
Create XYZ Using File with Tilt Meter Corrections

There are two new items in GPS Positioning menu labeled GPS Positioning with Tilt Meter Corrections and Grid Positioning with Tilt Meter Corrections (Figure A.1). New procedures are designed to apply roll and pitch parameters to correct positions of reading when data file is collected with the Geonics EM61-MK2 equipped with the Geonics installed tilt meter sensor.

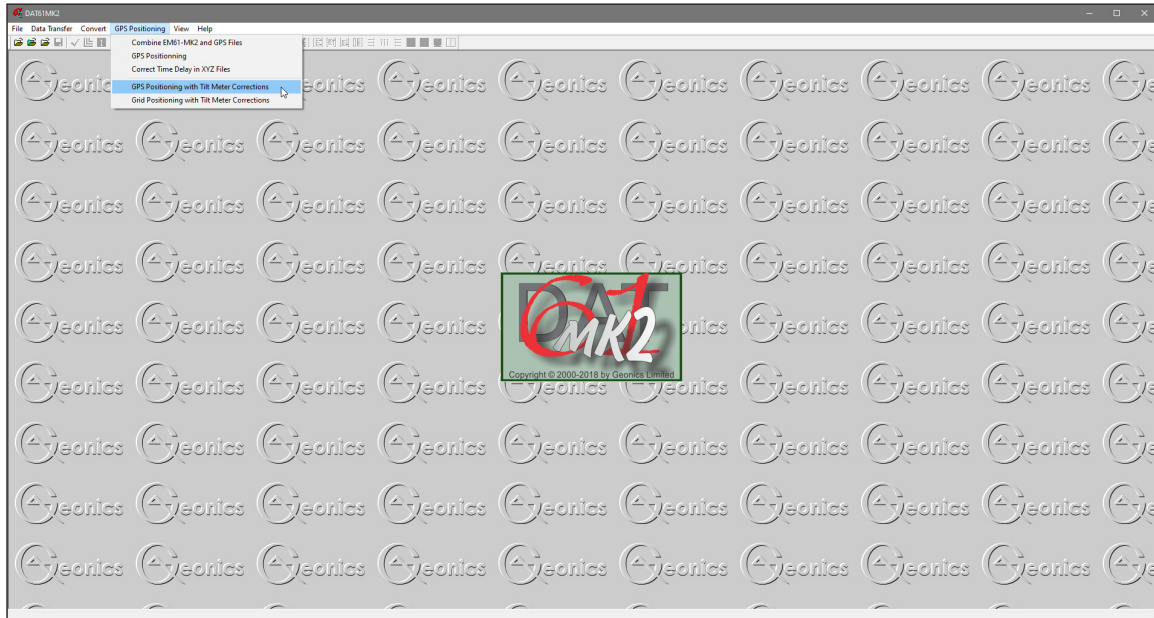


Figure A.1 DAT61MK2 GPS Positioning menu

A1. GPS Positioning with Tilt Meter Corrections

The **GPS Positioning with Tilt Meter Corrections** option can be used only when EM61-MK2 data is collected with GPS positioning data, GPS antenna is rigidly fixed on the EM61-MK2 sensor, the Geonics installed Tilt Meter was available and Roll and Pitch values were recorded during data collection. In this method the GPS receiver is connected to the logging field computer serial port and GPS data, as well as Tilt Meter data are collected in the EM61-MK2 data file. This method can be used with virtually any GPS receiver that can stream a **GGA** message (standard NMEA-0183 data string). The program is using GPS positions as received from employed GPS receiver, therefore differentially corrected positions (DGSP or any RTK system) provide better accuracy.

After you select the **GPS Positioning|GPS Positioning with Tilt Meter Corrections** from the DAT61MK2 menu (as shown in Figure A.1) the Create XYZ File Based on GPS Positions dialog is displayed (Figure A.2).

Before creating the XYZ file several parameters must be specified. These are the Input file name (M61 format), XYZ file name, the format of coordinates in the output file, and several parameters associated with GPS signal.

Data is always placed in the created XYZ file in the following order: X coordinate, Y coordinate, Channel 1, Channel 2, Channel 3, Channel 4 (or T if EM61-MK2 was used), Channel D (if EM61MK2 in mode D was used), following by parameters selected in the Options section.

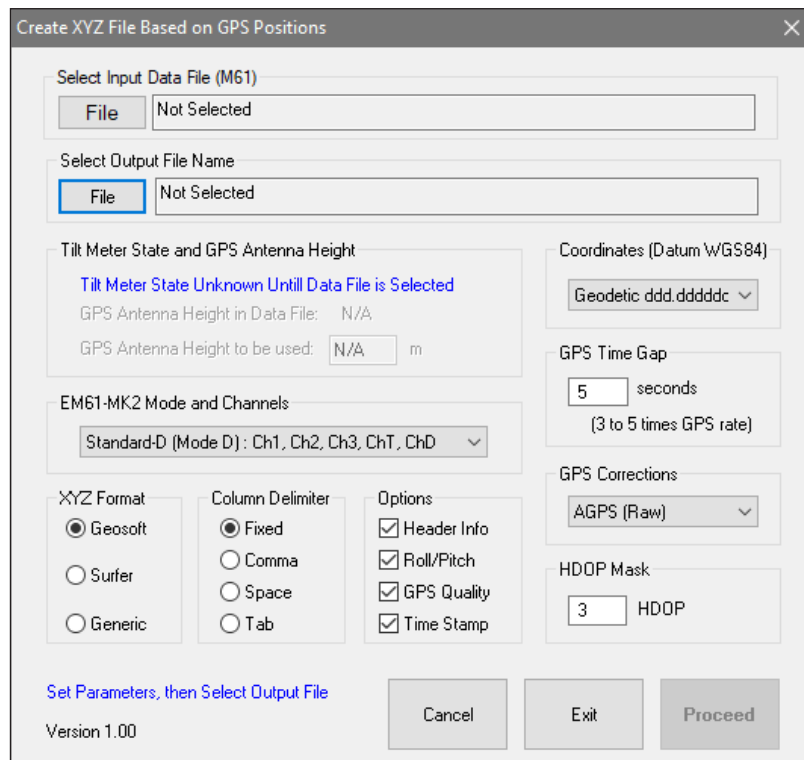


Figure A.2 Create XYZ File Based on GPS Positions dialog before Input Data File is specified

When input data file is not specified the label Tilt Meter State Unknown is displayed. After input data file is specified the program detects presence of Tilt Meter readings and if it is present then the label changes and GPS Antenna Height parameters are enabled.

