Yet Another Coupler – YAC

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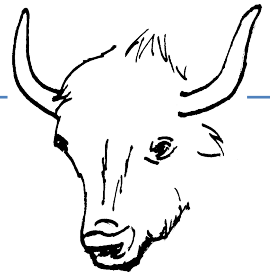
YAC – Team



Development Team

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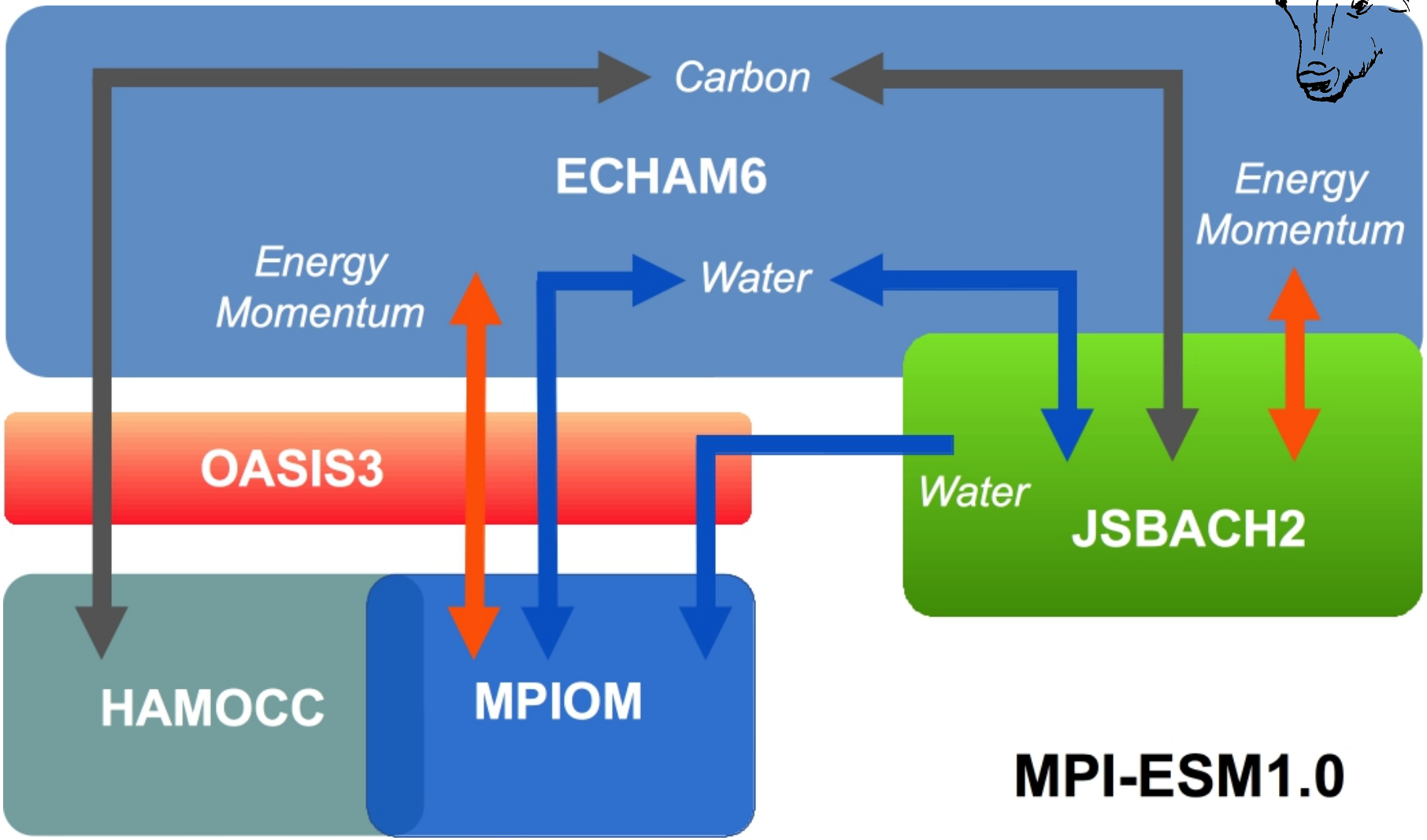
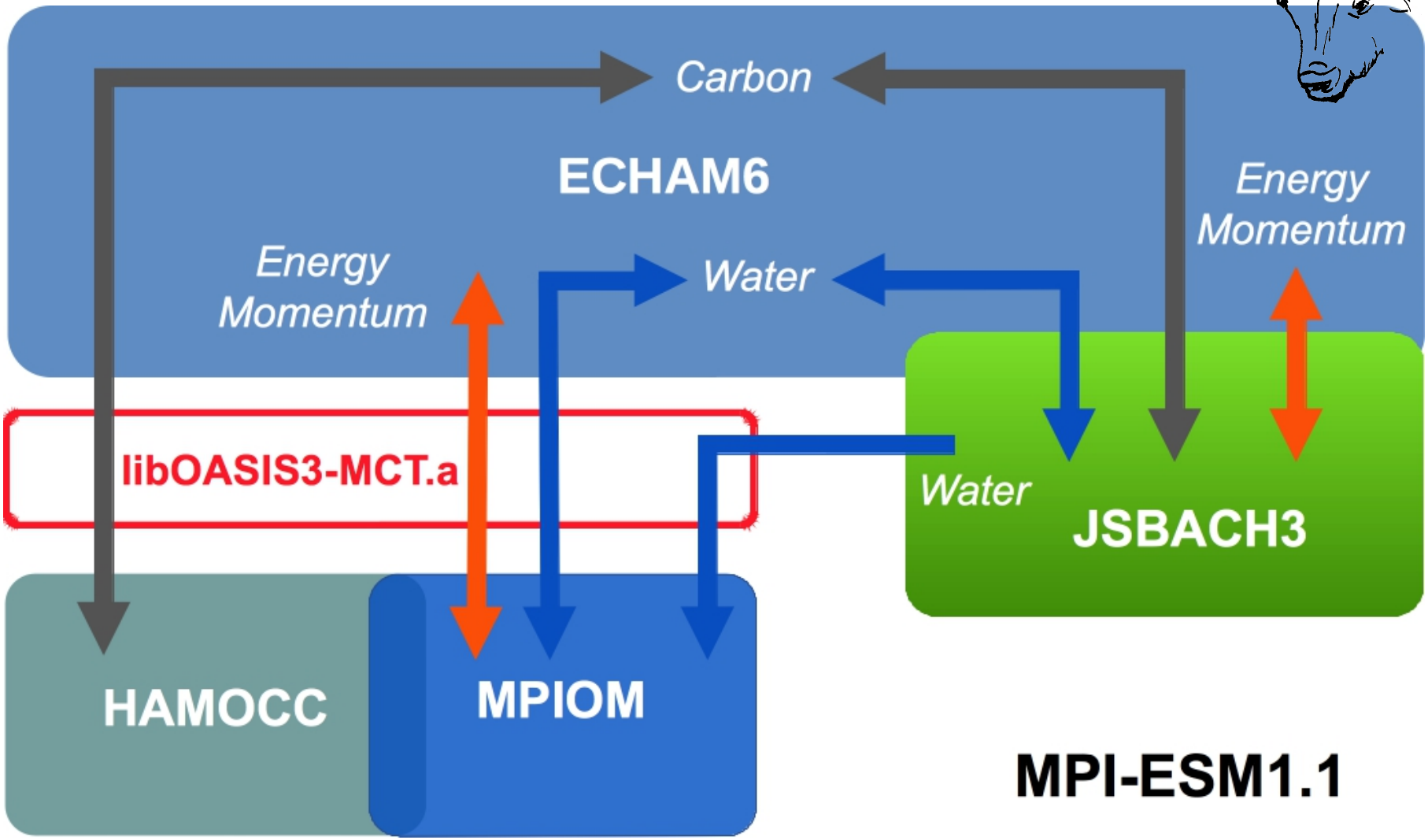
Sergey Kosukhin (MPI-M)

