

User Manual

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Q1 2024/2025

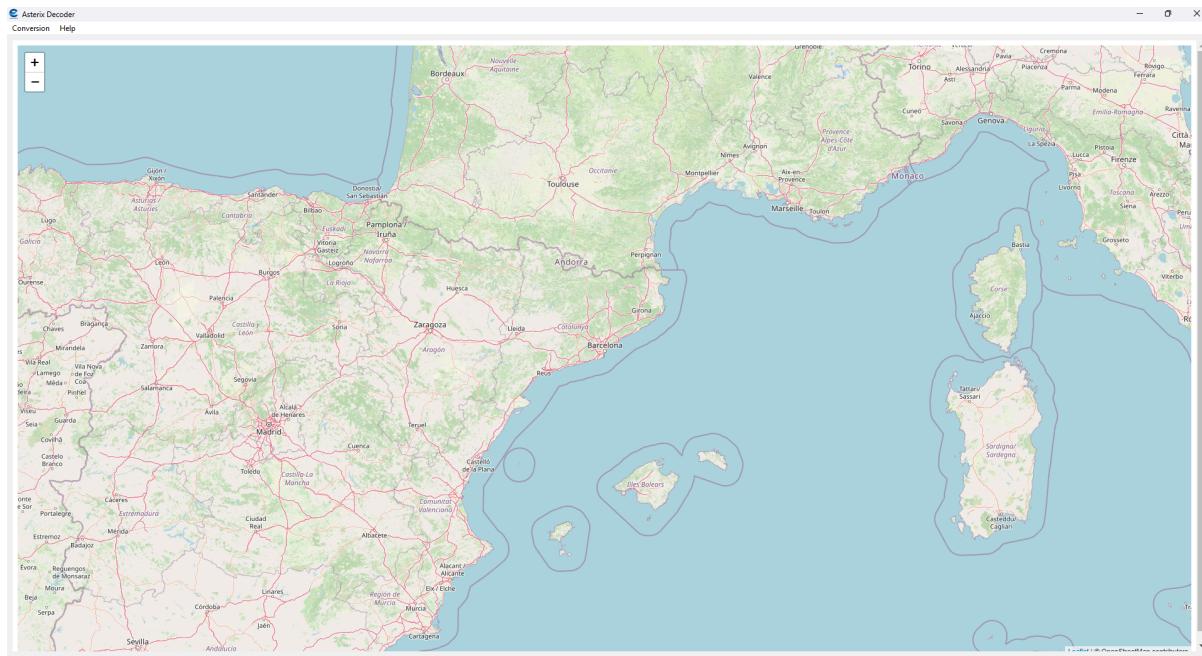
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Overview

The goal of the Asterix Decoder App is to be able to take an Asterix binary file (.ast) and convert it to a human readable file in CSV format. To accomplish this we have developed an algorithm that receives the .ast file as input and creates a .csv file as output.

Once the conversion is done, the data is loaded into a table that we can then use to view the information. With this table, we can also do things like filter and export, look for specific data and load the data to then simulate the location of each aircraft.

This is the main window when opening the application:

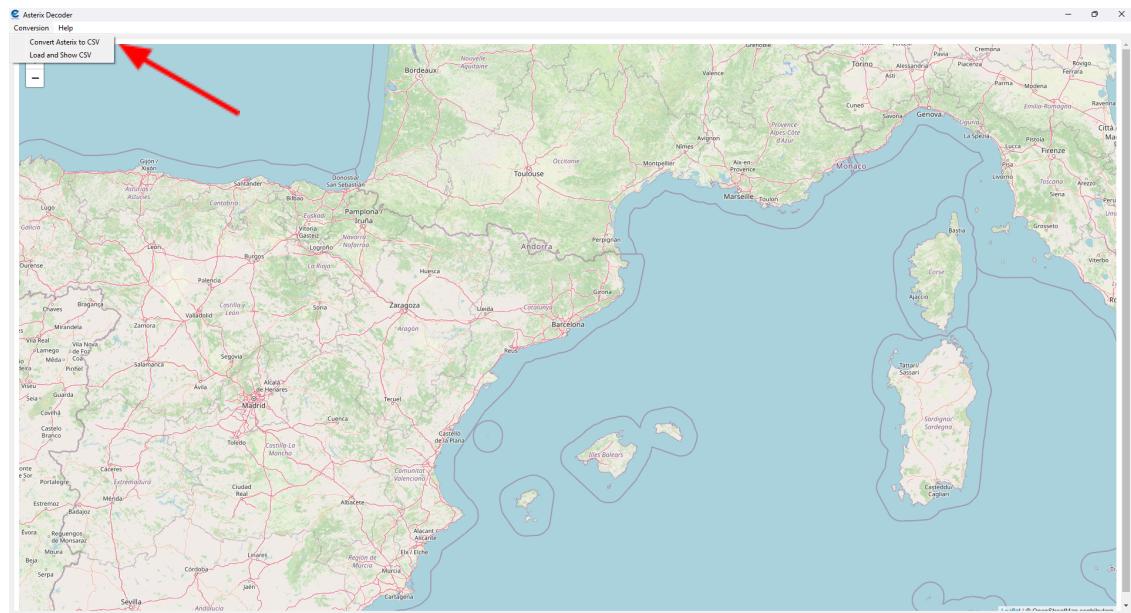


Conversion

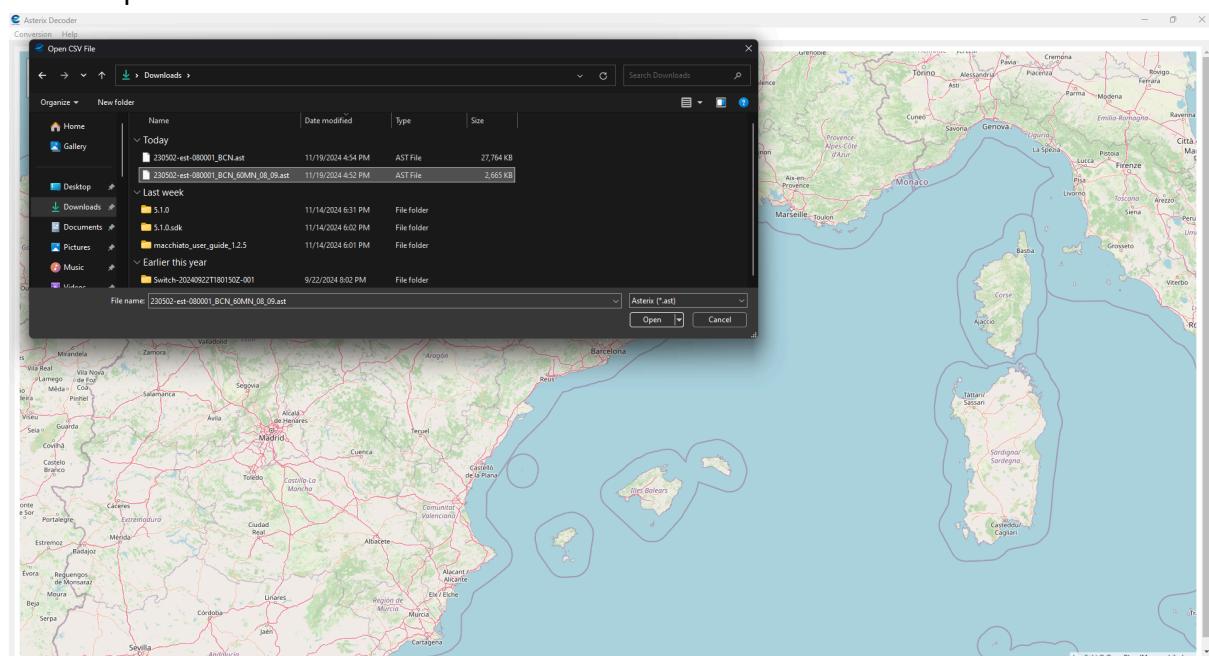
Convert Asterix to CSV

This function is used to convert an asterix binary file to csv. To do this follow the next steps:

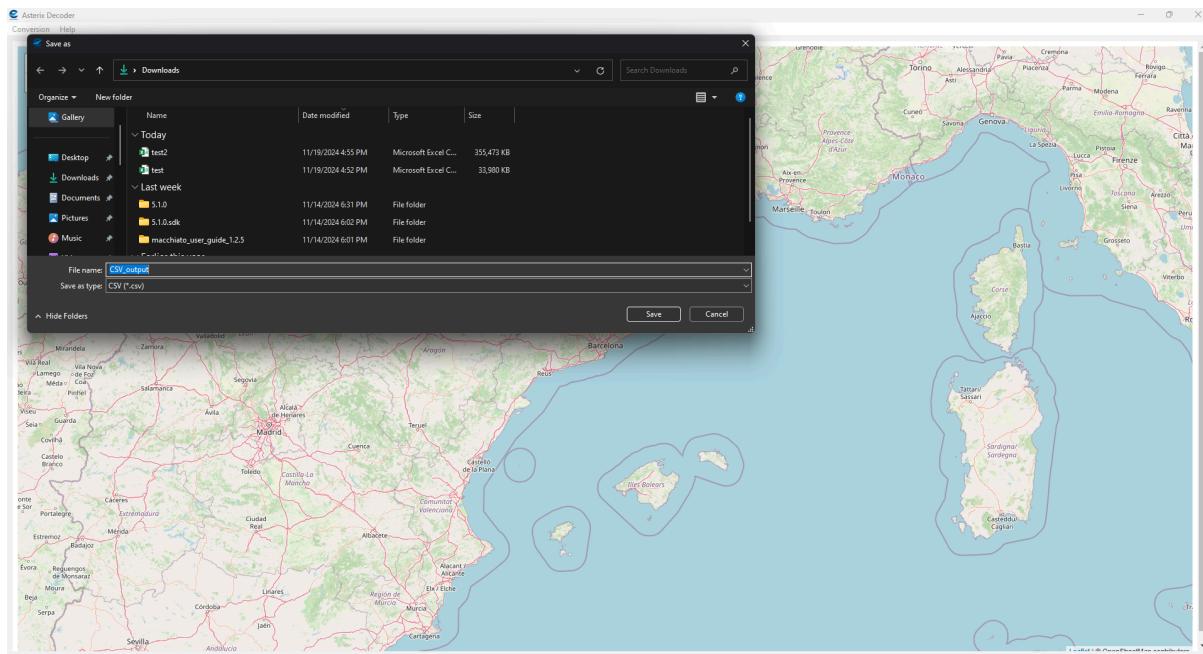
1. Click on the Convert Asterix to CSV.



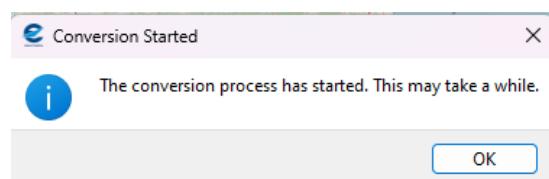
2. A new window is open. Select the Asterix binary file to convert to CSV. Then click Open.



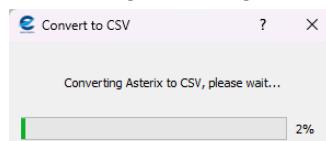
3. After this, a new window opens. In this window, select the location to save the file and enter the filename of the csv. Then click Save.



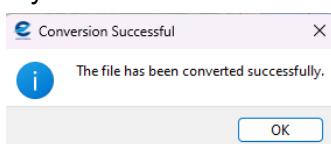
4. Then a message appears indicating that it is going to start the conversion process. Click ok.



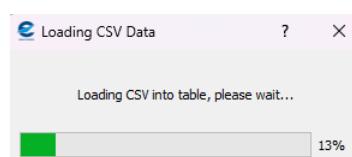
5. Then a loading bar appears showing the progress.



6. Once it finishes loading, a message will indicate it has finished. Click ok. The new csv file will be in the directory selected.



7. After this, it will automatically load the csv into a table. A loading bar will appear once again.



8. After it finishes loading, a new window will appear showing the table with the decoded data.

CSV Data

Active Filters: None

Apply Filter | Searcher | Search text

NUM	SAC	SIC	TIME	TIME(s)	LAT	LONG	H	TYP_020	SIM_020	RDP_020	SPI_020	RAB_020	TST_020	ERR_020	XPP_020	ME_020	MI_020	FOE_FRI_020	RHO	THETA	V_070	G_070
1	20	129	08:00:01.000	28801	41.18431307688220	1048223187688220	11276.038792988675	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	48.65324375	261.849714453125	Code Validated	Default		
2	20	129	08:00:01.000	28801	41.2389189752855	1.2017290585455032	10971.653806235641	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	41.36323125	265.0726318359375	Code Validated	Default		
3	20	129	08:00:01.000	28801	41.246361392324	0.84778059328862	4585.010451771319	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	56.91015625	267.127075195125	Code Validated	Default		
4	20	129	08:00:01.000	28801	41.2865945779325	2.006129456964206	15.227194521341813	Single Mode5 Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	4.41796875	256.9916921875	Code Validated	Default		
5	20	129	08:00:01.000	28801	41.30897605166628	1.607298417426982	10972.45297452123	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	23.1640625	271.4237152020125	Code Validated	Default		
6	20	129	08:00:01.000	28801	41.3222798751447	1.5207451078002217	10862.7214210922	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	26.921875	273.0125390625	Code Validated	Default		
7	20	129	08:00:01.000	28801	41.29932875629247	2.03837184380991	5.790723856292009	Single Mode5 Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	0.8359875	264.1697660150125	Code Validated	Default		
8	20	129	08:00:01.000	28801	41.29983242883895	2.074607307624168	1.0065132201685068	Single Mode5 Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	1.24609375	265.10009765625	Code Validated	Default		
9	20	129	08:00:01.000	28801	41.30063819000676	2.07407424358779	5.790083731546	Single Mode5 Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	1.265625	269.8320578125	Code Validated	Default		
10	20	129	08:00:01.000	28801	41.30063819000676	2.08031883195237	-0.0006695976480841637	Single Mode5 Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	0.984375	272.76590615234375	Code Validated	Default		
11	20	129	08:00:01.000	28801	41.30284265862089	2.0806523780987104	5.79055500425398	Single Mode5 Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	0.9765625	277.558593975	Code Validated	Default		
12	20	129	08:00:01.000	28801	41.32151446473534	1.65771546666834	5.1582.177604761761	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	24.84765625	303.55224609375	Code Validated	Default		
13	20	129	08:00:01.000	28801	41.3059867194776	2.00619213794764	-38.10032413527395	Single Mode5 Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	0.7351625	293.8348838671875	Code Validated	Default		
14	20	129	08:00:01.000	28801	41.30669484950029	2.087208763699	5.79092596241202	Single Mode5 Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	0.76711875	298.15795894375	Code Validated	Default		
15	20	129	08:00:01.000	28801	41.76926013699266	1.537473865733416	8176.140073834468	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	36.71875	320.6414794921875	Code Validated	Default		
16	20	129	08:00:02.000	28802	41.32885589866983	2.00584672734105	2682.274760134097	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	14.41796875	342.405395075125	Code Validated	Default		
17	20	129	08:00:02.000	28802	42.26894604319988	2.09149624612546	11178.6535995999112	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	58.4375	359.5330810546875	Code Validated	Default		
18	20	129	08:00:02.000	28802	42.012394975880094	2.16760946090024	4862.17037049004	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	42.00589375	0.87890625	Code Validated	Default		
19	20	129	08:00:02.000	28802	41.720300770249004	2.200793217701516	2979.60951371638	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	25.6009375	9.9795859375	Code Validated	Default		
20	20	129	08:00:02.000	28802	41.74699115498937	2.273866954800997	10058.38805843298	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	28.3984375	16.078491109375	Code Validated	Default		
21	20	129	08:00:02.000	28802	41.9456982771126	2.94747998913645	4084.4524526920587	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	44.65324375	29.65799773475	Code Validated	Default		
22	20	129	08:00:02.000	28802	41.70901474413324	2.438379729459651	3017.574570703127	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	28.74609375	31.31103515625	Code Validated	Default		
23	20	129	08:00:02.000	28802	41.80994825436139	2.648636830065897	2376.953801312926	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	45.453125	47.51037976525	Code Validated	Default		
24	20	129	08:00:02.000	28802	41.534307109268156	2.452641413123574	Single SSR detection	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	21.1445125	48.345369140625	Code Validated	Default			
25	20	129	08:00:02.000	28802	41.53427173403294	2.466114707395454	716.1562630751815	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	21.5975625	49.4347676525	Code Validated	Default		
26	20	129	08:00:03.000	28803	41.73683586262441	3.184011847713465	1522.570319843411	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	55.34765625	61.435548675	Code Validated	Default		
27	20	129	08:00:03.000	28803	41.37610701887008	2.39093059561518	775.3571889301522	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	10.3984375	64.1326904296875	Code Validated	Default		

