f13builder, a Tool for Rapid Creation and Review of the ADCIRC Nodal Attribute File

Taylor Asher
taylorgasher@gmail.com
URS

April 3, 2014

Overview

- Program Philosophy
- How It Works
- Nodal Attributes
  - Land Cover-Dependent (mnasf, scc, sderl)
  - sss & sshag
  - wris
- Checker Utility
- Acknowledgments
- Questions?

Tool Philosophy

- Quick ‘n easy (just watch)
- Shell (bash) + Fortran
  - bash primarily a wrapper for new and existing Fortran codes
- Modular
  - Each attribute handled separately (some optional overlap)
- Documented

- No direct control over “minor” parameters (e.g. attribute units)
  - Users can alter source if desired
- Not too concerned with backwards compatibility

How It Works

- Parse input file to determine nodal attributes and parameters, adding headers for each attribute to fort.13 file
- For each nodal attribute:
  - Create an input file to the Fortran program for that attribute
  - Run Fortran program, creating nodal attribute info
  - Append info for attribute to fort.13 file

```
fort.13                                          !filfort13 - output fort.13 nodal attribute file
FLBB11.grd                                       !filfort14 - fort.14 mesh file
../lcccap/flbb10_ccap_withseagrass.txt           !fillc - land cover file
7                                                !nattr - number of nodal attributes
mannings_n_at_sea_floor                          !curnamattr - nodal attribute name
../lcccap/ccap2mnasf                             !fillc2mnasf - mnasf land cover conversion table file
n y                                              !diflcmnasf difdefmnasf - mnasf different land cover an
0.02                                             !defmnasf - mnasf default value
primitive_weighting_in_continuity_equation       !curnamattr - nodal attribute name
```

How It Works

Text in *italics* are informational, text in **bold** are parameters in the file.

General:

- **filfort13** – fort.13 (nodal attribute) output file name
- **filfort14** – fort.14 (mesh) file name
- **fillc** – land cover file name (can be a dummy name if no land cover is used)
- **nattr** – number of nodal attributes
- *for cnt1=1..nattr*
  - **curnamattr** – name of current attribute
  - *parameters of current attribute (may be multiple lines)*

For specific attributes:

- mannings_n_at_sea_floor
  - **fillc2mnasf** – file containing the table converting land use codes to mnasf values
  - **diflcmnasf difdefmnasf** – whether a different land cover dataset should be used rather than **fillc** (y=yes n=no), and whether a different default value should be used (y=yes n=no, default is 0)
  - *if diflcmnasf=y*
    - **fillcmnasf** – land cover file name for mnasf
  - *if difdefmnasf=y*
    - **defmnasf** – default value for mnasf
- primitive_weighting_in_continuity_equation
  - *none*
- surface_canopy_coefficient
  - **fillc2scc** – file containing the table converting land use codes to scc values
  - **diflcscc** – whether a different land cover dataset should be used rather than **fillc**, y=yes n=no
  - *if diflcscc=y*
    - **fillcscc** – land cover file name for scc

Nodal Attributes

- mannings_n_at_sea_floor (**mnasf**) – land cover-driven spatially varying bottom friction
- primitive_weighting_in_continuity_equation (**pwice**) – see Tau0 documentation
- sea_surface_height_above_geoid (**sshag**) – starting water elevation
- surface_canopy_coefficient (**scc**) – land cover-driven zeroing of wind stress
- surface_directional_effective_roughness_length (**sderl**) – land cover-driven wind reduction
- surface_submergence_state (**sss**, my favorite) – initialize nodes as "dry"
- wave_refraction_in_swan (**wris**) – disable wave refraction in specified area(s)

