

Underwater soundscapes: New directions for studying the impact of climate change on marine biodiversity

Tzu-Hao Harry LIN

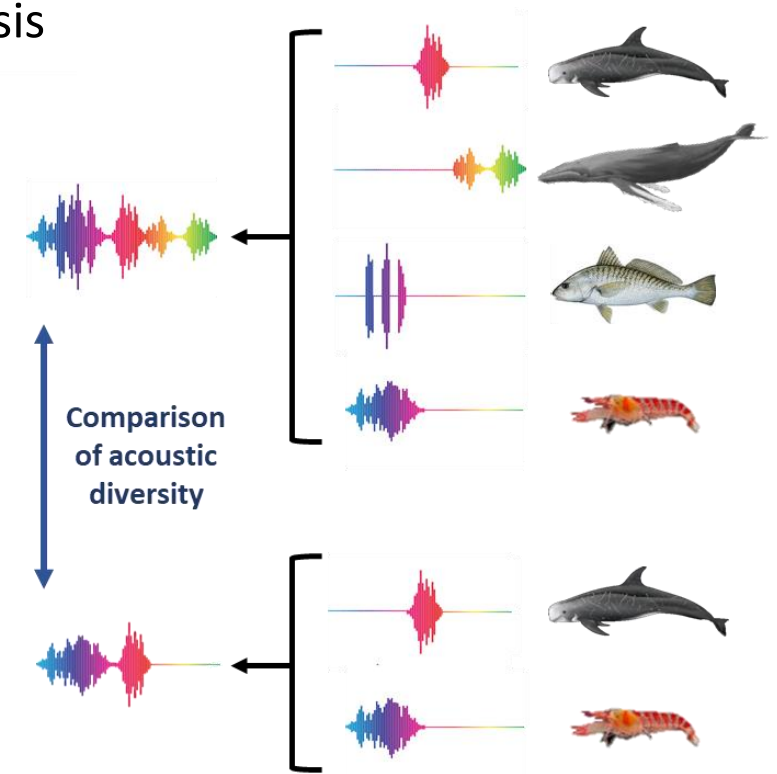
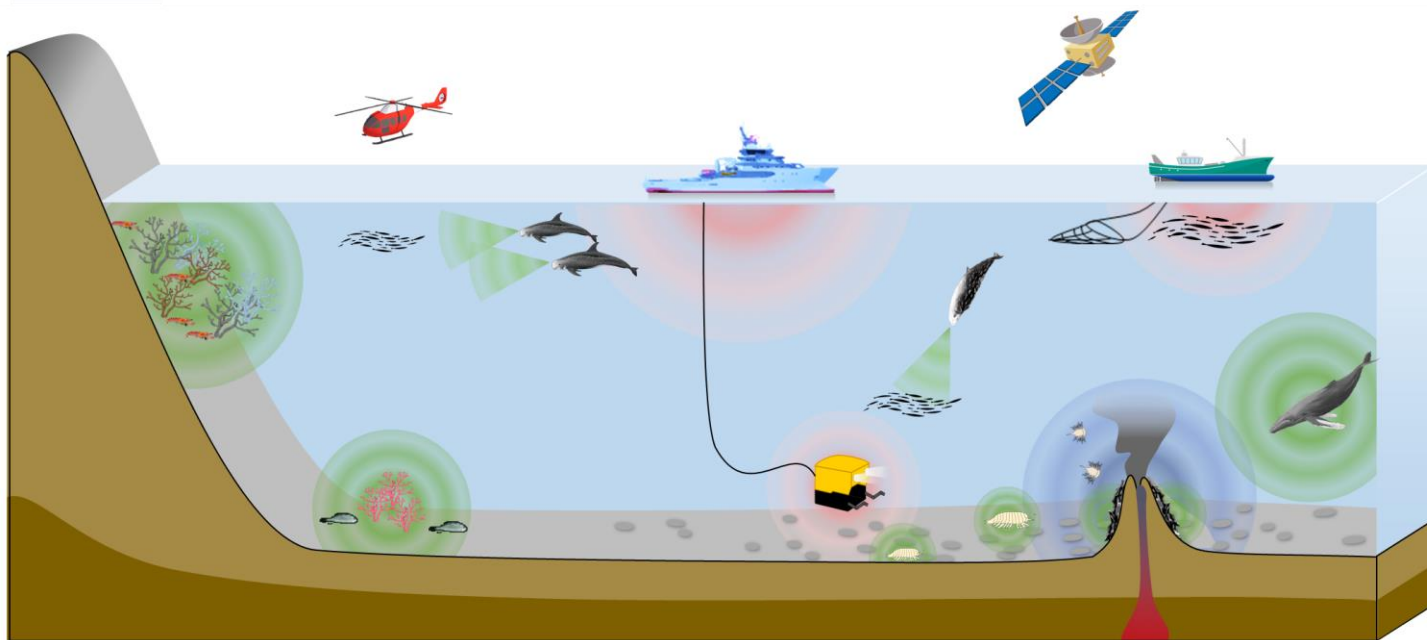
¹Biodiversity Research Center, Academia Sinica

