

Report on data processing results

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Abstract

Nowadays, the anthropogenic underwater noise has been recognised as a pollutant of international concern and the underwater noise levels have been identified as a target for the monitoring as they reflect the quality of the marine environment. By using the Passive Acoustic Monitoring (PAM) technique, the SOUNDSCAPE monitoring project aims to assess the levels of underwater sound at the Northern Adriatic Sea, compliant with the Marine Strategy Framework Directive (MSFD; EU).

This document describes:

(i) the procedures for processing the raw data by using a web app developed within the Soundscape project.

(ii) the procedures for validation and implementation of the web app;

(iii) the 1 sec and 20 sec averaged Sound Pressure Level data (SPLs) for 4 different 1/3 octave bands (63 Hz, 125 Hz, 250 Hz, 4000 Hz) calculated for all the recording stations during the period Mar-2020 / June-2021.

The here presented SOUNDSCAPE data sets are essential for establishing baselines that documents acoustic conditions over time on the NAS regional scale. In its turn this will facilitate the ecosystem health assessments and the evaluation of the consequences of proposed marine development, promoting a knowledge-based management of the marine resources.

1. Introduction

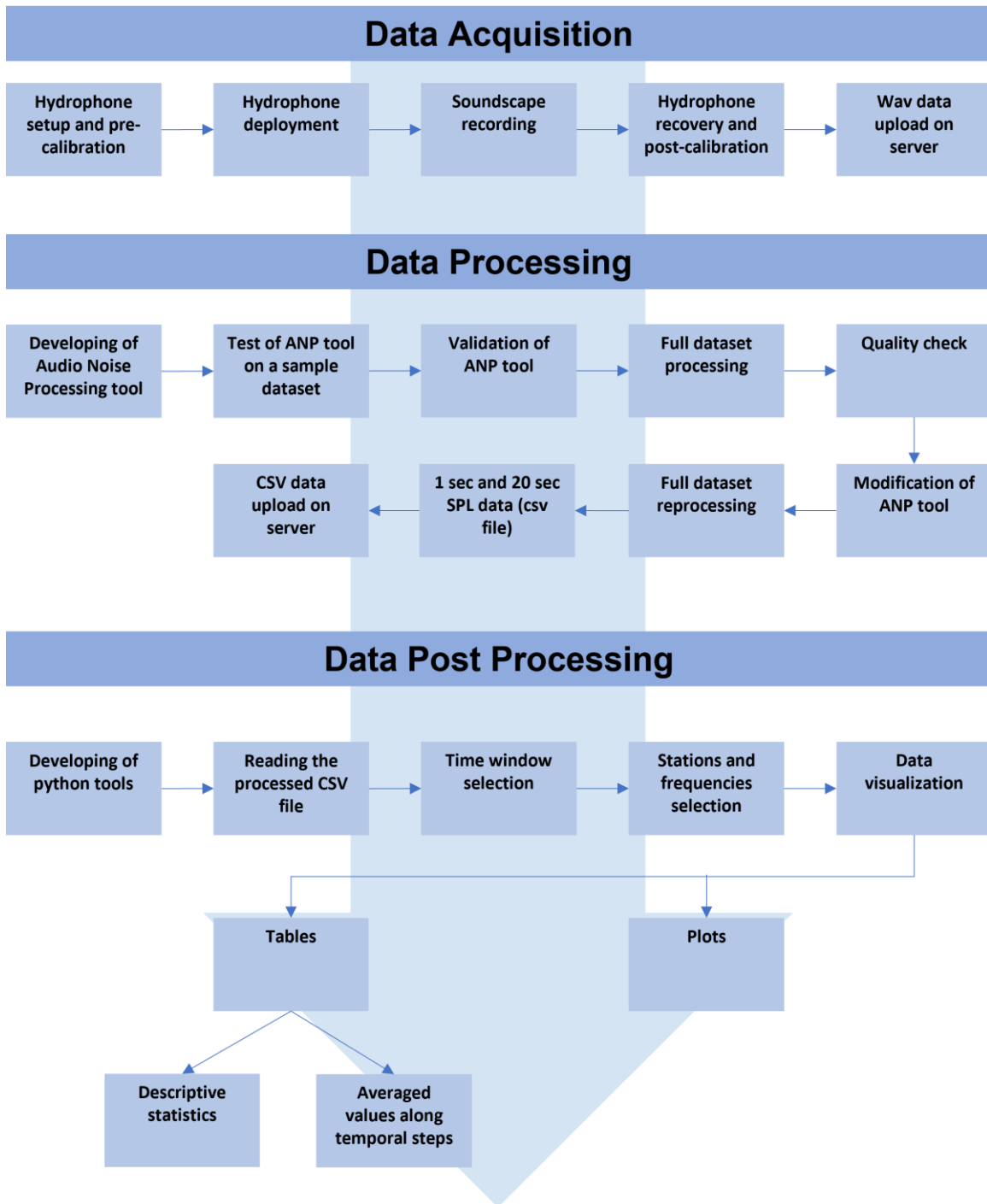
Since the anthropogenic underwater noise has been recognised as a pollutant of international concern (Duarte et al. 2021), the underwater noise levels have been identified as a target for the monitoring as they reflect the quality of the marine environments: the Directive 2008/56/EC (Marine Strategy Framework Directive, MSFD; EU), which was revised in the Commission Directive 2017/845/EU, 2017, mandates toward a Good Environmental Status (GES) in the European seas, with two indicators for underwater noise included to evaluate the GES. In particular, it is claimed to assess the 11.2.1 Indicator, that is described through the average values of sound pressure levels (re 1 μ Pa RMS) over a year within the 63 Hz and 125 Hz 1/3 octave bands standard centre frequencies. Setting up monitoring international cross-bordering programmes is recommended in this context.

By using the Passive Acoustic Monitoring (PAM) technique, the SOUNDSCAPE monitoring project aims to assess the levels of underwater sound at the Northern Adriatic Sea, compliant with the MSFD. Therefore, although the sound measurements themselves covered a wider frequency range (10 Hz – 20 kHz), the 63 and 125 Hz 1/3 octave frequency centred bands were the main focus of the data processing together with the 250 Hz and 4000 Hz 1/3 octave frequency centred bands as representative of the possible interaction between the local fauna and the man-made acoustic inputs (see Deliverable D4.2.1.).

The here presented SOUNDSCAPE data sets are essential for establishing baselines that document acoustic conditions over time on the NAS regional scale. In its turn this will facilitate the ecosystem health assessments and the evaluation of the consequences of proposed marine development, promoting a knowledge-based management of the marine resources.

The workflow that explains the path from the acquisition of underwater noise raw data to its processing and post-processing is shown in **Error! Unknown switch argument.** Three main blocks are distinguishable:

- “Data Acquisition” describes the process of sound recording and wav files uploading on the server;
- “Data Processing” shows the steps that lead to the processing of wav data to calculate Sound Pressure Level data;
- “Data Post Processing” is the last block and it illustrates the SPL data post-processing to obtain descriptive tables and graphs (Figure 2).



1. Workflow of data acquisition, processing and post-processing.

Figure
























Graph	Example	Graph	Example
Spectrogram like		Median Values of spectra	
Plot of the data		Plot of daily median	
KDE Density plot		Histogram	
Boxplot		Violinplot	
Boxplot of day/night data		Violinplot of day/night data	
Plot of percentiles		Percentiles comparison	
Boxplot of frequencies		Violinplot of frequencies	
Boxplot of monthly data		Violinplot of monthly data	
Boxplot of different periods		Violinplot of different periods	
Plot of frequencies in different periods			
Plot of the percentiles for different stations		Plot of the densities for different stations	
Boxplot of stations		Violinplot of stations	

Figure 2. List of plot types produced in the post processing.

2 Methods – data acquisition and processing

2.1 Data acquisition

The SOUNDSCAPE measuring system consists of a hydrophone (Neptune Sonar D60), the signal conditioning electronics, an A/D converter, and the data storage. Before and after each deployment the recording system was individually calibrated by using pistonphone in order to check its correct functioning. The collected wav files were uploaded and double backed up on two different servers. All the operations are detailed in DeliverableD3.2.1, DeliverableD3.2.2, DeliverableD3.3.2 and DeliverableD3.5.3.

2.2 Data processing

With the aim to assure a common processing protocol on all the SOUNDSCASPE collected data, a processing tool based on a python code was developed specifically for this project by the University of Gdansk together with CN: the tool is provided both as a web APP, hosted in a CNR server and optimize to perform parallel operations, and as an executable tool that can be run locally in any pc.

The tool is named Audio Noise Processing App (ANP); it has been developed following the recommendation described in DeliverableD3.5.1 and DeliverableD3.5.3. The steps used by the ANP are briefly summarized below:

- 1-sec segment is read from a wav file (i.e.48000 digit data, being the Sample Rate equal to 48000).
- A frequency dependent sensitivity is applied, according to DeliverableD3.2.1 and to the information provided by the hydrophone manufacturer.
- For each frequency, the SPL averaged over 1 second is calculated in the frequency domain by calculating the Discrete Fourier Transform (DFT) of the signal.
- 20 seconds averaged SPLs are then calculated from 1 second averaged SPLs.
- Output data of 1 second and 20 seconds SPLs are produced as text Comma separated files.

To validate the correct functioning of the ANP, the latter was tested against other already validated software, both commercial (Sigma plus) and not commercial (developed within other projects, i.e. BIAS project).

A subset of data (nine 1-hour wav files, one from each different station) was processed with ANP tool and the SPL of each 1/3 octave band were compared with the one calculated by a validated tool. The ANP was able to produce the same results. In Figure 3 an example is shown. In Table 1, the average and standard deviation of absolute errors (i.e. the absolute differences between trusted tool and ANP tool) are listed for each frequency; the average absolute error of all the data is really small: 0.08 dB re 1 μ Pa, and it is less than 0.1 dB re 1 μ Pa in most of the frequencies. Higher errors are associated to the lower frequencies, but anyway they are lower than 0.3 dB re 1 μ Pa.

Once assessed the good functioning of the ANP tool, all the wav data were processed.

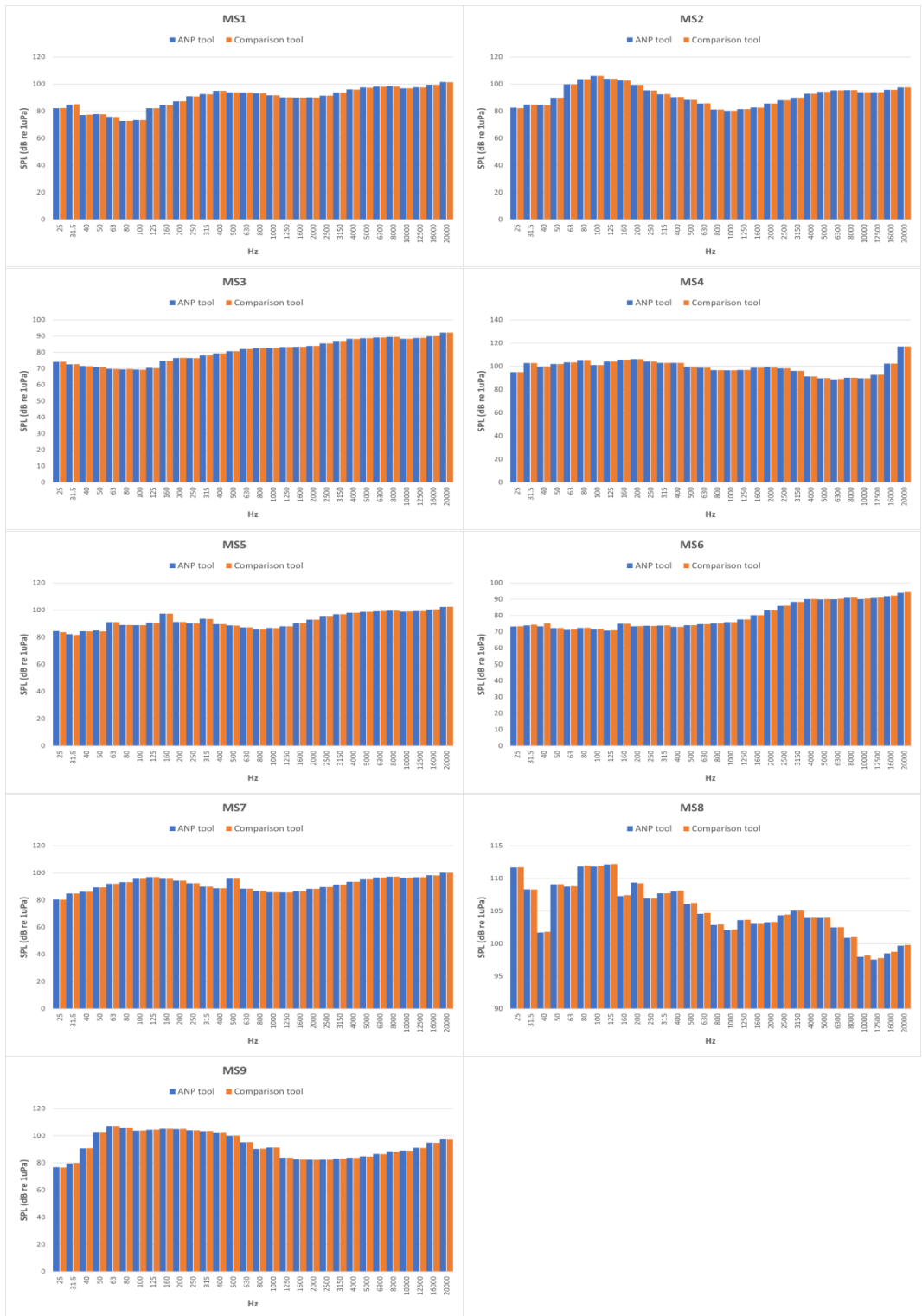


Figure 3. Comparison between ANP and an already validated tool.

Table 1. Absolute errors of differences between ANP tool and a validated analysis tool.

F	MeanError	St. Dev.
Hz (centred frequency)	SPL (dB re 1µPa)	
25	0.26	0.27
31.5	0.22	0.20
40	0.29	0.55
50	0.12	0.18
63	0.07	0.11
80	0.06	0.05
100	0.06	0.05
125	0.09	0.08
160	0.03	0.04
200	0.04	0.04
250	0.05	0.02
315	0.04	0.03
400	0.04	0.04
500	0.05	0.06
630	0.04	0.04
800	0.03	0.03
1000	0.04	0.04
1250	0.02	0.01
1600	0.03	0.03
2000	0.03	0.03
2500	0.04	0.04
3150	0.03	0.05
4000	0.05	0.05
5000	0.09	0.08
6300	0.11	0.12
8000	0.09	0.08

10000	0.10	0.10
12500	0.12	0.11
16000	0.12	0.11
20000	0.10	0.13
All data	0.08	0.15

2.3 Quality check

A quality check was performed on all the processed data, highlighting an unexpected bimodal distribution in the data (Figure 4), which was present in almost all the station but MS1. Additionally, the regular presence of jumps of about 15 dB was observed inspecting the SPL plots for the recording stations, with special regards to the lower frequencies (Figure 5). Many wav files were then manually checked, showing the presence of impulsive noises that occurred regularly (Figure 6).

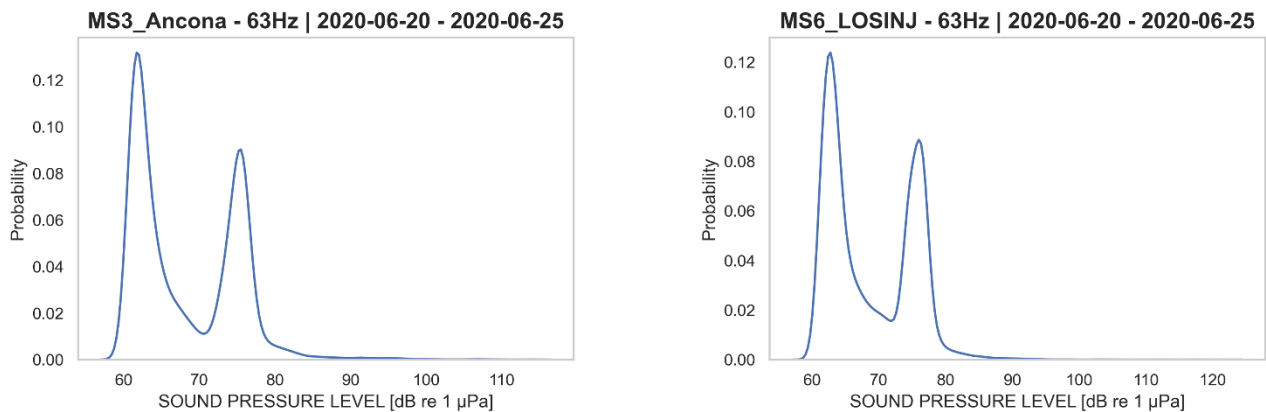


Figure 4. Distribution of SPL calculated from wav data affected by noisy signals.

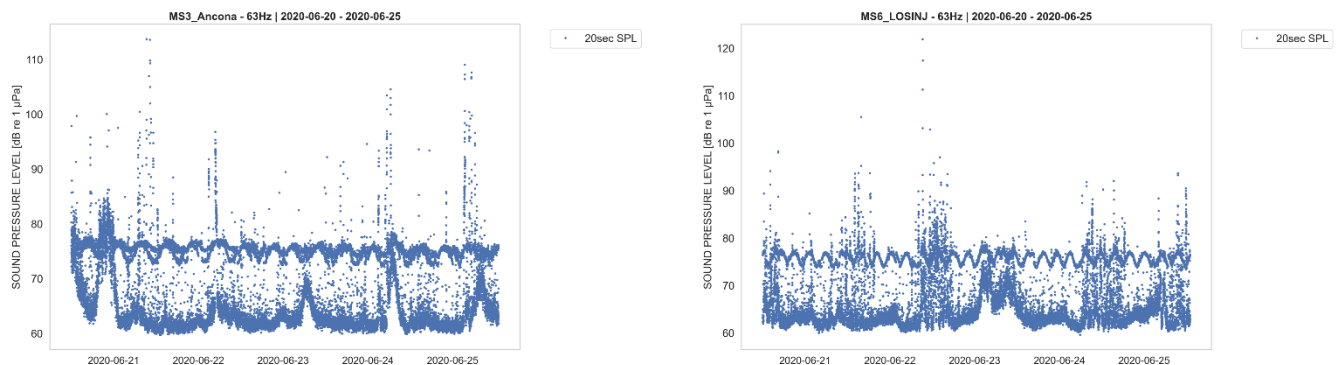


Figure 5. Plot of SPL calculated from wav data affected by noisy signals.

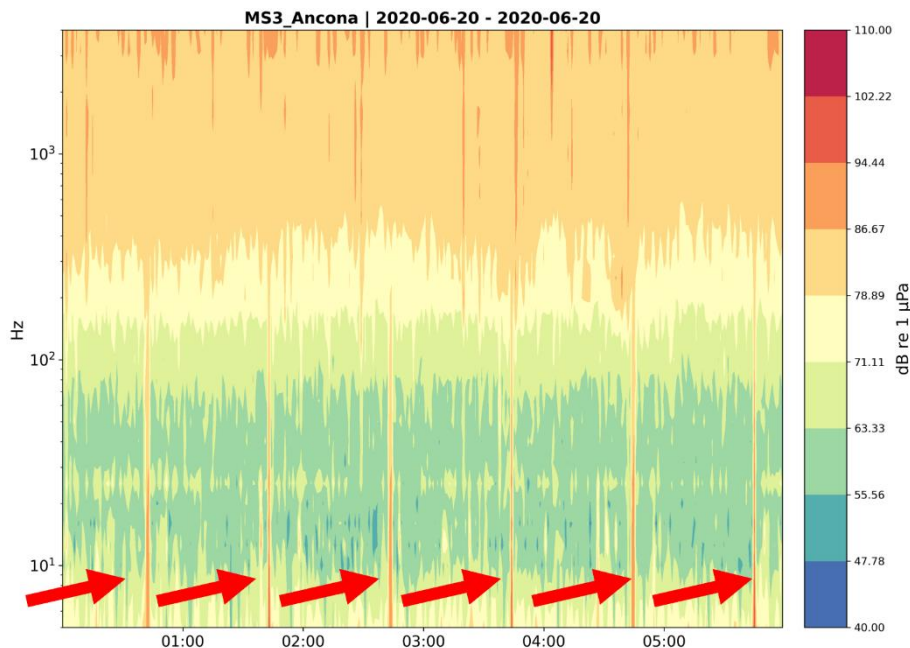


Figure 6. Example of impulsive noise.

More in detail we noticed that:

- **Stations MS2, MS4, MS5, MS7, MS8, MS9:** in every wav file the impulsive signal first appears after 59.8 seconds, it lasts about 0.8 seconds and then it occurs every 60.5 seconds.
- **Stations MS3:** in most of wav files the signal first appears after 59.8 seconds, it lasts about 0.8 seconds and then it occurs every 60.5 seconds. In some files, it first appears after 30 seconds, it lasts about 0.8 seconds and then it occurs every 60.5 seconds.
- **Stations MS6:** in most of wav files, the signal first appears after 59.8 seconds, lasts about 0.8 seconds and then occurs every 60.5 seconds; in some files it first appears after 27 seconds or after 30 seconds or after 33.3 seconds, it lasts about 0.8 seconds and then occurs every 60.5 seconds.

The impulsive signals couldn't have a natural or anthropic origin, being so common along so many different stations and so regularly spaced in time. The technicians from Develogic, the company that produces the hydrophones, confirmed that the impulsive noises were generated by a particular setting used in the configuration of the hydrophone (suggested by the Develogic itself). All the wav data had to be processed again, taking in account this issue.

The workflow used to exclude the impulsive noises from the SPL analysis is shown in Figure 7. The raw wav data were read by the ANP; once an impulsive noise was detected, the raw wav data corresponding to the 3 seconds centred on it was set as NAN (Not a Number): in this way, the impulsive noises were excluded from the analysis and the duration of wav files was preserved. Since the impulsive signals were not included in the SPL analysis and none of the 20-sec averaged SPLs were lost, SPL data output were considered highly reliable (Figure 8).

Unfortunately, in order to remove the impulsive signal, which could appear in a temporal range lasting 2 consecutive seconds, three 1-sec averaged SPLs were lost every minute. On the other hand, it has to be stressed that in this process, the original wav files were not modified.

The 1 second and 20 seconds averaged SPL output files (in the format of comma separated text files) were uploaded and double backed up on two different servers, according to DeliverableD3.6.1.

The user manual of ANP tool is reported in DeliverableD3.5.1.

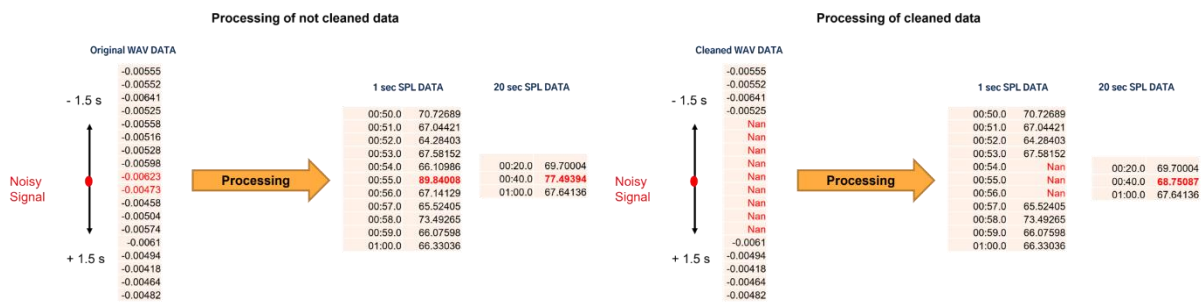


Figure 7. Example of cleaning of data.

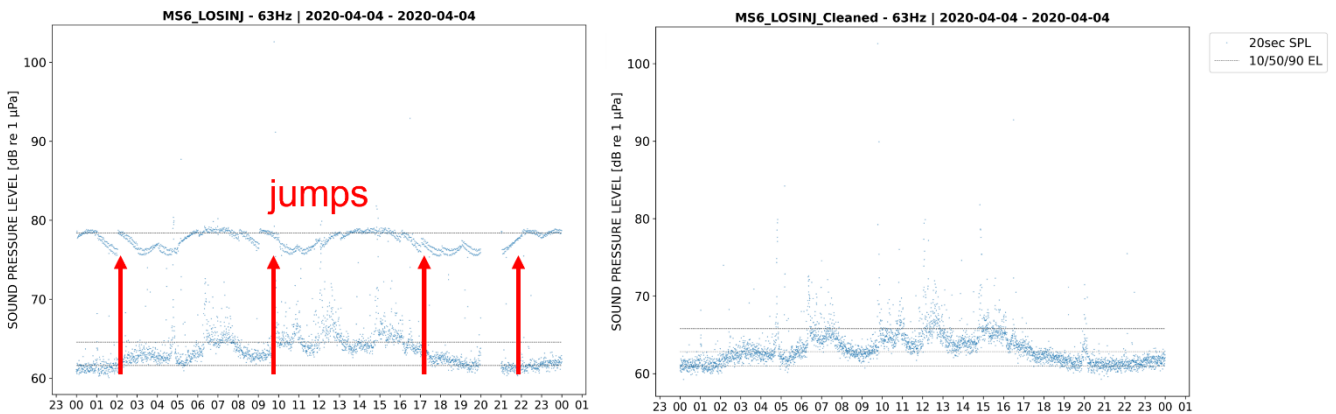


Figure 8. Example of SPL data before and after cleaning data.

3 Methods - Data Post Processing

To post process the SPL data, a Jupyter notebook in Python environment was developed. A Jupyter Notebook can be defined as a web application that allows to create documents that may contain live codes (see <https://jupyter.org/>). The notebook developed by ISMAR contains python codes with which users can process SPL data to produce descriptive tables and graphs. No skills in programming are required since all the operations are text driven.

The workflow of SPL data post processing, shown in Figure 1, is simply. After reading SPL csv files and selecting (i) a time window, (ii) a recording station and (iii) frequency, it is possible to compute some metrics, creating some tables and graphs.

The following statistical measures can be calculated:

- exceedance level (LXX): the SPL value that is exceeded by the XX% of the time in a period (median is the L50 level).
- Averaged SPL: defined as $10 \log_{10} \left(\frac{1}{n} \sum_{i=1}^n 10^{\frac{SPL_i}{10}} \right)$ for each SPL_i in a period.
- Total SPL: defined as $10 \log_{10} \left(\sum_{i=1}^n 10^{\frac{SPL_i}{10}} \right)$ for each SPL_i in a period.
-

The outputs of the Jupyter notebook are tables and graphs.

3.1 Tables

Two kinds of table are produced, given a time window:

- A table with some information and descriptive statistics was generated for each station and frequency selected, as shown in Figure 9.
- Given a temporal step (hour, day, week, month), a table with temporal values of statistics (EL, average and total SPL) was calculated for the station and the frequencies selected. In Figure 10 hourly EL50 values are listed.

Stats	Freq	Mean	50th perc	Min	Max	75 EL	25 EL	90 EL	10 EL	T_SPL	AV_SPL
Station = MS1_acqua_alta											
File = 20s											
Start time = 2020-03-01 00:00:00											
Last time = 2021-06-30 23:59:40											
First data = 2020-03-01 00:00:00											
Last data = 2021-06-30 23:59:40											
Expected data = 2103840											
Total data = 1691481											
Percent of data = 80.40%											
	63_1/3_octave	75.31	72.97	61.15	143.56	69.35	79.71	67.61	86.89	158.64	96.36
	125_1/3_octave	80.75	79.18	64.42	141.31	74.38	85.56	71.40	92.04	158.18	95.90
	250_1/3_octave	93.12	92.30	71.57	139.90	87.43	98.09	83.13	104.20	165.88	103.60
	4000_1/3_octave	97.05	96.81	77.96	139.92	94.97	98.57	92.92	101.03	162.56	100.27

Figure 9. Table with descriptive statistics.

datetime	63_1/3_octave	125_1/3_octave	250_1/3_octave	4000_1/3_octave
01/06/2021 00:00	69.18	75.06	89.56	97.43
01/06/2021 01:00	68.93	74.32	87.25	96.77
01/06/2021 02:00	69.21	74.05	87.42	97.06
01/06/2021 03:00	69.61	94.92	111.00	105.91
01/06/2021 04:00	69.20	80.15	94.48	97.76
01/06/2021 05:00	68.59	73.28	90.15	96.70
01/06/2021 06:00	68.42	70.02	86.11	96.00
01/06/2021 07:00	68.55	70.66	87.28	96.33
01/06/2021 08:00	68.32	72.08	88.54	96.21
01/06/2021 09:00	68.46	72.80	89.65	95.89
01/06/2021 10:00	68.00	70.02	89.46	95.32
01/06/2021 11:00	67.81	70.19	87.52	94.48
01/06/2021 12:00	67.62	72.61	87.15	94.47
01/06/2021 13:00	67.66	75.31	91.05	95.09
01/06/2021 14:00	68.49	73.43	88.14	95.44
01/06/2021 15:00	68.51	86.58	99.69	96.77
01/06/2021 16:00	67.91	73.89	88.08	95.12
01/06/2021 17:00	67.94	75.73	88.64	95.65
01/06/2021 18:00	68.01	72.88	89.87	96.38
01/06/2021 19:00	69.17	74.10	91.68	97.79
01/06/2021 20:00	69.73	83.07	96.22	98.28
01/06/2021 21:00	69.74	81.29	93.04	97.62
01/06/2021 22:00	69.46	80.45	90.11	97.76
01/06/2021 23:00	69.23	76.03	87.92	97.26

Figure 10. Table with temporal values.

3.2 Graphs

The list of plot types that can be outputted is shown in Figure 11.
























Graph	Example	Graph	Example
Spectrogram like		Median Values of spectra	
Plot of the data		Plot of daily median	
KDE Density plot		Histogram	
Boxplot		Violinplot	
Boxplot of day/night data		Violinplot of day/night data	
Plot of percentiles		Percentiles comparison	
Boxplot of frequencies		Violinplot of frequencies	
Boxplot of monthly data		Violinplot of monthly data	
Boxplot of different periods		Violinplot of different periods	
Plot of frequencies in different periods			
Plot of the percentiles for different stations		Plot of the densities for different stations	
Boxplot of stations		Violinplot of stations	

Figure 11. List of graphs.

Given a time window, different graphs can be produced:

- Time series plot, to visualize the temporal evolution of SPL data (Figures 12, 13, 14).

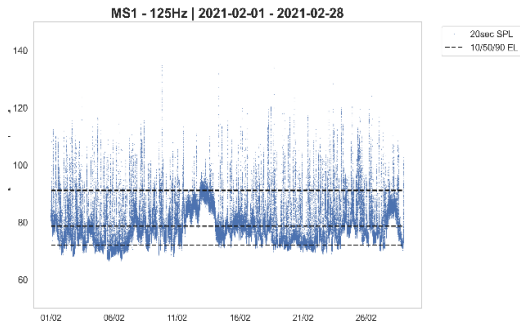


Figure 12. Plot SPL data over a period.

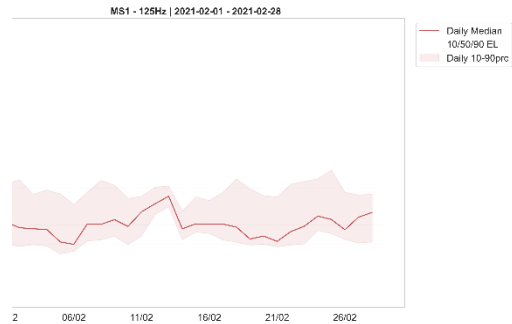


Figure 13. Plot of daily median with 10-90 EL band.

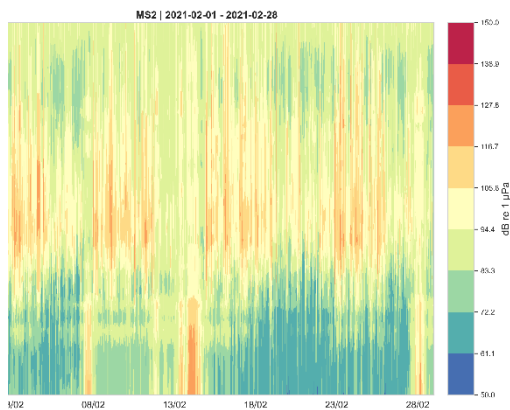


Figure 14. Displays the values of SPL at a specified time and frequency.

- Descriptive plots, to highlight the principal statistics of the data distribution over the time window (Figures 18-20).

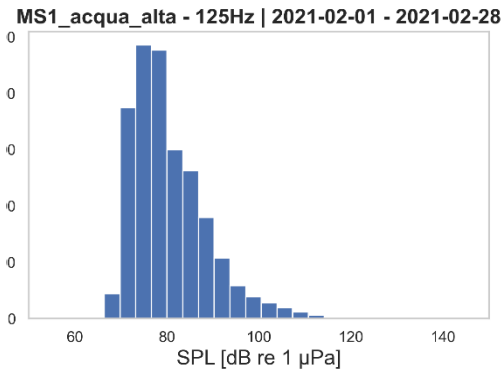


Figure 15. Histogram of data.

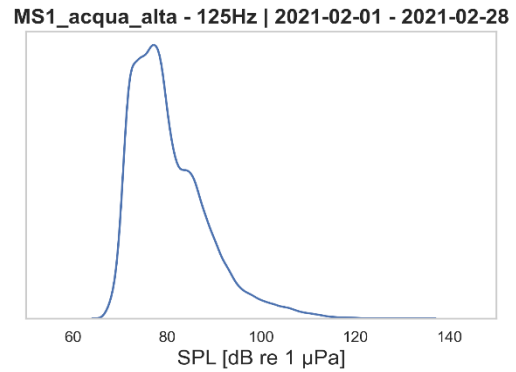


Figure 16. Probability density plot.

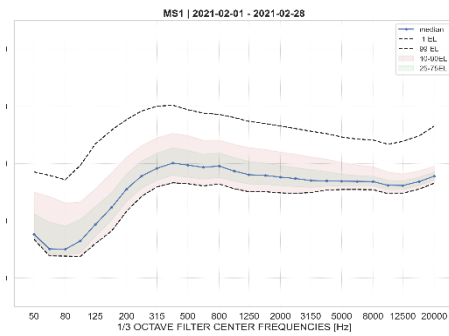


Figure 17. For each frequency, median of SPL over a period with bands of 25-75 EL, 10-90 EL and 1-99 EL.

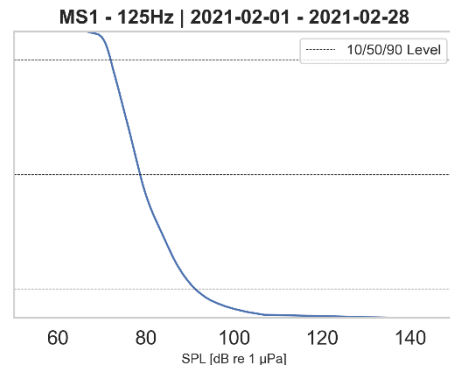


Figure 18. EL distribution over a period.

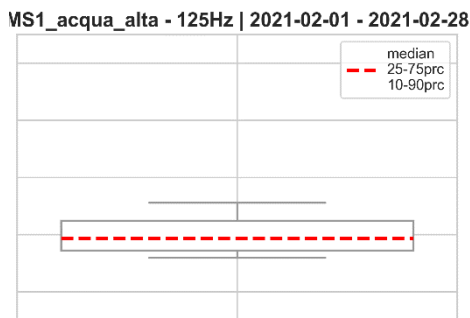


Figure 19. Box plot of SPL distribution over a period with some summary statistics in the boxplot: median, 25-75 EL (box) and 10-90 EL (whiskers).

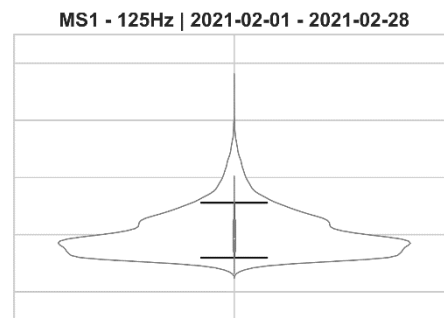


Figure 20. Violinplot over a period, with the probability density of the data and some summary statistics in the boxplot: median, 25-75 EL (box) and 10-90 EL (whiskers).

As can be seen in Figure 11. List of graphs.data can be aggregated and visualized in different way. So, for each station it is possible to compare data over different periods or to check the spatial distribution of data between stations. Some examples are shown in Figure 21-24.

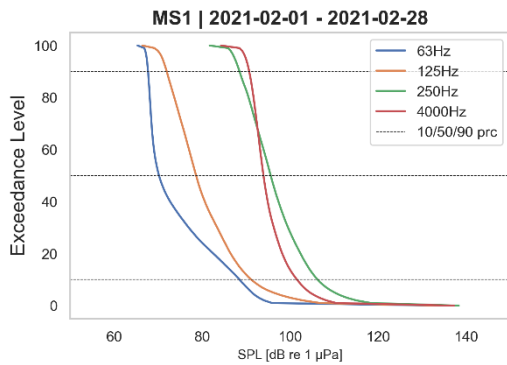


Figure 21. EL comparison between different frequencies over a period.

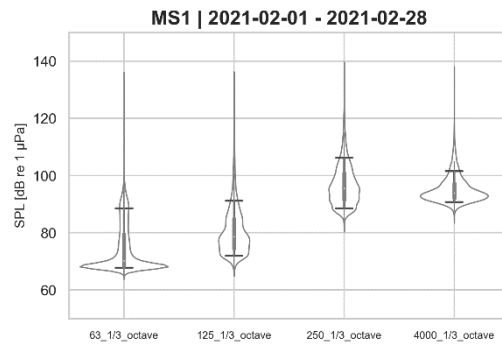


Figure 22. Comparison between different frequencies through Violinplots.

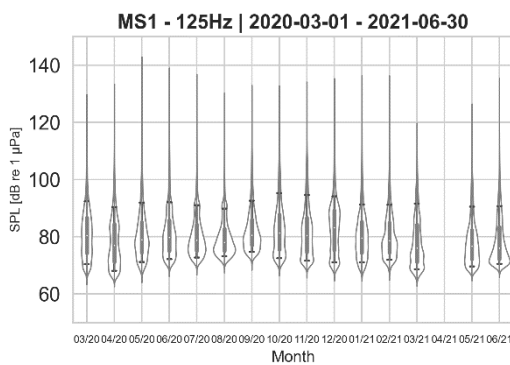


Figure 23. Comparison between months through Violinplots.

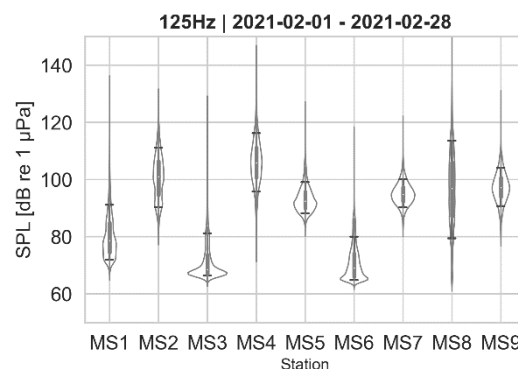


Figure 24. Spatial distribution of SPL.

4 Summary and general conclusions

All elaborations and graphs shown in this report were made using 20 seconds averaged SPLs data for four 1/3 octave bands, with central frequencies in 63, 125, 250, 4000 Hz, according to D 3.5.1.

For each station, SPL data were aggregated and processed over the whole period, 1 mar 2020 – 30 jun 2020, and over the different months. Figure 25 and Table 2 highlight the data availability for each station in the period March 2020 - June 2021. A map of the stations is shown in Figure 26.

Table 2. Data availability in mar 2020 - jun 2021.

Station	Data availability
MS1	80.40%
MS2	75.84%
MS3	76.68%
MS4	61.78%
MS5	95.68%
MS6	91.31%
MS7	76.34%
MS8	78.19%
MS9	68.28%

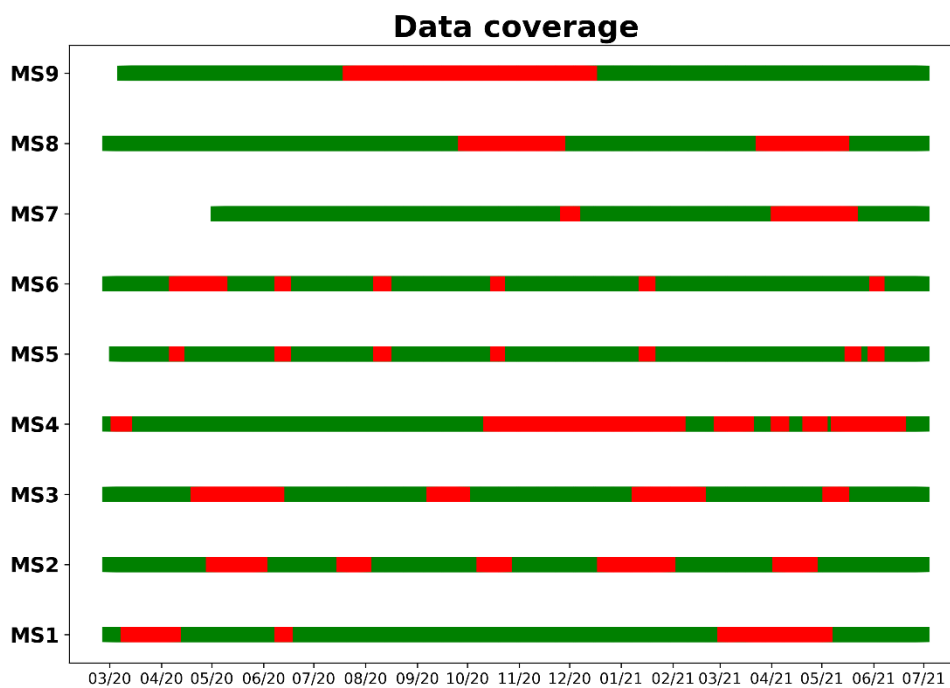


Figure 25. Data availability.



Figure 26. Maps of the stations.

Concluding, the spatial distribution of SPL data in the different stations is shown in Table 3 and in Figure 27, Figure 28, Figure 29, and Figure 30 for each of the considered frequency over the period march 2020 - June 2021. The spatial distribution of noise levels is found to be different between the four octave bands. In particular:

- 63 Hz 1/3 octave band: stations MS2, MS8 and MS9 are the loudest stations with median values greater than 94 dB re 1 μ Pa; stations MS1, MS3 and MS6 the more silent, with median values overall lower than 75 dB re 1 μ Pa, while stations MS4, MS5, MS7 have median values around 85 dB re 1 μ Pa. Stations MS2, MS4 and MS8 seem to have a higher variability in time, as shown in Figure 27, looking at the Inter-Quartile Range (IQR), a measure of variability, equal to the difference between 75th and 25th percentiles.
- 125 Hz 1/3 octave band: the spatial distribution of the recorded values is similar to the 63 Hz 1/3 octave band, with stations MS2, MS4 and MS8 presenting the highest median values, around 98 -100 dB re 1 μ Pa, and stations MS3 and MS6 showing the lowest ones, around 69 dB re 1 μ Pa. The higher SPLs temporal variability is seen in stations MS4 and MS8 (Figure 28).

- 250 Hz 1/3 octave band: stations MS4 and MS8 have the highest median values, close to 100 dB, stations MS3 and MS6 have the lowest values, around 77 dB re 1 μ Pa, while other stations show similar median values, ranging from 90 to 93 dB re 1 μ Pa ca. Highest temporal variability is found in station MS8 (Figure 29).
- 4000Hz 1/3 octave band: in this case, the differences between stations are less evident. Stations MS1, MS5, MS7 and MS8 show the highest median values while the lowest are recorded in stations MS4 and MS9. The IQR is similar in all the stations, being higher in station MS8 (Figure 30).

In annex and in related files are reported more graphs and table for each station.

Table 3. Median and Inter Quartile Range for stations and Octave bands in the period March 2020 - June 2021.

		63 Hz	125 Hz	250 Hz	4000 Hz
MS1	EL50	72.97	79.18	92.30	96.81
	IQR	10.36	11.18	10.66	3.60
MS2	EL50	93.92	98.31	91.89	89.98
	IQR	16.27	13.76	13.81	4.86
MS3	EL50	67.60	69.73	78.56	88.57
	IQR	9.85	10.26	11.94	5.15
MS4	EL50	85.05	100.73	100.73	86.94
	IQR	22.55	12.49	11.55	7.01
MS5	EL50	86.42	90.23	90.79	97.18
	IQR	9.80	7.20	6.73	3.94
MS6	EL50	64.22	69.97	75.79	90.33
	IQR	4.23	9.00	10.51	4.38
MS7	EL50	87.67	91.17	89.02	94.20
	IQR	7.08	6.65	6.90	3.30
MS8	EL50	93.76	98.68	97.07	97.08
	IQR	23.88	20.70	17.72	4.37
MS9	EL50	95.17	95.02	93.92	86.20
	IQR	10.21	7.86	7.68	4.93

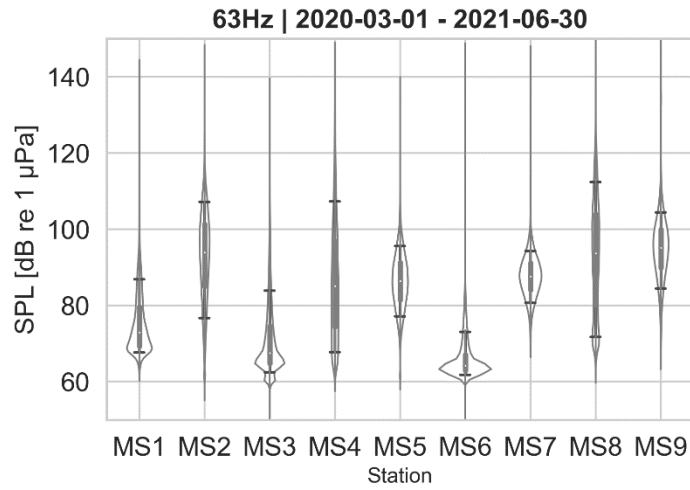


Figure 27. Violin plot of SPL data, 63 Hz band, mar 2020 - jun 2021.

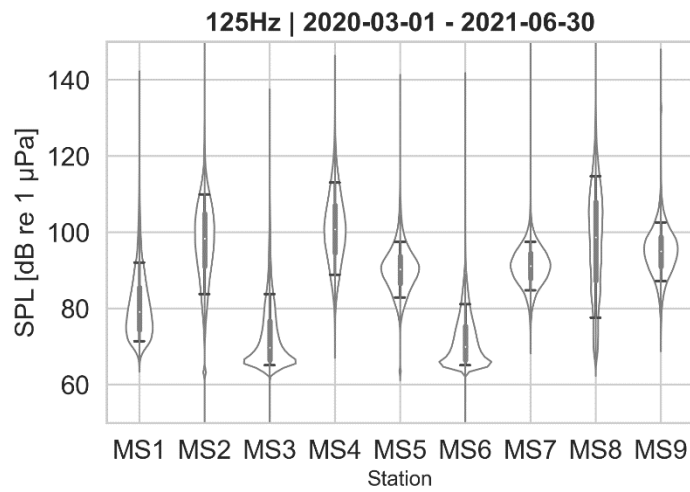


Figure 28. Violin plot of SPL data, 125 Hz band, mar 2020 - jun 2021.

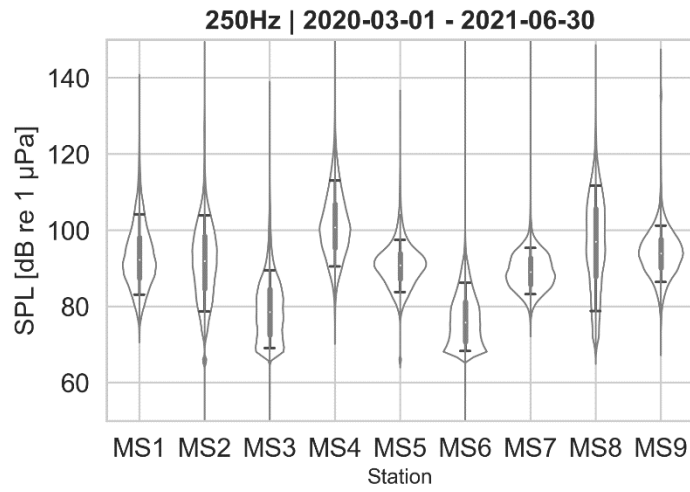


Figure 29. Violin plot of SPL data, 250 Hz band, mar 2020 - jun 2021.

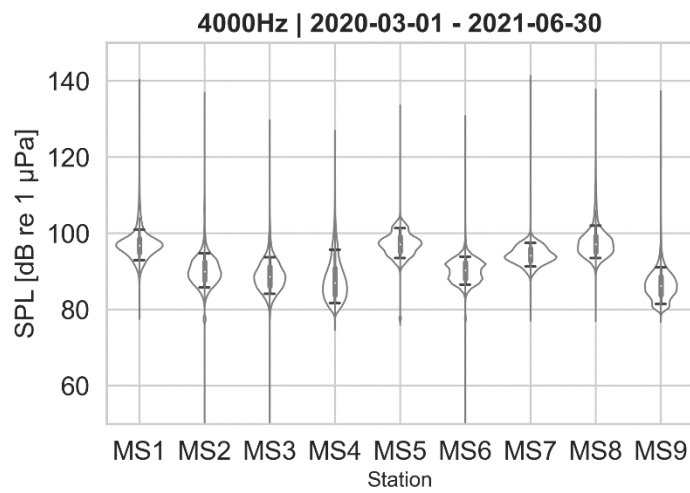


Figure 30. Violin plot of SPL data, 4000 Hz band, mar 2020 - jun 2021.

Annex

A1.Descriptive tables for each station.

Station	Time	Data availability	Freq	50 EL	75 EL	25 EL	90 EL	10 EL	T_SPL	AV_SPL
MS1	ALL	80.40%	63	72.97	69.35	79.71	67.61	86.89	158.64	96.36
			125	79.18	74.38	85.56	71.40	92.04	158.18	95.90
			250	92.30	87.43	98.09	83.13	104.20	165.88	103.60
			4000	96.81	94.97	98.57	92.92	101.03	162.56	100.27
mar-20	34.54%		63	74.29	67.53	83.20	65.51	88.39	135.22	88.58
			125	80.45	74.34	86.69	70.42	92.37	145.18	98.54
			250	95.98	91.88	100.37	87.27	106.15	153.17	106.53
			4000	94.52	92.31	97.94	90.77	101.47	145.90	99.26
apr-20	70.97%		63	68.60	65.98	74.04	64.42	84.86	135.29	85.65
			125	77.05	71.24	84.40	68.09	90.44	144.19	94.55
			250	91.18	86.51	96.59	82.75	101.60	151.22	101.58
			4000	94.12	92.55	95.72	90.92	98.13	146.54	96.90
mag-20	98.79%		63	71.96	68.81	77.94	66.93	84.45	145.61	94.39
			125	79.08	74.52	85.07	71.23	91.99	148.51	97.30
			250	91.04	86.99	96.28	83.02	101.84	153.38	102.16
			4000	96.41	95.08	97.79	93.93	99.42	149.37	98.15
giu-20	83.91%		63	72.42	70.07	78.49	68.78	84.67	144.95	94.59
			125	79.82	75.01	85.75	72.19	92.00	147.48	97.12
			250	90.63	86.25	96.67	82.11	103.06	154.18	103.82
			4000	97.63	96.47	98.80	95.49	100.16	149.90	99.54
lug-20	95.30%		63	73.47	71.04	77.75	69.48	84.03	142.10	91.04
			125	78.76	75.08	84.35	72.76	91.04	146.06	95.00
			250	89.35	84.83	95.44	81.15	103.49	152.85	101.79
			4000	98.03	96.98	99.17	96.09	100.46	151.10	100.04
ago-20	98.25%		63	75.32	72.81	79.85	71.08	85.58	145.73	94.54
			125	78.01	75.01	82.74	73.13	89.81	143.42	92.23
			250	87.04	82.30	93.53	78.96	102.98	151.52	100.33
			4000	97.98	96.94	99.09	96.04	100.46	150.94	99.75
set-20	100.00%		63	76.22	73.35	81.32	71.74	86.74	147.87	96.75
			125	80.61	77.01	85.94	74.71	92.60	146.70	95.58
			250	90.71	86.48	96.37	83.84	103.11	152.48	101.36
			4000	97.70	96.64	99.15	95.75	101.55	151.63	100.51
ott-20	99.46%		63	76.97	71.85	85.21	70.06	90.82	152.55	101.32
			125	81.38	75.47	87.74	72.53	95.26	148.58	97.34
			250	92.84	88.32	98.16	83.15	104.49	154.74	103.50
			4000	97.42	96.07	99.81	95.09	103.98	153.36	102.12
nov-20	99.72%		63	74.21	70.47	83.23	69.05	89.35	153.69	102.58
			125	80.49	74.64	86.67	71.59	94.64	148.30	97.19
			250	94.76	90.29	100.07	86.65	105.81	156.28	105.17
			4000	96.97	95.36	99.65	94.17	103.36	153.20	102.08
dic-20	98.66%		63	74.23	68.74	86.44	67.50	91.86	148.40	97.19
			125	83.23	75.39	89.24	71.04	94.12	147.10	95.89
			250	95.99	91.34	101.09	88.09	106.25	155.65	104.44
			4000	95.87	94.06	98.40	92.56	101.71	150.89	99.68
gen-21	95.70%		63	72.53	67.67	81.96	66.55	86.99	144.58	93.51
			125	79.56	74.44	85.22	71.11	91.30	145.09	94.01
			250	95.22	90.71	100.39	87.93	106.18	156.38	105.30
			4000	94.15	92.24	97.40	90.81	101.53	150.96	99.89
feb-21	98.96%		63	70.22	68.32	79.51	67.73	88.51	141.36	90.57
			125	78.65	74.55	84.92	71.98	91.16	147.99	97.21
			250	95.60	91.42	100.87	88.52	106.24	156.95	106.17
			4000	93.96	92.09	97.19	90.72	101.56	152.35	101.56
mar-21	24.60%		63	68.97	66.54	71.04	65.21	77.42	124.30	79.13
			125	76.03	71.19	84.19	68.62	91.56	136.43	91.26
			250	94.72	91.18	99.98	86.10	105.56	149.66	104.49
			4000	95.82	92.93	99.25	90.90	102.86	145.44	100.27
apr-21	0.00%		63	nan	nan	nan	nan	nan	nan	nan
			125	nan	nan	nan	nan	nan	nan	nan
			250	nan	nan	nan	nan	nan	nan	nan
			4000	nan	nan	nan	nan	nan	nan	nan
mag-21	88.44%		63	70.24	68.07	75.51	67.13	80.43	135.49	84.76
			125	76.72	72.17	82.37	69.62	90.53	143.22	92.49
			250	91.75	87.63	97.12	84.47	103.51	153.78	103.05
			4000	96.15	94.94	97.54	93.85	99.91	149.34	98.60
giu-21	100.00%		63	69.89	68.71	72.29	67.91	76.80	141.17	90.04
			125	76.04	72.20	83.40	70.49	90.75	147.02	95.89
			250	88.26	83.38	94.51	80.09	99.57	152.81	101.68
			4000	96.88	95.81	97.94	94.82	99.06	152.27	101.14

Station	Time	Data availability	Freq	50 EL	75 EL	25 EL	90 EL	10 EL	T_SPL	AV_SPL
MS2	ALL	75.84%	63	93.92	85.01	101.28	76.70	107.18	167.30	105.28
			125	98.31	91.06	104.82	83.80	109.98	170.66	108.63
			250	91.89	84.63	98.44	78.74	103.86	169.92	107.90
			4000	89.98	87.67	92.53	85.71	94.68	157.48	95.46
	mar-20	99.84%	63	94.51	88.16	100.85	82.97	106.53	157.42	106.18
			125	98.35	94.73	103.65	91.64	108.79	157.87	106.62
			250	95.10	91.75	98.90	88.48	103.89	154.88	103.64
			4000	89.29	87.53	91.33	86.33	93.56	144.14	92.90
	apr-20	100.00%	63	95.46	85.88	101.94	77.02	106.87	154.10	102.97
			125	99.70	93.75	104.98	88.18	109.45	156.72	105.59
			250	92.51	86.09	98.92	80.65	104.03	151.12	99.99
			4000	88.50	87.18	90.26	86.17	92.51	142.27	91.14
mag-20	1.39%	63	85.55	84.45	101.24	82.10	112.69	143.98	111.62	
		125	98.60	96.11	106.51	92.92	121.80	148.67	116.31	
		250	90.52	86.56	99.27	84.66	124.31	150.36	118.00	
		4000	92.27	91.05	94.15	89.99	105.07	132.34	99.98	
giu-20	100.00%	63	98.38	87.92	106.69	79.02	111.99	161.05	109.92	
		125	102.51	95.18	109.45	86.00	114.48	164.82	113.69	
		250	94.56	87.05	101.08	79.79	106.57	165.88	114.75	
		4000	93.66	92.56	95.19	91.68	97.76	149.81	98.68	
lug-20	56.80%	63	95.02	84.77	103.40	76.47	111.20	158.86	110.05	
		125	99.63	90.52	106.93	81.82	113.89	162.52	113.71	
		250	91.25	83.55	98.32	78.43	105.83	164.09	115.27	
		4000	94.09	93.01	95.65	92.19	98.25	148.13	99.32	
ago-20	98.25%	63	82.86	77.05	88.73	72.54	96.49	149.48	98.29	
		125	86.05	80.75	92.55	76.74	97.85	151.23	100.04	
		250	81.11	77.39	85.59	74.59	91.51	150.03	98.85	
		4000	92.22	90.69	93.62	89.45	95.03	144.94	93.76	
set-20	100.00%	63	93.37	83.26	100.95	74.41	107.06	155.46	104.33	
		125	95.25	85.84	102.62	78.94	108.70	157.92	106.79	
		250	88.98	81.90	96.20	76.58	102.23	155.39	104.26	
		4000	90.07	88.93	91.63	88.01	94.33	146.25	95.13	
ott-20	55.84%	63	95.53	84.21	103.30	75.26	108.01	153.30	104.56	
		125	99.13	87.15	105.81	81.56	110.04	155.59	106.86	
		250	93.26	84.52	99.84	78.75	103.93	153.90	105.17	
		4000	88.60	87.16	90.18	85.99	92.31	143.53	94.80	
nov-20	100.00%	63	96.46	88.97	102.58	79.62	107.39	154.92	103.84	
		125	101.18	93.39	107.04	87.17	111.34	158.24	107.16	
		250	95.19	87.38	101.63	82.03	106.45	154.66	103.58	
		4000	89.16	87.75	90.90	86.61	93.05	142.91	91.83	
dic-20	66.43%	63	94.48	88.17	99.81	73.80	105.20	152.78	103.30	
		125	98.04	91.47	103.36	84.29	107.61	155.20	105.72	
		250	93.28	88.40	98.28	80.71	103.21	151.00	101.53	
		4000	87.33	85.29	89.28	80.07	91.55	140.03	90.56	
gen-21	6.45%	63	85.80	76.09	92.94	61.42	99.72	141.07	101.76	
		125	93.06	87.12	99.04	63.33	104.39	142.23	102.92	
		250	90.62	83.33	97.95	65.86	103.39	142.54	103.23	
		4000	85.33	83.48	87.49	77.61	89.81	127.76	88.45	
feb-21	100.00%	63	95.08	88.27	101.31	80.88	107.10	154.72	103.89	
		125	101.00	94.61	106.45	90.27	111.19	158.25	107.43	
		250	96.11	90.31	101.98	87.02	106.94	155.06	104.23	
		4000	86.30	84.18	89.10	82.86	92.05	141.44	90.61	
mar-21	100.00%	63	96.15	89.03	102.87	79.71	108.01	155.42	104.15	
		125	101.08	95.40	106.46	90.63	111.00	158.61	107.34	
		250	94.24	89.21	100.41	85.24	105.52	154.50	103.23	
		4000	87.03	85.55	89.30	84.49	92.28	141.84	90.57	
apr-21	33.23%	63	91.49	74.93	100.23	62.29	105.74	154.32	107.99	
		125	95.53	87.61	103.15	63.71	108.03	161.10	114.77	
		250	87.46	80.15	95.91	66.11	101.69	159.64	113.32	
		4000	87.12	85.37	88.65	77.70	90.44	151.80	105.47	
mag-21	100.00%	63	92.31	84.21	98.72	77.80	104.48	152.38	101.11	
		125	96.11	90.15	101.98	85.26	106.88	155.21	103.94	
		250	86.38	81.58	93.60	78.33	99.26	147.54	96.27	
		4000	89.98	88.63	91.39	87.47	92.70	142.48	91.21	
giu-21	100.00%	63	94.22	86.33	101.10	78.86	106.32	153.86	102.73	
		125	99.99	92.91	105.40	85.82	109.31	157.06	105.94	
		250	90.30	82.85	96.45	77.03	100.85	150.92	99.79	
		4000	92.01	90.81	93.37	89.78	94.71	144.81	93.69	

Station	Time	Data availability	Freq	50 EL	75 EL	25 EL	90 EL	10 EL	T SPL	AV SPL
MS3	ALL	76.68%	63	67.60	64.77	74.63	62.46	83.87	156.60	94.53
			125	69.73	66.48	76.75	65.14	83.82	150.92	88.85
			250	78.56	72.56	84.50	69.06	89.48	153.77	91.70
			4000	88.58	86.10	91.25	84.06	93.73	154.07	92.00
Mar-20	100.00%	100.00%	63	65.66	60.85	75.49	60.14	85.25	141.17	89.90
			125	73.24	65.41	80.68	63.76	85.90	139.69	88.42
			250	80.56	72.99	85.87	68.28	89.86	142.05	90.78
			4000	89.70	87.76	91.77	86.13	93.70	143.10	91.83
Apr-20	73.33%	73.33%	63	62.17	60.68	68.12	60.13	75.13	133.31	83.53
			125	67.65	64.07	74.32	63.43	79.36	132.31	82.54
			250	75.46	69.04	81.31	66.88	85.17	137.22	87.44
			4000	88.40	86.86	90.23	85.67	92.28	139.95	90.17
May-20	0.00%	0.00%	63	nan	nan	nan	nan	nan	nan	nan
			125	nan	nan	nan	nan	nan	nan	nan
			250	nan	nan	nan	nan	nan	nan	nan
			4000	nan	nan	nan	nan	nan	nan	nan
Jun-20	69.03%	69.03%	63	62.05	60.94	65.08	60.32	72.13	146.85	97.34
			125	66.06	64.54	69.09	63.80	75.23	141.55	92.04
			250	73.57	70.12	78.42	68.56	83.35	144.89	95.38
			4000	87.79	85.81	89.96	84.22	92.39	144.93	95.42
Jul-20	100.00%	100.00%	63	68.89	65.18	74.01	63.12	79.53	140.73	89.46
			125	69.29	66.62	73.78	65.25	79.46	135.28	84.02
			250	79.20	73.19	84.82	70.27	88.83	138.37	87.10
			4000	87.15	84.84	90.21	83.14	92.72	141.60	90.33
Aug-20	100.00%	100.00%	63	69.84	66.22	75.79	64.23	83.63	144.14	92.88
			125	70.54	67.33	76.31	65.90	83.15	137.83	86.58
			250	79.98	73.55	86.41	70.44	90.46	138.41	87.15
			4000	88.07	85.79	90.91	84.09	93.32	142.07	90.81
Sep-20	36.32%	36.32%	63	67.07	64.94	71.89	63.98	80.12	153.23	106.52
			125	68.42	66.42	73.27	65.53	80.95	141.09	94.37
			250	76.95	71.77	83.15	69.40	88.26	142.00	95.29
			4000	92.54	91.21	93.76	89.91	95.01	142.13	95.41
Oct-20	100.00%	100.00%	63	65.44	64.05	70.70	63.47	78.31	134.25	82.98
			125	67.23	65.55	71.74	64.96	76.83	132.97	81.70
			250	75.86	70.90	80.82	68.32	84.69	137.80	86.53
			4000	90.45	88.16	92.83	86.65	95.45	144.36	93.09
Nov-20	100.00%	100.00%	63	69.67	65.06	77.77	63.98	85.10	140.35	89.23
			125	71.13	67.08	78.95	65.74	84.17	133.84	82.72
			250	82.11	75.67	86.90	69.86	91.52	142.54	91.42
			4000	89.69	87.43	92.65	85.87	96.18	144.05	92.93
Dec-20	100.00%	100.00%	63	70.48	65.60	80.15	64.51	92.72	143.04	91.77
			125	73.24	67.99	80.45	65.77	85.66	139.75	88.48
			250	81.66	75.77	86.64	70.43	91.15	145.38	94.11
			4000	89.65	86.95	92.13	84.99	95.05	143.98	92.71
Jan-21	32.80%	32.80%	63	70.04	66.55	76.77	65.12	85.57	133.51	87.23
			125	73.10	67.75	78.89	65.84	82.56	134.71	88.42
			250	81.25	76.39	85.75	71.42	88.07	138.99	92.70
			4000	88.01	85.59	91.29	84.00	93.75	138.20	91.92
Feb-21	41.52%	41.52%	63	66.86	66.36	68.29	65.93	76.50	144.58	97.58
			125	68.49	67.14	73.67	66.46	81.23	136.75	89.75
			250	76.04	69.25	82.10	67.97	86.89	142.51	95.51
			4000	84.83	82.42	87.64	80.02	90.36	137.68	90.67
Mar-21	100.00%	100.00%	63	70.38	66.18	79.13	65.08	87.83	138.64	87.37
			125	71.87	67.60	79.57	66.05	86.50	138.40	87.13
			250	78.82	72.98	83.83	69.92	88.58	139.06	87.79
			4000	86.34	84.47	88.55	82.95	90.79	139.98	88.71
Apr-21	100.00%	100.00%	63	66.86	64.98	74.00	64.36	84.92	139.77	88.66
			125	71.67	67.22	80.46	65.61	88.20	141.07	89.96
			250	78.86	73.76	85.70	69.08	92.28	141.59	90.48
			4000	90.23	88.23	92.78	86.43	94.99	144.10	92.99
May-21	71.11%	71.11%	63	69.72	65.81	78.03	64.63	85.21	146.71	96.92
			125	69.77	66.88	77.33	65.96	88.11	141.79	92.00
			250	78.72	72.83	85.06	69.41	92.72	145.11	95.33
			4000	87.37	85.15	89.43	83.15	91.56	140.73	90.94
Jun-21	100.00%	100.00%	63	68.12	66.02	73.73	65.22	85.85	142.34	91.22
			125	68.42	66.56	73.96	65.87	85.64	142.93	91.81
			250	77.78	72.37	83.72	69.42	89.75	142.33	91.20
			4000	86.28	83.75	89.01	81.85	90.82	139.61	88.48

Station	Time	Data availability	Freq	50 EL	75 EL	25 EL	90 EL	10 EL	T_SPL	AV_SPL
MS4	ALL	61.78%	63	85.05	74.37	96.93	67.78	107.31	172.85	111.71
			125	100.73	94.55	107.04	88.90	113.02	172.51	111.38
			250	100.73	95.31	106.86	90.52	113.05	172.75	111.61
			4000	86.94	83.82	90.82	81.66	95.64	154.62	93.48
	mar-20	81.12%	63	87.96	77.30	99.57	67.78	111.03	164.53	114.17
			125	102.55	96.03	109.58	90.86	115.66	164.15	113.79
			250	102.03	96.58	108.74	92.71	114.91	163.88	113.52
			4000	88.95	85.76	92.74	82.91	96.53	144.78	94.42
	apr-20	99.74%	63	82.10	71.23	94.29	65.13	106.98	162.42	111.30
			125	100.02	94.75	106.43	89.73	113.27	163.02	111.91
			250	101.62	96.69	107.30	91.90	113.81	163.75	112.64
			4000	84.48	81.69	87.79	79.90	91.29	142.31	91.20
mag-20	100.00%	63	80.98	71.04	93.41	65.26	106.34	161.92	110.65	
		125	99.25	93.26	105.76	88.09	112.38	162.12	110.85	
		250	99.89	94.48	105.93	90.13	112.10	161.58	110.31	
		4000	85.22	82.58	88.17	80.83	90.85	141.57	90.30	
giu-20	99.74%	63	80.27	71.28	93.09	66.44	105.27	161.28	110.17	
		125	99.17	93.77	105.49	88.75	111.56	160.17	109.06	
		250	100.14	95.07	105.84	90.45	111.77	160.48	109.38	
		4000	85.46	82.91	88.70	81.27	92.02	142.29	91.18	
lug-20	100.00%	63	81.60	72.82	93.93	68.12	105.53	161.99	110.72	
		125	99.38	94.12	105.53	89.00	111.57	160.73	109.47	
		250	100.02	95.18	105.26	90.80	111.43	160.74	109.47	
		4000	86.49	83.88	89.64	82.06	92.82	143.02	91.75	
ago-20	99.81%	63	77.06	69.77	89.20	65.87	102.97	161.45	110.20	
		125	94.43	88.05	102.09	82.96	109.20	159.36	108.11	
		250	94.57	89.25	100.98	85.28	107.84	160.12	108.87	
		4000	86.18	83.44	88.81	81.52	91.66	143.26	92.01	
set-20	100.00%	63	79.71	72.35	90.81	68.36	103.68	160.92	109.80	
		125	98.83	92.25	105.08	87.32	110.75	160.19	109.06	
		250	98.53	93.13	104.58	89.14	110.29	160.37	109.25	
		4000	86.69	84.31	89.54	82.76	92.95	143.64	92.51	
ott-20	43.28%	63	82.86	74.14	93.09	67.98	105.02	157.29	109.66	
		125	101.04	94.44	106.91	87.88	112.71	158.69	111.05	
		250	101.30	95.53	107.06	90.60	113.15	159.81	112.17	
		4000	87.61	85.36	91.14	83.80	95.81	142.31	94.68	
nov-20	0.00%	63	nan	nan	nan	nan	nan	nan	nan	nan
		125	nan	nan	nan	nan	nan	nan	nan	nan
		250	nan	nan	nan	nan	nan	nan	nan	nan
		4000	nan	nan	nan	nan	nan	nan	nan	nan
dic-20	0.00%	63	nan	nan	nan	nan	nan	nan	nan	nan
		125	nan	nan	nan	nan	nan	nan	nan	nan
		250	nan	nan	nan	nan	nan	nan	nan	nan
		4000	nan	nan	nan	nan	nan	nan	nan	nan
gen-21	0.00%	63	nan	nan	nan	nan	nan	nan	nan	nan
		125	nan	nan	nan	nan	nan	nan	nan	nan
		250	nan	nan	nan	nan	nan	nan	nan	nan
		4000	nan	nan	nan	nan	nan	nan	nan	nan
feb-21	84.23%	63	95.21	85.45	102.77	74.54	111.05	163.55	113.47	
		125	105.86	100.68	111.15	95.77	116.21	164.16	114.08	
		250	105.38	100.63	110.85	95.97	115.97	163.19	113.11	
		4000	88.88	84.50	94.08	81.85	97.82	144.59	94.51	
mar-21	46.02%	63	90.48	81.05	99.49	75.49	109.72	161.48	113.58	
		125	102.78	97.63	108.49	93.52	114.12	160.32	112.42	
		250	103.33	98.10	109.37	94.50	115.88	161.20	113.30	
		4000	88.28	84.51	92.87	82.21	96.65	142.19	94.30	
apr-21	63.06%	63	95.95	87.13	103.33	81.35	110.06	161.68	112.56	
		125	104.44	100.69	109.51	97.19	114.78	161.89	112.77	
		250	103.49	98.76	109.98	95.33	116.04	163.22	114.09	
		4000	93.85	88.83	97.46	84.37	100.08	146.34	97.22	
mag-21	29.86%	63	87.07	82.30	95.48	76.77	107.82	159.55	113.53	
		125	104.80	100.22	109.04	95.81	113.83	157.28	111.27	
		250	100.93	95.38	107.92	91.66	114.36	157.00	110.98	
		4000	93.04	86.77	100.00	82.73	103.06	144.72	98.70	
giu-21	45.00%	63	93.41	88.10	99.04	82.43	107.78	159.98	112.32	
		125	100.66	95.64	106.29	92.02	111.66	159.90	112.24	
		250	101.08	97.17	106.12	94.31	112.01	160.83	113.17	
		4000	88.56	84.74	91.99	82.39	95.25	140.79	93.14	

Station	Time	Data availability	Freq	50 EL	75 EL	25 EL	90 EL	10 EL	T_SPL	AV_SPL
MSS	ALL	95.68%	63	86.42	81.49	91.30	77.19	95.61	159.45	96.44
			125	90.23	86.55	93.75	82.86	97.49	159.34	96.33
			250	90.79	87.25	93.97	83.77	97.45	159.35	96.35
			4000	97.18	95.13	99.07	93.44	101.31	161.34	98.34
mar-20	86.02%	86.02%	63	87.72	83.39	92.10	79.36	96.05	144.27	93.66
			125	92.80	90.54	95.56	88.73	98.52	148.16	97.55
			250	93.29	91.38	95.37	89.84	98.42	147.95	97.34
			4000	95.36	93.39	97.08	92.12	98.24	146.67	96.06
apr-20	93.34%	93.34%	63	86.63	81.70	91.88	77.74	96.08	144.85	94.10
			125	91.45	88.63	95.10	86.41	99.45	148.81	98.06
			250	91.56	88.89	94.71	86.80	98.52	147.33	96.58
			4000	95.55	94.02	98.26	93.04	99.53	148.00	97.25
mag-20	100.00%	100.00%	63	86.90	81.41	92.03	76.85	96.28	143.70	92.43
			125	90.26	86.98	94.00	84.56	98.18	146.87	95.61
			250	89.87	87.15	93.42	85.02	97.92	147.15	95.88
			4000	97.51	96.06	100.27	95.08	101.37	150.04	98.78
giu-20	90.77%	90.77%	63	84.44	79.04	89.74	75.10	94.29	146.11	95.40
			125	86.46	82.99	90.79	80.53	95.22	146.93	96.23
			250	87.11	83.99	90.57	81.56	94.51	144.69	93.99
			4000	98.55	97.15	101.36	96.36	102.69	150.65	99.95
lug-20	100.00%	100.00%	63	84.69	80.14	90.00	76.31	94.69	144.12	92.85
			125	86.00	82.69	90.36	80.10	95.47	144.44	93.17
			250	87.05	84.10	90.88	81.89	95.96	145.09	93.82
			4000	99.16	98.00	101.90	97.26	102.80	151.79	100.52
ago-20	87.27%	87.27%	63	85.27	80.49	89.95	76.07	94.00	150.88	100.21
			125	86.45	82.82	90.45	79.88	94.76	148.10	97.43
			250	87.35	84.16	90.95	81.52	95.60	145.43	94.76
			4000	99.17	97.84	101.67	97.07	102.56	151.12	100.45
set-20	100.00%	100.00%	63	85.89	81.02	90.56	76.53	94.38	143.81	92.68
			125	86.17	82.77	90.07	80.35	93.61	143.70	92.58
			250	86.40	83.45	89.86	81.24	93.69	144.52	93.40
			4000	97.95	96.36	100.53	95.54	101.33	150.19	99.07
ott-20	93.96%	93.96%	63	87.18	82.78	91.61	78.95	95.98	150.11	99.11
			125	89.08	86.37	92.37	84.13	95.96	147.25	96.25
			250	89.60	87.33	92.41	85.33	96.37	146.99	95.99
			4000	97.26	95.08	98.77	94.24	99.68	148.79	97.79
nov-20	100.00%	100.00%	63	87.52	83.19	92.51	79.11	97.04	145.36	94.24
			125	91.78	88.91	95.15	86.61	99.44	148.84	97.72
			250	92.36	90.01	95.55	88.21	99.95	151.40	100.27
			4000	97.72	95.62	99.01	94.48	100.00	149.28	98.16
dic-20	100.00%	100.00%	63	88.40	82.92	93.27	78.38	98.38	153.29	102.02
			125	92.22	89.40	94.93	87.28	98.10	149.07	97.80
			250	93.08	90.74	95.59	89.01	98.30	149.95	98.68
			4000	96.09	94.53	97.45	93.44	98.50	148.12	96.85
gen-21	89.52%	89.52%	63	87.15	82.79	91.45	79.18	95.83	147.01	96.23
			125	91.89	89.64	95.01	87.69	98.38	147.60	96.82
			250	93.03	91.17	95.22	89.45	97.99	147.05	96.27
			4000	95.07	93.14	96.60	91.92	97.56	146.47	95.69
feb-21	100.00%	100.00%	63	87.73	82.76	92.62	78.43	96.59	143.56	92.73
			125	92.45	90.04	95.65	88.16	99.17	147.34	96.52
			250	93.29	91.61	95.76	90.17	99.26	148.11	97.28
			4000	95.30	92.90	96.61	91.70	97.54	146.56	95.73
mar-21	99.85%	99.85%	63	86.88	81.89	91.82	77.09	95.78	145.27	94.01
			125	92.09	89.77	95.06	87.46	98.27	148.27	97.01
			250	92.79	90.72	95.17	88.82	98.33	147.77	96.50
			4000	95.12	93.08	97.26	91.76	98.26	147.42	96.16
apr-21	100.00%	100.00%	63	87.38	82.91	91.83	78.51	95.54	142.96	91.84
			125	91.81	89.09	94.83	87.03	98.02	147.36	96.23
			250	91.83	89.75	94.50	87.71	97.83	147.30	96.18
			4000	95.81	94.02	98.45	93.23	99.35	148.21	97.09
mag-21	100.00%	100.00%	63	84.94	79.58	89.59	75.61	94.03	141.46	90.59
			125	88.40	85.34	91.73	82.85	95.18	143.63	92.76
			250	88.24	85.81	90.85	83.69	94.48	144.08	93.21
			4000	97.02	95.49	100.01	94.52	101.17	149.25	98.38
giu-21	90.53%	90.53%	63	83.34	78.48	88.08	74.52	92.15	149.83	99.14
			125	85.23	81.99	89.36	79.48	93.88	145.53	94.84
			250	85.13	82.30	88.78	80.16	93.50	144.30	93.60
			4000	99.03	97.85	102.00	97.01	103.07	151.13	100.43

Station	Time	Data availability	Freq	50 EL	75 EL	25 EL	90 EL	10 EL	T_SPL	AV_SPL
MS6	ALL	91.31%	63	64.22	62.91	67.14	61.78	73.07	161.63	98.80
			125	69.97	66.43	75.43	65.08	81.09	156.04	93.21
			250	75.79	70.72	81.24	68.27	86.25	157.08	94.25
			4000	90.33	88.00	92.38	86.56	93.83	155.40	92.56
mar-20	100.00%	100.00%	63	62.89	61.58	66.49	60.92	75.97	137.52	86.25
			125	69.08	65.71	74.85	64.30	83.73	131.61	80.35
			250	74.79	69.83	81.09	67.62	88.30	136.31	85.05
			4000	91.32	87.95	92.81	86.78	93.88	142.85	91.59
apr-20	28.07%	28.07%	63	62.44	61.39	64.94	60.77	70.50	117.71	72.11
			125	67.74	65.34	72.24	64.14	77.47	123.90	78.29
			250	72.79	68.96	78.14	67.36	83.37	128.52	82.91
			4000	90.33	87.38	92.05	86.39	92.85	136.45	90.84
mag-20	79.44%	79.44%	63	62.85	61.67	65.84	60.99	70.19	137.57	87.31
			125	69.75	66.30	74.89	64.76	79.13	139.32	89.06
			250	75.52	70.85	80.71	68.10	84.50	136.28	86.02
			4000	90.44	88.83	93.58	87.73	94.84	142.60	92.34
giu-20	90.28%	90.28%	63	63.26	61.98	66.49	61.24	72.28	139.16	88.49
			125	69.99	66.55	75.25	64.91	79.94	143.33	92.65
			250	75.19	70.83	80.70	68.54	85.50	142.70	92.02
			4000	90.66	88.70	93.66	87.29	95.25	144.43	93.76
lug-20	100.00%	100.00%	63	63.93	62.41	68.48	61.57	75.01	137.88	86.62
			125	71.15	67.11	76.58	65.34	82.26	141.31	90.05
			250	76.72	71.72	81.90	69.05	87.87	143.59	92.33
			4000	90.04	88.39	93.00	87.16	94.75	146.03	94.77
ago-20	87.33%	87.33%	63	64.00	62.30	69.27	61.49	75.84	145.10	94.43
			125	71.78	67.22	77.51	65.34	83.23	145.40	94.73
			250	77.33	72.11	82.98	69.24	88.94	144.65	93.98
			4000	90.51	88.28	92.85	87.06	94.19	146.07	95.40
set-20	100.00%	100.00%	63	63.31	62.04	66.62	61.35	72.07	130.33	79.21
			125	69.92	66.25	74.89	64.89	79.76	138.12	87.00
			250	75.77	70.91	81.27	68.51	86.24	138.62	87.49
			4000	89.68	87.30	91.97	85.88	93.22	143.64	92.51
ott-20	93.82%	93.82%	63	64.54	62.63	69.06	61.75	74.70	142.96	91.97
			125	71.35	66.99	76.65	65.11	82.05	137.95	86.96
			250	78.06	72.57	82.65	68.75	86.89	139.09	88.10
			4000	90.14	88.14	91.74	86.70	93.01	143.17	92.18
nov-20	100.00%	100.00%	63	63.98	62.65	67.28	61.95	71.71	125.78	74.66
			125	69.63	66.14	75.03	64.94	79.39	130.35	79.23
			250	75.97	70.72	81.15	68.39	84.81	134.34	83.21
			4000	90.72	88.73	92.04	87.42	92.99	142.37	91.25
dic-20	100.00%	100.00%	63	64.90	63.10	70.93	62.40	79.34	126.21	74.94
			125	72.07	66.84	79.24	65.10	86.61	133.00	81.73
			250	77.52	71.07	84.08	68.15	90.41	137.02	85.75
			4000	91.62	89.71	93.00	87.73	94.27	143.95	92.68
gen-21	91.13%	91.13%	63	65.34	63.74	70.63	63.06	75.96	160.38	109.52
			125	72.46	67.27	79.44	65.61	84.07	153.81	102.96
			250	78.61	72.11	84.55	68.93	88.37	144.54	93.68
			4000	91.32	89.14	92.41	87.18	93.39	142.80	91.94
feb-21	100.00%	100.00%	63	64.33	63.51	66.36	62.99	72.18	125.02	74.19
			125	69.14	65.98	74.13	64.92	80.06	129.89	79.06
			250	74.46	69.84	79.77	67.66	85.03	133.46	82.64
			4000	90.02	87.69	91.80	86.23	92.92	141.91	91.08
mar-21	99.46%	99.46%	63	64.47	63.70	66.67	63.20	71.57	137.74	86.50
			125	69.09	66.04	74.64	64.99	80.31	140.29	89.04
			250	75.15	69.66	80.89	67.55	85.58	137.58	86.33
			4000	89.30	86.49	91.27	84.82	92.40	142.56	91.31
apr-21	100.00%	100.00%	63	64.52	63.80	66.14	63.31	69.44	125.29	74.17
			125	69.57	66.39	74.33	65.29	78.29	128.28	77.16
			250	75.77	70.49	80.36	68.02	83.70	132.06	80.93
			4000	89.41	87.17	92.18	86.03	93.16	141.75	90.62
mag-21	100.00%	100.00%	63	64.40	63.82	65.41	63.37	67.80	119.95	68.69
			125	69.01	66.52	73.02	65.50	76.83	131.32	80.05
			250	74.85	70.81	79.23	68.38	82.57	134.23	82.97
			4000	89.23	87.63	92.54	86.59	93.91	142.65	91.38
giu-21	91.09%	91.09%	63	64.59	63.96	66.04	63.49	70.34	154.45	103.73
			125	68.52	66.36	72.88	65.53	78.20	147.13	96.41
			250	73.18	69.82	77.91	68.30	83.82	155.64	104.93
			4000	88.91	86.97	91.93	85.51	94.00	143.86	93.15

Station	Time	Data availability	Freq	50 EL	75 EL	25 EL	90 EL	10 EL	T_SPL	AV_SPL
MS7	ALL	76.34%	63	87.67	84.07	91.15	80.69	94.31	156.04	93.98
			125	91.17	87.83	94.48	84.74	97.42	161.17	99.12
			250	89.02	85.77	92.67	83.24	95.39	157.30	95.24
			4000	94.20	92.70	96.00	91.30	97.49	157.48	95.43
mar-20	0.00%	0.00%	63	nan	nan	nan	nan	nan	nan	nan
			125	nan	nan	nan	nan	nan	nan	nan
			250	nan	nan	nan	nan	nan	nan	nan
			4000	nan	nan	nan	nan	nan	nan	nan
apr-20	0.00%	0.00%	63	nan	nan	nan	nan	nan	nan	nan
			125	nan	nan	nan	nan	nan	nan	nan
			250	nan	nan	nan	nan	nan	nan	nan
			4000	nan	nan	nan	nan	nan	nan	nan
mag-20	85.08%	85.08%	63	88.61	85.04	92.31	81.93	95.59	145.07	94.51
			125	90.80	87.90	94.02	85.45	96.86	145.08	94.52
			250	87.20	84.92	89.48	82.77	91.63	141.93	91.37
			4000	93.45	92.17	95.68	91.44	96.61	145.07	94.51
giu-20	100.00%	100.00%	63	88.33	85.04	91.86	82.27	95.28	143.50	92.37
			125	90.13	87.54	92.98	85.25	95.88	145.72	94.59
			250	86.65	84.48	89.02	82.58	91.55	143.56	92.43
			4000	94.50	93.37	96.75	92.52	97.85	146.90	95.78
lug-20	100.00%	100.00%	63	88.46	84.91	91.88	81.32	95.17	144.83	93.56
			125	89.40	86.58	92.42	83.76	95.37	145.29	94.02
			250	85.59	83.42	88.11	81.39	90.93	145.17	93.90
			4000	95.04	93.93	97.36	93.28	98.19	147.61	96.34
ago-20	99.98%	99.98%	63	85.57	81.24	89.58	77.62	93.31	144.65	93.38
			125	87.69	84.04	91.30	80.93	94.30	145.83	94.57
			250	85.93	83.37	88.44	81.16	90.93	144.52	93.25
			4000	96.10	94.76	98.34	94.08	99.16	148.61	97.34
set-20	100.00%	100.00%	63	85.83	81.93	89.75	78.41	93.49	141.26	90.13
			125	87.70	84.35	91.10	81.55	94.23	143.74	92.61
			250	85.68	83.61	87.97	81.65	90.31	139.70	88.57
			4000	95.50	93.73	97.21	93.02	97.96	147.30	96.17
ott-20	100.00%	100.00%	63	86.69	82.78	90.54	79.49	93.98	142.00	90.74
			125	90.06	86.94	92.93	84.39	95.81	144.32	93.05
			250	88.35	86.23	90.49	84.12	92.39	142.63	91.36
			4000	95.37	93.45	96.38	92.54	97.17	146.92	95.65
nov-20	96.60%	96.60%	63	86.30	82.43	90.16	79.11	93.33	141.37	90.39
			125	90.16	87.17	93.31	84.28	96.40	144.18	93.20
			250	88.43	86.17	90.56	83.97	92.61	141.42	90.44
			4000	94.84	92.88	95.92	91.82	96.69	145.98	95.00
dic-20	89.11%	89.11%	63	87.74	84.75	90.79	82.16	93.69	143.31	92.54
			125	92.52	90.06	95.08	87.76	97.83	146.44	95.67
			250	91.93	89.88	93.90	88.11	95.77	144.81	94.05
			4000	93.79	92.03	94.96	90.89	95.97	145.18	94.42
gen-21	100.00%	100.00%	63	88.24	85.27	91.30	82.40	94.32	142.08	90.81
			125	93.26	90.67	95.96	88.40	98.93	147.01	95.74
			250	92.92	91.02	94.71	89.29	96.45	145.54	94.27
			4000	93.00	91.55	94.22	90.44	95.05	144.66	93.39
feb-21	100.00%	100.00%	63	89.51	86.31	92.48	83.48	95.28	142.75	91.92
			125	94.80	92.40	97.40	90.32	100.12	147.90	97.08
			250	94.45	92.78	96.25	91.35	98.06	146.54	95.71
			4000	92.17	90.52	93.70	89.45	94.90	143.64	92.82
mar-21	100.00%	100.00%	63	90.01	87.29	92.78	84.47	95.37	143.24	91.97
			125	95.26	92.88	97.59	90.72	99.90	148.13	96.86
			250	94.57	92.96	96.38	91.46	98.20	147.18	95.91
			4000	92.02	90.63	93.43	89.61	94.56	143.91	92.64
apr-21	10.37%	10.37%	63	89.23	86.17	92.08	82.75	94.70	132.42	91.14
			125	93.08	90.44	95.77	87.93	98.19	136.17	94.89
			250	93.06	91.29	95.32	89.14	97.91	136.12	94.84
			4000	92.74	90.86	94.65	89.86	95.47	134.66	93.37
mag-21	40.99%	40.99%	63	86.91	83.49	89.93	80.44	92.96	151.66	104.28
			125	90.91	88.22	94.00	86.06	96.57	159.19	111.80
			250	88.75	86.51	91.00	84.51	93.13	153.04	105.66
			4000	93.91	92.76	96.09	92.12	96.82	146.13	98.75
giu-21	100.00%	100.00%	63	85.78	82.76	88.83	80.10	91.58	142.69	91.57
			125	90.28	87.60	93.20	85.20	95.96	145.77	94.65
			250	87.44	84.87	89.96	82.72	92.36	144.26	93.13
			4000	94.54	93.38	96.59	92.74	97.66	147.20	96.08

Station	Time	Data availability	Freq	50 EL	75 EL	25 EL	90 EL	10 EL	T_SPL	AV_SPL
MS8	ALL	78.19%	63	93.76	80.13	104.00	71.77	112.37	173.71	111.55
			125	98.68	87.27	107.98	77.63	114.72	175.89	113.73
			250	97.07	87.89	105.61	78.83	111.74	172.37	110.21
			4000	97.08	94.98	99.35	93.44	101.96	164.23	102.07
mar-20	100.00%	100.00%	63	90.37	76.44	102.19	71.36	112.03	162.69	111.43
			125	96.22	85.46	106.84	80.12	114.94	164.87	113.61
			250	95.18	86.55	103.77	78.43	111.50	160.62	109.36
			4000	96.48	94.69	97.95	93.24	100.59	151.24	99.97
apr-20	100.00%	100.00%	63	86.33	73.56	98.50	70.14	108.87	161.60	110.47
			125	92.19	83.71	102.20	76.56	111.25	163.52	112.39
			250	91.93	83.15	100.53	74.03	108.29	159.34	108.21
			4000	97.20	95.15	98.92	93.67	100.30	151.40	100.28
mag-20	100.00%	100.00%	63	88.41	75.39	99.79	69.33	109.45	161.49	110.22
			125	92.98	81.74	103.39	72.23	111.29	163.07	111.80
			250	92.61	83.53	100.88	75.82	107.92	159.29	108.02
			4000	97.06	94.92	98.73	93.89	99.88	150.84	99.57
giu-20	100.00%	100.00%	63	95.34	82.05	104.37	71.51	112.31	163.33	112.21
			125	100.35	88.18	108.55	75.01	115.02	165.47	114.35
			250	98.90	88.48	105.91	78.19	111.70	162.06	110.94
			4000	99.06	97.06	100.81	95.72	102.36	153.67	102.55
lug-20	99.90%	99.90%	63	102.59	94.33	108.93	77.97	115.59	165.15	113.88
			125	106.02	98.31	112.13	84.48	117.74	166.39	115.12
			250	104.35	94.27	110.11	85.27	115.06	163.54	112.28
			4000	100.04	98.10	101.61	96.59	105.17	156.35	105.09
ago-20	100.00%	100.00%	63	101.55	89.77	109.33	76.04	115.96	165.13	113.86
			125	106.27	94.44	112.38	81.55	117.97	166.95	115.68
			250	105.02	94.12	110.81	82.29	115.51	164.04	112.77
			4000	99.61	98.11	101.67	96.58	106.74	157.25	105.98
set-20	95.83%	95.83%	63	96.54	82.76	105.24	72.82	113.44	162.83	111.89
			125	101.67	88.76	109.57	74.38	115.62	165.08	114.13
			250	99.54	89.63	106.76	77.97	112.15	160.83	109.89
			4000	98.25	96.76	99.62	95.35	102.33	154.14	103.20
ott-20	0.00%	0.00%	63	nan	nan	nan	nan	nan	nan	nan
			125	nan	nan	nan	nan	nan	nan	nan
			250	nan	nan	nan	nan	nan	nan	nan
			4000	nan	nan	nan	nan	nan	nan	nan
nov-20	18.75%	18.75%	63	90.93	77.21	101.71	72.29	111.65	155.02	111.19
			125	95.55	85.85	105.09	74.96	112.29	156.35	112.52
			250	94.61	86.25	102.82	79.94	109.57	152.22	108.39
			4000	97.23	95.61	98.49	94.21	101.13	145.18	101.35
dic-20	100.00%	100.00%	63	90.85	80.82	100.49	73.08	110.28	161.52	110.25
			125	94.96	88.58	104.19	82.22	112.05	163.92	112.65
			250	94.86	88.34	101.77	81.32	108.76	160.51	109.24
			4000	95.73	94.23	97.10	93.12	99.12	151.00	99.73
gen-21	100.00%	100.00%	63	90.89	79.07	101.01	70.74	110.55	163.01	111.74
			125	94.21	85.68	104.57	74.98	112.13	165.09	113.82
			250	93.78	86.48	101.33	78.76	108.39	161.39	110.12
			4000	94.31	93.08	95.55	91.87	97.60	149.51	98.24
feb-21	100.00%	100.00%	63	92.41	80.34	102.36	71.48	111.75	161.51	110.68
			125	97.63	86.82	106.73	75.90	114.44	164.47	113.64
			250	96.03	89.01	103.88	79.23	110.71	161.60	110.78
			4000	94.67	93.05	96.22	91.67	99.30	150.28	99.46
mar-21	81.05%	81.05%	63	92.88	79.85	103.75	71.77	112.41	160.85	110.49
			125	98.39	85.45	107.62	73.80	114.82	163.74	113.38
			250	96.21	86.87	104.28	78.30	110.99	160.09	109.73
			4000	95.35	94.03	96.91	92.51	100.14	149.95	99.59
apr-21	0.00%	0.00%	63	nan	nan	nan	nan	nan	nan	nan
			125	nan	nan	nan	nan	nan	nan	nan
			250	nan	nan	nan	nan	nan	nan	nan
			4000	nan	nan	nan	nan	nan	nan	nan
mag-21	55.78%	55.78%	63	91.04	80.85	101.08	72.90	109.77	157.98	109.24
			125	98.56	88.64	106.58	80.53	113.27	161.08	112.35
			250	97.53	88.28	104.81	80.51	110.32	157.05	108.32
			4000	96.79	94.90	98.69	93.42	101.36	149.85	101.12
giu-21	100.00%	100.00%	63	95.73	84.51	104.04	70.67	111.05	160.80	109.67
			125	101.95	91.89	108.76	79.37	114.99	164.59	113.46
			250	101.30	91.34	107.49	79.73	112.16	160.66	109.53
			4000	97.78	95.99	99.54	94.54	103.53	154.02	102.89

Station	Time	Data availability	Freq	50 EL	75 EL	25 EL	90 EL	10 EL	T_SPL	AV_SPL
MS9	ALL	68.28%	63	95.17	89.83	100.04	84.46	104.38	173.98	112.41
			125	95.02	90.97	98.83	87.21	102.49	172.09	110.52
			250	93.92	90.02	97.70	86.47	101.24	174.27	112.69
			4000	86.20	83.75	88.68	81.46	91.05	160.12	98.55
mar-20		69.76%	63	97.68	92.00	103.02	86.78	107.30	153.32	103.62
			125	96.83	92.88	100.58	89.98	104.13	150.86	101.16
			250	95.60	92.67	99.30	90.35	103.30	150.91	101.21
			4000	87.23	83.96	90.61	82.00	92.80	140.03	90.33
apr-20		100.00%	63	95.78	89.35	101.28	82.49	105.99	153.35	102.23
			125	95.07	90.97	99.23	87.96	102.88	151.11	99.99
			250	94.15	90.30	97.98	87.11	101.44	149.24	98.12
			4000	84.11	81.86	86.55	80.57	89.34	138.46	87.34
mag-20		100.00%	63	94.77	88.62	100.54	83.42	105.22	153.47	102.20
			125	93.51	89.50	97.50	85.95	100.76	149.37	98.10
			250	91.30	87.80	95.15	84.62	98.85	148.51	97.25
			4000	83.22	81.22	85.37	80.30	87.30	136.99	85.72
giu-20		100.00%	63	92.29	86.44	98.21	80.77	103.32	150.71	99.59
			125	90.81	86.63	94.71	82.69	97.87	146.01	94.89
			250	89.65	85.61	93.31	82.14	96.80	144.87	93.75
			4000	82.86	81.10	85.33	80.28	87.37	136.83	85.71
lug-20		68.90%	63	91.82	85.35	97.62	79.23	102.21	148.12	98.47
			125	89.08	84.76	93.63	80.78	97.87	144.26	94.61
			250	88.53	84.48	92.73	81.12	96.54	143.15	93.50
			4000	82.66	81.16	85.33	80.39	87.32	135.98	86.33
ago-20		0.00%	63	nan	nan	nan	nan	nan	nan	nan
			125	nan	nan	nan	nan	nan	nan	nan
			250	nan	nan	nan	nan	nan	nan	nan
			4000	nan	nan	nan	nan	nan	nan	nan
set-20		0.00%	63	nan	nan	nan	nan	nan	nan	nan
			125	nan	nan	nan	nan	nan	nan	nan
			250	nan	nan	nan	nan	nan	nan	nan
			4000	nan	nan	nan	nan	nan	nan	nan
ott-20		0.00%	63	nan	nan	nan	nan	nan	nan	nan
			125	nan	nan	nan	nan	nan	nan	nan
			250	nan	nan	nan	nan	nan	nan	nan
			4000	nan	nan	nan	nan	nan	nan	nan
nov-20		0.00%	63	nan	nan	nan	nan	nan	nan	nan
			125	nan	nan	nan	nan	nan	nan	nan
			250	nan	nan	nan	nan	nan	nan	nan
			4000	nan	nan	nan	nan	nan	nan	nan
dic-20		56.45%	63	94.10	90.13	98.32	86.17	101.58	148.14	99.37
			125	95.26	92.39	98.07	89.90	100.97	147.47	98.69
			250	94.49	92.13	96.91	90.10	99.57	146.82	98.05
			4000	87.48	86.05	89.40	84.79	91.91	140.22	91.45
gen-21		100.00%	63	94.83	90.05	98.96	85.26	102.67	150.00	98.74
			125	96.93	93.08	100.09	89.73	102.99	150.94	99.67
			250	96.37	92.94	99.39	90.06	102.17	150.19	98.92
			4000	87.78	86.04	89.55	84.60	91.55	140.88	89.61
feb-21		100.00%	63	96.14	91.59	100.17	86.99	103.89	151.18	100.35
			125	97.22	93.89	100.69	90.75	104.04	151.37	100.55
			250	96.14	92.95	99.29	90.10	102.16	149.88	99.05
			4000	87.74	85.75	89.87	83.83	92.05	141.26	90.43
mar-21		100.00%	63	96.95	92.76	101.03	88.56	104.41	152.11	100.84
			125	97.87	94.75	101.25	91.94	104.56	152.75	101.48
			250	97.34	94.08	100.32	90.98	103.12	152.41	101.14
			4000	87.60	85.62	89.71	83.70	92.70	143.95	92.68
apr-21		100.00%	63	95.86	90.95	100.06	85.98	103.66	151.08	99.96
			125	95.62	92.19	98.82	89.07	101.94	149.89	98.76
			250	94.86	91.43	98.06	88.62	101.15	149.45	98.32
			4000	87.14	85.30	88.92	83.62	90.99	140.54	89.41
mag-21		100.18%	63	94.83	89.93	99.38	85.51	103.25	151.53	100.26
			125	94.68	91.13	98.15	88.02	101.22	149.51	98.23
			250	93.22	89.80	96.32	87.12	99.31	148.39	97.12
			4000	86.93	84.98	88.93	83.79	90.68	140.52	89.24
giu-21		100.00%	63	95.07	89.96	100.79	85.01	109.38	173.70	122.57
			125	93.90	90.73	97.87	87.67	108.25	171.79	120.66
			250	92.30	88.78	96.19	85.75	111.24	174.11	122.99
			4000	87.14	84.93	89.70	84.10	93.12	159.61	108.48

A2.Jupyter Notebook

The Jupyter Notebook is a stand-alone, open-source interactive web tool, which researchers can use to combine software code, computational output, explanatory text and multimedia resources in a single document. In a Jupyter notebook, users input programming code or text in rectangular cells in a front-end web page; the browser then passes that code to a back-end 'kernel', which runs the code and returns the results. The notebook speaks many programming languages, as Python and R. However, it can be run only in its own environment, so that the Jupyter software should be installed on the user's computer. It can be used in many operating systems.

Installing procedure for the Jupyter software is described in:

<https://jupyter.org/install>.

<https://docs.anaconda.com/ae-notebooks/4.3.1/user-guide/basic-tasks/apps/jupyter/>

For the purpose described in the present Deliverable, the code in the notebook was written in Python, so also Python must be installed. For detailed information about download and installation, we refer to the website:

<https://wiki.python.org/moin/BeginnersGuide/Download>

<https://www.python.org/doc/>

To use the notebook, these modules may be required, depending on own Python installation:

matplotlib: <https://matplotlib.org/stable/users/installing.html>

numpy: <https://numpy.org/install/>

pandas: https://pandas.pydata.org/getting_started.html

seaborn: <https://seaborn.pydata.org/installing.html>

scipy: <https://www.scipy.org/install.html>

openpyxl: <https://openpyxl.readthedocs.io/en/stable/>

The notebook consists in many code cells, which can also be run separately, depending on the analyses the user wants to perform. No skills in programming are required, being all the operations text driven. Other code cells can be added to implement new analyses.

In Figure 31 an example of the Jupyter Notebook is shown: descriptive text and python code cells can be seen.

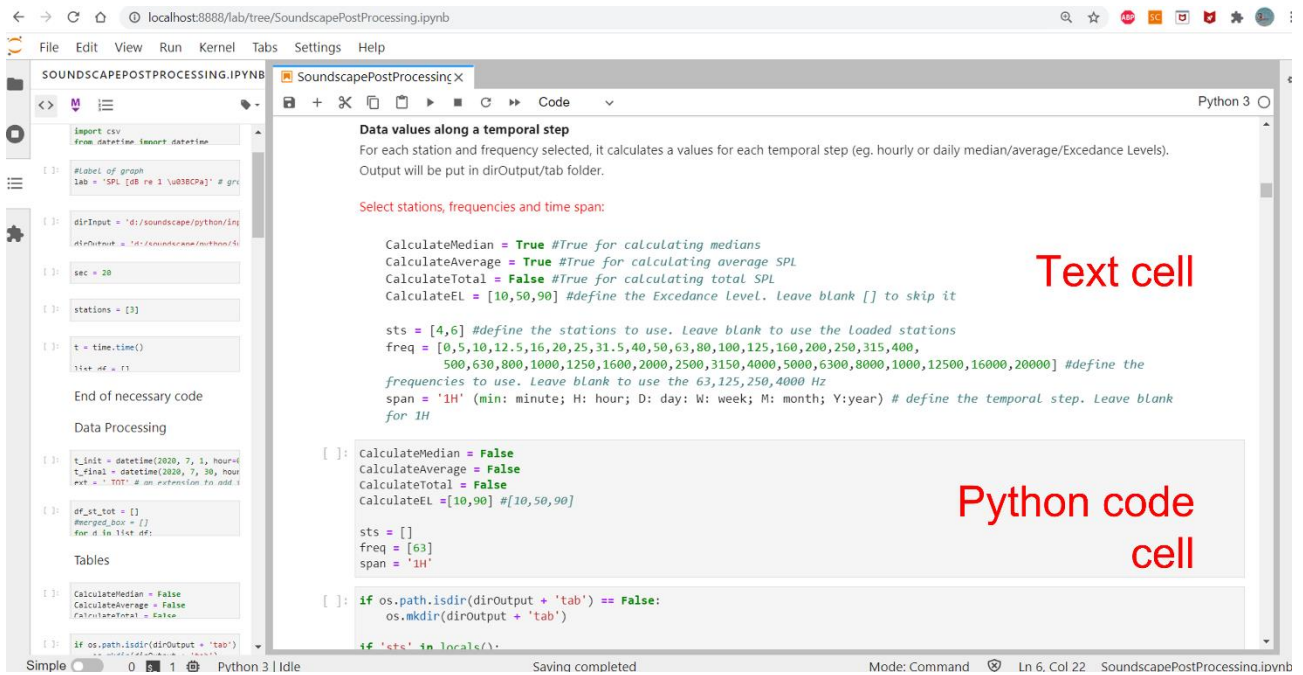


Figure 31. Jupyter Notebook example.