POC VIewer and Processing

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Acknowledgements

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Acronyms

GUI Graphical User Interface
POCViP POC VIewer and Processing
TTB Tidal ToolBox

1 Introduction

POC VIewer and Processing (POCViP) is meant to be the GUI of the Tidal ToolBox (TTB). The most basic features are described in section 2. The advanced features are detailed in the following sections.

2 Quick start

This section explains how to quickly view a data field.

2.1 Open a file

First open a file, either with the button or with the `selectFile` command. If you are using the GUI, the file appears in the main window with its variables. Otherwise, a list of its variables and attributes is printed on the terminal.

2.2 Select a variable

Then select a variable, either by clicking on its name or by using the `selectVar` command. A window displaying the field will appear automatically.

2.3 Browse the field

The middle button of the mouse is for zooming and centering the view.

Middle-click to center the view. Press the '+' or '-' keys to respectively zoom in and out. Scroll up and down to respectively zoom in and out and center at the same time. Middle-click-and-drag to box zoom. Shift+middle-click-and-drag to box reduce the window. Ctrl+middle-click-and-drag to:

- in horizontal mode, switch to vertical mode along so given azimuth,

- in vertical mode, change azimuth and go forward/backward.

The coordinates and values of the displayed fields will be written in the top bar of the view next to the buttons. Press one of the Shift (⇑) keys to display these values with higher precision and duplicated on the standard output and on a tooltip box.

Press the left or right keys to go respectively backward or forward a time frame.

Whenever relevant, widgets at the top of the view window will be displayed to enable you to change the time frame, layer, depth or azimuth.

For all this, you can also use the `setView` command.

2.4 Getting help

Press the help button or the F1 key on the GUI to display this document.

You can also get help from the command line (see listing 1 and listing 2).

Listing 1: output of `pocvip --help`

```
NAME AND VERSION
  pocvip version 1.8 Mercurial revision 738:1f1b4d63cc79 of 2018-09-12 12:42 +0200

USE
  ../src/pocvip [OPTION] COMMANDS
Note: as an argument of the executable, a path ending with / or starting with ./, ../ or / is equivalent to
 'selectFile <path>'.
```

DESCRIPTION
  General POC viewer.

OPTION
  -h,--help show this help and exit
  -x de-activate the GUI
  --verbosity Followed by verbosity. <0 is as silent as reasonable. Default: 0

COMMANDS
  A command line may start with any number of spaces.
  It is then followed by the command name or by its alias. The aliases are case-sensitive, the command
names are not. If a command is not recognised, the line is ignored.
  This is then followed by a single space.
  Anything after this space up to the end of the line, including any other leading or trailing spaces, is
given as argument to the command. If the line ends with a '\', it will be concatenated without this last
character with the following line, starting from the first non-blank character. It is therefore impossible
for pocvip to, e.g., open a file that has a carriage-return in its path.
  In the following examples, the begin and end of line are marked by a '|' and the current directory has
only one file named 'dataFields.nc'.
All the following command lines are equivalent and open the file:
  |-f dataFields.nc|
  | -f dataFields.nc|
  |selectFile dataFields.nc|
  | selectfile dataFields.nc|
  |selectfile dataFields.nc|
  |SELECTFILE dataFields.nc|
  |sEleCTfilE dataFields.nc|
The 3 following lines are one single command equivalent to the previous ones:
  |selec\|
  | tFile dataFiel\|
  | ds.nc|
Both following commands are ignored:
  |# selectFile dataFields.nc| <- '#' command not found
  |,selectFile dataFields.nc| <- ',selectFile' command not found

```
Both following commands fail:
  |-f dataFields.nc | <- Trailing space: 'dataFields.nc ' does not exist.
  |-f  dataFields.nc| <-  Leading space: ' dataFields.nc' does not exist.

The list of command names, preceded by their respective aliases, if any, is shown below:
  ?,help              print the help section about commands
  -f,selectFile       open or select a file
  -v,selectVar        select a variable
  -a,atted            set or delete an attribute
  -s,setStatus        set the status of the selected variable or file
  -l,setView          set the view location in time and space or refresh or just compute a formula
  -w,selectView       create or select a view
  -n,renameView       rename the currently selected view
  -p,saveView         save the image displayed by the view or extract timeseries
  -r,resizeView       resize the selected view
  -q,exit             just call exit(), saving history to ~/.pocvip_history
  !,system            * equivalent to the same-named C function *
  cd,chdir            * equivalent to the same-named C function *
  rm,unlink           * equivalent to the same-named C function *
  .,runScript         run a script
  set                 set the value of a script variable
  prompt              ask the user for the value of a script variable
  renameFile          rename the selected file
  closeView           close the currently selected view
  duplicateView       duplicate the current view
  moveNode            create, move or delete a node or a link
  intersect           intersect with a coastline or interpolate an edited notebook

  When given '--brief' as argument, a command will display its one-line help.
  When given '-h' or '--help' as argument, a command will display its long help.

ENVIRONMENT
  This uses OpenMP version 201107. Check the relevant API for more environment variables.
  For information, OpenMP version 200505 and above are sensitive to the following variables :
    OMP_SCHEDULE for the runtime schedule type and chunk size.
```

```
    OMP_NUM_THREADS for the number of threads to use.
    OMP_DYNAMIC for the dynamic adjustment of threads to use.
    OMP_NESTED to enable or disable nested parallelism.
  For example, in bash :
    OMP_NUM_THREADS=6 ../src/pocvip ...


  If you are running on a machine with already loaded CPUs, you SHOULD take only a number of CPUs
equivalent to the number that will remain free, otherwise the program may grind to an equivalent halt as
soon as it parallelises.


EXAMPLE
# Bash command to open all NetCDF files in the directory
f=(*.nc);pocvip ${f[@]/#/-f }
```