Select Input Data File (M61) (Input File)

Click on the **File** button below the Select Input Data File label. The Open File dialog is displayed (Figure A.3).

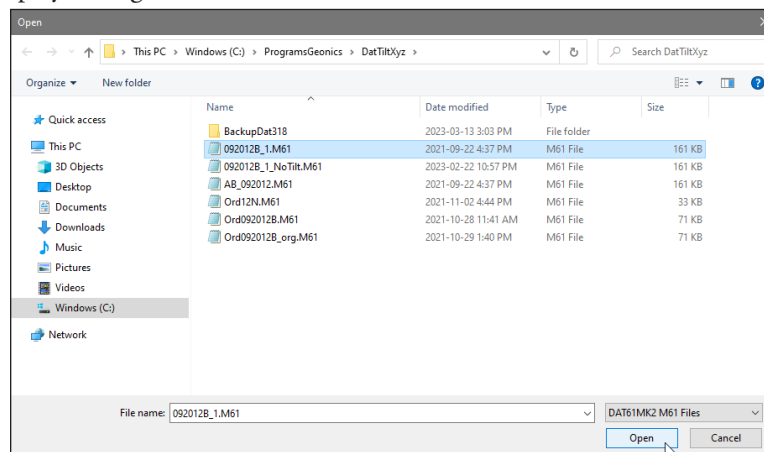


Figure A.3 Open DAT61MK2 (M61) Data File dialog

Select a file name and click the **Open** button. The Open File dialog will, the program will check presence of Tilt Meter data in the file while reading EM61MK2 and GPS readings and when done, the selected file name will be displayed beside the **File** button. At the same time if Tilt Meter data is detected in the input file parameters in section labeled Tilt Meter State and GPS Antenna Height will be enabled (Figure A.4), otherwise information

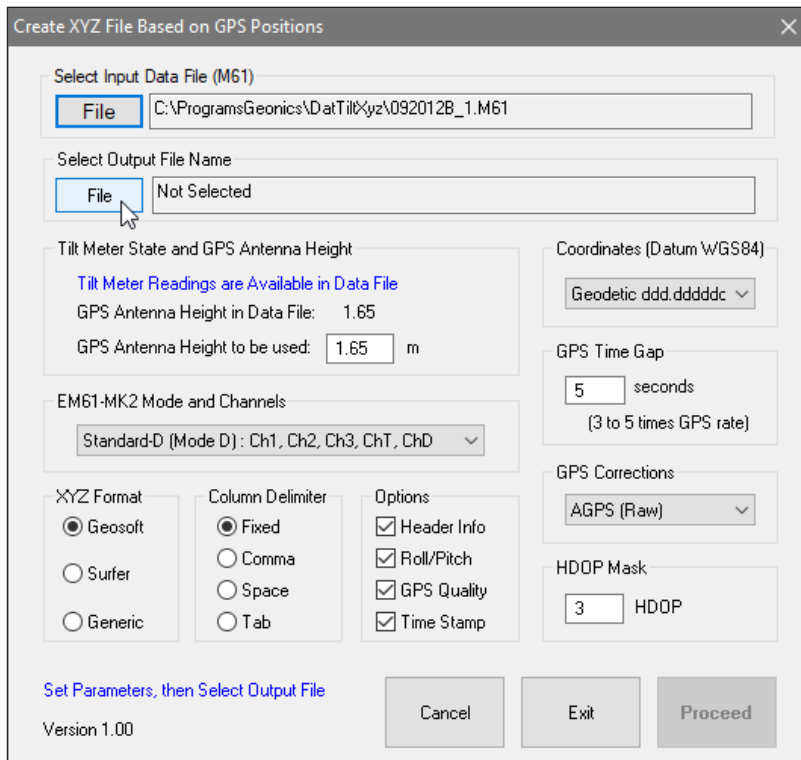


Figure A.4 The Create XYZ... dialog with confirmation that Tilt Meter data is present in the selected file, and displaying GPS Antenna Height as it was entered during data collection

about lack of Tilt Meter readings will be shown and parameters in this section will remain disabled as shown in Figure A.5. In case selected data file does not contain Tilt Meter read-

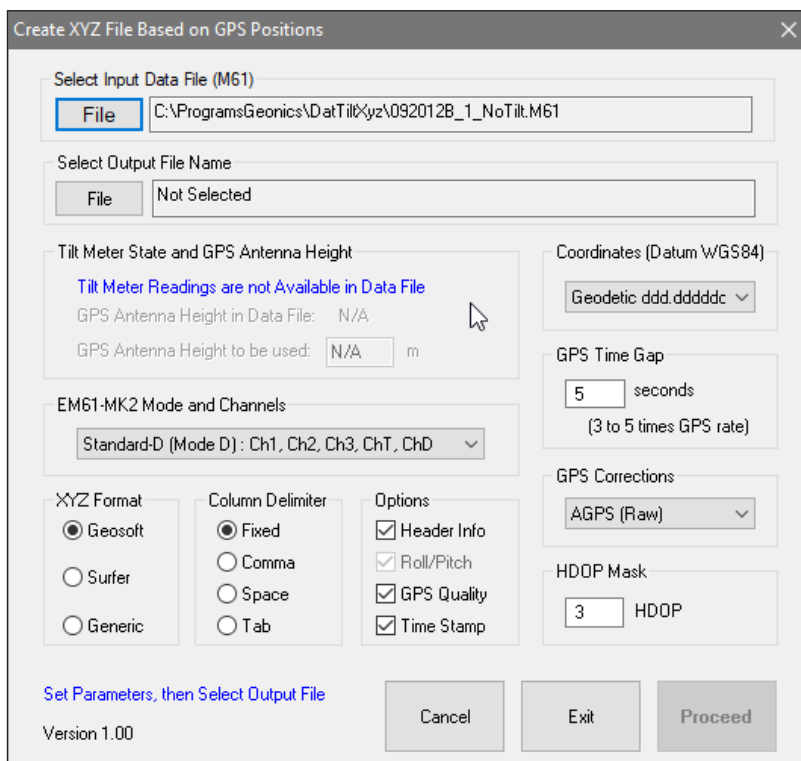


Figure A.5 The Create XYZ... dialog with information that Tilt Meter data is not available the selected file

ings it still can be processed, as any other data file with no Roll and Pitch corrections as long as GPS positions are available.

