Converting GPS Coordinates to Decimal Degrees in Excel

LOCATION DATA

Geographic Information System (GIS) data, including latitude and longitude, are commonly created with Global Positioning System (GPS) technology. Latitude (angular distance from the equator) and longitude (angular distance from the Prime Meridian) are recorded as part of location-based data collection. A GPS has the ability to collect latitude and longitude in several different formats. **The Dev aWhere platform requires latitude and longitude to be submitted in a standard format called decimal degrees.** Decimal degrees expresses latitude and longitude as decimal fractions, and is an alternative to using degrees, minutes, seconds or UTM.

CONVERTING FROM DEGREES, MINUTES, SECONDS TO DECIMAL DEGREES

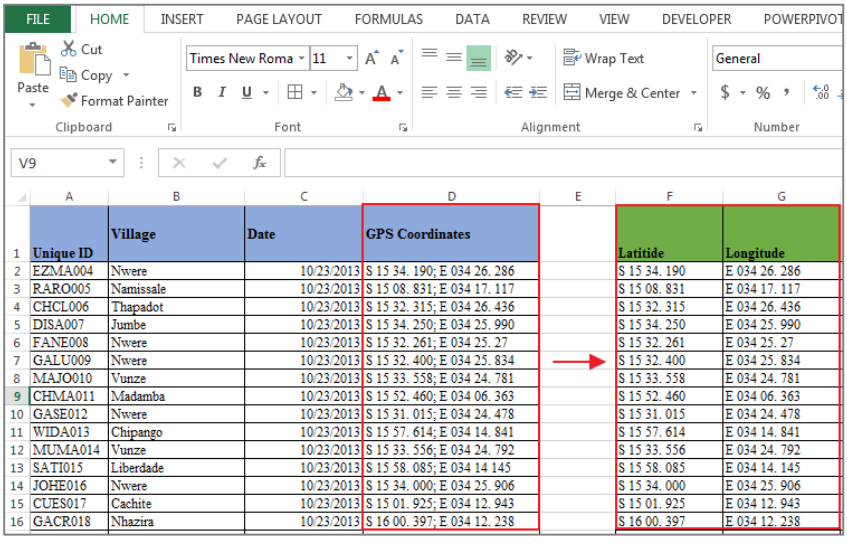
Latitudes and longitudes stored as degrees, minutes, and seconds can easily be converted to decimal degrees in Excel using the formula:

Decimal degrees = degrees + (minutes/60) + (seconds/3600)

GPS coordinates stored as degrees, minutes, seconds must have a direction associated with them (i.e., North/South, East/West). If latitude is south, then latitude in decimal degrees will be negative (-). If longitude is west, then in longitude in decimal degrees will be negative (-).

USING TEXT TO COLUMNS

The first step is to ensure that you have latitude and longitude stored in two separate columns.



