

- * Automated geodynamic diagnostics
- * Analysis & Publication Mode
- * Clear and focussed plot design
- * Light & Dark Mode
- * Scientific colour maps
- * Publication-ready figures & movies

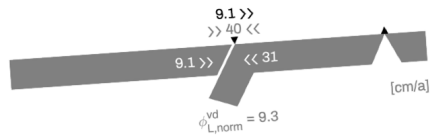
- ✓ Inclusive
- ✓ Free to use
- ✓ Easy to use
- ✓ Forward compatible
- ✓ Citable & reproducible

Crameri, F. (2017), StagLab, Zenodo, [doi:10.5281/zenodo.1199037](https://doi.org/10.5281/zenodo.1199037)

Crameri, F. (2018), Geodynamic diagnostics, scientific visualisation and StagLab 3.0, Geosci. Model Dev., 11, 2541-2562, [doi:10.5194/gmd-11-2541-2018](https://doi.org/10.5194/gmd-11-2541-2018)

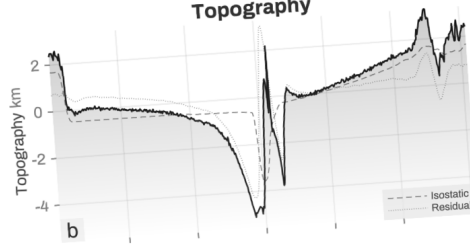
* www.fabiocrameri.ch/StagLab

Tectonics



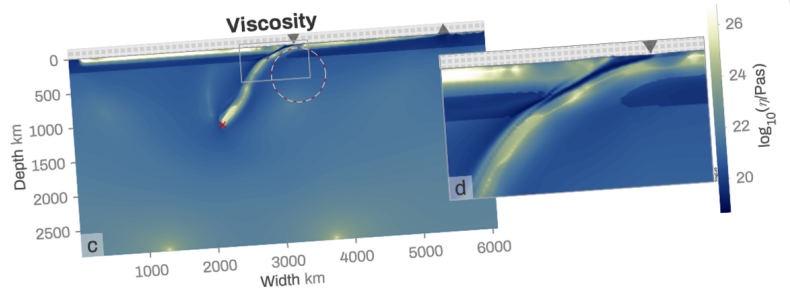
a

Topography



b

Viscosity



StagLab

Geodynamic diagnostics & scientific visualization
Made simple.

www.fabiocrameri.ch/StagLab



Contents

1	Creators	4
2	Acknowledgement	5
3	Instructions	6
3.1	Prerequisites	6
3.2	Installing	6
3.3	Testing	6
3.4	Running	6
3.5	Making use of StagLab diagnostics	8
3.6	Troubleshooting tips	8
3.7	Acknowledging StagLab	8
3.8	More detailed information	8
4	Version history	9
5	Reference	11
6	Contributing	11
7	License	12

1 Creators

Author: [Fabio Crameri](#)

Contributors: [Boris Kaus](#) – Original version of *f_readStagYY* to read StagYY's binary output directly into MatLab

[Paul Tackley](#) – Original version of *f_YYtoMap* to produce horizontal maps of fully spherical yinyang data

[Oliver Woodford](#) – The routine *export_fig* to add more flexibility to figure saving

[Kirill K. Pankratov](#) – The routines *flowfun* and *cumsimp* to derive the stream function and to perform the Simpson-rule column-wise cumulative summation, respectively

[Fanny Garel](#) – Original version of *f_readFluidity* to read Fluidity's CSV output into MatLab

[Kiran Chotalia](#) – Original version of *f_readStagYYhdf5* to read StagYY's HDF5 output into MatLab

[Nima Moshtagh](#) – The routine *MinVolEllipse* to fit a minimum-volume ellipse around a point cloud

[Neil Tandon](#) – Original version of *hatchfill2* to fill areas with a specific texture

[Kelly Kearney](#) – Original version of *plotboxpos* to return the position of the plot more accurately and reliably

[Peter Kovesi](#) – A few routines including *equalisecolourmap.m* and *sin-eramp2.m* to provide the colour-map diagnostics

[Tobias Rolf](#) – Help with with StagLab's surface variation histogram plot

[Robert Petersen](#) – Help with StagLab's diagnostics of the radius of curvature for the plate bending

[Marcel Thielmann](#) – Help with StagLab's compatibility across different MatLab versions

[Anna Gülcher](#) – Help with StagLab's compatibility for StagYY's HDF5 output

Debugging: [Kiran Chotalia](#); [Antoniette Greta Grima](#); [Enrico Marzotto](#)

2 Acknowledgement

! → Please acknowledge the free use of StagLab, its individual routines, or the included automated diagnostics.

e.g., "The software StagLab (Crameri 2017) is used in this study to post-process and visualise the geodynamic models (Crameri 2018)."

The software : **Crameri, F. (2017), StagLab, Zenodo, [doi:10.5281/zenodo.1199037](https://doi.org/10.5281/zenodo.1199037)**

The research : **Crameri, F. (2018), Geodynamic diagnostics, scientific visualisation and StagLab 3.0, Geosci. Model Dev., 11, 2541-2562, [doi:10.5194/gmd-11-2541-2018](https://doi.org/10.5194/gmd-11-2541-2018)**

3 Instructions

3.1 Prerequisites

StagLab necessitates a working version of **MatLab 2014b or later**.

StagLab works best with the latest version of MatLab as earlier versions might disable multiple StagLab features and might cause problems as compatibility is not carefully maintained any longer.

3.2 Installing

To install StagLab, simply execute the included `f_INSTALL`. This can be done in the MatLab terminal by typing:

```
cd <yourPath>/StagLab3
f_INSTALL
```

Alternatively, add all StagLab files manually to the MatLab search path (in MatLab go to: HOME > Set Path > Add With Subfolders).

! → It is best practise to delete old StagLab versions.

StagLab removes, however, file duplicates from the MatLab search path and so prevents confusion with old files.

3.3 Testing

To test StagLab on your system, simply execute the included `f_TEST`. This can be done in the MatLab terminal by typing:

```
cd <yourPath>/StagLab3
f_TEST
```

This automated test performs various core tasks of StagLab and produces a suite of test figures that are saved to `StagLab > Examples > ExampleFigures`.

3.4 Running

StagLab is run from parfiles (see folder `/Parfiles`). Use one of the parfiles included (e.g., `ParStagLab2D`) to set your parameters and to run one of the main StagLab Apps (`SL_FieldPlot` for parameter fields, `SL_RadialProfile` for radial profiles, `SL_TimeGraph` for time evolutions). See `f_Defaults`, `f_DefaultsRprof`, or `f_DefaultsTimedat` for all available options available with the corresponding parfile.

	Parameter fields	Radial profiles	Time graphs
Execution	ParStagLab2D ParStagLab3D ParStagLabYY	ParStagLabRprof	ParStagLabTimedat
Defaults	f_Defaults	f_DefaultsRprof	f_DefaultsTimedat
Routine	SL_FieldPlot	SL_RadialProfile	SL_TimeGraph

- * *Tip:* The parfile can be run from any directory.
- * *Tip:* You will always be able to re-use your old parfiles to run newer versions of StagLab.

Adjust file name, number and directory with:

```
IN.Name      =  {'test'};
IN.Number    =  [1];
IN.Folder    =  {'/work/stagyy/'};
```

- * *Tip:* Given the above `IN.Folder`, StagLab checks automatically also for the following folder-structures to read:

```
/<YourFolder>/+op/<fileToRead>
/<YourFolder>/+op/<filename>/<fileToRead>
```

and write:

```
/<YourFolder>/+im/<fileToSave>
/<YourFolder>/+im/<filename>/<fileToSave>
```

- * *Tip:* It is possible to plot or compare multiple files in the same figure by simply adding another file name.