Select Output File Name (Output XYZ File)

Click on the **File** button located under the Select Output File Name . The Save As dialog is displayed (Figure A.6).

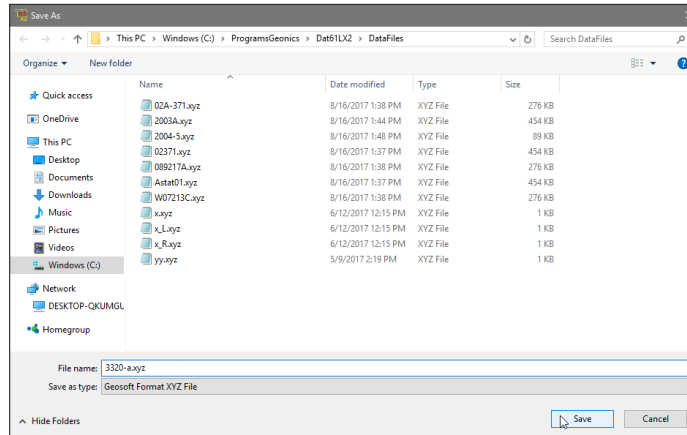


Figure A.6 Select XYZ File Name window

The XYZ file name extension default will be determined by the selected output file format (xyz or dat) in XYZ File Format section. The XYZ File Format option must be selected before clicking on the **File** button.

Specify a file name and click the **Save** button and the Save As dialog will close. When Output Files is specified the **Proceed** button in the Create XYZ File Based on GPS Positions becomes active and name of selected file is displayed in the window associated with the Select Output File Name section (Figure A.7).

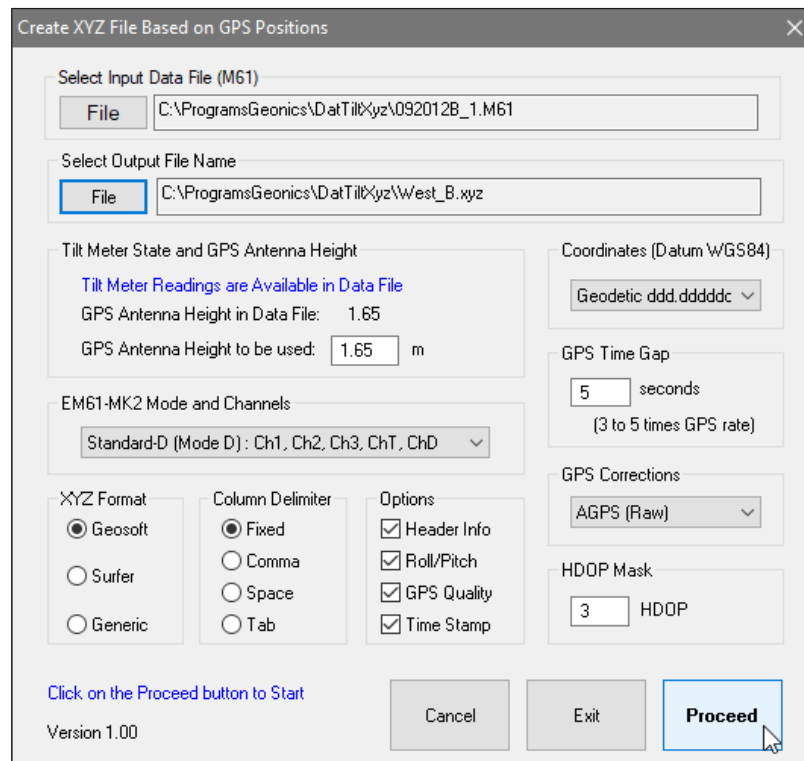


Figure A.7 Create XYZ File Based on GPS Positions dialog after both Input and Output Files are specified

GPS Antenna Height to be used

The GPS Antenna Height is always displayed as entered during data collection and the same value is displayed by default in the field labeled GPS Antenna Height to be used (Figure A.7). If for any reason the antenna height must be changed it can be entered in the edit box displayed at this label (Figure A.8 where GPS Antenna Height differs from default value). This value will be used by the program while calculating Roll and Pitch corrections, it must be specified in metres.

The screenshot shows a dialog box titled "Create XYZ File Based on GPS Positions". It has several sections: "Select Input Data File (M61)" with a file path "C:\Programs\Geonics\Data\Tilt\Xyz\092012B_1.M61"; "Select Output File Name" with a file path "C:\Programs\Geonics\Data\Tilt\Xyz\West_B.xyz"; "Tilt Meter State and GPS Antenna Height" where "GPS Antenna Height in Data File" is 1.65 and "GPS Antenna Height to be used" is 1.23 m; "EM61-MK2 Mode and Channels" set to "Standard-D (Mode D)"; "XYZ Format" with "Geosoft" selected; "Column Delimiter" with "Fixed" selected; "Options" with "Header Info", "Roll/Pitch", "GPS Quality", and "Time Stamp" checked; "Coordinates (Datum WGS84)" set to "Geodetic ddd.dddddc"; "GPS Time Gap" set to 5 seconds; "GPS Corrections" set to "AGPS (Raw)"; and "HDOP Mask" set to 3. At the bottom, there are "Cancel", "Exit", and "Proceed" buttons, and a "Version 1.00" label.

Figure A.8 Create XYZ File Based on GPS Positions dialog with adjusted GPS Antenna Height

EM61-MK2 Mode and Channels

Select EM61-MK2 and Channels to be placed in the XYZ file. To select this parameter click one of items listed in the combo box labeled EM61-MK2 Mode and Channels, see Figure A.9.

XYZ File Format

Indicate the appropriate option for the contouring software to be used. The Generic option will create a multi column file without any text strings. This file can be used as an input file for many contouring packages (including Geosoft and Surfer). This parameter will also determine a default file extension name during specifying XYZ file name. The program will prompt extension file names XYZ, DAT, ASC for formats Geosoft, Surfer, and Generic.

Column Delimiter

Select column delimiter that is required by your application. The option Fixed corresponds to fixed field for each column with space or spaces between columns. This format is suitable for most applications and a file created with this selection provides the easiest option if file is to be viewed using any standard text editor. Remaining column delimiters are Comma, Space (single), and Tab.