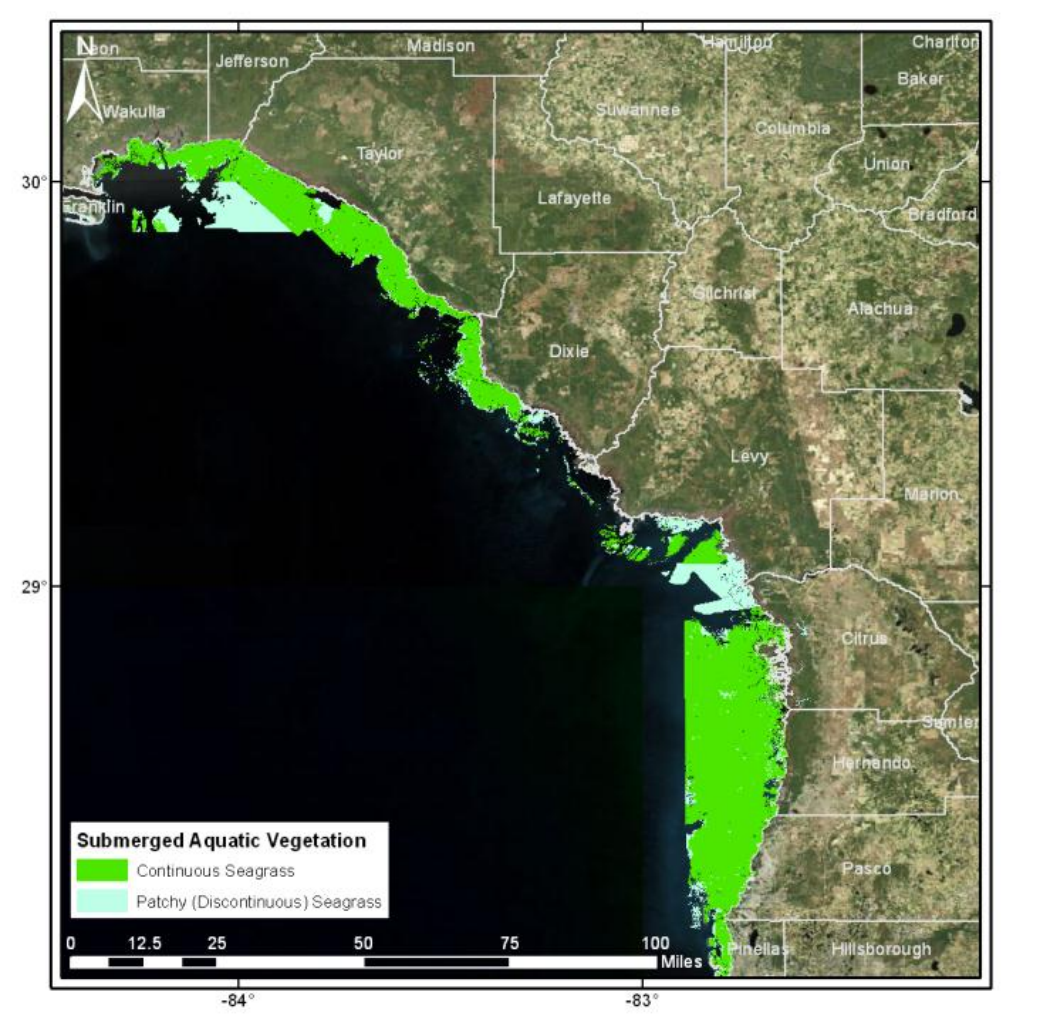
- **Anything else you want?**

Land Cover-Dependent

- Code requires:
  - Land cover dataset (NLCD, GAP, CCAP, etc.)
  - Land cover conversion table (NLCD & CCAP tables available)
  - Other code-specific standard inputs
- Allows specification of separate land cover datasets for different attributes

Land cover code	mnasf	scc	sderl	Description
11	0.02	1	0.001	!Open Water
12	0.01	1	0.012	!Perennial Ice/Snow
21	0.02	1	0.1	!Developed - Open Space
22	0.05	1	0.3	!Developed - Low Intensity
23	0.1	1	0.4	!Developed - Medium Intensity
24	0.15	1	0.55	!Developed - High Intensity
31	0.09	1	0.04	!Barren Land (Rock/Sand/Clay)
32	0.04	1	0.09	!Unconsolidated Shore
41	0.1	0	0.65	!Deciduous Forest
42	0.11	0	0.72	!Evergreen Forest
43	0.1	0	0.71	!Mixed Forest
51	0.04	1	0.1	!Dwarf Scrub
52	0.05	1	0.12	!Shrub/Scrub
71	0.034	1	0.04	!Grassland/Herbaceous
72	0.03	1	0.03	!Sedge/Herbaceous
73	0.027	1	0.025	!Lichens
74	0.025	1	0.02	!Moss
82	0.037	1	0.06	!Cultivated Crops