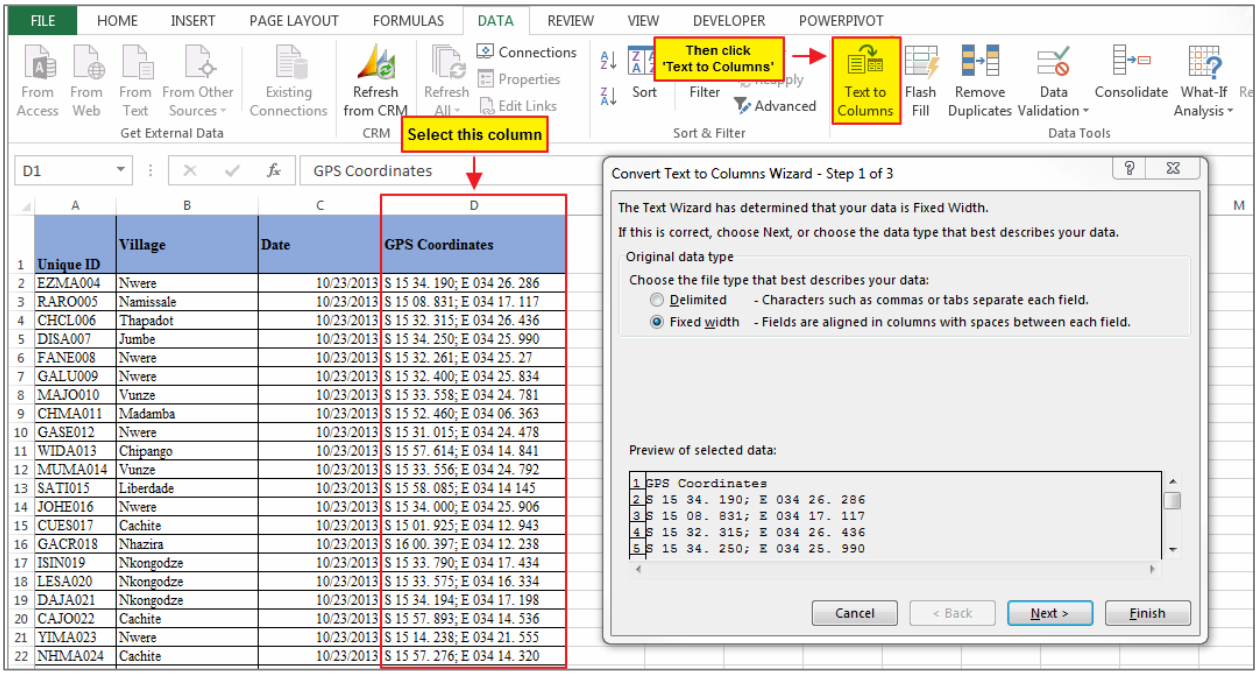
	A	B	C	D	E	F	G
1	Unique ID	Village	Date	GPS Coordinates		Latitide	Longitude
2	EZMA004	Nwere	10/23/2013	S 15 34. 190; E 034 26. 286		S 15 34. 190	E 034 26. 286
3	RARO005	Namissale	10/23/2013	S 15 08. 831; E 034 17. 117		S 15 08. 831	E 034 17. 117
4	CHCL006	Thapadot	10/23/2013	S 15 32. 315; E 034 26. 436		S 15 32. 315	E 034 26. 436
5	DISA007	Jumbe	10/23/2013	S 15 34. 250; E 034 25. 990		S 15 34. 250	E 034 25. 990
6	FANE008	Nwere	10/23/2013	S 15 32. 261; E 034 25. 27		S 15 32. 261	E 034 25. 27
7	GALU009	Nwere	10/23/2013	S 15 32. 400; E 034 25. 834		S 15 32. 400	E 034 25. 834
8	MAJO010	Vunze	10/23/2013	S 15 33. 558; E 034 24. 781		S 15 33. 558	E 034 24. 781
9	CHMA011	Madamba	10/23/2013	S 15 52. 460; E 034 06. 363		S 15 52. 460	E 034 06. 363
10	GASE012	Nwere	10/23/2013	S 15 31. 015; E 034 24. 478		S 15 31. 015	E 034 24. 478
11	WIDA013	Chipango	10/23/2013	S 15 57. 614; E 034 14. 841		S 15 57. 614	E 034 14. 841
12	MUMA014	Vunze	10/23/2013	S 15 33. 556; E 034 24. 792		S 15 33. 556	E 034 24. 792
13	SATI015	Liberdade	10/23/2013	S 15 58. 085; E 034 14 145		S 15 58. 085	E 034 14. 145
14	JOHE016	Nwere	10/23/2013	S 15 34. 000; E 034 25. 906		S 15 34. 000	E 034 25. 906
15	CUES017	Cachite	10/23/2013	S 15 01. 925; E 034 12. 943		S 15 01. 925	E 034 12. 943
16	GACR018	Nhazira	10/23/2013	S 16 00. 397; E 034 12. 238		S 16 00. 397	E 034 12. 238

Headquarters
2655 W. Midway Blvd STE 235
Broomfield, Colorado USA 80020

W: www.awhere.com
E: beawhere@awhere.com
O: 303.279.9293

Latitude and longitude can easily be separated into two columns using the **Text to Columns** tool, found on the **Data** tab.

