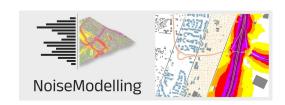
NoiseModelling in 3 minutes

NoiseMapping tool

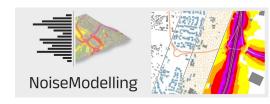


- Since 2010
- Implement CNOSSOS-EU method
- Road, railway, and "industrial" sound sources
- From local to national scale
- By and mainly for research
- Not a conccurrrent of NMS (support, user interface...)





Open-Source tool





- Open-science initiative (GPLv3)
 - reproducibility
 - transparency
 - traceability

Allowed:

- Commercial use
- Modification
- Redistribution
- Selling services based on the software
- Using in your own company

Not allowed:

- Closing the source
- Adding extra license restrictions
- Mixing with incompatible licenses
- Distributing without full source code
- Preventing user from modifying on devices (anti-Tivoization)

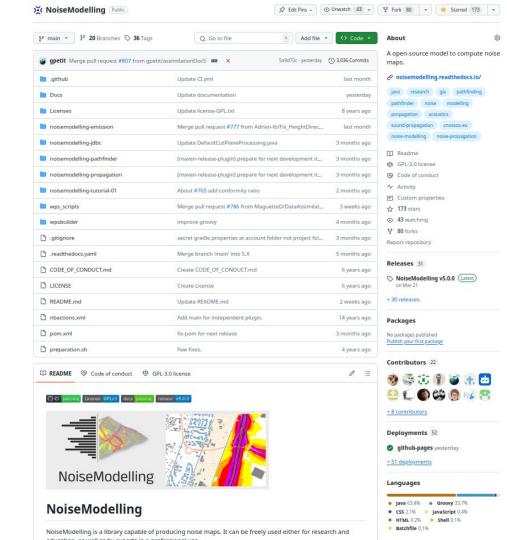






Github distributed

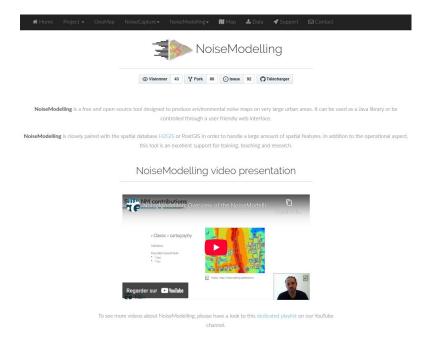
https://github.com/Universite-Gustave-Eiffel/NoiseModelling/



NoiseModelling website and documentation

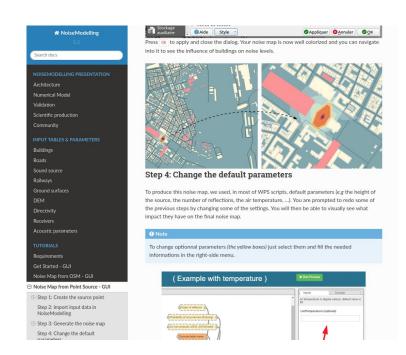
Website:

https://noise-planet.org/noisemodelling.html



Documentation:

https://noisemodelling.readthedocs.io/en/latest/



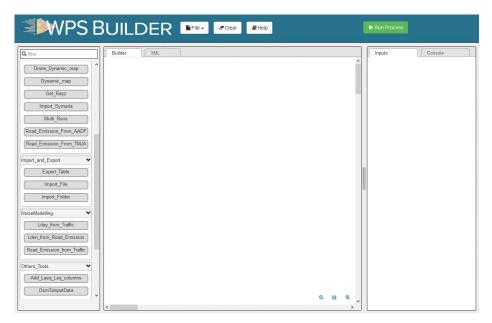


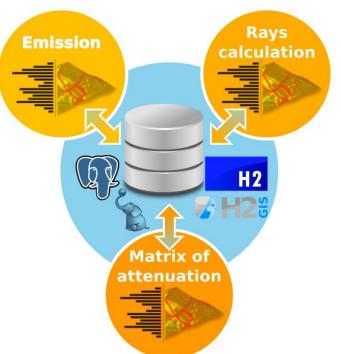




NoiseModelling

- 4 Java libraries
- Direct connection to GIS databases
- User Interface or control via scripts (groovy, python, etc.)