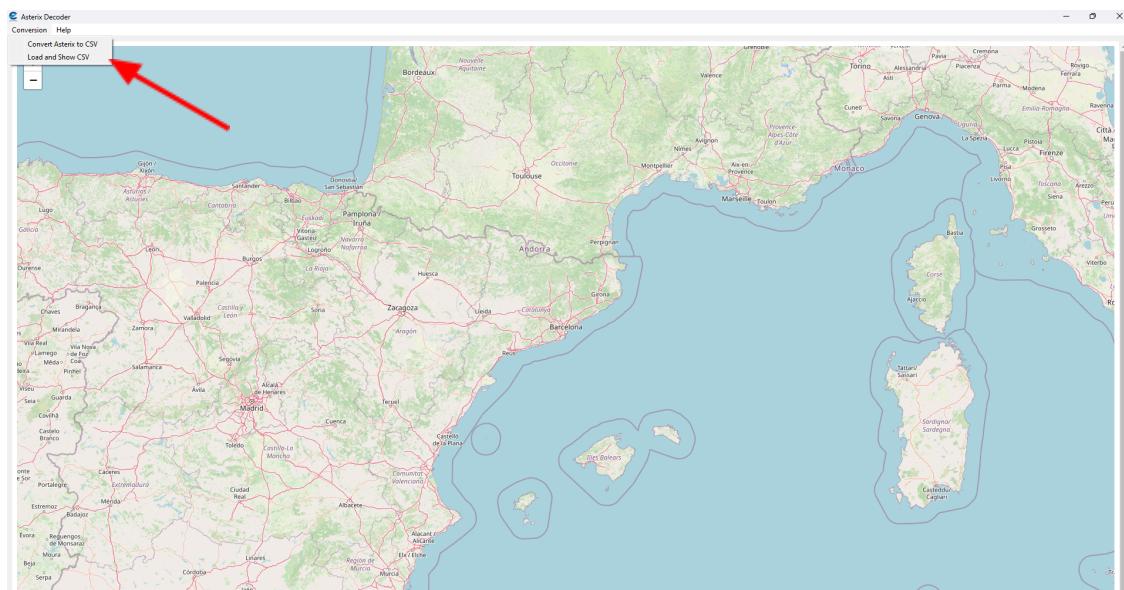
Latitude Range: Lat Min | Lat Max | Longitude Range: Lon Min | Lon Max | Apply Filtered Data | Simulate Filtered Data

9. Once the table is loaded, this function has finished executing. You can then visualize or filter the data. For more information read [Visualizing CSV](#).

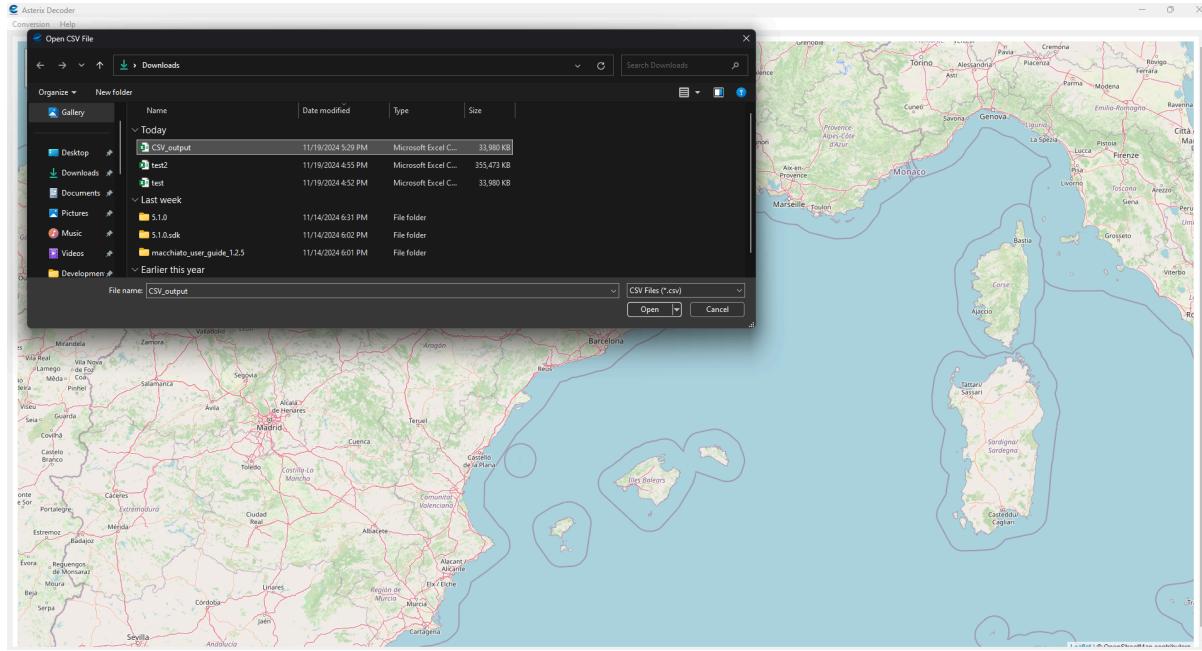
Load and Show CSV

If a file has already been converted to CSV, it can be loaded directly and shown as a table to filter, export or simulate. To do this follow the next steps:

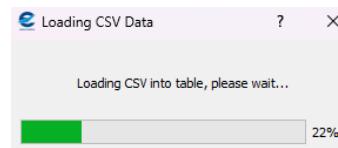
1. Click on the Load and Show CSV.