First highlight the column containing the data to be separated, and then click **Text to Columns**.



	Unique ID	Village	Date	GPS Coordinates
2	EZMA004	Nwere	10/23/2013	S 15 34. 190; E 034 26. 286
3	RARO005	Namissale	10/23/2013	S 15 08. 831; E 034 17. 117
4	CHCL006	Thapadot	10/23/2013	S 15 32. 315; E 034 26. 436
5	DISA007	Jumbe	10/23/2013	S 15 34. 250; E 034 25. 990
6	FANE008	Nwere	10/23/2013	S 15 32. 261; E 034 25. 27
7	GALU009	Nwere	10/23/2013	S 15 32. 400; E 034 25. 834
8	MAJO010	Vunze	10/23/2013	S 15 33. 558; E 034 24. 781
9	CHMA011	Madamba	10/23/2013	S 15 52. 460; E 034 06. 363
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11	WIDA013	Chipango	10/23/2013	S 15 57. 614; E 034 14. 841
12	MUMA014	Vunze	10/23/2013	S 15 33. 556; E 034 24. 792
13	SATI015	Liberdade	10/23/2013	S 15 58. 085; E 034 14 145
14	JOHE016	Nwere	10/23/2013	S 15 34. 000; E 034 25. 906
15	CUES017	Cachite	10/23/2013	S 15 01. 925; E 034 12. 943
16	GACR018	Nhazira	10/23/2013	S 16 00. 397; E 034 12. 238
17	ISIN019	Nkongodze	10/23/2013	S 15 33. 790; E 034 17. 434
18	LESA020	Nkongodze	10/23/2013	S 15 33. 575; E 034 16. 334
19	DAJA021	Nkongodze	10/23/2013	S 15 34. 194; E 034 17. 198
20	CAJO022	Cachite	10/23/2013	S 15 57. 893; E 034 14. 536
21	YIMA023	Nwere	10/23/2013	S 15 14. 238; E 034 21. 555
22	NHMA024	Cachite	10/23/2013	S 15 57. 276; E 034 14. 320

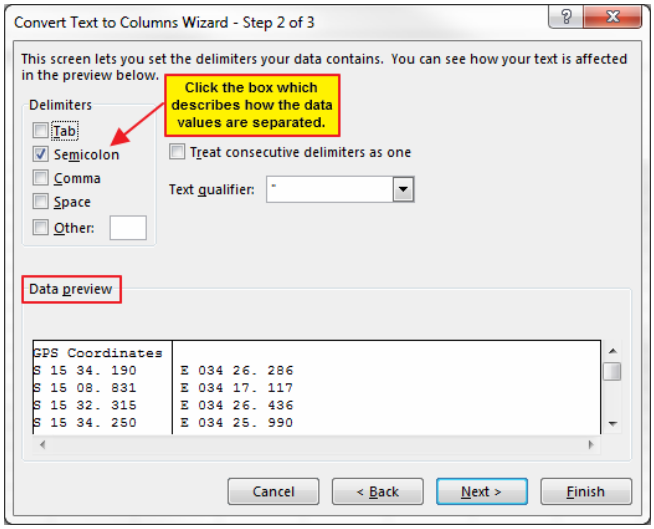
Then decide whether the data values are delimited or fixed width. In this example, you could choose either because the values, latitude and longitude, are consistently spaced within the cell (i.e. fixed width), and they are separated (i.e. delimited) by a semicolon (;). With 'delimited', the semi-colon will be removed automatically. With 'fixed width', the semicolon must be removed from the cells. **Note:** The semicolon can easily be replaced with the '**Find and Replace'** tool.