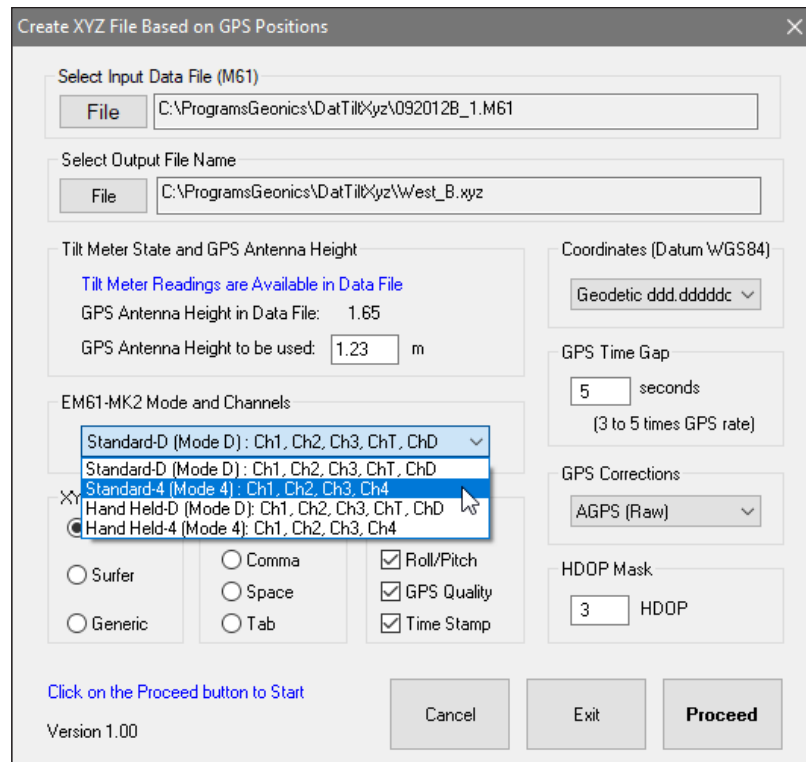


Figure A.9 Selecting EM61-MK2 Mode and Channels

Options

There are four items listed: Header Info, Roll/Pitch, GPS Quality, and Time Stamp. File Header occupies two lines at the beginning of file, the first line contains Datum description and the second line contains labels with description of each column included in the file. Roll/Pitch (2 columns), GPS Quality (3 columns), and Time Stamp will be written in columns (in the order as listed in this dialog) that follow instrument readings. The Roll/Pitch option contains two columns (Roll and Pitch in degrees), while the GPS Quality contains parameters located in three columns: Quality (degree of differential corrections), number of satellites, and HDOP parameter. Time Stamp (if selected) is placed always in the last column of XYZ file.

Coordinates

Positions can be written in the output file as geodetic (geographical) coordinates (Latitude/Longitude) or they can be converted to UTM coordinates. The program uses the WGS1984 datum.

Geodetic coordinates are given in degrees. They can be written in format ddd.dddddd. UTM coordinates can be generated in metres, feet or US Survey feet. To select Geodetic or UTM (and units) coordinates click one of the item listed in the combo box labeled Coordinates (Datum WGS 1984), see Figure A.10.

GPS Time Gap

The **GPS Time Gap** parameter specifies the maximum time during which the EM61-MK2 data will be linearly interpolated between two GPS positions. Enter this parameter (in seconds) in the edit box labelled GPS Time Gap. In most cases a value 2 to 3 times larger than the GPS acquisition frequency is adequate

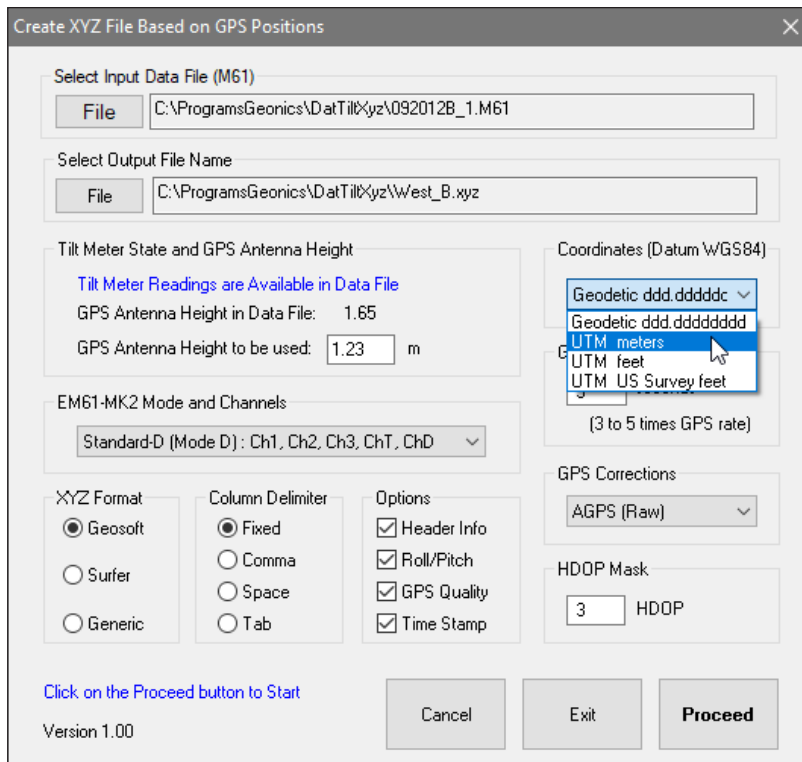


Figure A.10 Selecting Coordinates in Create XYZ File Based on GPS Positions dialog

GPS Corrections

Select item in combo box placed in a section labeled **GPS Corrections** to write selected or higher degree of GPS differential corrections. Selection includes: AGPS (Raw), DGPS, RTK-3, RTK-4, RTK-5, Higher (>5), see Figure A11. The latter option covers future RTK

