Godiva: HOWTODO

Climatologies production

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Outline

Getting sources and GODIVA installation

- Download the Diva latest version from
  http://modb.oce.ulg/mediawiki/index.php/DIVA
  to your home directory & extract the GODIVA tar file

Outline

Diva fortran programs compilation

In `DIVA3D/src/Fortran`

- **Edit** the file `divacompile_options` and adapt it to
  - the name of your **Fortran compiler** and
  - the path of your **NetCDF library**.
- **Run** the script file `divacompileall`.

  Make sure you get the comment saying that all programs were compiled and all binaries were created.
- Make sure you extended the path as follows if not yet done: PATH=$PATH:.

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Diva input info files

In `input`

- **Edit** info files and adapt them to your case by providing in the relevant information

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`contour.depth`	list file of all depths in meters.
`NCDFinfo`	metadata information for climatology NetCDF files.
`general_info`	information for metadata XML files generation.

Outline

Data extraction: input files praparation

In `Climatology` directory provide:

- `datasource` file: list of paths to **ODV4 spreadsheet(s)** from which data sets will be extracted.
- `varlist`, `yearlist` and `monthlist` files.
- `qflist` file if desired.

varlist	yearlist	monthlist
Temperature	19002012	0101
Salinity		0202
		0303

Data extraction: `driver` configuration & `divadoall`

In `Climatology` directory:

- **Edit** the `driver` file and put in a flag number for data extraction.

`driver` file configuration example

- **Run** the `divadoall` script file.

A subdirectory `divadata` is created in `input` directory, and contains the data sets.

Outline

Topography preparation: `gebcomodif`

For a GEBCO topography file **use** the script file `gebcomodif` **to:**

- eliminate header lines
- change depth values from negative to positive values
- change comas to dots in decimal numbers
- change longitude values from [0:360] range to [-180:180] range
- Mask rectangle regions by giving coordinates in a `takeout.coord` file

Topography preparation

In `input`:

- **Provide** a topography file named `topogebco.asc` extracted from GEBCO Global Elevation Data.

In the `Climatology` directory:

- **Provide** a `takeout.coord` file:

Minlon1	Maxlon1	Minlat1	Maxlat1
Minlon2	Maxlon2	Minlat2	Maxlat2
Minlon3	Maxlon3	Minlat3	Maxlat3
.	.	.	.
.	.	.	.

- **Run** `gebcomodif` script file.

A `topo.gebco` file is generated in `input`.

Masking regions in topography

Example of topography preparation

- In `input`, we provide `topogebco.asc` covering the Mediterranean Sea area: 30°N to 46°N and 6°W to 37°E.
- In `Climatology`, we provide a `takeout.coord` file:

```
-6. -1. 42. 46.
26.5 40. 40. 46.
5. 9. 33. 35.
20. 30. 30. 30.5
35. 37. 31. 33.
```

After **running** the script file `gebcomodif` in `Climatology` directory, we obtain a `topo.gebco` in `input` directory.

Coastline files generation: input files

In `input` directory provide:

- (a) a `topo.gebco` file OR
  (b) a `topo.dat` file OR
  (c) `topo.grd` + `TopoInfo.dat` files
- the `contour.depth` file
- a `param.par` file

Coastlines files generation: `driver` configuration

In `Climatology` directory:

- **Edit** the `driver` file and choose a flag number for boundary lines and coastlines generation:

Comment line	Flag value and corresponding action	
Boundary lines and coastlines genaration:	0 :	no action is performed
	1 :	generation of contour files of boundaries and coastlines
	2 :	generation of advection UV files of velocities along coasts
	3 :	generation of contour files and advection UV files

`driver` **options for coastlines generation**

`driver` **file configuration example**

Coastlines files generation: output

In `Climatology` directory

- **Run `divadoall`**

A `newinput` directory is created which contains:

- `divaparam`: a subdirectory where coastlines files "`coast.cont.100xx`" are stored
- `divaUVcons_all`: a subdirectory where velocity field files are stored

Copy `divaparam` and `divaUVcons_all` to your `input` directory.

Outline

Data Cleaning: input files

In `input` directory provide:

- `divadata`: directory which contains data set files of the considered layers.
- `divaparam`: directory which contains coastlines `coast.cont.100xx` files for all considered layers.
- the `contour.depth` file.
- a `param.par` file.

