

231	271	2022-11-05	12:01:29	2	14.651926994	121.058448792	0.0141	110.014
37.75	3.85							
232	270	2022-11-05	12:10:23	2	14.651926994	121.058448792	0.0141	110.119
37.5	3.86							
233	272	2022-11-05	12:21:35	2	14.651926994	121.058448792	0.0141	110.046
36.75	3.87							
234	273	2022-11-05	12:30:38	2	14.651926994	121.058448792	0.0141	109.992
36.5	3.88							
235	274	2022-11-05	12:40:21	2	14.651926994	121.058448792	0.0141	110.017
36.25	3.86							
236	275	2022-11-05	12:50:29	2	14.651926994	121.058448792	0.0141	110.018
36.25	3.86							
237	276	2022-11-05	13:00:24	2	14.651926994	121.058448792	0.0141	110.005
36.25	3.86							
238	278	2022-11-05	13:20:23	2	14.651926994	121.058448792	0.0141	110.021
36.5	3.88							
239	279	2022-11-05	13:30:39	2	14.651926994	121.058448792	0.0141	110.028
36.25	3.88							
240	280	2022-11-05	13:40:29	2	14.651926994	121.058448792	0.0141	110.008
35.75	3.87							
241	281	2022-11-05	13:50:22	2	14.651926994	121.058448792	0.0141	110.036
35.25	3.88							
242	283	2022-11-05	14:00:19	2	14.651926994	121.058448792	0.0141	110.036
34.75	3.87							
243	282	2022-11-05	14:10:30	2	14.651926994	121.058448792	0.0141	110.033
32.25	3.86							
244	284	2022-11-05	14:20:21	2	14.651926994	121.058448792	0.0141	110.031
30.75	3.86							
245	286	2022-11-05	14:40:11	2	14.651926994	121.058448792	0.0141	110.044
29.75	3.87							
246	287	2022-11-05	14:50:10	2	14.651926994	121.058448792	0.0141	110.043
29.5	3.86							
247	288	2022-11-05	15:10:12	2	14.651926994	121.058448792	0.0141	109.999
29.5	3.86							
248	289	2022-11-05	15:20:27	2	14.651926994	121.058448792	0.0141	110.003
29.5	3.88							
249	290	2022-11-05	15:40:47	2	14.651926994	121.058448792	0.0141	110.022
29.5	3.87							
250	292	2022-11-05	15:51:10	2	14.651926994	121.058448792	0.0141	110.026
29.75	3.89							
251	294	2022-11-05	16:00:56	2	14.651926994	121.058448792	0.0141	109.99
30.0	3.84							
252	293	2022-11-05	16:11:03	2	14.651926994	121.058448792	0.0141	110.017
30.0	3.86							
253	295	2022-11-05	16:30:47	2	14.651926994	121.058448792	0.0141	110.046
30.0	3.84							
254	296	2022-11-05	16:40:08	2	14.651919365	121.058410645	0.0141	74.8979
30.0	3.86							
255	297	2022-11-05	16:50:25	2	14.651926994	121.058448792	0.0141	110.032
30.0	3.86							
256	298	2022-11-05	17:00:09	2	14.651919365	121.058418274	0.0141	72.4826
30.0	3.87							
257	300	2022-11-05	17:21:02	2	14.651926994	121.058448792	0.0141	110.029
30.0	3.85							
258	301	2022-11-05	17:30:16	2	14.651926994	121.058448792	0.0141	110.03
30.0	3.84							
259	302	2022-11-05	17:40:25	2	14.651926994	121.058448792	0.0141	110.03
30.0	3.85							
260	303	2022-11-05	17:50:47	2	14.651926994	121.058448792	0.0141	110.019
29.75	3.85							
261	305	2022-11-05	18:00:40	2	14.651926994	121.058448792	0.0141	110.048
29.75	3.84							
262	304	2022-11-05	18:10:09	2	14.651891708	121.058456421	0.0141	72.4594

29.5	3.86						
263	306	2022-11-05	18:21:01	2	14.651926994	121.058448792	0.0141 110.047
29.5	3.84						
264	307	2022-11-05	18:31:22	2	14.651926994	121.058448792	0.0141 110.019
29.5	3.84						
265	308	2022-11-05	18:41:00	2	14.651926994	121.058448792	0.0141 110.054
29.25	3.84						
266	309	2022-11-05	18:50:23	2	14.651926994	121.058448792	0.0141 110.013
29.25	3.86						
267	310	2022-11-05	19:00:38	2	14.651926041	121.058448792	0.0141 110.006
29.25	3.87						
268	312	2022-11-05	19:20:37	2	14.651926994	121.058448792	0.0141 110.007
29.0	3.87						
269	314	2022-11-05	19:30:53	2	14.651926994	121.058448792	0.0141 110.033
29.0	3.85						
270	313	2022-11-05	19:40:52	2	14.651926994	121.058448792	0.0141 110.042
29.0	3.86						
271	315	2022-11-05	19:50:18	2	14.651864052	121.058418274	0.0141 75.34
29.0	3.84						
272	317	2022-11-05	20:10:32	2	14.651926994	121.058448792	0.0141 110.014
29.0	3.85						
273	318	2022-11-05	20:20:09	2	14.651859283	121.058441162	0.0141 77.2179
29.0	3.87						
274	320	2022-11-05	20:30:30	2	14.651926994	121.058448792	0.0141 110.025
28.75	3.87						
275	319	2022-11-05	20:40:34	2	14.651926994	121.058448792	0.0141 110.047
28.75	3.87						
276	321	2022-11-05	20:50:42	2	14.651926994	121.058448792	0.0141 110.036
28.75	3.86						
277	323	2022-11-05	21:01:07	2	14.651926994	121.058448792	0.0141 110.028
29.0	3.86						
278	322	2022-11-05	21:10:58	2	14.651926994	121.058448792	0.0141 110.023
29.0	3.86						
279	324	2022-11-05	21:20:35	2	14.651926994	121.058448792	0.0141 110.031
28.75	3.86						
280	325	2022-11-05	21:30:25	2	14.651926994	121.058448792	0.0141 110.056
28.75	3.86						
281	326	2022-11-05	21:40:23	2	14.651926994	121.058448792	0.0141 110.013
28.75	3.88						
282	329	2022-11-05	22:11:38	2	14.651926994	121.058448792	0.0141 110.094
29.0	3.86						
283	330	2022-11-05	22:20:55	2	14.651926994	121.058448792	0.0141 110.019
28.75	3.86						
284	332	2022-11-05	22:40:47	2	14.651926994	121.058448792	0.0141 110.021
28.5	3.86						
285	333	2022-11-05	22:50:49	2	14.651926994	121.058448792	0.0141 110.021
28.5	3.84						
286	334	2022-11-05	23:00:33	2	14.651926994	121.058448792	0.0141 110.033
28.5	3.86						
287	335	2022-11-05	23:10:39	2	14.651926994	121.058448792	0.0141 110.02
28.5	3.84						
288	336	2022-11-05	23:20:25	2	14.651926994	121.058448792	0.0141 110.021
28.5	3.86						
289	338	2022-11-05	23:30:34	2	14.651926994	121.058448792	0.0141 110.017
28.5	3.88						
290	337	2022-11-05	23:40:40	2	14.651926994	121.058448792	0.0141 110.05
28.5	3.86						
291	339	2022-11-05	23:50:30	2	14.651926994	121.058448792	0.0141 110.014
28.25	3.85						
292	340	2022-11-06	00:00:30	2	14.651926994	121.058448792	0.0141 110.022
28.25	3.84						
293	341	2022-11-06	00:20:34	2	14.651926994	121.058448792	0.0141 110.016
28.25	3.88						

294	342	2022-11-06 00:30:35	2	14.651926994	121.058448792	0.0141	109.996
28.25	3.86						
295	343	2022-11-06 00:41:07	2	14.651926994	121.058448792	0.0141	110.029
28.25	3.86						
296	344	2022-11-06 00:50:42	2	14.651926994	121.058448792	0.0141	110.005
28.25	3.85						
297	347	2022-11-06 01:21:12	2	14.651926994	121.058448792	0.0141	110.032
28.0	3.85						
298	348	2022-11-06 01:30:40	2	14.651926994	121.058448792	0.0141	110.004
28.0	3.85						
299	349	2022-11-06 01:41:15	2	14.651926994	121.058448792	0.0141	110.095
28.0	3.85						
300	350	2022-11-06 01:51:02	2	14.651926994	121.058448792	0.0141	110.009
28.0	3.85						
301	351	2022-11-06 02:00:44	2	14.651926994	121.058448792	0.0141	110.02
28.0	3.84						
302	352	2022-11-06 02:11:07	2	14.651926994	121.058448792	0.0141	110.056
28.0	3.85						
303	353	2022-11-06 02:21:47	2	14.651926994	121.058448792	0.0141	110.063
28.25	3.86						
304	354	2022-11-06 02:30:14	2	14.651908875	121.058418274	0.0141	77.2939
28.0	3.86						
305	355	2022-11-06 02:40:43	2	14.651926994	121.058448792	0.0141	110.021
28.25	3.84						
306	356	2022-11-06 02:50:08	2	14.651912689	121.058425903	0.0141	74.0113
28.25	3.86						
307	358	2022-11-06 03:00:45	2	14.651926994	121.058448792	0.0141	110.038
28.0	3.86						
308	357	2022-11-06 03:10:36	2	14.651926994	121.058448792	0.0141	110.012
28.0	3.85						
309	359	2022-11-06 03:20:40	2	14.651926994	121.058448792	0.0141	110.021
28.0	3.84						
310	361	2022-11-06 03:30:32	2	14.651926994	121.058448792	0.0141	110.027
28.0	3.85						
311	360	2022-11-06 03:40:32	2	14.651926994	121.058448792	0.0141	110.037
27.75	3.85						
312	362	2022-11-06 03:50:40	2	14.651926994	121.058448792	0.0141	110.014
27.75	3.86						
313	363	2022-11-06 04:00:43	2	14.651926994	121.058448792	0.0141	110.019
27.75	3.86						
314	364	2022-11-06 04:10:12	2	14.651931763	121.058433533	0.0141	69.2789
27.75	3.85						
315	365	2022-11-06 04:20:50	2	14.651926994	121.058448792	0.0141	110.039
27.75	3.86						
316	366	2022-11-06 04:30:51	2	14.651926994	121.058448792	0.0141	110.041
27.75	3.85						
317	367	2022-11-06 04:40:45	2	14.651926994	121.058448792	0.0141	110.025
27.75	3.86						
318	368	2022-11-06 04:50:36	2	14.651926994	121.058448792	0.0141	110.018
27.75	3.84						
319	370	2022-11-06 05:00:43	2	14.651926994	121.058448792	0.0141	110.014
28.0	3.86						
320	369	2022-11-06 05:10:48	2	14.651926994	121.058448792	0.0141	109.999
28.0	3.85						
321	371	2022-11-06 05:20:39	2	14.651926994	121.058448792	0.0141	110.028
28.0	3.85						
322	373	2022-11-06 05:40:29	2	14.651926994	121.058448792	0.0141	110.006
27.75	3.86						
323	374	2022-11-06 05:50:42	2	14.651926994	121.058448792	0.0141	110.027
27.75	3.86						
324	376	2022-11-06 06:00:35	2	14.651926994	121.058448792	0.0141	110.002
27.75	3.85						
325	375	2022-11-06 06:10:30	2	14.651926994	121.058448792	0.0141	110.026

27.75	3.84						
326	377	2022-11-06 06:20:40	2	14.651926994	121.058448792	0.0141	110.026
27.75	3.84						
327	378	2022-11-06 06:30:14	2	14.651918411	121.058433533	0.0141	75.7012
27.75	3.85						
328	379	2022-11-06 06:40:27	2	14.651904106	121.058410645	0.0141	80.0737
28.0	3.84						
329	380	2022-11-06 07:00:39	2	14.651926994	121.058448792	0.0141	109.977
28.0	3.86						
330	381	2022-11-06 07:10:24	2	14.651926994	121.058448792	0.0141	110.015
28.25	3.84						
331	382	2022-11-06 07:20:26	2	14.651926994	121.058448792	0.0141	110.025
28.25	3.87						
332	383	2022-11-06 07:30:37	2	14.651926994	121.058448792	0.0141	110.049
28.5	3.85						
333	384	2022-11-06 07:40:30	2	14.651926994	121.058448792	0.0141	110.023
28.75	3.84						
334	385	2022-11-06 07:50:41	2	14.651926994	121.058448792	0.0141	110.025
29.0	3.84						
335	386	2022-11-06 08:01:03	2	14.651926994	121.058448792	0.0141	110.011
29.25	3.88						
336	387	2022-11-06 08:11:34	2	14.651926994	121.058448792	0.0141	110.01
29.5	3.85						
337	388	2022-11-06 08:21:30	2	14.651926994	121.058448792	0.0141	110.02
29.75	3.84						
338	389	2022-11-06 08:30:42	2	14.651926994	121.058448792	0.0141	110.026
29.75	3.84						
339	390	2022-11-06 08:40:36	2	14.651926041	121.058448792	0.0141	109.969
30.0	3.87						
340	391	2022-11-06 08:50:49	2	14.651926994	121.058448792	0.0141	110.014
30.0	3.86						
341	392	2022-11-06 09:00:39	2	14.651926994	121.058448792	0.0141	110.038
30.0	3.85						
342	393	2022-11-06 09:10:50	2	14.651926994	121.058448792	0.0141	110.011
30.25	3.86						
343	394	2022-11-06 09:20:20	2	14.651926994	121.058448792	0.0141	109.89
30.25	3.84						
344	395	2022-11-06 09:30:19	2	14.651926041	121.058448792	0.0141	110.027
30.5	3.89						
345	397	2022-11-06 09:50:31	2	14.651926994	121.058448792	0.0141	109.996
31.0	3.84						
346	398	2022-11-06 10:00:35	2	14.651926994	121.058448792	0.0141	109.985
31.25	3.86						
347	399	2022-11-06 10:10:32	2	14.651926994	121.058448792	0.0141	110.013
31.5	3.86						
348	401	2022-11-06 10:40:27	2	14.651926994	121.058448792	0.0141	110.027
34.0	3.86						
349	402	2022-11-06 10:50:26	2	14.651926994	121.058448792	0.0141	110.023
35.25	3.86						
350	403	2022-11-06 11:00:19	2	14.651926994	121.058448792	0.0141	110.027
36.5	3.86						
351	404	2022-11-06 11:10:22	2	14.651926994	121.058448792	0.0141	110.013
37.75	3.85						
352	406	2022-11-06 11:30:14	2	14.651921272	121.058433533	0.0141	75.2818
38.5	3.88						
353	407	2022-11-06 11:40:40	2	14.651926994	121.058448792	0.0141	110.037
39.25	3.88						
354	409	2022-11-06 12:00:26	2	14.651926994	121.058448792	0.0141	110.034
38.25	3.85						
355	411	2022-11-06 12:20:18	2	14.651926994	121.058448792	0.0141	110.033
37.75	3.86						
356	412	2022-11-06 12:30:45	2	14.651926994	121.058448792	0.0141	110.012
37.25	3.85						

357	413	2022-11-06	12:40:24	2	14.651926994	121.058448792	0.0141	110.142
36.5	3.86							
358	415	2022-11-06	13:00:44	2	14.651926994	121.058448792	0.0141	110.023
35.5	3.87							
359	417	2022-11-06	13:20:15	2	14.651893616	121.058433533	0.0141	74.6968
35.0	3.85							
360	418	2022-11-06	13:30:34	2	14.651926994	121.058448792	0.0141	110.011
34.75	3.88							
361	419	2022-11-06	13:40:23	2	14.651926994	121.058448792	0.0141	110.031
35.0	3.85							
362	420	2022-11-06	13:50:23	2	14.651926994	121.058448792	0.0141	110.007
35.0	3.84							
363	422	2022-11-06	14:10:23	2	14.651926994	121.058448792	0.0141	110.027
35.0	3.86							
364	423	2022-11-06	14:20:16	2	14.651926994	121.058448792	0.0141	110.04
35.25	3.87							
365	424	2022-11-06	14:30:17	2	14.651926994	121.058448792	0.0141	110.049
35.0	3.87							
366	426	2022-11-06	14:50:16	2	14.651926994	121.058448792	0.0141	109.955
35.0	3.88							
367	427	2022-11-06	15:00:25	2	14.651926994	121.058448792	0.0141	110.083
34.75	3.86							
368	428	2022-11-06	15:10:19	2	14.651926994	121.058448792	0.0141	110.013
34.75	3.86							
369	429	2022-11-06	15:20:16	2	14.651926994	121.058448792	0.0141	110.03
34.75	3.86							
370	430	2022-11-06	15:30:11	2	14.651926994	121.058448792	0.0141	109.996
34.5	3.85							
371	431	2022-11-06	15:51:12	2	14.651926994	121.058448792	0.0141	109.938
34.25	3.88							
372	432	2022-11-06	16:00:57	2	14.651926994	121.058448792	0.0141	110.013
34.25	3.88							
373	433	2022-11-06	16:11:13	2	14.651926994	121.058448792	0.0141	110.015
34.5	3.88							
374	434	2022-11-06	16:21:04	2	14.651926994	121.058448792	0.0141	110.034
34.25	3.88							
375	436	2022-11-06	16:30:16	2	14.651926994	121.058448792	0.0141	110.009
34.0	3.88							
376	435	2022-11-06	16:40:19	2	14.651926994	121.058448792	0.0141	110.013
33.75	3.86							
377	437	2022-11-06	16:51:10	2	14.651926994	121.058448792	0.0141	109.999
33.5	3.86							
378	438	2022-11-06	17:00:24	2	14.651926041	121.058448792	0.0141	109.834
33.0	3.85							
379	440	2022-11-06	17:20:26	2	14.651926041	121.058448792	0.0141	110.047
32.5	3.86							
380	442	2022-11-06	17:41:00	2	14.651926994	121.058448792	0.0141	110.032
32.0	3.83							
381	443	2022-11-06	17:50:42	2	14.651926994	121.058448792	0.0141	110.033
31.75	3.84							
382	444	2022-11-06	18:00:34	2	14.651926994	121.058448792	0.0141	110.017
31.75	3.88							
383	446	2022-11-06	18:20:15	2	14.651926994	121.058448792	0.0141	110.029
31.5	3.84							
384	449	2022-11-06	18:30:28	2	14.651926994	121.058448792	0.0141	110.01
31.5	3.86							
385	447	2022-11-06	18:40:20	2	14.651926994	121.058448792	0.0141	109.997
31.25	3.87							
386	448	2022-11-06	18:50:32	2	14.651926994	121.058448792	0.0141	110.021
31.25	3.88							
387	452	2022-11-06	19:20:37	2	14.651926994	121.058448792	0.0141	110.026
31.0	3.84							
388	453	2022-11-06	19:30:40	2	14.651926994	121.058448792	0.0141	110.033

31.0	3.86						
389	455	2022-11-06	19:50:28	2	14.651926994	121.058448792	0.0141 110.033
31.0	3.87						
390	457	2022-11-06	20:00:20	2	14.651926994	121.058448792	0.0141 110.02
30.75	3.85						
391	456	2022-11-06	20:10:22	2	14.651926994	121.058448792	0.0141 110.031
30.75	3.85						
392	459	2022-11-06	20:30:42	2	14.651926994	121.058448792	0.0141 110.016
30.5	3.85						
393	460	2022-11-06	20:40:10	2	14.651877403	121.058441162	0.0141 74.5029
30.25	3.87						
394	462	2022-11-06	21:00:15	2	14.651857376	121.058456421	0.0141 73.6548
30.25	3.85						
395	464	2022-11-06	21:20:29	2	14.651926994	121.058448792	0.0141 110.014
30.25	3.86						
396	465	2022-11-06	21:30:55	2	14.651926994	121.058448792	0.0141 109.994
30.0	3.86						
397	466	2022-11-06	21:40:46	2	14.651926041	121.058448792	0.0141 109.961
30.0	3.86						
398	467	2022-11-06	21:50:37	2	14.651926994	121.058448792	0.0141 109.988
30.0	3.87						
399	469	2022-11-06	22:00:45	2	14.651926041	121.058448792	0.0141 110.021
29.75	3.86						
400	468	2022-11-06	22:10:39	2	14.651926994	121.058448792	0.0141 110.007
29.75	3.86						
401	470	2022-11-06	22:21:07	2	14.651926994	121.058448792	0.0141 110.114
29.75	3.86						
402	471	2022-11-06	22:30:34	2	14.651926994	121.058448792	0.0141 109.999
29.5	3.86						
403	472	2022-11-06	22:40:51	2	14.651926041	121.058448792	0.0141 110.121
29.5	3.88						
404	473	2022-11-06	22:50:09	2	14.65189743	121.058410645	0.0141 74.6962
29.25	3.86						
405	474	2022-11-06	23:00:07	2	14.651908875	121.058433533	0.0141 77.5942
29.25	3.86						
406	475	2022-11-06	23:10:40	2	14.651926994	121.058448792	0.0141 110.02
29.25	3.86						
407	476	2022-11-06	23:20:33	2	14.651926994	121.058448792	0.0141 110.008
29.25	3.85						
408	477	2022-11-06	23:30:22	2	14.651926994	121.058448792	0.0141 110.036
29.25	3.86						
409	478	2022-11-06	23:40:27	2	14.651926994	121.058448792	0.0141 110.026
29.25	3.87						
410	479	2022-11-06	23:50:28	2	14.651926994	121.058448792	0.0141 110.008
29.0	3.86						
411	480	2022-11-07	00:00:34	2	14.651926994	121.058448792	0.0141 110.029
29.0	3.85						
412	481	2022-11-07	00:10:32	2	14.651926994	121.058448792	0.0141 110.016
29.0	3.86						
413	482	2022-11-07	00:20:36	2	14.651926994	121.058448792	0.0141 110.01
29.0	3.86						
414	484	2022-11-07	00:30:48	2	14.651926994	121.058448792	0.0141 110.019
28.75	3.86						
415	483	2022-11-07	00:40:49	2	14.651926994	121.058448792	0.0141 109.973
28.75	3.86						
416	485	2022-11-07	00:50:44	2	14.651926994	121.058448792	0.0141 110.051
28.75	3.86						
417	487	2022-11-07	01:00:58	2	14.651926994	121.058448792	0.0141 110.014
28.75	3.88						
418	486	2022-11-07	01:10:54	2	14.651926994	121.058448792	0.0141 110.011
28.5	3.86						
419	488	2022-11-07	01:20:53	2	14.651926994	121.058448792	0.0141 109.992
28.5	3.84						

420	489	2022-11-07 01:30:56	2	14.651926994	121.058448792	0.0141	110.015
28.5	3.86						
421	490	2022-11-07 01:40:52	2	14.651926994	121.058448792	0.0141	110.015
28.5	3.86						
422	491	2022-11-07 01:51:02	2	14.651926994	121.058448792	0.0141	109.99
28.5	3.86						
423	492	2022-11-07 02:00:57	2	14.651926994	121.058448792	0.0141	110.018
28.5	3.85						
424	493	2022-11-07 02:10:52	2	14.651926994	121.058448792	0.0141	110.015
28.5	3.86						
425	494	2022-11-07 02:20:55	2	14.651926994	121.058448792	0.0141	110.023
28.5	3.85						
426	495	2022-11-07 02:30:51	2	14.651926994	121.058448792	0.0141	110.02
28.5	3.85						
427	496	2022-11-07 02:40:44	2	14.651926994	121.058448792	0.0141	110.041
28.25	3.84						
428	498	2022-11-07 03:00:33	2	14.651926994	121.058448792	0.0141	110.019
28.25	3.86						
429	499	2022-11-07 03:10:26	2	14.651910782	121.058418274	0.0141	81.7094
28.25	3.87						
430	500	2022-11-07 03:20:41	2	14.651926994	121.058448792	0.0141	110.017
28.25	3.86						
431	501	2022-11-07 03:30:07	2	14.651916504	121.058425903	0.0141	74.8966
28.0	3.84						
432	502	2022-11-07 03:40:42	2	14.651926994	121.058448792	0.0141	110.021
28.0	3.86						
433	503	2022-11-07 03:50:48	2	14.651926994	121.058448792	0.0141	110.013
28.25	3.85						
434	504	2022-11-07 04:00:41	2	14.651913643	121.058433533	0.0141	78.4318
28.0	3.87						
435	505	2022-11-07 04:10:48	2	14.651926994	121.058448792	0.0141	110.024
28.0	3.86						
436	506	2022-11-07 04:20:53	2	14.651926994	121.058448792	0.0141	110.039
28.0	3.86						
437	507	2022-11-07 04:30:09	2	14.651917458	121.058425903	0.0141	67.9477
28.0	3.86						
438	508	2022-11-07 04:40:48	2	14.651926994	121.058448792	0.0141	110.002
28.0	3.84						
439	509	2022-11-07 04:50:54	2	14.651926994	121.058448792	0.0141	109.996
28.0	3.86						
440	510	2022-11-07 05:00:42	2	14.651926994	121.058448792	0.0141	110.068
28.0	3.85						
441	511	2022-11-07 05:10:45	2	14.651926994	121.058448792	0.0141	110.009
27.75	3.85						
442	512	2022-11-07 05:20:40	2	14.651926994	121.058448792	0.0141	109.993
27.75	3.86						
443	514	2022-11-07 05:30:39	2	14.651926994	121.058448792	0.0141	110.024
27.75	3.85						
444	513	2022-11-07 05:40:41	2	14.651926994	121.058448792	0.0141	109.99
27.75	3.85						
445	515	2022-11-07 05:50:46	2	14.651926994	121.058448792	0.0141	110.001
27.75	3.86						
446	517	2022-11-07 06:00:12	2	14.651919365	121.058441162	0.0141	70.1263
27.75	3.86						
447	516	2022-11-07 06:10:39	2	14.651926994	121.058448792	0.0141	109.985
27.75	3.86						
448	518	2022-11-07 06:20:35	2	14.651926994	121.058448792	0.0141	109.996
27.75	3.84						
449	519	2022-11-07 06:30:22	2	14.651926994	121.058448792	0.0141	110.012
27.75	3.85						
450	520	2022-11-07 06:40:34	2	14.651926994	121.058448792	0.0141	110.036
27.75	3.85						
451	521	2022-11-07 06:50:31	2	14.651926994	121.058448792	0.0141	109.995