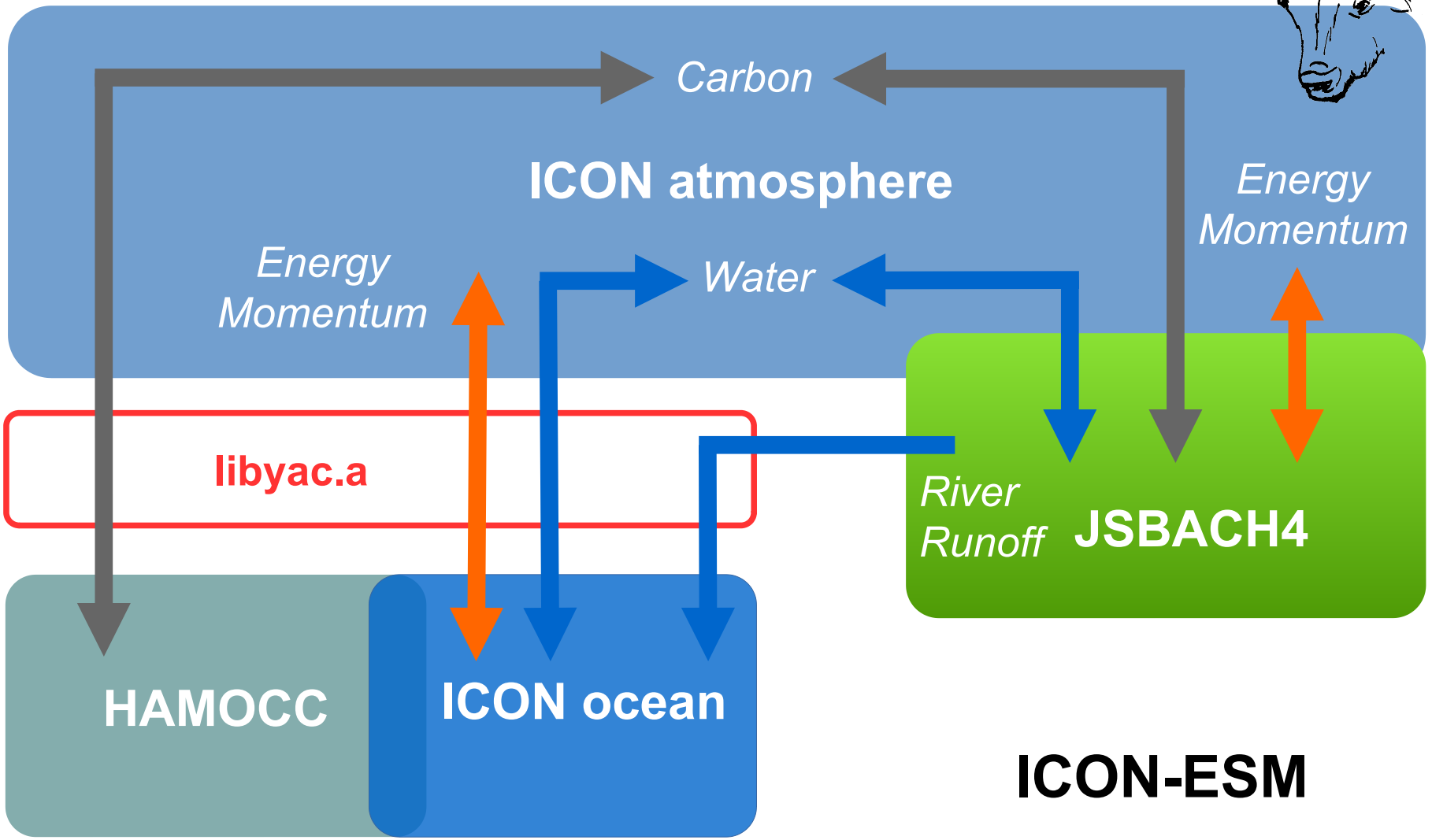
YAC – General remarks



YAC – General remarks



YAC – General remarks



YAC – General remarks

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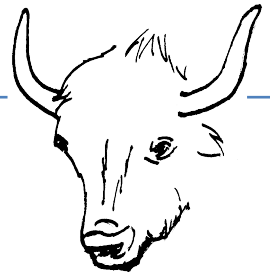


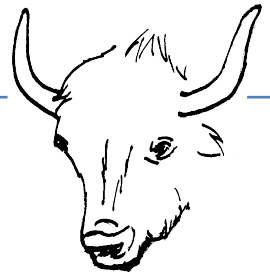
A coupling software not only for ICON

Parallel search on (almost) arbitrary grids on the sphere
Parallel interpolation
Parallel data exchange

Library
BSD License
Programming Language C (~95%)[1)]
Fortran and C user API
Programming based on standards (C, MPI, XML, NetCDF)
Git repository
Redmine
Autotools
Valgrind testing
Unit tests (~90% of lines covered)
Fortran and C examples plus toy models
XML coupling configuration file with GUI support

[1)] generated using David A. Wheeler's 'SLOCCount'

YAC – Search



required

- Unique global IDs for cells, vertices, edges
- Geographical positions (λ, φ) of vertices and points
- Halo points/cells have to be marked
- Ranks of respective processes

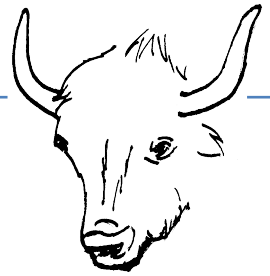
provided

- Initial scalable computation of global mapping
- Final scalable parallel interpolation specific search and calculation of interpolation weights

features

- Support for circles of latitude/longitude and great circles
- Search and interpolation in Cartesian coordinates
- Convex & moderately concave polygons
- Support for masked cells and points

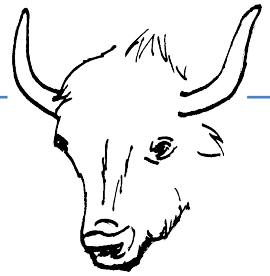
YAC – Interpolation



Available 2-dimensional (horizontal) interpolation methods

- 1st – order conservative remapping (**`conserv`**)
- 2nd – order conservative remapping (**`conserv`**)
- Hybrid cubic spherical Bernstein-Bézier patch interpolation (**`bernstein_bezier`**)
- Patch recovery - polynomial fit (**`patch_recovery`**)
- Smoothed Patch recovery - polynomial fit (**`smooth_patch_recovery`**)
- Distance-weighted N-nearest-neighbour (**`n-nearest_neighbour`**)
- N-nearest-neighbour average (**`n-nearest_neighbour`**)
- Gauss-weighted N-nearest-neighbour (**`n-nearest_neighbour`**)
- Radial Basis Functions (**`radial_basis_function`**)
- Source Point to Target Point Mapping (**`source_to_target_map`**)
- Simple cell average (**`average`**)
- Distance-weighted cell average (**`average`**)
- Fixed value (**`fixed`**)
- File input (**`user_file`**)

YAC – Interpolation stack

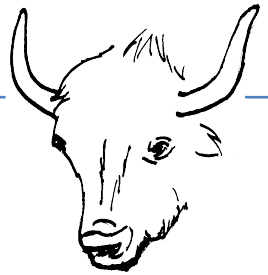


example

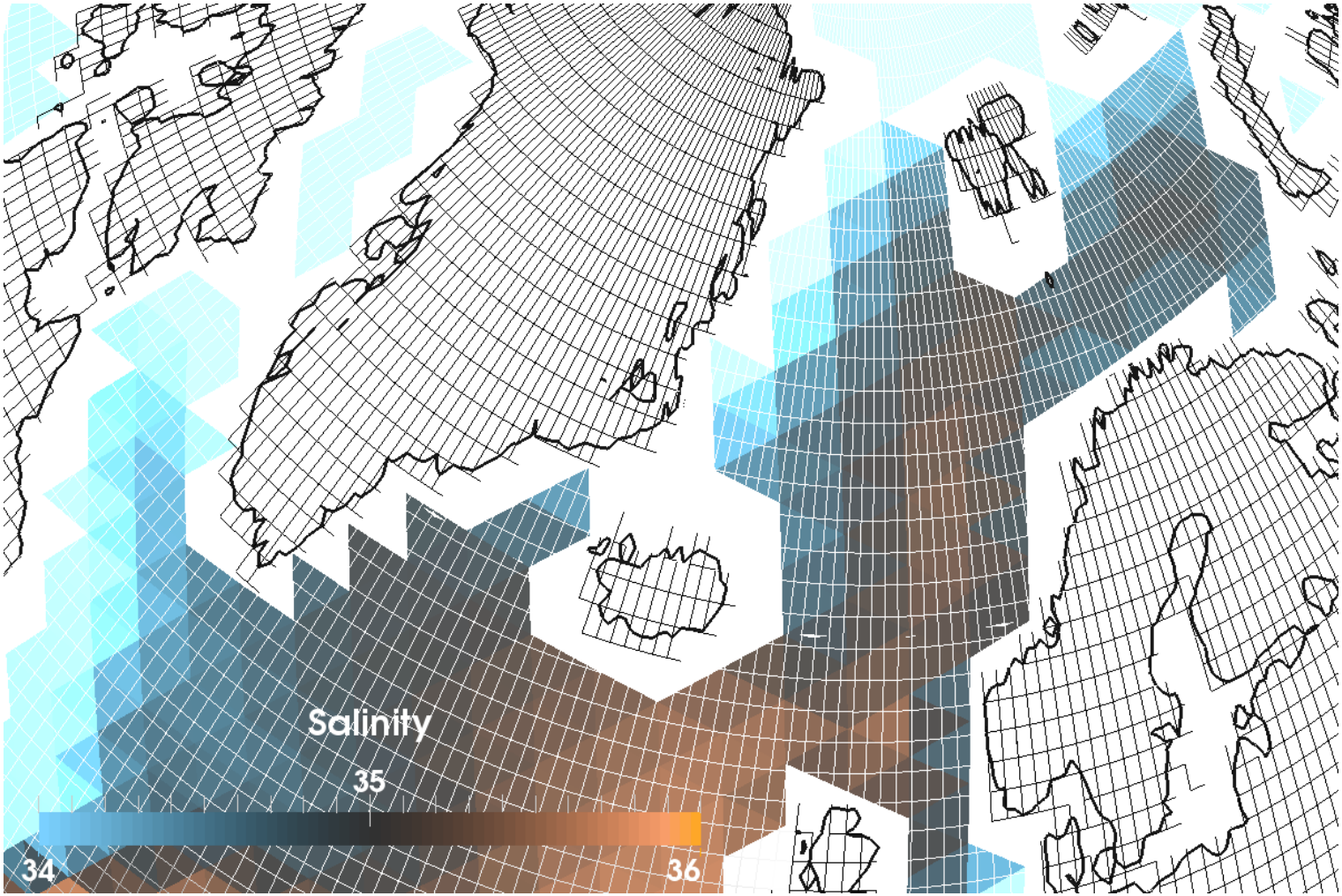
interpolation of World Ocean Atlas 2009 sea surface salinity onto an ICON R2B04 atmosphere grid.

