How to add (simple) interactivity to Madagascar: A proposal

Joe Dellinger, BP

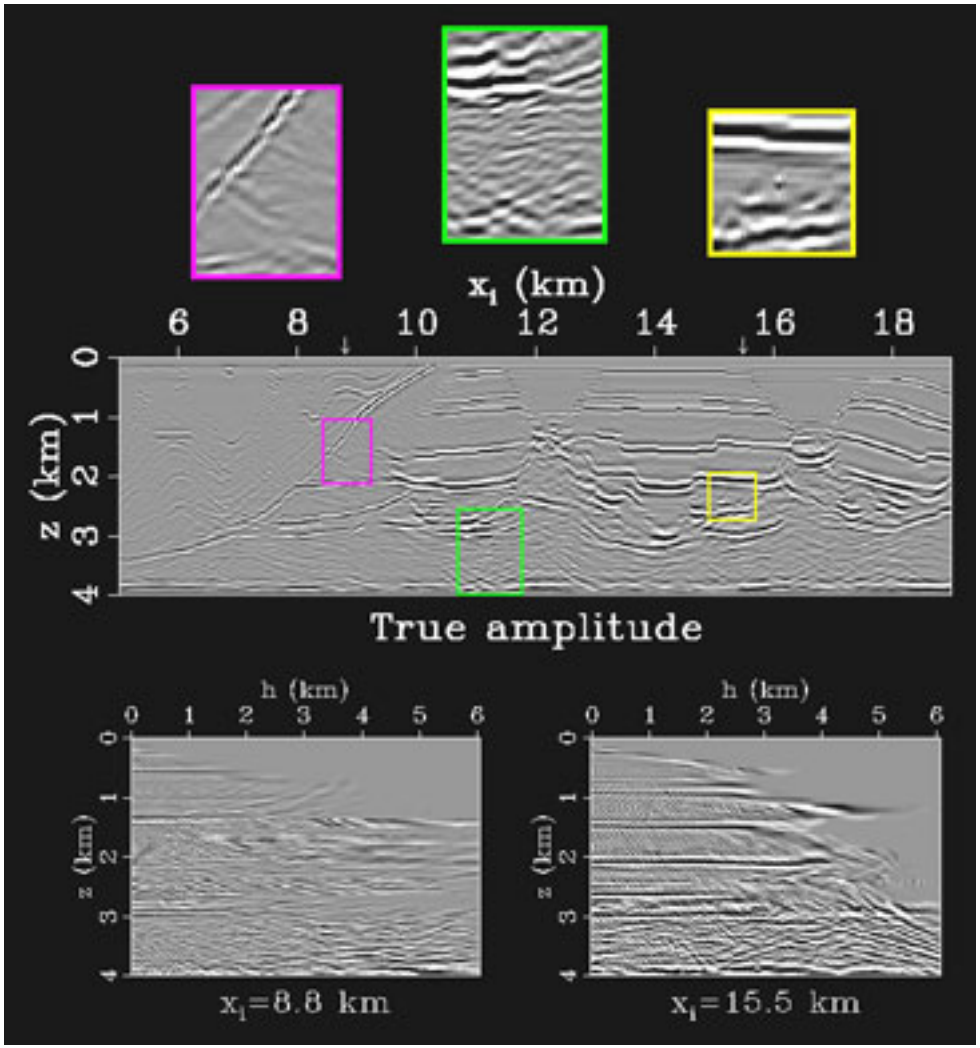
What do I mean by “interactive”?

- If you want to do REAL interactive graphics, you probably need to create your masterpiece!
- I’m thinking of programs like “sfgrey” and “sfgraph”, not a velocity-analysis-picking tool.
- My goal is to enable some simple useful interactivity requiring minimal coding by the Madagascar user.
- Respect Madagascar’s core philosophies:
  - Simplicity (at most a few lines of code)
  - Modularity (pieces should work together)
  - Device independence (i.e. don’t edit a bitmap)
  - Reproduceability (i.e. not one-off works of art)
- Don’t break things!

Why this talk?

- **I think this is the right way to attack the problem!**
- **Feedback / help requested!**

The structure of a figure



What do we have here?