27.75	3.85						
452	522	2022-11-07 07:00:21	2	14.651926994	121.058448792	0.0141	110.027
27.75	3.87						
453	523	2022-11-07 07:10:21	2	14.651926994	121.058448792	0.0141	110.006
28.0	3.86						
454	524	2022-11-07 07:20:20	2	14.651926994	121.058448792	0.0141	110.056
28.0	3.84						
455	526	2022-11-07 07:30:40	2	14.651926994	121.058448792	0.0141	110.017
28.25	3.85						
456	525	2022-11-07 07:40:11	2	14.651919365	121.058433533	0.0141	73.9865
28.25	3.88						
457	528	2022-11-07 08:00:41	2	14.651926994	121.058448792	0.0141	110.015
28.75	3.83						
458	529	2022-11-07 08:11:03	2	14.651926994	121.058448792	0.0141	110.019
29.0	3.86						
459	532	2022-11-07 08:31:05	2	14.651926994	121.058448792	0.0141	109.92
29.5	3.86						
460	531	2022-11-07 08:40:42	2	14.651926994	121.058448792	0.0141	110.019
30.0	3.88						
461	533	2022-11-07 08:50:33	2	14.651926994	121.058448792	0.0141	110.008
30.0	3.86						
462	534	2022-11-07 09:00:31	2	14.651926994	121.058448792	0.0141	110.001
30.25	3.86						
463	535	2022-11-07 09:10:34	2	14.651926994	121.058448792	0.0141	109.97
30.75	3.85						
464	537	2022-11-07 09:30:34	2	14.651926994	121.058448792	0.0141	110.018
33.75	3.88						
465	539	2022-11-07 09:51:02	2	14.651926994	121.058448792	0.0141	110.012
37.0	3.88						
466	540	2022-11-07 10:00:50	2	14.651926994	121.058448792	0.0141	110.001
39.0	3.88						
467	541	2022-11-07 10:11:02	2	14.651926041	121.058448792	0.0141	109.993
40.75	3.85						
468	543	2022-11-07 10:40:33	2	14.651926994	121.058448792	0.0141	110.007
41.25	3.86						
469	545	2022-11-07 10:50:11	2	14.651946068	121.058441162	0.0141	72.1689
42.5	3.88						
470	546	2022-11-07 11:00:20	2	14.651970863	121.058456421	0.0141	79.0093
43.75	3.88						
471	548	2022-11-07 11:20:39	2	14.651926994	121.058448792	0.0141	110.039
44.0	3.86						
472	550	2022-11-07 11:30:38	2	14.651926994	121.058448792	0.0141	109.988
44.0	3.87						
473	549	2022-11-07 11:40:35	2	14.651926994	121.058448792	0.0141	110.038
42.75	3.86						
474	551	2022-11-07 11:50:31	2	14.651926994	121.058448792	0.0141	110.038
41.25	3.88						
475	552	2022-11-07 12:00:29	2	14.651926994	121.058448792	0.0141	110.021
40.5	3.87						
476	553	2022-11-07 12:10:33	2	14.651926994	121.058448792	0.0141	110.026
39.25	3.86						
477	554	2022-11-07 12:21:04	2	14.651926994	121.058448792	0.0141	110.02
38.5	3.85						
478	556	2022-11-07 12:30:37	2	14.651926041	121.058448792	0.0141	110.02
37.75	3.88						
479	555	2022-11-07 12:40:48	2	14.651926994	121.058448792	0.0141	109.76
37.25	3.85						
480	557	2022-11-07 12:50:31	2	14.651926994	121.058448792	0.0141	110.036
37.75	3.86						
481	558	2022-11-07 13:00:28	2	14.651926994	121.058448792	0.0141	110.021
37.5	3.86						
482	559	2022-11-07 13:11:16	2	14.651926994	121.058448792	0.0141	110.025
37.0	3.86						

483	560	2022-11-07	13:21:33	2	14.651926994	121.058448792	0.0141	110.026
36.75	3.88							
484	561	2022-11-07	13:30:55	2	14.651926994	121.058448792	0.0141	110.006
36.5	3.89							
485	562	2022-11-07	13:40:23	2	14.651926994	121.058448792	0.0141	110.007
36.25	3.84							
486	563	2022-11-07	13:50:27	2	14.651926994	121.058448792	0.0141	110.013
36.0	3.85							
487	564	2022-11-07	14:00:18	2	14.651926994	121.058448792	0.0141	110.036
35.75	3.88							
488	565	2022-11-07	14:10:23	2	14.651926994	121.058448792	0.0141	110.036
35.75	3.86							
489	566	2022-11-07	14:20:19	2	14.651926994	121.058448792	0.0141	110.024
35.5	3.87							
490	567	2022-11-07	14:30:16	2	14.651926994	121.058448792	0.0141	110.023
35.5	3.88							
491	568	2022-11-07	14:40:12	2	14.651926994	121.058448792	0.0141	110.03
35.5	3.87							
492	569	2022-11-07	14:50:16	2	14.651926994	121.058448792	0.0141	110.114
35.25	3.87							
493	570	2022-11-07	15:00:15	2	14.651926994	121.058448792	0.0141	110.079
35.25	3.86							
494	571	2022-11-07	15:10:22	2	14.651926994	121.058448792	0.0141	109.913
35.25	3.86							
495	572	2022-11-07	15:20:58	2	14.651926994	121.058448792	0.0141	110.019
35.25	3.87							
496	573	2022-11-07	15:30:36	2	14.651926994	121.058448792	0.0141	109.998
35.25	3.87							
497	574	2022-11-07	15:40:54	2	14.651926994	121.058448792	0.0141	110.031
35.25	3.88							
498	575	2022-11-07	15:50:23	2	14.651926994	121.058448792	0.0141	110.017
35.25	3.87							
499	576	2022-11-07	16:00:25	2	14.651926994	121.058448792	0.0141	110.044
35.25	3.84							

In [15]:

In [16]:

Out[16]:

	ts	fix_type	latitude	longitude	accuracy	msl_round	freq
0	2022-11-03 13:50:11	2	14.651926994	121.058448792	0.0141	110.03	71
1	2022-11-03 14:20:49	2	14.651926994	121.058448792	0.0141	110.0	42
2	2022-11-03 14:30:19	2	14.651926994	121.058448792	0.0141	110.02	125
3	2022-11-03 14:40:19	2	14.651926994	121.058448792	0.0141	110.02	125
4	2022-11-03 14:50:13	2	14.651926994	121.058448792	0.0141	110.02	125
5	2022-11-03 15:00:15	2	14.651926994	121.058448792	0.0141	110.04	50
6	2022-11-03 15:10:22	2	14.651926994	121.058448792	0.0141	110.02	125
7	2022-11-03 15:20:55	2	14.651926994	121.058448792	0.0141	110.02	125
8	2022-11-03 15:31:09	2	14.651926994	121.058448792	0.0141	110.03	71
9	2022-11-03 15:51:03	2	14.651926994	121.058448792	0.0141	110.02	125
10	2022-11-03 16:11:16	2	14.651926994	121.058448792	0.0141	110.04	50
11	2022-11-03 16:20:18	2	14.651926994	121.058448792	0.0141	110.04	50
12	2022-11-03 16:50:46	2	14.651926994	121.058448792	0.0141	110.01	72
13	2022-11-03 17:00:40	2	14.651926994	121.058448792	0.0141	110.04	50
14	2022-11-03 17:10:39	2	14.651926994	121.058448792	0.0141	110.0	42
15	2022-11-03 17:20:48	2	14.651926994	121.058448792	0.0141	110.02	125
16	2022-11-03 17:50:30	2	14.651926994	121.058448792	0.0141	110.02	125
17	2022-11-03 18:00:28	2	14.651926994	121.058448792	0.0141	110.02	125
18	2022-11-03 18:20:13	2	14.651926994	121.058448792	0.0141	110.03	71
19	2022-11-03 18:30:30	2	14.651926994	121.058448792	0.0141	110.03	71
20	2022-11-03 19:00:48	2	14.651926994	121.058448792	0.0141	110.01	72
21	2022-11-03 19:30:40	2	14.651926994	121.058448792	0.0141	110.0	42
22	2022-11-03 19:50:27	2	14.651926994	121.058448792	0.0141	110.02	125

23	2022-11-03	20:00:35	2	14.651926994	121.058448792	0.0141	110.01	72
24	2022-11-03	20:30:51	2	14.651926994	121.058448792	0.0141	110.03	71
25	2022-11-03	20:50:48	2	14.651926994	121.058448792	0.0141	110.02	125
26	2022-11-03	21:20:48	2	14.651926994	121.058448792	0.0141	110.01	72
27	2022-11-03	21:30:44	2	14.651926994	121.058448792	0.0141	110.02	125
28	2022-11-03	21:50:34	2	14.651926994	121.058448792	0.0141	110.03	71
29	2022-11-03	22:10:48	2	14.651926994	121.058448792	0.0141	110.02	125
30	2022-11-03	22:40:43	2	14.651926994	121.058448792	0.0141	110.02	125
31	2022-11-03	22:50:50	2	14.651926994	121.058448792	0.0141	110.0	42
32	2022-11-03	23:00:34	2	14.651926994	121.058448792	0.0141	110.04	50
33	2022-11-03	23:10:33	2	14.651926994	121.058448792	0.0141	110.02	125
34	2022-11-03	23:20:32	2	14.651926994	121.058448792	0.0141	110.01	72
35	2022-11-03	23:30:42	2	14.651926994	121.058448792	0.0141	110.04	50
36	2022-11-03	23:40:26	2	14.651926994	121.058448792	0.0141	110.04	50
37	2022-11-03	23:50:25	2	14.651926994	121.058448792	0.0141	110.04	50
38	2022-11-04	00:00:29	2	14.651926994	121.058448792	0.0141	110.03	71
39	2022-11-04	00:20:24	2	14.651926994	121.058448792	0.0141	110.02	125
40	2022-11-04	00:30:29	2	14.651926994	121.058448792	0.0141	110.02	125
41	2022-11-04	00:50:28	2	14.651926994	121.058448792	0.0141	110.02	125
42	2022-11-04	01:00:32	2	14.651926994	121.058448792	0.0141	110.0	42
43	2022-11-04	01:31:09	2	14.651926994	121.058448792	0.0141	110.02	125
44	2022-11-04	01:40:50	2	14.651926041	121.058448792	0.0141	110.02	125
45	2022-11-04	02:00:52	2	14.651926994	121.058448792	0.0141	110.02	125
46	2022-11-04	02:10:35	2	14.651926994	121.058448792	0.0141	110.04	50
47	2022-11-04	02:20:35	2	14.651926994	121.058448792	0.0141	110.03	71
48	2022-11-04	02:30:43	2	14.651926994	121.058448792	0.0141	110.04	50
49	2022-11-04	02:40:35	2	14.651926994	121.058448792	0.0141	110.01	72
50	2022-11-04	02:50:35	2	14.651926994	121.058448792	0.0141	110.03	71
51	2022-11-04	03:00:36	2	14.651926994	121.058448792	0.0141	110.04	50
52	2022-11-04	03:10:38	2	14.651926994	121.058448792	0.0141	110.04	50
53	2022-11-04	03:20:41	2	14.651926994	121.058448792	0.0141	110.03	71
54	2022-11-04	03:30:31	2	14.651926994	121.058448792	0.0141	110.03	71
55	2022-11-04	04:00:33	2	14.651926994	121.058448792	0.0141	110.04	50
56	2022-11-04	04:10:42	2	14.651926994	121.058448792	0.0141	110.02	125
57	2022-11-04	04:30:52	2	14.651926994	121.058448792	0.0141	110.03	71
58	2022-11-04	04:41:00	2	14.651926994	121.058448792	0.0141	110.0	42
59	2022-11-04	05:00:39	2	14.651926994	121.058448792	0.0141	110.0	42
60	2022-11-04	05:10:43	2	14.651926994	121.058448792	0.0141	110.02	125
61	2022-11-04	05:30:43	2	14.651926994	121.058448792	0.0141	110.02	125
62	2022-11-04	05:50:40	2	14.651926994	121.058448792	0.0141	110.01	72
63	2022-11-04	06:00:39	2	14.651926994	121.058448792	0.0141	110.04	50
64	2022-11-04	06:10:37	2	14.651926994	121.058448792	0.0141	110.02	125
65	2022-11-04	06:40:24	2	14.651926994	121.058448792	0.0141	110.02	125
66	2022-11-04	06:50:27	2	14.651926994	121.058448792	0.0141	110.01	72
67	2022-11-04	07:00:28	2	14.651926994	121.058448792	0.0141	110.0	42
68	2022-11-04	07:20:18	2	14.651926994	121.058448792	0.0141	110.01	72
69	2022-11-04	07:30:39	2	14.651926994	121.058448792	0.0141	110.0	42
70	2022-11-04	08:30:34	2	14.651926994	121.058448792	0.0141	110.01	72
71	2022-11-04	08:40:56	2	14.651926994	121.058448792	0.0141	110.0	42
72	2022-11-04	08:50:41	2	14.651926994	121.058448792	0.0141	110.04	50
73	2022-11-04	09:11:10	2	14.651926041	121.058448792	0.0141	110.01	72
74	2022-11-04	09:40:29	2	14.651926994	121.058448792	0.0141	110.02	125
75	2022-11-04	10:30:28	2	14.651926994	121.058448792	0.0141	110.02	125
76	2022-11-04	11:01:10	2	14.651926994	121.058448792	0.0141	110.02	125
77	2022-11-04	11:40:36	2	14.651926994	121.058448792	0.0141	110.03	71
78	2022-11-04	11:50:24	2	14.651926994	121.058448792	0.0141	110.01	72
79	2022-11-04	12:00:37	2	14.651926994	121.058448792	0.0141	110.02	125
80	2022-11-04	12:50:24	2	14.651926994	121.058448792	0.0141	110.01	72
81	2022-11-04	13:00:30	2	14.651926994	121.058448792	0.0141	110.0	42
82	2022-11-04	13:10:19	2	14.651926994	121.058448792	0.0141	110.01	72
83	2022-11-04	13:20:54	2	14.651926994	121.058448792	0.0141	110.03	71
84	2022-11-04	13:40:29	2	14.651926994	121.058448792	0.0141	110.02	125
85	2022-11-04	13:50:28	2	14.651926994	121.058448792	0.0141	110.03	71

86	2022-11-04	14:00:54	2	14.651926994	121.058448792	0.0141	110.04	50
87	2022-11-04	14:20:50	2	14.651926994	121.058448792	0.0141	110.03	71
88	2022-11-04	15:00:18	2	14.651926994	121.058448792	0.0141	110.02	125
89	2022-11-04	15:10:31	2	14.651926994	121.058448792	0.0141	110.02	125
90	2022-11-04	15:20:21	2	14.651926994	121.058448792	0.0141	110.03	71
91	2022-11-04	16:00:18	2	14.651926994	121.058448792	0.0141	110.02	125
92	2022-11-04	16:10:29	2	14.651926994	121.058448792	0.0141	110.03	71
93	2022-11-04	16:20:29	2	14.651926994	121.058448792	0.0141	110.02	125
94	2022-11-04	16:50:51	2	14.651926994	121.058448792	0.0141	110.02	125
95	2022-11-04	17:00:51	2	14.651926994	121.058448792	0.0141	110.02	125
96	2022-11-04	17:30:24	2	14.651926994	121.058448792	0.0141	110.02	125
97	2022-11-04	17:40:13	2	14.651926994	121.058448792	0.0141	110.04	50
98	2022-11-04	17:50:42	2	14.651926994	121.058448792	0.0141	110.04	50
99	2022-11-04	18:00:46	2	14.651926994	121.058448792	0.0141	110.02	125
100	2022-11-04	18:30:28	2	14.651926994	121.058448792	0.0141	110.01	72
101	2022-11-04	19:00:13	2	14.651926994	121.058448792	0.0141	110.02	125
102	2022-11-04	19:50:37	2	14.651926994	121.058448792	0.0141	110.02	125
103	2022-11-04	20:10:35	2	14.651926994	121.058448792	0.0141	110.04	50
104	2022-11-04	20:20:40	2	14.651926994	121.058448792	0.0141	110.03	71
105	2022-11-04	21:00:19	2	14.651926994	121.058448792	0.0141	110.02	125
106	2022-11-04	21:20:34	2	14.651926994	121.058448792	0.0141	110.04	50
107	2022-11-04	21:50:35	2	14.651926994	121.058448792	0.0141	110.02	125
108	2022-11-04	22:00:46	2	14.651926994	121.058448792	0.0141	110.02	125
109	2022-11-04	22:10:35	2	14.651926994	121.058448792	0.0141	110.01	72
110	2022-11-04	22:20:43	2	14.651926994	121.058448792	0.0141	110.02	125
111	2022-11-04	23:00:41	2	14.651926994	121.058448792	0.0141	110.03	71
112	2022-11-04	23:40:31	2	14.651926994	121.058448792	0.0141	110.03	71
113	2022-11-05	00:10:36	2	14.651926994	121.058448792	0.0141	110.03	71
114	2022-11-05	00:41:28	2	14.651926994	121.058448792	0.0141	110.01	72
115	2022-11-05	00:50:46	2	14.651926994	121.058448792	0.0141	110.0	42
116	2022-11-05	01:00:36	2	14.651926994	121.058448792	0.0141	110.01	72
117	2022-11-05	01:10:46	2	14.651926041	121.058448792	0.0141	110.02	125
118	2022-11-05	01:20:54	2	14.651926994	121.058448792	0.0141	110.0	42
119	2022-11-05	01:30:40	2	14.651926994	121.058448792	0.0141	110.01	72
120	2022-11-05	01:41:01	2	14.651926994	121.058448792	0.0141	110.02	125
121	2022-11-05	01:50:50	2	14.651926994	121.058448792	0.0141	110.02	125
122	2022-11-05	02:01:22	2	14.651926994	121.058448792	0.0141	110.0	42
123	2022-11-05	02:12:10	2	14.651926994	121.058448792	0.0141	110.0	42
124	2022-11-05	02:23:19	2	14.651926994	121.058448792	0.0141	110.01	72
125	2022-11-05	02:51:14	2	14.651926994	121.058448792	0.0141	110.03	71
126	2022-11-05	03:00:31	2	14.651926994	121.058448792	0.0141	110.02	125
127	2022-11-05	03:10:38	2	14.651926994	121.058448792	0.0141	110.02	125
128	2022-11-05	03:40:41	2	14.651926994	121.058448792	0.0141	110.03	71
129	2022-11-05	03:50:31	2	14.651926994	121.058448792	0.0141	110.02	125
130	2022-11-05	04:00:43	2	14.651926994	121.058448792	0.0141	110.04	50
131	2022-11-05	04:21:09	2	14.651926994	121.058448792	0.0141	110.03	71
132	2022-11-05	04:30:55	2	14.651926994	121.058448792	0.0141	110.02	125
133	2022-11-05	04:40:55	2	14.651926994	121.058448792	0.0141	110.02	125
134	2022-11-05	04:50:43	2	14.651926994	121.058448792	0.0141	110.04	50
135	2022-11-05	05:10:42	2	14.651926994	121.058448792	0.0141	110.04	50
136	2022-11-05	05:30:34	2	14.651926994	121.058448792	0.0141	110.01	72
137	2022-11-05	05:40:37	2	14.651926994	121.058448792	0.0141	110.01	72
138	2022-11-05	05:51:27	2	14.651926994	121.058448792	0.0141	110.03	71
139	2022-11-05	06:01:18	2	14.651926994	121.058448792	0.0141	110.02	125
140	2022-11-05	06:10:35	2	14.651926994	121.058448792	0.0141	110.0	42
141	2022-11-05	06:20:45	2	14.651926994	121.058448792	0.0141	110.03	71
142	2022-11-05	06:30:38	2	14.651926994	121.058448792	0.0141	110.01	72
143	2022-11-05	06:40:28	2	14.651926994	121.058448792	0.0141	110.0	42
144	2022-11-05	06:50:25	2	14.651926994	121.058448792	0.0141	110.02	125
145	2022-11-05	07:00:35	2	14.651926994	121.058448792	0.0141	110.02	125
146	2022-11-05	07:10:35	2	14.651926994	121.058448792	0.0141	110.0	42
147	2022-11-05	07:21:14	2	14.651926994	121.058448792	0.0141	110.02	125
148	2022-11-05	07:50:35	2	14.651926994	121.058448792	0.0141	110.0	42

149	2022-11-05	08:00:40	2	14.651926994	121.058448792	0.0141	110.02	125
150	2022-11-05	08:10:40	2	14.651926994	121.058448792	0.0141	110.01	72
151	2022-11-05	08:20:25	2	14.651926994	121.058448792	0.0141	110.02	125
152	2022-11-05	08:50:26	2	14.651926994	121.058448792	0.0141	110.01	72
153	2022-11-05	09:00:55	2	14.651926994	121.058448792	0.0141	110.0	42
154	2022-11-05	09:10:18	2	14.651926994	121.058448792	0.0141	110.01	72
155	2022-11-05	09:31:52	2	14.651926994	121.058448792	0.0141	110.0	42
156	2022-11-05	09:40:39	2	14.651926994	121.058448792	0.0141	110.01	72
157	2022-11-05	10:20:29	2	14.651926994	121.058448792	0.0141	110.01	72
158	2022-11-05	10:30:31	2	14.651926994	121.058448792	0.0141	110.02	125
159	2022-11-05	10:40:35	2	14.651926994	121.058448792	0.0141	110.02	125
160	2022-11-05	11:00:34	2	14.651926994	121.058448792	0.0141	110.04	50
161	2022-11-05	11:20:35	2	14.651926994	121.058448792	0.0141	110.04	50
162	2022-11-05	11:31:05	2	14.651926994	121.058448792	0.0141	110.04	50
163	2022-11-05	11:40:28	2	14.651926994	121.058448792	0.0141	110.03	71
164	2022-11-05	12:01:29	2	14.651926994	121.058448792	0.0141	110.01	72
165	2022-11-05	12:40:21	2	14.651926994	121.058448792	0.0141	110.02	125
166	2022-11-05	12:50:29	2	14.651926994	121.058448792	0.0141	110.02	125
167	2022-11-05	13:00:24	2	14.651926994	121.058448792	0.0141	110.0	42
168	2022-11-05	13:20:23	2	14.651926994	121.058448792	0.0141	110.02	125
169	2022-11-05	13:30:39	2	14.651926994	121.058448792	0.0141	110.03	71
170	2022-11-05	13:40:29	2	14.651926994	121.058448792	0.0141	110.01	72
171	2022-11-05	13:50:22	2	14.651926994	121.058448792	0.0141	110.04	50
172	2022-11-05	14:00:19	2	14.651926994	121.058448792	0.0141	110.04	50
173	2022-11-05	14:10:30	2	14.651926994	121.058448792	0.0141	110.03	71
174	2022-11-05	14:20:21	2	14.651926994	121.058448792	0.0141	110.03	71
175	2022-11-05	14:40:11	2	14.651926994	121.058448792	0.0141	110.04	50
176	2022-11-05	14:50:10	2	14.651926994	121.058448792	0.0141	110.04	50
177	2022-11-05	15:10:12	2	14.651926994	121.058448792	0.0141	110.0	42
178	2022-11-05	15:20:27	2	14.651926994	121.058448792	0.0141	110.0	42
179	2022-11-05	15:40:47	2	14.651926994	121.058448792	0.0141	110.02	125
180	2022-11-05	15:51:10	2	14.651926994	121.058448792	0.0141	110.03	71
181	2022-11-05	16:11:03	2	14.651926994	121.058448792	0.0141	110.02	125
182	2022-11-05	16:50:25	2	14.651926994	121.058448792	0.0141	110.03	71
183	2022-11-05	17:21:02	2	14.651926994	121.058448792	0.0141	110.03	71
184	2022-11-05	17:30:16	2	14.651926994	121.058448792	0.0141	110.03	71
185	2022-11-05	17:40:25	2	14.651926994	121.058448792	0.0141	110.03	71
186	2022-11-05	17:50:47	2	14.651926994	121.058448792	0.0141	110.02	125
187	2022-11-05	18:31:22	2	14.651926994	121.058448792	0.0141	110.02	125
188	2022-11-05	18:50:23	2	14.651926994	121.058448792	0.0141	110.01	72
189	2022-11-05	19:00:38	2	14.651926041	121.058448792	0.0141	110.01	72
190	2022-11-05	19:20:37	2	14.651926994	121.058448792	0.0141	110.01	72
191	2022-11-05	19:30:53	2	14.651926994	121.058448792	0.0141	110.03	71
192	2022-11-05	19:40:52	2	14.651926994	121.058448792	0.0141	110.04	50
193	2022-11-05	20:10:32	2	14.651926994	121.058448792	0.0141	110.01	72
194	2022-11-05	20:30:30	2	14.651926994	121.058448792	0.0141	110.02	125
195	2022-11-05	20:50:42	2	14.651926994	121.058448792	0.0141	110.04	50
196	2022-11-05	21:01:07	2	14.651926994	121.058448792	0.0141	110.03	71
197	2022-11-05	21:10:58	2	14.651926994	121.058448792	0.0141	110.02	125
198	2022-11-05	21:20:35	2	14.651926994	121.058448792	0.0141	110.03	71
199	2022-11-05	21:40:23	2	14.651926994	121.058448792	0.0141	110.01	72
200	2022-11-05	22:20:55	2	14.651926994	121.058448792	0.0141	110.02	125
201	2022-11-05	22:40:47	2	14.651926994	121.058448792	0.0141	110.02	125
202	2022-11-05	22:50:49	2	14.651926994	121.058448792	0.0141	110.02	125
203	2022-11-05	23:00:33	2	14.651926994	121.058448792	0.0141	110.03	71
204	2022-11-05	23:10:39	2	14.651926994	121.058448792	0.0141	110.02	125
205	2022-11-05	23:20:25	2	14.651926994	121.058448792	0.0141	110.02	125
206	2022-11-05	23:30:34	2	14.651926994	121.058448792	0.0141	110.02	125
207	2022-11-05	23:50:30	2	14.651926994	121.058448792	0.0141	110.01	72
208	2022-11-06	00:00:30	2	14.651926994	121.058448792	0.0141	110.02	125
209	2022-11-06	00:20:34	2	14.651926994	121.058448792	0.0141	110.02	125
210	2022-11-06	00:30:35	2	14.651926994	121.058448792	0.0141	110.0	42
211	2022-11-06	00:41:07	2	14.651926994	121.058448792	0.0141	110.03	71