Listing 2: output of `setView help()`

3 Statuses

Edit the text box below the list of files to set the status of the selected file or variable if you are using the GUI. Press Enter or click on the apply button next to it to update the value. Press Escape to give focus back to the list of files.

You can also use the `setStatus` command (see listing 3).

Listing 3: output of `setStatus --help`

```
  -s,setStatus        set the status of the selected variable or file


  Files and variables statuses set what is displayed and how.


The following table describes ordinary file statuses:
| status | description
----------------------------------------------------------------------------
|   g    | grid file, if not that of the X field
|   <    | edited mesh file or polygone (e.g. coastline)
|   <:   | formula-edited grid file.
```

```
|         |    Setting a previously saved file to this status will set:
|         |    - the status of the formula file to the 'formula' attribute of this file
|         |    - the statuses of the formula variables to the 'status' attributes of its variables.

The names of special files all end with '/'.
The following table describes the special files and what their status do:
|   file    | description
-------------------------------------------------------------------------------
| settings/ | Settings file. Its variable (should) have intuitive names.
|           |    Its status is irrelevant.
| drawings/ | The statuses of the variables of this file will trigger the display
|           |    of text and geometrical shapes. Its status is irrelevant.
|    :/     | Formula file. Its status is the formula.


The following table describes variable statuses:
| status | description
-------------------------------------------------------------------------------
|   :    | amplitude or scalar value, eventually followed by an interpolated variable name
|   ,    | phase, optionally followed by an interpolated variable name, otherwise, last interpolated
variable name of : will be taken
|   @    | followed by variable name

| variable | description
-------------------------------------------------------------------------------
|     p    | background color field. Default: selected variable if:
|          |   - it does not have a status and
|          |   - no variable of this table has been set.
|  u and v | vector fields. If the background color field has not been set,
|          |    the background color is taken from the norm of the vector

  Colors are specified as a hex value in the form '#rgb' '#rrggbb' '#rrrgggbbb' or '#rrrrggggbbbb' where 'r
', 'g' and 'b' are hex digits of the red, green, and blue components of the color, respectively. (Green in
the four forms is '#0f0' '#00ff00' '#000fff000' and '#0000ffff0000')
  Lines are specified by an optional width (default:1), a color and an optional pattern (default:continuous
) with the following characters :.-_~
```

3.1 Formula

As explained in the help of the `setStatus` command (see listing 3), the displayed color field, and eventually arrows, depend on the variables set. Variables can also be set from the formula, that is the status of the `:/` special file.

3.2 Freezing the view

Each time the status of a variable changes, the view of the GUI is re-drawn. This can be CPU-time-consuming, especially when the status of many variables need to be set for a particular display, e.g. when displaying current ellipses. To avoid this, you can freeze or unfreeze the view respectively by ticking or unticking the "freeze" box. Pressing the Escape key also toggles the freeze state of the view.