2. A new window will appear. Here, select the CSV file to be opened. Then click Open.



3. A loading bar will appear, wait for it to load.



4. When it finishes loading, a new window will appear showing the table with the decoded data.

NUM	SAC	SIC	TIME	TIME(s)	LAT	LONG	H	TYP_020	SIM_020	RDP_020	SPI_020	RAB_020	TST_020	ERR_020	XPP_020	ME_020	MI_020	FOE_FRI_020	RHO	THETA	V_020	G_070
1	20	129	08:00:01.000	28801	41.18153128351447	1.04823182768826	11276.058782988675	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	48.0523475	261.84104453125	Code Validated	Default	
2	20	129	08:00:01.000	28801	41.23859189752855	1.201790854350522	10971.653802635641	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	41.36328125	265.072631859375	Code Validated	Default	
3	20	129	08:00:01.000	28801	41.24636136139324	0.8477980593286682	4585.010451771319	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	56.91015625	267.1270751953125	Code Validated	Default	
4	20	129	08:00:01.000	28801	41.2869450779925	2.00619249569426	15.22719421341813	Single Mode5 Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	4.41796675	256.99169921875	Code Validated	Default	
5	20	129	08:00:01.000	28801	41.308876051666628	1.607245184742692	10972.458974521212	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	23.1640625	271.4375192020125	Code Validated	Default	
6	20	129	08:00:01.000	28801	41.3222978751447	1.520745107800217	10962.712412059221	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	26.921875	273.0125390625	Code Validated	Default	
7	20	129	08:00:01.000	28801	41.2993827552947	2.0367184386091	5.790722852629009	Single Mode5 Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	0.835937	264.160766015625	Code Validated	Default	
8	20	129	08:00:01.000	28801	41.2989242883895	2.074687357674816	-0.0010651322061685068	Single Mode5 Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	1.24609375	265.10009756625	Code Validated	Default	
9	20	129	08:00:01.000	28801	41.30063819800676	2.0740773425387779	5.7908919731546	Single Mode5 Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	1.265625	269.832305070125	Code Validated	Default	
10	20	129	08:00:01.000	28801	41.3014914314406	2.0033183195237	5.79006957640041637	Single Mode5 Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	0.984375	272.763061523475	Code Validated	Default	
11	20	129	08:00:01.000	28801	41.30294235862388	2.006635379097104	5.7905355042398	Single Mode5 Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	0.9795625	277.55599375	Code Validated	Default	
12	20	129	08:00:01.000	28801	41.52131446473634	1.6377215466668341	11582.177670047618	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	24.84765625	303.53234609375	Code Validated	Default	
13	20	129	08:00:01.000	28801	41.30598749776	2.0681921437947464	108.1032413527396	Single Mode5 Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	0.7351925	293.834838671875	Code Validated	Default	
14	20	129	08:00:01.000	28801	41.3066948595029	2.087208776363	5.7995295421202	Single Mode5 Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	0.76711875	296.15795984875	Code Validated	Default	
15	20	129	08:00:02.000	28802	41.76926013699266	1.58747386733416	8176.14007934468	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	36.71875	320.6414794921875	Code Validated	Default	
16	20	129	08:00:02.000	28802	41.32865589668693	2.00584672734105	2682.2748614097	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	14.41799875	342.4053955078125	Code Validated	Default	
17	20	129	08:00:02.000	28802	42.26894043191968	2.09149824615146	11278.65519399112	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	58.4375	359.5330810546875	Code Validated	Default	
18	20	129	08:00:02.000	28802	42.01283945880094	2.20079321710516	2979.00593131638	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	42.8059375	48.8799625	Code Validated	Default	
19	20	129	08:00:02.000	28802	41.7203007204904	2.20079321710516	2979.00593131638	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	25.609375	9.9795859375	Code Validated	Default	
20	20	129	08:00:02.000	28802	41.74699115468337	2.273866548050997	1058.58858483236	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	28.3984375	16.0782992109375	Code Validated	Default	
21	20	129	08:00:02.000	28802	41.9456922771126	2.5947799889123645	4084.454264029587	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	44.65324375	29.6579927734375	Code Validated	Default	
22	20	129	08:00:02.000	28802	41.7090147441324	2.433879272945955	3017.537457091327	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	28.74609375	31.3110315625	Code Validated	Default	
23	20	129	08:00:02.000	28802	41.80994825436139	2.84863683005897	2376.65380113296	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	45.453125	47.510759795625	Code Validated	Default	
24	20	129	08:00:02.000	28802	41.53450105926956	2.63264141312374	365.6499973961948	Single SSR detector	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	21.14453125	48.3453916940625	Code Validated	Default	
25	20	129	08:00:02.000	28802	41.53427177404324	2.466174707385454	716.156265075185	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	21.97965625	49.4384765625	Code Validated	Default	
26	20	129	08:00:03.000	28803	41.7863596262441	3.18401188773465	1522.7019843411	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	55.34795625	61.435548675	Code Validated	Default	
27	20	129	08:00:03.000	28803	41.78610701887008	2.30963059561518	77.35188031322	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	10.3984375	64.1326904296575	Code Validated	Default	

5. Once the table is loaded, this function has finished executing. You can then visualize or filter the data. For more information read [Visualizing CSV](#).

Visualizing CSV

This table allows you to view the corresponding values for each data item.

NUM	SAC	SIC	TIME	TIME(s)	LAT	LON	H	TYP_020	SIM_020	RDP_02C
1	20	129	08:00:01.000	28801	41.18183128351447	1.0482231827688226	11276.038782988675	ModeS Roll-Call + PSR	Actual target report	RDP Chair
2	20	129	08:00:01.000	28801	41.23859189752855	1.2017290854350522	10971.653806235641	ModeS Roll-Call + PSR	Actual target report	RDP Chair
3	20	129	08:00:01.000	28801	41.246361361392324	0.8477980593288682	4585.010451771319	ModeS Roll-Call + PSR	Actual target report	RDP Chair
4	20	129	08:00:01.000	28801	41.28659450773925	2.0061829465964296	15.227194321341813	Single ModeS Roll-Call	Actual target report	RDP Chair
5	20	129	08:00:01.000	28801	41.308976051666626	1.6072984157426922	10972.452937452123	ModeS Roll-Call + PSR	Actual target report	RDP Chair

Latitude Range: Lat Min _____ Lat Max _____ Longitude Range: Lon Min _____ Lon Max _____

Active Area Filter: None

Export Filtered Data | Simulate Filtered Data

Filters

Additionally, a set of filters is provided to help you hide rows that are not of interest. By applying these filters, unnecessary data can be quickly excluded from the display, allowing for a more focused and efficient analysis. Filters can be combined to display data in a more customized way. When the filter is selected, the "Apply Filter" button must be pressed for the changes to be made.

NUM	SAC	SIC	TIME	TIME(s)	LAT	LON	H	TYP_020	SIM_020	RDP_02C
1	20	129	08:00:01.000	28801	41.18183128351447	1.0482231827688226	11276.038782988675	ModeS Roll-Call + PSR	Actual target report	RDP Chair
2	20	129	08:00:01.000	28801	41.23859189752855	1.2017290854350522	10971.653806235641	ModeS Roll-Call + PSR	Actual target report	RDP Chair
3	20	129	08:00:01.000	28801	41.246361361392324	0.8477980593288682	4585.010451771319	ModeS Roll-Call + PSR	Actual target report	RDP Chair
4	20	129	08:00:01.000	28801	41.28659450773925	2.0061829465964296	15.227194321341813	Single ModeS Roll-Call	Actual target report	RDP Chair
5	20	129	08:00:01.000	28801	41.308976051666626	1.6072984157426922	10972.452937452123	ModeS Roll-Call + PSR	Actual target report	RDP Chair

Latitude Range: Lat Min _____ Lat Max _____ Longitude Range: Lon Min _____ Lon Max _____

Active Area Filter: None

Export Filtered Data | Simulate Filtered Data

The applicable filters are as follows:

1. Remove Blancos Puros: When applying this filter, the Data item I048/020, Target Report Descriptor is observed, which tells us the type and properties of the target report. Then it is checked if the type of interrogation is Mode S or Mode S interrogation reinforced with primary interrogation, if the message is not one of these two types it is automatically filtered.
2. Remove Fixed Transponder: This filter checks the values of Data Item I048/070, Mode-3/A Code, where all transponders that are "7777" are filtered since this corresponds to the Fixed Transponders + tests.
3. Remove On Ground Flights: This filter is directed by the data obtained from Data Item I048/230, Communications/ACAS Capability and Flight Status, where the status

of the flight is checked. Any flight that is "on ground", "N/A", "Not assigned" or "Unknown" is automatically filtered.

4. No filter: This option undoes any applied filters, redisplaying all data.

Filter by area

This filter works independently of the previous filters, meaning that changes applied with this filter will not affect or reverse adjustments made with previous filters.

ING	CNF_170	RAD_170	DOU_170	MAH_170	CDM_170	TRE_170	GHO_170	SUP_170	TCC_170	HEIGHT	
	Confirmed Track	SSR/Mode S Track	Normal confidence	No horizontal maneuver sensed	N/A	N/A	N/A	N/A	N/A	N/A	Cc
	Confirmed Track	SSR/Mode S Track	Normal confidence	No horizontal maneuver sensed	N/A	N/A	N/A	N/A	N/A	N/A	Cc
	Confirmed Track	SSR/Mode S Track	Normal confidence	No horizontal maneuver sensed	N/A	N/A	N/A	N/A	N/A	N/A	Cc
6328125	Confirmed Track	Combined Track	Normal confidence	No horizontal maneuver sensed	N/A	N/A	N/A	N/A	N/A	N/A	Cc
5	Confirmed Track	Combined Track	Normal confidence	No horizontal maneuver sensed	N/A	N/A	N/A	N/A	N/A	N/A	Cc

Latitude Range: Longitude Range:

Active Area Filter: None

To apply this filter, two latitudes and two longitudes must be specified, forming a square. Any aircraft located outside this defined area will be excluded from the display. After entering the coordinates, click the "Apply area filter" button to confirm and apply the changes.

NUM	SAC	SIC	TIME	TIME(s)	LAT	LON	H	TYP_020	SIM_020	RDP_02C
5656	20	129	08:08:02.000	29282	41.52378597558589	2.0809633298301122	424.9485937021673	Single ModeS Roll-Call	Actual target report	RDP Chair
5694	20	129	08:08:05.000	29285	41.33526433394276	1.8426435391506228	4160.426007528789	ModeS Roll-Call + PSR	Actual target report	RDP Chair
5696	20	129	08:08:05.000	29285	41.30284690876496	2.080653394441906	5.790555575862527	Single ModeS Roll-Call	Actual target report	RDP Chair
5700	20	129	08:08:06.000	29286	41.55625758882331	1.780240180419813	6111.169707189314	ModeS Roll-Call + PSR	Actual target report	RDP Chair

Latitude Range: Longitude Range:

Active Area Filter:
 Latitude Range: Min 41.302° - Max 41.597°
 Longitude Range: Min 1.645° - Max 2.086°

Once this filter is applied, the defined latitude and longitude ranges will be displayed. If you wish to modify the values of the area, simply enter the new coordinates and click the "Apply Area Filter" button again to update the filter. To remove this filter and restore the full data view, click the "Reset Area Filter" button.