212	2022-11-06	00:50:42	2	14.651926994	121.058448792	0.0141	110.0	42
213	2022-11-06	01:21:12	2	14.651926994	121.058448792	0.0141	110.03	71
214	2022-11-06	01:30:40	2	14.651926994	121.058448792	0.0141	110.0	42
215	2022-11-06	01:51:02	2	14.651926994	121.058448792	0.0141	110.01	72
216	2022-11-06	02:00:44	2	14.651926994	121.058448792	0.0141	110.02	125
217	2022-11-06	02:40:43	2	14.651926994	121.058448792	0.0141	110.02	125
218	2022-11-06	03:00:45	2	14.651926994	121.058448792	0.0141	110.04	50
219	2022-11-06	03:10:36	2	14.651926994	121.058448792	0.0141	110.01	72
220	2022-11-06	03:20:40	2	14.651926994	121.058448792	0.0141	110.02	125
221	2022-11-06	03:30:32	2	14.651926994	121.058448792	0.0141	110.03	71
222	2022-11-06	03:40:32	2	14.651926994	121.058448792	0.0141	110.04	50
223	2022-11-06	03:50:40	2	14.651926994	121.058448792	0.0141	110.01	72
224	2022-11-06	04:00:43	2	14.651926994	121.058448792	0.0141	110.02	125
225	2022-11-06	04:20:50	2	14.651926994	121.058448792	0.0141	110.04	50
226	2022-11-06	04:30:51	2	14.651926994	121.058448792	0.0141	110.04	50
227	2022-11-06	04:40:45	2	14.651926994	121.058448792	0.0141	110.02	125
228	2022-11-06	04:50:36	2	14.651926994	121.058448792	0.0141	110.02	125
229	2022-11-06	05:00:43	2	14.651926994	121.058448792	0.0141	110.01	72
230	2022-11-06	05:10:48	2	14.651926994	121.058448792	0.0141	110.0	42
231	2022-11-06	05:20:39	2	14.651926994	121.058448792	0.0141	110.03	71
232	2022-11-06	05:40:29	2	14.651926994	121.058448792	0.0141	110.01	72
233	2022-11-06	05:50:42	2	14.651926994	121.058448792	0.0141	110.03	71
234	2022-11-06	06:00:35	2	14.651926994	121.058448792	0.0141	110.0	42
235	2022-11-06	06:10:30	2	14.651926994	121.058448792	0.0141	110.03	71
236	2022-11-06	06:20:40	2	14.651926994	121.058448792	0.0141	110.03	71
237	2022-11-06	07:10:24	2	14.651926994	121.058448792	0.0141	110.02	125
238	2022-11-06	07:20:26	2	14.651926994	121.058448792	0.0141	110.02	125
239	2022-11-06	07:40:30	2	14.651926994	121.058448792	0.0141	110.02	125
240	2022-11-06	07:50:41	2	14.651926994	121.058448792	0.0141	110.02	125
241	2022-11-06	08:01:03	2	14.651926994	121.058448792	0.0141	110.01	72
242	2022-11-06	08:11:34	2	14.651926994	121.058448792	0.0141	110.01	72
243	2022-11-06	08:21:30	2	14.651926994	121.058448792	0.0141	110.02	125
244	2022-11-06	08:30:42	2	14.651926994	121.058448792	0.0141	110.03	71
245	2022-11-06	08:50:49	2	14.651926994	121.058448792	0.0141	110.01	72
246	2022-11-06	09:00:39	2	14.651926994	121.058448792	0.0141	110.04	50
247	2022-11-06	09:10:50	2	14.651926994	121.058448792	0.0141	110.01	72
248	2022-11-06	09:30:19	2	14.651926041	121.058448792	0.0141	110.03	71
249	2022-11-06	09:50:31	2	14.651926994	121.058448792	0.0141	110.0	42
250	2022-11-06	10:10:32	2	14.651926994	121.058448792	0.0141	110.01	72
251	2022-11-06	10:40:27	2	14.651926994	121.058448792	0.0141	110.03	71
252	2022-11-06	10:50:26	2	14.651926994	121.058448792	0.0141	110.02	125
253	2022-11-06	11:00:19	2	14.651926994	121.058448792	0.0141	110.03	71
254	2022-11-06	11:10:22	2	14.651926994	121.058448792	0.0141	110.01	72
255	2022-11-06	11:40:40	2	14.651926994	121.058448792	0.0141	110.04	50
256	2022-11-06	12:00:26	2	14.651926994	121.058448792	0.0141	110.03	71
257	2022-11-06	12:20:18	2	14.651926994	121.058448792	0.0141	110.03	71
258	2022-11-06	12:30:45	2	14.651926994	121.058448792	0.0141	110.01	72
259	2022-11-06	13:00:44	2	14.651926994	121.058448792	0.0141	110.02	125
260	2022-11-06	13:30:34	2	14.651926994	121.058448792	0.0141	110.01	72
261	2022-11-06	13:40:23	2	14.651926994	121.058448792	0.0141	110.03	71
262	2022-11-06	13:50:23	2	14.651926994	121.058448792	0.0141	110.01	72
263	2022-11-06	14:10:23	2	14.651926994	121.058448792	0.0141	110.03	71
264	2022-11-06	14:20:16	2	14.651926994	121.058448792	0.0141	110.04	50
265	2022-11-06	15:10:19	2	14.651926994	121.058448792	0.0141	110.01	72
266	2022-11-06	15:20:16	2	14.651926994	121.058448792	0.0141	110.03	71
267	2022-11-06	15:30:11	2	14.651926994	121.058448792	0.0141	110.0	42
268	2022-11-06	16:00:57	2	14.651926994	121.058448792	0.0141	110.01	72
269	2022-11-06	16:11:13	2	14.651926994	121.058448792	0.0141	110.02	125
270	2022-11-06	16:21:04	2	14.651926994	121.058448792	0.0141	110.03	71
271	2022-11-06	16:30:16	2	14.651926994	121.058448792	0.0141	110.01	72
272	2022-11-06	16:40:19	2	14.651926994	121.058448792	0.0141	110.01	72
273	2022-11-06	16:51:10	2	14.651926994	121.058448792	0.0141	110.0	42
274	2022-11-06	17:41:00	2	14.651926994	121.058448792	0.0141	110.03	71

275	2022-11-06	17:50:42	2	14.651926994	121.058448792	0.0141	110.03	71
276	2022-11-06	18:00:34	2	14.651926994	121.058448792	0.0141	110.02	125
277	2022-11-06	18:20:15	2	14.651926994	121.058448792	0.0141	110.03	71
278	2022-11-06	18:30:28	2	14.651926994	121.058448792	0.0141	110.01	72
279	2022-11-06	18:40:20	2	14.651926994	121.058448792	0.0141	110.0	42
280	2022-11-06	18:50:32	2	14.651926994	121.058448792	0.0141	110.02	125
281	2022-11-06	19:20:37	2	14.651926994	121.058448792	0.0141	110.03	71
282	2022-11-06	19:30:40	2	14.651926994	121.058448792	0.0141	110.03	71
283	2022-11-06	19:50:28	2	14.651926994	121.058448792	0.0141	110.03	71
284	2022-11-06	20:00:20	2	14.651926994	121.058448792	0.0141	110.02	125
285	2022-11-06	20:10:22	2	14.651926994	121.058448792	0.0141	110.03	71
286	2022-11-06	20:30:42	2	14.651926994	121.058448792	0.0141	110.02	125
287	2022-11-06	21:20:29	2	14.651926994	121.058448792	0.0141	110.01	72
288	2022-11-06	22:00:45	2	14.651926041	121.058448792	0.0141	110.02	125
289	2022-11-06	22:10:39	2	14.651926994	121.058448792	0.0141	110.01	72
290	2022-11-06	22:30:34	2	14.651926994	121.058448792	0.0141	110.0	42
291	2022-11-06	23:10:40	2	14.651926994	121.058448792	0.0141	110.02	125
292	2022-11-06	23:20:33	2	14.651926994	121.058448792	0.0141	110.01	72
293	2022-11-06	23:30:22	2	14.651926994	121.058448792	0.0141	110.04	50
294	2022-11-06	23:40:27	2	14.651926994	121.058448792	0.0141	110.03	71
295	2022-11-06	23:50:28	2	14.651926994	121.058448792	0.0141	110.01	72
296	2022-11-07	00:00:34	2	14.651926994	121.058448792	0.0141	110.03	71
297	2022-11-07	00:10:32	2	14.651926994	121.058448792	0.0141	110.02	125
298	2022-11-07	00:20:36	2	14.651926994	121.058448792	0.0141	110.01	72
299	2022-11-07	00:30:48	2	14.651926994	121.058448792	0.0141	110.02	125
300	2022-11-07	01:00:58	2	14.651926994	121.058448792	0.0141	110.01	72
301	2022-11-07	01:10:54	2	14.651926994	121.058448792	0.0141	110.01	72
302	2022-11-07	01:30:56	2	14.651926994	121.058448792	0.0141	110.02	125
303	2022-11-07	01:40:52	2	14.651926994	121.058448792	0.0141	110.02	125
304	2022-11-07	02:00:57	2	14.651926994	121.058448792	0.0141	110.02	125
305	2022-11-07	02:10:52	2	14.651926994	121.058448792	0.0141	110.02	125
306	2022-11-07	02:20:55	2	14.651926994	121.058448792	0.0141	110.02	125
307	2022-11-07	02:30:51	2	14.651926994	121.058448792	0.0141	110.02	125
308	2022-11-07	02:40:44	2	14.651926994	121.058448792	0.0141	110.04	50
309	2022-11-07	03:00:33	2	14.651926994	121.058448792	0.0141	110.02	125
310	2022-11-07	03:20:41	2	14.651926994	121.058448792	0.0141	110.02	125
311	2022-11-07	03:40:42	2	14.651926994	121.058448792	0.0141	110.02	125
312	2022-11-07	03:50:48	2	14.651926994	121.058448792	0.0141	110.01	72
313	2022-11-07	04:10:48	2	14.651926994	121.058448792	0.0141	110.02	125
314	2022-11-07	04:20:53	2	14.651926994	121.058448792	0.0141	110.04	50
315	2022-11-07	04:40:48	2	14.651926994	121.058448792	0.0141	110.0	42
316	2022-11-07	04:50:54	2	14.651926994	121.058448792	0.0141	110.0	42
317	2022-11-07	05:10:45	2	14.651926994	121.058448792	0.0141	110.01	72
318	2022-11-07	05:30:39	2	14.651926994	121.058448792	0.0141	110.02	125
319	2022-11-07	05:50:46	2	14.651926994	121.058448792	0.0141	110.0	42
320	2022-11-07	06:20:35	2	14.651926994	121.058448792	0.0141	110.0	42
321	2022-11-07	06:30:22	2	14.651926994	121.058448792	0.0141	110.01	72
322	2022-11-07	06:40:34	2	14.651926994	121.058448792	0.0141	110.04	50
323	2022-11-07	06:50:31	2	14.651926994	121.058448792	0.0141	110.0	42
324	2022-11-07	07:00:21	2	14.651926994	121.058448792	0.0141	110.03	71
325	2022-11-07	07:10:21	2	14.651926994	121.058448792	0.0141	110.01	72
326	2022-11-07	07:30:40	2	14.651926994	121.058448792	0.0141	110.02	125
327	2022-11-07	08:00:41	2	14.651926994	121.058448792	0.0141	110.02	125
328	2022-11-07	08:11:03	2	14.651926994	121.058448792	0.0141	110.02	125
329	2022-11-07	08:40:42	2	14.651926994	121.058448792	0.0141	110.02	125
330	2022-11-07	08:50:33	2	14.651926994	121.058448792	0.0141	110.01	72
331	2022-11-07	09:00:31	2	14.651926994	121.058448792	0.0141	110.0	42
332	2022-11-07	09:30:34	2	14.651926994	121.058448792	0.0141	110.02	125
333	2022-11-07	09:51:02	2	14.651926994	121.058448792	0.0141	110.01	72
334	2022-11-07	10:00:50	2	14.651926994	121.058448792	0.0141	110.0	42
335	2022-11-07	10:40:33	2	14.651926994	121.058448792	0.0141	110.01	72
336	2022-11-07	11:20:39	2	14.651926994	121.058448792	0.0141	110.04	50
337	2022-11-07	11:40:35	2	14.651926994	121.058448792	0.0141	110.04	50

```

338 2022-11-07 11:50:31      2 14.651926994 121.058448792 0.0141 110.04 50
339 2022-11-07 12:00:29      2 14.651926994 121.058448792 0.0141 110.02 125
340 2022-11-07 12:10:33      2 14.651926994 121.058448792 0.0141 110.03 71
341 2022-11-07 12:21:04      2 14.651926994 121.058448792 0.0141 110.02 125
342 2022-11-07 12:30:37      2 14.651926041 121.058448792 0.0141 110.02 125
343 2022-11-07 12:50:31      2 14.651926994 121.058448792 0.0141 110.04 50
344 2022-11-07 13:00:28      2 14.651926994 121.058448792 0.0141 110.02 125
345 2022-11-07 13:11:16      2 14.651926994 121.058448792 0.0141 110.02 125
346 2022-11-07 13:21:33      2 14.651926994 121.058448792 0.0141 110.03 71
347 2022-11-07 13:30:55      2 14.651926994 121.058448792 0.0141 110.01 72
348 2022-11-07 13:40:23      2 14.651926994 121.058448792 0.0141 110.01 72
349 2022-11-07 13:50:27      2 14.651926994 121.058448792 0.0141 110.01 72
350 2022-11-07 14:00:18      2 14.651926994 121.058448792 0.0141 110.04 50
351 2022-11-07 14:10:23      2 14.651926994 121.058448792 0.0141 110.04 50
352 2022-11-07 14:20:19      2 14.651926994 121.058448792 0.0141 110.02 125
353 2022-11-07 14:30:16      2 14.651926994 121.058448792 0.0141 110.02 125
354 2022-11-07 14:40:12      2 14.651926994 121.058448792 0.0141 110.03 71
355 2022-11-07 15:20:58      2 14.651926994 121.058448792 0.0141 110.02 125
356 2022-11-07 15:30:36      2 14.651926994 121.058448792 0.0141 110.0 42
357 2022-11-07 15:40:54      2 14.651926994 121.058448792 0.0141 110.03 71
358 2022-11-07 15:50:23      2 14.651926994 121.058448792 0.0141 110.02 125
359 2022-11-07 16:00:25      2 14.651926994 121.058448792 0.0141 110.04 50

```

```

In [17]: len
Out[17]: 500

```

```

In [18]: len
Out[18]: 360

```

```

In [19]:      =      .
...:      =
'Latitude' 'Longitude' 'msl' .      =1      =48      =False .

```

```

In [20]:      .      'display.max_rows' False

```

```

In [21]:
Out[21]:
      latitude      longitude      msl
0      14.651926994      121.058448792      110.026
1      14.651926994      121.058448792      110.0095
2      14.651926994      121.058448792      110.02166666666666
3      14.651926994      121.058448792      110.01650000000001
4      14.651926994000002      121.058448792      110.01680000000002
5      14.651926994      121.058448792      110.01783333333333
6      14.651926993999998      121.058448792      110.01828571428572
7      14.651926994      121.058448792      110.02074999999999
8      14.651926994      121.05844879199998      110.021
9      14.651926994000002      121.058448792      110.02080000000001
10     14.651926994      121.058448792      110.02172727272728
11     14.651926994      121.058448792      110.0215
..
...
488 14.651927947729169      121.05844831512498      106.99118750000001
489 14.651927947729165      121.058448315125      106.99150000000002
490 14.651927947729169      121.058448315125      106.992125
491 14.651927947729165      121.05844831512498      106.99225
492 14.651927947729165      121.058448315125      106.99483333333332
493 14.651927947729169      121.05844831512498      106.99645833333334
494 14.651928106666666      121.05844847408332      107.82534791666666
495 14.651928106666666      121.05844847408332      107.82605625000001
496 14.651928106666666      121.05844847408333      107.82609791666665
497 14.651928106666666      121.05844847408332      107.82649375
498 14.651928106666666      121.05844847408333      107.82609791666668
499 14.651928106666668      121.05844847408332      107.82711875000001

```

```
[500 rows x 3 columns]
```

```
In [22]:      =      .
...:      =
'Latitude' 'Longitude' 'msl' .           =1           =48           =False .
Traceback (most recent call last):
```

```
File "C:\Users\Ket\AppData\Local\Temp\ipykernel_20676\3127516144.py", line 2, in <module>
    df_mean =
dff[['latitude','longitude','msl']].rolling(min_periods=1,window=48,center=False).mean()
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\core\frame.py", line 3511, in
__getitem__
    indexer = self.columns._get_indexer_strict(key, "columns")[1]
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\core\indexes\base.py", line 5782, in
_get_indexer_strict
    self._raise_if_missing(keyarr, indexer, axis_name)
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\core\indexes\base.py", line 5845, in
_raise_if_missing
    raise KeyError(f"{not_found} not in index")
```

```
KeyError: "['msl'] not in index"
```

```
In [23]:      =      .
...:      =
'Latitude' 'Longitude' 'msl_round' .           =1           =48           =False .
```

```
In [24]:
```

```
Out[24]:
```

	latitude	longitude	msl_round
0	14.651926994	121.058448792	110.03
1	14.651926994	121.058448792	110.015
2	14.651926994	121.058448792	110.01666666666667
3	14.651926994	121.058448792	110.0175
4	14.651926994000002	121.058448792	110.018
5	14.651926994	121.058448792	110.02166666666666
6	14.651926993999998	121.058448792	110.02142857142857
7	14.651926994	121.058448792	110.02125
8	14.651926994	121.05844879199998	110.02222222222223
9	14.651926994000002	121.058448792	110.022
10	14.651926994	121.058448792	110.02363636363636
11	14.651926994	121.058448792	110.02499999999999
..
348	14.651926974145832	121.058448792	110.01854166666665
349	14.651926974145836	121.058448792	110.01854166666668
350	14.651926974145832	121.058448792	110.01895833333333
351	14.651926974145832	121.058448792	110.01937499999998
352	14.651926974145836	121.058448792	110.01937500000001
353	14.651926974145832	121.05844879199998	110.01937499999998
354	14.651926974145836	121.058448792	110.01958333333334
355	14.651926974145832	121.05844879199998	110.01958333333333
356	14.651926974145836	121.058448792	110.01875
357	14.651926974145832	121.058448792	110.01895833333333
358	14.651926974145832	121.058448792	110.01895833333333
359	14.651926974145832	121.058448792	110.01937500000001

```
[360 rows x 3 columns]
```


In [25]:

Out[25]:

	msl_round	freq
0	110.03	71
1	109.99	21
2	110.05	18
3	110.0	42
4	110.02	125
5	110.04	50
6	110.01	72
7	109.93	1
8	82.78	1
9	110.1	2
10	109.96	5
11	79.99	1
..
64	77.59	1
65	81.71	1
66	78.43	1
67	67.95	1
68	110.07	1
69	70.13	1
70	73.99	1
71	109.92	1
72	72.17	1
73	79.01	1
74	109.76	1
75	109.91	1

[76 rows x 2 columns]

In [26]:

Out[26]:

	ts	fix_type	latitude	longitude	accuracy	msl_round	freq
0	2022-11-03 13:50:11	2	14.651926994	121.058448792	0.0141	110.03	71
1	2022-11-03 14:20:49	2	14.651926994	121.058448792	0.0141	110.0	42
2	2022-11-03 14:30:19	2	14.651926994	121.058448792	0.0141	110.02	125
3	2022-11-03 14:40:19	2	14.651926994	121.058448792	0.0141	110.02	125
4	2022-11-03 14:50:13	2	14.651926994	121.058448792	0.0141	110.02	125
5	2022-11-03 15:00:15	2	14.651926994	121.058448792	0.0141	110.04	50
6	2022-11-03 15:10:22	2	14.651926994	121.058448792	0.0141	110.02	125
7	2022-11-03 15:20:55	2	14.651926994	121.058448792	0.0141	110.02	125
8	2022-11-03 15:31:09	2	14.651926994	121.058448792	0.0141	110.03	71
9	2022-11-03 15:51:03	2	14.651926994	121.058448792	0.0141	110.02	125
10	2022-11-03 16:11:16	2	14.651926994	121.058448792	0.0141	110.04	50
11	2022-11-03 16:20:18	2	14.651926994	121.058448792	0.0141	110.04	50
..
348	2022-11-07 13:40:23	2	14.651926994	121.058448792	0.0141	110.01	72
349	2022-11-07 13:50:27	2	14.651926994	121.058448792	0.0141	110.01	72
350	2022-11-07 14:00:18	2	14.651926994	121.058448792	0.0141	110.04	50
351	2022-11-07 14:10:23	2	14.651926994	121.058448792	0.0141	110.04	50
352	2022-11-07 14:20:19	2	14.651926994	121.058448792	0.0141	110.02	125
353	2022-11-07 14:30:16	2	14.651926994	121.058448792	0.0141	110.02	125
354	2022-11-07 14:40:12	2	14.651926994	121.058448792	0.0141	110.03	71
355	2022-11-07 15:20:58	2	14.651926994	121.058448792	0.0141	110.02	125
356	2022-11-07 15:30:36	2	14.651926994	121.058448792	0.0141	110.0	42
357	2022-11-07 15:40:54	2	14.651926994	121.058448792	0.0141	110.03	71
358	2022-11-07 15:50:23	2	14.651926994	121.058448792	0.0141	110.02	125
359	2022-11-07 16:00:25	2	14.651926994	121.058448792	0.0141	110.04	50

[360 rows x 7 columns]

In [27]:

Out[27]:

	ts	fix_type	latitude	longitude	accuracy	msl_round	freq
0	2022-11-03 13:50:11	2	14.651926994	121.058448792	0.0141	110.03	71
1	2022-11-03 14:20:49	2	14.651926994	121.058448792	0.0141	110.0	42
2	2022-11-03 14:30:19	2	14.651926994	121.058448792	0.0141	110.02	125
3	2022-11-03 14:40:19	2	14.651926994	121.058448792	0.0141	110.02	125
4	2022-11-03 14:50:13	2	14.651926994	121.058448792	0.0141	110.02	125
5	2022-11-03 15:00:15	2	14.651926994	121.058448792	0.0141	110.04	50
6	2022-11-03 15:10:22	2	14.651926994	121.058448792	0.0141	110.02	125
7	2022-11-03 15:20:55	2	14.651926994	121.058448792	0.0141	110.02	125
8	2022-11-03 15:31:09	2	14.651926994	121.058448792	0.0141	110.03	71
9	2022-11-03 15:51:03	2	14.651926994	121.058448792	0.0141	110.02	125
10	2022-11-03 16:11:16	2	14.651926994	121.058448792	0.0141	110.04	50
11	2022-11-03 16:20:18	2	14.651926994	121.058448792	0.0141	110.04	50
...
348	2022-11-07 13:40:23	2	14.651926994	121.058448792	0.0141	110.01	72
349	2022-11-07 13:50:27	2	14.651926994	121.058448792	0.0141	110.01	72
350	2022-11-07 14:00:18	2	14.651926994	121.058448792	0.0141	110.04	50
351	2022-11-07 14:10:23	2	14.651926994	121.058448792	0.0141	110.04	50
352	2022-11-07 14:20:19	2	14.651926994	121.058448792	0.0141	110.02	125
353	2022-11-07 14:30:16	2	14.651926994	121.058448792	0.0141	110.02	125
354	2022-11-07 14:40:12	2	14.651926994	121.058448792	0.0141	110.03	71
355	2022-11-07 15:20:58	2	14.651926994	121.058448792	0.0141	110.02	125
356	2022-11-07 15:30:36	2	14.651926994	121.058448792	0.0141	110.0	42
357	2022-11-07 15:40:54	2	14.651926994	121.058448792	0.0141	110.03	71
358	2022-11-07 15:50:23	2	14.651926994	121.058448792	0.0141	110.02	125
359	2022-11-07 16:00:25	2	14.651926994	121.058448792	0.0141	110.04	50