1st-order conservative remapping
plus **patch recovery**
plus **fixed value**

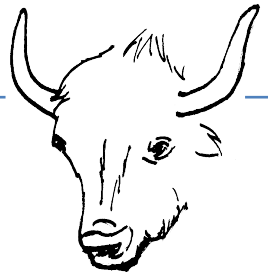
YAC – Interpolation stack



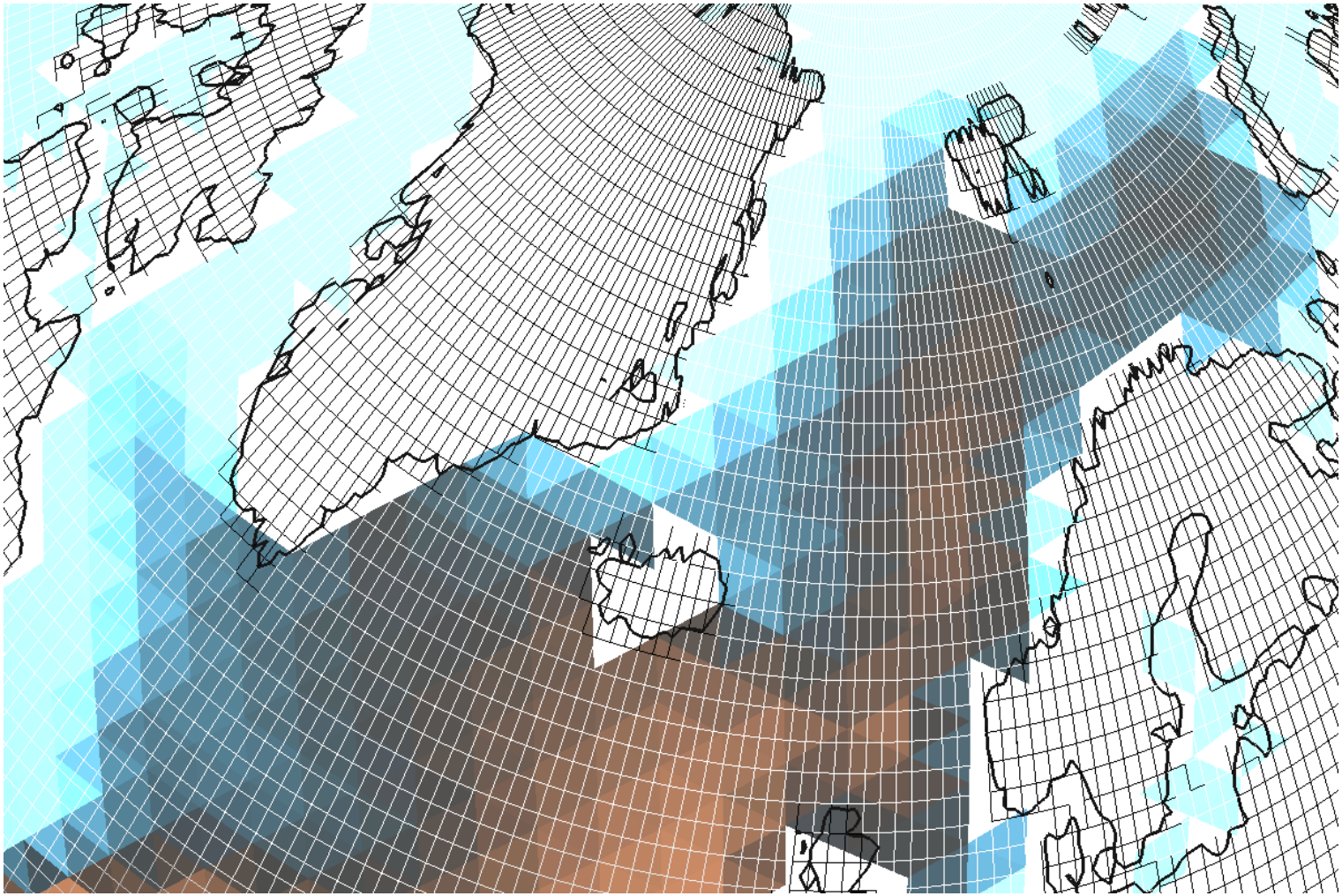
Step 1: 1st- order conservative remapping