²Acoustic Measurement of Ocean Biodiversity Hotspots,
International Quiet Ocean Experiment



Listening to marine biodiversity

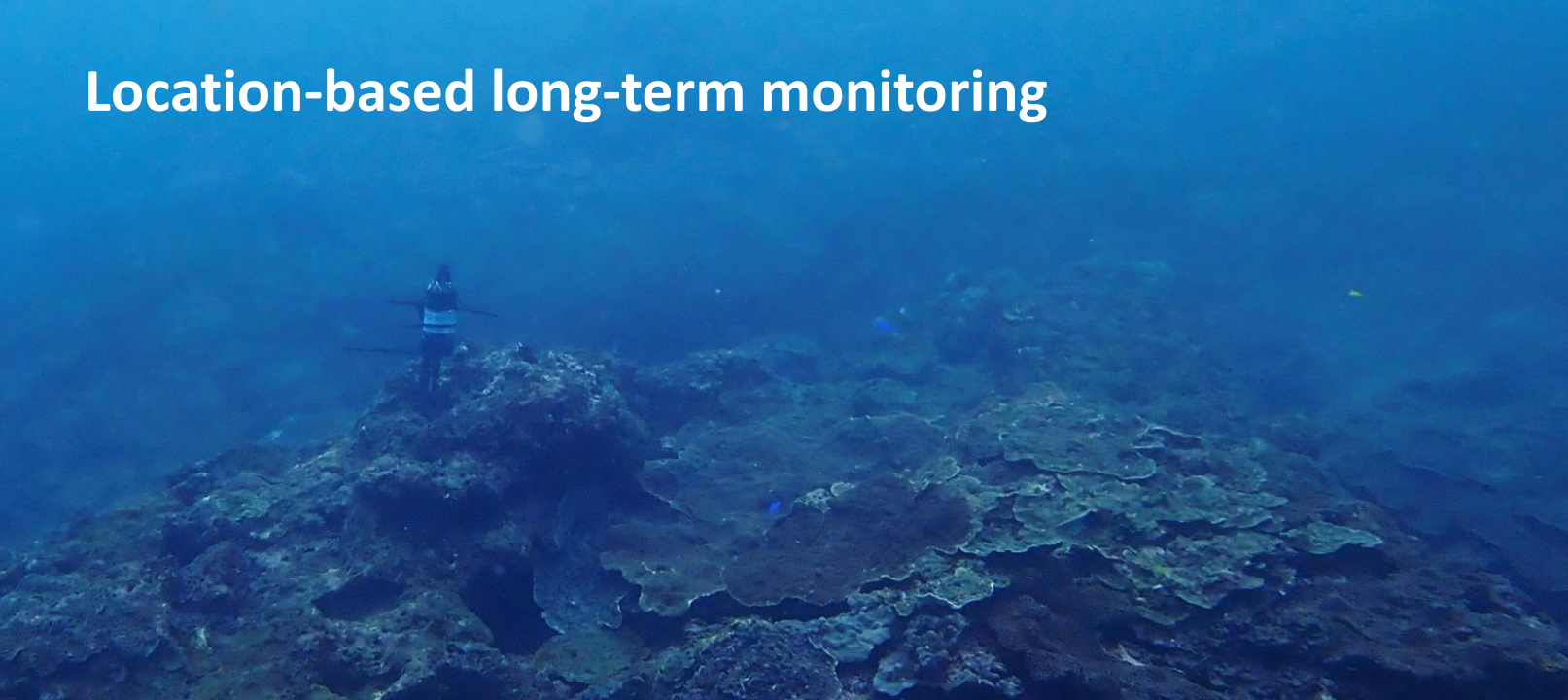
- Capable of detecting sound-producing biological, environmental, and anthropogenic activities
- Wide spatial coverage, not being affected by visibility and weather conditions
- Massive amount of acoustic data available for quantification analysis



