

How to import SkyTEM XYZ data

In this document we will show how to create a new workspace and import SkyTEM XYZ data in preparation for SkyTEM XYZ data quality control and data processing.

With SkyTEM XYZ data the import files will usually already have been prepared, so aside from a brief introduction to the different files, we will focus on the actual import.

Import files introduction

Start by organizing your data.

There should be a geometry file. This is a text format (.gex) file that describes the system parameters of the used SkyTEM system. It includes the geometry of the frame, the placement of the instruments, the transmitter waveform, time gate specifications, and so on. Everything needed to allow accurate modelling of the system in the inversion. For more details see the gex format description on the Aarhus Workbench wiki page (http://www.ags-cloud.dk/Wiki/W GeometryFileFormat).

Then there should be a data file. This is space delimited column file in text format (.xyz) with columns describing the data. It includes the utm coordinates, the time and date, the current, the voltage gates, and so on.

Lastly there should be a xyz format file. This is a text format (.alc) file with two columns. It is used to map the different columns of the data file into the corresponding database fields used by Aarhus Workbench. The first column is the largely fixed list of database fields such as utmx and utmy, the second column holds the column numbers of the columns that will be read from the data file into those database fields.

Create a new workspace and import the SkyTEM XYZ data

Now we can open the Aarhus Workbench and select New to create a new workspace. Select a folder for the workspace, add names and select the map coordinate system (EPSG).

New Workspace Wizard			
New Workspace	Workspace Definition		
New Workspace	Folder	C:\Temp	
	Workspace name	WS_SkyTEM_XYZ	
	User name	BR	
	Open data import wizard		
	Мар		
	GIS map node name	МуМар	
	Map coordinate system	WGS 84 UTM zone 32N (epsg: 32632)	
			Finish Cancel

Figure 1. Create the Workspace.

When the workspace has been created, go to the database explorer and select Import on the database ribbon to start the import. If the open data import wizard checkbox was checked before, this wizard will



open automatically. Now set the importer to import to a new database and fill out a name. Then go to the Airborne Data tab and select Airborne TEM Processing (SkyTEM XYZ).

Select Import Type						×
Boreholes Airborne	Data G	iroundbased EM	Data	ERT/IP	Special Imports	Models
① 1. SkyTEM raw and	navigatio	n data				
2. Airborne TEM pro	icessing (A	eroTEM, TEMPE	EST, VT	EM, etc)		
🔘 3. Frequency domain	n HEM da	ta (column based	file form	at)		
Ø 4. Layered models (a	any system	n, column based f	ile forma	it)		
Import To						
🔘 Existing database:			-			
New database:	SkyTEN	1_XYZ				
					ОК	Cancel

Figure 2. Select the Airborne TEM importer.

This launches the Airborne TEM importer. Select the SkyTEM XYZ importer.

Import Wizard	
Data Type System Setup Import Data Report Log	Data Type SkyTEM XYZ VTEM AeroTEM Tempest MegaTEM
	Cancel

Figure 3. Selecting the SKYTEM XYZ importer.

Here we need to create the new dataset and import the geometry file with the system setup. First name the dataset, then make sure that the right coordinate system has been set, and finally point the geometry file.

In addition to this, it is possible to set several labels related the data processing and the used height system and reference model. None of this affects the inversion of the data, it is just labels in the database.



Figure 4. Create the dataset and import the geometry file.

Now we can import the data to the dataset. Point to the xyz file with the data. Then point to the xyz format file with the information about how the data from xyz file should be imported. There should normally not be any need to edit the xyz format files here, so the editor mostly serves as an easy way to confirm that the different columns have been assigned to the right fields. The editor is great for changing the columns of the gates, but for other minor edits we can also easily update the column numbers directly in the file.

It is possible, but in general not recommended, to skip the log form and go directly to automatic processing by pointing to a processing settings file here.

Finally, we have the option of doing decimation on the data and skip some of the data during the import. Start the import by clicking Finish.



Import Wizard	
Data Type	Load Files XYZ file C:\Temp\data\SkyTEM\XYZ\SkyTEM_XYZ_data_example.XYZ XYZ format file C:\Temp\data\SkyTEM\XYZ\SkyTEM_XYZ.ALC Edit
Report Log	Settings Processing Skip Log form and launch automatic processing function Processing settings file
	Misc Decimation 1 (import every 1 sounding)
	<< Back Next >> Cancel

Figure 5. Import the data.

🛞 Alc File Editor									x
Format file fields		XYZ File							
Gate_Ch01_end	X	Gate_Ch01_07 * * * * * *	Gate_Ch01_08 1.12026e+04 1.14491e+04 1.14598e+04	Gate_Ch01_09 8.10406e+03 8.26461e+03 8.27548e+03	Gate_Ch01_10 5.86176e+03 5.96565e+03 5.93356e+03	Gate_Ch01_11 4.18889e+03 4.26489e+03 4.24005e+03	Gate_Ch01_12 2.98350e+03 3.03947e+03 3.06350e+03	Gate_Ch01_13 2.15281e+03 2.19414e+03 2.20073e+03 ▶	•
STD_ch01_begin STD_ch01_end InUse_ch01_begin InUse_ch01_end Current_ch01 Gate_ch02_begin Gate_ch02_end STD_ch02_begin STD_ch02_end	x	Settings Dummy Value: * Number of channe File Version	els: 2 To de) t a keyword on th elete a column hea ble click to delete	der, just click on it				
							Save	e <u>C</u> lose	e

Figure 6. The alc file editor. For gates there is an option to click on the first gate and then the last gate, it can then fill out the gate column numbers of the gates in-between. To adjust an already existing gate setup, first click on begin and then any of the already assigned gates to reset the selection.