[360 rows x 7 columns]

In [28]: 0 'C:/Users/Ket/Documents/Python Scripts/ub/filter by freq.py'

C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py:761: UserWarning: pandas only support SQLAlchemy connectable(engine/connection) or database string URI or sqlite3 DBAPI2 connection other DBAPI2 objects are not tested, please consider using SQLAlchemy
warnings.warn(

In [29]:

	ts	fix_type	latitude	longitude	accuracy	msl_round	freq
0	2022-11-03 13:50:11	2	14.651926994	121.058448792	0.0141	110.03	71
1	2022-11-03 15:31:09	2	14.651926994	121.058448792	0.0141	110.03	71
2	2022-11-03 18:20:13	2	14.651926994	121.058448792	0.0141	110.03	71
3	2022-11-03 18:30:30	2	14.651926994	121.058448792	0.0141	110.03	71
4	2022-11-03 20:30:51	2	14.651926994	121.058448792	0.0141	110.03	71
5	2022-11-03 21:50:34	2	14.651926994	121.058448792	0.0141	110.03	71
6	2022-11-04 00:00:29	2	14.651926994	121.058448792	0.0141	110.03	71
7	2022-11-04 02:20:35	2	14.651926994	121.058448792	0.0141	110.03	71
8	2022-11-04 02:50:35	2	14.651926994	121.058448792	0.0141	110.03	71
9	2022-11-04 03:20:41	2	14.651926994	121.058448792	0.0141	110.03	71
10	2022-11-04 03:30:31	2	14.651926994	121.058448792	0.0141	110.03	71
11	2022-11-04 04:30:52	2	14.651926994	121.058448792	0.0141	110.03	71
...
498	2022-11-07 03:10:26	2	14.651910782	121.058418274	0.0141	81.71	1
499	2022-11-07 04:00:41	2	14.651913643	121.058433533	0.0141	78.43	1
500	2022-11-07 04:30:09	2	14.651917458	121.058425903	0.0141	67.95	1
501	2022-11-07 05:00:42	2	14.651926994	121.058448792	0.0141	110.07	1
502	2022-11-07 06:00:12	2	14.651919365	121.058441162	0.0141	70.13	1
503	2022-11-07 07:40:11	2	14.651919365	121.058433533	0.0141	73.99	1
504	2022-11-07 08:31:05	2	14.651926994	121.058448792	0.0141	109.92	1
505	2022-11-07 10:50:11	2	14.651946068	121.058441162	0.0141	72.17	1
506	2022-11-07 11:00:20	2	14.651970863	121.058456421	0.0141	79.01	1
507	2022-11-07 12:40:48	2	14.651926994	121.058448792	0.0141	109.76	1
508	2022-11-07 15:10:22	2	14.651926994	121.058448792	0.0141	109.91	1

```
509 2022-11-07 16:10:15          2 14.651900291 121.058418274    0.0141    71.49    1
```

```
[510 rows x 7 columns]
```

```
In [30]:          0  'C:/Users/Ket/Documents/Python Scripts/ub/filter by freq.py'
C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py:761: UserWarning: pandas only
support SQLAlchemy connectable(engine/connection) or database string URI or sqlite3 DBAPI2
connection other DBAPI2 objects are not tested, please consider using SQLAlchemy
  warnings.warn(
Traceback (most recent call last):

  File "C:\Users\Ket\Documents\Python Scripts\ub\filter by freq.py", line 40, in <module>
    cp_df.columns = ['msl_round']

  File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\core\generic.py", line 5588, in
__setattr__
    return object.__setattr__(self, name, value)

  File "pandas\_libs\properties.pyx", line 70, in
pandas._libs.properties.AxisProperty.__set__

  File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\core\generic.py", line 769, in
__set_axis
    self._mgr.set_axis(axis, labels)

  File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\core\internals\managers.py", line
214, in set_axis
    self._validate_set_axis(axis, new_labels)

  File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\core\internals\base.py", line 69, in
_validate_set_axis
    raise ValueError(
```

```
ValueError: Length mismatch: Expected axis has 2 elements, new values have 1 elements
```

```
In [31]:
```

```
Out[31]:
```

	ts	fix_type	latitude	longitude	accuracy	msl_round
0	2022-11-03 13:50:11	2	14.651926994	121.058448792	0.0141	110.03
1	2022-11-03 14:00:31	2	14.651926994	121.058448792	0.0141	109.99
2	2022-11-03 14:10:38	2	14.651926994	121.058448792	0.0141	110.05
3	2022-11-03 14:20:49	2	14.651926994	121.058448792	0.0141	110.0
4	2022-11-03 14:30:19	2	14.651926994	121.058448792	0.0141	110.02
5	2022-11-03 14:40:19	2	14.651926994	121.058448792	0.0141	110.02
6	2022-11-03 14:50:13	2	14.651926994	121.058448792	0.0141	110.02
7	2022-11-03 15:00:15	2	14.651926994	121.058448792	0.0141	110.04
8	2022-11-03 15:10:22	2	14.651926994	121.058448792	0.0141	110.02
9	2022-11-03 15:20:55	2	14.651926994	121.058448792	0.0141	110.02
10	2022-11-03 15:31:09	2	14.651926994	121.058448792	0.0141	110.03
11	2022-11-03 15:51:03	2	14.651926994	121.058448792	0.0141	110.02
..
498	2022-11-07 15:50:23	2	14.651926994	121.058448792	0.0141	110.02
499	2022-11-07 16:00:25	2	14.651926994	121.058448792	0.0141	110.04
500	2022-11-07 16:10:15	2	14.651900291	121.058418274	0.0141	71.49
501	2022-11-07 16:20:40	2	14.651926994	121.058448792	0.0141	110.0
502	2022-11-07 16:30:22	2	14.651926994	121.058448792	0.0141	110.0
503	2022-11-07 16:40:40	2	14.651926041	121.058448792	0.0141	110.04
504	2022-11-07 16:50:42	2	14.651926994	121.058448792	0.0141	110.02
505	2022-11-07 17:01:19	2	14.651926994	121.058448792	0.0141	110.0
506	2022-11-07 17:30:19	2	14.651926994	121.058448792	0.0141	110.01
507	2022-11-07 17:50:33	2	14.651926994	121.058448792	0.0141	110.01
508	2022-11-07 18:01:00	2	14.651926994	121.058448792	0.0141	110.01

509 2022-11-07 18:20:17 2 14.651926994 121.058448792 0.0141 110.01

[510 rows x 6 columns]

```
In [32]: 0 'C:/Users/Ket/Documents/Python Scripts/ub/filter by freq.py'
C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py:761: UserWarning: pandas only
support SQLAlchemy connectable(engine/connection) or database string URI or sqlite3 DBAPI2
connection other DBAPI2 objects are not tested, please consider using SQLAlchemy
warnings.warn(
```

In [33]:

```
Out[33]:
```

		data_id	ts	fix_type	latitude	longitude	accuracy	msl
temp	volt							
0		1	2022-11-03 13:50:11	2	14.651926994	121.058448792	0.0141	110.026
30.5	3.87							
1		8	2022-11-03 14:00:31	2	14.651926994	121.058448792	0.0141	109.993
30.0	3.88							
2		12	2022-11-03 14:10:38	2	14.651926994	121.058448792	0.0141	110.046
29.25	3.86							
3		6	2022-11-03 14:20:49	2	14.651926994	121.058448792	0.0141	110.001
29.25	3.87							
4		11	2022-11-03 14:30:19	2	14.651926994	121.058448792	0.0141	110.018
29.75	3.86							
5		15	2022-11-03 14:40:19	2	14.651926994	121.058448792	0.0141	110.023
30.25	3.85							
6		18	2022-11-03 14:50:13	2	14.651926994	121.058448792	0.0141	110.021
30.5	3.87							
7		4	2022-11-03 15:00:15	2	14.651926994	121.058448792	0.0141	110.038
31.0	3.85							
8		9	2022-11-03 15:10:22	2	14.651926994	121.058448792	0.0141	110.023
31.75	3.84							
9		13	2022-11-03 15:20:55	2	14.651926994	121.058448792	0.0141	110.019
32.25	3.86							
10		16	2022-11-03 15:31:09	2	14.651926994	121.058448792	0.0141	110.031
32.5	3.86							
11		5	2022-11-03 15:51:03	2	14.651926994	121.058448792	0.0141	110.019
32.25	3.85							
..
...	...							
498		575	2022-11-07 15:50:23	2	14.651926994	121.058448792	0.0141	110.017
35.25	3.87							
499		576	2022-11-07 16:00:25	2	14.651926994	121.058448792	0.0141	110.044
35.25	3.84							
500		577	2022-11-07 16:10:15	2	14.651900291	121.058418274	0.0141	71.4876
35.5	3.86							
501		578	2022-11-07 16:20:40	2	14.651926994	121.058448792	0.0141	110.005
35.5	3.85							
502		579	2022-11-07 16:30:22	2	14.651926994	121.058448792	0.0141	109.996
35.5	3.86							
503		580	2022-11-07 16:40:40	2	14.651926041	121.058448792	0.0141	110.039
35.5	3.86							
504		581	2022-11-07 16:50:42	2	14.651926994	121.058448792	0.0141	110.021
35.25	3.86							
505		582	2022-11-07 17:01:19	2	14.651926994	121.058448792	0.0141	110.001
35.0	3.85							
506		584	2022-11-07 17:30:19	2	14.651926994	121.058448792	0.0141	110.013
33.0	3.85							
507		586	2022-11-07 17:50:33	2	14.651926994	121.058448792	0.0141	110.013
32.25	3.86							
508		587	2022-11-07 18:01:00	2	14.651926994	121.058448792	0.0141	110.006
32.25	3.86							
509		589	2022-11-07 18:20:17	2	14.651926994	121.058448792	0.0141	110.011

32.0 3.86

[510 rows x 9 columns]

In [34]:

Out[34]:

	ts	fix_type	latitude	longitude	accuracy	msl_round
0	2022-11-03 13:50:11	2	14.651926994	121.058448792	0.0141	110.03
1	2022-11-03 14:00:31	2	14.651926994	121.058448792	0.0141	109.99
2	2022-11-03 14:10:38	2	14.651926994	121.058448792	0.0141	110.05
3	2022-11-03 14:20:49	2	14.651926994	121.058448792	0.0141	110.0
4	2022-11-03 14:30:19	2	14.651926994	121.058448792	0.0141	110.02
5	2022-11-03 14:40:19	2	14.651926994	121.058448792	0.0141	110.02
6	2022-11-03 14:50:13	2	14.651926994	121.058448792	0.0141	110.02
7	2022-11-03 15:00:15	2	14.651926994	121.058448792	0.0141	110.04
8	2022-11-03 15:10:22	2	14.651926994	121.058448792	0.0141	110.02
9	2022-11-03 15:20:55	2	14.651926994	121.058448792	0.0141	110.02
10	2022-11-03 15:31:09	2	14.651926994	121.058448792	0.0141	110.03
11	2022-11-03 15:51:03	2	14.651926994	121.058448792	0.0141	110.02
..
498	2022-11-07 15:50:23	2	14.651926994	121.058448792	0.0141	110.02
499	2022-11-07 16:00:25	2	14.651926994	121.058448792	0.0141	110.04
500	2022-11-07 16:10:15	2	14.651900291	121.058418274	0.0141	71.49
501	2022-11-07 16:20:40	2	14.651926994	121.058448792	0.0141	110.0
502	2022-11-07 16:30:22	2	14.651926994	121.058448792	0.0141	110.0
503	2022-11-07 16:40:40	2	14.651926041	121.058448792	0.0141	110.04
504	2022-11-07 16:50:42	2	14.651926994	121.058448792	0.0141	110.02
505	2022-11-07 17:01:19	2	14.651926994	121.058448792	0.0141	110.0
506	2022-11-07 17:30:19	2	14.651926994	121.058448792	0.0141	110.01
507	2022-11-07 17:50:33	2	14.651926994	121.058448792	0.0141	110.01
508	2022-11-07 18:01:00	2	14.651926994	121.058448792	0.0141	110.01
509	2022-11-07 18:20:17	2	14.651926994	121.058448792	0.0141	110.01

[510 rows x 6 columns]

In [35]:

0 'C:/Users/Ket/Documents/Python Scripts/ub/filter by freq.py'

C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py:761: UserWarning: pandas only support SQLAlchemy connectable(engine/connection) or database string URI or sqlite3 DBAPI2 connection other DBAPI2 objects are not tested, please consider using SQLAlchemy
warnings.warn(
Traceback (most recent call last):

File "C:\Users\Ket\Documents\Python Scripts\ub\filter by freq.py", line 56, in <module>
new_df_on_tol = df.loc[(df['msl_round'] > msl_tol_min) & (df['msl_round'] <
msl_tol_max)]

NameError: name 'msl_tol_min' is not defined

In [36]:

0 'C:/Users/Ket/Documents/Python Scripts/ub/filter by freq.py'

C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py:761: UserWarning: pandas only support SQLAlchemy connectable(engine/connection) or database string URI or sqlite3 DBAPI2 connection other DBAPI2 objects are not tested, please consider using SQLAlchemy
warnings.warn(
Traceback (most recent call last):

In [37]: len

Out[37]: 512

In [38]: len

Out[38]: 371

In [39]:

...: = . * 1.005 2
...: = . * 0.995 2

Traceback (most recent call last):

```
File "C:\Users\Ket\AppData\Local\Temp\ipykernel_20676\2003751059.py", line 1, in <module>
    msl_tol_max = np.round((cp_df_top_ri.msl.max() * 1.005),2)
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\core\generic.py", line 5575, in
__getattr__
    return object.__getattribute__(self, name)
```

AttributeError: 'DataFrame' object has no attribute 'msl'

```
In [40]:          = .          .          .          * 1.005 2
...:          = .          .          .          * 0.995 2
```

```
In [41]:
Out[41]: 109.65
```

```
In [42]:
Out[42]: 110.75
```

```
In [43]:          = .          'msl_round' >          &          'msl_round' <
```

```
In [44]:
Out[44]:
```

	ts	fix_type	latitude	longitude	accuracy	msl_round
0	2022-11-03 13:50:11	2	14.651926994	121.058448792	0.0141	110.03
1	2022-11-03 14:00:31	2	14.651926994	121.058448792	0.0141	109.99
2	2022-11-03 14:10:38	2	14.651926994	121.058448792	0.0141	110.05
3	2022-11-03 14:20:49	2	14.651926994	121.058448792	0.0141	110.0
4	2022-11-03 14:30:19	2	14.651926994	121.058448792	0.0141	110.02
5	2022-11-03 14:40:19	2	14.651926994	121.058448792	0.0141	110.02
6	2022-11-03 14:50:13	2	14.651926994	121.058448792	0.0141	110.02
7	2022-11-03 15:00:15	2	14.651926994	121.058448792	0.0141	110.04
8	2022-11-03 15:10:22	2	14.651926994	121.058448792	0.0141	110.02
9	2022-11-03 15:20:55	2	14.651926994	121.058448792	0.0141	110.02
10	2022-11-03 15:31:09	2	14.651926994	121.058448792	0.0141	110.03
11	2022-11-03 15:51:03	2	14.651926994	121.058448792	0.0141	110.02
..
499	2022-11-07 16:00:25	2	14.651926994	121.058448792	0.0141	110.04
501	2022-11-07 16:20:40	2	14.651926994	121.058448792	0.0141	110.0
502	2022-11-07 16:30:22	2	14.651926994	121.058448792	0.0141	110.0
503	2022-11-07 16:40:40	2	14.651926041	121.058448792	0.0141	110.04
504	2022-11-07 16:50:42	2	14.651926994	121.058448792	0.0141	110.02
505	2022-11-07 17:01:19	2	14.651926994	121.058448792	0.0141	110.0
506	2022-11-07 17:30:19	2	14.651926994	121.058448792	0.0141	110.01
507	2022-11-07 17:50:33	2	14.651926994	121.058448792	0.0141	110.01
508	2022-11-07 18:01:00	2	14.651926994	121.058448792	0.0141	110.01
509	2022-11-07 18:20:17	2	14.651926994	121.058448792	0.0141	110.01
510	2022-11-07 18:50:49	2	14.651926994	121.058448792	0.0141	110.0
511	2022-11-07 19:00:52	2	14.651926994	121.058448792	0.0141	110.02

[464 rows x 6 columns]

```
In [45]:          = .          = 'msl_round'
...:          = .          >= .          .          * .25
2          = 'ts'          =True          =True
```

```
In [46]:
Out[46]:
```

	ts	fix_type	latitude	longitude	accuracy	msl_round	freq
0	2022-11-03 13:50:11	2	14.651926994	121.058448792	0.0141	110.03	71

1	2022-11-03	14:20:49	2	14.651926994	121.058448792	0.0141	110.0	46
2	2022-11-03	14:30:19	2	14.651926994	121.058448792	0.0141	110.02	127
3	2022-11-03	14:40:19	2	14.651926994	121.058448792	0.0141	110.02	127
4	2022-11-03	14:50:13	2	14.651926994	121.058448792	0.0141	110.02	127
5	2022-11-03	15:00:15	2	14.651926994	121.058448792	0.0141	110.04	51
6	2022-11-03	15:10:22	2	14.651926994	121.058448792	0.0141	110.02	127
7	2022-11-03	15:20:55	2	14.651926994	121.058448792	0.0141	110.02	127
8	2022-11-03	15:31:09	2	14.651926994	121.058448792	0.0141	110.03	71
9	2022-11-03	15:51:03	2	14.651926994	121.058448792	0.0141	110.02	127
10	2022-11-03	16:11:16	2	14.651926994	121.058448792	0.0141	110.04	51
11	2022-11-03	16:20:18	2	14.651926994	121.058448792	0.0141	110.04	51
...
359	2022-11-07	16:00:25	2	14.651926994	121.058448792	0.0141	110.04	51
360	2022-11-07	16:20:40	2	14.651926994	121.058448792	0.0141	110.0	46
361	2022-11-07	16:30:22	2	14.651926994	121.058448792	0.0141	110.0	46
362	2022-11-07	16:40:40	2	14.651926041	121.058448792	0.0141	110.04	51
363	2022-11-07	16:50:42	2	14.651926994	121.058448792	0.0141	110.02	127
364	2022-11-07	17:01:19	2	14.651926994	121.058448792	0.0141	110.0	46
365	2022-11-07	17:30:19	2	14.651926994	121.058448792	0.0141	110.01	76
366	2022-11-07	17:50:33	2	14.651926994	121.058448792	0.0141	110.01	76
367	2022-11-07	18:01:00	2	14.651926994	121.058448792	0.0141	110.01	76
368	2022-11-07	18:20:17	2	14.651926994	121.058448792	0.0141	110.01	76
369	2022-11-07	18:50:49	2	14.651926994	121.058448792	0.0141	110.0	46
370	2022-11-07	19:00:52	2	14.651926994	121.058448792	0.0141	110.02	127

[371 rows x 7 columns]

In [47]:

Out[47]:

	ts	fix_type	latitude	longitude	accuracy	msl_round
0	2022-11-03 13:50:11	2	14.651926994	121.058448792	0.0141	110.03
1	2022-11-03 14:00:31	2	14.651926994	121.058448792	0.0141	109.99
2	2022-11-03 14:10:38	2	14.651926994	121.058448792	0.0141	110.05
3	2022-11-03 14:20:49	2	14.651926994	121.058448792	0.0141	110.0
4	2022-11-03 14:30:19	2	14.651926994	121.058448792	0.0141	110.02
5	2022-11-03 14:40:19	2	14.651926994	121.058448792	0.0141	110.02
6	2022-11-03 14:50:13	2	14.651926994	121.058448792	0.0141	110.02
7	2022-11-03 15:00:15	2	14.651926994	121.058448792	0.0141	110.04
8	2022-11-03 15:10:22	2	14.651926994	121.058448792	0.0141	110.02
9	2022-11-03 15:20:55	2	14.651926994	121.058448792	0.0141	110.02
10	2022-11-03 15:31:09	2	14.651926994	121.058448792	0.0141	110.03
11	2022-11-03 15:51:03	2	14.651926994	121.058448792	0.0141	110.02
...
499	2022-11-07 16:00:25	2	14.651926994	121.058448792	0.0141	110.04
501	2022-11-07 16:20:40	2	14.651926994	121.058448792	0.0141	110.0
502	2022-11-07 16:30:22	2	14.651926994	121.058448792	0.0141	110.0
503	2022-11-07 16:40:40	2	14.651926041	121.058448792	0.0141	110.04
504	2022-11-07 16:50:42	2	14.651926994	121.058448792	0.0141	110.02
505	2022-11-07 17:01:19	2	14.651926994	121.058448792	0.0141	110.0
506	2022-11-07 17:30:19	2	14.651926994	121.058448792	0.0141	110.01
507	2022-11-07 17:50:33	2	14.651926994	121.058448792	0.0141	110.01
508	2022-11-07 18:01:00	2	14.651926994	121.058448792	0.0141	110.01
509	2022-11-07 18:20:17	2	14.651926994	121.058448792	0.0141	110.01
510	2022-11-07 18:50:49	2	14.651926994	121.058448792	0.0141	110.0
511	2022-11-07 19:00:52	2	14.651926994	121.058448792	0.0141	110.02

[464 rows x 6 columns]

In [48]:

```

= .
...: = .
...:
...: # new_df_on_tol = df.loc[(df['msl_round'] > msl_tol_min) & (df['msl_round'] <
msl_tol_max)]

```

```

...: # # cp_df_top_ri.freq.loc[(cp_df_top_ri.freq >= 1)].sum()
...: # cp_df_top_ri.loc[(cp_df_top_ri.freq >= (np.round((cp_df_top_ri.freq.max() * .25),
2)))]
...:
...: = . 'msl_round' > & 'msl_round' <

```

In [49]:

Out[49]:

	ts	fix_type	latitude	longitude	accuracy	msl_round
0	2022-11-03 13:50:11	2	14.651926994	121.058448792	0.0141	110.03
1	2022-11-03 14:00:31	2	14.651926994	121.058448792	0.0141	109.99
2	2022-11-03 14:10:38	2	14.651926994	121.058448792	0.0141	110.05
3	2022-11-03 14:20:49	2	14.651926994	121.058448792	0.0141	110.0
4	2022-11-03 14:30:19	2	14.651926994	121.058448792	0.0141	110.02
5	2022-11-03 14:40:19	2	14.651926994	121.058448792	0.0141	110.02
6	2022-11-03 14:50:13	2	14.651926994	121.058448792	0.0141	110.02
7	2022-11-03 15:00:15	2	14.651926994	121.058448792	0.0141	110.04
8	2022-11-03 15:10:22	2	14.651926994	121.058448792	0.0141	110.02
9	2022-11-03 15:20:55	2	14.651926994	121.058448792	0.0141	110.02
10	2022-11-03 15:31:09	2	14.651926994	121.058448792	0.0141	110.03
11	2022-11-03 15:51:03	2	14.651926994	121.058448792	0.0141	110.02
...
499	2022-11-07 16:00:25	2	14.651926994	121.058448792	0.0141	110.04
501	2022-11-07 16:20:40	2	14.651926994	121.058448792	0.0141	110.0
502	2022-11-07 16:30:22	2	14.651926994	121.058448792	0.0141	110.0
503	2022-11-07 16:40:40	2	14.651926041	121.058448792	0.0141	110.04
504	2022-11-07 16:50:42	2	14.651926994	121.058448792	0.0141	110.02
505	2022-11-07 17:01:19	2	14.651926994	121.058448792	0.0141	110.0
506	2022-11-07 17:30:19	2	14.651926994	121.058448792	0.0141	110.01
507	2022-11-07 17:50:33	2	14.651926994	121.058448792	0.0141	110.01
508	2022-11-07 18:01:00	2	14.651926994	121.058448792	0.0141	110.01
509	2022-11-07 18:20:17	2	14.651926994	121.058448792	0.0141	110.01
510	2022-11-07 18:50:49	2	14.651926994	121.058448792	0.0141	110.0
511	2022-11-07 19:00:52	2	14.651926994	121.058448792	0.0141	110.02

[464 rows x 6 columns]

In [50]:

```

...: = 6371e3
...:
...: = 'ts' .
...: 'lat2' = .
...: 'lon2' = .
...: 'lat1' = . . -1
...: 'lon1' = . . -1
...:
...: = . * . /180
...: = . * . /180
...:
...: 'delta_lat' = . - . * . /180
...: 'delta_lon' = . - . * . /180
...: = . 0
...:
...: #haversine
...: = . /2 **2 + . *
...: . * . /2 **2
...: = ** 1/2
...: = 1- ** 1/2
...: = 2 * .
...: = * #in meters
...: 'dist' =
...:
...:

```



```

...: #moving average
...:     = 11
...:
...:     =
...:     =
...:     =
...:     = - 1
...:
...:     =
...:     =
...:     =
...:     = - 1
...:
...:     = 'ts'
...:     = 5
...:     = True #remove head = n : depends
on window
...:
...:     = 5
...:     = True
...:     'mva_lat2' =
...:     'mva_lon2' =
...:
...:
...:     =
...:     = 'Longitude vs. Latitude : TESUA displacement plot' = 'bold'
...:     = 2 2
...: # labels = df_new.ts
...: # labels = ['\n'.join(wrap(l, 11)) for l in labels]
...:
...:     = 0 0
...:     = "green" = 0.5
...:     =
...:     'Latitude, °' = 'bold'
...:     = 'gray' = '--' = 0.5
...:     = 'w'
...:
...:     = 0 1
...:     = "blue" = 0.5
...:     =
...:     'Longitude, °' = 'bold'
...:     = 'gray' = '--' = 0.5
...:     = 'w'
...:
...:     = 1
...:     = "red"
...:     'dist, m' = 'bold'
...:     = 'gray' = '--' = 0.5
...:     = 90
...:
...:     =
...:     =
...:
...:
In [51]:     = 6371e3
...:
...:     =
...:     = 'ts'
...:     'lat2' =
...:     'lon2' =
...:     'lat1' = -1
...:     'lon1' = -1
...:

```

```

..... = ..... * ..... /180
..... = ..... * ..... /180
.....
..... 'delta_lat' = ..... - ..... * ..... /180
..... 'delta_lon' = ..... - ..... * ..... /180
..... = ..... 0
.....
..... #haversine
..... = ..... /2 **2 + ..... *
.....
..... = ..... ** 1/2
..... = 1 - ..... ** 1/2
..... = 2 * .....
..... = ..... #in meters
..... 'dist' =
.....
..... #moving average
..... = 11
.....
..... = .....
..... = .....
..... = ..... - 1
.....
..... = .....
..... = .....
..... = ..... - 1
.....
..... = ..... 'ts' .....
..... = ..... 5 ..... =True #remove head = n : depends
on window ..... = ..... 5 ..... =True
..... 'mva_lat2' =
..... 'mva_lon2' =
.....
.....
..... = .....
..... 'Longitude vs. Latitude : TESUA displacement plot' ..... = 'bold'
..... = ..... 2 2
..... # labels = df_new.ts
..... # labels = ['\n'.join(wrap(l, 11)) for l in labels]
.....
..... 0 0 ..... "green" ..... =0.5
.....
..... 'Latitude, °' ..... = 'bold'
..... = 'gray' ..... = '--' ..... = 0.5
..... = 'w'
.....
..... 0 1 ..... "blue" ..... =0.5
.....
..... 'Longitude, °' ..... = 'bold'
..... = 'gray' ..... = '--' ..... = 0.5
..... = 'w'
.....
..... 1 ..... "red"
..... 'dist, m' ..... = 'bold'

```

```

...:      .          = 'gray'          = '--'          = 0.5
...:      .          =90
...:
...:
...:      =      .
...:      .      .
...:      .