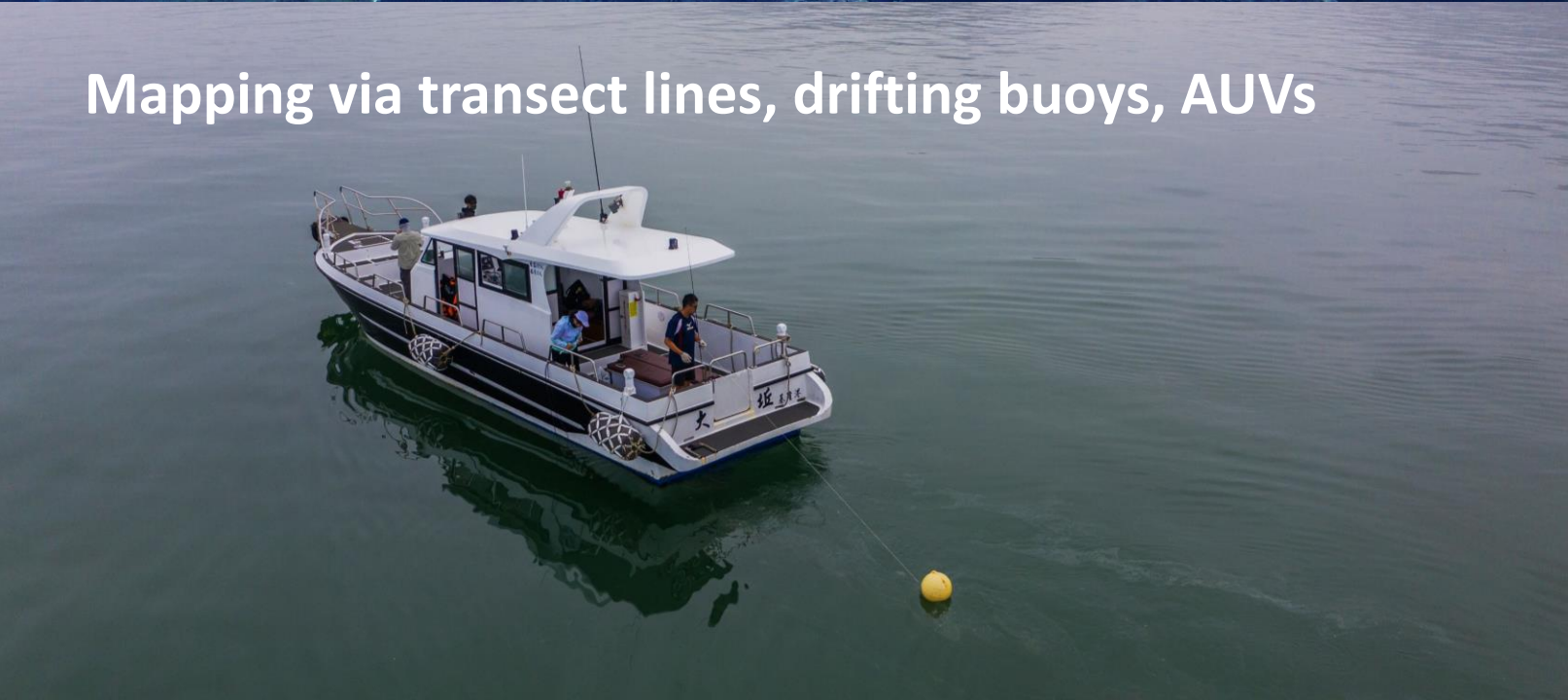
Mooney et al. (2020) Royal Society Open Science, 7: 201287.