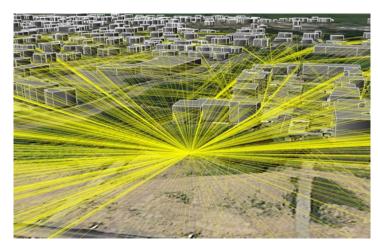


NoiseModelling in detail (see tomorrow!)

- CNOSSOS EU (Road & Rail)
- Large scale / robustness
- Meso-center / HPC calculation
- Unit tests / regressions (ISO/TR 17534 4:2020)

- ...

Some use cases (see tomorrow!)















Some key figures

- ~12,000 release downloads
- ~8 downloads/day
- 20 unique visits/day on GitHub page
- 172 GitHub stars
- ~230,000 lines of code
- 22 contributors

Universities & Research Institutes:

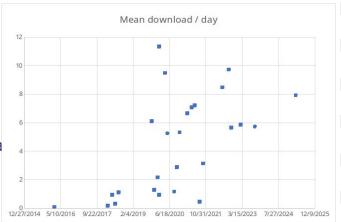
KTH Royal, Utrecht University, Université de Sherbrooke (Canada), Groupe WAVES (Université de Gand - Belgique), Dipartimento di Ingegneria Civile/DICIV (Université de Salerne - Italie), HFT Stuttga University of Applied Science, ONERA...

5 private companies

Neovya, Quiet Places Ltd, Airbus, Orbiwise et Archimethod...

Public institutes:

 Centre National d'Incendie et de Secours - CNIS (Luxembourg), CEDEX, CEREMA...









NoiseModelling Technical Committee



Pierre Acoustician Researcher



Nicolas Main dev.



Gwendall GIS expert Documentation



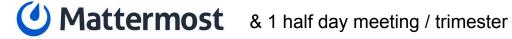
Arnaud Acoustician Researcher



Valentin Acoustician MatSim enthousiast



Judicaël Founder OpenResearch









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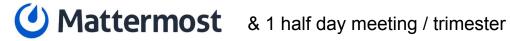
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Valentin Acoustician MatSim enthousiast



Judicaël Founder OpenResearch



But not a Univ. Eiffel tool! We lead, but open-source = own to the community You can join!







How to contribute in FLOSS (NoiseModelling)?

Code

- 1. Bug reports (<u>Issues</u>, github tab)
- Upstream your code
- 3. Bug fixes
- 4. Implement new features
- 5. Be a core developer

Community

- Tell to community!
- 2. Open discussions (<u>Discussions</u>, github tab)
- 3. Contribute to discussions
- Participate to NM Days
- 5. Help NM Days organisation
- 6. Propose documentation (e.g. video)
- 7. Be an ambassador

Coordination (mattermost)

- 1. Join the technical committee meetings
- 2. Join the technical committee

Help to fund the projects

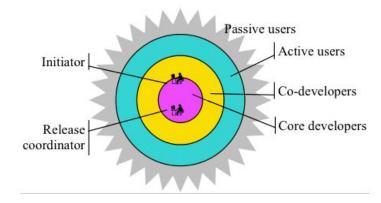


Figure 1: A synthesised FLOSS development team structure.

How to conserve a normal distribution with large standard deviation!