```

In [52]:

Out[52]:

	ts	fix_type	latitude	longitude	accuracy	msl_round
0	2022-11-03 13:50:11	2	14.651926994	121.058448792	0.0141	110.03
1	2022-11-03 14:00:31	2	14.651926994	121.058448792	0.0141	109.99
2	2022-11-03 14:10:38	2	14.651926994	121.058448792	0.0141	110.05
3	2022-11-03 14:20:49	2	14.651926994	121.058448792	0.0141	110.0
4	2022-11-03 14:30:19	2	14.651926994	121.058448792	0.0141	110.02
5	2022-11-03 14:40:19	2	14.651926994	121.058448792	0.0141	110.02
6	2022-11-03 14:50:13	2	14.651926994	121.058448792	0.0141	110.02
7	2022-11-03 15:00:15	2	14.651926994	121.058448792	0.0141	110.04
8	2022-11-03 15:10:22	2	14.651926994	121.058448792	0.0141	110.02
9	2022-11-03 15:20:55	2	14.651926994	121.058448792	0.0141	110.02
10	2022-11-03 15:31:09	2	14.651926994	121.058448792	0.0141	110.03
11	2022-11-03 15:51:03	2	14.651926994	121.058448792	0.0141	110.02
...
499	2022-11-07 16:00:25	2	14.651926994	121.058448792	0.0141	110.04
501	2022-11-07 16:20:40	2	14.651926994	121.058448792	0.0141	110.0
502	2022-11-07 16:30:22	2	14.651926994	121.058448792	0.0141	110.0
503	2022-11-07 16:40:40	2	14.651926041	121.058448792	0.0141	110.04
504	2022-11-07 16:50:42	2	14.651926994	121.058448792	0.0141	110.02
505	2022-11-07 17:01:19	2	14.651926994	121.058448792	0.0141	110.0
506	2022-11-07 17:30:19	2	14.651926994	121.058448792	0.0141	110.01
507	2022-11-07 17:50:33	2	14.651926994	121.058448792	0.0141	110.01
508	2022-11-07 18:01:00	2	14.651926994	121.058448792	0.0141	110.01
509	2022-11-07 18:20:17	2	14.651926994	121.058448792	0.0141	110.01
510	2022-11-07 18:50:49	2	14.651926994	121.058448792	0.0141	110.0
511	2022-11-07 19:00:52	2	14.651926994	121.058448792	0.0141	110.02

[464 rows x 6 columns]

In [53]: . 'display.max_rows' None

In [54]:

Out[54]:

	ts	fix_type	latitude	longitude	accuracy	msl_round
0	2022-11-03 13:50:11	2	14.651926994	121.058448792	0.0141	110.03
1	2022-11-03 14:00:31	2	14.651926994	121.058448792	0.0141	109.99
2	2022-11-03 14:10:38	2	14.651926994	121.058448792	0.0141	110.05
3	2022-11-03 14:20:49	2	14.651926994	121.058448792	0.0141	110.0
4	2022-11-03 14:30:19	2	14.651926994	121.058448792	0.0141	110.02
5	2022-11-03 14:40:19	2	14.651926994	121.058448792	0.0141	110.02
6	2022-11-03 14:50:13	2	14.651926994	121.058448792	0.0141	110.02
7	2022-11-03 15:00:15	2	14.651926994	121.058448792	0.0141	110.04
8	2022-11-03 15:10:22	2	14.651926994	121.058448792	0.0141	110.02
9	2022-11-03 15:20:55	2	14.651926994	121.058448792	0.0141	110.02
10	2022-11-03 15:31:09	2	14.651926994	121.058448792	0.0141	110.03
11	2022-11-03 15:51:03	2	14.651926994	121.058448792	0.0141	110.02
12	2022-11-03 16:11:16	2	14.651926994	121.058448792	0.0141	110.04
13	2022-11-03 16:20:18	2	14.651926994	121.058448792	0.0141	110.04
14	2022-11-03 16:40:50	2	14.651926041	121.058448792	0.0141	109.99
15	2022-11-03 16:50:46	2	14.651926994	121.058448792	0.0141	110.01
16	2022-11-03 17:00:40	2	14.651926994	121.058448792	0.0141	110.04
17	2022-11-03 17:10:39	2	14.651926994	121.058448792	0.0141	110.0
18	2022-11-03 17:20:48	2	14.651926994	121.058448792	0.0141	110.02

19	2022-11-03	17:50:30	2	14.651926994	121.058448792	0.0141	110.02
20	2022-11-03	18:00:28	2	14.651926994	121.058448792	0.0141	110.02
21	2022-11-03	18:20:13	2	14.651926994	121.058448792	0.0141	110.03
22	2022-11-03	18:30:30	2	14.651926994	121.058448792	0.0141	110.03
23	2022-11-03	18:41:39	2	14.651926041	121.058448792	0.0141	109.93
24	2022-11-03	19:00:48	2	14.651926994	121.058448792	0.0141	110.01
26	2022-11-03	19:30:40	2	14.651926994	121.058448792	0.0141	110.0
27	2022-11-03	19:50:27	2	14.651926994	121.058448792	0.0141	110.02
28	2022-11-03	20:00:35	2	14.651926994	121.058448792	0.0141	110.01
29	2022-11-03	20:10:41	2	14.651926994	121.058448792	0.0141	110.1
30	2022-11-03	20:30:51	2	14.651926994	121.058448792	0.0141	110.03
31	2022-11-03	20:40:38	2	14.651926994	121.058448792	0.0141	109.99
32	2022-11-03	20:50:48	2	14.651926994	121.058448792	0.0141	110.02
33	2022-11-03	21:10:56	2	14.651926994	121.058448792	0.0141	109.96
34	2022-11-03	21:20:48	2	14.651926994	121.058448792	0.0141	110.01
35	2022-11-03	21:30:44	2	14.651926994	121.058448792	0.0141	110.02
36	2022-11-03	21:50:34	2	14.651926994	121.058448792	0.0141	110.03
37	2022-11-03	22:01:00	2	14.651926041	121.058456421	0.0141	109.96
38	2022-11-03	22:10:48	2	14.651926994	121.058448792	0.0141	110.02
39	2022-11-03	22:20:35	2	14.651926994	121.058448792	0.0141	110.05
41	2022-11-03	22:40:43	2	14.651926994	121.058448792	0.0141	110.02
42	2022-11-03	22:50:50	2	14.651926994	121.058448792	0.0141	110.0
43	2022-11-03	23:00:34	2	14.651926994	121.058448792	0.0141	110.04
44	2022-11-03	23:10:33	2	14.651926994	121.058448792	0.0141	110.02
45	2022-11-03	23:20:32	2	14.651926994	121.058448792	0.0141	110.01
46	2022-11-03	23:30:42	2	14.651926994	121.058448792	0.0141	110.04
47	2022-11-03	23:40:26	2	14.651926994	121.058448792	0.0141	110.04
48	2022-11-03	23:50:25	2	14.651926994	121.058448792	0.0141	110.04
49	2022-11-04	00:00:29	2	14.651926994	121.058448792	0.0141	110.03
50	2022-11-04	00:20:24	2	14.651926994	121.058448792	0.0141	110.02
51	2022-11-04	00:30:29	2	14.651926994	121.058448792	0.0141	110.02
53	2022-11-04	00:50:28	2	14.651926994	121.058448792	0.0141	110.02
54	2022-11-04	01:00:32	2	14.651926994	121.058448792	0.0141	110.0
56	2022-11-04	01:31:09	2	14.651926994	121.058448792	0.0141	110.02
57	2022-11-04	01:40:50	2	14.651926041	121.058448792	0.0141	110.02
59	2022-11-04	02:00:52	2	14.651926994	121.058448792	0.0141	110.02
60	2022-11-04	02:10:35	2	14.651926994	121.058448792	0.0141	110.04
61	2022-11-04	02:20:35	2	14.651926994	121.058448792	0.0141	110.03
62	2022-11-04	02:30:43	2	14.651926994	121.058448792	0.0141	110.04
63	2022-11-04	02:40:35	2	14.651926994	121.058448792	0.0141	110.01
64	2022-11-04	02:50:35	2	14.651926994	121.058448792	0.0141	110.03
65	2022-11-04	03:00:36	2	14.651926994	121.058448792	0.0141	110.04
66	2022-11-04	03:10:38	2	14.651926994	121.058448792	0.0141	110.04
67	2022-11-04	03:20:41	2	14.651926994	121.058448792	0.0141	110.03
68	2022-11-04	03:30:31	2	14.651926994	121.058448792	0.0141	110.03
69	2022-11-04	03:40:33	2	14.651926041	121.058448792	0.0141	110.06
71	2022-11-04	04:00:33	2	14.651926994	121.058448792	0.0141	110.04
72	2022-11-04	04:10:42	2	14.651926994	121.058448792	0.0141	110.02
73	2022-11-04	04:20:42	2	14.651926994	121.058448792	0.0141	109.98
74	2022-11-04	04:30:52	2	14.651926994	121.058448792	0.0141	110.03
75	2022-11-04	04:41:00	2	14.651926994	121.058448792	0.0141	110.0
77	2022-11-04	05:00:39	2	14.651926994	121.058448792	0.0141	110.0
78	2022-11-04	05:10:43	2	14.651926994	121.058448792	0.0141	110.02
80	2022-11-04	05:30:43	2	14.651926994	121.058448792	0.0141	110.02
82	2022-11-04	05:50:40	2	14.651926994	121.058448792	0.0141	110.01
83	2022-11-04	06:00:39	2	14.651926994	121.058448792	0.0141	110.04
84	2022-11-04	06:10:37	2	14.651926994	121.058448792	0.0141	110.02
87	2022-11-04	06:40:24	2	14.651926994	121.058448792	0.0141	110.02
88	2022-11-04	06:50:27	2	14.651926994	121.058448792	0.0141	110.01
89	2022-11-04	07:00:28	2	14.651926994	121.058448792	0.0141	110.0
90	2022-11-04	07:20:18	2	14.651926994	121.058448792	0.0141	110.01
91	2022-11-04	07:30:39	2	14.651926994	121.058448792	0.0141	110.0
92	2022-11-04	08:00:15	2	14.651926994	121.058448792	0.0141	109.99

93	2022-11-04	08:10:24	2	14.651926994	121.058448792	0.0141	110.08
94	2022-11-04	08:30:34	2	14.651926994	121.058448792	0.0141	110.01
95	2022-11-04	08:40:56	2	14.651926994	121.058448792	0.0141	110.0
96	2022-11-04	08:50:41	2	14.651926994	121.058448792	0.0141	110.04
98	2022-11-04	09:11:10	2	14.651926041	121.058448792	0.0141	110.01
100	2022-11-04	09:40:29	2	14.651926994	121.058448792	0.0141	110.02
101	2022-11-04	09:50:38	2	14.651926994	121.058448792	0.0141	109.99
102	2022-11-04	10:00:37	2	14.651926994	121.058448792	0.0141	109.97
104	2022-11-04	10:30:28	2	14.651926994	121.058448792	0.0141	110.02
105	2022-11-04	10:51:09	2	14.651926994	121.058448792	0.0141	109.97
106	2022-11-04	11:01:10	2	14.651926994	121.058448792	0.0141	110.02
109	2022-11-04	11:40:36	2	14.651926994	121.058448792	0.0141	110.03
110	2022-11-04	11:50:24	2	14.651926994	121.058448792	0.0141	110.01
111	2022-11-04	12:00:37	2	14.651926994	121.058448792	0.0141	110.02
112	2022-11-04	12:10:24	2	14.651926041	121.058448792	0.0141	110.06
113	2022-11-04	12:20:31	2	14.651926994	121.058448792	0.0141	110.06
115	2022-11-04	12:40:42	2	14.651926994	121.058448792	0.0141	109.99
116	2022-11-04	12:50:24	2	14.651926994	121.058448792	0.0141	110.01
117	2022-11-04	13:00:30	2	14.651926994	121.058448792	0.0141	110.0
118	2022-11-04	13:10:19	2	14.651926994	121.058448792	0.0141	110.01
119	2022-11-04	13:20:54	2	14.651926994	121.058448792	0.0141	110.03
120	2022-11-04	13:40:29	2	14.651926994	121.058448792	0.0141	110.02
121	2022-11-04	13:50:28	2	14.651926994	121.058448792	0.0141	110.03
122	2022-11-04	14:00:54	2	14.651926994	121.058448792	0.0141	110.04
123	2022-11-04	14:20:50	2	14.651926994	121.058448792	0.0141	110.03
124	2022-11-04	14:30:57	2	14.651926994	121.058448792	0.0141	110.2
125	2022-11-04	14:40:16	2	14.651926994	121.058448792	0.0141	110.06
126	2022-11-04	14:50:14	2	14.651926994	121.058448792	0.0141	110.05
127	2022-11-04	15:00:18	2	14.651926994	121.058448792	0.0141	110.02
128	2022-11-04	15:10:31	2	14.651926994	121.058448792	0.0141	110.02
129	2022-11-04	15:20:21	2	14.651926994	121.058448792	0.0141	110.03
130	2022-11-04	15:30:27	2	14.651926994	121.058448792	0.0141	110.06
131	2022-11-04	15:40:19	2	14.651926994	121.058448792	0.0141	109.97
132	2022-11-04	16:00:18	2	14.651926994	121.058448792	0.0141	110.02
133	2022-11-04	16:10:29	2	14.651926994	121.058448792	0.0141	110.03
134	2022-11-04	16:20:29	2	14.651926994	121.058448792	0.0141	110.02
135	2022-11-04	16:40:28	2	14.651926994	121.058448792	0.0141	109.99
136	2022-11-04	16:50:51	2	14.651926994	121.058448792	0.0141	110.02
137	2022-11-04	17:00:51	2	14.651926994	121.058448792	0.0141	110.02
138	2022-11-04	17:10:31	2	14.651926041	121.058448792	0.0141	109.96
139	2022-11-04	17:30:24	2	14.651926994	121.058448792	0.0141	110.02
140	2022-11-04	17:40:13	2	14.651926994	121.058448792	0.0141	110.04
141	2022-11-04	17:50:42	2	14.651926994	121.058448792	0.0141	110.04
142	2022-11-04	18:00:46	2	14.651926994	121.058448792	0.0141	110.02
143	2022-11-04	18:30:28	2	14.651926994	121.058448792	0.0141	110.01
144	2022-11-04	18:40:27	2	14.651926994	121.058448792	0.0141	110.13
145	2022-11-04	18:50:51	2	14.651926994	121.058448792	0.0141	109.68
146	2022-11-04	19:00:13	2	14.651926994	121.058448792	0.0141	110.02
147	2022-11-04	19:50:37	2	14.651926994	121.058448792	0.0141	110.02
148	2022-11-04	20:10:35	2	14.651926994	121.058448792	0.0141	110.04
149	2022-11-04	20:20:40	2	14.651926994	121.058448792	0.0141	110.03
150	2022-11-04	20:30:41	2	14.651926994	121.058448792	0.0141	110.05
151	2022-11-04	21:00:19	2	14.651926994	121.058448792	0.0141	110.02
152	2022-11-04	21:10:28	2	14.651926994	121.058448792	0.0141	110.06
153	2022-11-04	21:20:34	2	14.651926994	121.058448792	0.0141	110.04
154	2022-11-04	21:50:35	2	14.651926994	121.058448792	0.0141	110.02
155	2022-11-04	22:00:46	2	14.651926994	121.058448792	0.0141	110.02
156	2022-11-04	22:10:35	2	14.651926994	121.058448792	0.0141	110.01
157	2022-11-04	22:20:43	2	14.651926994	121.058448792	0.0141	110.02
160	2022-11-04	22:50:35	2	14.651926994	121.058448792	0.0141	110.05
161	2022-11-04	23:00:41	2	14.651926994	121.058448792	0.0141	110.03
162	2022-11-04	23:10:43	2	14.651926994	121.058448792	0.0141	109.99
163	2022-11-04	23:20:35	2	14.651926994	121.058448792	0.0141	109.99

164	2022-11-04	23:30:35	2	14.651926994	121.058448792	0.0141	109.99
165	2022-11-04	23:40:31	2	14.651926994	121.058448792	0.0141	110.03
167	2022-11-05	00:10:36	2	14.651926994	121.058448792	0.0141	110.03
168	2022-11-05	00:20:40	2	14.651926041	121.058448792	0.0141	110.06
169	2022-11-05	00:30:28	2	14.651926041	121.058448792	0.0141	109.88
170	2022-11-05	00:41:28	2	14.651926994	121.058448792	0.0141	110.01
171	2022-11-05	00:50:46	2	14.651926994	121.058448792	0.0141	110.0
172	2022-11-05	01:00:36	2	14.651926994	121.058448792	0.0141	110.01
173	2022-11-05	01:10:46	2	14.651926041	121.058448792	0.0141	110.02
174	2022-11-05	01:20:54	2	14.651926994	121.058448792	0.0141	110.0
175	2022-11-05	01:30:40	2	14.651926994	121.058448792	0.0141	110.01
176	2022-11-05	01:41:01	2	14.651926994	121.058448792	0.0141	110.02
177	2022-11-05	01:50:50	2	14.651926994	121.058448792	0.0141	110.02
178	2022-11-05	02:01:22	2	14.651926994	121.058448792	0.0141	110.0
179	2022-11-05	02:12:10	2	14.651926994	121.058448792	0.0141	110.0
180	2022-11-05	02:23:19	2	14.651926994	121.058448792	0.0141	110.01
181	2022-11-05	02:41:26	2	14.651926041	121.058448792	0.0141	110.16
182	2022-11-05	02:51:14	2	14.651926994	121.058448792	0.0141	110.03
183	2022-11-05	03:00:31	2	14.651926994	121.058448792	0.0141	110.02
184	2022-11-05	03:10:38	2	14.651926994	121.058448792	0.0141	110.02
185	2022-11-05	03:20:38	2	14.651926994	121.058448792	0.0141	110.05
186	2022-11-05	03:30:43	2	14.651926994	121.058448792	0.0141	110.05
187	2022-11-05	03:40:41	2	14.651926994	121.058448792	0.0141	110.03
188	2022-11-05	03:50:31	2	14.651926994	121.058448792	0.0141	110.02
189	2022-11-05	04:00:43	2	14.651926994	121.058448792	0.0141	110.04
191	2022-11-05	04:21:09	2	14.651926994	121.058448792	0.0141	110.03
192	2022-11-05	04:30:55	2	14.651926994	121.058448792	0.0141	110.02
193	2022-11-05	04:40:55	2	14.651926994	121.058448792	0.0141	110.02
194	2022-11-05	04:50:43	2	14.651926994	121.058448792	0.0141	110.04
195	2022-11-05	05:01:04	2	14.651926994	121.058448792	0.0141	109.99
196	2022-11-05	05:10:42	2	14.651926994	121.058448792	0.0141	110.04
197	2022-11-05	05:20:42	2	14.651926994	121.058448792	0.0141	110.06
198	2022-11-05	05:30:34	2	14.651926994	121.058448792	0.0141	110.01
199	2022-11-05	05:40:37	2	14.651926994	121.058448792	0.0141	110.01
200	2022-11-05	05:51:27	2	14.651926994	121.058448792	0.0141	110.03
201	2022-11-05	06:01:18	2	14.651926994	121.058448792	0.0141	110.02
202	2022-11-05	06:10:35	2	14.651926994	121.058448792	0.0141	110.0
203	2022-11-05	06:20:45	2	14.651926994	121.058448792	0.0141	110.03
204	2022-11-05	06:30:38	2	14.651926994	121.058448792	0.0141	110.01
205	2022-11-05	06:40:28	2	14.651926994	121.058448792	0.0141	110.0
206	2022-11-05	06:50:25	2	14.651926994	121.058448792	0.0141	110.02
207	2022-11-05	07:00:35	2	14.651926994	121.058448792	0.0141	110.02
208	2022-11-05	07:10:35	2	14.651926994	121.058448792	0.0141	110.0
209	2022-11-05	07:21:14	2	14.651926994	121.058448792	0.0141	110.02
211	2022-11-05	07:50:35	2	14.651926994	121.058448792	0.0141	110.0
212	2022-11-05	08:00:40	2	14.651926994	121.058448792	0.0141	110.02
213	2022-11-05	08:10:40	2	14.651926994	121.058448792	0.0141	110.01
214	2022-11-05	08:20:25	2	14.651926994	121.058448792	0.0141	110.02
215	2022-11-05	08:31:10	2	14.651926994	121.058448792	0.0141	109.88
216	2022-11-05	08:50:26	2	14.651926994	121.058448792	0.0141	110.01
217	2022-11-05	09:00:55	2	14.651926994	121.058448792	0.0141	110.0
218	2022-11-05	09:10:18	2	14.651926994	121.058448792	0.0141	110.01
219	2022-11-05	09:31:52	2	14.651926994	121.058448792	0.0141	110.0
220	2022-11-05	09:40:39	2	14.651926994	121.058448792	0.0141	110.01
222	2022-11-05	10:20:29	2	14.651926994	121.058448792	0.0141	110.01
223	2022-11-05	10:30:31	2	14.651926994	121.058448792	0.0141	110.02
224	2022-11-05	10:40:35	2	14.651926994	121.058448792	0.0141	110.02
225	2022-11-05	11:00:34	2	14.651926994	121.058448792	0.0141	110.04
226	2022-11-05	11:10:49	2	14.651926994	121.058448792	0.0141	110.11
227	2022-11-05	11:20:35	2	14.651926994	121.058448792	0.0141	110.04
228	2022-11-05	11:31:05	2	14.651926994	121.058448792	0.0141	110.04
229	2022-11-05	11:40:28	2	14.651926994	121.058448792	0.0141	110.03
230	2022-11-05	11:51:02	2	14.651926041	121.058448792	0.0141	110.15