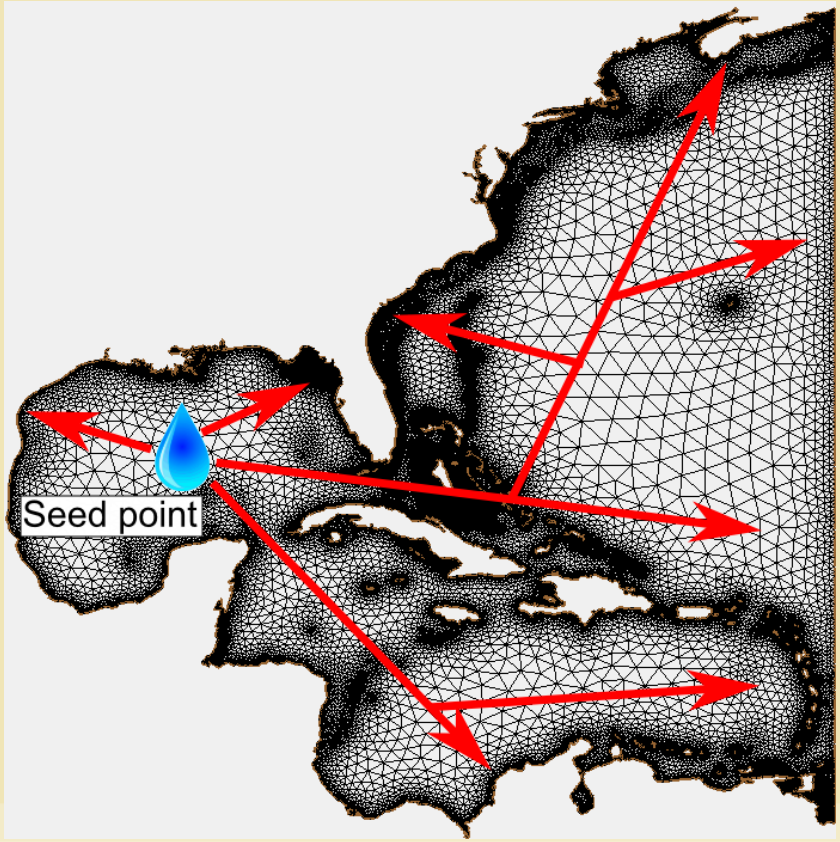
Land Cover-Dependent



sss & sshag

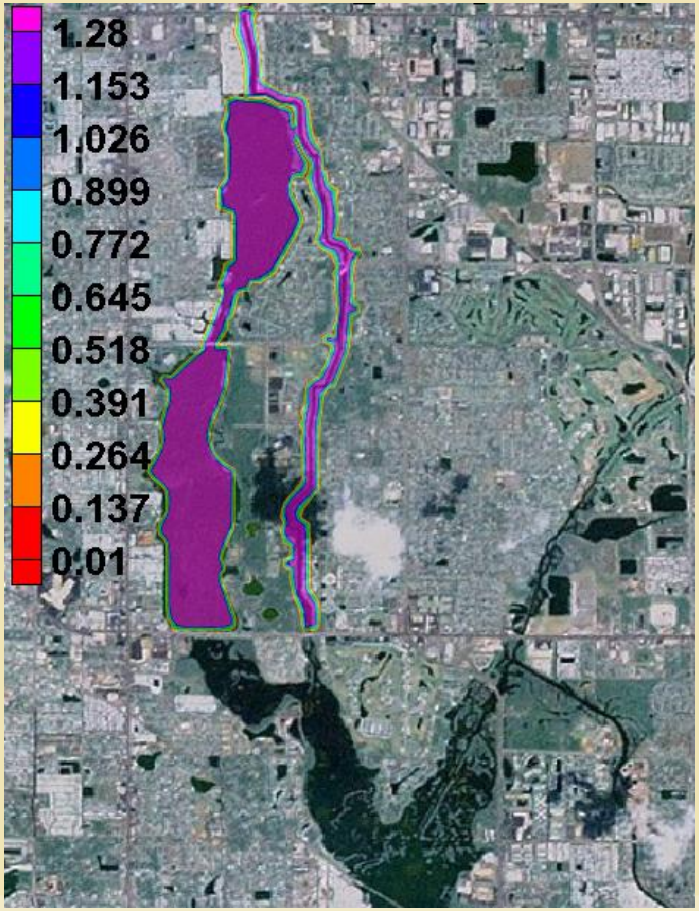
- surface_submergence_state
- Code requires:
  - Seed coordinates (x,y,z)
- Extrapolates to cover basin (great tool for identifying v-notches, holes in barriers)
- Can be set to use sshag default values

