole_fraction_of_hydroperoxyl_radical_in_air | ho2        |
| mole_fraction_of_hydrogen_peroxide_in_air    | h2o2       |
| mole_fraction_of_atomic_nitrogen_in_air      | n          |

|   |        |
|---|--------|
| mole_fraction_of_dinitrogen_pentoxide_in_air    | n2o5   |
| mole_fraction_of_peroxyntiric_acid_in_air       | hno4   |
| mole_fraction_of_total_reactive_nitrogen_in_air | noy    |
| mole_fraction_of_atomic_bromine_in_air          | br     |
| mole_fraction_of_bromine_monoxide_in_air        | bro    |
| mole_fraction_of_bromine_chloride_in_air        | brcl   |
| mole_fraction_of_hydrogen_bromide_in_air        | hbr    |
| mole_fraction_of_hypobromous_acid_in_air        | hobr   |
| mole_fraction_of_bromine_nitrate_in_air         | brono2 |
| mole_fraction_of_total_inorganic_bromine_in_air | bry    |
| mole_fraction_of_methyl_hydroperoxide_in_air    | ch3ooh |
| mole_fraction_of_anthropogenic_nmvoc_in_air     | (1)    |
| mole_fraction_of_biogenic_nmvoc_in_air          | (1)    |
| mole_fraction_of_hydrogen_cyanide_in_air        | hcn    |
| mole_fraction_of_passive_ozone_in_air           | (2)    |

(1) NMVOC stands for Non-methane volatile organic compounds

(2) "Passive ozone" is a term used to describe an artificial tracer widely used in modelling studies.

## 2 Filename component: mole\_burden [18]

CCMVal will archive many variables only in terms of the total, globally and vertically integrated atmospheric content. This is widely referred to as the "atmospheric burden", in the IPCC assessment reports and elsewhere. We propose using a syntax which follows the syntax for column amounts which is already used in the table, in names such as: atmosphere\_water\_content.

Thus, atmosphere\_cfc114\_mole\_burden would be the total number of cfc114 molecules in the atmosphere

| Standard name                               |
|---|
| atmosphere_nitrous_oxide_mole_burden        |
| atmosphere_cfc11_mole_burden                |
| atmosphere_cfc12_mole_burden                |
| atmosphere_cfc113_mole_burden               |
| atmosphere_cfc114_mole_burden               |
| atmosphere_cfc115_mole_burden               |
| atmosphere_carbon_tetrachloride_mole_burden |
| atmosphere_halon1301_mole_burden            |
| atmosphere_halon1211_mole_burden            |
| atmosphere_halon2402_mole_burden            |
| atmosphere_halon1202_mole_burden            |
| atmosphere_methane_mole_burden              |
| atmosphere_carbon_monoxide_mole_burden      |

|   |
|---|
| atmosphere_molecular_hydrogen_mole_burden |
| atmosphere_methyl_chloride_mole_burden    |
| atmosphere_methyl_bromide_mole_burden     |
| atmosphere_hcc140a_mole_burden            |
| atmosphere_hcfc22_mole_burden             |

### 3 Filename components: tendency\_of\_, \_troposphere\_, \_middle\_atmosphere\_, dynamical\_tropopause\_ [31]

In addition, tendencies of the above will be required (CCMVal will actually use annual losses: tendencies summed over a calendar year). The only new species in this list is  
\_molecular\_hydrogen\_

For many species there is widespread interest in how the tropospheric and/or stratospheric burdens evolve. For CCMVal, tropospheric totals will be needed, and totals for the combined stratosphere and troposphere will also be needed. Names can be constructed by replacing “\_atmosphere\_” with “\_troposphere\_” or “\_middle\_atmosphere\_”.