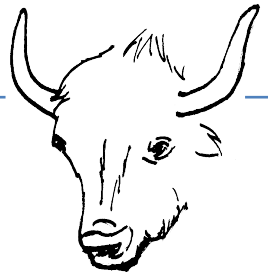
YAC – Interpolation stack



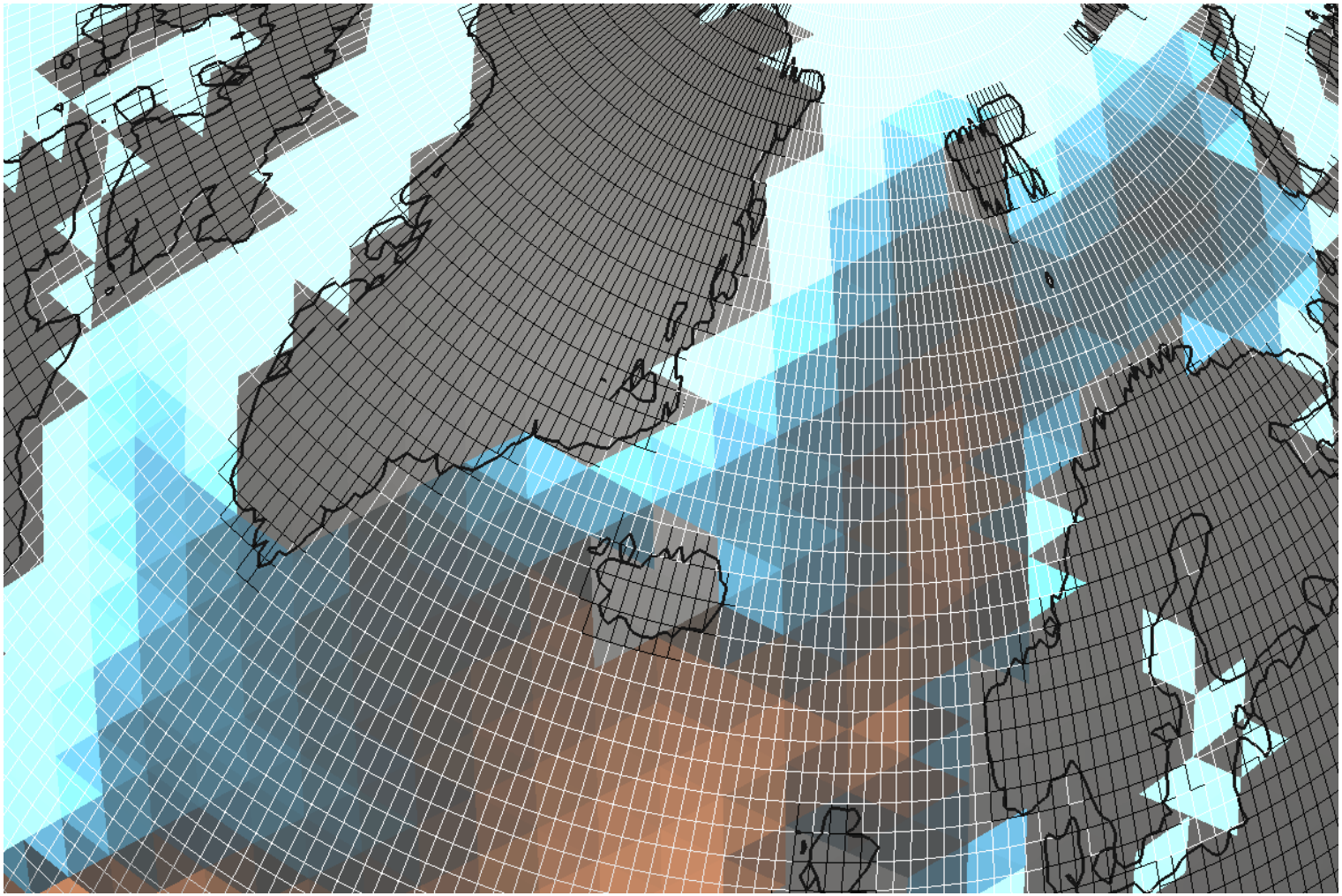
Step 2: … + patch recovery



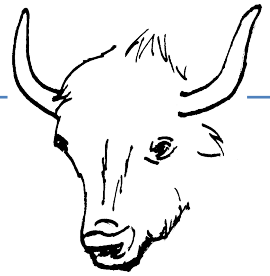
YAC – Interpolation stack

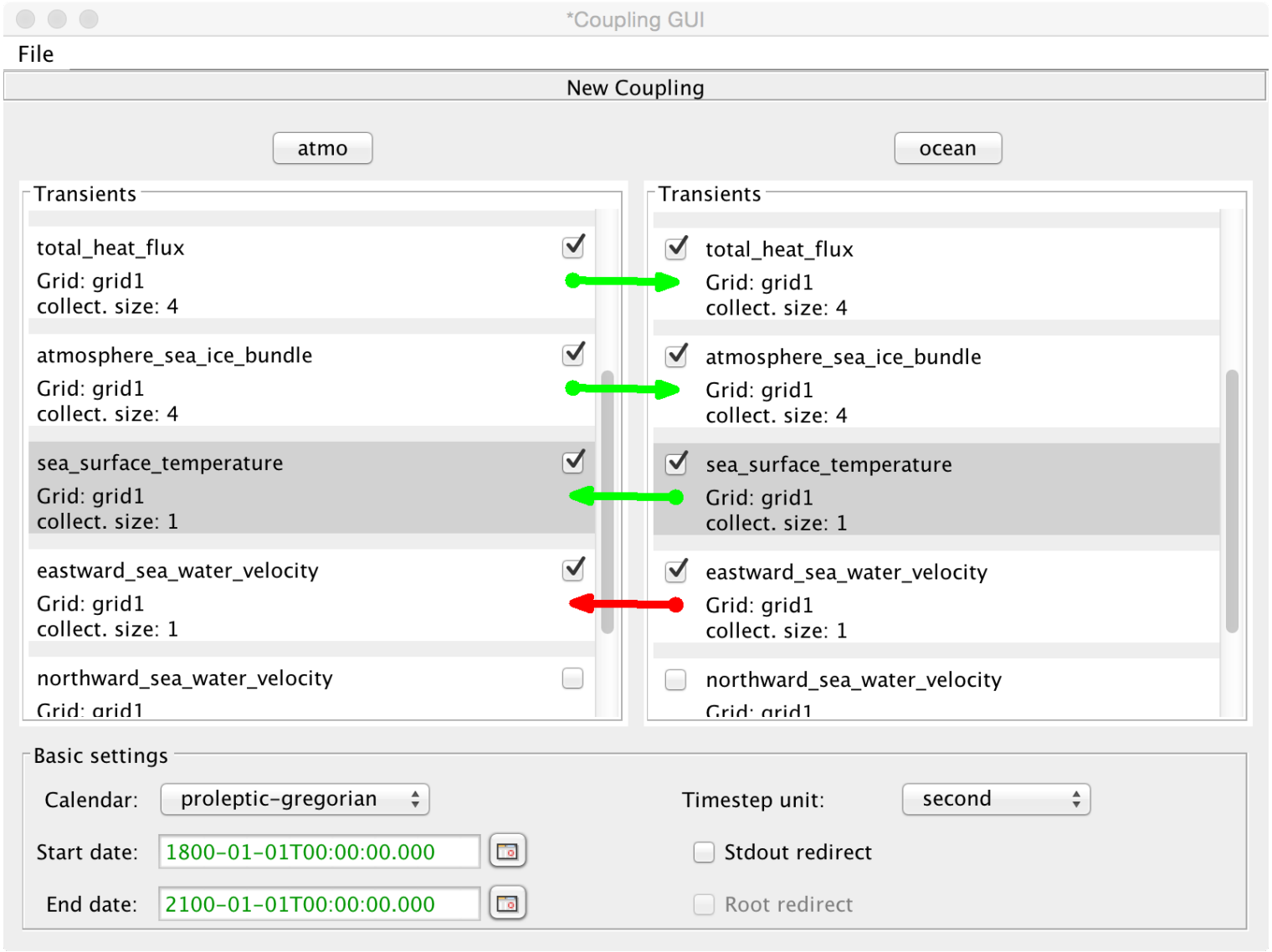


Step 3: … + fixed value

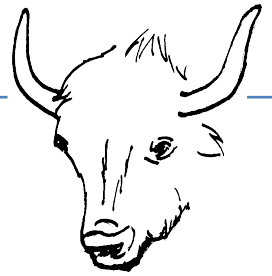


YAC – Graphical User Interface





YAC – Fortran Interface



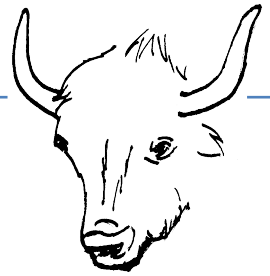
Initialisation Phase
- yac_finit
- yac_fdef_comp
- yac_fdef_datetime
- yac_fget_localcomm

Grid Definition
- yac_fdef_subdomain
- yac_fdef_points
- yac_fdef_index_location
- yac_fdef_elements
- yac_fconnect_subdomains
- yac_fdef_mask
- yac_fdef_field

Search – End of Definition
- yac_fsearch

Data exchange
- yac_fget
- yac_fput

Termination
- yac_ffinalize



component initialisation

CALL yac_finit (“coupling.xml”, “coupling.xsd”)

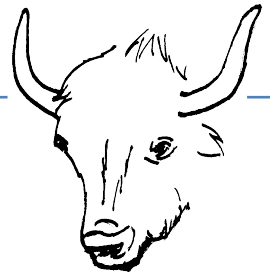
- will call MPI_INIT if not been called already

CALL yac_fdef_comp (component_name, **component_id**)

- local operations for initialising of YAC-internal data structures
- needs to be called by all processes

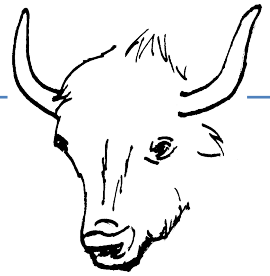
CALL yac_fdef_datetime (start_datetime = start_of_run_in iso_format,
end_datetime = end_of_run_in_iso_format)

- overwrites start and end date set in coupling.xml
- if required it has to be called before calling yac_fdef_field
- time management inside yac using mtime



grid definition

```
CALL yac_fdef_subdomain   (   component_id,
                              grid_name,
                              subdomain_id )
```

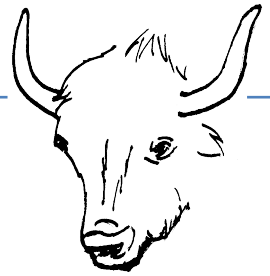


grid definition

```
CALL yac_fdef_elements  ( subdomain_id,
                          nbr_of_horizontal_vertices,
                          nbr_of_horizontal_cells,
                          nbr_vertices_per_cell,
                          array_of_longitudes,
                          array_of_latitudes,
                          connectivity )
```

overloaded with respect to

- data type for coordinate arrays
- grid types

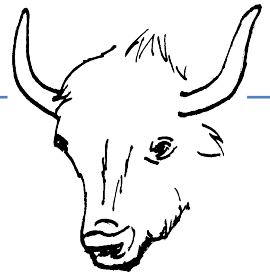


grid definition

```
CALL yac_fdef_points  ( subdomain_id,
                        nbr_of_horizontal_points,
                        CELL,
                        array_of_longitudes,
                        array_of_latitudes,
                        point_id )
```

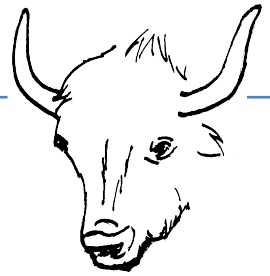
overloaded with respect to

- data type for coordinate arrays
- grid types



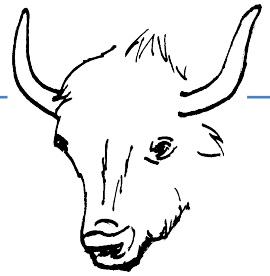
grid definition

```
CALL yac_fdef_index_location   (  subdomain_id,
                                  nbr_of_indices,
                                  CELL,
                                  array_of_global_indices,
                                  array_of_ranks  )
```



grid definition

```
CALL yac_fconnect_subdomains  (  component_id,
                                 nbr_subdomain_ids,
                                 array_of_subdomain_ids,
                                 domain_id   )
```

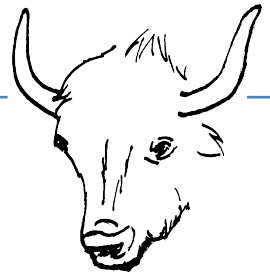


mask definition

```
CALL yac_fdef_mask   (  size_of_mask_array,
                        mask_array,
                        point_id,
                        mask_id    )
```

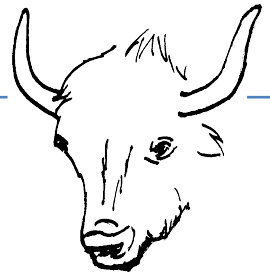
overloaded with respect to

- data type for mask array



field definition

```
CALL yac_fdef_field   (   field_name,
                          component_id,
                          domain_id,
                          array_of_cell_point_ids,
                          array_of_cell_mask_ids,
                          nbr_point_set_per_subdomain,
                          field_id   )
```



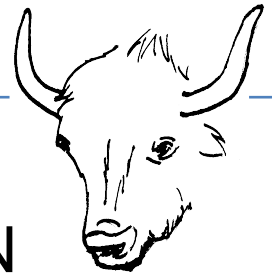
search

CALL yac_fsearch (nbr_of_components,
array_of_**component_ids**,
nbr_of_fields,
array_of_**field_ids**,
error_status)

- includes collective MPI operations
- needs to be called by all processes
- accesses the coupling configuration
- invokes the neighbourhood search
- does the communicator splitting

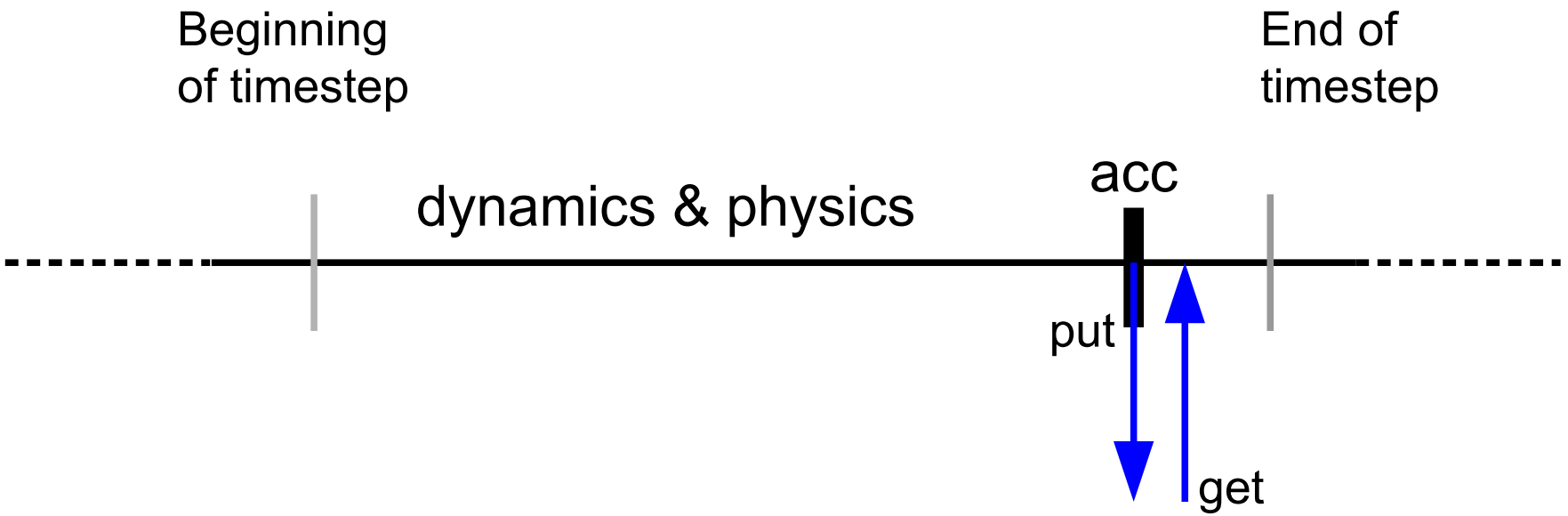
CALL yac_fget_localcomm (local_mpi_communicator, **component_id**)

