C3Grid application: Diagnostic workflows for climate data

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Overview

- Motivation
- Typical application
- Currently available diagnostics
- Future WFs and features
Motivation

- **Title of the project:** „**C3Grid – INAD: Towards an **IN**frastructure for **General Access to Climate Data**“
  (C3: Collaborative Climate Community)
  Duration: 08/2010 – 07/2013

- **Target:** make the C3Grid available to a wider circle of users

- **C3Grid** should become a useful tool in the daily work of climate researchers

- **Access and process distributed data archives in an easy and uniform way**
Typical application

Login
Select workflow
Select data
Set options
Submit job
Done

CLM Assembly 2011 – Cava dei Tirreni

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Welcome to C3-Portal

This portal is the main entry into the world of Collaborative Climate Community Grid (Generation 2). At the moment we offer:

- Data Retrieval
  - IPCC - Intergovernmental Panel on Climate Change (IPCC). Entries for the AR4 MPI-M data sets.
  - RIK - Grided meteorological data
  - GKSS - Palaeoclimate and climate simulation with ECHO-G
  - DLR - Satellite-based atmospheric data of MOCDAT (ozone) and IPA chemical weather forecast model demonstration products.

- Workflow Processing
  - Humidity Fluxes (QHflx)
  - Convective Available Potential Energy (CAPE)
  - Stormtracks
  - Chemical Weather Forecast
  - CDD ensemble statistics

August 24, 2011
QFlux - calculation of the integrated humidity flux

The diagnostic tool "qflux" calculates the integrated transport of humidity between selected levels for a selected area and visualizes the result. [less...]

The temperature and relative or specific humidity as well as the horizontal wind field are the necessary input parameters for the calculation of the upper level humidity flux. If the surface is chosen as the lowest level of the integrated flux, surface parameters (temperature, humidity and wind) of the dataset can be used additionally to retrieve the most realistic values.

The output contains the result for each time step as well as yearly means and an over all time steps calculated average. The last one will be visualized (gf).

The diagnostic tool is written in fortran90/95, grads is the underlying visualisation software and the environment is controlled by shell and perl scripts.

Click to show available datasets

Click to show preprocessing options
Select an available data set

Click to hide available datasets

- ECHAM5/MPI-OM_DMI_ECHAM5_Run4_20C
- ECHAM5/MPI-OM_DMI_ECHAM5_Run4_A1B
- IPCC-AR4_MPI-ECHEAMS_T63L31_MPI-OM_GR1-5L40 1%year CO2 increase experiment to doubling run no.3: atmosphere 6 HOUR values MRImet/MaD Germany
- IPCC-AR4_MPI-ECHEAMS_T63L31_MPI-OM_GR1-5L40 1%year CO2 increase experiment to quadrupling run no.1: atmosphere 6 HOUR values MRImet/MaD Germany
- IPCC-AR4_MPI-ECHEAMS_T63L31_MPI-OM_GR1-5L40 20CM run no.1: atmosphere 6 HOUR values MRImet/MaD Germany

IPCC-AR4_MPI-ECHEAMS_T63L31_MPI-OM_GR1-5L40 20CM run no.1: atmosphere 6 HOUR values MRImet/MaD Germany

from Max-Planck-Institut fuer Meteorologie, Model and Data Group

Date
Min: 1880-01-01T00:00
Max: 2000-12-31T23:00

Geographical Extent
Lat: 90° to 90°
Lon: 0° to 360°

Vertical Extent
standardPressureLevel
Min: 10 hPa
Max: 1000 hPa
depth/BelowSurface
Min: -9.834 m
Max: 0 m

Data Format
Type: gr3

Abstract
The data represent 6 hourly values of a 20th century simulation (including year 2000) with observed anthropogenic forcings (CO2, CH4, N2O, CFCs, O3 and sulfate) initialized in year 2190 of the preindustrial control run. This is followed by a commitment experiment for the 21st century (years 2001-2100) with all concentrations fixed at their levels of the year 2000. Data Sets with monthly mean values are also available. Technical data to this experiment: The experiment is using ECHAM5.2.02a coupled to MPI-OM Vers. 1.0 GR1-5L40. The output from the model run: humilipanklirr mandated to MPI-OM Vers. 1.0 GR1-5L40.

Please note: experiment_name/acronym was renamed (27-JUN-2005, 20C_0 changed to 20C_1)

Contents: List of Parameters
- air_pressure_at_sea_level
- air_temperature
- air_temperature_at2m
- air_temperature_at2m (maximum per ...)
- air_temperature_at2m (minimum per ...)
- area_fraction-ocean (area grid box)
- area_fraction-land (area grid box)
- area_fraction-ocean (except ice shelf) (area grid box)
- area_fraction-ocean (except ice shelf) (area grid box)
- atmosphere_cloud_ice_content
- atmosphere_cloud_liquid_water_content
- atmosphere_horizontal_Streamfunction
- atmosphere_horizontal_velocity_potential
- atmosphere_relative_vorticity
- atmosphere_water_vapor_content
- cloud_area_fraction
- convective_precipitation_flux
- dew_point_temperature_at2m
Define workflow options (e.g., data constraints)
Submit the job

QFlux - calculation of the integrated humidity flux

The diagnostic tool "Qflux" calculates the integrated, transport of humidity between selected levels for a selected area and visualizes the result. [less...]