| Standard name  |
|--|
| tendency_of_nitrous_oxide_mole_burden                        |
| tendency_of_atmosphere_cfc11_mole_burden                     |
| tendency_of_atmosphere_cfc12_mole_burden                     |
| tendency_of_atmosphere_cfc113_mole_burden                    |
| tendency_of_atmosphere_cfc114_mole_burden                    |
| tendency_of_atmosphere_cfc115_mole_burden                    |
| tendency_of_atmosphere_carbon_tetrachloride_mole_burden      |
| tendency_of_atmosphere_halon1301_mole_burden                 |
| tendency_of_atmosphere_halon1211_mole_burden                 |
| tendency_of_atmosphere_halon2402_mole_burden                 |
| tendency_of_atmosphere_halon1202_mole_burden                 |
| tendency_of_atmosphere_methane_mole_burden                   |
| tendency_of_troposphere_methane_mole_burden                  |
| tendency_of_middle_atmosphere_methane_mole_burden            |
| tendency_of_atmosphere_carbon_monoxide_mole_burden           |
| tendency_of_troposphere_carbon_monoxide_mole_burden          |
| tendency_of_middle_atmosphere_carbon_monoxide_mole_burden    |
| tendency_of_atmosphere_molecular_hydrogen_mole_burden        |
| tendency_of_troposphere_molecular_hydrogen_mole_burden       |
| tendency_of_middle_atmosphere_molecular_hydrogen_mole_burden |
| tendency_of_atmosphere_methyl_chloride_mole_burden           |
| tendency_of_troposphere_methyl_chloride_mole_burden          |
| tendency_of_middle_atmosphere_methyl_chloride_mole_burden    |
| tendency_of_atmosphere_methyl_bromide_mole_burden            |
| tendency_of_troposphere_methyl_bromide_mole_burden           |

|   |
|---|
| tendency_of_middle_atmosphere_methyl_bromide_burden   |
| tendency_of_atmosphere_atmosphere_hcc140a_mole_burden |
| tendency_of_troposphere_hcc140a_mole_burden           |
| tendency_of_middle_atmosphere_hcc140a_mole_burden     |
| tendency_of_atmosphere_hcfc22_mole_burden             |
| tendency_of_troposphere_hcfc22_mole_burden            |

#### 4 Dynamical names [15]

|  |
|--|
| Standard name  |
| age_of_stratospheric_air (1) (or mean_age_of_stratospheric_air??)            |
| northward_heat_flux_due_to_eddy_advection (2)                                |
| northward_eliassen_palm_flux (3)   |
| upward_eliassen_palm_flux  |
| tendency_of_eastward_wind_due_to_eliassen_palm_flux_divergence               |
| northward_transformed_eulerian_mean_velocity                                 |
| upward_transformed_eulrian_mean_velocity                                     |
| tendency_of_eastward_wind_due_to_gravity_wave_drag (4)                       |
| tendency_of_eastward_wind_due_to_orographic_gravity_wave_drag                |
| tendency_of_eastward_wind_due_to_nonorographic_gravity_wave_drag             |
| upward_flux_of_eastward_momentum_due_to_orographic_gravity_waves             |
| upward_flux_of_eastward_momentum_due_to_nonorographic_eastward_gravity_waves |
| upward_flux_of_eastward_momentum_due_to_nonorographic_westward_gravity_waves |
| tendency_of_eastward_wind_due_to_numerical_artefacts (5)                     |
| dynamic_tropopause_potential_temperature (6)                                 |

(1) “mean age of air” is the term used in the literature to define an estimate of the time since last contact with the troposphere. Here a slightly more verbose phrasing is used. The “mean” has been omitted following preliminary discussion, but under strong protest – views on this would be welcome.

(2) “Eddy heat flux” is the description usually used in the scientific literature, here the term is fitted around the “\_due\_to\_” syntax

- (3) “Eliassen Palm flux” is a widely used vector in the meridional plane, and the divergence of this flux appears as a forcing in the Transformed Eulerian mean formulation of the zonal mean zonal wind equation. Thus, “eastward\_wind” here will generally be the zonally averaged eastward wind.
- (4) Gravity wave drag needs to be archived separately for orographic and non-orographic components, and the non-orographic component should be further categorised as from eastward or westward propagating waves.
- (5) The actual tendency of the eastward wind will include a variety of numerical and diffusive effects: this variable is designed to allow the momentum budget to be closed.
- (6) The dynamical tropopause is very useful for interpreting the dynamics of the upper troposphere and lower stratosphere. As with regions in the previous section, it will be useful to have a description of the dynamical tropopause definition, as there are variations in the scientific literature. We would propose to give the variable an attribute “surface” containing the name of a global attribute which describes the surface used.