PROGRAM DEM2GRD

User’s Manual, Version 6.2

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Utility to interpolate digital elevation model to ADCIRC mesh nodes

# Introduction

This FORTRAN90 program assigns ADCIRC mesh nodes an elevation based on a digital elevation model (DEM).

# Algorithm

The algorithm employed is the Cell Area Averaging (CAA) window for each node, and is based on the DEM raster cell size and local node density:





where *N* is the number of DEM grid cells radiating omnidirectionally from the DEM cell containing the node in question. Details can be found in Bilskie & Hagen (2013):

[M.V. Bilskie, S.C. Hagen (2013). “Topographic Accuracy Assessment of Bare Earth lidar-derived Unstructured Meshes.” Advances in Water Resources, 52, 165-177,](http://mbilskie.safeport.com/wp-content/uploads/2013/07/Bilskie_Topographic-accuracy-assessment-of-bare-earth-lidar-derived-unstructured-meshes.pdf)[http://dx.doi.org/10.1016/j.advwatres.2012.09.003](http://www.sciencedirect.com/science/article/pii/S0309170812002503)

Note: Only nodes that contain an elevation < -1000 will get interpolate (i.e. nodes that already have an elevation value will not get a new one).

# Inputs

This program requires three inputs. The first is a general control input file that contains the necessary information to run the program. The other two inputs are an ADCIRC mesh and raster DEM (in \*.flt format).

## Control input file (\*.inp)

The contents are as follows:

* Line 1 and 2: header lines
* Line 3: Name of flagged ADCIRC mesh that need elevations assigned. Only flagged nodes (less than or equal to -1000) will be included for interpolation. A flag value of -1001 uses the method in Bilskie & Hagen*.* A flag value of -1002 will use the methods in Bilskie & Hagen and multiply the result by 2, a value of -1003 will multiple by 3, and so on. This essentially increases the control volume and is a method to smooth the elevations. Including a “1” in the hundredths place will only interpolate “wet” value within the control volume (i.e. -1101). This is useful for interpolating within rivers and channels when you do not want to include DEM cells on the land in the averaging method.
* Line 4: Coordinate System type (0 for Cartesian or 1 for a mesh that is in lat/long).
* Line 5: Multiplication factor. This can be used to convert between units or convert DEM elevations to the ADCIRC standard (-1).
* Line 6: Output ADCIRC mesh with interpolated values
* Line 7: Number of flt/hdr raters
* Line 8+: Raster file names (without the file extension)

# Compiling and running the program

Under Intel FORTRAN compiler:

ifort DEM2GRD.F90 –o DEM2GRD.exe

Under gfortra compiler:

gfortran DEM2GRD.F90 –o DEM2GRD.exe

To run the program:

./DEM2GRD.exe –i input.inp

# Disclaimer

This program is to be used as-is, and the developers do not provide warranty of any kind. The software may not be error free and may not be appropriate for all projects or decisions. The developers have undergone basic checks, but has not undergone a formal Quality Assurance of any kind. Please report any bugs to mbilsk3@lsu.edu