4 Drawings

If a special file has a path that starts with `draw`, it is drawings special file.

Variables can be added to drawings special files with the `selectVar` command folowed by the new variable name or by clicking just below the last variable in the GUI and entering a new variable name at the prompt.

4.1 Drawing element

The statuses of the variables of drawings special files are drawing elements.

4.1.1 Feature

The first part, up to the first space, of the status of the variable is the feature.

The first part of the feature is the coordinates in the following formats:

- longitude and latitude with _lon_d_lat_d or _lat_N_lon_d -_lon_W-_lat_N or -_lat_N-_lon_W

- pixels with _x_x_y_y or _y_y_x_x

- percents of the view width or height with _x_%_y_%

- mixed percents and pixels with _x_%_y_y or _x_x_y_% or _y_y_x_%

The second part is the feature type is:

- for arrows, `<` or `>` followed by the coordinates of the other end followed by optional line type

- for ellipses, `o` or `O` followed by the radius, followed by optional: line type, second radius, and 3 angles in degree: major axis rotation, arc start, arc end.

The last optional part is the horizontal and vertical alignement and rotation in degrees of the label.

All parts are separated from the following one with a comma, unless for radiuses that must be given in pixels of the view (with `p`), kilometers (`k`), meters (`m`), radians (`r`) or degrees (`d`). The second radius can also be given as a ratio of the first radius (with `x` or `X`) or as a percentage of the first radius (with `%`).

4.1.2 Label

The second part, from after the first space to the end, of the status of the variable is the text of the label in Pango Markup Language. See `/usr/share/gtk-doc/html/pango/PangoMarkupFormat.html` if Pango documentation is installed on your machine or `https://developer.gnome.org/pango/stable/PangoMarkupFormat.html` otherwise.

4.2 View title

The variable `title` of the `drawings/` special file will behave differently in that all of its status is the text of the label. If it is empty, the data area of the view will be larger. If it has at least one character, even a space, the data area of the view will be shrunk proportionally to the font size to allow for the title to be displayed at the top center above the data area.

5 Edition

5.1 With the command line

The `moveNode` command (see listing 4) is for editing.

```
  moveNode              create, move or delete a node or a link


SYNTAX 1: moveNode n lon lat
- with n an integer and lon and lat finite numbers: move node n
- with n a real and lon and lat finite numbers: create a node linked with floor(n)
- with n<0 or n>N the total number of points and lon and lat finite numbers: create an unlinked node
SYNTAX 2: moveNode n1 n2
- with both n1 and n2 different positive integers: merge node n1 to n2
- with n1 positive integer and n2==-2: cleave node n1
- with n1 a real and n2 an integer: link nodes floor(n1) and n2
- with n1 an integer and n1=n2 and:
   -> n1<0, clear selection
   -> n1>=0, select node n1. For polygones, it is only relevant to select extremities.
SYNTAX 3: moveNode n
  delete node n
SYNTAX 4: moveNode -2 n1 n2
- with both n1 and n2 positive: attempt to break link between nodes n1 and n2
- with at least n1 or n2 negative: exchange link between nodes n1 and n2
- with neither n1 nor n2 while editing a mesh: re-compute code table
SYNTAX 5: moveNode -3 dx dy
  With dx and dy real and in degrees:
- with both -2e4<dx<2e4 and -2e4<dy<2e4: translate polygone with selected node by (dx,dy) degrees referring
 to selected node
- with only -2e4<dx<2e4: rotate polygone with selected node by dx degrees around selected node
- otherwise: delete polygone with selected node


When editing a notebook, only move is allowed.
```

5.2   With the GUI

On the GUI, the left button of the mouse is for editing (see tab. 1) by default. The mapping is read from the file given in the `edition buttons` setting. See the content of the default file for how to create your own.

When editing, pressing the Escape key either:

- cancels moving a node when a node is being moved

- or removes selection when a node is selected

- or freezes the view as explained in section 3.2.

action	handler	on nothing	on a node	on a link
simple click	move	create a node	move node	
Ctrl+ click	select	create a node linked to selected	If no node is selected: select node. If on selected node: deselect node. Otherwise: link node to selected.	create a node on that link
Shift+ click	delete		delete node	delete link
Ctrl+Shift+ click *or* P	polygone	When a node is moved and when a node is selected: toggle polygone mode. When no node is moved and when a node is selected: delete polygone with selected node.		
K	cleave	Cleave the nearest node, i.e., when a node has too many connections, split it to share the connections between 2 other nodes.		
L	exchange	Exchange the nearest link.		