`IN.Name` controls which and how many files are plotted. To plot three different files all for the first output number:

```
IN.Name      =  { 'test1' 'test2' 'test3'};
IN.Number    =  [ 1 ];
IN.Folder    =  {'/folder1/' '/folder2/' '/folder3/'};
```

To plot multiple time steps of one single model:

```
IN.Name      =  { 'test1' 'test1' 'test1'};
IN.Number    =  [ 1 2 3 ];
IN.Folder    =  { '/folder_test1/'};
```

If there is just one entry for either `IN.Number` or `IN.Folder`, it will take the same entry for all files specified in `IN.Name`.

Adjust the dimensional parameters in the parfile for correct dimensionalisation according to *f_Dimensions*.

```
IN.Parameter =  [ 11 ];
```

StagLab saves the publication-ready figures and movies, if:

```
SAVE.Figure  =  logical(1);
SAVE.Movie   =  logical(1);
```

To specify a certain write directory change the default:

```
SAVE.writeDirectory =  'auto';
```

to e.g.:

```
SAVE.writeDirectory =  '/work/stagyy/';
```

3.4.1 Preparing Fluidity output

To make readable by StagLab, the original Fluidity output needs to be converted to a .csv file using e.g., Paraview. Adjust StagLab's *f_readFluidity* to the specific details of the .csv file.

3.5 Making use of StagLab diagnostics

To make use of StagLab's extensive, automated geodynamic diagnostics, make sure to switch on `SWITCH.PlateDiagnostics` and/or `SWITCH.MantleDiagnostics`. StagLab offers multiple ways to easily access the resulting model diagnostics, which are performed on the fly during its execution.

MatLab terminal : The live terminal output offers a quick overview over the multiple numeric and geophysical characteristics of the current model snapshot(s).

StagLab output data files : StagLab optionally offers externally stored data files (optionally in various data file formats) that contain relevant geodynamic diagnostics. Using `SAVE.GeodynamicsDiagnostics`, data files are saved for each processed time step that allow, once created, to be replotted within StagLab using the `PLOT.CustomGraph`. The Custom Graph option allows to plot graphs of all StagLab diagnostics (e.g., trench position over time) in conjunction with all other field plots.

*** Tip:** To save StagLab diagnostics over multiple model time snapshots, use `SWITCH.QuickMode` to more efficiently create all data files.

3.6 Troubleshooting tips

Error with writing cache : If an error occurs with writing the StagLab cache, it is likely due to two or more open MatLab sessions running multiple StagLab jobs that try to access the cache simultaneously. – Close both MatLab sessions and restart one, then try running only one StagLab job at once.

Plots exceed figure borders : If the plots (or subplots) run over the figure borders and/or overlap each other add and adjust the default values for the plotting settings in `f_Defaults.m`, section `%% SUBPLOT LAYOUT`.

Figure is too small or big : If the figure size is not optimal, adjust the default values in `f_SetupFigure.m`.

Bug reporting : If you encounter a bug, use `SWITCH.sendErrorLog = logical(1);` in the parfile, and run it once again, to send an automated bug report to the developer.

3.7 Acknowledging StagLab

! → Please acknowledge the free use of StagLab, its individual routines, or the included automated diagnostics.

Use, for example: "*The software StagLab (Crameri 2017) is used in this study to post-process and visualise the geodynamic models (Crameri 2018).*"

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3.8 More detailed information

See [Crameri \(2018, GMD\)](#).

