Modelling and Forecasting Facility internal report

BRIFS verification and visualization codes for Matlab

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Contents

1 Verification of WRF and ROMS

The main codes for verifications and comparisons of model results with existing observations are

- `/home/mlicer/BRIFSverif/plot_sealevel_ROMS_BRIFS_OBS.m`
- `/home/mlicer/BRIFSverif/plot_pressure_WRF_BRIFS_OBS.m`

Before we continue, we'd like to remind the reader that the above Matlab verification scripts should *not ideally be used at all*: `performBRIFSverification.py` code *should* be used for this purpose instead.

1.1 `/home/mlicer/BRIFSverif/plot_sealevel_ROMS_BRIFS_OBS.m` call tree

This function produces the types of graphs presented in Figure 1. Output directory: `/home/mlicer/BRIFSver`

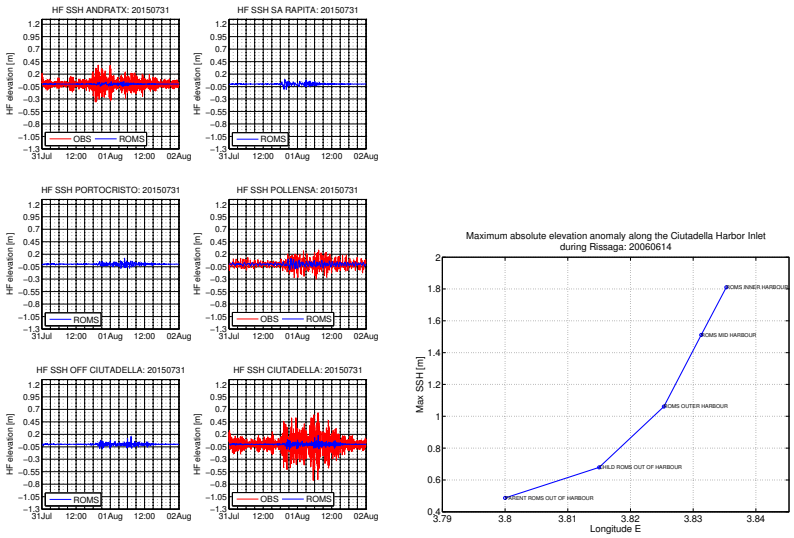

FIGURE 1: Figure produced by `/home/mlicer/BRIFSverif/plot_sealevel_ROMS_BRIFS_OBS.m`

- **plot_sealevel_ROMS_BRIFS_OBS**
  - **WRF_ROMS_OBS_data_analysis**: computes basic BIAS/RMSE/CORR statistics of WRF vs observations and ROMS vs observations and generates LaTeX table to be included in the Rissaga sections of the Rissaga report.
    - **fft_h**: computes Fast Fourier Transforms of the input timeseries.
    - **basicStatistics**: computes basic BIAS/RMSE/CORR statistics of the input timeseries.
      - **naninterp**: interpolates over NaNs.
    - **removeROMSLowFrequencies**: a high-pass Butterworth filter.
  - **get_SOCIB_logo**: gets SOCIB logo.

- **plotSeaLevelsObsROMS**: a simple plotting function that plots a Figure of 3x2 subplots at different locations, comparing ROMS SSH and in situ SSH. Both signals are high-pass filtered to allow comparisons.
  - **romsAxis**: a unified Figure axis setup, to be consistent in all Figures.
- **readCurrentProfilerObservations**: wrapper for reading and structuring current observations from THREDDS.
  - **cropObservationTimeWindow**: cropping of the timeseries to required time-window.
  - **mergeDataStructures**: merging observations from different months (years).
  - **readCurrentProfilerObs**: the actual current profiler netCDF reading routine.
- **readSeaLevelObservations**: wrapper for reading and structuring sea level observations from THREDDS.
  - **readSeaLevelObs**: the actual sea level netCDF reading routine.
- **readTideGaugeObservations**: wrapper for reading and structuring sea level observations from THREDDS.
  - **readTideGaugeObs**: the actual sea level netCDF reading routine.
- **removeLowFrequencies**: a high-pass Butterworth filter.