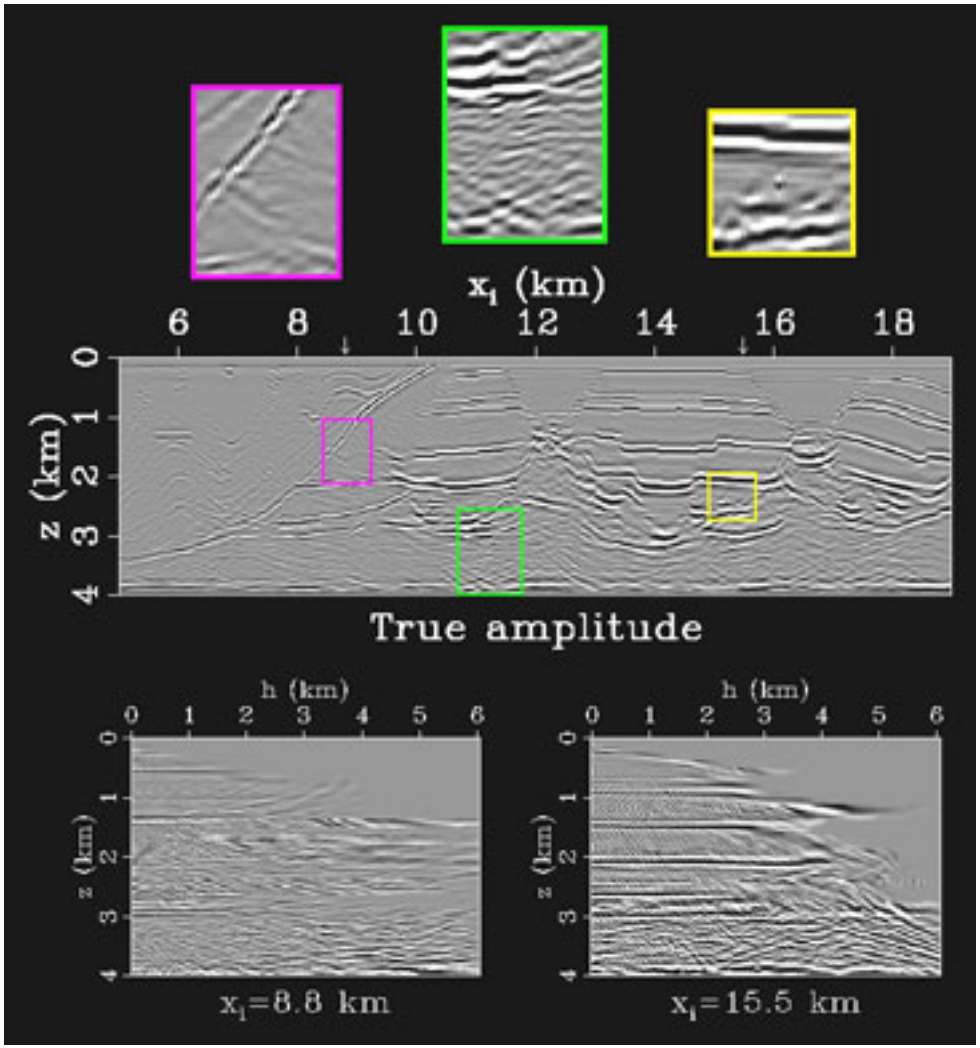
- **Nested groups of objects**
- **Axes, labels, rasters**

This figure was made by a script.

That script used parameters to put everything in the right places.

Optimizing script parameters is a pain.