231	2022-11-05	12:01:29	2	14.651926994	121.058448792	0.0141	110.01
232	2022-11-05	12:10:23	2	14.651926994	121.058448792	0.0141	110.12
233	2022-11-05	12:21:35	2	14.651926994	121.058448792	0.0141	110.05
234	2022-11-05	12:30:38	2	14.651926994	121.058448792	0.0141	109.99
235	2022-11-05	12:40:21	2	14.651926994	121.058448792	0.0141	110.02
236	2022-11-05	12:50:29	2	14.651926994	121.058448792	0.0141	110.02
237	2022-11-05	13:00:24	2	14.651926994	121.058448792	0.0141	110.0
238	2022-11-05	13:20:23	2	14.651926994	121.058448792	0.0141	110.02
239	2022-11-05	13:30:39	2	14.651926994	121.058448792	0.0141	110.03
240	2022-11-05	13:40:29	2	14.651926994	121.058448792	0.0141	110.01
241	2022-11-05	13:50:22	2	14.651926994	121.058448792	0.0141	110.04
242	2022-11-05	14:00:19	2	14.651926994	121.058448792	0.0141	110.04
243	2022-11-05	14:10:30	2	14.651926994	121.058448792	0.0141	110.03
244	2022-11-05	14:20:21	2	14.651926994	121.058448792	0.0141	110.03
245	2022-11-05	14:40:11	2	14.651926994	121.058448792	0.0141	110.04
246	2022-11-05	14:50:10	2	14.651926994	121.058448792	0.0141	110.04
247	2022-11-05	15:10:12	2	14.651926994	121.058448792	0.0141	110.0
248	2022-11-05	15:20:27	2	14.651926994	121.058448792	0.0141	110.0
249	2022-11-05	15:40:47	2	14.651926994	121.058448792	0.0141	110.02
250	2022-11-05	15:51:10	2	14.651926994	121.058448792	0.0141	110.03
251	2022-11-05	16:00:56	2	14.651926994	121.058448792	0.0141	109.99
252	2022-11-05	16:11:03	2	14.651926994	121.058448792	0.0141	110.02
253	2022-11-05	16:30:47	2	14.651926994	121.058448792	0.0141	110.05
255	2022-11-05	16:50:25	2	14.651926994	121.058448792	0.0141	110.03
257	2022-11-05	17:21:02	2	14.651926994	121.058448792	0.0141	110.03
258	2022-11-05	17:30:16	2	14.651926994	121.058448792	0.0141	110.03
259	2022-11-05	17:40:25	2	14.651926994	121.058448792	0.0141	110.03
260	2022-11-05	17:50:47	2	14.651926994	121.058448792	0.0141	110.02
261	2022-11-05	18:00:40	2	14.651926994	121.058448792	0.0141	110.05
263	2022-11-05	18:21:01	2	14.651926994	121.058448792	0.0141	110.05
264	2022-11-05	18:31:22	2	14.651926994	121.058448792	0.0141	110.02
265	2022-11-05	18:41:00	2	14.651926994	121.058448792	0.0141	110.05
266	2022-11-05	18:50:23	2	14.651926994	121.058448792	0.0141	110.01
267	2022-11-05	19:00:38	2	14.651926041	121.058448792	0.0141	110.01
268	2022-11-05	19:20:37	2	14.651926994	121.058448792	0.0141	110.01
269	2022-11-05	19:30:53	2	14.651926994	121.058448792	0.0141	110.03
270	2022-11-05	19:40:52	2	14.651926994	121.058448792	0.0141	110.04
272	2022-11-05	20:10:32	2	14.651926994	121.058448792	0.0141	110.01
274	2022-11-05	20:30:30	2	14.651926994	121.058448792	0.0141	110.02
275	2022-11-05	20:40:34	2	14.651926994	121.058448792	0.0141	110.05
276	2022-11-05	20:50:42	2	14.651926994	121.058448792	0.0141	110.04
277	2022-11-05	21:01:07	2	14.651926994	121.058448792	0.0141	110.03
278	2022-11-05	21:10:58	2	14.651926994	121.058448792	0.0141	110.02
279	2022-11-05	21:20:35	2	14.651926994	121.058448792	0.0141	110.03
280	2022-11-05	21:30:25	2	14.651926994	121.058448792	0.0141	110.06
281	2022-11-05	21:40:23	2	14.651926994	121.058448792	0.0141	110.01
282	2022-11-05	22:11:38	2	14.651926994	121.058448792	0.0141	110.09
283	2022-11-05	22:20:55	2	14.651926994	121.058448792	0.0141	110.02
284	2022-11-05	22:40:47	2	14.651926994	121.058448792	0.0141	110.02
285	2022-11-05	22:50:49	2	14.651926994	121.058448792	0.0141	110.02
286	2022-11-05	23:00:33	2	14.651926994	121.058448792	0.0141	110.03
287	2022-11-05	23:10:39	2	14.651926994	121.058448792	0.0141	110.02
288	2022-11-05	23:20:25	2	14.651926994	121.058448792	0.0141	110.02
289	2022-11-05	23:30:34	2	14.651926994	121.058448792	0.0141	110.02
290	2022-11-05	23:40:40	2	14.651926994	121.058448792	0.0141	110.05
291	2022-11-05	23:50:30	2	14.651926994	121.058448792	0.0141	110.01
292	2022-11-06	00:00:30	2	14.651926994	121.058448792	0.0141	110.02
293	2022-11-06	00:20:34	2	14.651926994	121.058448792	0.0141	110.02
294	2022-11-06	00:30:35	2	14.651926994	121.058448792	0.0141	110.0
295	2022-11-06	00:41:07	2	14.651926994	121.058448792	0.0141	110.03
296	2022-11-06	00:50:42	2	14.651926994	121.058448792	0.0141	110.0
297	2022-11-06	01:21:12	2	14.651926994	121.058448792	0.0141	110.03
298	2022-11-06	01:30:40	2	14.651926994	121.058448792	0.0141	110.0

299	2022-11-06	01:41:15	2	14.651926994	121.058448792	0.0141	110.1
300	2022-11-06	01:51:02	2	14.651926994	121.058448792	0.0141	110.01
301	2022-11-06	02:00:44	2	14.651926994	121.058448792	0.0141	110.02
302	2022-11-06	02:11:07	2	14.651926994	121.058448792	0.0141	110.06
303	2022-11-06	02:21:47	2	14.651926994	121.058448792	0.0141	110.06
305	2022-11-06	02:40:43	2	14.651926994	121.058448792	0.0141	110.02
307	2022-11-06	03:00:45	2	14.651926994	121.058448792	0.0141	110.04
308	2022-11-06	03:10:36	2	14.651926994	121.058448792	0.0141	110.01
309	2022-11-06	03:20:40	2	14.651926994	121.058448792	0.0141	110.02
310	2022-11-06	03:30:32	2	14.651926994	121.058448792	0.0141	110.03
311	2022-11-06	03:40:32	2	14.651926994	121.058448792	0.0141	110.04
312	2022-11-06	03:50:40	2	14.651926994	121.058448792	0.0141	110.01
313	2022-11-06	04:00:43	2	14.651926994	121.058448792	0.0141	110.02
315	2022-11-06	04:20:50	2	14.651926994	121.058448792	0.0141	110.04
316	2022-11-06	04:30:51	2	14.651926994	121.058448792	0.0141	110.04
317	2022-11-06	04:40:45	2	14.651926994	121.058448792	0.0141	110.02
318	2022-11-06	04:50:36	2	14.651926994	121.058448792	0.0141	110.02
319	2022-11-06	05:00:43	2	14.651926994	121.058448792	0.0141	110.01
320	2022-11-06	05:10:48	2	14.651926994	121.058448792	0.0141	110.0
321	2022-11-06	05:20:39	2	14.651926994	121.058448792	0.0141	110.03
322	2022-11-06	05:40:29	2	14.651926994	121.058448792	0.0141	110.01
323	2022-11-06	05:50:42	2	14.651926994	121.058448792	0.0141	110.03
324	2022-11-06	06:00:35	2	14.651926994	121.058448792	0.0141	110.0
325	2022-11-06	06:10:30	2	14.651926994	121.058448792	0.0141	110.03
326	2022-11-06	06:20:40	2	14.651926994	121.058448792	0.0141	110.03
329	2022-11-06	07:00:39	2	14.651926994	121.058448792	0.0141	109.98
330	2022-11-06	07:10:24	2	14.651926994	121.058448792	0.0141	110.02
331	2022-11-06	07:20:26	2	14.651926994	121.058448792	0.0141	110.02
332	2022-11-06	07:30:37	2	14.651926994	121.058448792	0.0141	110.05
333	2022-11-06	07:40:30	2	14.651926994	121.058448792	0.0141	110.02
334	2022-11-06	07:50:41	2	14.651926994	121.058448792	0.0141	110.02
335	2022-11-06	08:01:03	2	14.651926994	121.058448792	0.0141	110.01
336	2022-11-06	08:11:34	2	14.651926994	121.058448792	0.0141	110.01
337	2022-11-06	08:21:30	2	14.651926994	121.058448792	0.0141	110.02
338	2022-11-06	08:30:42	2	14.651926994	121.058448792	0.0141	110.03
339	2022-11-06	08:40:36	2	14.651926041	121.058448792	0.0141	109.97
340	2022-11-06	08:50:49	2	14.651926994	121.058448792	0.0141	110.01
341	2022-11-06	09:00:39	2	14.651926994	121.058448792	0.0141	110.04
342	2022-11-06	09:10:50	2	14.651926994	121.058448792	0.0141	110.01
343	2022-11-06	09:20:20	2	14.651926994	121.058448792	0.0141	109.89
344	2022-11-06	09:30:19	2	14.651926041	121.058448792	0.0141	110.03
345	2022-11-06	09:50:31	2	14.651926994	121.058448792	0.0141	110.0
346	2022-11-06	10:00:35	2	14.651926994	121.058448792	0.0141	109.98
347	2022-11-06	10:10:32	2	14.651926994	121.058448792	0.0141	110.01
348	2022-11-06	10:40:27	2	14.651926994	121.058448792	0.0141	110.03
349	2022-11-06	10:50:26	2	14.651926994	121.058448792	0.0141	110.02
350	2022-11-06	11:00:19	2	14.651926994	121.058448792	0.0141	110.03
351	2022-11-06	11:10:22	2	14.651926994	121.058448792	0.0141	110.01
353	2022-11-06	11:40:40	2	14.651926994	121.058448792	0.0141	110.04
354	2022-11-06	12:00:26	2	14.651926994	121.058448792	0.0141	110.03
355	2022-11-06	12:20:18	2	14.651926994	121.058448792	0.0141	110.03
356	2022-11-06	12:30:45	2	14.651926994	121.058448792	0.0141	110.01
357	2022-11-06	12:40:24	2	14.651926994	121.058448792	0.0141	110.14
358	2022-11-06	13:00:44	2	14.651926994	121.058448792	0.0141	110.02
360	2022-11-06	13:30:34	2	14.651926994	121.058448792	0.0141	110.01
361	2022-11-06	13:40:23	2	14.651926994	121.058448792	0.0141	110.03
362	2022-11-06	13:50:23	2	14.651926994	121.058448792	0.0141	110.01
363	2022-11-06	14:10:23	2	14.651926994	121.058448792	0.0141	110.03
364	2022-11-06	14:20:16	2	14.651926994	121.058448792	0.0141	110.04
365	2022-11-06	14:30:17	2	14.651926994	121.058448792	0.0141	110.05
366	2022-11-06	14:50:16	2	14.651926994	121.058448792	0.0141	109.96
367	2022-11-06	15:00:25	2	14.651926994	121.058448792	0.0141	110.08
368	2022-11-06	15:10:19	2	14.651926994	121.058448792	0.0141	110.01

369	2022-11-06	15:20:16	2	14.651926994	121.058448792	0.0141	110.03
370	2022-11-06	15:30:11	2	14.651926994	121.058448792	0.0141	110.0
371	2022-11-06	15:51:12	2	14.651926994	121.058448792	0.0141	109.94
372	2022-11-06	16:00:57	2	14.651926994	121.058448792	0.0141	110.01
373	2022-11-06	16:11:13	2	14.651926994	121.058448792	0.0141	110.02
374	2022-11-06	16:21:04	2	14.651926994	121.058448792	0.0141	110.03
375	2022-11-06	16:30:16	2	14.651926994	121.058448792	0.0141	110.01
376	2022-11-06	16:40:19	2	14.651926994	121.058448792	0.0141	110.01
377	2022-11-06	16:51:10	2	14.651926994	121.058448792	0.0141	110.0
378	2022-11-06	17:00:24	2	14.651926041	121.058448792	0.0141	109.83
379	2022-11-06	17:20:26	2	14.651926041	121.058448792	0.0141	110.05
380	2022-11-06	17:41:00	2	14.651926994	121.058448792	0.0141	110.03
381	2022-11-06	17:50:42	2	14.651926994	121.058448792	0.0141	110.03
382	2022-11-06	18:00:34	2	14.651926994	121.058448792	0.0141	110.02
383	2022-11-06	18:20:15	2	14.651926994	121.058448792	0.0141	110.03
384	2022-11-06	18:30:28	2	14.651926994	121.058448792	0.0141	110.01
385	2022-11-06	18:40:20	2	14.651926994	121.058448792	0.0141	110.0
386	2022-11-06	18:50:32	2	14.651926994	121.058448792	0.0141	110.02
387	2022-11-06	19:20:37	2	14.651926994	121.058448792	0.0141	110.03
388	2022-11-06	19:30:40	2	14.651926994	121.058448792	0.0141	110.03
389	2022-11-06	19:50:28	2	14.651926994	121.058448792	0.0141	110.03
390	2022-11-06	20:00:20	2	14.651926994	121.058448792	0.0141	110.02
391	2022-11-06	20:10:22	2	14.651926994	121.058448792	0.0141	110.03
392	2022-11-06	20:30:42	2	14.651926994	121.058448792	0.0141	110.02
395	2022-11-06	21:20:29	2	14.651926994	121.058448792	0.0141	110.01
396	2022-11-06	21:30:55	2	14.651926994	121.058448792	0.0141	109.99
397	2022-11-06	21:40:46	2	14.651926041	121.058448792	0.0141	109.96
398	2022-11-06	21:50:37	2	14.651926994	121.058448792	0.0141	109.99
399	2022-11-06	22:00:45	2	14.651926041	121.058448792	0.0141	110.02
400	2022-11-06	22:10:39	2	14.651926994	121.058448792	0.0141	110.01
401	2022-11-06	22:21:07	2	14.651926994	121.058448792	0.0141	110.11
402	2022-11-06	22:30:34	2	14.651926994	121.058448792	0.0141	110.0
403	2022-11-06	22:40:51	2	14.651926041	121.058448792	0.0141	110.12
406	2022-11-06	23:10:40	2	14.651926994	121.058448792	0.0141	110.02
407	2022-11-06	23:20:33	2	14.651926994	121.058448792	0.0141	110.01
408	2022-11-06	23:30:22	2	14.651926994	121.058448792	0.0141	110.04
409	2022-11-06	23:40:27	2	14.651926994	121.058448792	0.0141	110.03
410	2022-11-06	23:50:28	2	14.651926994	121.058448792	0.0141	110.01
411	2022-11-07	00:00:34	2	14.651926994	121.058448792	0.0141	110.03
412	2022-11-07	00:10:32	2	14.651926994	121.058448792	0.0141	110.02
413	2022-11-07	00:20:36	2	14.651926994	121.058448792	0.0141	110.01
414	2022-11-07	00:30:48	2	14.651926994	121.058448792	0.0141	110.02
415	2022-11-07	00:40:49	2	14.651926994	121.058448792	0.0141	109.97
416	2022-11-07	00:50:44	2	14.651926994	121.058448792	0.0141	110.05
417	2022-11-07	01:00:58	2	14.651926994	121.058448792	0.0141	110.01
418	2022-11-07	01:10:54	2	14.651926994	121.058448792	0.0141	110.01
419	2022-11-07	01:20:53	2	14.651926994	121.058448792	0.0141	109.99
420	2022-11-07	01:30:56	2	14.651926994	121.058448792	0.0141	110.02
421	2022-11-07	01:40:52	2	14.651926994	121.058448792	0.0141	110.02
422	2022-11-07	01:51:02	2	14.651926994	121.058448792	0.0141	109.99
423	2022-11-07	02:00:57	2	14.651926994	121.058448792	0.0141	110.02
424	2022-11-07	02:10:52	2	14.651926994	121.058448792	0.0141	110.02
425	2022-11-07	02:20:55	2	14.651926994	121.058448792	0.0141	110.02
426	2022-11-07	02:30:51	2	14.651926994	121.058448792	0.0141	110.02
427	2022-11-07	02:40:44	2	14.651926994	121.058448792	0.0141	110.04
428	2022-11-07	03:00:33	2	14.651926994	121.058448792	0.0141	110.02
430	2022-11-07	03:20:41	2	14.651926994	121.058448792	0.0141	110.02
432	2022-11-07	03:40:42	2	14.651926994	121.058448792	0.0141	110.02
433	2022-11-07	03:50:48	2	14.651926994	121.058448792	0.0141	110.01
435	2022-11-07	04:10:48	2	14.651926994	121.058448792	0.0141	110.02
436	2022-11-07	04:20:53	2	14.651926994	121.058448792	0.0141	110.04
438	2022-11-07	04:40:48	2	14.651926994	121.058448792	0.0141	110.0
439	2022-11-07	04:50:54	2	14.651926994	121.058448792	0.0141	110.0

440	2022-11-07	05:00:42	2	14.651926994	121.058448792	0.0141	110.07
441	2022-11-07	05:10:45	2	14.651926994	121.058448792	0.0141	110.01
442	2022-11-07	05:20:40	2	14.651926994	121.058448792	0.0141	109.99
443	2022-11-07	05:30:39	2	14.651926994	121.058448792	0.0141	110.02
444	2022-11-07	05:40:41	2	14.651926994	121.058448792	0.0141	109.99
445	2022-11-07	05:50:46	2	14.651926994	121.058448792	0.0141	110.0
447	2022-11-07	06:10:39	2	14.651926994	121.058448792	0.0141	109.98
448	2022-11-07	06:20:35	2	14.651926994	121.058448792	0.0141	110.0
449	2022-11-07	06:30:22	2	14.651926994	121.058448792	0.0141	110.01
450	2022-11-07	06:40:34	2	14.651926994	121.058448792	0.0141	110.04
451	2022-11-07	06:50:31	2	14.651926994	121.058448792	0.0141	110.0
452	2022-11-07	07:00:21	2	14.651926994	121.058448792	0.0141	110.03
453	2022-11-07	07:10:21	2	14.651926994	121.058448792	0.0141	110.01
454	2022-11-07	07:20:20	2	14.651926994	121.058448792	0.0141	110.06
455	2022-11-07	07:30:40	2	14.651926994	121.058448792	0.0141	110.02
457	2022-11-07	08:00:41	2	14.651926994	121.058448792	0.0141	110.02
458	2022-11-07	08:11:03	2	14.651926994	121.058448792	0.0141	110.02
459	2022-11-07	08:31:05	2	14.651926994	121.058448792	0.0141	109.92
460	2022-11-07	08:40:42	2	14.651926994	121.058448792	0.0141	110.02
461	2022-11-07	08:50:33	2	14.651926994	121.058448792	0.0141	110.01
462	2022-11-07	09:00:31	2	14.651926994	121.058448792	0.0141	110.0
463	2022-11-07	09:10:34	2	14.651926994	121.058448792	0.0141	109.97
464	2022-11-07	09:30:34	2	14.651926994	121.058448792	0.0141	110.02
465	2022-11-07	09:51:02	2	14.651926994	121.058448792	0.0141	110.01
466	2022-11-07	10:00:50	2	14.651926994	121.058448792	0.0141	110.0
467	2022-11-07	10:11:02	2	14.651926041	121.058448792	0.0141	109.99
468	2022-11-07	10:40:33	2	14.651926994	121.058448792	0.0141	110.01
471	2022-11-07	11:20:39	2	14.651926994	121.058448792	0.0141	110.04
472	2022-11-07	11:30:38	2	14.651926994	121.058448792	0.0141	109.99
473	2022-11-07	11:40:35	2	14.651926994	121.058448792	0.0141	110.04
474	2022-11-07	11:50:31	2	14.651926994	121.058448792	0.0141	110.04
475	2022-11-07	12:00:29	2	14.651926994	121.058448792	0.0141	110.02
476	2022-11-07	12:10:33	2	14.651926994	121.058448792	0.0141	110.03
477	2022-11-07	12:21:04	2	14.651926994	121.058448792	0.0141	110.02
478	2022-11-07	12:30:37	2	14.651926041	121.058448792	0.0141	110.02
479	2022-11-07	12:40:48	2	14.651926994	121.058448792	0.0141	109.76
480	2022-11-07	12:50:31	2	14.651926994	121.058448792	0.0141	110.04
481	2022-11-07	13:00:28	2	14.651926994	121.058448792	0.0141	110.02
482	2022-11-07	13:11:16	2	14.651926994	121.058448792	0.0141	110.02
483	2022-11-07	13:21:33	2	14.651926994	121.058448792	0.0141	110.03
484	2022-11-07	13:30:55	2	14.651926994	121.058448792	0.0141	110.01
485	2022-11-07	13:40:23	2	14.651926994	121.058448792	0.0141	110.01
486	2022-11-07	13:50:27	2	14.651926994	121.058448792	0.0141	110.01
487	2022-11-07	14:00:18	2	14.651926994	121.058448792	0.0141	110.04
488	2022-11-07	14:10:23	2	14.651926994	121.058448792	0.0141	110.04
489	2022-11-07	14:20:19	2	14.651926994	121.058448792	0.0141	110.02
490	2022-11-07	14:30:16	2	14.651926994	121.058448792	0.0141	110.02
491	2022-11-07	14:40:12	2	14.651926994	121.058448792	0.0141	110.03
492	2022-11-07	14:50:16	2	14.651926994	121.058448792	0.0141	110.11
493	2022-11-07	15:00:15	2	14.651926994	121.058448792	0.0141	110.08
494	2022-11-07	15:10:22	2	14.651926994	121.058448792	0.0141	109.91
495	2022-11-07	15:20:58	2	14.651926994	121.058448792	0.0141	110.02
496	2022-11-07	15:30:36	2	14.651926994	121.058448792	0.0141	110.0
497	2022-11-07	15:40:54	2	14.651926994	121.058448792	0.0141	110.03
498	2022-11-07	15:50:23	2	14.651926994	121.058448792	0.0141	110.02
499	2022-11-07	16:00:25	2	14.651926994	121.058448792	0.0141	110.04
501	2022-11-07	16:20:40	2	14.651926994	121.058448792	0.0141	110.0
502	2022-11-07	16:30:22	2	14.651926994	121.058448792	0.0141	110.0
503	2022-11-07	16:40:40	2	14.651926041	121.058448792	0.0141	110.04
504	2022-11-07	16:50:42	2	14.651926994	121.058448792	0.0141	110.02
505	2022-11-07	17:01:19	2	14.651926994	121.058448792	0.0141	110.0
506	2022-11-07	17:30:19	2	14.651926994	121.058448792	0.0141	110.01
507	2022-11-07	17:50:33	2	14.651926994	121.058448792	0.0141	110.01

```

508 2022-11-07 18:01:00      2 14.651926994 121.058448792    0.0141    110.01
509 2022-11-07 18:20:17      2 14.651926994 121.058448792    0.0141    110.01
510 2022-11-07 18:50:49      2 14.651926994 121.058448792    0.0141    110.0
511 2022-11-07 19:00:52      2 14.651926994 121.058448792    0.0141    110.02

```

```

In [55]:      0 'C:/Users/Ket/Documents/Python Scripts/ub/filter by freq.py'
C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py:761: UserWarning: pandas only
support SQLAlchemy connectable(engine/connection) or database string URI or sqlite3 DBAPI2
connection; other DBAPI2 objects are not tested, please consider using SQLAlchemy
warnings.warn(

```

```

In [56]:      0 'C:/Users/Ket/Documents/Python Scripts/ub/filter by freq.py'
C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py:761: UserWarning: pandas only
support SQLAlchemy connectable(engine/connection) or database string URI or sqlite3 DBAPI2
connection; other DBAPI2 objects are not tested, please consider using SQLAlchemy
warnings.warn(

```

```

In [57]:      .          'display.max_rows' False

```

```

In [58]:

```

```

Out[58]:
   data_id      ts  fix_type  latitude  longitude  accuracy  msl
temp volt
0      2171 2022-07-26 12:00:29      2 16.723468781 120.781333923    0.0141 2,304.56
22.75  4.53
1      4007 2022-07-26 15:34:51      2 16.723386765 120.78250885    0.0141 2,295.52
NaN    4.54
2       727 2022-07-26 15:40:34      2 16.723386765 120.78250885    0.0141 2,295.47
NaN    4.54
3      1639 2022-07-26 15:52:09      2 16.723386765 120.78250885    0.0141 2,295.45
NaN    4.55
4      3441 2022-07-26 16:11:51      2 16.723386765 120.78250885    0.0141 2,295.51
NaN    4.54
5      3719 2022-07-26 16:31:25      2 16.723459244 120.781311035    0.0141 2,280.02
18.25  4.04
6       420 2022-07-26 16:41:29      2 16.723470688 120.781311035    0.0141 2,321.91
19.0   4.02
7      1321 2022-07-26 16:51:33      2 16.723459244 120.781311035    0.0141 2,280.03
19.0   4.06
8      2239 2022-07-26 17:01:28      2 16.723472595 120.781311035    0.0141 2,320.37
18.75  4.01
9      3158 2022-07-26 17:21:33      2 16.723478317 120.781311035    0.0141 2,297.82
18.0   3.99
10     4199 2022-07-26 17:51:42      2 16.723459244    120.78125    0.0141 2,286.1
18.0   4.01
11      918 2022-07-26 18:01:36      2 16.723459244 120.781311035    0.0141 2,280.05
18.0   4.02
...     ...
...     ...
10181   11208 2022-11-08 17:11:46      2 16.723461151 120.781311035    0.0141 2,279.86
18.75  3.99
10182   11209 2022-11-08 17:21:14      2 16.72344017 120.781333923    0.0141 2,304.01
18.25  3.99
10183   11210 2022-11-08 17:31:39      2 16.723461151 120.781311035    0.0141 2,279.88
18.0   4.04
10184   11211 2022-11-08 17:41:56      2 16.723461151 120.781311035    0.0141 2,279.84
18.0   4.02
10185   11213 2022-11-08 18:01:24      2 16.723461151 120.781311035    0.0141 2,279.85
18.0   3.99
10186   11214 2022-11-08 18:11:30      2 16.723461151 120.781311035    0.0141 2,279.85
18.0   4.07
10187   11215 2022-11-08 18:21:57      2 16.723461151 120.781311035    0.0141 2,279.88
18.0   4.02