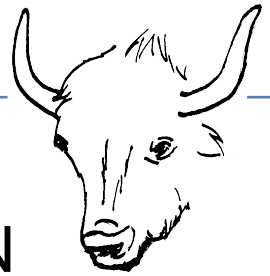
YAC – Exchange Phase



data exchange

as it is implemented in ICON

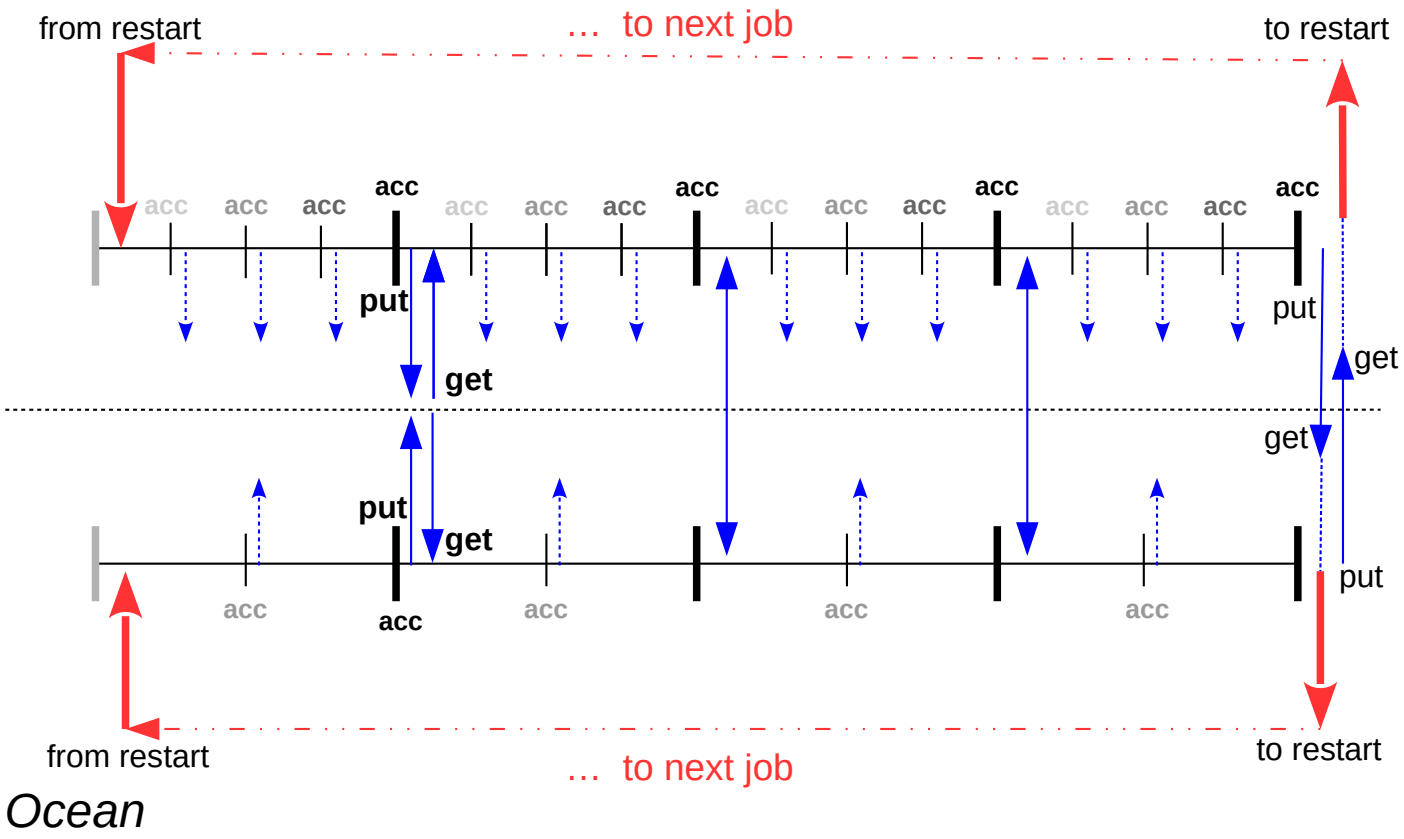




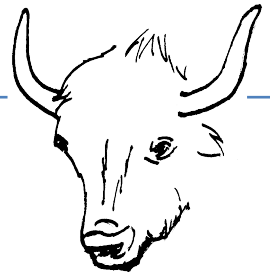
data exchange

as it is implemented in ICON

Atmosphere



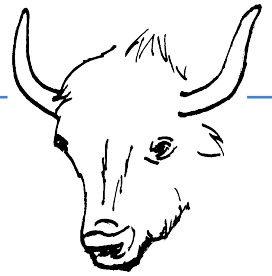
Ocean



data exchange

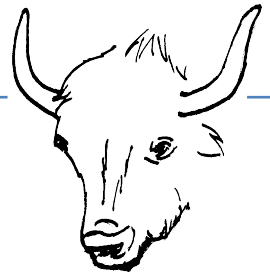
```
CALL yac_fput   (  field_id,
                   nbr_horizontal_points,
                   collection_size,
                   nbr_pointsets,
                   nbr_subdomains,
                   send_field,
                   info,
                   error_flag  )
```

- to be called at every time step
- at the “source timestep” interval specified in the xml file
- accumulation/averaging done inside yac_fput



data exchange

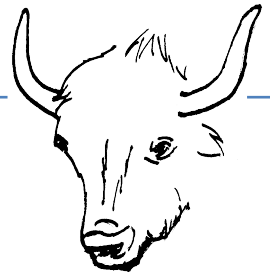
```
! field_id(6) : Temperature

DO i_blk = 1, patch_horz%nblks_c
  nn = (i_blk-1)*nproma
  DO n = 1, nproma
    buffer(nn+n,1) = &
    ocean_state%p_prog(nold(1))%tracer(n,1,i_blk,1) + tmelt
  ENDDO
ENDDO

CALL yac_fput ( field_id(6), nbr_hor_points, 1,    &
      &          1, 1, buffer(1:nbr_hor_points,1), &
      &          info, ierror )
```



data exchange

```
CALL yac_fget   (  field_id,
                   nbr_horizontal_points,
                   collection_size,
                   nbr_pointsets,
                   nbr_subdomains,
                   recv_field,
                   info,
                   error_flag  )
```

- to be called at every time step
- at the “target timestep” interval specified in the xml file
- check the returned **info** argument

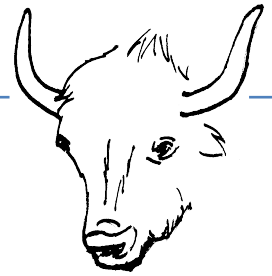


data exchange

Return values for the info argument

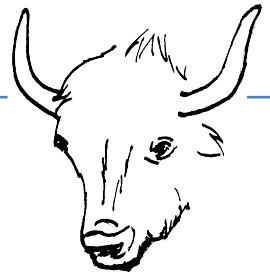
```
enum, bind(c)
   enumerator :: NONE                = 0
   enumerator :: COUPLING            = 1
   enumerator :: RESTART             = 2
   enumerator :: GET_FOR_RESTART     = 3
   enumerator :: PUT_FOR_RESTART     = 4
   enumerator :: GET_FOR_CHECKPOINT  = 5
   enumerator :: PUT_FOR_CHECKPOINT  = 6
   enumerator :: OUT_OF_BOUND        = 7
end enum
```

YAC – Exchange Phase



data exchange

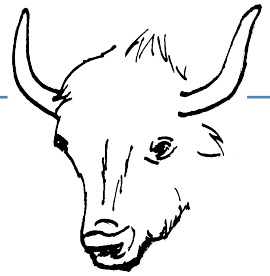
```
CALL yac_fget ( field_id(1), nbr_hor_points, 2,       &
      &          1, 1, buffer(1:nbr_hor_points,1:2), &
      &          info, ierror )

IF (info > 0 .AND. info < 7 ) THEN
  DO i_blk = 1, patch_horz%nblks_c
    nn = (i_blk-1)*nproma
    DO n = 1, nproma
      atmos_fluxes%stress_xw(n,i_blk) = buffer(nn+n,1)
      atmos_fluxes%stress_x (n,i_blk) = buffer(nn+n,2)
    ENDDO
  ENDDO
  CALL sync_patch_array ( … , atmos_fluxes%stress_xw(:,:))
  CALL sync_patch_array ( … , atmos_fluxes%stress_x (:,:))
ENDIF
```



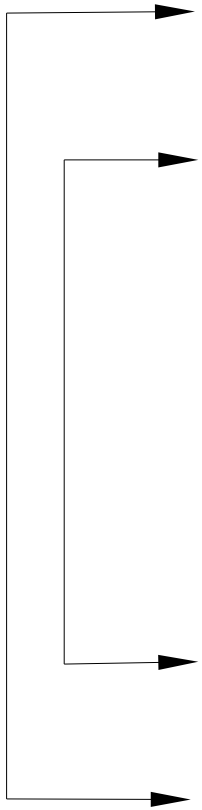
termination of coupling

CALL yac_ffinalise ( )

- frees all internal data structures related to coupling
- MPI communicators may no longer be available
- will call MPI_FINALIZE
  if MPI_INIT has been called by yac_finit
  if MPI_FINALIZE has not already been called

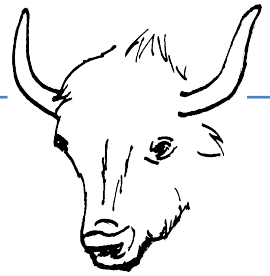


Recommended calling sequence



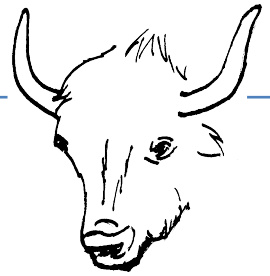
```
CALL MPI_init ( ... )
CALL yac_finit ( ... )
CALL yac_finit_comp ( … )
CALL yac_fsearch ( … )
CALL yac_fget_local_comm ( … )
CALL yac_ffinalise ( )
CALL MPI_finalize ( ... )
```

YAC – Component XML configuration



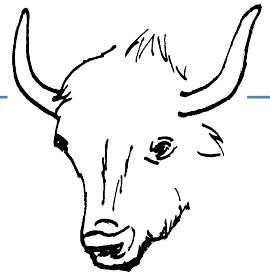
```
<?xml version="1.0" encoding="UTF-8"?>
<component
        xmlns="http://www.w3schools.com"
        xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        xsi:schemaLocation="http://www.w3schools.component.xsd">
        <id>1</id>
        <name>atmo</name>
        <model>ICON</model>
        <simulated>atmosphere</simulated>
        <transient_grid_refs>
            <transient_grid_ref collection_size="2" grid_ref="1" id="1" transient_ref="1"/>
            <transient_grid_ref collection_size="2" grid_ref="1" id="2" transient_ref="2"/>
            <transient_grid_ref collection_size="3" grid_ref="1" id="3" transient_ref="3"/>
            <transient_grid_ref collection_size="4" grid_ref="1" id="4" transient_ref="4"/>
            <transient_grid_ref collection_size="4" grid_ref="1" id="5" transient_ref="5"/>
            <transient_grid_ref collection_size="1" grid_ref="1" id="6" transient_ref="6"/>
            <transient_grid_ref collection_size="1" grid_ref="1" id="7" transient_ref="7"/>
            <transient_grid_ref collection_size="1" grid_ref="1" id="8" transient_ref="8"/>
            <transient_grid_ref collection_size="5" grid_ref="1" id="9" transient_ref="9"/>
        </transient_grid_refs>
        <transients>
            <transient id="1" transient_standard_name="surface_downward_eastward_stress"/>
            <transient id="2" transient_standard_name="surface_downward_northward_stress"/>
            <transient id="3" transient_standard_name="surface_fresh_water_flux"/>
            <transient id="4" transient_standard_name="total_heat_flux"/>
            <transient id="5" transient_standard_name="atmosphere_sea_ice_bundle"/>
            <transient id="6" transient_standard_name="sea_surface_temperature"/>
            <transient id="7" transient_standard_name="eastward_sea_water_velocity"/>
            <transient id="8" transient_standard_name="northward_sea_water_velocity"/>
            <transient id="9" transient_standard_name="ocean_sea_ice_bundle"/>
        </transients>
        <grids>
            <grid id="1" alias_name="grid1"/>
        </grids>
</component>
```

YAC – Component XML configuration



```
<?xml version="1.0" encoding="UTF-8"?>
<component
        xmlns="http://www.w3schools.com"
        xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        xsi:schemaLocation="http://www.w3schools.component.xsd">
        <id>1</id>
        <name>atmo</name>
        <model>ICON</model>
        <simulated>atmosphere</simulated>
        <transient_grid_refs>
            <transient_grid_ref collection_size="2" grid_ref="1" id="1" transient_ref="1"/>
            <transient_grid_ref collection_size="2" grid_ref="1" id="2" transient_ref="2"/>
            <transient_grid_ref collection_size="3" grid_ref="1" id="3" transient_ref="3"/>
            <transient_grid_ref collection_size="4" grid_ref="1" id="4" transient_ref="4"/>
            <transient_grid_ref collection_size="4" grid_ref="1" id="5" transient_ref="5"/>
            <transient_grid_ref collection_size="1" grid_ref="1" id="6" transient_ref="6"/>
            <transient_grid_ref collection_size="1" grid_ref="1" id="7" transient_ref="7"/>
            <transient_grid_ref collection_size="1" grid_ref="1" id="8" transient_ref="8"/>
            <transient_grid_ref collection_size="5" grid_ref="1" id="9" transient_ref="9"/>
        </transient_grid_refs>
        <transients>
            <transient id="1" transient_standard_name="surface_downward_eastward_stress"/>
            <transient id="2" transient_standard_name="surface_downward_northward_stress"/>
            <transient id="3" transient_standard_name="surface_fresh_water_flux"/>
            <transient id="4" transient_standard_name="total_heat_flux"/>
            <transient id="5" transient_standard_name="atmosphere_sea_ice_bundle"/>
            <transient id="6" transient_standard_name="sea_surface_temperature"/>
            <transient id="7" transient_standard_name="eastward_sea_water_velocity"/>
            <transient id="8" transient_standard_name="northward_sea_water_velocity"/>
            <transient id="9" transient_standard_name="ocean_sea_ice_bundle"/>
        </transients>
        <grids>
            <grid id="1" alias_name="grid1"/>
        </grids>
</component>
```

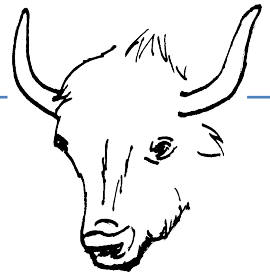
YAC – Component XML configuration



```
<name>atmo</name>
<model>ICON</model>
<simulated>atmosphere</simulated>
```

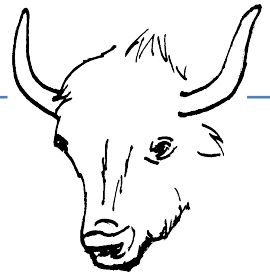
```
CALL YAC_fdef_comp ( "atmo", comp_id )
```

YAC – Component XML configuration



```
<?xml version="1.0" encoding="UTF-8"?>
<component
        xmlns="http://www.w3schools.com"
        xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        xsi:schemaLocation="http://www.w3schools.component.xsd">
        <id>1</id>
        <name>atmo</name>
        <model>ICON</model>
        <simulated>atmosphere</simulated>
        <transient_grid_refs>
            <transient_grid_ref collection_size="2" grid_ref="1" id="1" transient_ref="1"/>
            <transient_grid_ref collection_size="2" grid_ref="1" id="2" transient_ref="2"/>
            <transient_grid_ref collection_size="3" grid_ref="1" id="3" transient_ref="3"/>
            <transient_grid_ref collection_size="4" grid_ref="1" id="4" transient_ref="4"/>
            <transient_grid_ref collection_size="4" grid_ref="1" id="5" transient_ref="5"/>
            <transient_grid_ref collection_size="1" grid_ref="1" id="6" transient_ref="6"/>
            <transient_grid_ref collection_size="1" grid_ref="1" id="7" transient_ref="7"/>
            <transient_grid_ref collection_size="1" grid_ref="1" id="8" transient_ref="8"/>
            <transient_grid_ref collection_size="5" grid_ref="1" id="9" transient_ref="9"/>
        </transient_grid_refs>
        <transients>
            <transient id="1" transient_standard_name="surface_downward_eastward_stress"/>
            <transient id="2" transient_standard_name="surface_downward_northward_stress"/>
            <transient id="3" transient_standard_name="surface_fresh_water_flux"/>
            <transient id="4" transient_standard_name="total_heat_flux"/>
            <transient id="5" transient_standard_name="atmosphere_sea_ice_bundle"/>
            <transient id="6" transient_standard_name="sea_surface_temperature"/>
            <transient id="7" transient_standard_name="eastward_sea_water_velocity"/>
            <transient id="8" transient_standard_name="northward_sea_water_velocity"/>
            <transient id="9" transient_standard_name="ocean_sea_ice_bundle"/>
        </transients>
        <grids>
            <grid id="1" alias_name="grid1"/>
        </grids>
</component>
```

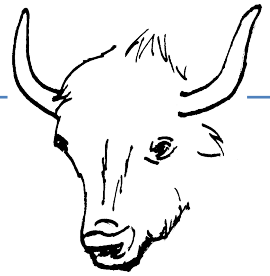
YAC – Component XML configuration



```
<transient_grid_refs>
   <transient_grid_ref collection_size="2" grid_ref="1" id="1" transient_ref="1"/>
   <transient_grid_ref collection_size="2" grid_ref="1" id="2" transient_ref="2"/>
   <transient_grid_ref collection_size="3" grid_ref="1" id="3" transient_ref="3"/>
   <transient_grid_ref collection_size="4" grid_ref="1" id="4" transient_ref="4"/>
   …
   <transient_grid_ref collection_size="5" grid_ref="1" id="9" transient_ref="9"/>
</transient_grid_refs>
```

```
CALL yac_fget ( field_id, nbr_hor_points, 2,          &
      &         1, 1, buffer(1:nbr_hor_points,1:2), &
      &         info, ierror )

CALL yac_fput ( field_id, nbr_hor_points, 5,          &
      &         1, 1, buffer(1:nbr_hor_points,1:5), &
      &         info, ierror )
```

YAC – Component XML configuration



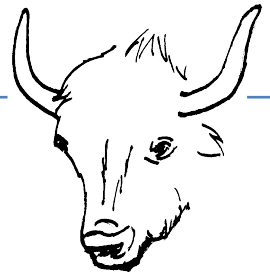
```
<?xml version="1.0" encoding="UTF-8"?>
<component
        xmlns="http://www.w3schools.com"
        xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        xsi:schemaLocation="http://www.w3schools.component.xsd">
        <id>1</id>
        <name>atmo</name>
        <model>ICON</model>
        <simulated>atmosphere</simulated>
        <transient_grid_refs>
            <transient_grid_ref collection_size="2" grid_ref="1" id="1" transient_ref="1"/>
            <transient_grid_ref collection_size="2" grid_ref="1" id="2" transient_ref="2"/>
            <transient_grid_ref collection_size="3" grid_ref="1" id="3" transient_ref="3"/>
            <transient_grid_ref collection_size="4" grid_ref="1" id="4" transient_ref="4"/>
            <transient_grid_ref collection_size="4" grid_ref="1" id="5" transient_ref="5"/>
            <transient_grid_ref collection_size="1" grid_ref="1" id="6" transient_ref="6"/>
            <transient_grid_ref collection_size="1" grid_ref="1" id="7" transient_ref="7"/>
            <transient_grid_ref collection_size="1" grid_ref="1" id="8" transient_ref="8"/>
            <transient_grid_ref collection_size="5" grid_ref="1" id="9" transient_ref="9"/>
        </transient_grid_refs>
        <transients>
            <transient id="1" transient_standard_name="surface_downward_eastward_stress"/>
            <transient id="2" transient_standard_name="surface_downward_northward_stress"/>
            <transient id="3" transient_standard_name="surface_fresh_water_flux"/>
            <transient id="4" transient_standard_name="total_heat_flux"/>
            <transient id="5" transient_standard_name="atmosphere_sea_ice_bundle"/>
            <transient id="6" transient_standard_name="sea_surface_temperature"/>
            <transient id="7" transient_standard_name="eastward_sea_water_velocity"/>
            <transient id="8" transient_standard_name="northward_sea_water_velocity"/>
            <transient id="9" transient_standard_name="ocean_sea_ice_bundle"/>
        </transients>
        <grids>
            <grid id="1" alias_name="grid1"/>
        </grids>
</component>
```

YAC – Component XML configuration

```
<transients>
   <transient id="1"  transient_standard_name="surface_downward_eastward_stress"/>
   <transient id="2"  transient_standard_name="surface_downward_northward_stress"/>
   <transient id="3"  transient_standard_name="surface_fresh_water_flux"/>
   <transient id="4"  transient_standard_name="total_heat_flux"/>
   ...
   <transient id="9"  transient_standard_name="ocean_sea_ice_bundle"/>
</transients>
```