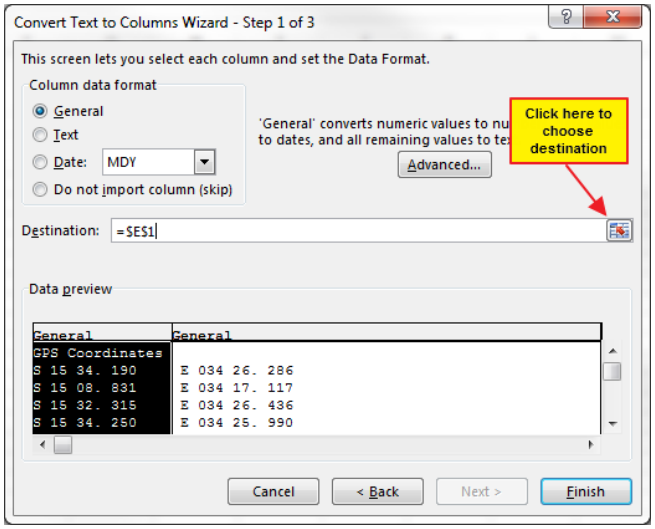
DELIMITED

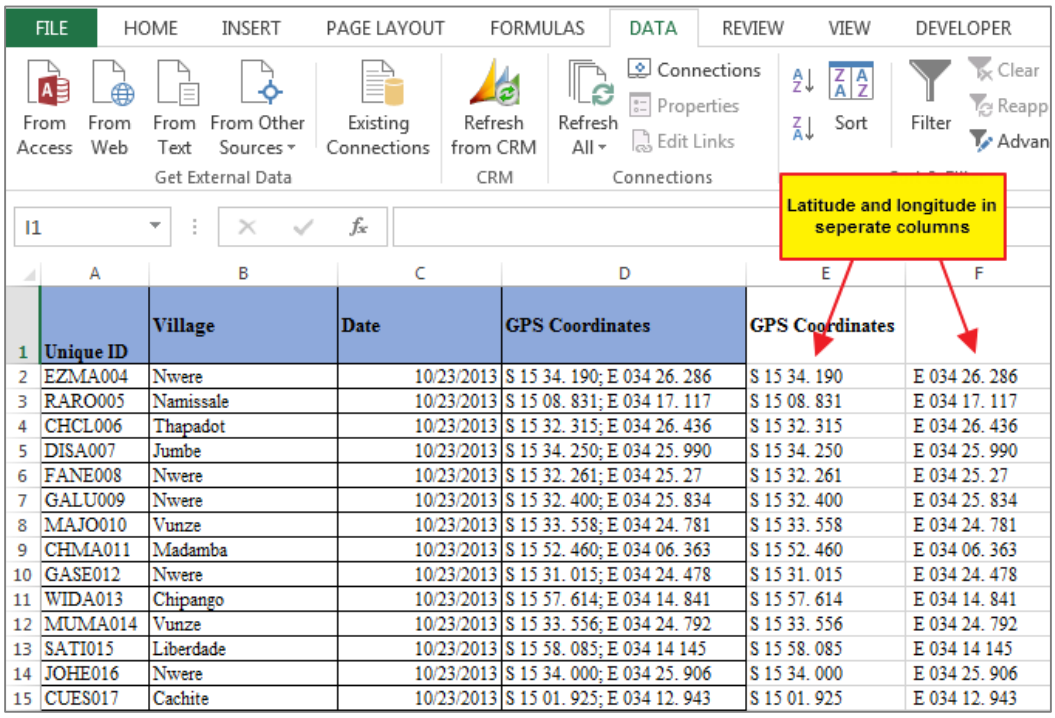
In this case, latitude and longitude are separated by a semi-colon. They can be separated into two columns using the **'Delimited'** option.

First determine which character separates your data. You will notice that when you select "Semicolon", a line appears in the Data Preview, separating the value for latitude, from the value for longitude. If it looks correct, click 'Next".

On the next screen, select a destination for the new columns of data. The destination should be the first cell of a blank column. Once you've selected the destination click "Finish".







