

AFDA User's Guide

This document provides an exercise on how to perform automated flow direction analysis using ArcGIS. The ArcGIS used in the analysis should support ArcGIS workstation (command line) and grid operation.

Before starting the exercise, make sure you already download the data (AFDA.exe) from the website and unzip it to the **folder C:\workspace**. You can also put the data into other folders. Because the default workspace in the ArcGIS workstation (command line) is **C:\workspace**, here, we just suggest you put all your data under this folder (C:\workspace). If you are familiar with the ArcGIS workstation, you can put the data in any place of your computer.

Download the AML program (AFDA.aml) from the website and put it in the same folder of the exercise data (C:\workspace). You can also copy the AFDA.aml file to the ArcGIS system folder "C:\arcgis\arcexe9x\atool\arc" in order to use it as a system command in ArcGIS workstation. We suggest you do that if you want to use this tool very often.

1. Start Arc



2. make sure the current workspace is C:\workspace

To do this, input **w** in the Arc window (w means workspace). The system will tell you the current workspace is C:\workspace. If you want to change workspace to other folders, you can add your folder name (include path) after the **w**, for example, **w C:\temp**. If you put all data in the c:\workspace, you don't need to change the workspace.

3. Get to know the AFDA program (AFDA.aml)

Input **&run afda** in the Arc window. The system will show a help documents about this program.

```

*****
*-----*
* Usage: afda <Flowset> <token> <start> <end> <step> <free> <frozen> <file> {ASC|BIN}*
*-----*
* Description of parameters
* Flowset - the field observed flowset grid
* token - the token of the model outputs
* start - Start year of the model output
* end - End year of the model output
* step - time interval(step) of the model outputs
* free - Value for ice free condition
* frozen - Value for frozen bed condition
* file - output file name, the program automatically adds .txt
* ASC|BIN - The type of model outputs, ASC(ASCII file),BIN(Binary file)
*****
Usage: afda <Flowset> <token> <start> <end> <step> <free> <frozen> <file> {ASC|BIN}

```

“&run” is the way to run an aml program in the Arc environment. If you already copy the aml file to the ArcGIS system folder (C:\arcgis\arcexe9x\atool\arc), you don’t need to use “&run” and just input “apca”. The same information will show up in the Arc window.

This provides an instruction to use the AFDA program. Basically, AFDA needs 9 parameters to run.

The first parameter <Flowset> is the grid name of field observed glacial lineation. In the exercise, it will be “set31”.

The second parameter <token> is the token to identify model predicted flow directions at different time slices. In this exercise, the model predicted ice flow directions for different time slices are a set of *.ASC file such as f_10000, f_11000, f_12000, ... This type of file names provides useful information about the model output. “f_” indicates that the model output is the basal ice flow direction. The number in the file name is the time slice of the model output. The “ASC” extension indicates that the model output is ASCII file. Based on this information, we know that the <token> for the AFDA program is “f_”.

The 3-5 parameters are the start, end and step (interval) for the model output files. Browsing all the model output in the folder, you know that the start and end time are 35000 and 10000 B.P. and the time step is 1000 year (however, you need to input -1000 as the step value because the start time 35000 is larger than the end time 10000).

The next two parameters are the specific values to identify ice free and frozen bed conditions in the model output. In this exercise, the model output used 999 to identify the ice free condition and 888 to identify the frozen bed condition.

The <file> parameter is the output file name (text file) to record the analysis results. After you

input a file name, the program automatically adds .txt. In this exercise, you can use “out01” as a file name to record the analysis results (you can use any name you want).

The last parameter is the model output file. Basically, ArcGIS can convert two types (ASCII or BIN) of model outputs. The default value for this parameter is ASC (ASCII file). In this exercise, the model output is *.ASC file, so you don’t need to input this parameter and the system will use the default value of this parameter.

Now, you know all the parameters to run the AFDA analysis “set31 f_ 35000 10000 -1000 999 888 out01”. So in the Arc window input the following command:

&run afda set31 f_ 35000 10000 -1000 999 888 out01

Then, the program will start to run. It probably will take 1 minute to run the whole analysis for this exercise. If you have more data, it will take more time to run.

4. Get to know the analysis result

After you finished the program run, you can open the output file (out01.txt) using excel or just notepad. The following is the output file of this exercise.

```
Flowset Grid: set31
Time,      Vec_Mean,      Vec_variance(*100),      IceMoveNum(%),      IceFreeNum(%),      IceFrozenNum(%)
35000,      182.00,      0.00,      0,      100,      0
34000,      182.00,      0.00,      0,      100,      0
33000,      182.00,      0.00,      0,      100,      0
32000,      181.49,      0.00,      0,      48.65,      51.35
31000,      159.09,      17.85,      33.11,      0,      66.89
30000,      124.75,      0.79,      100,      0,      0
29000,      126.07,      1.83,      100,      0,      0
28000,      66.02,      24.61,      99.32,      0,      0.68
27000,      11.09,      2.28,      100,      0,      0
26000,      5.63,      0.29,      100,      0,      0
25000,      5.82,      0.27,      100,      0,      0
24000,      6.00,      0.28,      100,      0,      0
23000,      6.58,      0.37,      100,      0,      0
22000,      7.01,      0.43,      100,      0,      0
21000,      7.38,      0.48,      100,      0,      0
20000,      8.69,      0.57,      100,      0,      0
19000,      9.26,      0.59,      100,      0,      0
18000,      10.45,      0.63,      100,      0,      0
17000,      12.91,      0.68,      100,      0,      0
16000,      18.11,      0.81,      100,      0,      0
15000,      24.24,      1.02,      100,      0,      0
14000,      36.85,      6.67,      100,      0,      0
13000,      57.45,      15.56,      100,      0,      0
12000,      82.38,      17.97,      100,      0,      0
11000,      96.42,      14.98,      100,      0,      0
```

10000, 101.54, 12.07, 100, 0, 0

As you can see from the output file, the AFDA analysis records the following information:

- (1) time slice
- (2) Vec_mean: the resultant mean residual values
- (3) Vec_variance (*100): The variance of residual values and scale to range of 0-100.
- (4) IceMoveNum (%): the area percentage of grid cells where the model predicts ice flow directions against field observed lineations.
- (5) IceFreeNum (%): the area percentage of grid cells where the model predicts ice free conditions against field observed lineations.
- (6) IceFrozenNum (%): the area percentage of grid cells where the model predicts frozen bed conditions against field observed lineations.

5. Contact information

Any question please contact:

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