When everything has been imported check the log. If everything looks fine, it is time to create the data node. For that go to Data Processing and select Data (create new processing) and then select the database in the dropdown and processing type Airborne TEM. Then there is a dataset selector where we just need to say ok and a name for the processing node that needs to be filled out, before the data node will be created.



🔞 New Processing	
Create from Database name	
SkyTEM_XYZ.gdb	•
Processing type	
Airborne TEM	•
	OK Cancel

Figure 7. Create new data processing.

We will then be asked to also create a processing node. Here just click ones on each side of the data we want to include. If needed, click the button in the upper right corner of the form to reset. Larger nodes will be slower to work with in the processing, so it is suggested to limit the size of the processing nodes. For SkyTEM XYZ a processing node is normally made for 1 flight or in the case of larger datasets, for 1 day consisting of 1-3 flights. When doing so it can be advantageous to enter the from and to times manually to get more exactly defined processing nodes that doesn't leave out any data.

If a lot of data has been imported this approach becomes impractical, but one can then instead use the gab option in the bottom of this form that allows us to create automatic intervals after for instance each 8 hours gab.

New Processing From Time: 2018-05-31	▼ 13:02:11 🚔	To Time: 2018-0	5-31 👻 14:14:04			
Intersection				 		
Transmitter						-
Tilt						
Altitude					•••••••••••••••••••••••••••••••••••••••	
GPS) ()		_	 	··· · ·	
Raw Data)			 		.
	13:15:00 13:30:00 1	3:45:00 14:00:00 1	14:15:00 14:30:00 Time	15:15:00 15:30:00) 15:45:00 16	:00:00
Create automatic inter	vals after 8 ho	urs gap			ОК	Cancel

Figure 8. Processing node creation. Select the beginning and end of the data needed.

Lastly, we will be asked to give that node a name (this name must include a letter) and then we get to the processing filters. That will be covered in greater details later, for now just use default values. This was the last part of the import.



	Ch. 1, LM, Z		Move GPS in x-direction	0.0 ~
1	Ch. 2, HM, Z		Process in	Time 🗸
			Sounding Distance [s]	N/A
ssor	15	Processing	options	
	Raw Tilt Correction	Gate	Time 1 [s]	1.00E-05
~	Raw Sign Filter	Gate	Time 2 [s]	1.00E-04
•	Raw Slope Filter	Gate	Time 3 [s]	1.00E-03
~	Altitude	Widt	h 1 [s]	3
•	Trapez Filter	Widt	h 2 [s]	6
•	Average Sign Filter	Widt	h 3 [s]	18
~	Average Slope Filter	Spike	e factor	20
	Average STD Filter	Min.	No. Gates [%]	20
		Min.	No. Gates per sounding	6
		Requ	uire left/right sounding	Yes
The ave ove impr sme defi	bez Filter se work on raw data with the purpose of creating trage data. Using trapezoid filters, data can be averaged r a larger time span at later times than at earlier times, to rove the signal-to-noise ratio at late times without aning out details at early times. The width of the filter is ned stepwise at three gate times. The filters also include aike filter that will remove outlyers caused by sferics.		Time 1 [s] Allowed the time of Trapez Width 1.	range: [1.0E-8; 1.0E+

Figure 9. Processing filters with default settings.

If it was necessary to cut the processing into multiple node, additional processing nodes should be made by selecting the data node and then selecting Process Data. This open a window where we can select Create new processing node(s) which will return us to the Processing node creation. This is important as this allows us to create multiple processing nodes under the same data node rather than under a new data node.

🛞 Processing Settings 📃 🔳 💌
Processing modes
 Create new processing node(s) Apply new settings for selected node(s)
p1
<u>O</u> k <u>C</u> ancel

Figure 10. Creating additional processing nodes from the same data node.



All SkyTEM XYZ data from a survey should be imported through a single import, unless different geometry files make it necessary to split the survey into multiple imports.

If additional data from the same survey need to be imported later, it should be imported into the same dataset. The only exception would be if parts of the survey was flown using a different geometry file, then import it into a new database. To import additional data of a different type, simply import it into a new database.

When importing to the same dataset, go into import as before. Since the database already exist we can adjust the Import To setting to points to the existing database.

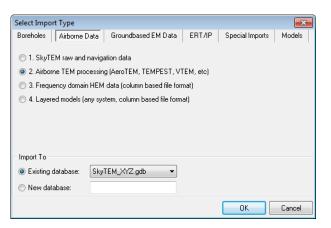


Figure 11. Importing to an existing database.

The dataset has also already been created, so we can select the import to existing dataset option and point the existing dataset. The rest is done just like before, just point to the new xyz file with the data. There is one little thing however that we need to remember here, if we are using an artificial starting point, one should move the date ahead here so that we don't import to the same time. When done additional processing node can be made just as described earlier.



Import Wizard	
Data Type System Setup	System Setup and Dataset Definition Create new dataset in the database name Dataset Name SkyTEM Labels
Import Data	Dataset Coordinate System
Report Log	WGS 84 UTM zone 32N (epsg: 32632)
	System Setup File
	C:\Temp\data\SkyTEM\XYZ\SkyTEM_XYZ_geometry_example.gex View
	Import to existing dataset
	1 TEM.SkyTEM (SK/TEMMIN1)
	Kack Next >> Cancel

Figure 12. Import additional raw data to existing dataset.