**Max Planck Institute for Meteorology**
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# Exercises
# "Working with ICON"

## Exercise 6

## Problem 16

Introduce a new "stream" in order to write the emission flux to an output file. To this end, modify the template ~m218036/icon_course_2018/mo_echam_ttr_memory.f90.
Inside this module, you find (*i*) the FAD variable echam_ttr of type t_echam_ttr that contains as sole component the 2d–array tracer_emi for the surface emission flux. You find further (*ii*) the "stream" variable echam_ttr_list of type t_var_list that will contain all information about the output. The stream has to be connected to the FAD variable by a call to add_var. Since this has to be done for each model domain, you first allocate your vectors echam_ttr(n_dom) and echam_ttr_list(n_dom) in construct_echam_ttr_list. Inside a loop over the model domains, you call new_echam_ttr_list. In new_echam_ttr_list, you first call new_var_list and then add_var. The call to add_var is:

```
CALL add_var ( echam_ttr_list,'tracer_emi',       &
               & echam_ttr%tracer_emi,            &
               & GRID_UNSTRUCTURED_CELL, ZA_SURFACE, &
               & cf_desc, grib2_desc,               &
               & ldims=shape_2d                     )
```

For GRIB2 data description, use

```
grib2_desc = grib2_var &
           & (  0,          14,           3,          &
           &    DATATYPE_PACK24, GRID_UNSTRUCTURED,   &
           &    GRID_UNSTRUCTURED_CELL                )
```

Call construct_echam_ttr_list in construct_atmo_nonhydrostatic of mo_atmo_nonhydrostatic.f90 after construct_psrad_forcing_list. Call destruct_echam_ttr_list in mo_echam_phy_cleanup.f90 at the respective place. In mo_interface_echam_ttr.f90 use the FAD echam_ttr and assign tend%qtrc_ttr at the appropriate places of interface_echam_ttr according to echam_phy_config(jg)%fc_ttr. Perform a short run writing 'tracer_emi' to a file tracer_diag using the atm_amip_test experiment. What is the difference between the two possibilities of tracer tendency output?