Parsons et al. (2022) Frontiers in Ecology and Evolution, 10: 810156.

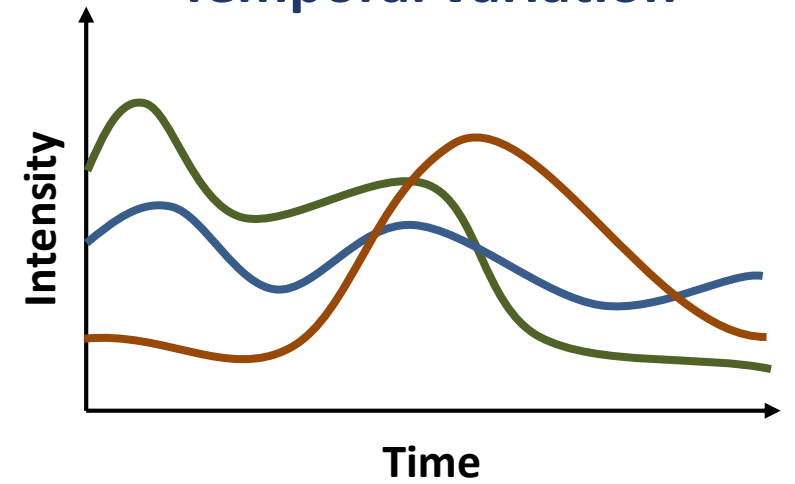
Location-based long-term monitoring



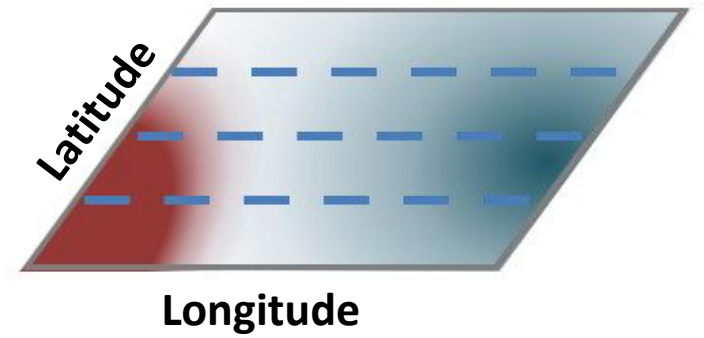
Mapping via transect lines, drifting buoys, AUVs