1.2 `/home/mlicer/BRIFSverif/plot_pressure_WRF_BRIFS_OBS.m` call tree

This function produces the types of graphs presented in Figure 2. Output directory: `/home/mlicer/BRIFSver`

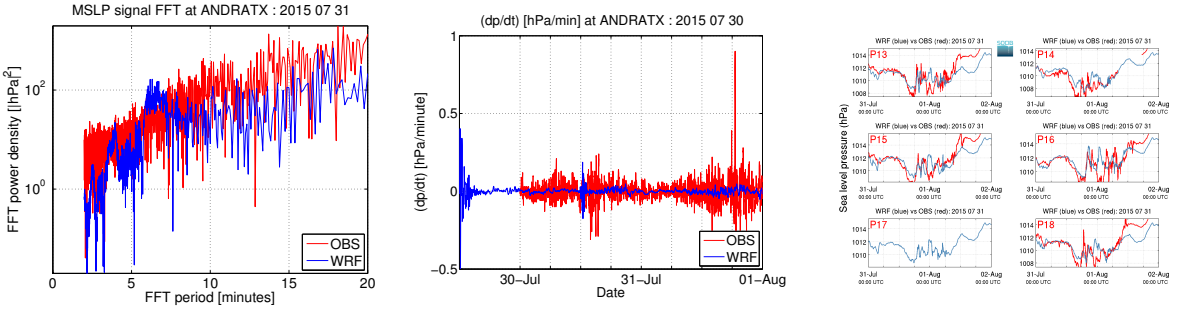

FIGURE 2: Figures produced by `/home/mlicer/BRIFSverif/plot_pressure_WRF_BRIFS_OBS.m`.

- **plot_pressure_WRF_BRIFS_OBS**
  - **WRF_OBS_data_analysis**: computes air pressure time derivatives ($\partial p/\partial t$), Fast Fourier transforms and plots graphs of observations vs WRF, if available.
    - **fft_h**: computes Fast Fourier Transforms of the input timeseries.
    - **plotPgraphs**: A simple plotting function that plots graphs of P01-P18 locations and compares the WRF pressures to observations where and when available.

– **readPressureObservations**: wrapper for reading and structuring current observations from THREDDS.

  * **cropObservationTimeWindow**: cropping of the timeseries to required time-window.
  * **mergeDataStructures**: merging observations from different months (years).
  * **readBarometerObs**: the actual air pressure netCDF reading routine.

2 Additional Visualization Codes for WRF and ROMS

2.1 `/home/mlicer/BRIFSverif/ROMS_analyze_numexp.m`

This script reads ROMS netCDF or matfile *of a single numerical experiment* and plots the plots from Figure 3. The code itself is thoroughly documented and we do not repeat that here. Please see the code for further info.