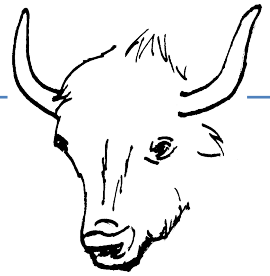
```
CALL yac_fdef_field &
       &          ( "surface_downward_eastward_stress",    &
       &            component_id, subdomain_id, point_id, &
       &            mask_id, 1, field_id(1) )

...
CALL yac_fdef_field &
       &          ( "ocean_sea_ice_bundle",                &
       &            component_id, subdomain_id, point_id, &
       &            mask_id, 1, field_id(9) )
```

YAC – Component XML configuration



```
<?xml version="1.0" encoding="UTF-8"?>
<component
        xmlns="http://www.w3schools.com"
        xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        xsi:schemaLocation="http://www.w3schools.component.xsd">
        <id>1</id>
        <name>atmo</name>
        <model>ICON</model>
        <simulated>atmosphere</simulated>
        <transient_grid_refs>
            <transient_grid_ref collection_size="2" grid_ref="1" id="1" transient_ref="1"/>
            <transient_grid_ref collection_size="2" grid_ref="1" id="2" transient_ref="2"/>
            <transient_grid_ref collection_size="3" grid_ref="1" id="3" transient_ref="3"/>
            <transient_grid_ref collection_size="4" grid_ref="1" id="4" transient_ref="4"/>
            <transient_grid_ref collection_size="4" grid_ref="1" id="5" transient_ref="5"/>
            <transient_grid_ref collection_size="1" grid_ref="1" id="6" transient_ref="6"/>
            <transient_grid_ref collection_size="1" grid_ref="1" id="7" transient_ref="7"/>
            <transient_grid_ref collection_size="1" grid_ref="1" id="8" transient_ref="8"/>
            <transient_grid_ref collection_size="5" grid_ref="1" id="9" transient_ref="9"/>
        </transient_grid_refs>
        <transients>
            <transient id="1" transient_standard_name="surface_downward_eastward_stress"/>
            <transient id="2" transient_standard_name="surface_downward_northward_stress"/>
            <transient id="3" transient_standard_name="surface_fresh_water_flux"/>
            <transient id="4" transient_standard_name="total_heat_flux"/>
            <transient id="5" transient_standard_name="atmosphere_sea_ice_bundle"/>
            <transient id="6" transient_standard_name="sea_surface_temperature"/>
            <transient id="7" transient_standard_name="eastward_sea_water_velocity"/>
            <transient id="8" transient_standard_name="northward_sea_water_velocity"/>
            <transient id="9" transient_standard_name="ocean_sea_ice_bundle"/>
        </transients>
        <grids>
            <grid id="1" alias_name="grid1"/>
        </grids>
</component>
```

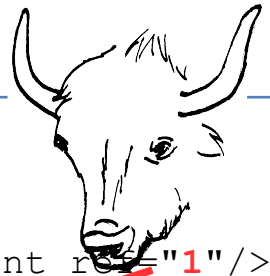
YAC – Component XML configuration



```
<grids>
   <grid id="1" alias_name="grid1"/>
</grids>
```

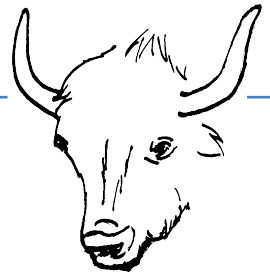
```
CALL yac_fdef_subdomain ( component_id,
                          "grid1",
                          subdomain_id )
```

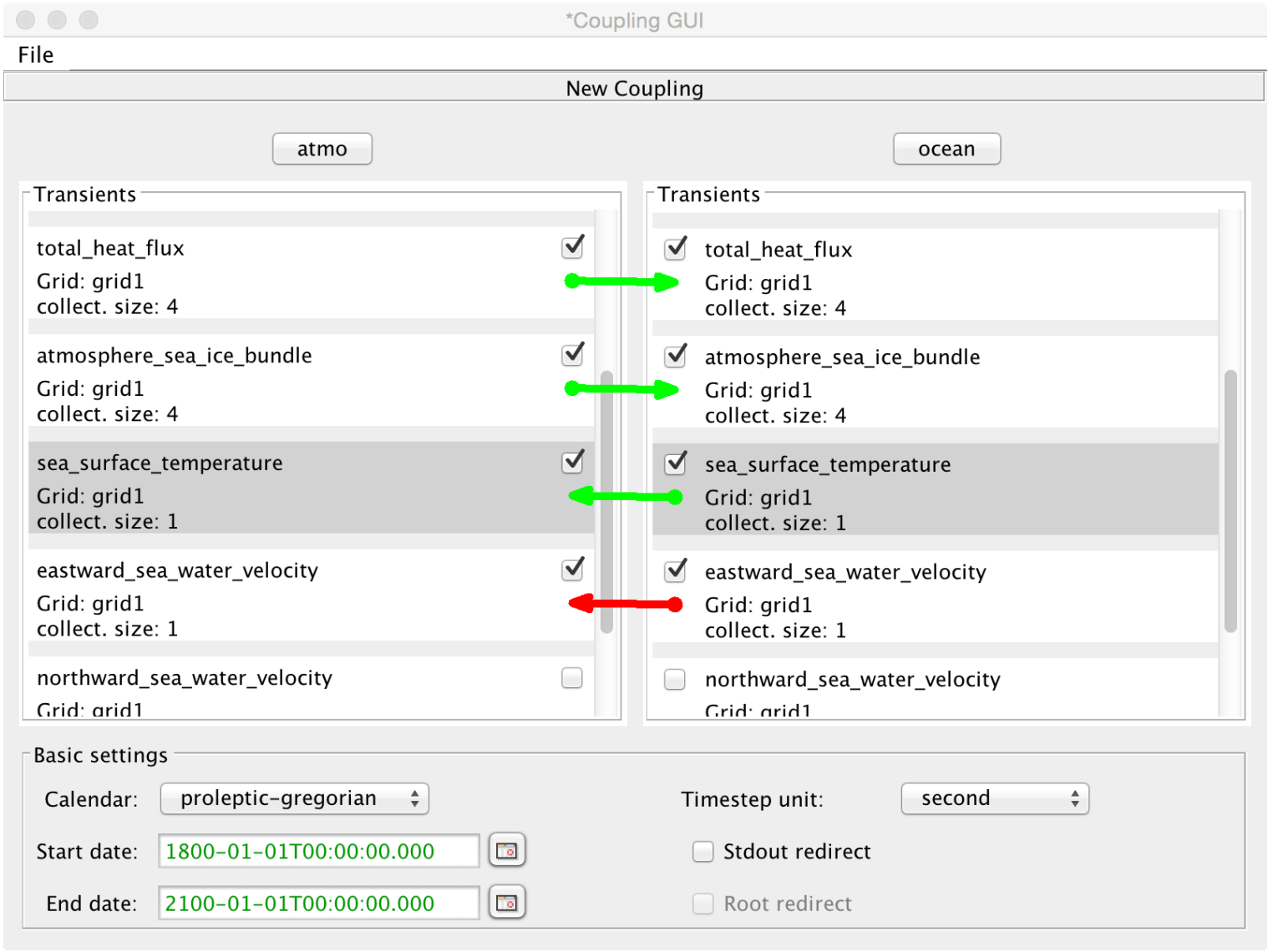
YAC – Component XML configuration



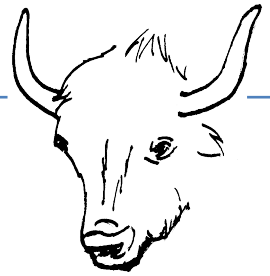
```
<transient_grid_refs>
   <transient_grid_ref collection_size="2" grid_ref="1" id="1" transient_ref="1"/>
   <transient_grid_ref collection_size="2" grid_ref="1" id="2" transient_ref="2"/>
   <transient_grid_ref collection_size="3" grid_ref="1" id="3" transient_ref="3"/>
   <transient_grid_ref collection_size="4" grid_ref="1" id="4" transient_ref="4"/>
   …
   <transient_grid_ref collection_size="5" grid_ref="1" id="9" transient_ref="9"/>
</transient_grid_refs>


<transients>
   <transient id="1" transient_standard_name="surface_downward_eastward_stress"/>
   <transient id="2" transient_standard_name="surface_downward_northward_stress"/>
   <transient id="3" transient_standard_name="surface_fresh_water_flux"/>
   <transient id="4" transient_standard_name="total_heat_flux"/>
   ...
   <transient id="9"  transient_standard_name="ocean_sea_ice_bundle"/>
</transients>


<grids>
   <grid id="1" alias_name="grid1"/>
</grids>
```