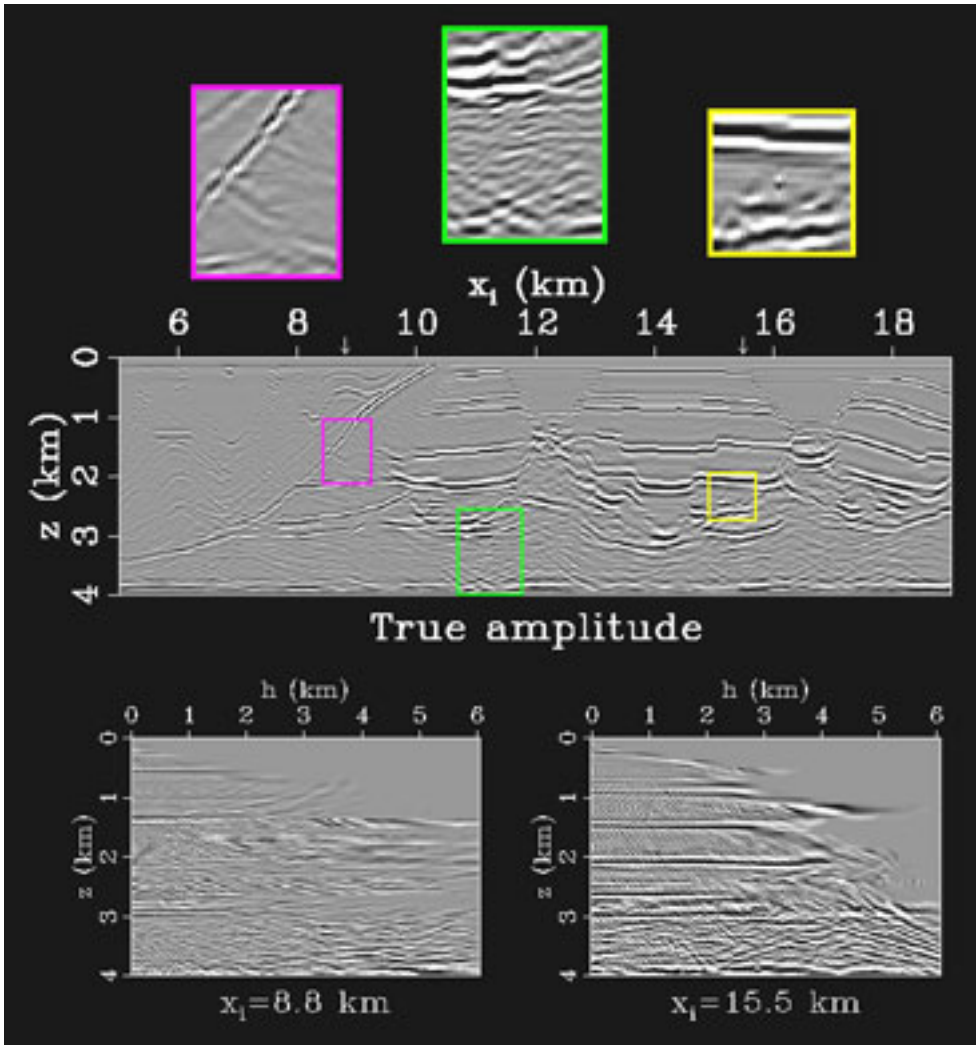
What might you do to this figure?



Graphical things to do:

- **Toggle elements on / off**
- **Change a label**
- **Resize some text**
- **Move a box**
- **Add annotation**