Program

NoiseModelling Days 2025



Day 1 (June 26th 2025)

French, UTC+2	Туре	Title	First speaker	Affiliation(s)
15h00 - 15h15		Welcome coffee		
15h15 - 15h30	Presentation	Introduction NoiseModelling Team		
15h30 - 15h50	Presentation	Open Research in acoustics : The Noise-Planet & UMRAE experience	Judicaël Picaut	UMRAE, Univ Gustave Eiffel, Cerema
15h50 - 16h30	Presentation	Toward a collaborative room acoustics simulation software community	Maarten Hornikx	Eindhoven University of Technology
16h30 - 16h45		Break		
16h45 - 17h05	Presentation	Open source data & software for noise and vibration modelling in the Netherlands	Arnaud Kok, Rob Van Loon	National Institute for Public Health and the Environment
17h05 - 17h25	Presentation	Code_TYMPAN™ software for calculating industrial noise in the environment	Thibaud Thénint	EDF
17h25 - 17h35	Presentation	CNOSSOS EU & Open source	Pierre Aumond	UMRAE, Univ Gustave Eiffel, Cerema
17h35		Brainstorm Open Research for environmental acoustics		

Day 2 (June 27th 2025)

French, UTC+2	Type	Title	First Speaker	Affiliation(s)
09h00 - 09h30		Welcome coffee		
09h30 - 10h00	Presentation	NoiseModelling - What's new?	Pierre Aumond	UMRAE, Univ Gustave Eiffel, Cerema
10h00 - 10h15	User presentation	LLM-based Multi-agent Framework for Traffic Noise Mapping	Zhiyong Wang, Yueying Zhang	South China University of Technology
10h15 - 10h30	User presentation	Towards a comprehensive noise assessment in Spain	Ignacio Soto Molina	Spanish ministry of the Environment
10h30 - 10h45	User presentation	Applying EU standards to noise mapping in emerging	Alexandra L. Montenegro	Università di Pisa, ARPAT
10h45 - 11h00	User presentation	Understanding the relation between traffic and noise in urban motorways using UAVs and low-cost sensors	Oriol Pascual Anglès, Jasso Espadaler Clapés	MobiLysis
11h00 - 11h30	Tutorial	NoiseModelling in action	NoiseModelling team	
11h30 - 12h00		Break (coffee + snacks)		
12h00 - 12h15	User presentation	Data assimilation for dynamic urban noise mapping	Ndeye Maguette Diagne	UMRAE, Univ Gustave Eiffel, Cerema
12h15 - 12h30	User presentation	From road traffic volumes to individual vehicule representation	Yu Gao, Sacha Baclet	UMRAE, KTH Royal Institute of Technolog
12h30 - 12h45	User presentation	Synthetic population & NoiseModelling	Valentin Le Bescond	UMRAE, Univ Gustave Eiffel, Cerema
12h45 - 13h00		Break (coffee + snacks)		
13h00 - 13h20	User presentation	NoiseCapture vs NoiseModelling: a test case on Sherbrooke university campu	ıs Léonor Rimani	Université de Sherbrooke
13h20 - 14h00	Discussion	Whishlist for NoiseModelling Days 2026		











NoiseModelling - What's new ? (30 min)

Thank you!







NoiseModelling Days 2025 - crew members



PierreResearcher
Makes things happen



Gwendall GIS expert Markdown lover



Valentin Acoustician MatSim enjoyer



Sacha SUMO enjoyer



MaguetteDev.
Test breaker



Judicaël Founder OpenResearch



IgnacioSpanish Ambassador
CPU killer



More about you



- 1. Go to https://www.mentimeter.com/
- 2. Enter the 27419542 code to join

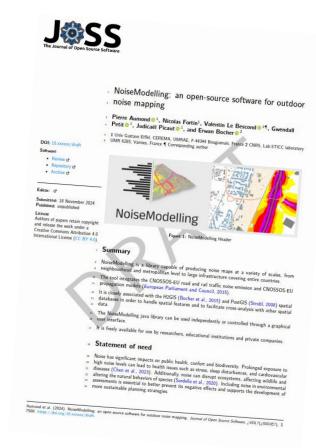
Join at menti.com | Use vote code 2741 9542



JOSS publication

Title: "NoiseModelling: an open-source software for outdoor noise mapping"