- sea_surface_height_above_geoid
- Same process

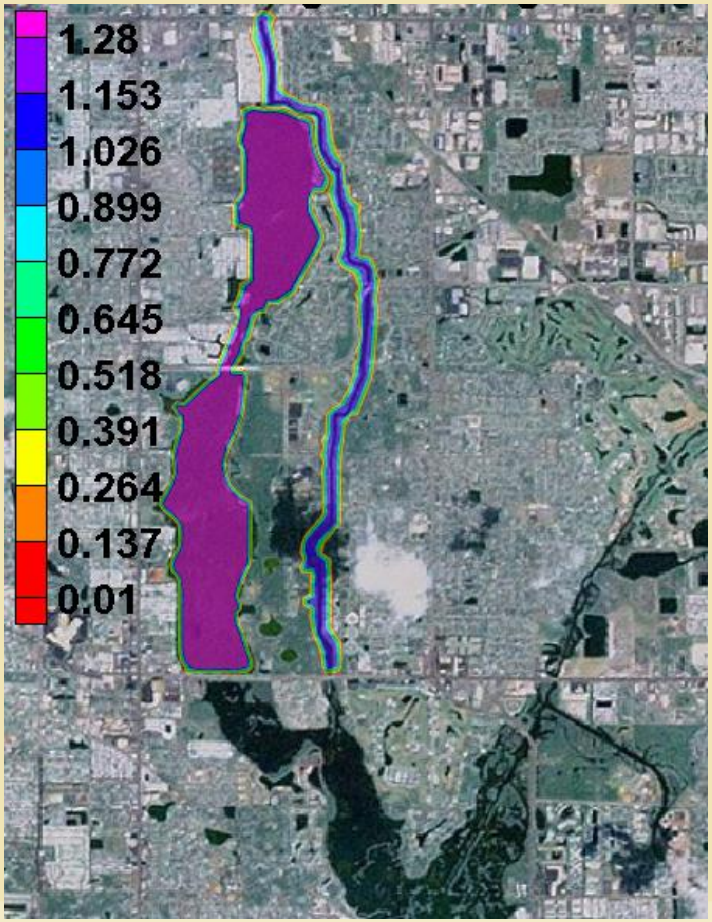


sss & sshag

- whoops



- fixed hole in barrier

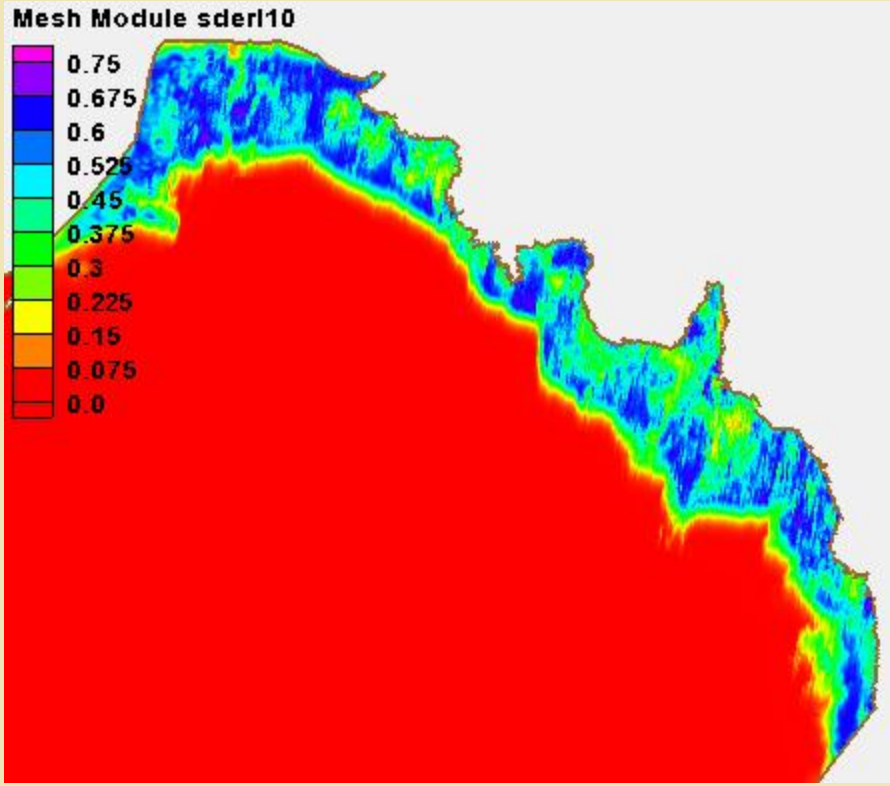


wris

- wave_refraction_in_swan
- Code requires:
  - (x1,y1),(x2,y2) bounding box
- May expand to work with arbitrary polygon(s) as input
- Does anyone still use this attribute?

Checker Utility

- Simple bash/Fortran tool to turn fort.13 into .63-style files
- Can specify a single attribute by name or use "--all" flag to parse whole file
- Then visualize!



Acknowledgments

- mannings_n_finder.f – Crystal Fulcher
- surface_canopy.f – Crystal Fulcher
- surface_roughness_calc.f – Crystal Fulcher, Craig Mattocks
- tau0_gen.f – Robert Weaver
- inflate.F author

- Anyone else who contributed to any of the above codes that I've basically stolen for this tool

URS

A JV of Dewberry, URS and ESP
RAMPP
Risk Assessment, Mapping, and Planning Partners

FEMA

END

Questions?