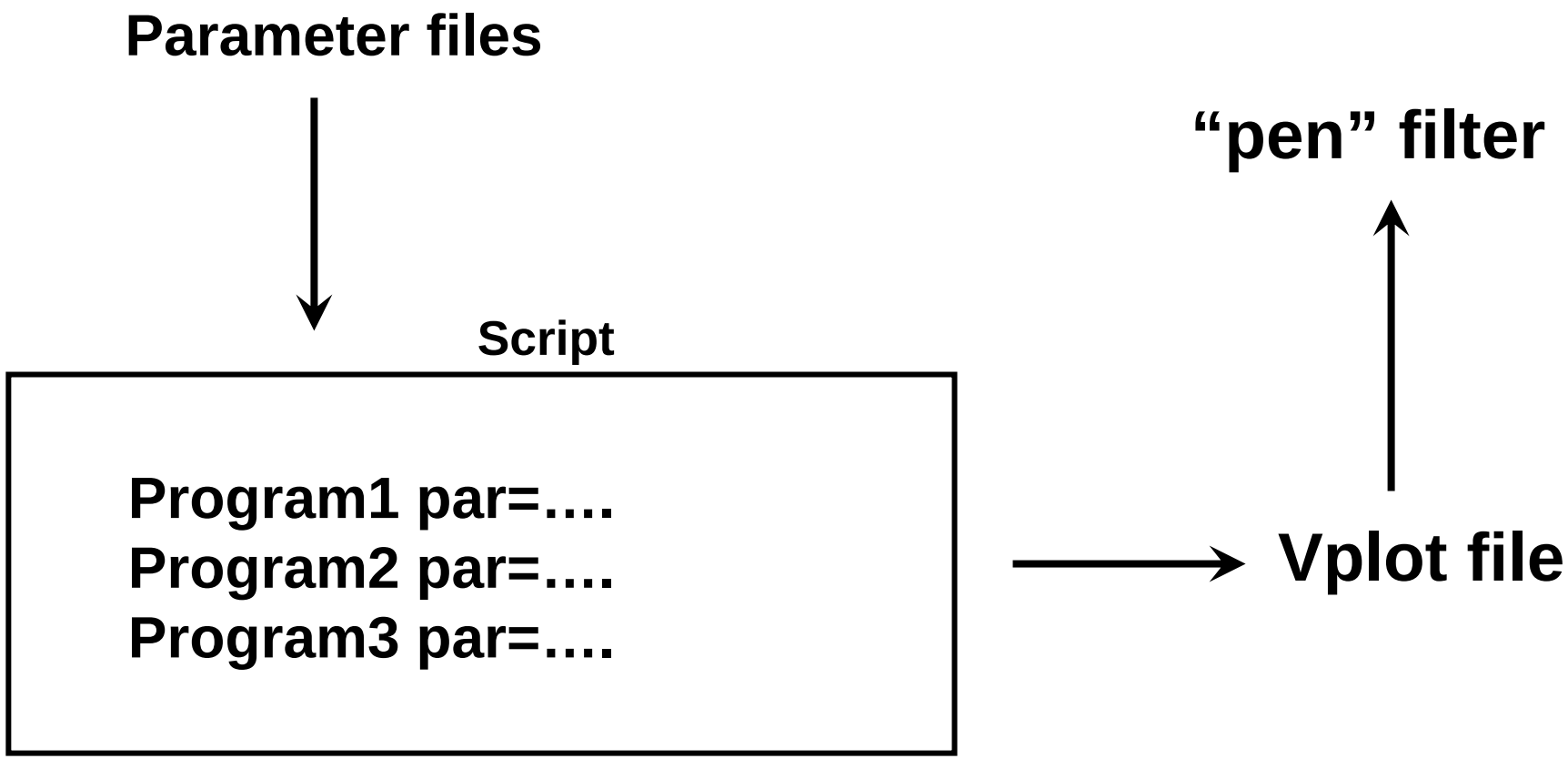
What might you do to this figure?



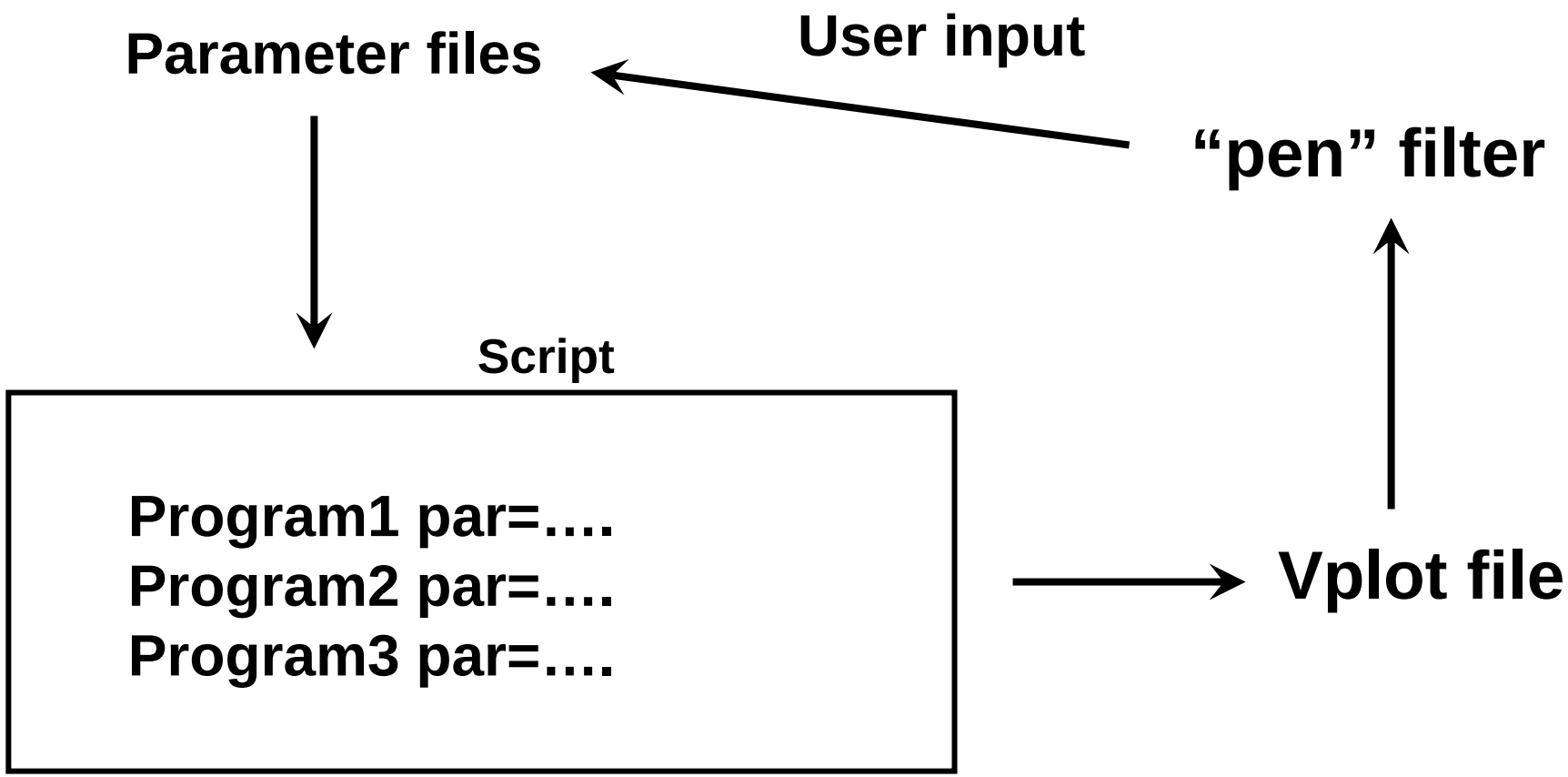
Scientific things to do here:

- **Change axis limits for a different view**
- **Move one of the zoom-in boxes**
- **Get coordinates of a point**
- **Read off a value**

Overall philosophy



Overall philosophy



Current Vplot Methodology

- Elements of figures are in nested groups
- Each group can have a name
- We don’t do anything useful with groups now

- Pen filter option: interact=file_name
- Click and the vplot coordinates of that point (in inches) are written to file_name

Proposed New Methodology

- Elements of figures are in nested groups
- Each group can have a name

- That “name” can be a long text string.
- We can use that text string to leave instructions in the vplot file telling the “pen” program what to do.
- Will look like a command line.

- Could write out a parameter file. Where?
- interact.Xaxis=axis1.par

FORMAT controls the output. Interpreted sequences are:

%% a literal %
%a locale's abbreviated weekday name (Sun..Sat)
%A locale's full weekday name, variable length (Sunday..Saturday)
%b locale's abbreviated month name (Jan..Dec)
%B locale's full month name, variable length (January..December)
%c locale's date and time (Sat Nov 04 12:02:33 EST 1989)
%C century (year divided by 100 and truncated to an integer) [00-99]
%d day of month (01..31)
%D date (mm/dd/yy)
%e day of month, blank padded (1..31)
%F same as %Y-%m-%d
%g the 2-digit year corresponding to the %V week number
%G the 4-digit year corresponding to the %V week number
%h same as %b
%H hour (00..23)
%I hour (01..12)
%j day of year (001..366)
%k hour (0..23)
%l hour (1..12)
%m month (01..12)
%M minute (00..59)
%n a newline
%N nanoseconds (000000000..999999999)
%r time, 12-hour (hh:mm:ss [AP]M)
%R time, 24-hour (hh:mm)
%s seconds since '00:00:00 1970-01-01 UTC' (a GNU extension)
%S second (00..60); the 60 is necessary to accommodate a leap second
%t a horizontal tab
%T time, 24-hour (hh:mm:ss)
%u day of week (1..7); 1 represents Monday
%U week number of year with Sunday as first day of week (00..53)
%V week number of year with Monday as first day of week (01..53)
%w day of week (0..6); 0 represents Sunday
%W week number of year with Monday as first day of week (00..53)
%y last two digits of year (00..99)
%Y year (1970...)

Inspiration:

date +'%A %B %e %Y'
Produces:
Thursday June 16 2011

How to do it?