Searcher

The app also includes a search feature that allows you to filter and find specific data within the table. You can select the column you want to search on, making it easier to locate particular values or entries

A screenshot of the 'CSV Data' application window. At the top, there's a header bar with the title 'CSV Data' and standard window controls. Below the header is a toolbar with buttons for 'Active Filters: None', 'Apply Filter', and other options. A dropdown menu titled 'Searcher' is open, showing a list of columns: NUM, SAC, SIC, TIME, TIME(s), LAT, LON, TYP_020, SIM_020, RDP_02C. The 'TIME(s)' option is highlighted with a red arrow pointing to it from below. The main area contains a table with several rows of data. At the bottom, there are buttons for 'Latitude Range', 'Longitude Range', 'Active Area Filter', 'Export Filtered Data', 'Simulate Filtered Data', and 'Reset Area Filter'.

NUM	SAC	SIC	TIME	TIME(s)	LAT	LON	TYP_020	SIM_020	RDP_02C
453	20	129	08:00:45.000	28845	41.30149612703833	2.0801461575340356	Single ModeS Roll-Call	Actual target report	RDP Chair
454	20	129	08:00:45.000	28845	41.30282175817679	2.080997552451205	Single ModeS Roll-Call	Actual target report	RDP Chair
455	20	129	08:00:45.000	28845	41.305996122086924	2.086180572773372	Single ModeS Roll-Call	Actual target report	RDP Chair
456	20	129	08:00:45.000	28845	41.59792018232666	1.6452955601221704	ModeS Roll-Call + PSR	Actual target report	RDP Chair
457	20	129	08:00:45.000	28845	41.306638465052224	2.087266815679506	Single ModeS Roll-Call	Actual target report	RDP Chair

Once you have selected the column you want to search, you can enter the desired text or value into the search field. The application will filter the data and display only the rows where the selected column contains the text or value you entered.

A screenshot of the 'CSV Data' application window. The interface is similar to the previous one, with a header bar, toolbar, and search dropdown. In this version, the 'MODE 3/A' column is highlighted with a red box, and the value '777' is typed into the search input field above it. A red arrow points from the search input to the '777' value. The main table shows several rows of data, and the bottom buttons are identical to the first screenshot.

THETA	V_070	G_070	MODE 3/A	V_090	G_090	FL	MODE C Corrected Altitude	SRL_130	SSR_130	SAN
259.0081787109375	Code Validated	Default	7777	Code Validated	Default	0.5		1.494140625 dg	5	-52 dg
259.0081787109375	Code Validated	Default	7777	Code Validated	Default	0.5	194.0	1.40625 dg	5	-52 dg
259.0081787109375	Code Validated	Default	7777	Code Validated	Default	0.5	194.0	1.494140625 dg	5	-52 dg
58.88671875	Code Validated	Default	5777	Code Validated	Default	169.75		1.1865234375 dg	4	-60 dg
259.0081787109375	Code Validated	Default	7777	Code Validated	Default	0.5	194.0	1.5380859375 dg	5	-52 dg

Loading Simulation

From this same table, we have the option to load the data into the simulation. This can be done by:

1. Click on the Simulate Filtered Data Button.

CSV Data

Active Filters: None

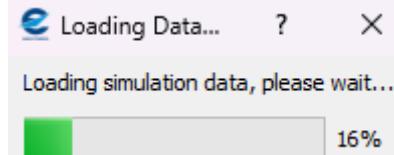
Searcher Search text

NUM	SAC	SIC	TIME	TIME(s)	LAT	LONG	H	TYP_020	SIM_020	RDP_020	SPI_020	RAB_020	TST_020	ERR_020	XPP_020	ME_020	MI_020	FOE_FRI_020	RHO	THETA	V_070	G_070
1	20	129	08:00:01.000	28801	41.181831369351447	1.0482231827688226	11276.08782988675	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	48.6523475	261.841453125	Code Validated	Default	
2	20	129	08:00:01.000	28801	41.2389189753855	1.201729085430522	10971.653806235641	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	41.36328125	265.072618359375	Code Validated	Default	
3	20	129	08:00:01.000	28801	41.24636136193234	0.847798093288862	4585.010451771319	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	56.9105625	267.1270751953125	Code Validated	Default	
4	20	129	08:00:01.000	28801	41.28694545773925	2.0061329465964206	15.227194521341813	Single Model Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	4.41796875	255.99169921875	Code Validated	Default	
5	20	129	08:00:01.000	28801	41.308976051666625	1.6072984157426922	10972.45937452123	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	23.1640625	271.4337158203125	Code Validated	Default	
6	20	129	08:00:01.000	28801	41.3222798751447	1.520745107800221	10962.72121029621	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	26.921875	273.01205290625	Code Validated	Default	
7	20	129	08:00:01.000	28801	41.29938275532047	2.0386784384091	5.790723852629088	Single Model Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	0.8359375	264.167066015625	Code Validated	Default	
8	20	129	08:00:01.000	28801	41.29982428389905	2.0746077507624168	5.790723852629088	Single Model Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	1.24609375	265.10097659625	Code Validated	Default	
9	20	129	08:00:01.000	28801	41.30063819800676	2.074074325387779	5.790089193731546	Single Model Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	1.265625	269.832505078125	Code Validated	Default	
10	20	129	08:00:01.000	28801	41.3014914614406	2.000318839194327	-0.000669597640041627	Single Model Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	0.984375	272.7630615224375	Code Validated	Default	
11	20	129	08:00:01.000	28801	41.302842285862886	2.0006525780907104	5.7905555042398	Single Model Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	0.9785625	277.55959375	Code Validated	Default	
12	20	129	08:00:01.000	28801	41.32122798751447	1.520745107800221	10962.72121029621	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	24.84765625	303.55224609375	Code Validated	Default	
13	20	129	08:00:01.000	28801	41.30598677949776	2.0861921437947464	-38.10032413527395	Single Model Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	0.78515625	293.8348388671875	Code Validated	Default	
14	20	129	08:00:01.000	28801	41.3069484950029	2.0872087763699	5.7909396421202	Single Model Roll-Call	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	0.76171875	298.157959842375	Code Validated	Default	
15	20	129	08:00:01.000	28801	41.7653013699266	1.587473865733416	8176.14007584644868	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	36.71875	320.641479821875	Code Validated	Default	
16	20	129	08:00:02.000	28802	41.3286559866982	2.0098462727341015	2.882.374091614097	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	14.41796875	242.403930507125	Code Validated	Default	
17	20	129	08:00:02.000	28802	42.26864603191968	2.091462624615346	11278.63539599112	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	58.4375	359.533081054875	Code Validated	Default	
18	20	129	08:00:02.000	28802	42.0123948588004	2.11670694609024	4863.17059947905	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	42.80859375	0.87890625	Code Validated	Default	
19	20	129	08:00:02.000	28802	41.72300077049900	2.2007932127103156	2979.60991313638	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	25.609375	9.99758895375	Code Validated	Default	
20	20	129	08:00:02.000	28802	41.7469911549837	2.273826654806997	10058.588038463289	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	28.3984375	16.0784912109375	Code Validated	Default	
21	20	129	08:00:02.000	28802	41.94598223771326	2.934779989173645	4084.54264923857	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	44.6523475	29.65792734375	Code Validated	Default	
22	20	129	08:00:02.000	28802	41.70917441135219	2.43387927249551	3017.5747470791327	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	28.4669375	31.3103515625	Code Validated	Default	
23	20	129	08:00:02.000	28802	41.8094823436139	2.848636830803897	2376.935380313296	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	45.433125	47.510379765625	Code Validated	Default	
24	20	129	08:00:02.000	28802	41.53401019261956	2.45264113123374	365.6499973963486	Single SSR detection	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	21.14453125	48.3453369140625	Code Validated	Default	
25	20	129	08:00:02.000	28802	41.534277173043294	2.4661747078795454	716.1562650753189	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	21.59765625	49.4384785625	Code Validated	Default	
26	20	129	08:00:03.000	28803	41.73683586260441	3.184071847713469	1523.7317037943411	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	55.34765625	61.45354875	Code Validated	Default	
27	20	129	08:00:03.000	28803	41.3761071887008	2.30903059561518	773.37188301522	Mode5 Roll-Call + PSR	Actual target report	RDP Chain 1	Absence of SPI	Report from aircraft transponder	None	None	None	None	None	10.3984375	64.1326904296875	Code Validated	Default	