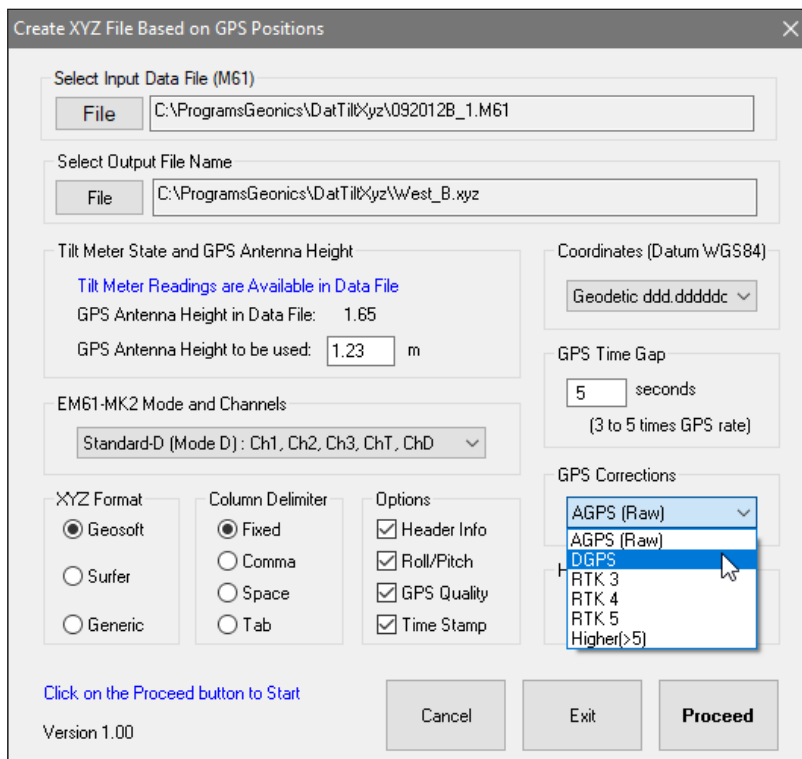


Figure A.11 Selecting GPS Corrections

options as well as WAAS option that is indicated by Quality Indicator 9. The specified parameter indicates the lowest acceptable degree of corrections. For example, if Raw is selected then all GPS positions will be accepted by the program (obviously with the exception of NO FIX that has Quality Indicator = 0), and if DGPS is selected than all positions with Quality Indicator = 1 (Raw) will be ignored by the program filter and DGPS and higher degree of corrections will be accepted.

HDOP Mask

Specify value of HDOP parameter the section labeled **HDOP Mask**. Readings associated with GPS positions that have HDOP values higher than specified will not be written to the file.

After all parameters are specified and you click on the **Proceed** button a progress bar, will appear above command buttons and it will indicate the percentage of the created file that has been completed, see Figure A.12 below.

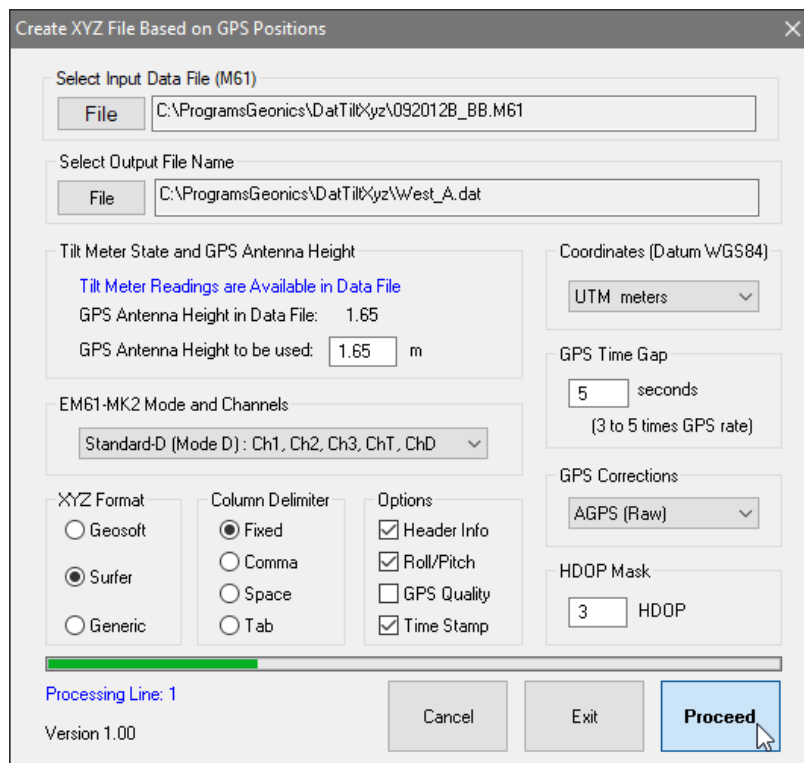


Figure A.12 Create XYZ File Based on GPS Positions dialog during creating output file

A2. Grid Positioning with Tilt Meter Corrections

The **Grid Positioning with Tilt Meter Corrections** option can be used only when EM61-MK2 data file geometry is fully adjusted in DAT61-MK2 (it means survey lines are named as one of coordinates, stations represent another coordinate, and stations are adjusted) and the Geonics installed tilt meter readings (roll and pitch) were recorded.

After you select the **GPS Positioning|Grid Positioning with Tilt Meter Corrections** from the DAT61MK2 menu (Figure A.13) the Create XYZ File Based on Grid Positions with Tilt Meter Corrections dialog will be displayed (Figure A.14).