```

```

10188    11216 2022-11-08 18:31:32      2 16.72344017 120.781311035 0.0141 2,282.99
18.0 3.99
10189    11217 2022-11-08 18:41:28      2 16.723461151 120.781311035 0.0141 2,279.86
17.75 4.02
10190    11218 2022-11-08 18:51:23      2 16.723426819 120.781311035 0.0141 2,295.79
17.25 4.01
10191    11219 2022-11-08 19:01:27      2 16.723461151 120.781311035 0.0141 2,279.84
17.0 4.01
10192    11220 2022-11-08 19:11:45      2 16.723461151 120.781311035 0.0141 2,279.87
17.0 4.02

```

[10193 rows x 9 columns]

In [59]:

Out[59]:

		ts	fix_type	latitude	longitude	accuracy	msl_round
0	2022-07-26	12:00:29	2	16.723468781	120.781333923	0.0141	2,304.56
1	2022-07-26	15:34:51	2	16.723386765	120.78250885	0.0141	2,295.52
2	2022-07-26	15:40:34	2	16.723386765	120.78250885	0.0141	2,295.47
3	2022-07-26	15:52:09	2	16.723386765	120.78250885	0.0141	2,295.45
4	2022-07-26	16:11:51	2	16.723386765	120.78250885	0.0141	2,295.51
5	2022-07-26	16:31:25	2	16.723459244	120.781311035	0.0141	2,280.02
6	2022-07-26	16:41:29	2	16.723470688	120.781311035	0.0141	2,321.91
7	2022-07-26	16:51:33	2	16.723459244	120.781311035	0.0141	2,280.03
8	2022-07-26	17:01:28	2	16.723472595	120.781311035	0.0141	2,320.37
9	2022-07-26	17:21:33	2	16.723478317	120.781311035	0.0141	2,297.82
10	2022-07-26	17:51:42	2	16.723459244	120.78125	0.0141	2,286.1
11	2022-07-26	18:01:36	2	16.723459244	120.781311035	0.0141	2,280.05
...	
10181	2022-11-08	17:11:46	2	16.723461151	120.781311035	0.0141	2,279.86
10182	2022-11-08	17:21:14	2	16.72344017	120.781333923	0.0141	2,304.01
10183	2022-11-08	17:31:39	2	16.723461151	120.781311035	0.0141	2,279.88
10184	2022-11-08	17:41:56	2	16.723461151	120.781311035	0.0141	2,279.84
10185	2022-11-08	18:01:24	2	16.723461151	120.781311035	0.0141	2,279.85
10186	2022-11-08	18:11:30	2	16.723461151	120.781311035	0.0141	2,279.85
10187	2022-11-08	18:21:57	2	16.723461151	120.781311035	0.0141	2,279.88
10188	2022-11-08	18:31:32	2	16.72344017	120.781311035	0.0141	2,282.99
10189	2022-11-08	18:41:28	2	16.723461151	120.781311035	0.0141	2,279.86
10190	2022-11-08	18:51:23	2	16.723426819	120.781311035	0.0141	2,295.79
10191	2022-11-08	19:01:27	2	16.723461151	120.781311035	0.0141	2,279.84
10192	2022-11-08	19:11:45	2	16.723461151	120.781311035	0.0141	2,279.87

[10193 rows x 6 columns]

In [60]:

Out[60]:

	msl_round	freq
0	2,304.56	2
1	2,295.52	1
2	2,295.47	3
3	2,295.45	3
4	2,295.51	1
5	2,280.02	177
6	2,321.91	4
7	2,280.03	157
8	2,320.37	4
9	2,297.82	1
10	2,286.1	1
11	2,280.05	78
...
2870	2,325.42	1
2871	2,287.03	1
2872	2,298.76	1

```

2873    2,315.93    1
2874    2,289.92    1
2875    2,302.41    1
2876    2,318.88    1
2877    2,309.62    1
2878    2,326.36    1
2879    2,304.01    1
2880    2,282.99    1
2881    2,295.79    1

```

[2882 rows x 2 columns]

```

In [61]:
Out[61]: 2352.11

```

```

In [62]:
Out[62]: 2328.71

```

```

In [63]:          = .          = 'msl_round'
...:          = .          >= .          * .25
2          = 'ts'          =True          =True

```

```

In [64]:
Out[64]:

```

	ts	fix_type	latitude	longitude	accuracy	msl_round	freq
0	2022-07-26 16:31:25	2	16.723459244	120.781311035	0.0141	2,280.02	177
1	2022-07-26 16:51:33	2	16.723459244	120.781311035	0.0141	2,280.03	157
2	2022-07-26 18:31:51	2	16.723459244	120.781311035	0.0141	2,280.04	133
3	2022-07-26 18:51:55	2	16.723459244	120.781311035	0.0141	2,280.04	133
4	2022-07-26 19:41:39	2	16.723459244	120.781311035	0.0141	2,280.04	133
5	2022-07-26 21:31:57	2	16.723459244	120.781311035	0.0141	2,280.04	133
6	2022-07-26 21:41:44	2	16.723459244	120.781311035	0.0141	2,280.03	157
7	2022-07-26 22:11:40	2	16.723459244	120.781311035	0.0141	2,280.04	133
8	2022-07-26 23:01:35	2	16.723459244	120.781311035	0.0141	2,280.04	133
9	2022-07-27 01:01:40	2	16.723459244	120.781311035	0.0141	2,280.0	203
10	2022-07-27 01:21:49	2	16.723459244	120.781311035	0.0141	2,280.03	157
11	2022-07-27 02:21:45	2	16.723459244	120.781311035	0.0141	2,280.02	177
...
4992	2022-11-08 15:21:31	2	16.723461151	120.781311035	0.0141	2,279.86	247
4993	2022-11-08 15:41:29	2	16.723461151	120.781311035	0.0141	2,279.86	247
4994	2022-11-08 15:51:24	2	16.723461151	120.781311035	0.0141	2,279.86	247
4995	2022-11-08 16:21:35	2	16.723461151	120.781311035	0.0141	2,279.85	163
4996	2022-11-08 16:51:48	2	16.723461151	120.781311035	0.0141	2,279.85	163
4997	2022-11-08 17:11:46	2	16.723461151	120.781311035	0.0141	2,279.86	247
4998	2022-11-08 17:31:39	2	16.723461151	120.781311035	0.0141	2,279.88	408
4999	2022-11-08 18:01:24	2	16.723461151	120.781311035	0.0141	2,279.85	163
5000	2022-11-08 18:11:30	2	16.723461151	120.781311035	0.0141	2,279.85	163
5001	2022-11-08 18:21:57	2	16.723461151	120.781311035	0.0141	2,279.88	408
5002	2022-11-08 18:41:28	2	16.723461151	120.781311035	0.0141	2,279.86	247
5003	2022-11-08 19:11:45	2	16.723461151	120.781311035	0.0141	2,279.87	328

[5004 rows x 7 columns]

```

In [65]:          = 6371e3
...:
...:          = 'ts'
...:          'lat2' =
...:          'lon2' =
...:          'lat1' =
...:          'lon1' =
...:
...:          = * /180
...:          = * /180

```

```

...:         'delta_lat' = . - . * . /180
...:         'delta_lon' = . - . * . /180
...:         = . 0
...:
...: #haversine
...:         = . /2 **2 + . *
...:         = . * . /2 **2
...:         = ** 1/2
...:         = 1- ** 1/2
...:         = 2 * .
...:         = * #in meters
...:         'dist' =
...:
...: #moving average
...:         = 11
...:
...:         = . .
...:         = .
...:         = - 1
...:
...:         = . .
...:         = .
...:         = - 1
...:
...:         = 'ts' .
...:         . 5 . =True #remove head = n : depends
on window
...:         . 5 . =True
...:         'mva_lat2' =
...:         'mva_lon2' =
...:
...:
...:         = .
...:         . 'Longitude vs. Latitude : TESUA displacement plot' = 'bold'
...:         = . 2 2
...: # labels = df_new.ts
...: # labels = ['\n'.join(wrap(l, 11)) for l in labels]
...:
...:         0 0
...:         . "green" =0.5
...:         .
...:         'Latitude, °' = 'bold'
...:         = 'gray' = '--' = 0.5
...:         = 'w'
...:
...:         0 1
...:         . "blue" =0.5
...:         .
...:         'Longitude, °' = 'bold'
...:         = 'gray' = '--' = 0.5
...:         = 'w'
...:
...:         1
...:         . "red"
...:         'dist, m' = 'bold'
...:         = 'gray' = '--' = 0.5
...:         =90

```

```

....:
....:
....:      =      .
....:      .      .
....:      .

```

In [66]:
Traceback (most recent call last):

File "C:\Users\Ket\AppData\Local\Temp\ipykernel_20676\3154473969.py", line 1, in <module>
plt.shw

AttributeError: module 'matplotlib.pyplot' has no attribute 'shw'

In [67]:

In [68]:
Out[68]: 2352.11

In [69]:
Out[69]: 2328.71

In [70]:
Out[70]: 2340.41

In [71]:
Out[71]: 467

In [72]:
C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py:761: UserWarning: pandas only support SQLAlchemy connectable(engine/connection) or database string URI or sqlite3 DBAPI2 connectionother DBAPI2 objects are not tested, please consider using SQLAlchemy
warnings.warn(

In [73]:
Out[73]: 2341.41

In [74]:
Out[74]: 2339.41

In [75]:
Out[75]: 2340.41

In [76]:
2
....:
= 'ts' =True =True * .25

In [77]:
Out[77]:

	ts	fix_type	latitude	longitude	accuracy	msl_round	freq
0	2022-07-26 16:31:25	2	16.723459244	120.781311035	0.0141	2,280.02	177
1	2022-07-26 16:51:33	2	16.723459244	120.781311035	0.0141	2,280.03	157
2	2022-07-26 18:31:51	2	16.723459244	120.781311035	0.0141	2,280.04	133
3	2022-07-26 18:51:55	2	16.723459244	120.781311035	0.0141	2,280.04	133
4	2022-07-26 19:41:39	2	16.723459244	120.781311035	0.0141	2,280.04	133
5	2022-07-26 21:31:57	2	16.723459244	120.781311035	0.0141	2,280.04	133
6	2022-07-26 21:41:44	2	16.723459244	120.781311035	0.0141	2,280.03	157
7	2022-07-26 22:11:40	2	16.723459244	120.781311035	0.0141	2,280.04	133
8	2022-07-26 23:01:35	2	16.723459244	120.781311035	0.0141	2,280.04	133
9	2022-07-27 01:01:40	2	16.723459244	120.781311035	0.0141	2,280.0	203
10	2022-07-27 01:21:49	2	16.723459244	120.781311035	0.0141	2,280.03	157
11	2022-07-27 02:21:45	2	16.723459244	120.781311035	0.0141	2,280.02	177

```

...
4992 2022-11-08 15:21:31      ...      2 16.723461151 120.781311035 0.0141 2,279.86 247
4993 2022-11-08 15:41:29      ...      2 16.723461151 120.781311035 0.0141 2,279.86 247
4994 2022-11-08 15:51:24      ...      2 16.723461151 120.781311035 0.0141 2,279.86 247
4995 2022-11-08 16:21:35      ...      2 16.723461151 120.781311035 0.0141 2,279.85 163
4996 2022-11-08 16:51:48      ...      2 16.723461151 120.781311035 0.0141 2,279.85 163
4997 2022-11-08 17:11:46      ...      2 16.723461151 120.781311035 0.0141 2,279.86 247
4998 2022-11-08 17:31:39      ...      2 16.723461151 120.781311035 0.0141 2,279.88 408
4999 2022-11-08 18:01:24      ...      2 16.723461151 120.781311035 0.0141 2,279.85 163
5000 2022-11-08 18:11:30      ...      2 16.723461151 120.781311035 0.0141 2,279.85 163
5001 2022-11-08 18:21:57      ...      2 16.723461151 120.781311035 0.0141 2,279.88 408
5002 2022-11-08 18:41:28      ...      2 16.723461151 120.781311035 0.0141 2,279.86 247
5003 2022-11-08 19:11:45      ...      2 16.723461151 120.781311035 0.0141 2,279.87 328

```

[5004 rows x 7 columns]

```

In [78]: import          as
...: import          as
...: import
...:
...:          = 6371e3
...:
...:          = 16.723459244
...:          = 120.781311035
...:          = 16.723461151
...:          = 120.781311035
...:
...:          =      *      . /180
...:          =      *      . /180
...:
...:          =      -      *      . /180
...:          =      -      *      . /180
...:
...:
...: #haversine
...:          =      . /2 **2 +      .      *      .      *      . /
2 **2
...:          =      ** 1/2
...:          = 1 -      ** 1/2
...:          = 2 *      .
...:          =      *      #in meters
...: print
0.21204872487919552

```

```

In [79]:          = "SELECT * FROM analysis_db.gnss_sinsa ORDER BY ts desc"
...:
...:          =      .
...:          =      .          'accuracy' ==
0.0141      .          =True      .          = 'ts'          =True          =True
...:
...:          'ts' =      .          'ts'
...:          'latitude' =      .          'latitude'
...:          'longitude' =      .          'longitude'
...:          'accuracy' =      .          'accuracy'
...:          'msl' =      .          'msl'
...:          'volt' =      .          'volt'
...:
...: # df = data[['ts','fix_type','latitude','longitude','accuracy','msl']].copy()
...:          =      'ts' 'fix_type' 'latitude' 'longitude' 'accuracy' .
...:          'msl_round' =      .          . 2
...:
...:          = list      .
...:          =

```



```

...:         = . = 'index' .
...:         = 'msl_round' 'freq'
...:         = . =True
...:
...:         = . = 'msl_round'
...:         = 'ts' =True >= . * .20
2
...:         = 6371e3
...:
...:         = 'ts' .
...:         'lat2' = .
...:         'lon2' = .
...:         'lat1' = . . -1
...:         'lon1' = . . -1
...:
...:         = . * . /180
...:         = . * . /180
...:
...:         'delta_lat' = . - . * . /180
...:         'delta_lon' = . - . * . /180
...:         = . 0
...:
...: #haversine
...:         = . /2 **2 + . *
...:         = . * . /2 **2
...:         = ** 1/2
...:         = 1- ** 1/2
...:         = 2 * .
...:         = . #in meters
...:         'dist' =
...:
...: #moving average
...:         = 11
...:
...:         = . .
...:         = .
...:         = . - 1
...:
...:         = . .
...:         = . - 1
...:
...:         = 'ts' .
...:         . 5 . =True #remove head = n : depends
on window
...:         . 5 . =True
...:         'mva_lat2' =
...:         'mva_lon2' =
...:
...:         = .
...:         # fig.suptitle('longitude vs. latitude : TESUA displacement plot',
fontweight='bold')
...:         = . 2 2
...:         # labels = df_new.ts
...:         # labels = ['\n'.join(wrap(1, 11)) for 1 in labels]
...:

```

```

...: .          0 0          .          "green"          =0.5
...: .          .          .          .          .
...: .          .          .          .          .
...: .          'Latitude, °'          = 'bold'
...: .          = 'gray'          = '--'          = 0.5
...: .          = 'w'
...: .
...: .          0 1          .          "blue"          =0.5
...: .          .          .          .          .
...: .          .          .          .          .
...: .          'Longitude, °'          = 'bold'
...: .          = 'gray'          = '--'          = 0.5
...: .          = 'w'
...: .
...: .          1          .          "red"
...: .          .          .          .          .
...: .          'dist, m'          = 'bold'
...: .          = 'gray'          = '--'          = 0.5
...: .          =90
...: .
...: .          =          .
...: .          .          .
...: .

```

C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py:761: UserWarning: pandas only support SQLAlchemy connectable(engine/connection) or database string URI or sqlite3 DBAPI2 connection other DBAPI2 objects are not tested, please consider using SQLAlchemy
warnings.warn(

In [80]:

Out[80]:

	ts	fix_type	latitude	longitude	accuracy	msl_round	freq
0	2022-07-26 16:31:25	2	16.723459244	120.781311035	0.0141	2,280.02	177
1	2022-07-26 16:51:33	2	16.723459244	120.781311035	0.0141	2,280.03	157
2	2022-07-26 18:31:51	2	16.723459244	120.781311035	0.0141	2,280.04	133
3	2022-07-26 18:51:55	2	16.723459244	120.781311035	0.0141	2,280.04	133
4	2022-07-26 19:41:39	2	16.723459244	120.781311035	0.0141	2,280.04	133
5	2022-07-26 21:31:57	2	16.723459244	120.781311035	0.0141	2,280.04	133
6	2022-07-26 21:41:44	2	16.723459244	120.781311035	0.0141	2,280.03	157
7	2022-07-26 22:11:40	2	16.723459244	120.781311035	0.0141	2,280.04	133
8	2022-07-26 23:01:35	2	16.723459244	120.781311035	0.0141	2,280.04	133
9	2022-07-27 01:01:40	2	16.723459244	120.781311035	0.0141	2,280.0	203
10	2022-07-27 01:21:49	2	16.723459244	120.781311035	0.0141	2,280.03	157
11	2022-07-27 02:21:45	2	16.723459244	120.781311035	0.0141	2,280.02	177
...
4992	2022-11-08 15:21:31	2	16.723461151	120.781311035	0.0141	2,279.86	247
4993	2022-11-08 15:41:29	2	16.723461151	120.781311035	0.0141	2,279.86	247
4994	2022-11-08 15:51:24	2	16.723461151	120.781311035	0.0141	2,279.86	247
4995	2022-11-08 16:21:35	2	16.723461151	120.781311035	0.0141	2,279.85	163
4996	2022-11-08 16:51:48	2	16.723461151	120.781311035	0.0141	2,279.85	163
4997	2022-11-08 17:11:46	2	16.723461151	120.781311035	0.0141	2,279.86	247
4998	2022-11-08 17:31:39	2	16.723461151	120.781311035	0.0141	2,279.88	408
4999	2022-11-08 18:01:24	2	16.723461151	120.781311035	0.0141	2,279.85	163
5000	2022-11-08 18:11:30	2	16.723461151	120.781311035	0.0141	2,279.85	163
5001	2022-11-08 18:21:57	2	16.723461151	120.781311035	0.0141	2,279.88	408
5002	2022-11-08 18:41:28	2	16.723461151	120.781311035	0.0141	2,279.86	247
5003	2022-11-08 19:11:45	2	16.723461151	120.781311035	0.0141	2,279.87	328

[5004 rows x 7 columns]

In [80]:

In [81]: from import

```

...: # Using current time
...:         = .
...:
...: # for two hours
...:         = - = 1
...:         = . 'Y-%m-%d %H:%M:%S'
...:
...: #sql query
...:         = "SELECT * FROM comms_db.smsinbox_loggers where sms_msg Like '%%SINUA%%'
and ts_sms > ('%s')" %
...:         = .
...:         = .
...:         .

```

Traceback (most recent call last):

```

File "C:\Users\Ket\AppData\Local\Temp\ipykernel_20676\2909644257.py", line 11, in <module>
    sql_data = pd.read_sql(query,connection)

```

NameError: name 'connection' is not defined

```

In [82]:         = . . = '192.168.150.112'
...:         = 'pysys_local'
...:         = 'NaCAhztBgYZ3HwTkvHwwGVtJn5sVMFgg'
...:         = 'comms_db'

```

```

In [83]: from         import
...: # Using current time
...:         = .
...:
...: # for two hours
...:         = - = 1
...:         = . 'Y-%m-%d %H:%M:%S'
...:
...: #sql query
...:         = "SELECT * FROM comms_db.smsinbox_loggers where sms_msg Like '%%SINUA%%'
and ts_sms > ('%s')" %
...:         = .
...:         = .
...:         .

```

C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py:761: UserWarning: pandas only support SQLAlchemy connectable(engine/connection) or database string URI or sqlite3 DBAPI2 connectionother DBAPI2 objects are not tested, please consider using SQLAlchemy
warnings.warn(

```

Out[83]:
   index  inbox_id      ts_sms      ts_stored  mobile_id
sms_msg read_status  gsm_id
0      0  10012925  2022-11-08  19:21:43  2022-11-08  19:22:37      143  SINUA:
2,16.723409653,120.781333923,0.0141,2296...      1      4
1      1  10013141  2022-11-08  19:35:23  2022-11-08  19:36:14      143
No SINUA data.      -1      4
2      2  10013210  2022-11-08  19:45:23  2022-11-08  19:46:16      143
No SINUA data.      -1      4
3      3  10013257  2022-11-08  19:55:23  2022-11-08  19:56:15      143
No SINUA data.      -1      4
4      4  10013398  2022-11-08  20:01:41  2022-11-08  20:03:08      143  SINUA:
2,16.723411560,120.781311035,0.0141,2292...      1      4
5      5  10013538  2022-11-08  20:11:16  2022-11-08  20:12:18      143  SINUA:
2,16.723360062,120.781333923,0.0141,2309...      1      4

```

```

In [84]: from         import
...: # Using current time
...:         = .

```

```

...:
...: # for two hours
...:
...: = - = 1
...: = . 'Y-%m-%d %H:%M:%S'
...:
...: #sql query
...: = "SELECT * FROM SELECT * FROM analysis_db.gnss_sinsa where ts > ('%s') " %
...:
...: = .
...: = .
...: .

```

C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py:761: UserWarning: pandas only support SQLAlchemy connectable(engine/connection) or database string URI or sqlite3 DBAPI2 connection other DBAPI2 objects are not tested, please consider using SQLAlchemy

warnings.warn(

Traceback (most recent call last):

```

File "C:\Users\Ket\anaconda3\lib\site-packages\mysql\connector\connection_cext.py", line
555, in cmd_query
    self._cmysql.query(

```

MySQLInterfaceError: You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'SELECT * FROM analysis_db.gnss_sinsa where ts > ('2022-11-08 19:18:46')' at line 1

The above exception was the direct cause of the following exception:

Traceback (most recent call last):

```

File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 2020, in execute
    cur.execute(*args, **kwargs)

```

```

File "C:\Users\Ket\anaconda3\lib\site-packages\mysql\connector\cursor_cext.py", line 276,
in execute
    result = self._cnx.cmd_query(

```

```

File "C:\Users\Ket\anaconda3\lib\site-packages\mysql\connector\connection_cext.py", line
563, in cmd_query
    raise get_mysql_exception(

```

ProgrammingError: You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'SELECT * FROM analysis_db.gnss_sinsa where ts > ('2022-11-08 19:18:46')' at line 1

The above exception was the direct cause of the following exception:

Traceback (most recent call last):

```

File "C:\Users\Ket\AppData\Local\Temp\ipykernel_20676\3307851151.py", line 11, in <module>
    sql_data = pd.read_sql(query,connection)

```

```

File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 566, in read_sql
    return pandas_sql.read_query(

```

```

File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 2080, in read_query
    cursor = self.execute(*args)

```

```

File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 2032, in execute
    raise ex from exc

```

DatabaseError: Execution failed on sql 'SELECT * FROM SELECT * FROM analysis_db.gnss_sinsa

where ts > ('2022-11-08 19:18:46')': 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'SELECT * FROM analysis_db.gnss_sinsa where ts > ('2022-11-08 19:18:46')' at line 1

```
In [85]: from pandas.io.sql import
...: # Using current time
...:         = .
...:
...: # for two hours
...:         = - = 1
...:         = . 'Y-%m-%d %H:%M:%S'
...:
...: #sql query
...:         = "SELECT * FROM SELECT * FROM analysis_db.gnss_sinsa where ts > (%s)" %
...:
...:         = .
...:         = .
...:         .
```

C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py:761: UserWarning: pandas only support SQLAlchemy connectable(engine/connection) or database string URI or sqlite3 DBAPI2 connection other DBAPI2 objects are not tested, please consider using SQLAlchemy

warnings.warn(

Traceback (most recent call last):

```
File "C:\Users\Ket\anaconda3\lib\site-packages\mysql\connector\connection_cext.py", line
555, in cmd_query
    self._cmysql.query(
```

MySQLInterfaceError: You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near '19:19:16)' at line 1

The above exception was the direct cause of the following exception:

Traceback (most recent call last):

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 2020, in execute
    cur.execute(*args, **kwargs)
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\mysql\connector\cursor_cext.py", line 276,
in execute
    result = self._cnx.cmd_query(
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\mysql\connector\connection_cext.py", line
563, in cmd_query
    raise get_mysql_exception(
```

ProgrammingError: You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near '19:19:16)' at line 1

The above exception was the direct cause of the following exception:

Traceback (most recent call last):

```
File "C:\Users\Ket\AppData\Local\Temp\ipykernel_20676\308263865.py", line 11, in <module>
    sql_data = pd.read_sql(query,connection)
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 566, in read_sql
    return pandas_sql.read_query(
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 2080, in read_query
```

```
cursor = self.execute(*args)
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 2032, in execute
    raise ex from exc
```

DatabaseError: Execution failed on sql 'SELECT * FROM SELECT * FROM analysis_db.gnss_sinsa where ts > (2022-11-08 19:19:16)': 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near '19:19:16)' at line 1

```
In [86]: from pandas import
...: # Using current time
...:
...:
...: # for two hours
...:
...: = - = 1
...: = . '%Y-%m-%d %H:%M:%S'
...:
...: #sql query
...: = "SELECT * FROM SELECT * FROM analysis_db.gnss_sinsa where ts > %s" %
...:
...: = .
...: = .
...: .
```

C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py:761: UserWarning: pandas only support SQLAlchemy connectable(engine/connection) or database string URI or sqlite3 DBAPI2 connection; other DBAPI2 objects are not tested, please consider using SQLAlchemy