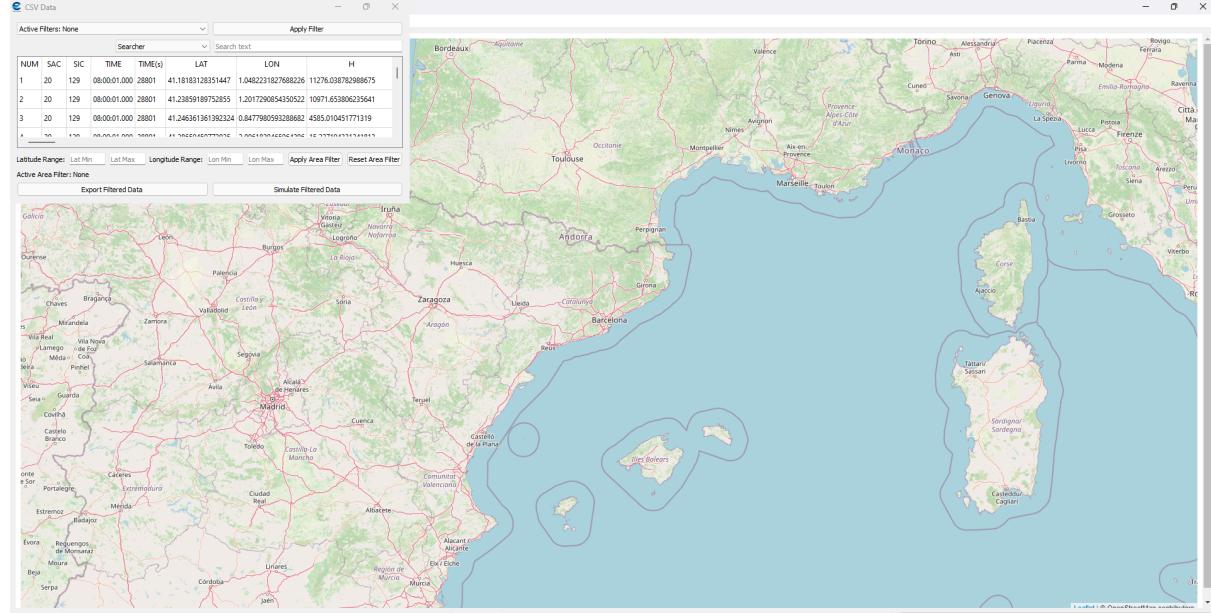
Latitude Range: Lat Min Lat Max Longitude Range: Lon Min Lon Max Apply Filter Reset Area Filter

Simulate Filtered Data

2. A loading bar will appear showing the progress. Wait for it to finish.



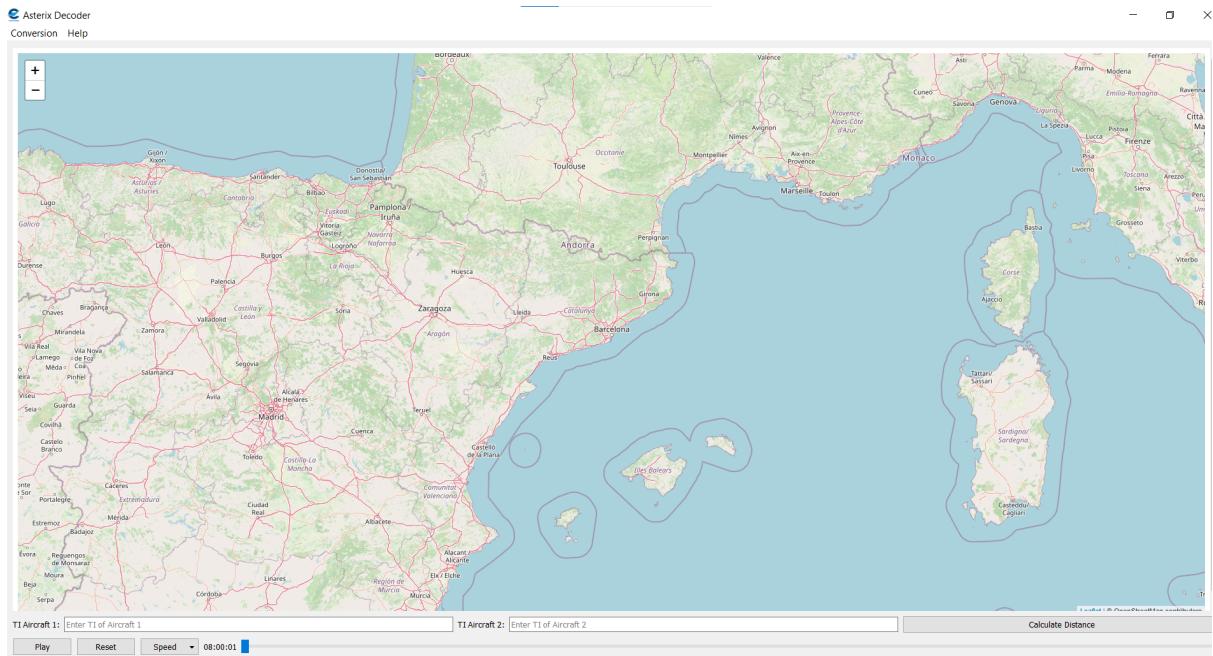
3. Once it is finished, it will show the following screen.



4. From here different things can be done, for more information see the [Simulation](#) section.

Simulation

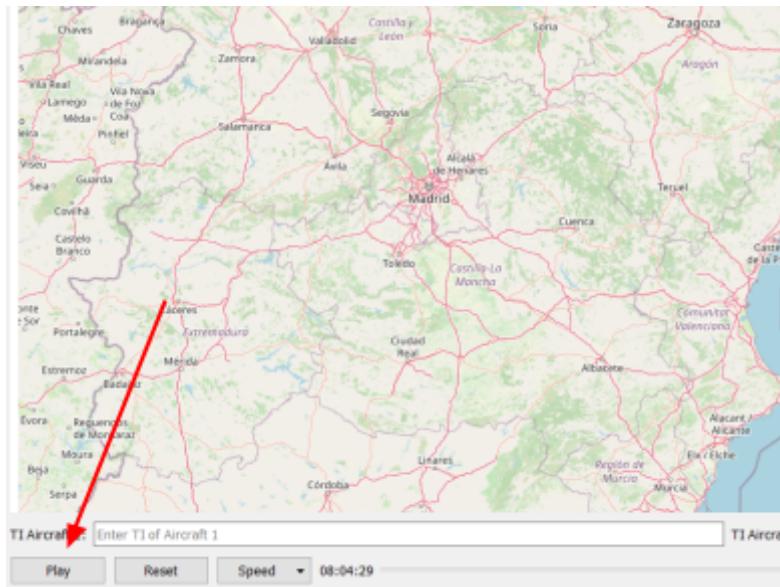
Once the simulation data is loaded you are taken back to the main screen, where you can simulate the positions of the airplanes and see how they change over time based on the CSV data.



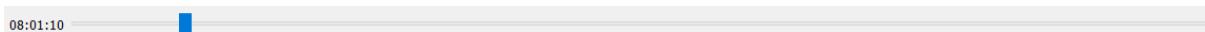
General simulation

You will see basic controls, including buttons like Play, Reset, Speed and a progress bar to track the simulation.

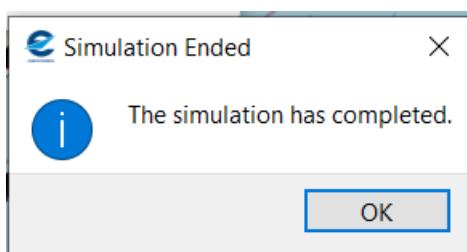
Click on the Play button to start the simulation, allowing you to visualize the trajectories of the aircrafts on the map in 1s intervals. While the simulation is running, the Play button changes to the Pause button, which you can use to temporarily stop the simulation.