The temperature and relative or specific humidity as well as the horizontal wind field are the necessary input parameters for the calculation of the upper level humidity flux. If the surface is chosen as the lowest level of the integrated flux, surface parameters (temperature, humidity and wind) of the dataset can be used additionally to retrieve the most realistic values.

The output contains the result for each time step, as well as yearly means and an over all time steps calculated average. The last one will be visualized (gif).

The diagnostic tool is written in fortran@90/95, grads is the underlying visualization software and the environment is controlled by shell and perl scripts.

Click to show available datasets

Click to hide preprocessing options

<table>
<thead>
<tr>
<th>Constraints</th>
<th></th>
<th>Geographical Constraints</th>
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<tbody>
<tr>
<td>Time Constraints</td>
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</tr>
<tr>
<td>Min Lat</td>
<td>-10</td>
<td></td>
</tr>
<tr>
<td>Max Lat</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Min Lon</td>
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<td>Max Lon</td>
<td>150</td>
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</tr>
<tr>
<td>Regions</td>
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</table>

start operation
Job has been successfully submitted.
Active/completed job

<table>
<thead>
<tr>
<th>Date of Submission</th>
<th>Type</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-09-24 15:19</td>
<td>qflux</td>
<td>active</td>
<td></td>
</tr>
</tbody>
</table>

[delete]
Active/completed job

My Stored Jobs

<table>
<thead>
<tr>
<th>Date of Submission</th>
<th>Type</th>
<th>Description</th>
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</tr>
</thead>
<tbody>
<tr>
<td>2011-08-24 15:13</td>
<td>qflux</td>
<td></td>
<td>completed</td>
</tr>
</tbody>
</table>

delete
Active/completed job

Details for job:
- e705e20c4e934f47d31f966563f2b585
- IPCC AR4 MPI-ECHAM5.16.3.1m MP4.0M GR1.5L40 29CIM run no.1: atmosphere 6 HOUR values MP4netMap Germany
  (De.4Dec2009-0309)

- Time Constraints
  - 1971-01-01T00:00Z - 1971-12-31T23:59Z
- Geographical Constraints
  - Latitude
    - -10° - 90°
  - Longitude
    - 50° - 190°
- Vertical Constraints
  - 200 - 850 hPa [standardPressureLevel]
- Content Constraints
  - relative_humidity
  - eastward_wind
  - northward_wind
  - air_temperature
- Months
  - 6 - 9
- Time Resolution
  - 0000,0000,1200,1600
Active/completed job

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</table>

Download results for job c705ec00-cc52-310b-5b2f-bb2b90d9b1fe

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diagnostic workflow: qflux
integrated humidity flux [kg/(m*s)] (vectors), integrated humidity flux divergency (contoured)

Levels: 20000, 25000, 30000, 40000, 50000, 60000, 70000, 77500, 85000

data: 1971/1971 - months: 6 to 9

- developed by: C3-Grid / 20110824 - 13:28:03 -
Visualization

diagnostic workflow: CAPE
Convective available potential Energy CAPE (shaded) [J/kg], Convective inhibition CIN (contoured) [J/kg]
Levels: 60000, 70000, 77500, 85000
Currently available WFs

- Qflux: calculation of the integrated humidity flux
- CAPE: calculation of conv. available potential energy
- Storm tracking
- Ensemble statistics with cdo
- CWF: Chemical weather forecast
- GIS: additional output format for GIS (csv)
- CWT: Circulation weather types
- WFs are using Shell and Perl scripts, Fortran90/95 codes, GRADS, cdo, etc.
More features

- **WSL upload:** Upload your own WSL scripts
  - e.g., adapt the file you receive with the results email
  (Also works as tool to test new WF's in development)

- **WSL:** C3Grid-specific XML dialect

- You can also download the raw data (e.g., the ECHAM5 runs) via the “Search & Download” tab
Future WFs and features

- WF MMME: multi model multi ensembles
- WF Evaluation and inter comparison of model runs
- IPCC-AR5 data browsing and access (via CMIP5/ESGF interface)
- WF Prepare initial and boundary conditions for the COSMO-CLM (later on: ... for RCMs)
The int2lm WF

- **Status:** in development. Runs via WSL upload on NCEP test data.

- Is planned to work on different global int2lm-ready data sets:
  NCEP and ERA re-analyses, ECHAM5, CMIP5-GCMs -> central place for int2lm-ready data sets

- GUI based interface to the int2lm program
  -> data selection, domain selection, INPUT and PEP file upload, etc.
Open issues

- Data selection for int2lm (which GCMs?)
- int2lm data integration (Metafile generation)
- Data restriction handling (e.g., ECMWF)
- Parallelization, looping of int2lm (and other) jobs
- General management of data permission (groups, projects)
- Quality assurance (we are in the testing phase) -> review by the end of November
Some links

- Project main page: http://www.c3grid.de/
  More Information e.g. -> Results -> Poster
- C3Grid portal: http://www.c3grid.de/portal

Thank you for your attention!

stay tuned...