- Each group has a name

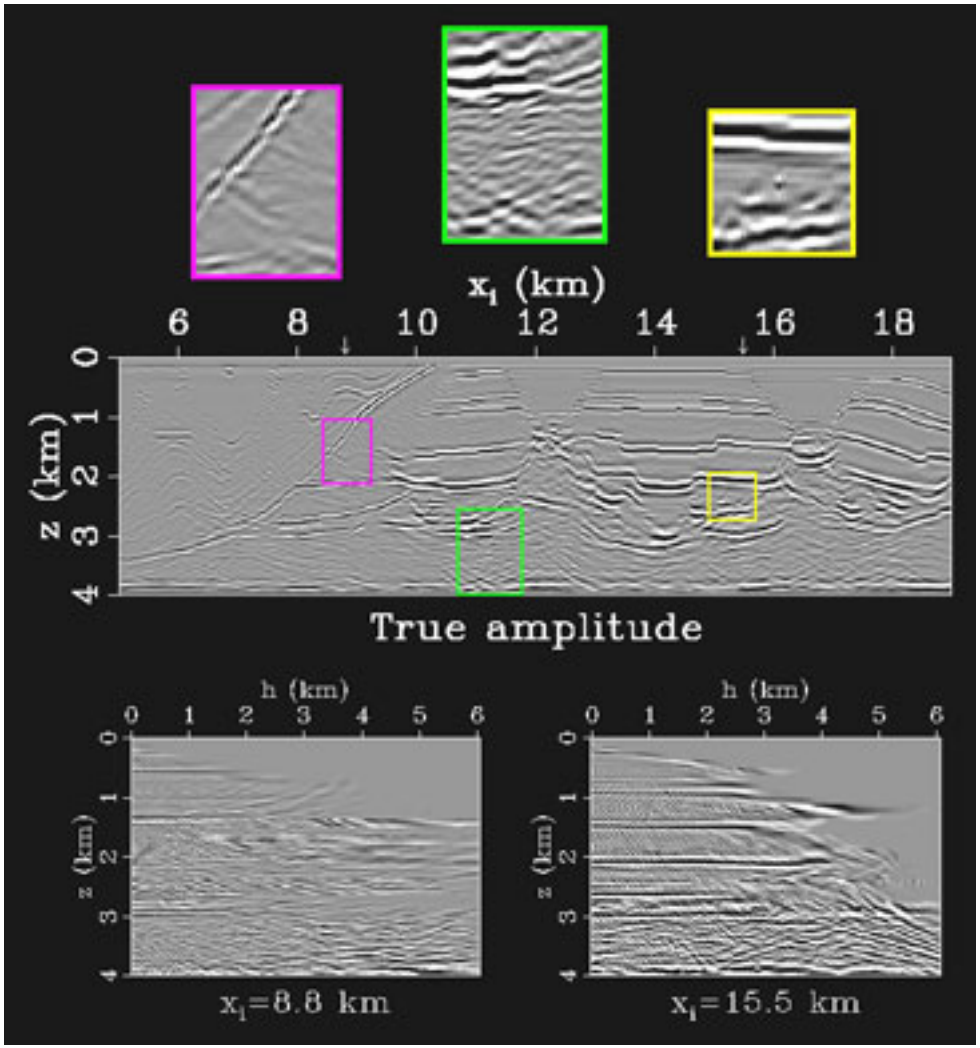
  name=“Xaxis”

- Each group specifies an “active region”
  - Usually will just be a box
  - May be a circle around a point
  - Or a user-defined boundary

  boundingbox=xmin,xmax,ymin,ymax

- Each group has a precedence
  - On top (default)
  - Or on bottom
- And an opacity

What might you do to this figure?



Possible actions:

- **Request user input**
- **Print value to screen**
  - **default area**
  - **area just for this group**
- **Print to file**
- **Change precedence**
- **Change opacity**
- **Delete this group**
- **Rewind and replot**
- **Exit**

What to print?

- Actions:
  - Hover
  - Click (1, 2, 3?)
  - Click and drag (1, 2, 3?)
  - Print prompt and accept text input
- Available output values in “printf”:
  - Vplot X, Vplot Y
  - Text string associated with color table value associated with raster position
  - Which button was clicked
  - Prompted text input
  - Value projected along an axis
  - Specify arbitrary formula?

What needs to be done?

- Begin group, end group commands already exist
  - Need to gracefully handle long group “names” (sfplas, sfpldb)
- New command to associate a text string with a raster color table value

- Example “wrapper” script
- Add interactivity to existing graphics programs as examples
- Start with “show value on hover”

- Only hard work is in dovplot.c

What needs to be done?