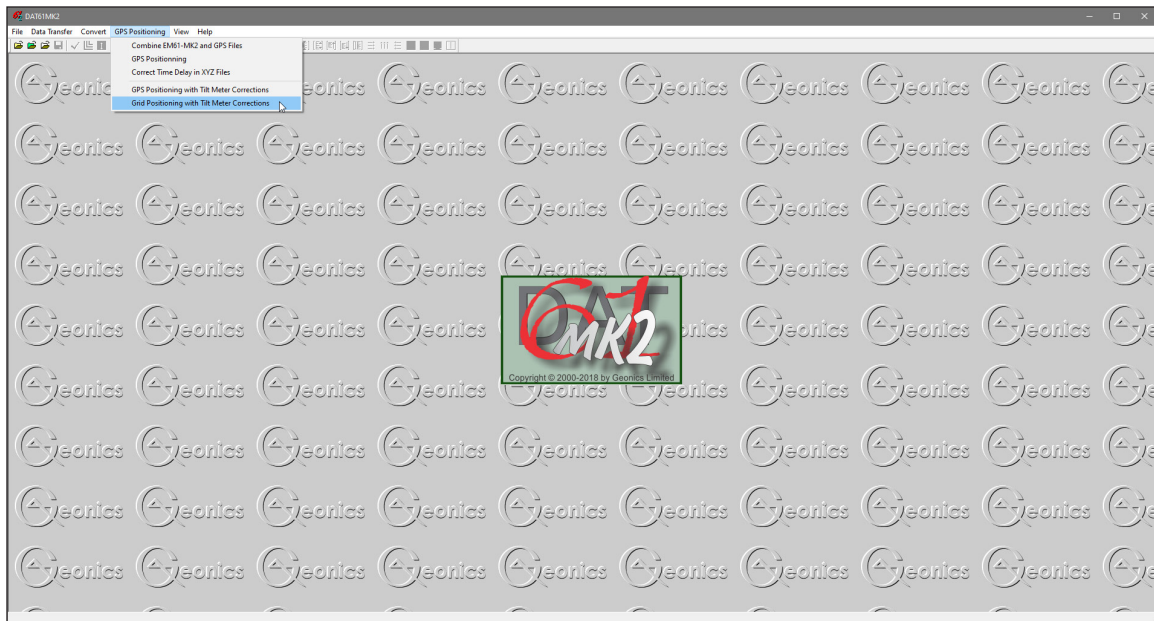


Figure A.13 DAT61MK2 GPS Positioning menu



Figure A.14 Create XYZ File Based on Grid Positions... dialog before Input Data File is specified

Before creating the XYZ file several parameters must be specified. These are the Input file name (M61 format), Output XYZ file name, Survey Lines Layout, format of coordinates in the output file, and EM61-MK2 mode used.

Data is always placed in the created XYZ file in the following order: X coordinate, Y coordinate, Channel 1, Channel 2, Channel 3, Channel 4 (or T if EM61-MK2 was used), Channel D (if EM61MK2 in mode D was used), following by parameters selected in the Options section.

When input data file is not specified the label Tilt Meter State Unknown is displayed. After input data file is specified the program detects presence of Tilt Meter readings and if its parameters are present in the data file then Main Antenna Height parameters are enabled.

Select Input Data File (M61) (Input File)

Click on the **File** button below the Select Input Data File label. The Open File dialog is displayed (Figure A.15).

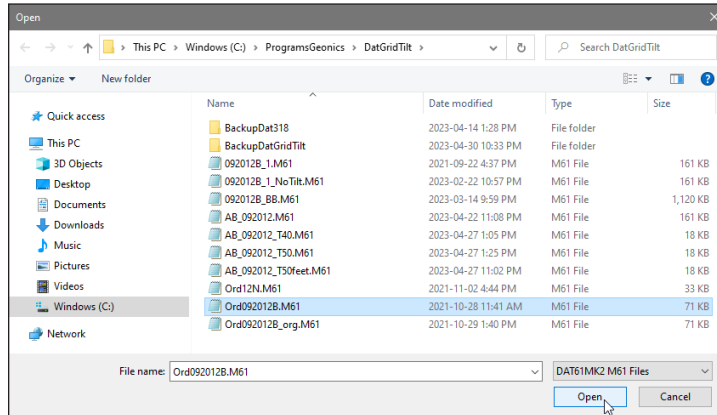


Figure A.15 Open DAT61MK2 (M61) Data File dialog

Select a file name and click the **Open** button. The Open File dialog will, the program will check presence of Tilt Meter data in the file while reading EM61MK2 and GPS readings and when done, the selected file name will be displayed beside the **File** button. At the same time if Tilt Meter records are detected in the input file parameters in section labeled Tilt Meter State and Main Antenna Height will be enabled (Figure A.16), otherwise information about lack of Tilt Meter readings will be shown and parameters in this section will remain disabled as shown in Figure A.17. In case selected data file does not contain Tilt Meter readings it still can be processed, as any other data file with no Roll and Pitch corrections as long as GPS positions are available.

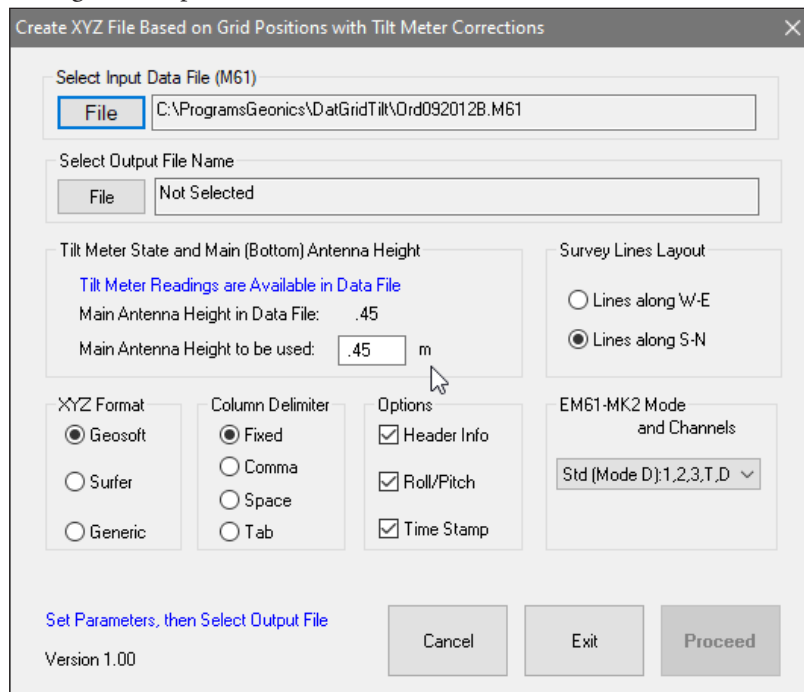


Figure A.16 The Create XYZ... dialog with confirmation that Tilt Meter data is present in the selected file, and displaying Main Antenna Height as it was entered during data collection