Table 1: Default edition mappings

5.3   With formula

Add a point with the "new point" script.

Remove a point by deleting (or commenting out) all its references in the formula.

5.4   Color and shapes codes

The nodes will change color depending on whether there are at the beginning or the end or not and whether they are on a polygone with a selected node or not.

Selected nodes are shown with a circle. The other nodes are shown with a disk. The status of the `data grid` variable in the `settings/` gives the line type of the of the links and the diameter of the nodes.

5.5   How to create a .bel file

Display a field. Create a polygone. Click the `intersect` button twice, eventually editing the polygone between the clicks to make sure open boundaries are given in the anticlockwise direction.

6   Measurements

6.1   Gauges

Clicking on the error circle of a gauge will disable it and replace it with a cross. Clicking on the cross will re-enable it.

Size is scaled by the first number of the `arrows` setting.
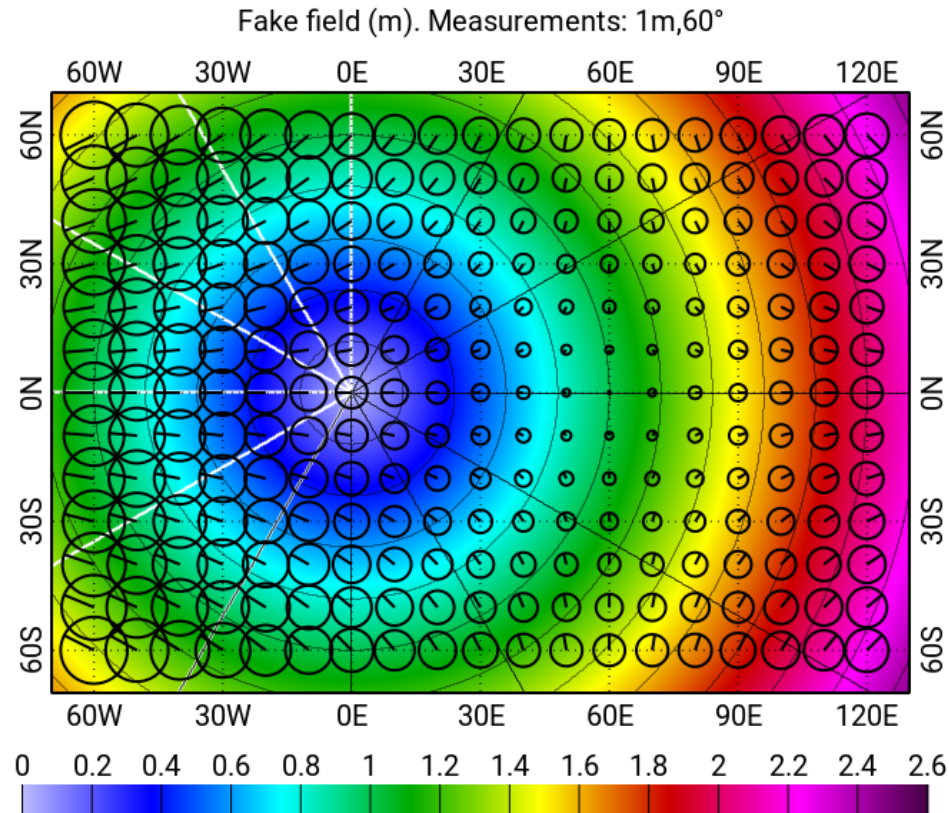
Fake field (m). Measurements: 1m,60°

Figure 1: Illustration of the complex difference between a field and measurements. Amplitude isovalues are in thin black. Positive phase delay isovalues are in medium black. Strictly negative phase delay isovalues are in thick white. Phase wrap around is both strictly negative and positive.

- a radius length proportional to the amplitude of the complex difference

- and a radius direction equal to the difference of phase between phase of the complex difference and the phase of the measurement

as shown on fig. 1.

6.2 Current meters

Setting `uobs` and `vobs` will show them as current meters.

Size is scaled by the first number of the `arrows` setting.

When a vector complex field is color-displayed, then field ellipses are drawn at the locations of the current meters.

When a scalar complex field is color-displayed, the complex difference between the field and the measurement are shown with circles with: