Introduction 200 words

170/200

Our team decided to look for suitable areas around the world to reforest. We have chosen this particular theme as we are aware that trees and plants are essential to stop climate change. Every year we destroy around 15.3 billion trees worldwide (in 3 years, around an area the size of Costa Rica is demolished). It affects the species that coexist in the area, but it also hurts us. By destroying these natural wonders, we increase the threat of climate change.

The four main variables that affect if an area is eligible or not to afforest include soil moisture, elevation, slopes, and whether it already contains vegetation (chlorophyll).

**Using already processed data from European satellites (such as SENTINEL 2-A), our python program and three other files/databases that relate to elevation, slopes and soil moisture data obtained from space European entities we collected all the information we needed to choose the eligible areas to reforest.

The Astro-Pi took the images with a the blue filter which were then processed with NDVI principles to find which images haven't got chlorophyll. Images which information is between boundaries applied beforehand of things such as the elevation, slopes, and soil moisture data are accepted. Photos taken at night were rejected and not saved. A final image with the locations that can be potentially afforested will be saved.

Method 200 words

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We used Astro-Pi Izzy which faced the Earth with the blue filter installed. **Every time interval, an image was taken. We then found out whether that area in particular is suitable to afforest. In each stage of the algorithm, only previous valid images were analysed. This is a great advantage as the computing processing will be decreased, increasing the possibilities of taking more suitable images.**

We searched for the lack of chlorophyll concentration by using the Astro-Pi's NoIR camera to find which areas have more chlorophyll concentration. We did this by using the principles of the NVDI. This means that we know which places already contain a small or no vegetation, therefore, places which contain a forest are already discarded. **We then measured things such as altitude, slope, humidity levels and of course the location by using the longitude and latitude of each photo.****

All of our data was processed in Space. We created an excel file in which all of our data was laid out in a very organised way. Data from photo which were taken at night were not saved to have more space for those pictures which were actually successful.

** Añadir los limites, reorganizar la frase.

RESULTS 300 words

205/300

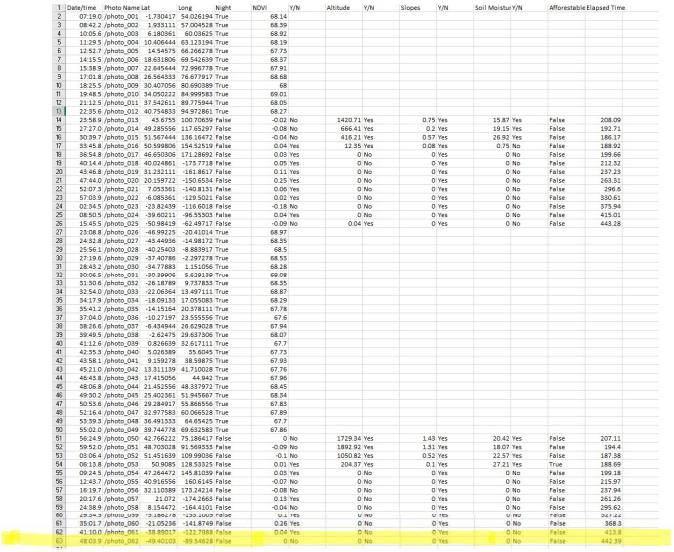
We only got one successful image however our program turned out successful too. Most of the night images were rejected immediately. As for the trajectory of the ISS it sadly took pictures of the sea during the day and of land during the night for the most part.

Below to the left we can see our good result (photo 053). We can see the confluence of the river Zaya (border between Russia and China) into the river Amur. River Zaya acts as a border between Russia and China. Our program identified this as a good area to reforest. In order to prove the success of our program we investigated the area to see if it was truly a good place to afforest. The land is around a river meaning fertile soil due to floods. Trees can actually help control those floods without the need of manmade barriers. The area is also relatively flat meaning easy to access.

To the right we can see a photo of the sea covered by a pattern of clouds. We weren't particularly lucky as many pictures are between 6/8th to 8/8th covered by clouds. This picture in particular is photo 024 taken in the pacific ocean, 2,116 km west from the city of Concepción, Chile.

Figure 1: 50°54'30.6"N 128°31'59.7"E (053)

Figure 2: 39°36'07.6"S 96°33'10.9"W (024)