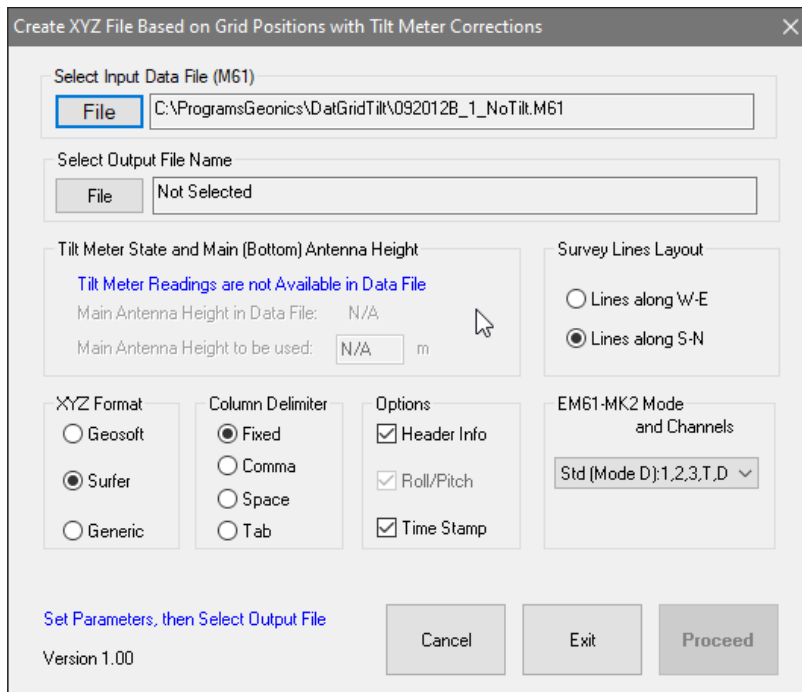


Figure A.17 The Create XYZ... dialog with information that Tilt Meter data is not available the selected file

Select Output File Name (Output XYZ File)

Click on the **File** button located under the Select Output File Name . The Save As dialog is displayed (Figure A.18).

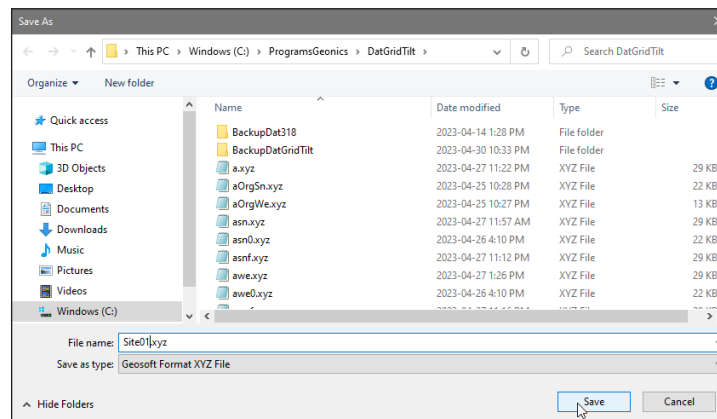


Figure A.18 Select XYZ File Name window

The XYZ file name extension default will be determined by the selected output file format (xyz or dat) in XYZ File Format section. The XYZ File Format option must be selected before clicking on the **File** button.

Specify a file name and click the **Save** button and the Save As dialog will close. When Output Files is specified the **Proceed** button in the Create XYZ File Based on GPS Positions becomes active and name of selected file is displayed in the window associated with the Select Output File Name section (Figure A.19).

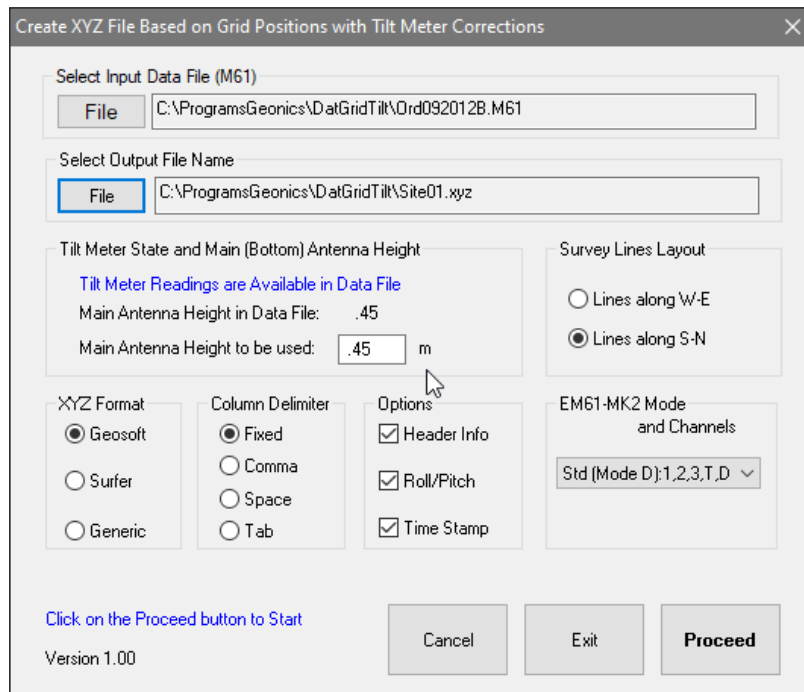


Figure A.19 Create XYZ File Based on Grid Positions dialog after both Input and Output Files are specified

GPS Antenna Height to be used

The GPS Antenna Height is always displayed as entered during data collection and the same value is displayed by default in the field labeled GPS Antenna Height to be used (Figure A.19). If for any reason the antenna height must be changed it can be entered in the edit box displayed at this label (Figure A.20 where GPS Antenna Height differs from default value). This value will be used by the program while calculating Roll and Pitch corrections, it must be specified in metres.

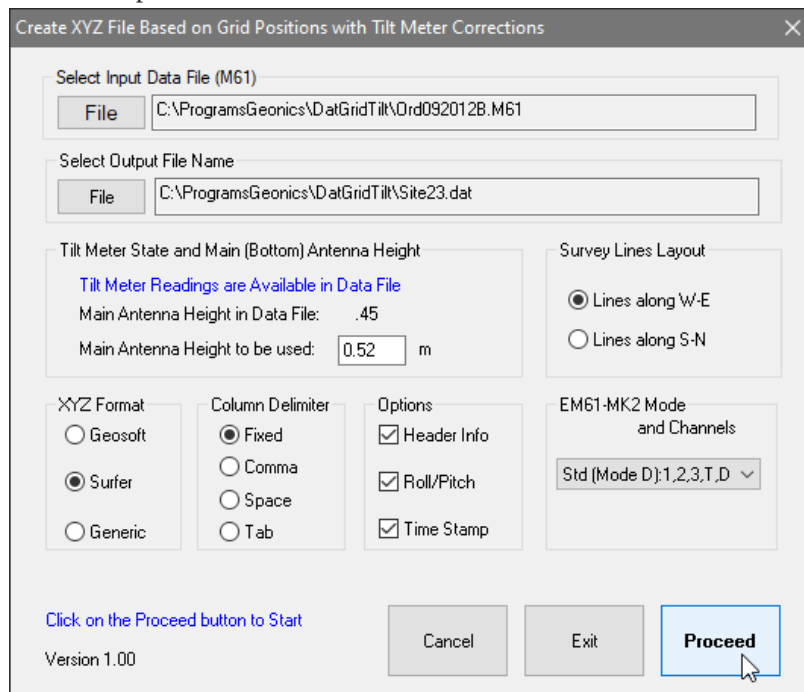


Figure A.20 Create XYZ File Based on Grid Positions dialog with adjusted Main Antenna (Bottom sensor) Height