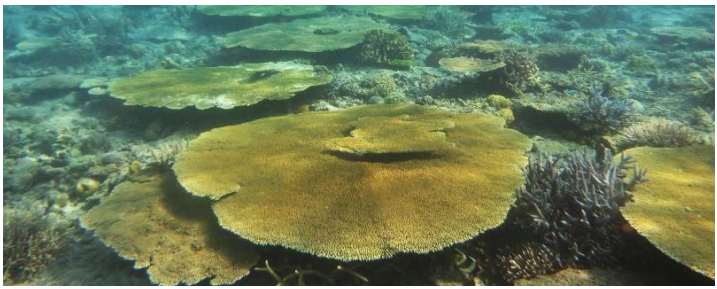
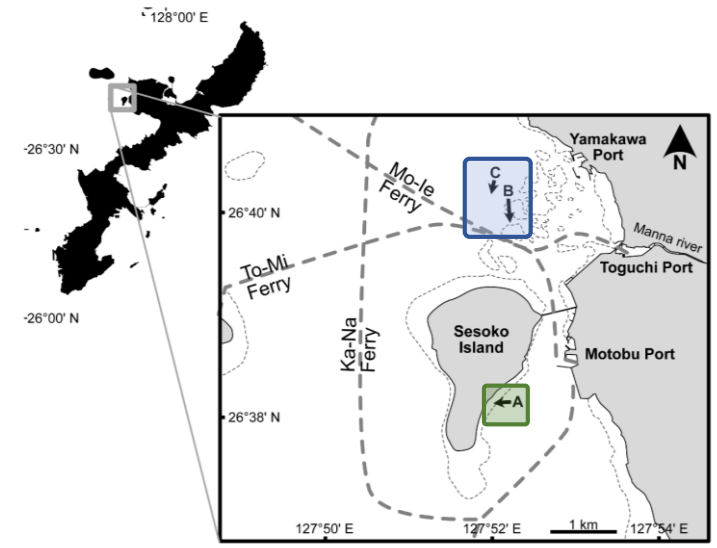


Temporal variation



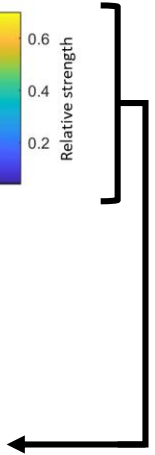
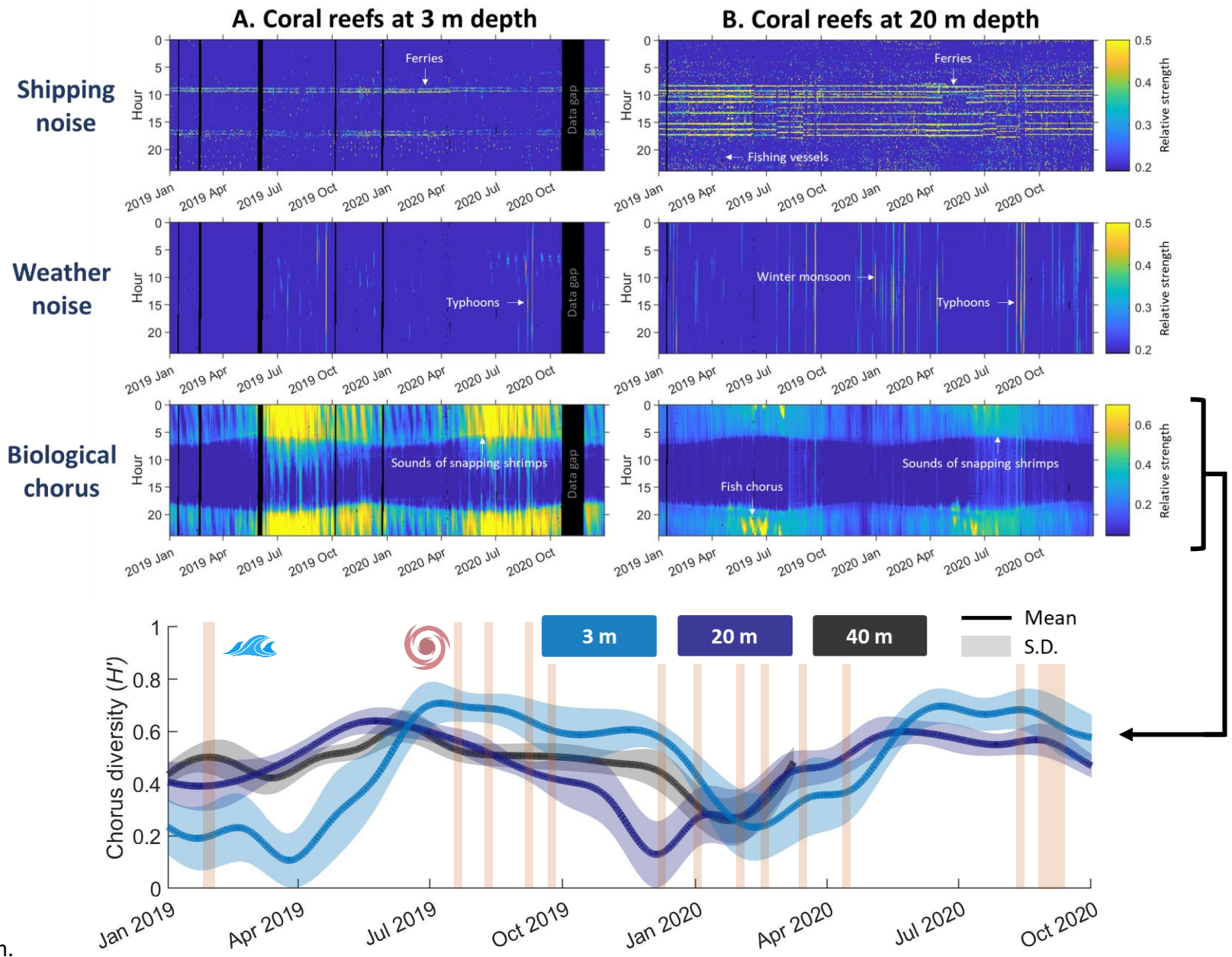
Spatial variation