Date/time	Photo Name	Lat	Long	Night	NDVI	Y/N	Altitude	Y/N	Slopes	Y/N	Soil Moistur	Y/N	Afforestable	Elapsed Time
07:19.0	/photo_001	-1.730417	54.026194	True	68.14									
08:42.2	/photo_002	1.933111	57.004528	True	68.39									
10:05.6	/photo_003	6.180361	60.03625	True	68.92									
11:29.5	/photo_004	10.406444	63.123194	True	68.19									
12:52.7	/photo_005	14.54575	66.166278	True	67.73									
14:15.5	/photo_006	18.631806	69.542639	True	68.37									
15:38.9	/photo_007	22.645444	72.996778	True	67.91									
17:01.8	/photo_008	26.564333	76.677917	True	68.68									
18:25.5	/photo_009	30.407056	80.690389	True	68									
19:48.5	/photo_010	34.050222	84.999583	True	69.01									
21:12.5	/photo_011	37.542611	89.775944	True	68.05									
22:35.6	/photo_012	40.754833	94.972861	True	68.27									
23:58.9	/photo_013	43.6755	100.70639	False	-0.02	No	1420.71	Yes	0.75	Yes	15.87	Yes	False	208.09
27:27.0	/photo_014	49.285556	117.65297	False	-0.08	No	666.41	Yes	0.2	Yes	19.15	Yes	False	192.71
30:39.7	/photo_015	51.567444	136.16472	False	-0.04	No	416.21	Yes	0.57	Yes	26.92	Yes	False	186.17
33:45.8	/photo_016	50.599806	154.52519	False	0.04	Yes	12.35	Yes	0.08	Yes	0.75	No	False	188.92
36:54.8	/photo_017	46.650306	171.28692	False	0.03	Yes	0	No	0	Yes	0	No	False	199.66
40:14.4	/photo_018	40.024861	-173.7718	False	0.05	Yes	0	No	0	Yes	0	No	False	212.32
43:46.8	/photo_019	31.232111	-161.8617	False	0.11	Yes	0	No	0	Yes	0	No	False	237.23
47:44.0	/photo_020	20.159722	-150.6534	False	0.25	Yes	0	No	0	Yes	0	No	False	263.31
52:07.3	/photo_021	7.053361	-140.8131	False	0.06	Yes	0	No	0	Yes	0	No	False	296.6
57:03.9	/photo_022	-6.085361	-129.5021	False	0.02	Yes	0	No	0	Yes	0	No	False	330.61
02:34.5	/photo_023	-23.82439	-116.6018	False	-0.18	No	0	No	0	Yes	0	No	False	375.94
08:50.5	/photo_024	-39.60211	-96.55503	False	0.04	Yes	0	No	0	Yes	0	No	False	415.01
15:45.5	/photo_025	-50.98419	-62.49717	False	-0.09	No	0.04	Yes	0	Yes	0	No	False	443.28
23:08.8	/photo_026	-46.99225	-20.41014	True	68.97									
24:32.8	/photo_027	-43.44936	-14.98172	True	68.35									
25:56.1	/photo_028	-40.25403	-8.883917	True	68.5									
27:19.8	/photo_029	-37.40786	-2.297278	True	68.53									
28:43.2	/photo_030	-34.77883	1.151056	True	68.28									
30:06.5	/photo_031	-30.29906	5.639139	True	69.08									
31:30.6	/photo_032	-26.18789	9.737833	True	68.35									
32:54.0	/photo_033	-22.06364	13.497111	True	68.87									
34:17.9	/photo_034	-18.09133	17.055083	True	68.29									
35:41.2	/photo_035	-14.15164	20.378111	True	67.78									
37:04.0	/photo_036	-10.27197	23.555556	True	67.6									
38:26.6	/photo_037	-6.434944	26.629028	True	67.94									
39:49.5	/photo_038	-2.62475	29.637306	True	68.07									
41:12.6	/photo_039	0.826639	32.617111	True	67.7									
42:35.3	/photo_040	5.026389	35.6045	True	67.73									
43:58.1	/photo_041	9.159278	38.59875	True	67.93									
45:21.0	/photo_042	13.311139	41.710028	True	67.76									
46:45.8	/photo_043	17.415056	44.942	True	67.96									
48:06.8	/photo_044	21.452556	48.337972	True	68.45									
49:30.2	/photo_045	25.402361	51.945667	True	68.34									
50:53.6	/photo_046	29.284917	55.866556	True	67.83									
52:16.4	/photo_047	32.977583	60.066528	True	67.89									
53:39.3	/photo_048	36.491333	64.65425	True	67.7									
55:02.0	/photo_049	39.744778	69.632583	True	67.86									
56:24.9	/photo_050	42.766222	75.186417	False	0	No	1729.34	Yes	1.43	Yes	20.42	Yes	False	207.11
59:52.0	/photo_051	48.703028	91.569333	False	-0.09	No	1892.92	Yes	1.31	Yes	18.07	Yes	False	194.4
03:06.4	/photo_052	51.451639	109.99036	False	-0.1	No	1050.82	Yes	0.52	Yes	22.57	Yes	False	187.38
06:13.8	/photo_053	50.9085	128.53325	False	0.01	Yes	234.37	Yes	0.1	Yes	27.21	Yes	True	188.69
09:24.5	/photo_054	47.264472	145.81039	False	0.03	Yes	0	No	0	Yes	0	No	False	199.18
12:43.7	/photo_055	40.916556	160.6145	False	-0.07	No	0	No	0	Yes	0	No	False	215.97
16:19.7	/photo_056	32.110389	173.24214	False	-0.08	No	0	No	0	Yes	0	No	False	237.94
20:17.6	/photo_057	21.072	-174.2663	False	0.13	Yes	0	No	0	Yes	0	No	False	261.26
24:38.9	/photo_058	8.154472	-164.4101	False	-0.04	No	0	No	0	Yes	0	No	False	295.62
29:24.7	/photo_059	-2.185478	-153.3049	False	0.11	Yes	0	No	0	Yes	0	No	False	347.44
35:01.7	/photo_060	-21.05236	-141.8749	False	0.26	Yes	0	No	0	Yes	0	No	False	368.3
41:10.0	/photo_061	-38.88017	-122.7988	False	0.04	Yes	0	No	0	Yes	0	No	False	413.8
48:03.9	/photo_062	-49.40103	-89.54628	False	0	No	0	No	0	Yes	0	No	False	442.39

Excel all Data

Conclusion 200 words.

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The experiment so to say, was very successful in terms of functionality. Sadly we weren´t lucky enough to get more images of land during the day.

If we could change anything, we would've maybe liked to run the program for longer to guarantee more results. Now that we know it works we could also add more categories to ensure the best results possible. In essence the program has a lot of potential and can be modified according to ones needs, having in mind not every plant or tree needs the exact same thing.

Image 053 was our one good result. As we expected the area is great to afforest.