- → Need of an up-to-date reference paper
- → The paper to cite in your article!
- → Research of editor



More details:

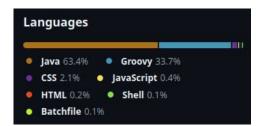
https://github.com/openjournals/joss-reviews/issues/7500#issuecomment-3001338833

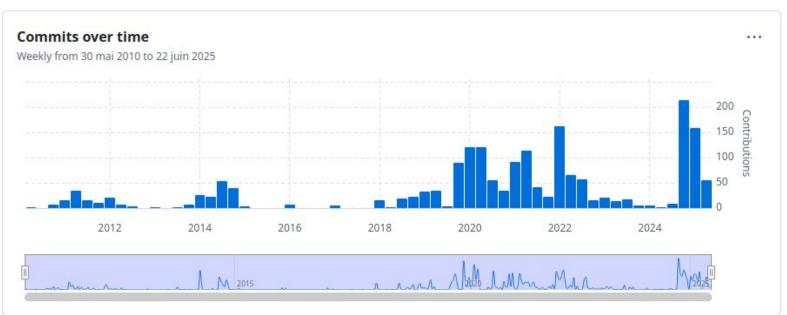






NoiseModelling code





https://github.com/Universite-Gustave-Eiffel/NoiseModelling/graphs/contributors







NoiseModelling achievements since 2023 → From 4.0 to 5.0.1

Move from the standard approach "Day Evening Night" to a more flexible "PERIOD" column, while **maintaining compatibility with previous** source table.

Before:

SOURCE

- PK SOURCE
- THE_GEOM
- LWD500

After:

SOURCE_GEOM

- PK_SOURCE
- THE_GEOM

SOURCE_EMISSION (optional)

- PK_SOURCE
- PERIOD
- HZ500



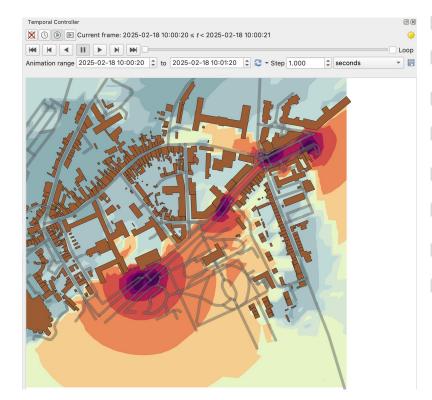


NoiseModelling achievements since 2023 → From 4.0 to 5.0.1

CONTOURING NOISEMAP

compatibility with PERIOD column

Output contouring for each periods



New dynamic tools and tutorial

https://noisemodelling.readthedocs.io/en/latest/Dynamic Tutorial.html





Conformity to ISO 17534-1:2015



Test Case	Conform ?	NLD Conform ?	Largest Deviation	Details
TC01	7		0.00 dB @ 2000 Hz	TC01
TC02			0.07 dB @ 1000 Hz	TC02
TC03	7		0.05 dB @ 500 Hz	TC03
TC04		☑	0.07 dB @ 1000 Hz	TC04
TC05			0.00 dB @ 1000 Hz	TC05
TC06			0.06 dB @ 500 Hz	TC06
TC07			0.02 dB @ 1000 Hz	TC07
TC08		☑	0.02 dB @ 1000 Hz	TC08
TC09	2		0.01 dB @ 250 Hz	TC09
TC10	Ø		0.02 dB @ 250 Hz	TC10
TC11	7	Ø	0.02 dB @ 125 Hz	TC11
TC12	2		0.04 dB @ 500 Hz	TC12
TC13			0.01 dB @ 500 Hz	TC13
TC14	2	\square	0.04 dB @ 8000 Hz	TC14
TC15	7		0.06 dB @ 250 Hz	TC15
TC16	Ø		0.00 dB @ 2000 Hz	TC16

V

TC17

TC18

7

Extensive work to bring the code into line with the standard

Conform

- Do not the deviate more than ±0,1 dB
- Percentage of conformity: 75% (21/28)

NLD Conform

- Do not the deviate more than ± 0.1 dB neglecting lateral diffraction
- Percentage of conformity: 83% (23/28)

The results in details (automatically updated): https://noisemodelling.readthedocs.io/en/latest/Cnossos Report.html



0.05 dB @ 500 Hz

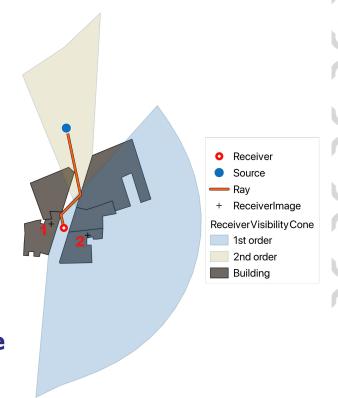
0.02 dB @ 500 Hz





Code refactoring

- Separation of noise path finding algorithm with noise attenuation computation
- Rewrite of the path finding algorithm to increase the performance and reliability
- Precomputation of the visibility cones for each receivers for **fast reflection path** search algorithm
- Classes and packages renaming to make code structure easier to read



In addition to improving NoiseModelling's performance, this work will be used to integrate Harmonoise Sound Propagation Model





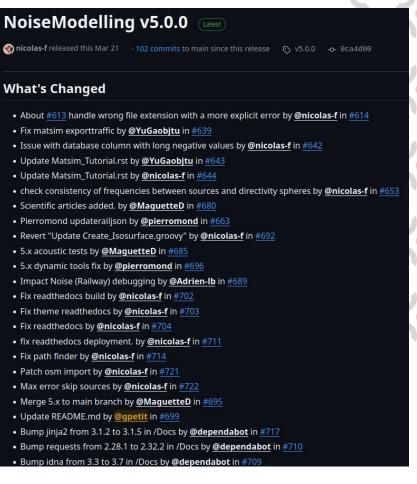
General fixes

In the **code**:

- many small bug fixes or improvements

In the **doc**:

 lot of optimizations, to be more clear (when necessary) and to add new pages



In detail: https://github.com/Universite-Gustave-Eiffel/NoiseModelling/releases/tag/v5.0.0







H2GIS

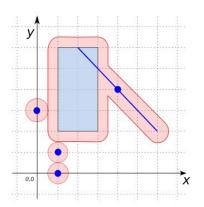
A **standalone** & **lightweight** geospatial database (spatial extension of the H2 database), ... like PostGIS is for PostGreSQL

→ The heart of NoiseModelling, used to load, process and export data

- Made by CNRS
- Open-source (LGPLv3)
- Code: https://github.com/orbisgis/h2gis
- Doc: http://www.h2gis.org/docs/dev/home/













GeoClimate



A geospatial processing toolbox for environmental and climate studies

→ Used to download, format and enrich (with geomorphological indicators, such as estimated building's height) OpenStreetMap data, to feed NoiseModelling



- Made by CNRS / H2GIS team
- Open-source (LGPLv3)
- Code: https://github.com/orbisgis/geoclimate
- Doc: https://geoclimate.readthedocs.io/en/latest/

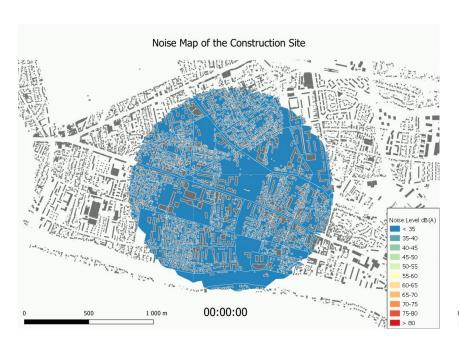


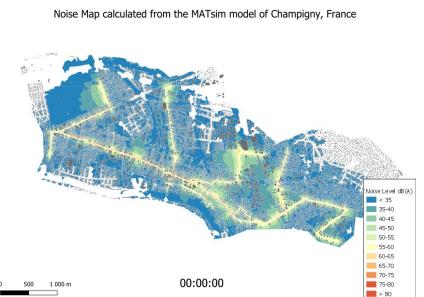




Dynamic Noise Maps (flow traffic)





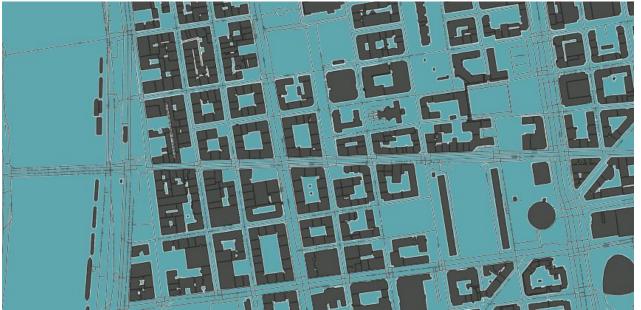








Dynamic Noise Maps (individualized traffic)







Data assimilation









New Scientific production page

 \rightarrow

https://noisemodelling.readthedocs.io/en/latest/Scientific production.html

Important to get numbers
numbers = visibility
visibility = interest
interest = fundings
fundings = development
dev = research
research = more fun :)

New visibility

Tell us if some articles are missing!

3. Pierre Aumond, Arna Can, Vissensitivity analysis for urban

All UMRAE Not UMRAE Noise Mapping (END) Traffic dynamics

Other than Traffic noise Fauna impacts Al & Surrogates Data Assimilation

Teaching Software

- Antoine Lesieur, Pierre Aumond, Arnaud Can, and Vivien Mallet. Une cartographie du bruit plus rapide et plus précise combinant méta-modélisation et assimilation de données. In 16ème Congrès Français d'Acoustique, CFA2022. Marseille, France, April 2022. Société Française d'Acoustique and Laboratoire de Mécanique et d'Acoustique. URL: https:// hal.science/hal-03848396 (visited on 2025-06-06).
- Antoine Lesieur, Vivien Mallet, Pierre Aumond, and Arnaud Can. Data assimilation for urban noise mapping with a meta-model. Applied Acoustics, 178:107938, 2021. URL: https:// www.sciencedirect.com/science/article/abs/pii/S0003682X21000311, doi:10.1016/ i.apacoust.2021.107938.
- Antoine Lesieur, Vivien Mallet, Pierre Aumond, and Arnaud Can. Faster and more accurate noise mapping combining meta-modeling and data assimilation. In *Proceedings of Euronoise* 2021. Madeira, Portugal, 2021. URL: https://cense.ifsttar.fr/fileadmin/contributeurs/ CENSE/Documents/Euronoise_2021_WP4.pdf.

All UMRAE Not UMRAE Noise Mapping (END) Traffic dynamics

Other than Traffic noise Fauna impacts Al & Surrogates Data Assimilation

Teaching Software

- Cristian-Gabriel Alionte and Daniel-Constantin Comeaga. Noise assessment of the small-scale wind farm. E3S Web Conf., 112:02011, 2019. Publisher: EDP Sciences. URL: https://www.e3s-conferences.org/articles/e3sconf/abs/2019/38/e3sconf_te-re-rd18_02011/e3sconf_te-re-rd18_02011.html (visited on 2025-06-06), doi:10.1051/e3sconf/201911202011.
- Pierre Aumond, Erwan Bocher, David Ecotiere, Nicolas Fortin, Benoit Gauvreau, Gwenael Guillaume, and Gwendall Petit. Improvement of city noise map production processes and sensitivity analysis to noise models inputs. In EuroNoise 2021: 12th European Congress and Exposition on Noise Control Engineering, 10 p. MADERE, Portugal, October 2021. URL: https://hal.science/hal-03616731 (visited on 2025-06-10).
- Pierre Aumond, Arna Can, Vivien Mallet, Benoit Gauvreau, and Gwenaël Guillaume. Global sensitivity analysis for urban noise modelling. In Proceedings of the 23rd International

nen, Germany, 2019. URL: https://publications.rwth-loi:10.18154/RWTH-CONV-239314.

- u, Olivier Chiello, David Ecotière, Adrien Le Bellec, Damien colas Fortin, Sylvain Palominos, Gwendall Petit, and Judicaël ing in France to 2023: Coupling a national database with the delling. INTER-NOISE and NOISE-CON Congress and Conference 24, February 2023. doi:10.3397/IN_2022_0367.
- u, Olivier Chiello, and others. Couplage entre la base de et l'outil open-source NoiseModelling pour la réalisation de ln 16ème Congrès Français d'Acoustique (CFA2022). Marseille, 11.science/hal-03848495/.

n, and Arnaud Can. Overview of the NoiseModelling opend its applications. In INTER-NOISE and NOISE-CON Congress olume 261, 2005–2011. 2020. Issue: 4. URL: https://=V1-niMT9cYE.

n, and Arnaud Can. Probabilistic modeling framework for In Proceedings of Euronoise, -. 2018. URL: https:// s/papers/102_Euronoise2018.pdf, doi:10.1016/

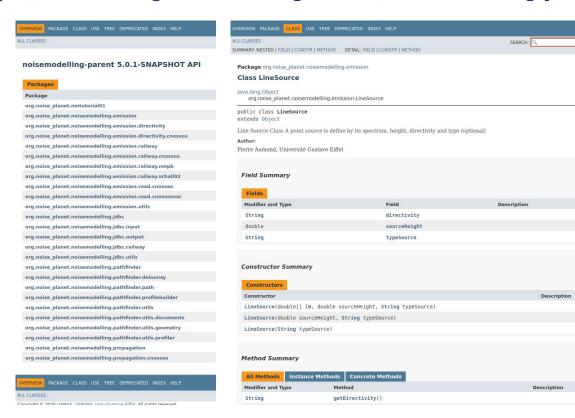






Developer documentation

New Javadoc, automatically generated from documentation written in the source code → https://universite-gustave-eiffel.github.io/NoiseModelling/javadoc/



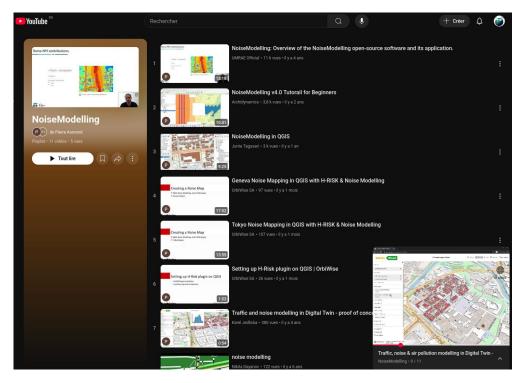






NoiseModelling YouTube playlist

→ https://www.youtube.com/playlist?list=PLIZraYcEigE8aOrpk7ythCM3ygSuhkVjO



If you know any videos that could be included, please let us know!







How to contribute?

Code

- 1. Bug reports
- 2. Upstream your code
- 3. Bug fixes
- 4. Implement new features
- 5. Be a core developer

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- Tell to community!
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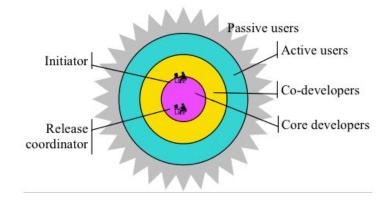


Figure 1: A synthesised FLOSS development team structure.

How to conserve a normal distribution with large standard deviation!









NoiseModelling Days 2025

NoiseModelling team

pierre.aumond@univ-eiffel.fr contact@noise-planet.org