Tomonari Akamatsu (OPRI)
 Frederic Sinniger, Saki Harii (University of the Ryukyus)

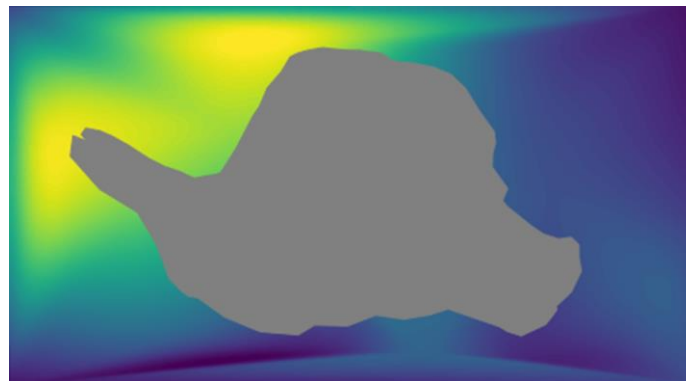
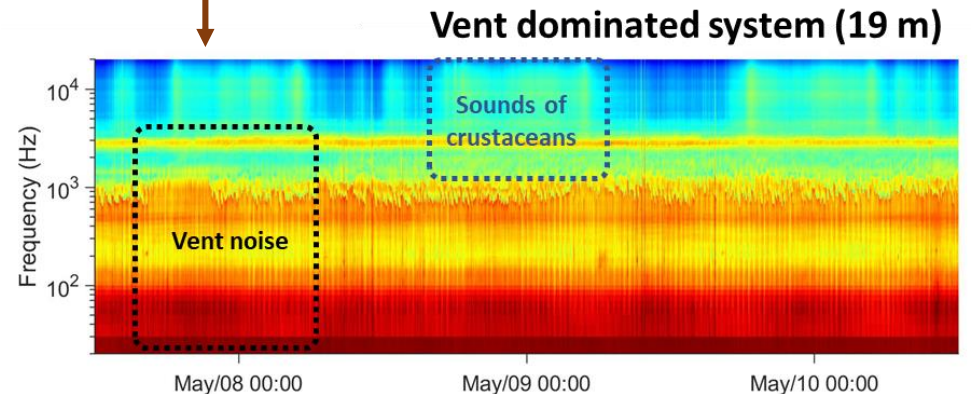
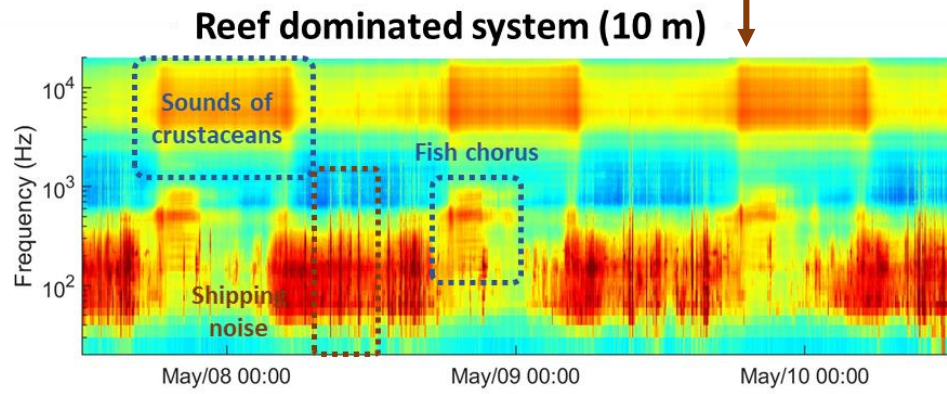
Lin et al. (2021) Biological Conservation, 253: 108901.
 Lin et al. (2021) 14th International Coral Reef Symposium.
<https://drive.google.com/file/d/18dzyLZe0V2--vQBan4t2bHlkQ16icGWQ>