Data Cleaning: input files

In `Climatology` directory

- **Provide** `varlist`,
- `yearlist` and
- `monthlist` files.

- **Edit** the `driver` file and
- **choose** a flag number for data cleaning and
- **give** the considered minimum layer and maximum layer numbers.

Data Cleaning: driver configuration

Comment line	Flag value and corresponding action	
cleaning data on mesh	0 :	no action is performed
	1 :	cleaning data out of the mesh
	2 :	generation of relative length (RL) fields
	3 :	cleaning data out of the mesh and generations of RL fields
	4 :	cleaning data set files from outliers
	5 :	generations of RL fields and cleaning data set files from outliers

`driver` **options for data cleaning**

`driver` **file configuration example**

Data Cleaning: output

In `Climatology` directory

run `divadoall`.

A `newinput` directory is created and contains:

- `divadata` subdirectory which contains cleaned data sets
- `divadata` subdirectory which contains relative length files if generated

Copy the content of `newinput/divadata` and `newinput/divaparam` to `input/divadata` and `input/divaparam` directories.

Outline

Parameters optimisation : input

In `input` directory provide:

- `divadata` directory which contains the data set files of the considered depths.
- `divaparam` directory which contains coastlines `coast.cont.100xx` files of the considered basin.
- The `contour.depth` file.
- A (template) `param.par` file.

Parameters optimisation : input files

In `Climatology` directory

- **Provide** `varlist`, `yearlist` and `monthlist` files
- **Edit** the `driver` file and **give** a flag number for parameters optimisation and bounds for correlation length (L) and signal-to-noise (S/N) parameters.

`driver` **file configuration example**

Parameters optimisation : `driver configuration`

Comment line	Flag value and corresponding action	
Parameters optimisation and vertical filtering	0 :	no action is performed
	1 :	estimation for each level of correlation length L parameter
	2 :	estimation for each level of signal to noise ratio (S/N) parameter
	-1 :	estimation and vertical filtering of L parameter
	-2 :	estimation and vertical filtering of S/N parameter
	3 :	estimation for each level of L and S/N parameters
	-3 :	estimation and vertical filtering of L and S/N parameters
	10 :	estimation of L parameter for each level using data mean distance as a minimum
	-10 :	estimation of L parameter using data mean distance as a minimum and vertical filtering
	30 :	estimation of S/N and L parameters for each level, using data mean distance as a minimum for L
	-30 :	estimation and vertical filtering of S/N and L parameters, using data mean distance as a minimum for L,

`driver` **options for parameters optimisation**

Parameters optimisation: output

In `Climatology` directory

- **Run** the `divadoall` script file.

A `newinput` directory is created and contains:

`divaparam` subdirectory with `param.par.100xx` files and summary files of the optimisation and filtering procedure.

- **Copy the content** of:

  `newinput/divaparam` to `input/divaparam` directory.

Outline

Producing a Climatology: input

In `input` directory provide:

- `divadata` directory which contains data sets for the considered layers,
- `divaparam` directory which contains:
  - coastlines `coast.cont.100xx` files,
  - coastlines `param.par.100XX` files.
- the `contour.depth` file,
- a `param.par` file if not provided in `divaparam`

Producing a Climatology: input & and driver

In `Climatology` directory:

- **Provide**

  `varlist`,
  `yearlist` and
  `monthlist` files.

- **Edit** the `driver` file and choose a flag number for analysis.

`driver` file configuration example

Producing a Climatology: input & and driver

In `Climatology` directory:

Comment line	Flag value and corresponding action	
Analysis and reference fields	0 :	no action is performed
	1 :	Perform analyses defined by a set of input files: `varlist`, `yearlist`, `monthlist`, `constandrefe` and the files in `input/` directory
	2 :	generation of reference field
	3 :	perform analyses as in 1 based on vertically filtered background
	11 :	perform analyses using a log(data)-exp(analysis) transformations
	13 :	perform analyses using the anamorphosis transformation
	14 :	perform analyses using a user defined transformation
	21 :	perform reference fields using a log(data)-exp(analysis) transformations
	23 :	perform reference fields using the anamorphosis transformation
	24 :	perform reference fields using user defined transformation

Adding 100 to flag values 1, 11, 13 and 14 allows to perform the same action using a reference field for each layer generated on the basis of all data from the two neighbouring layers in addition to the layer data set.