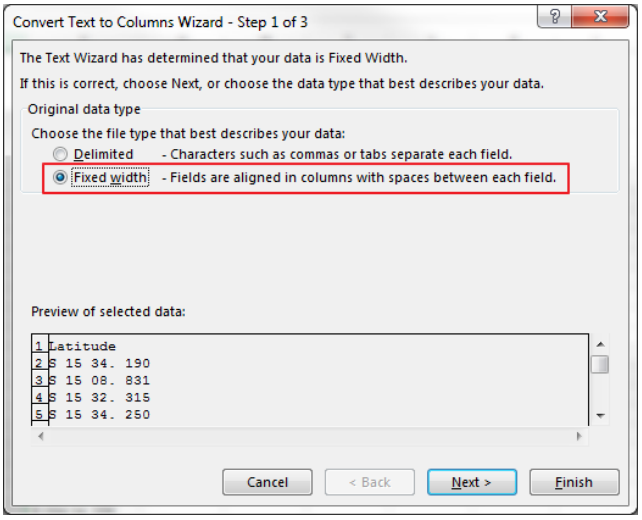
	A	B	C	D	E	F
1	Unique ID	Village	Date	GPS Coordinates	GPS Coordinates	
2	EZMA004	Nwere	10/23/2013	S 15 34. 190; E 034 26. 286	S 15 34. 190	E 034 26. 286
3	RARO005	Namissale	10/23/2013	S 15 08. 831; E 034 17. 117	S 15 08. 831	E 034 17. 117
4	CHCL006	Thapadot	10/23/2013	S 15 32. 315; E 034 26. 436	S 15 32. 315	E 034 26. 436
5	DISA007	Jumbe	10/23/2013	S 15 34. 250; E 034 25. 990	S 15 34. 250	E 034 25. 990
6	FANE008	Nwere	10/23/2013	S 15 32. 261; E 034 25. 27	S 15 32. 261	E 034 25. 27
7	GALU009	Nwere	10/23/2013	S 15 32. 400; E 034 25. 834	S 15 32. 400	E 034 25. 834
8	MAJO010	Vunze	10/23/2013	S 15 33. 558; E 034 24. 781	S 15 33. 558	E 034 24. 781
9	CHMA011	Madamba	10/23/2013	S 15 52. 460; E 034 06. 363	S 15 52. 460	E 034 06. 363
10	GASE012	Nwere	10/23/2013	S 15 31. 015; E 034 24. 478	S 15 31. 015	E 034 24. 478
11	WIDA013	Chipango	10/23/2013	S 15 57. 614; E 034 14. 841	S 15 57. 614	E 034 14. 841
12	MUMA014	Vunze	10/23/2013	S 15 33. 556; E 034 24. 792	S 15 33. 556	E 034 24. 792
13	SATI015	Liberdade	10/23/2013	S 15 58. 085; E 034 14 145	S 15 58. 085	E 034 14 145
14	JOHE016	Nwere	10/23/2013	S 15 34. 000; E 034 25. 906	S 15 34. 000	E 034 25. 906
15	CUES017	Cachite	10/23/2013	S 15 01. 925; E 034 12. 943	S 15 01. 925	E 034 12. 943

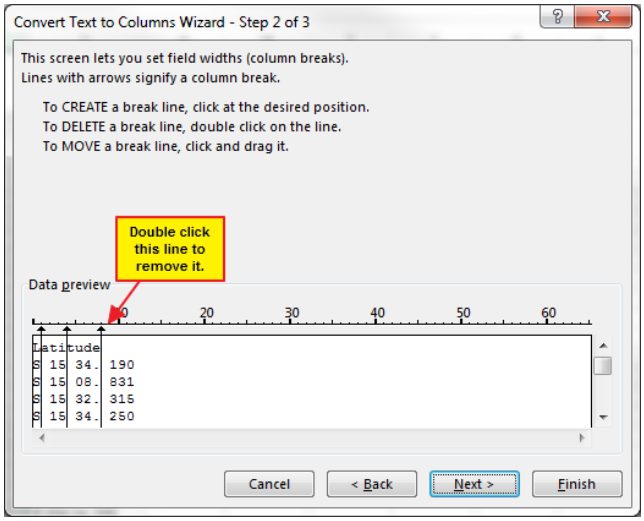
*To insert a new column, highlight a column, right click and select ‘Insert’.

FIXED WIDTH

Once you have latitude and longitude in separate columns, you can separate them further by element - degrees, and in this case, decimal minutes. **Note:** In this case, there is no 'seconds' value – only degrees and decimal minutes.