```
warnings.warn(
```

Traceback (most recent call last):

```
File "C:\Users\Ket\anaconda3\lib\site-packages\mysql\connector\connection_cext.py", line
555, in cmd_query
    self._cmysql.query(
```

MySQLInterfaceError: You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'SELECT * FROM analysis_db.gnss_sinsa where ts > 2022-11-08 19:19:26' at line 1

The above exception was the direct cause of the following exception:

Traceback (most recent call last):

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 2020, in execute
    cur.execute(*args, **kwargs)
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\mysql\connector\cursor_cext.py", line 276,
in execute
    result = self._cnx.cmd_query(
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\mysql\connector\connection_cext.py", line
563, in cmd_query
    raise get_mysql_exception(
```

ProgrammingError: You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'SELECT * FROM analysis_db.gnss_sinsa where ts > 2022-11-08 19:19:26' at line 1

The above exception was the direct cause of the following exception:

Traceback (most recent call last):

```
File "C:\Users\Ket\AppData\Local\Temp\ipykernel_20676\2231802356.py", line 11, in <module>
    sql_data = pd.read_sql(query,connection)
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 566, in read_sql
    return pandas_sql.read_query(
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 2080, in read_query
    cursor = self.execute(*args)
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 2032, in execute
    raise ex from exc
```

DatabaseError: Execution failed on sql 'SELECT * FROM SELECT * FROM analysis_db.gnss_sinsa where ts > 2022-11-08 19:19:26': 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'SELECT * FROM analysis_db.gnss_sinsa where ts > 2022-11-08 19:19:26' at line 1

```
In [87]: from          import
...: # Using current time
...:
...:
...: # for two hours
...:
...: = - = 1
...: = . '%Y-%m-%d %H:%M:%S'
...:
...: #sql query
...: = "SELECT * FROM SELECT * FROM analysis_db.gnss_sinsa where ts > '%s'" %
...:
...: = .
...: = .
...: .
```

C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py:761: UserWarning: pandas only support SQLAlchemy connectable(engine/connection) or database string URI or sqlite3 DBAPI2 connection; other DBAPI2 objects are not tested, please consider using SQLAlchemy

warnings.warn(

Traceback (most recent call last):

```
File "C:\Users\Ket\anaconda3\lib\site-packages\mysql\connector\connection_cext.py", line
555, in cmd_query
    self._cmysql.query(
```

MySQLInterfaceError: You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'SELECT * FROM analysis_db.gnss_sinsa where ts > '2022-11-08 19:19:40'' at line 1

The above exception was the direct cause of the following exception:

Traceback (most recent call last):

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 2020, in execute
    cur.execute(*args, **kwargs)
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\mysql\connector\cursor_cext.py", line 276,
in execute
    result = self._cnx.cmd_query(
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\mysql\connector\connection_cext.py", line
563, in cmd_query
    raise get_mysql_exception(
```

ProgrammingError: You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'SELECT * FROM analysis_db.gnss_sinsa where ts > '2022-11-08 19:19:40'' at line 1

The above exception was the direct cause of the following exception:

Traceback (most recent call last):

```
File "C:\Users\Ket\AppData\Local\Temp\ipykernel_20676\3861086759.py", line 11, in <module>
    sql_data = pd.read_sql(query,connection)
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 566, in read_sql
    return pandas_sql.read_query(
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 2080, in read_query
    cursor = self.execute(*args)
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 2032, in execute
    raise ex from exc
```

DatabaseError: Execution failed on sql 'SELECT * FROM SELECT * FROM analysis_db.gnss_sinsa where ts > '2022-11-08 19:19:40': 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'SELECT * FROM analysis_db.gnss_sinsa where ts > '2022-11-08 19:19:40'' at line 1

```
In [88]: from          import
...: # Using current time
...:
...:
...: # for two hours
...:
...: = - = 1
...: = . '%Y-%m-%d %H:%M:%S'
...:
```

```
In [89]: #sql query
...:      = "SELECT * FROM SELECT * FROM analysis_db.gnss_sinsa where ts > ('%s') " %
...:
...:      = .
...:      = .
...:      .
```

C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py:761: UserWarning: pandas only support SQLAlchemy connectable(engine/connection) or database string URI or sqlite3 DBAPI2 connectionother DBAPI2 objects are not tested, please consider using SQLAlchemy

warnings.warn(

Traceback (most recent call last):

```
File "C:\Users\Ket\anaconda3\lib\site-packages\mysql\connector\connection_cext.py", line
555, in cmd_query
    self._cmysql.query(
```

MySQLInterfaceError: You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'SELECT * FROM analysis_db.gnss_sinsa where ts > ('2022-11-08 19:20:15')' at line 1

The above exception was the direct cause of the following exception:

Traceback (most recent call last):

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 2020, in execute
    cur.execute(*args, **kwargs)
```



```
File "C:\Users\Ket\anaconda3\lib\site-packages\mysql\connector\cursor_cext.py", line 276,
in execute
    result = self._cnx.cmd_query(
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\mysql\connector\connection_cext.py", line
563, in cmd_query
    raise get_mysql_exception(
```

ProgrammingError: You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'SELECT * FROM analysis_db.gnss_sinsa where ts > ('2022-11-08 19:20:15')' at line 1

The above exception was the direct cause of the following exception:

Traceback (most recent call last):

```
File "C:\Users\Ket\AppData\Local\Temp\ipykernel_20676\1412549085.py", line 3, in <module>
    sql_data = pd.read_sql(query,connection)
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 566, in read_sql
    return pandas_sql.read_query(
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 2080, in read_query
    cursor = self.execute(*args)
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 2032, in execute
    raise ex from exc
```

DatabaseError: Execution failed on sql 'SELECT * FROM SELECT * FROM analysis_db.gnss_sinsa where ts > ('2022-11-08 19:20:15')': 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'SELECT * FROM analysis_db.gnss_sinsa where ts > ('2022-11-08 19:20:15')' at line 1

```
In [90]: import
...: from                import
...: from                import
...: import              as
...: import
...: import
...: from                import

In [91]: #connect to database
...: try
...:     = . . = '192.168.150.112'
...:     = 'pysys_local'
...:     = 'NaCAhztBgYZ3HwTkvHwwGVtJn5sVMFgg'
...:     = 'comms_db'
...:
...:     if
...:         =
...:         print "Connected to MySQL Server version "
...:         =
...:         . "select database();"
...:         =
...:         print "You're connected to database: "
...:
...: except as
...:     print "Error while connecting to MySQL"
...:
```

Connected to MySQL Server version 5.7.40-0ubuntu0.18.04.1
 You're connected to database: ('comms_db',)

```
In [92]: #connect to database
...: try
...:     host = '192.168.150.112'
...:     user = 'pysys_local'
...:     password = 'NaCAhzTbgYZ3HwTkvHwwGVtJn5sVMFgg'
...:     database = 'analysis_db'
...:
...:     if True:
...:         print "Connected to MySQL Server version "
...:         print "select database();"
...:         print "You're connected to database: "
...:     except Exception as e:
...:         print "Error while connecting to MySQL"
```

Connected to MySQL Server version 5.7.40-0ubuntu0.18.04.1
 You're connected to database: ('analysis_db',)

```
In [93]: # Using current time
...:     start = datetime.datetime.now()
...:
...:     # for two hours
...:     end = datetime.datetime.now() + datetime.timedelta(hours=2)
...:     query = "SELECT * FROM analysis_db.gnss_sinsa where ts_sms > ('%s') " % start.strftime('%Y-%m-%d %H:%M:%S')
```

```
In [94]: #sql query
...:     query = "SELECT * FROM analysis_db.gnss_sinsa where ts_sms > ('%s') " % start.strftime('%Y-%m-%d %H:%M:%S')
...:
...:     cursor = connection.cursor()
...:     cursor.execute(query)
```

C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py:761: UserWarning: pandas only support SQLAlchemy connectable(engine/connection) or database string URI or sqlite3 DBAPI2 connection other DBAPI2 objects are not tested, please consider using SQLAlchemy

warnings.warn(
 Traceback (most recent call last):

```
File "C:\Users\Ket\anaconda3\lib\site-packages\mysql\connector\connection_cext.py", line 555, in cmd_query
    self._cmysql.query(
```

MySQLInterfaceError: Unknown column 'ts_sms' in 'where clause'

The above exception was the direct cause of the following exception:

Traceback (most recent call last):

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 2020, in execute
    cur.execute(*args, **kwargs)

File "C:\Users\Ket\anaconda3\lib\site-packages\mysql\connector\cursor_cext.py", line 276, in execute
    result = self._cnx.cmd_query(

File "C:\Users\Ket\anaconda3\lib\site-packages\mysql\connector\connection_cext.py", line
```

```
563, in cmd_query
    raise get_mysql_exception(
```

ProgrammingError: Unknown column 'ts_sms' in 'where clause'

The above exception was the direct cause of the following exception:

Traceback (most recent call last):

```
File "C:\Users\Ket\AppData\Local\Temp\ipykernel_20676\3261076587.py", line 3, in <module>
    sql_data = pd.read_sql(query,connection)
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 566, in read_sql
    return pandas_sql.read_query(
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 2080, in read_query
    cursor = self.execute(*args)
```

```
File "C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py", line 2032, in execute
    raise ex from exc
```

DatabaseError: Execution failed on sql 'SELECT * FROM analysis_db.gnss_sinsa where ts_sms > ('2022-11-08 19:20:58')': 1054 (42S22): Unknown column 'ts_sms' in 'where clause'

```
In [95]: #sql query
...:     = "SELECT * FROM analysis_db.gnss_sinsa where ts > ('%s')" %
```

```
...:
...:     = .
...:     = .
...:     .
```

C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py:761: UserWarning: pandas only support SQLAlchemy connectable(engine/connection) or database string URI or sqlite3 DBAPI2 connectionother DBAPI2 objects are not tested, please consider using SQLAlchemy
warnings.warn(

```
Out[95]:
```

	index	data_id	ts	fix_type	latitude	longitude	accuracy
msl	temp	volt					
0	0	11221	2022-11-08 19:21:43	2	16.723409653	120.781333923	0.0141
2,296.91	17.25	3.98					
1	1	11222	2022-11-08 20:01:41	2	16.72341156	120.781311035	0.0141
2,292.05	17.5	3.99					
2	2	11223	2022-11-08 20:11:16	2	16.723360062	120.781333923	0.0141
2,309.94	17.25	4.0					

```
In [96]: # Using current time
...:     = .
...:
...: # for two hours
...:     = - = 3
...:     = 'Y-%m-%d %H:%M:%S'
...: #sql query
...:     = "SELECT * FROM analysis_db.gnss_sinsa where ts > ('%s')" %
```

```
...:
...:     = .
...:     = True
```

C:\Users\Ket\anaconda3\lib\site-packages\pandas\io\sql.py:761: UserWarning: pandas only support SQLAlchemy connectable(engine/connection) or database string URI or sqlite3 DBAPI2 connectionother DBAPI2 objects are not tested, please consider using SQLAlchemy
warnings.warn(

```
In [97]:
```

Out[97]:

	data_id	ts	fix_type	latitude	longitude	accuracy	msl
temp	volt						
0	11210	2022-11-08 17:31:39	2	16.723461151	120.781311035	0.0141	2,279.88
18.0	4.04						
1	11211	2022-11-08 17:41:56	2	16.723461151	120.781311035	0.0141	2,279.84
18.0	4.02						
2	11212	2022-11-08 17:51:15	2	16.723421097	120.781333923	0.0146	2,317.47
17.75	3.97						
3	11213	2022-11-08 18:01:24	2	16.723461151	120.781311035	0.0141	2,279.85
18.0	3.99						
4	11214	2022-11-08 18:11:30	2	16.723461151	120.781311035	0.0141	2,279.85
18.0	4.07						
5	11215	2022-11-08 18:21:57	2	16.723461151	120.781311035	0.0141	2,279.88
18.0	4.02						
6	11216	2022-11-08 18:31:32	2	16.72344017	120.781311035	0.0141	2,282.99
18.0	3.99						
7	11217	2022-11-08 18:41:28	2	16.723461151	120.781311035	0.0141	2,279.86
17.75	4.02						
8	11218	2022-11-08 18:51:23	2	16.723426819	120.781311035	0.0141	2,295.79
17.25	4.01						
9	11219	2022-11-08 19:01:27	2	16.723461151	120.781311035	0.0141	2,279.84
17.0	4.01						
10	11220	2022-11-08 19:11:45	2	16.723461151	120.781311035	0.0141	2,279.87
17.0	4.02						
11	11221	2022-11-08 19:21:43	2	16.723409653	120.781333923	0.0141	2,296.91
17.25	3.98						
12	11222	2022-11-08 20:01:41	2	16.72341156	120.781311035	0.0141	2,292.05
17.5	3.99						
13	11223	2022-11-08 20:11:16	2	16.723360062	120.781333923	0.0141	2,309.94
17.25	4.0						

```
In [98]:      =      .      'accuracy' ==
0.0141      .      =True      = 'ts'      =True      =True
```

In [99]:

Out[99]:

	data_id	ts	fix_type	latitude	longitude	accuracy	msl
temp	volt						
0	11210	2022-11-08 17:31:39	2	16.723461151	120.781311035	0.0141	2,279.88
18.0	4.04						
1	11211	2022-11-08 17:41:56	2	16.723461151	120.781311035	0.0141	2,279.84
18.0	4.02						
2	11212	2022-11-08 17:51:15	2	16.723421097	120.781333923	0.0146	2,317.47
17.75	3.97						
3	11213	2022-11-08 18:01:24	2	16.723461151	120.781311035	0.0141	2,279.85
18.0	3.99						
4	11214	2022-11-08 18:11:30	2	16.723461151	120.781311035	0.0141	2,279.85
18.0	4.07						
5	11215	2022-11-08 18:21:57	2	16.723461151	120.781311035	0.0141	2,279.88
18.0	4.02						
6	11216	2022-11-08 18:31:32	2	16.72344017	120.781311035	0.0141	2,282.99
18.0	3.99						
7	11217	2022-11-08 18:41:28	2	16.723461151	120.781311035	0.0141	2,279.86
17.75	4.02						
8	11218	2022-11-08 18:51:23	2	16.723426819	120.781311035	0.0141	2,295.79
17.25	4.01						
9	11219	2022-11-08 19:01:27	2	16.723461151	120.781311035	0.0141	2,279.84
17.0	4.01						
10	11220	2022-11-08 19:11:45	2	16.723461151	120.781311035	0.0141	2,279.87
17.0	4.02						
11	11221	2022-11-08 19:21:43	2	16.723409653	120.781333923	0.0141	2,296.91
17.25	3.98						

```

12    11222 2022-11-08 20:01:41          2  16.72341156 120.781311035    0.0141 2,292.05
17.5   3.99
13    11223 2022-11-08 20:11:16          2  16.723360062 120.781333923    0.0141 2,309.94
17.25   4.0

```

```

In [100]:      =      .      'accuracy' ==
0.0141      .      =True      .      = 'ts'      =True      =True

```

```

In [101]:
Out[101]:
   data_id      ts  fix_type  latitude  longitude  accuracy  msl
temp  volt
0    11210 2022-11-08 17:31:39          2  16.723461151 120.781311035    0.0141 2,279.88
18.0   4.04
1    11211 2022-11-08 17:41:56          2  16.723461151 120.781311035    0.0141 2,279.84
18.0   4.02
2    11213 2022-11-08 18:01:24          2  16.723461151 120.781311035    0.0141 2,279.85
18.0   3.99
3    11214 2022-11-08 18:11:30          2  16.723461151 120.781311035    0.0141 2,279.85
18.0   4.07
4    11215 2022-11-08 18:21:57          2  16.723461151 120.781311035    0.0141 2,279.88
18.0   4.02
5    11216 2022-11-08 18:31:32          2  16.72344017 120.781311035    0.0141 2,282.99
18.0   3.99
6    11217 2022-11-08 18:41:28          2  16.723461151 120.781311035    0.0141 2,279.86
17.75   4.02
7    11218 2022-11-08 18:51:23          2  16.723426819 120.781311035    0.0141 2,295.79
17.25   4.01
8    11219 2022-11-08 19:01:27          2  16.723461151 120.781311035    0.0141 2,279.84
17.0   4.01
9    11220 2022-11-08 19:11:45          2  16.723461151 120.781311035    0.0141 2,279.87
17.0   4.02
10   11221 2022-11-08 19:21:43          2  16.723409653 120.781333923    0.0141 2,296.91
17.25   3.98
11   11222 2022-11-08 20:01:41          2  16.72341156 120.781311035    0.0141 2,292.05
17.5   3.99
12   11223 2022-11-08 20:11:16          2  16.723360062 120.781333923    0.0141 2,309.94
17.25   4.0

```

```

In [102]:      'ts' =      .      'ts'
...:      'latitude' =      .      'latitude'
...:      'longitude' =      .      'longitude'
...:      'accuracy' =      .      'accuracy'
...:      'msl' =      .      'msl'
...:      'volt' =      .      'volt'

```

```

In [103]:      =      'ts' 'fix_type' 'latitude' 'longitude' 'accuracy' .
...:      'msl_round' =      .      2

```

Traceback (most recent call last):

```

File "C:\Users\Ket\AppData\Local\Temp\ipykernel_20676\624225047.py", line 2, in <module>
    df_new['msl_round'] = np.round(df.msl,2)

```

NameError: name 'df_new' is not defined

```

In [104]:      =      'ts' 'fix_type' 'latitude' 'longitude' 'accuracy' .
...:      'msl_round' =      .      .      2

```

```

In [105]:
Out[105]:
      ts  fix_type  latitude  longitude  accuracy  msl_round
0  2022-11-08 17:31:39          2  16.723461151 120.781311035    0.0141    2,279.88

```

1	2022-11-08 17:41:56	2	16.723461151	120.781311035	0.0141	2,279.84
2	2022-11-08 18:01:24	2	16.723461151	120.781311035	0.0141	2,279.85
3	2022-11-08 18:11:30	2	16.723461151	120.781311035	0.0141	2,279.85
4	2022-11-08 18:21:57	2	16.723461151	120.781311035	0.0141	2,279.88
5	2022-11-08 18:31:32	2	16.72344017	120.781311035	0.0141	2,282.99
6	2022-11-08 18:41:28	2	16.723461151	120.781311035	0.0141	2,279.86
7	2022-11-08 18:51:23	2	16.723426819	120.781311035	0.0141	2,295.79
8	2022-11-08 19:01:27	2	16.723461151	120.781311035	0.0141	2,279.84
9	2022-11-08 19:11:45	2	16.723461151	120.781311035	0.0141	2,279.87
10	2022-11-08 19:21:43	2	16.723409653	120.781333923	0.0141	2,296.91
11	2022-11-08 20:01:41	2	16.72341156	120.781311035	0.0141	2,292.05
12	2022-11-08 20:11:16	2	16.723360062	120.781333923	0.0141	2,309.94

```
In [106]:          = list          .
...:          =
...:          = 'index' .
...:          = 'msl_round' 'freq'
...:          = True
```

```
In [107]:
Out[107]:
```

	msl_round	freq
0	2,279.88	2
1	2,279.84	2
2	2,279.85	2
3	2,282.99	1
4	2,279.86	1
5	2,295.79	1
6	2,279.87	1
7	2,296.91	1
8	2,292.05	1
9	2,309.94	1

```
In [108]:          =          = 'msl_round'
...: # #filter by frequency count
...:          =          >=          *
25 2          = 'ts'          = True          = True
```

```
In [109]:
Out[109]:
```

	ts	fix_type	latitude	longitude	accuracy	msl_round	freq
0	2022-11-08 17:31:39	2	16.723461151	120.781311035	0.0141	2,279.88	2
1	2022-11-08 17:41:56	2	16.723461151	120.781311035	0.0141	2,279.84	2
2	2022-11-08 18:01:24	2	16.723461151	120.781311035	0.0141	2,279.85	2
3	2022-11-08 18:11:30	2	16.723461151	120.781311035	0.0141	2,279.85	2
4	2022-11-08 18:21:57	2	16.723461151	120.781311035	0.0141	2,279.88	2
5	2022-11-08 18:31:32	2	16.72344017	120.781311035	0.0141	2,282.99	1
6	2022-11-08 18:41:28	2	16.723461151	120.781311035	0.0141	2,279.86	1
7	2022-11-08 18:51:23	2	16.723426819	120.781311035	0.0141	2,295.79	1
8	2022-11-08 19:01:27	2	16.723461151	120.781311035	0.0141	2,279.84	2
9	2022-11-08 19:11:45	2	16.723461151	120.781311035	0.0141	2,279.87	1
10	2022-11-08 19:21:43	2	16.723409653	120.781333923	0.0141	2,296.91	1
11	2022-11-08 20:01:41	2	16.72341156	120.781311035	0.0141	2,292.05	1
12	2022-11-08 20:11:16	2	16.723360062	120.781333923	0.0141	2,309.94	1

```
In [110]:          =          = 'msl_round'
...: # #filter by frequency count
...:          =          >=          *
5 2          = 'ts'          = True          = True
```

```
In [111]:
Out[111]:
```

	ts	fix_type	latitude	longitude	accuracy	msl_round	freq
--	----	----------	----------	-----------	----------	-----------	------

0	2022-11-08 17:31:39	2	16.723461151	120.781311035	0.0141	2,279.88	2
1	2022-11-08 17:41:56	2	16.723461151	120.781311035	0.0141	2,279.84	2
2	2022-11-08 18:01:24	2	16.723461151	120.781311035	0.0141	2,279.85	2
3	2022-11-08 18:11:30	2	16.723461151	120.781311035	0.0141	2,279.85	2
4	2022-11-08 18:21:57	2	16.723461151	120.781311035	0.0141	2,279.88	2
5	2022-11-08 18:31:32	2	16.72344017	120.781311035	0.0141	2,282.99	1
6	2022-11-08 18:41:28	2	16.723461151	120.781311035	0.0141	2,279.86	1
7	2022-11-08 18:51:23	2	16.723426819	120.781311035	0.0141	2,295.79	1
8	2022-11-08 19:01:27	2	16.723461151	120.781311035	0.0141	2,279.84	2
9	2022-11-08 19:11:45	2	16.723461151	120.781311035	0.0141	2,279.87	1
10	2022-11-08 19:21:43	2	16.723409653	120.781333923	0.0141	2,296.91	1
11	2022-11-08 20:01:41	2	16.72341156	120.781311035	0.0141	2,292.05	1
12	2022-11-08 20:11:16	2	16.723360062	120.781333923	0.0141	2,309.94	1

```
In [112]:
...: # #filter by frequency count
...:
2 ...: = 'ts' = True = True * .5
```

```
In [113]:
Out[113]:
```

	ts	fix_type	latitude	longitude	accuracy	msl_round	freq
0	2022-11-08 17:31:39	2	16.723461151	120.781311035	0.0141	2,279.88	2
1	2022-11-08 17:41:56	2	16.723461151	120.781311035	0.0141	2,279.84	2
2	2022-11-08 18:01:24	2	16.723461151	120.781311035	0.0141	2,279.85	2
3	2022-11-08 18:11:30	2	16.723461151	120.781311035	0.0141	2,279.85	2
4	2022-11-08 18:21:57	2	16.723461151	120.781311035	0.0141	2,279.88	2
5	2022-11-08 19:01:27	2	16.723461151	120.781311035	0.0141	2,279.84	2

```
In [114]:
...: = 6371e3
...:
...: = 'ts'
...: 'lat2' =
...: 'lon2' =
...: 'lat1' = -1
...: 'lon1' = -1
...:
...: # df_forplot = new_df_on_tol[['ts']].copy()
...: # df_forplot['lat2'] = new_df_on_tol.latitude
...: # df_forplot['lon2'] = new_df_on_tol.longitude
...: # df_forplot['lat1'] = df_forplot.lat2.shift(-1)
...: # df_forplot['lon1'] = df_forplot.lon2.shift(-1)
...:
...: = * /180
...: = * /180
...:
...: 'delta_lat' = - * /180
...: 'delta_lon' = - * /180
...: = 0
...:
...: #haversine
...: = /2 **2 + *
...: = ** 1/2
...: = 1- ** 1/2
...: = 2 *
...: = * #in meters
...: 'dist' =
...:
...: #moving average
...: = 11
...:
```

```

...:         =         .         .
...:         =         .         .
...:         =         .         .         - 1
...:
...:         =         .         .
...:         =         .         .         - 1
...:
...:         =         'ts'         .
...:         .         .         5         =True         #remove head = n :
depends on window
...:         .         .         5         =True
...:         'mva_lat2' =
...:         'mva_lon2' =
...:
...:         =         .
...:         # fig.suptitle('longitude vs. latitude : TESUA displacement plot',
fontweight='bold')
...:         =         .         2 2
...:         # labels = df_new.ts
...:         # labels = ['\n'.join(wrap(l, 11)) for l in labels]
...:
...:         .         0 0
...:         .         .         .         "green"         =0.5
...:         .         .         .
...:         .         'Latitude, °'         = 'bold'
...:         .         = 'gray'         = '---'         = 0.5
...:         .         = 'w'
...:
...:         .         0 1
...:         .         .         .         "blue"         =0.5
...:         .         .         .
...:         .         'Longitude, °'         = 'bold'
...:         .         = 'gray'         = '---'         = 0.5
...:         .         = 'w'
...:
...:         .         1
...:         .         .         .         "red"
...:         .         'dist, m'         = 'bold'
...:         .         = 'gray'         = '---'         = 0.5
...:         .         =90
...:
...:         =         .
...:         .         .
...:         .

```

In [115]: