

Evolution-MATPIVoT: A MATLAB script to plot the evolution of a PecubeGUI inversion

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This MATLAB script has been set up to plot the evolution of the misfit explored per model per parameter in a PecubeGUI inversion. The Python counterpart by Isabel Wapenhans et al. can also be accessed on Zenodo.

1. Requirements

This code requires MATLAB installed (R2020a or later recommended).

2. Input

- This script reads the model's name from the folder in which it is placed.
- It reads parameter and misfit values from:
 - **NA/NA_int_res.csv** (while the inversion is running), or
 - **NA/NA_results.csv** (once the inversion is complete).
- It chooses the input file automatically; *thus, this script can be run while the inversion is ongoing to visually check the progress of the inversion.*
- It reads and prints the parameters of the Neighborhood Algorithm (NA) selected in inversion (lowest misfit thus far, size of first iteration, size of all subsequent iterations, cells resampled in subsequent iterations, number of iterations, resulting overall number of forward models run or planned) from **input/Pecube.in** and prints them onto the plot figure for easy reading. It also marks, in black, the end of the first iteration which is run at random, and, in white, the beginning/ end of subsequent iterations.

3. Folder Structure

```
MATPIVoT/
├── 01_evolution/
│   ├── Code/                # Contains MATLAB scripts
│   │   └── plot_evolution.m  # Main MATLAB script
│   ├── Example/             # Default location for model folders
│   │   └── BAT12/           # Example model folder, directly from Pecube inversion results, no changes needed
│   │       ├── NA/
│   │       │   ├── NA_int_res.csv  # Intermediate results (while inversion is running)
│   │       │   └── NA_results.csv  # Final inversion results
│   │       └── input/
│   │           └── Pecube.in        # Inversion parameters (can be edited directly in the file or via PecubeGUI)
│   └── Instructions/         # User documentation
│       └── 01_evolution_MATPIVoT_instructions.pdf
```

4. Usage

- There are two ways to run the script:
 - **Option A** (idefault):
Copy your inversion model (e.g., **BAT12/**) into the **MATPIVoT/01_evolution/Example/** directory.

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• **Option B:**

Copy the entire **MATPIVoT/** folder into the main **Pecube/** directory. Your inversion model (e.g., **BAT12/**) should then be located under **Pecube/**.

- If you use Option B, uncomment the corresponding lines in the script for **filepath**, **results_path**, **int_res_path**, **input_file**, and **save_dir**.
- Edit the names of the inversion parameters under **USER INPUT** section: `titles = {'xxx', 'xxx'}`.
- Run this script from command-line with either:
 - In the MATLAB editor → click **Run**, or
 - In the Command Window:

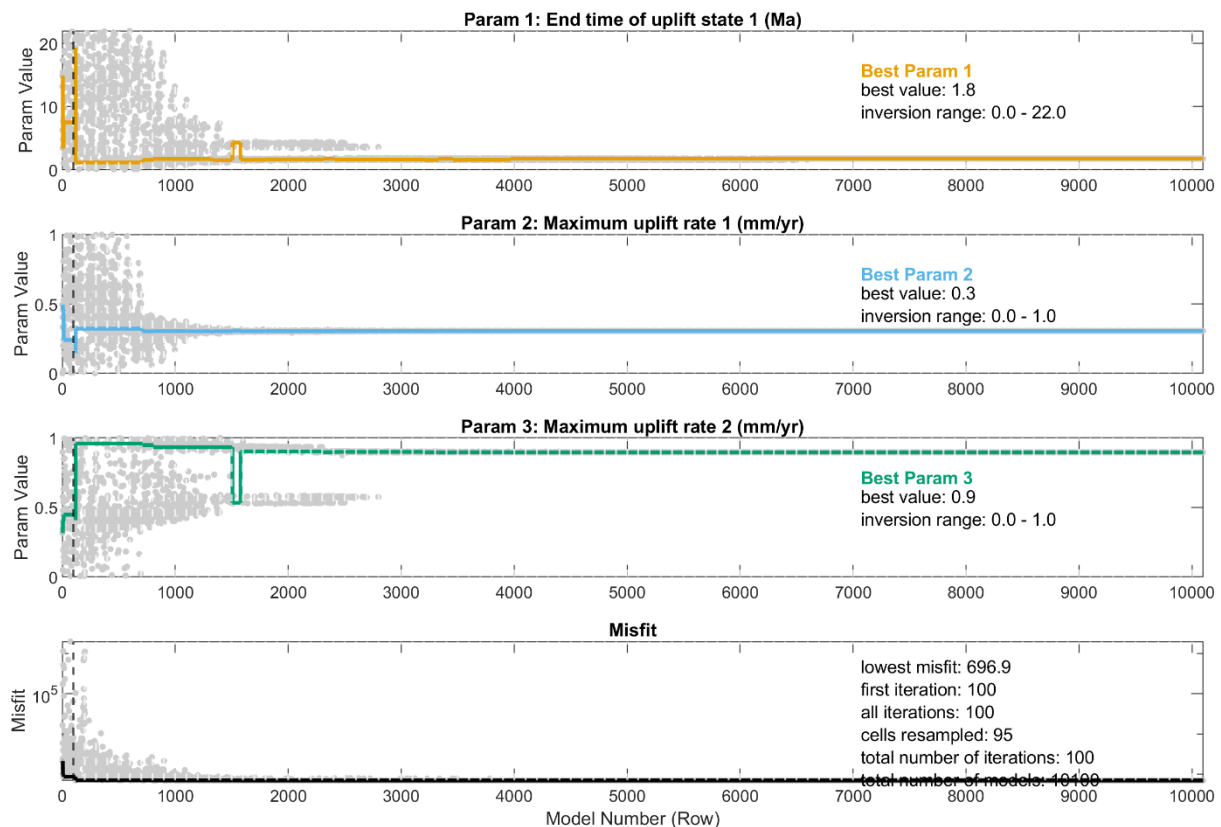
```
run(plot_evolution.m), or simply  
plot_evolution
```

5. Example

model directory: **/BAT12**

```
titles = {'End time of uplift state 1 (Ma)', 'Maximum  
uplift rate 1 (mm/yr)', 'Maximum uplift rate 2 (mm/yr)'}
```

Overview Model BAT12: (3 params; 10100 models)



6. How to cite

If you use this plotting script, please following DOI: [xxx].

7. Contact

If you have questions or suggestions for improvement, please do not hesitate to contact: Lingxiao Gong - gong@uni-potsdam.de