Survey Lines Layout

Indicate if survey lines are oriented in W-E direction (option: Lines along W-E) or survey lines were oriented in the S-N direction (option: Lines along S-N).

EM61-MK2 Mode and Channels

Select EM61-MK2 and Channels to be placed in the XYZ file. To select this parameter click one of items listed in the combo box labeled EM61-MK2 Mode and Channels, see Figure A.21.

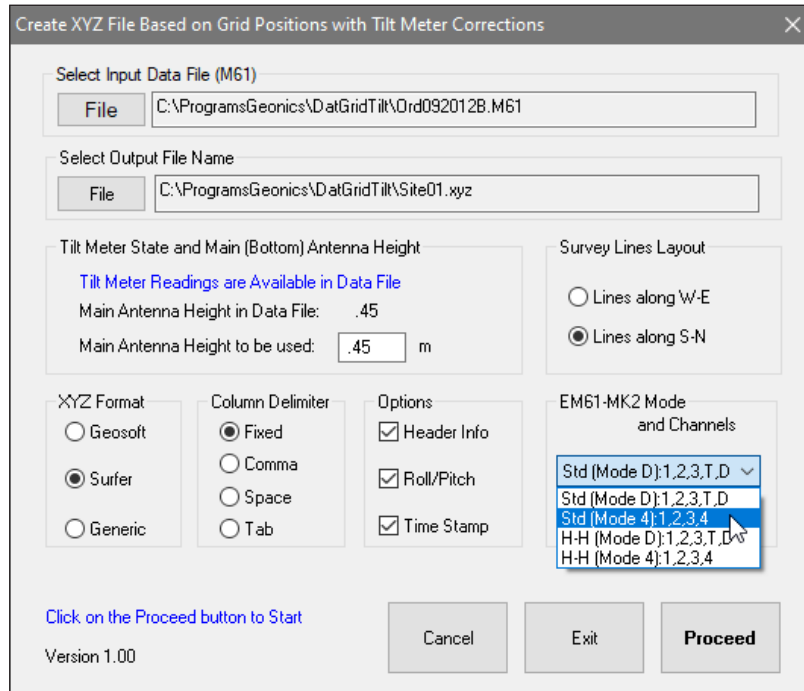


Figure A.21 Selecting EM61-MK2 Mode and Channels

XYZ File Format

Indicate the appropriate option for the contouring software to be used. The Generic option will create a multi column file without any text strings. This file can be used as an input file for many contouring packages (including Geosoft and Surfer). This parameter will also determine a default file extension name during specifying XYZ file name. The program will prompt extension file names XYZ, DAT, ASC for formats Geosoft, Surfer, and Generic.

Column Delimiter

Select column delimiter that is required by your application. The option Fixed corresponds to fixed field for each column with space or spaces between columns. This format is suitable for most applications and a file created with this selection provides the easiest option if file is to be viewed using any standard text editor. Remaining column delimiters are Comma, Space (single), and Tab.

Options

There are three items listed: Header Info, Roll/Pitch, and Time Stamp. File Header occupies two lines at the beginning of file, the first line contains coordinates units (as entered during data collection) following by labels with description of each column included in the file Roll/Pitch (2 columns), and Time Stamp will be written in columns (in the order as listed in this dialog) that follow instrument readings. The Roll/Pitch option contains

two columns (Roll and Pitch in degrees). Time Stamp (if selected) is placed always in the last column of XYZ file.

After all parameters are specified and you click on the **Proceed** button a progress bar, will appear above command buttons and it will indicate the percentage of the created file that has been completed, see Figure A.22 below.

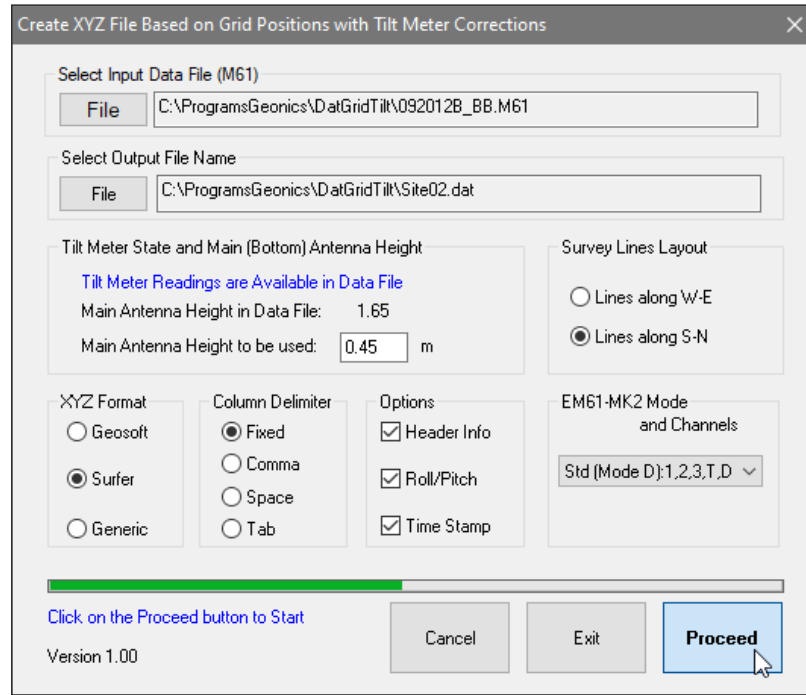


Figure A.22 Create XYZ File Based on Grid Positions dialog during creating output file