LoadSnowPIT
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1. Introduction

LoadSnowPIT is a combination of MATLAB GUI's and functions used to load manual snow pit data into MATLAB format. The original code was adapted from SnowpitLAB created by HP Marshall. The files contained in LoadSnowPIT are:

> load_pitdata.m
> PlotSnowpitProfile4.m
> LoadSnowPIT.fig
> LoadSnowPIT.m
> SnowPitTemplate.xlsx
> SampleSnowPits.xls
> pitsample.mat
> Snow_graintypes.pdf

Please send questions/comments/bugs to scotthavens@u.boisestate.edu.

2. SnowPitTemplate.xlsx

This template is used to enter manual snow pit data into a common format. Complete as many fields in the spreadsheet as possible. The template is broken up into four sections: headings, layer profile, density profile, and temperature profile. If multiple pits were performed at one site or over the course of the winter, add additional sheets to the spreadsheet. All sheets within the selected spreadsheet will be loaded, therefore make sure that there are no additional sheets not formatted with the SnowPitTemplate style.

2.1 Headings

The heading section is a fixed length section, DO NOT ADD OR REMOVE SPREADSHEET LINES. This section describes snow pit attributes.

2.2 Layer profile

The layer profile section is a variable length section, add as many lines as needed. However, for a proper load into MATLAB, leave a blank line between the layer profile and density profile section. Fill this section out as completely as possible, fields left blank will be assumed empty and will not be loaded into MATLAB.

Use the Snow_graintypes.pdf to determine the correct two or four letter grain type code (i.e. PP or FCsf). There are three fields for grain types, the first and second fields are for primary grain types and the third is for secondary grain types and will be displayed within a parenthesis.

2.3 Density profile

The density profile section is a variable length section, add as many lines as needed. However, for a proper load into MATLAB, leave a blank line between the density profile and temperature profile section. Enter a cutter volume in the correct field. Enter the cutter weights measured in the field and calculate the density:

$$\text{Density} = \frac{\text{weight (g)}}{\text{cutter volume (cc)}} \cdot 1000(\frac{\text{kg}}{g} \cdot \frac{\text{cc}}{m^3})$$

2.4 Temperature profile

The temperature section is a variable length section, add as many lines as needed.

3. Loading and displaying snow pit data

3.1 Using MATLAB functions

There are two functions to load (load_pitdata.m) and plot (PlotSnowpitProfile4.m) the manual snow pit data. Prior to running load_pitdata.m, fill out as completely as possible the SnowPitTemplate.xlsx as described above.

3.1.1 load_pitdata.m

Run the function load_pitdata.m to load the manual snow pit data. This function will prompt the user to select the proper Excel file containing the manual snow pit data in the SnowPitTemplate.xlsx format. The data will be loaded into the following MATLAB format:

```
% p =
%                 Obs: 'Kelly, Scott'
%                Date: '01-Mar-2011 10:00:00'
%                 Loc: 'Grand Mesa'
%                 Pit: 13
%              Aspect: NW
%           Elevation: 10500
%          SlopeAngle: 20
%       Precipitation: 'S-1'
%            SkyCover: 'OVC'
%             AirTemp: -3
%                Wind: 'L SW'
%                UTME: 751106
%                UTMN: 4323521
%               notes: 'So much fun!'
%               layer: [1x1 struct]
%               dprof: [1x1 struct]
%               Tprof: [1x1 struct]
%
% p.layer =
%                 top: [131 127 126 114 81 19 10]
%                 bot: [127 126 114 81 19 10 0]
```

```
%    grainsize1: [1 1 1 2 1 1 5]
%    grainsize2: [1 1 1 3 1 1 4]
%    grainsize3: [1 1 1 2 1 1 4]
%    graintype1: {1x7 cell}
%    graintype2: {1x7 cell}
%    graintype3: {1x7 cell}
%      hardness: [1 1 1 2.5000 1 1 4.5000]
%         notes: {1x7 cell}
%
% p.dprof =
%     top: [131 121 111 101 91 81 71 61 51 41 31 21 11]
%     bot: [121 111 101 91 81 71 61 51 41 31 21 11 1]
%     rho: [13x2 double]
%
% p.Tprof =
%     depth: [1x14 double]
%      temp: [-1 -3 -4 -4 -4 -3 -3 -2 -2 -2 -1 -1 0 0]
```

After the data is loaded, the user will be prompted to save the resulting .mat file.

3.1.2. PlotSnowpitProfile4.m

This function takes two arguments, a snow pit profile formatted from load_snowpit.m or LoadSnowPIT.m, and a string of desired plot options. Type `>> help PlotSnowpitProfile4` for function inputs and outputs. The result is a figure of the manual snow pit data.

3.2 Using the GUI

LoadSnowPIT.m launches a GUI for loading manual snow pit data. Prior to running LoadSnowPIT.m, fill out as completely as possible the SnowPitTemplate.xlsx. The GUI is launched by typing into the MATLAB command line:

`>> LoadSnowPIT`

To launch GUI, the user will need to be in the LoadSnowPIT directory or add LoadSnowPIT to the MATLAB search path (see doc path in MATLAB).

Under the Choose Data File heading click **Browse** and select the desired Excel file. If you are on a Linux or Mac, you will need to save the Excel spreadsheet in Excel95/5.0 format for compatibility. On a PC all Excel files will load into MATLAB. The chosen file name will appear under this button, verify it is correct. Click **Load Data** to load data into the MATLAB environment.

Under the Plot Pit Data heading are options to plot the loaded snow pit data. From the drop down menu, choose the desired pit profile organized by "Loc – Pit" from the SnowPitTemplate headers. Choose the desired Plot Options by checking the necessary boxes. Click **Plot!** and the pit will be displayed in the axis window. Go through each pit and

visually make sure that the data has been loaded correctly. If changes are needed, change the necessary fields in the SnowPitTemplate and reload using the steps outlined above.

Once the data appears to be correct, click **Save Pit Data** to save the pit data in a .mat format.   This .mat file can be loaded into MATLAB and plotted again with PlotSnowpitProfile4.m.