Adding 100 to flag values 2, 21, 23 and 24 allows to perform reference fields with the same action using all data from the two neighbouring layers in addition to the layer data set

`driver` **options analyses & climatologies production**

Run `divadoall` script file.

Producing a Climatology: output

An `output/3Danalysis` directory
is created and contains:

- **The 4D climatology netcdf file:**
  `Temperature.19002010.4Danl.nc`

- **subdirectories**:
  `Fields`: contains all Diva analyses 2D-fields
  `Meshes`: contains depths meshes for each layer

- **3D netcdf and binary (GHER format) files**:
  `Temperature.19002010.nnmm.100xx.100yy.anl.nc`
  `Temperature.19002010.nnmm.100xx.100yy.fieldgher.anl`

Outline

Production of a Climatology using advection fields

In `input` directory provide:

- `divadata` directory (data sets)
- `divaparam` directory (`coast.cont.100xx` and `param.par.100xx` files)
- `divaUVcons_all` directory which contains velocity fields: (GHER-format) binary files.
- the `contour.depth`
- a `param.par` if not provided in `divaparam`

In `input/divaUVcons_all` provide

- `constraint.dat` (one line) file.

```
10    0
```

example: `constraint.dat` **file**

Production of a Climatology using advection fields

In `Climatology` directory

- provide a `constandrefe` file:

```
# advection flag
1
# reference field flag
0
# variable year code
00000000
# variable month code
0000
```

- **Provide** `varlist`, `yearlist` and `monthlist` files.
- **Edit** the `driver` file and **choose** a flag number for analysis.
- **Run** `divadoall`.

Outline

Data extraction for reference field

In `input` directory provide:

- the `contour.depth` file

In `Climatology` directory provide:

- `datasource` file (ODV4 spreadsheet(s) path)
- `varlist`, `yearlist` and `monthlist` files

varlist	yearlist	monthlist
Temperature	19002010	0103

- `qflist` file if desired
- **Edit** the `driver` file and **choose** a flag number for data extraction
- **Run** `divadoall` script file.

The variable(s) data set files are stored in `input/divadata` directory

Production reference fields: inputs

In `input` directory provide:

- `divadata` directory (data sets)
- `divaparam` directory (`coast.cont.100xx` and `param.par.100xx` files)
- the `contour.depth`
- a `param.par` if not provided in `divaparam` with value equal to zero for ireg (ireg$= 0$)

In `Climatology` directory

- **provide** `varlist`, `yearlist` and `monthlist` files.
- **Edit** the `driver` and choose flag value 1 for data cleaning.
- and flag value 2, 21, 23 or 24 for analysis.
- **Run** `divadoall` script file.

Production reference fields: output

A `newinput` directory is created and contains:

- `divarefe` subdirectory which contains referece fields (Diva 2D binary files) in GHER-format.

In `output/3Danalysis` directory:

- `Fields`: contains all Diva analyses 2D-fields.
- **3D netcdf files**:

  `Temperature.19002010.0103.100xx.100yy.ref.nc`
- **Binary 3D files** (GHER-format):

  `Temperature.19002010.0103.100xx.100yy.fieldgher.ref`

Copy the content of `newinput/divarefe` to `input/divarefe_all`

Producing Climatology using reference fields

In `input` directory provide:

- `divadata` directory (data sets)
- `divaparam` (`coast.cont.100xx` and `param.par.100xx`)
- `divarefe_all` directory which contains reference fields
- the `contour.depth` file.

In `Climatology` directory provide:

- `constandrefe` file:

```
# advection flag
0
# reference field flag
1
# variable year code
19002010
# variable month code
0103
```

Using reference fields

In `Climatology` directory provide:

- `varlist`, `yearlist` and `monthlist` files
- **Edit** the `driver` file and **choose** a flag number for analysis.
- **Run** `divadoall` **script file**.

Results will be stored in `output/3Danalysis` **directory**.

Outline

Detrending

In `input` directory provide:

- `divadata` directory where data set files have more than five columns (fifth, sixth ... contain the information in which class the data point falls)
- same other inputs as for normal run

In `Climatology` directory
provide the usual input texte files and:

- **Edit** the `driver` file and
- **choose** a flag number for detrending a value **less or equal to the number of groups** present in your data sets

Run `divadoall` script file.

- Results will be stored in

`output/3Danalysis` directory.