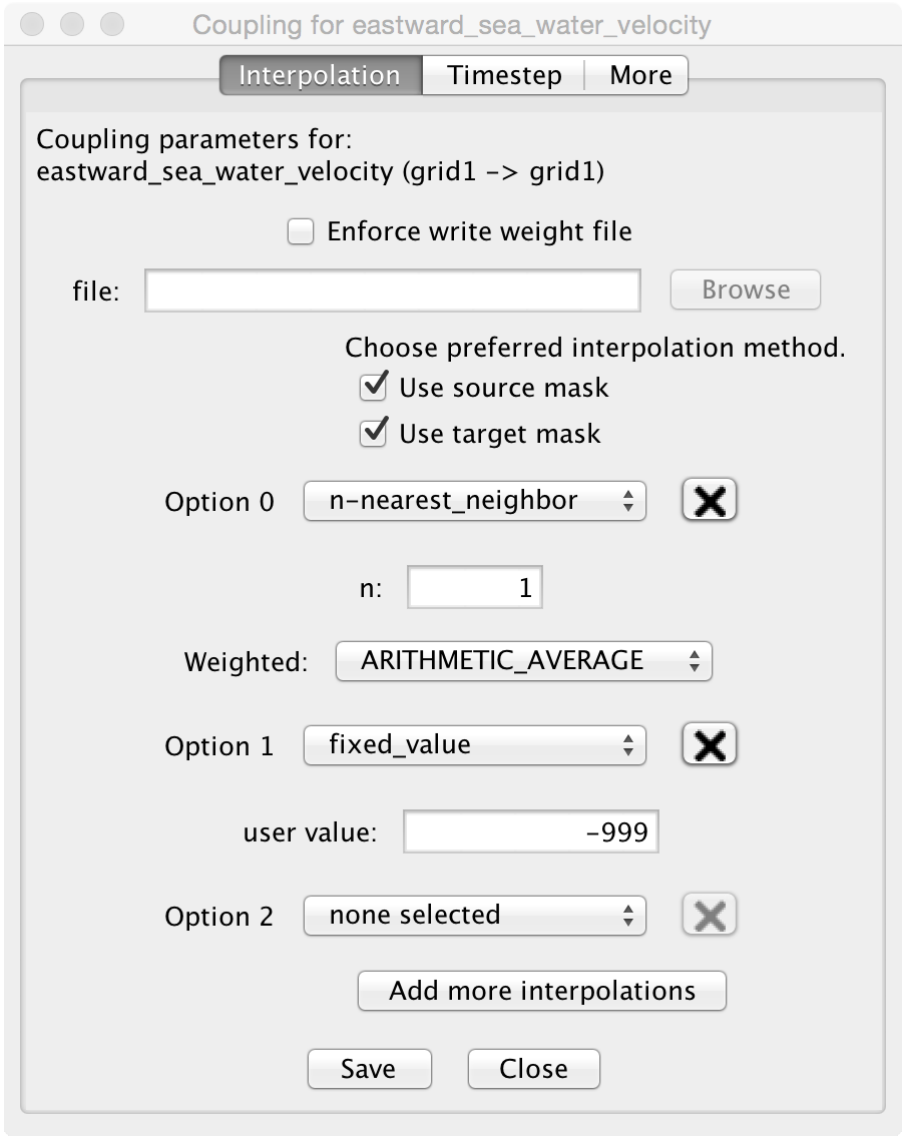
YAC – XML configuration



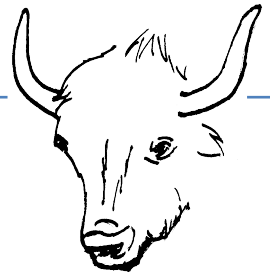


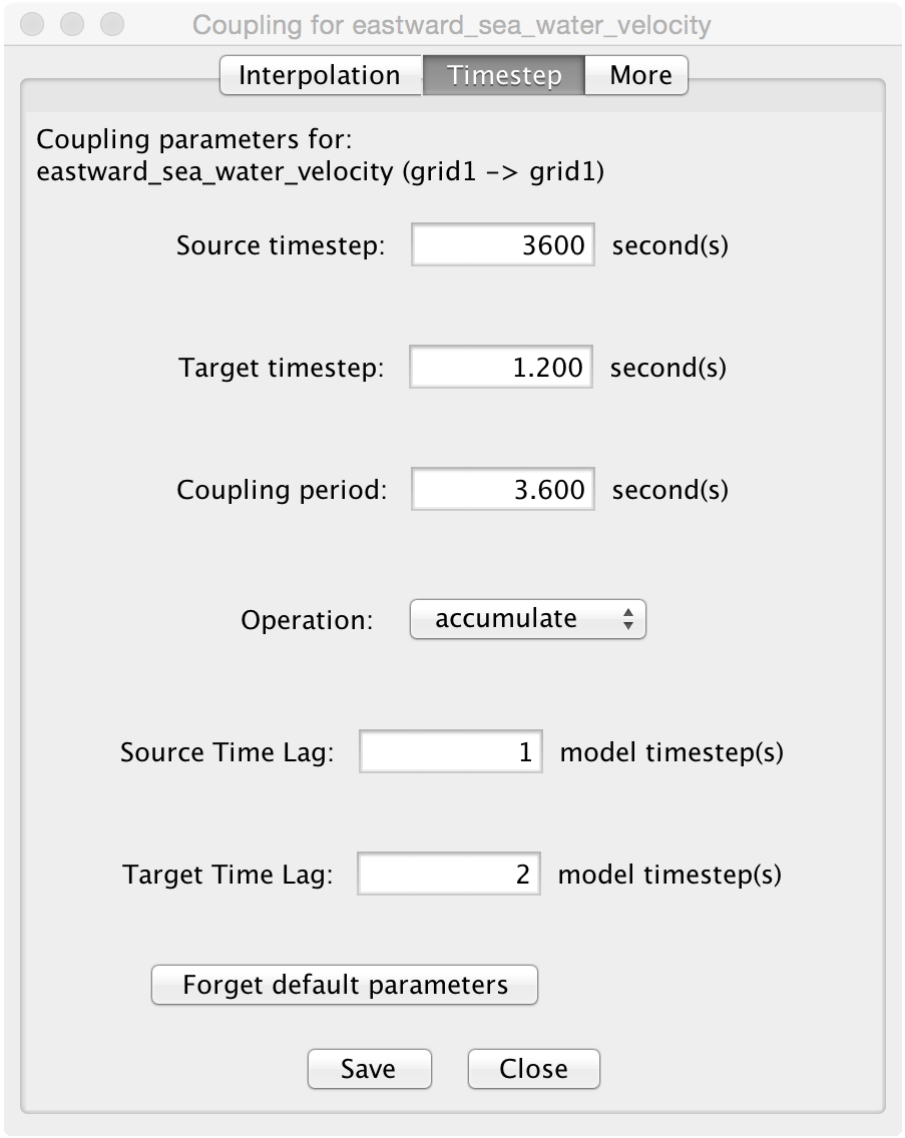
YAC – XML configuration



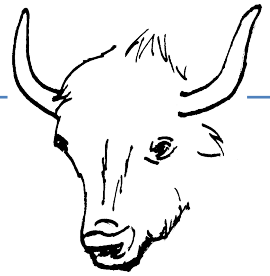


YAC – XML configuration





YAC – XML configuration



Source time step

- time interval between two consecutive calls to yac_fput

Target time step

- time interval between two consecutive calls to yac_fget

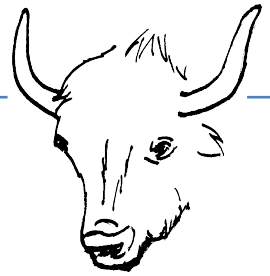
Requirement: Source or target time step must be equal to or an integer multiple of the other.

Coupling period

- Time interval at which data are exchanged (with internal calls to MPI_SEND and MPI_RECV)

Requirement: Coupling period must be an integer multiple of the source/ target time step

YAC – Examples

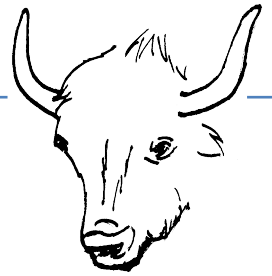


ICON_toy_cube.c
ICON_toy_reg2d.c
ICON_toy_unstruct.c
ICON_toy_unstruct_2.c

toy_icon_[atm/ocn].c
toy_mpiom_ocn.c
toy_reg2d_[atm/ocn].c
toy_woa_ocn.c

dummy_atmosphere.F90
dummy_io.F90
dummy_ocean.F90

dummy_atmosphere_c.c
dummy_io_c.c
dummy_ocean_c.c



ICON Implementation

Atmosphere *mo_interface_echam_ocean.f90*

Initialisation, definition and search:	construct_atmo_coupler
Exchange of coupling fields:	interface_echam_ocean
Termination phase:	destruct_atmo_coupler

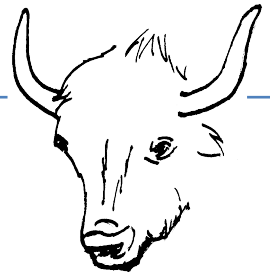
Land – HD model *mo_interface_hd_ocean.f90*

Definition:	jsb_fdef_hd_fields
Exchange of runoff:	interface_hd_ocean

Ocean *mo_ocean_coupling.f90*

Initialisation, definition and search:	construct_ocean_coupling
Exchange of coupling field:	couple_ocean_toatmo_fluxes
Termination phase:	destruct_ocean_coupling

YAC – Building



https://doc.redmine.dkrz.de/YAC/html/pages.html 150% Suchen

YetAnotherCoupler 1.5.0

Main Page | Related Pages | Data Types List | Files | Examples | Search

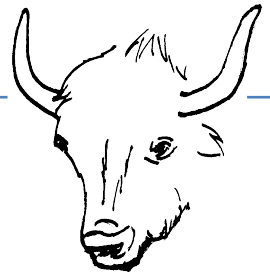
Related Pages

Here is a list of all related documentation pages:

- Sphere Partitioning Algorithm
- Polygon clipping in YAC
- Example on how to use XML routines from config_xml.h
- Configuration examples for different systems
- Tips'n'Tricks for developers
- Description of how to build and run the Java GUI
- The c interface (yac_interface.h)
- The Fortran interface (yac_finterface.f90 and mo_yac_finterface.f90)
- Patch Recovery in YAC
- Issue with Patch Recovery in YAC
- Condensed release information
- Todo List

Generated on Mon Oct 22 2018 15:27:14 for YetAnotherCoupler by doxygen 1.8.5

YAC – Building with ICON



checkout ICON

The default configure will compile and build icon with yac.
In order to deactivate the compilation with yac

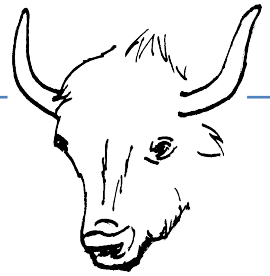
./configure … --disable-yac …

./build_command

Known issues:

pgc: fails with communicator_local.c
nag: -Wc,-O3 -Wc,-march=native -float-store
causes internal compiler error on Debian wheezy
MPI: MPI_(un)pack_external

YAC – Documentation



Doxygen

http://dkrz-sw.gitlab-pages.dkrz.de/yac/

Source Code (version 1.5.5)

```
git clone -b 'release-1.5.5' --single-branch --depth 1 \
        git@gitlab.dkrz.de:YAC/YAC.git
```

Latest version (untagged)

```
git clone git@gitlab.dkrz.de:YAC/YAC.git
```

Documentation with further Links

- https://www.geosci-model-dev.net/9/2755/2016/
- https://doi.org/10.5676/dwd_pub/nwv/icon_003
- https://code.zmaw.de/projects/mpiesm-2/wiki/ICON_Coupled_Model_Development
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