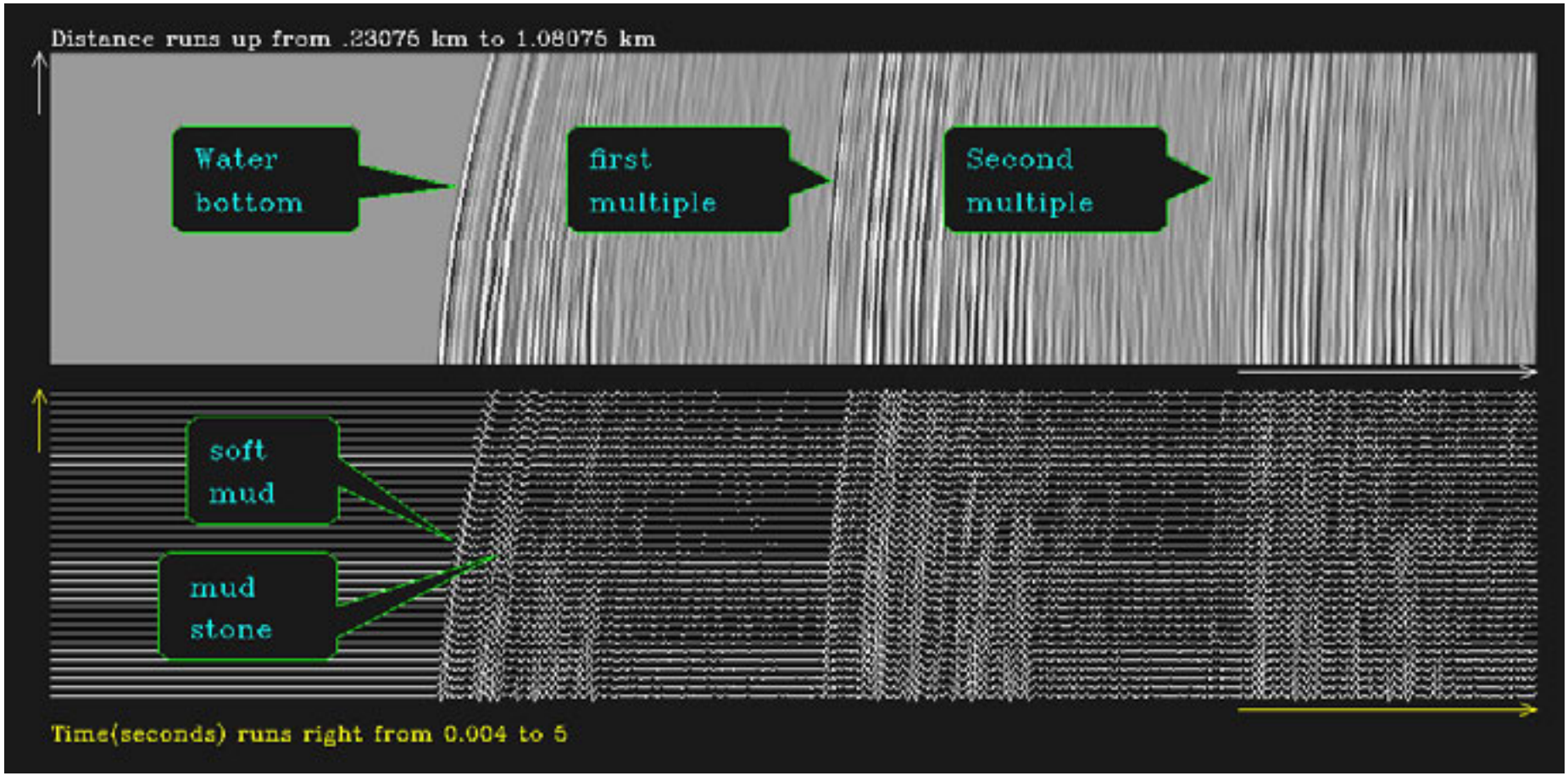
- **Need CONVENTIONS!**
- **Like, “right click to find out what’s possible here”?**

Example: “add_label.vpl”

- Contains group that “covers entire screen” (default)
- Opaque group
- Contains commands for click and drag
- Prompts for text box on click and drag

- Simple script appends “label.vpl” onto existing file to add annotation:
- Pen erase=once interact.label=parfile plot.vpl label.vpl
- Writes out parfile for desired label

What could we do with this?



Thanks!

- I think that’s probably enough for a morning talk…
- Thanks to everyone helping keep the old SEPlib collaborative spirit alive!