If the contents of the cell are evenly spaced in the cell, you can separate them into two columns using the 'Fixed width' option. First highlight the column containing latitude and then click '**Text to Columns'** and this time select '**Fixed width**'.





Since latitude is formatted as degrees, decimal minutes, remove the line separating the decimal minutes. The output should be three columns – one for the sign (i.e. direction - N/S), one for degrees, and one for decimal minutes.

	A	B	C	D	E	F	G	H	I
1	**Unique ID**	**Village**	**Date**	**GPS Coordinates**	**Latitude**		**Sign**	**Degrees**	**Decimal Minutes**
2	EZMA004	Nwere	10/23/2013	S 15 34. 190; E 034 26. 286	S 15 34. 190		S	15	34. 190
3	RARO005	Namissale	10/23/2013	S 15 08. 831; E 034 17. 117	S 15 08. 831		S	15	08. 831
4	CHCL006	Thapadot	10/23/2013	S 15 32. 315; E 034 26. 436	S 15 32. 315		S	15	32. 315
5	DISA007	Jumbe	10/23/2013	S 15 34. 250; E 034 25. 990	S 15 34. 250		S	15	34. 250
6	FANE008	Nwere	10/23/2013	S 15 32. 261; E 034 25. 27	S 15 32. 261	→	S	15	32. 261
7	GALU009	Nwere	10/23/2013	S 15 32. 400; E 034 25. 834	S 15 32. 400		S	15	32. 400
8	MAJO010	Vunze	10/23/2013	S 15 33. 558; E 034 24. 781	S 15 33. 558		S	15	33. 558
9	CHMA011	Madamba	10/23/2013	S 15 52. 460; E 034 06. 363	S 15 52. 460		S	15	52. 460
10	GASE012	Nwere	10/23/2013	S 15 31. 015; E 034 24. 478	S 15 31. 015		S	15	31. 015
11	WIDA013	Chipango	10/23/2013	S 15 57. 614; E 034 14. 841	S 15 57. 614		S	15	57. 614
12	MUMA014	Vunze	10/23/2013	S 15 33. 556; E 034 24. 792	S 15 33. 556		S	15	33. 556
13	SATI015	Liberdade	10/23/2013	S 15 58. 085; E 034 14 145	S 15 58. 085		S	15	58. 085
14	JOHE016	Nwere	10/23/2013	S 15 34. 000; E 034 25. 906	S 15 34. 000		S	15	34. 000
15	CUES017	Cachite	10/23/2013	S 15 01. 925; E 034 12. 943	S 15 01. 925		S	15	01. 925
16	GACR018	Nhazira	10/23/2013	S 16 00. 397; E 034 12. 238	S 16 00. 397		S	16	00. 397

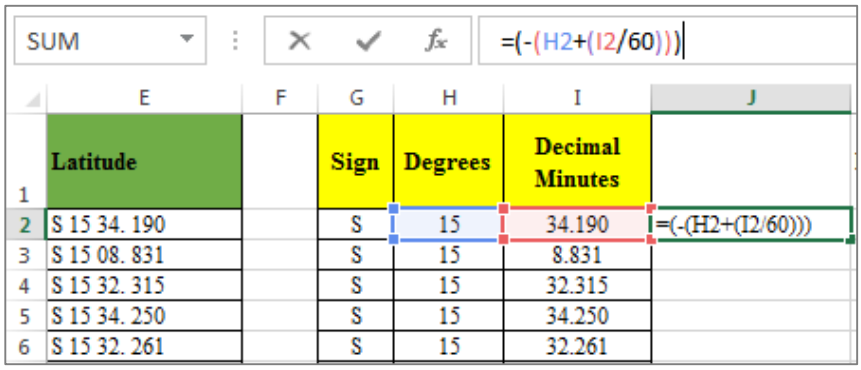
Now we can write a formula to calculate decimal degrees.