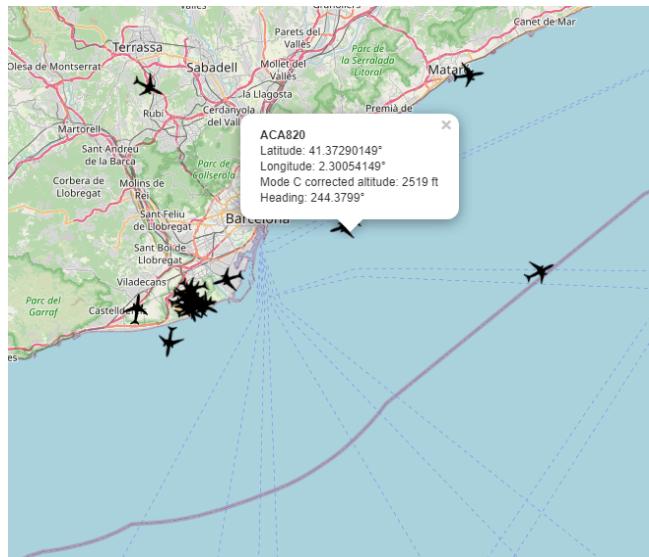
Once the simulation begins, the progress bar displays the current progress and the simulated time at the moment. You can click or drag the progress bar to move forward or backward to a specific point in the simulation.



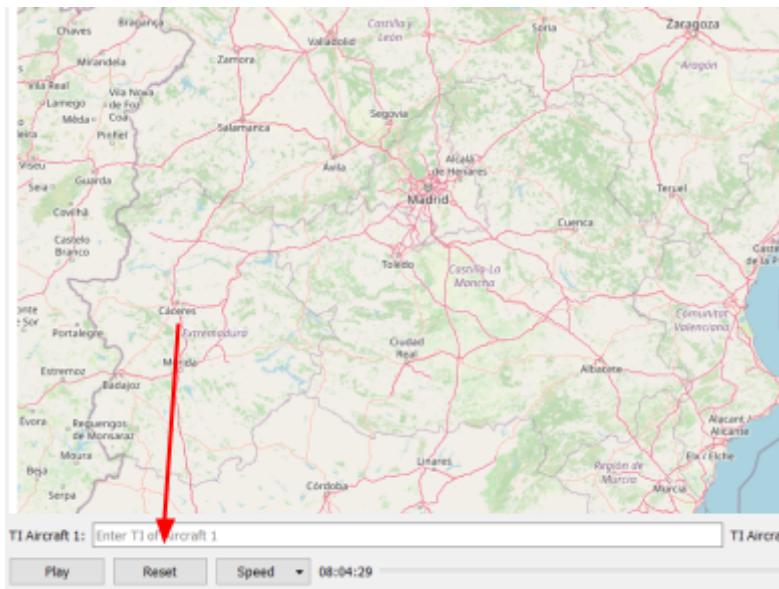
When the simulation reaches the end, a window will pop up notifying you that it has finished, and the simulation will automatically reset.



Click on the icon of an aircraft to view its basic information (such as TI, latitude, longitude, altitude or flight level and heading) in a pop-up. This information will update in real-time as the simulation progresses.

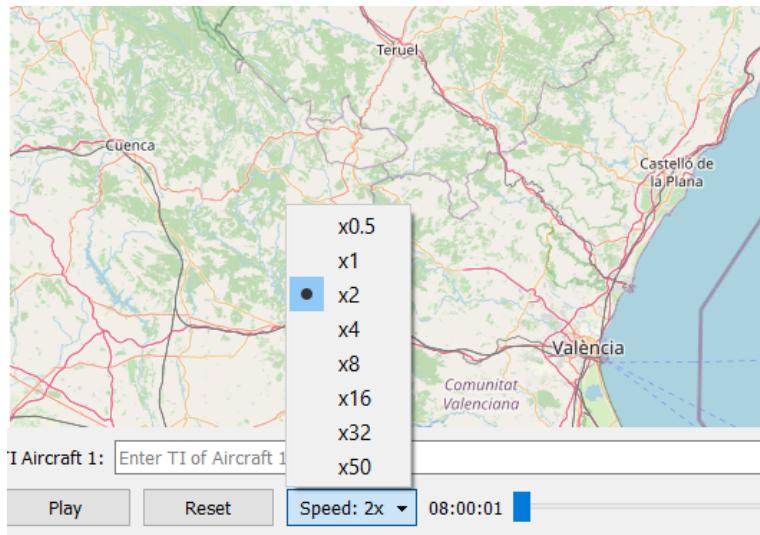


Click on the Reset button to restart the simulation. This will clear any current progress (including clearing all the aircraft from the map) and begin again from the start.



Click on the Speed button to adjust the speed of the simulation. You can choose different speeds to either speed up or down the simulation. These are the different options:

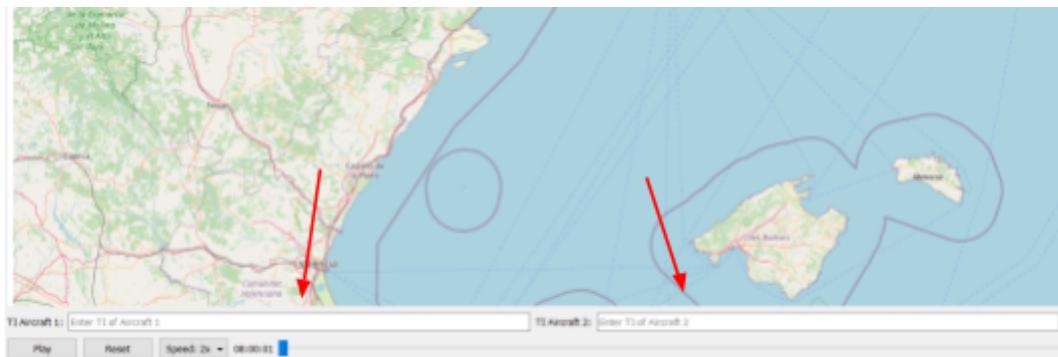
- x0.5: Updates every 2s
- x1 (default): Updates every 1s
- x2: Updates every 0,5s
- x4: Updates every 0,25s
- x8: Updates every 0,125s
- x16: Updates every 0,0625s
- x32: Updates every 0,03125s
- x50: Updates every 0,02s



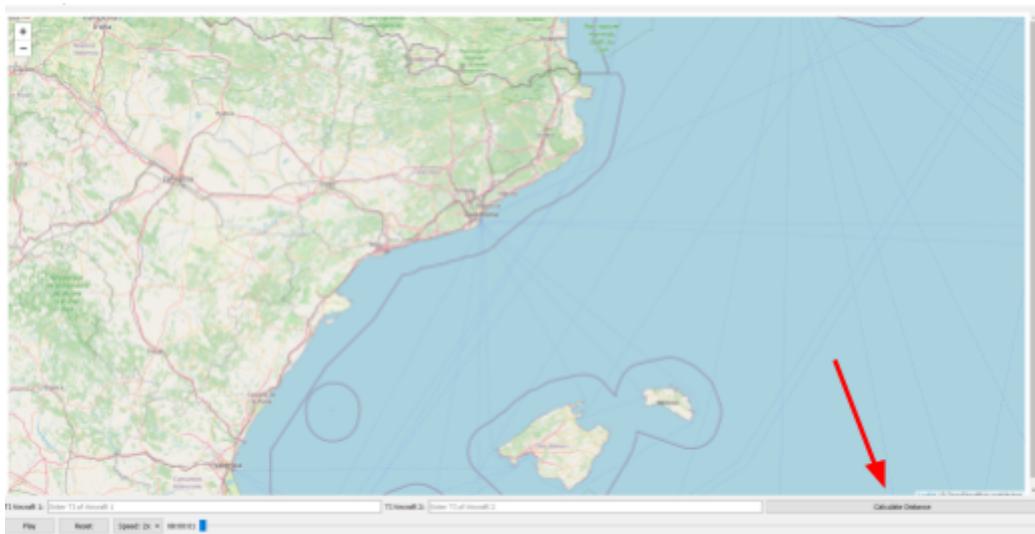
Distances between two aircrafts

In addition to the basic simulation buttons, on the main window you will see some boxes and a button to calculate the distance between two aircrafts using their positions in the stereographic system. To visualize it, follow these steps:

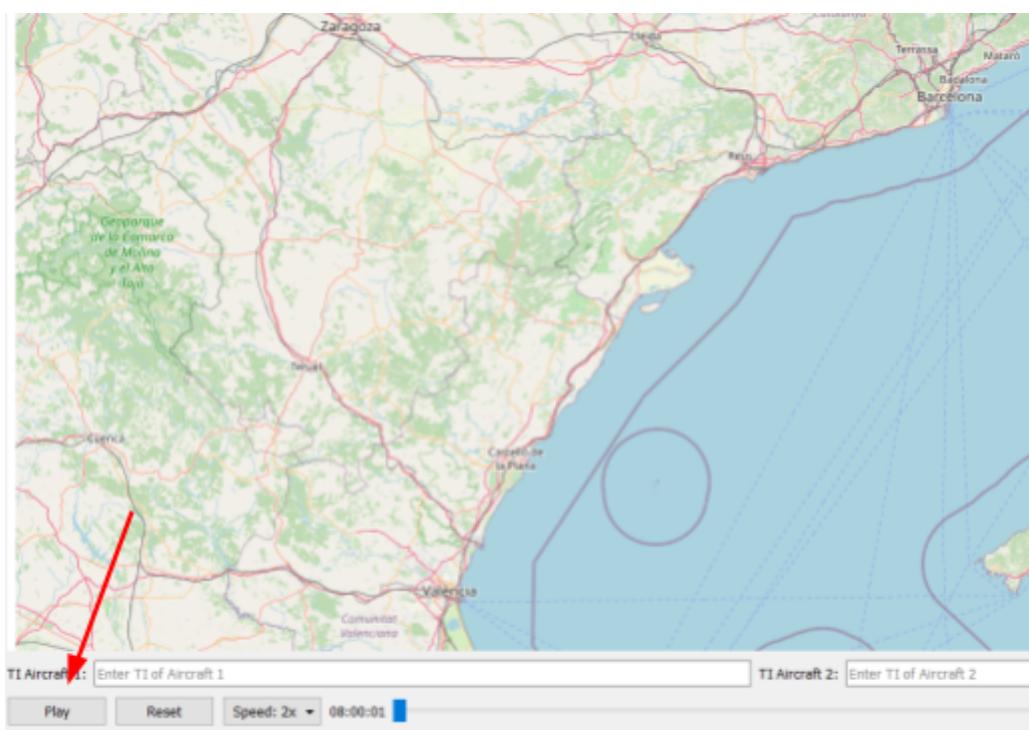
1. Enter the TIs of the two aircrafts whose distance you want to see.



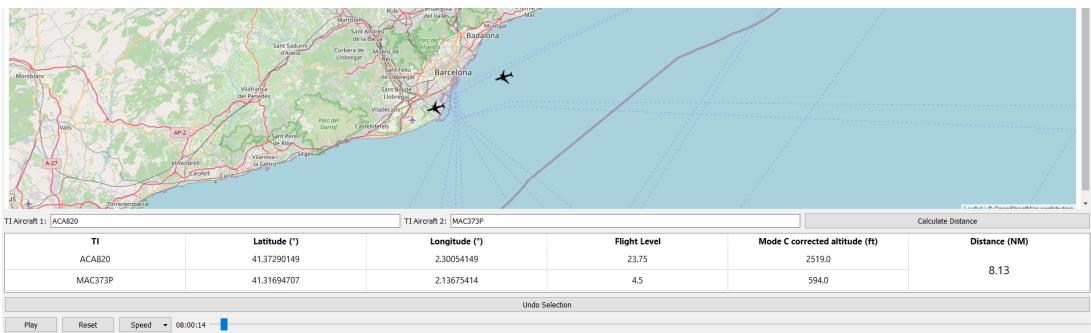
2. Click on the Calculate Distance button



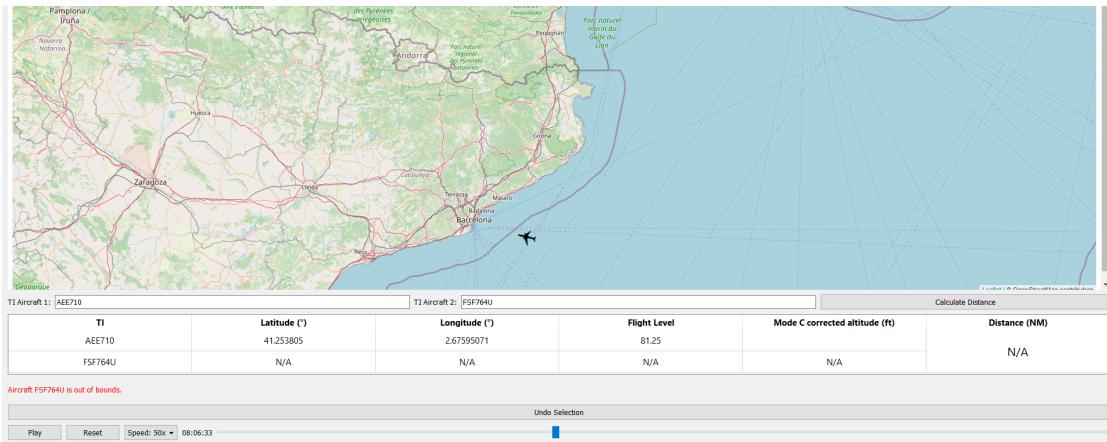
- Start the simulation if it has not been started yet (it can be paused, but it should have been started before).



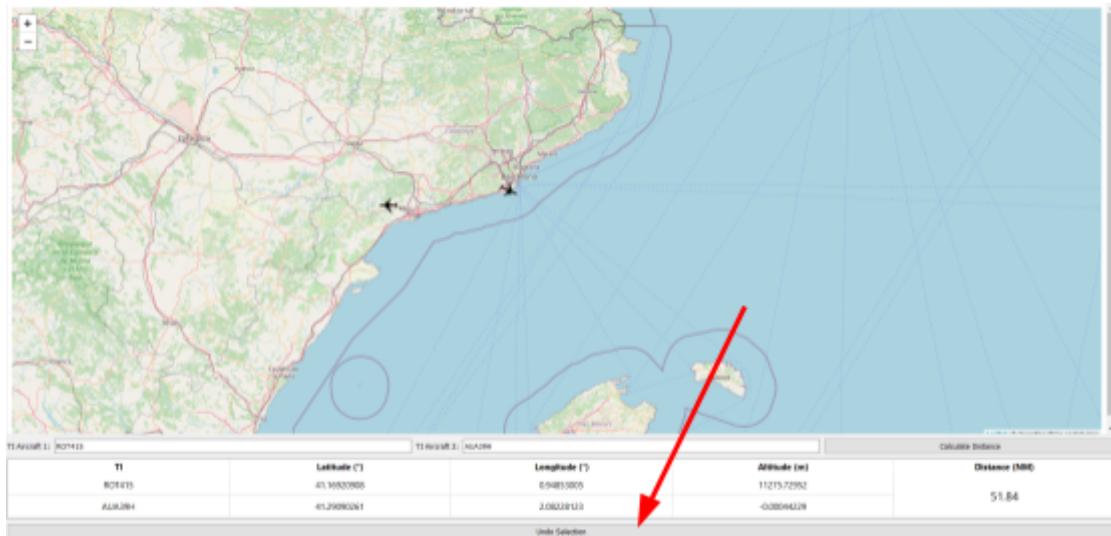
- If the simulation was already running, all the other aircraft will be removed from the map and only the two selected aircraft will be displayed. A table will appear showing the positions of the two aircraft and the distance between them, which will be updated with each cycle of the simulation. Below that table a button will also appear to clear the selection of the aircrafts.



- If, at any point, the data for one (or both) aircraft is unavailable (for example, if the aircraft is out of the simulation current range or has already left), the table will show "N/A" for that aircraft's information, and the distance will not be calculated. A message will appear below the table indicating that the aircraft is out of bounds. As the simulation progresses, if data for the aircraft becomes available, it will automatically update in the table. Similarly, if the aircraft moves out of range, the table will reflect that change.



- To see the distance between other aircraft simply repeat steps 1 and 2.
- Click on the Undo Selection button to reset the selection and all the aircrafts will reappear on the map at their current position when the simulation is running.



Help

Manual

This option is used to open this manual in the web browser from the app.

About

This option is used to view the general information about the app. It will show a message such as the following:

