Pysim: A Python package for bathymetry estimation using Enkf method.

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1 Introduction

For detail information on scientific background and idea about case study done with this package please see Moghimi et al (2014).

2 How to setup

Here is the general steps you need to take in order to make the package working:

1. Set variables in `base_info.py` file.
2. Set directories carefully e.g. `base_dir,inp_dir,scr_dir.`The `base_dir` is the main output directory.

3 Structure of input directory

The `inp` folder has diffrent folders including:

- `const` : for all input information for running numerical models. Like ROMS and SWAN input files, boundary conditions, compiled excutables, bathymetry information and so on.
- `obs` : for current velocity observation. `sar` refers to SAR actuale data and `syn` refers to synthetic data for a twin test.
- `obs_swift` : for current velocity observation from a drifter.
- `obs_wave` : for wave observation from a x-band radar or synthetic source.

4 Structure of output directory

The results will save in `base_dir`which is defined in `base_info.py`. The software always copy the whole `inp` folder in order to keep each case reproduceable later on.

For each iteration one folder as `run_100X`will be created. each iteration folder includes several folders as:

1. `00_prior` : prior bathymetry of current iteration
2. `01_bat_inp` : initial bumps ensembmle members
3. `02_bat_adj` : final bathymetry ensebles
4. `03_mem_inp` : ROMS results for each ensmble member
5. `04_mem_adj` : Adjusted ROMS ready to assimilate based on the time of assimilation
6. `04_swf_adj` : Drifter extracted data from ROMS runs ready for assimilation
7. `04_wav_adj` : SWAN folder including netcdf post-processed ready for assimilation
8. `05_assimilate` : Assimilation results directory

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9. `06_mat2prior` : Prepare posterior in netcdf fomat ready for next iterartion as new prior
10. `07_post` : folder to keep post-processing of results (plots)
11. `08_forward` : forward ROMS run over assimilated bathymetry
12. `08_forward_swan` : forward SWAN run over assimilated bathymetry
13. `scr` : a copy of scripts for this iteration as refrence.

References

Moghimi S, Ozkan-Haller HT, Wilson G, Kurapov A (2014) Data assimilation for bathymetry estimation at a tidal inlet. Journal of Atmospheric and Oceanic Technology p In Review