CALCULATING DECIMAL DEGREES

The formula for converting degrees, minutes, seconds to decimal degrees is:

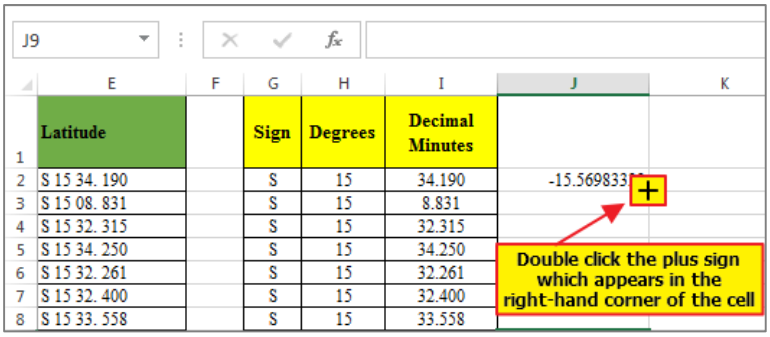
Decimal degrees = degrees + (minutes/60) + (seconds/3600)

Since degrees and decimal minutes are separated into separate columns, we can easily write a formula in Excel to calculate decimal degrees. It's important to add a negative sign to the beginning of the formula because latitude is South. If the sign/direction is North, then latitude would remain positive.



	E	F	G	H	I	J
1	Latitude		Sign	Degrees	Decimal Minutes	
2	S 15 34. 190		S	15	34.190	=(-(H2+(I2/60)))
3	S 15 08. 831		S	15	8.831	
4	S 15 32. 315		S	15	32.315	
5	S 15 34. 250		S	15	34.250	
6	S 15 32. 261		S	15	32.261	

Tip: Insert a new column for the formula, and then use auto fill to fill in the rest of the rows. To do so, hover over the lower right-hand corner of the cell containing the formula until a plus sign appears.



	E	F	G	H	I	J	K
1	Latitude		Sign	Degrees	Decimal Minutes		
2	S 15 34. 190		S	15	34.190	-15.569833	
3	S 15 08. 831		S	15	8.831		
4	S 15 32. 315		S	15	32.315		
5	S 15 34. 250		S	15	34.250		
6	S 15 32. 261		S	15	32.261		
7	S 15 32. 400		S	15	32.400		
8	S 15 33. 558		S	15	33.558		

Repeat the process for longitude.

Original coordinates										Final coordinates in decimal degrees	
Latitide	Longitude	Latitude	Degrees	Minutes	seconds	Longitud	Degrees	Minutes	seconds	Decimal Degrees Latitude	Decimal Degrees Longitude
S 15 34. 190	E 034 26. 286	S	15	34	190	E	34	26	286	-15.6194444444444	34.51277778
S 15 08. 831	E 034 17. 117	S	15	8	831	E	34	17	117	-15.3641666666667	34.31583333
S 15 32. 315	E 034 26. 436	S	15	32	315	E	34	26	436	-15.6208333333333	34.55444444
S 15 34. 250	E 034 25. 990	S	15	34	250	E	34	25	990	-15.6361111111111	34.69166667
S 15 32. 261	E 034 25. 27	S	15	32	261	E	34	25	27	-15.6058333333333	34.42416667
S 15 32. 400	E 034 25. 834	S	15	32	400	E	34	25	834	-15.6444444444444	34.64833333
S 15 33. 558	E 034 24. 781	S	15	33	558	E	34	24	781	-15.705	34.61694444
S 15 52. 460	E 034 06. 363	S	15	52	460	E	34	6	363	-15.9944444444444	34.20083333
S 15 31. 015	E 034 24. 478	S	15	31	15	E	34	24	478	-15.5208333333333	34.53277778
S 15 57. 614	E 034 14. 841	S	15	57	614	E	34	14	841	-16.1205555555556	34.46694444
S 15 33. 556	E 034 24. 792	S	15	33	556	E	34	24	792	-15.7044444444444	34.62
S 15 58. 085	E 034 14. 145	S	15	58	85	E	34	14	145	-15.9902777777778	34.27361111
S 15 34. 000	E 034 25. 906	S	15	34	0	E	34	25	906	-15.5666666666667	34.66833333
S 15 01. 925	E 034 12. 943	S	15	1	925	E	34	12	943	-15.2736111111111	34.46194444