4 Version history

- StagLab 6 :
- Introducing [StagLab-OpenSky](#) for developers
 - Deeper integration of StagYY's HDF5 output
 - Extended compatibility with StagYY's latest rprof.dat output
 - Compatibility testing measures for ASPECT's HDF5 output
 - Added Scientific categorical colour maps
 - Improved colouring for graph plots
 - Fix for usage with other system time formats
 - Fix for updated StagLab repository
 - Fix for rprof.dat output of latest StagYY version
 - Minor improvements for SL_RadialProfile and SL_TimeGraph
 - Bug fixes
- StagLab 5 :
- Introducing continent diagnostics
 - Introducing LLSVP diagnostics
 - Introducing slab-tip diagnostics
 - Introducing horizontal mantle flow diagnostics
 - Introducing panel
 - Introducing transparent figure background
 - Introducing automated error logging
 - Introducing categorical Scientific colour maps
 - Introducing journal-specific plot design
 - Introducing user guide
 - Additional StagLab-data output
 - Improvements and extensions to YinYang mode
 - Additional parameter field additions
 - Option to make difference plot with vector data
 - Less interruptive updating of old parfiles
 - Improved Windows compatibility
 - Special character fix for Windows
 - Improved code design
 - Stability and speed improvements for loop mode
 - Bug fixes
- StagLab 4 :
- Re-introducing multi-subduction-zone tracking
 - Introducing plume-mobility diagnostics
 - Improved Windows compatibility
 - Improved compatibility with latest StagYY version
 - Improved handling of 3-D spherical models

- Additional parameter fields
- Extended suite of Scientific colour maps
- Analysis mode for SL_RadialProfile and SL_TimeGraph
- Flexibility extensions to SL_RadialProfile and SL_TimeGraph
- Automatic fixing of corrupt time.dat files
- Stability improvements
- Bug fixes

- StagLab 3 :
- Introducing automated installation and testing
 - Introducing 2-D mode for 3-D
 - Introducing analysis mode
 - Introducing tracer plot
 - Introducing surface-variation histogram plot
 - Introducing topography diagnostics
 - Introducing perceptually-uniform colour schemes
 - Option to discretise colour maps
 - Option to set default figure position on screen
 - Option to shift or flip data horizontally
 - Support for partial cylindrical geometry
 - Magnifier support for cylindrical geometry
 - Additional parameter fields
 - Additional plate diagnostics
 - Major improvements to SL_RadialProfile and SL_TimeGraph
 - Compatibility with Fluidity output
 - Refined visual design
 - Improved file finder
 - Improved code design
 - Improved speed
 - Bug fixes

- StagLab 2 :
- Introducing mantle-dynamics diagnostics
 - Introducing tectonic diagnostics
 - Introducing topography components (isostatic,residual)
 - Introducing plot for up- and downwelling
 - Introducing parameter table
 - Introducing plot-in-plot mode
 - Introducing movies
 - Introducing fAlo
 - More parameter fields added

- Automatic detection of side-boundary v-condition
- Less-disruptive error handling
- Cleaner plot design and layout
- Improved colormaps
- Improved filefinder
- Improved display output
- Improved stability of design-routines
- Improved saving and plotting of tectonic data
- Convertibility improvements with other geodynamic codes
- Bug fixes

- StagLab 1 :
- Combining Apps to StagLab
 - Support of all available StagYY model geometries
 - Support of all available StagYY output
 - YinYang horizontal maps
 - Hot and cold plume tracking
 - Beta version of 3-D Cartesian plate-boundary tracking
 - Code speed optimisations: deriving lithosphere thickness
 - Horizontal residual temperature plot
 - Heat flux plot
 - Plot for temporal evolution of tectonic parameters
 - Option added to save figure to specific directory
 - Improved code design
 - Improved user friendliness
 - Bug fixed that led to empty plate sketch plot
 - Bug fixes and updates to the dimensionalisation

5 Reference

Crameri, F. (2018), Geodynamic diagnostics, scientific visualisation and StagLab 3.0, *Geosci. Model Dev.*, 11, 2541-2562, [doi:10.5194/gmd-11-2541-2018](https://doi.org/10.5194/gmd-11-2541-2018)

6 Contributing

Please forward contributions, bug reports, requests, and general questions to [Fabio Crameri](#).

7 License

StagLab, its individual subroutines and the included Scientific colour maps are licensed under a [MIT License](#)

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