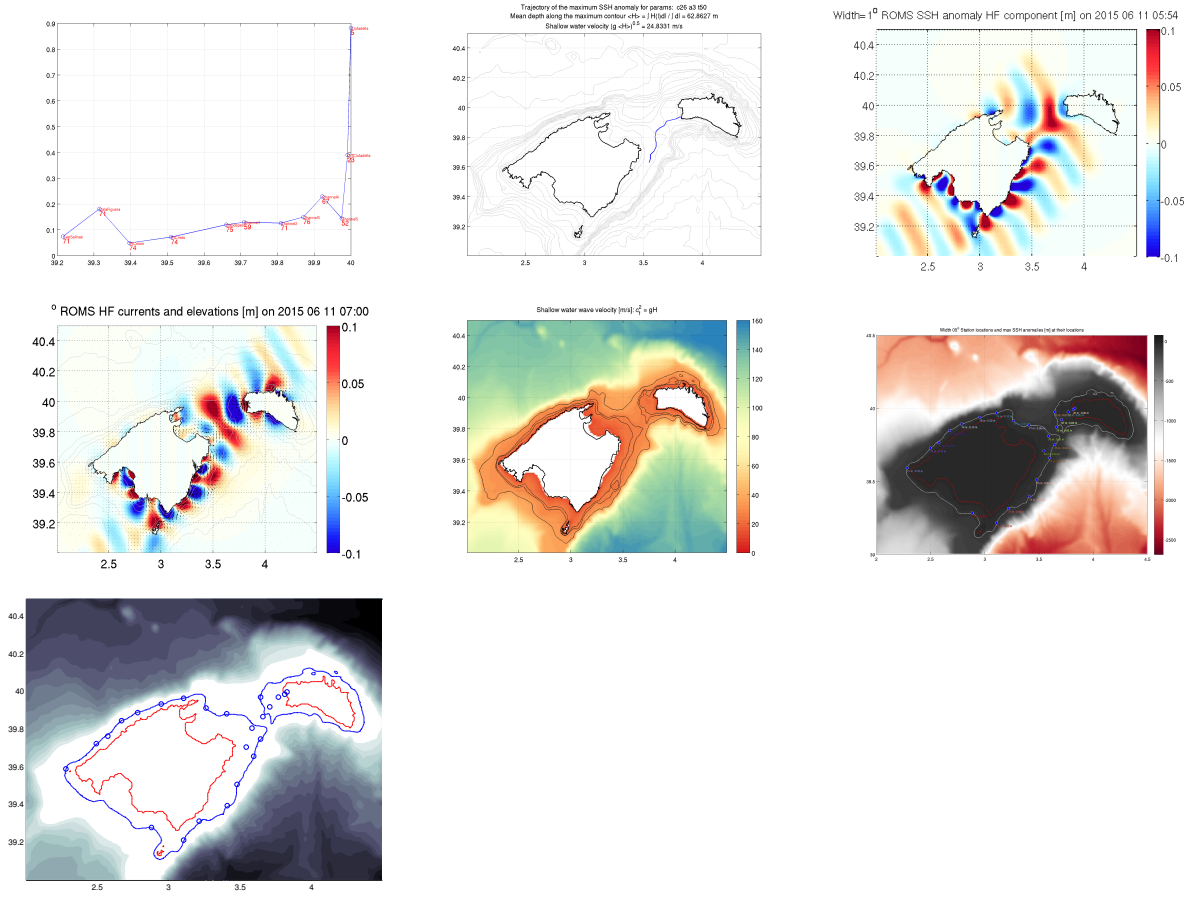

FIGURE 3: Figures produced by `/home/mlicer/BRIFSverif/plot_pressure_WRF_BRIFS_OBS.m`.

2.2 /home/mlicer/BRIFSverif/ROMS_analyze_event.m

This script reads ROMS netCDF or matfile *of a past rissaga event* and plots the same plots as in Figure 3 - apart from the maximum tracking, which is currently only implemented in numerical experiments. The code itself is thoroughly documented and we do not repeat that here. Please see the code (and also `/home/mlicer/BRIFSverif/ROMS_analyze_numexp.m`) for further info.

2.3 /home/mlicer/BRIFSverif/plotMaxTrajectory.m

This script reads ROMS matfile containing maximum anomaly trajectory data (created by `/home/mlicer/BRIFSverif/ROMS_analyze_numexp.m` code) and plots the figures in Figure 4:

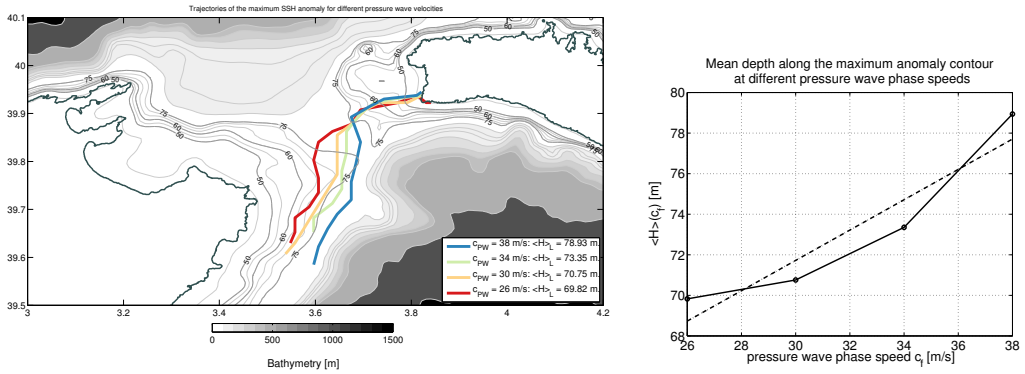

FIGURE 4: Figures produced by `/home/mlicer/BRIFSverif/plotMaxTrajectory.m`.

2.4 /home/mlicer/BRIFSverif/analyzeROMSnumexp.m

This script is used for BULK analysis of ALL the ROMS numerical experiments and plots $SSH(\theta, c_f)$ matrices for all stations specified. The figures produced by the code are shown in Figure 5.

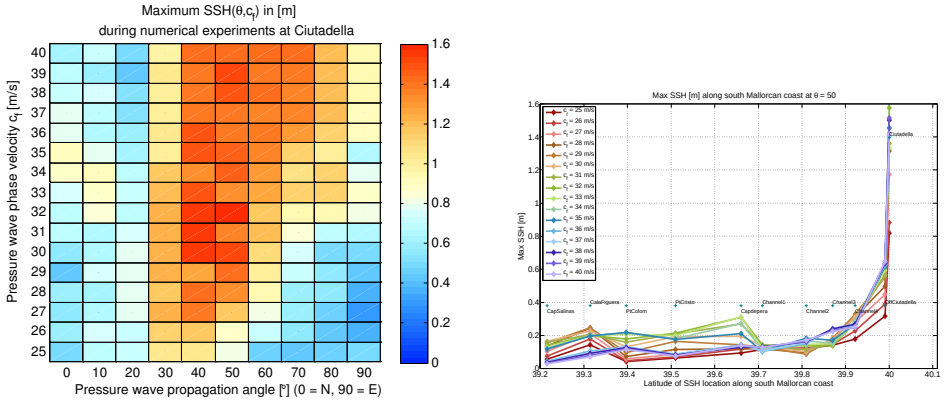

FIGURE 5: Figures produced by `/home/mlicer/BRIFSverif/analyzeROMSnumexp.m`.