Instruction manual


1. Folder structure

```
├── Code
│   ├── .idea
│   ├── ANALYSIS
│   ├── HCA-FM
│   └── PREDATA
│       └── workspace.gdb
├── Data
│   ├── ADCIRC_Swan
│   │   ├── Hato
│   │   ├── Lekima
│   │   └── Polly
│   ├── FIGURE
│   │   ├── figure1
│   │   ├── figure2
│   │   ├── figure3
│   │   └── figure6
│   └── HCA_FM
│       ├── CZ
│       │   └── Lekima
│       │       ├── INPUT
│       │       └── observation
│       │       └── OUTPUT
│       │           └── ta1_tb1_n0
│       │               └── PreData
│       └── LZW
│           └── Lekima
│                   └── compare
│                           └── INPUT
│                           └── OUTPUT
│                               └── ta0_tb0_n1
│                               └── ta0_tb1_n1
│                               └── ta1_tb0_n1
│                               └── ta1_tb1_n1
│                                   └── PreData
│                                   └── Polly
```
Notes.

- **Software requirements:**
  Matlab (R2022a), Python 2.7, ArcGIS (Version 10.8), TeXstudio (Version 2.12.8)

- **Tips:**
  Please run programs in their path
  please change workspace path (workspace.gdb) in python programs and mainpath (Data folder) in FloDefs.py before run python programs

- **Parameters for different experiments (change in the codes)**
  Regions: CZ (Cangzhou, Hebei), LZW (Laizhou Bay), SZ (Shenzhen, Guangdong)
  Typhoons: Lekima (1909), Polly (9216), Hato (1713)

- **Description:**
  …/Code/PREDATA: code for creating the input files of HCA-FM
    FortToMat.m
    CreatBC.m (subfunction: m_UVdir.m)
    CreatIC.py (subfunction: FloDefs.py)
  …/Code/HCA_FM: main program and subfunctions of HCA-FM
    HCA_FM.mlx (subfunctions: m_count.m, m_neighbor.m)
  …/Code/ANALYSIS: main program and subfunctions to convert files and compare results between two models
    Analysis.py (subfunction: FloDefs.py)

  …/Data/ADCIRC_SWAN/Typhoon
    input (fort.14/15/22/26) and output (fort.63/64) files of ADCIRC+SWAN coupled model

  …/Data/HCA_FM/Region/Typhoon/PreData
    datasets used to creat input files for HCA-FM including DEM, landcover, wind, boundary water level and velocity

  …/Data/HCA_FM/Region/Typhoon/INPUT
    input files for HCA-FM: BIC.mat

  …/Data/HCA_FM/Region/Typhoon/OUTPUT
    output files of HCA-FM, and comparative results to ADCIRC-SWAN:
    OUTDATA.mat
… / Data / HCA_FM / Region / Typhoon / compare
Points at which comparison is made between HCA-FM and ADCIRC+SWAN results
… / Data / HCA_FM / Region / Typhoon / observation
field survey data

… / Data / FIGURE: programs to produce figures in paper

2. Experimental procedures

1. Run ADCIRC+SWAN coupled model
   - Input fort.14/15/22/26
   - Output fort.63/64
   Detailed information about ADCIRC+SWAN please refer to

2. Prepare input files for HCA-FM
   - Run FortToMat.m  Output Fort.mat
- Run CreatBC.m Output POINTS.xls
- Run CreatIC.py Output BIC.mat

3. Run HCA-FM
   - Run HCA_FM.mlx Output OUTPUT.mat

4. Analysis results
   - Run Analysis.py Output depth.tif, range.shp
     Output COMPARE.mat, analysis.txt (compared with ADCIRC+SWAN)

5. Draw figures
   - Figure 1
   - Figure 2
   - Figure 3
   - Figure 4
   - Figure 5
   - Figure 6