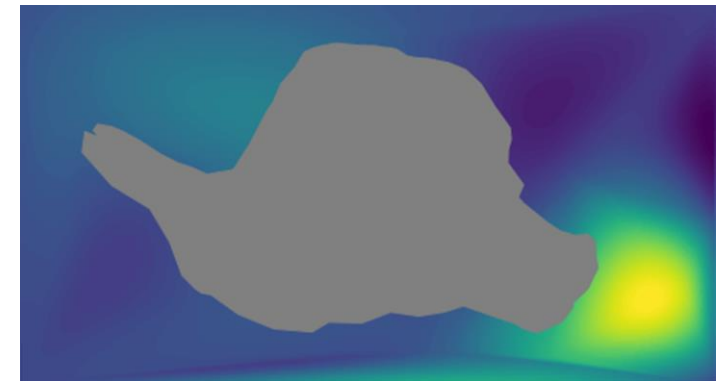


Yung-Che Tseng
(Academia Sinica)

Lin et al. (2021) Japan Geoscience Union Meeting 2021.
<https://youtu.be/EUp68fh5hTs>



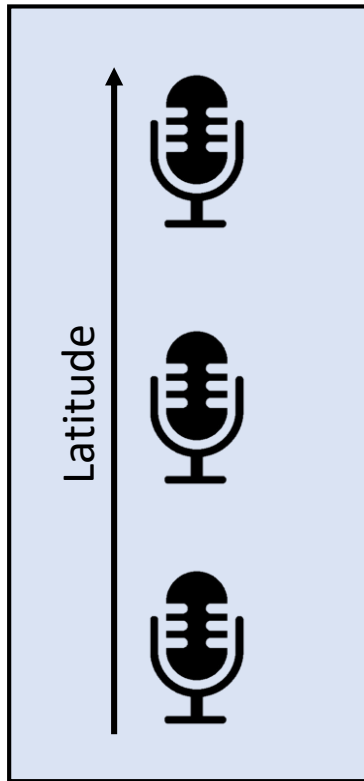
Reef sounds



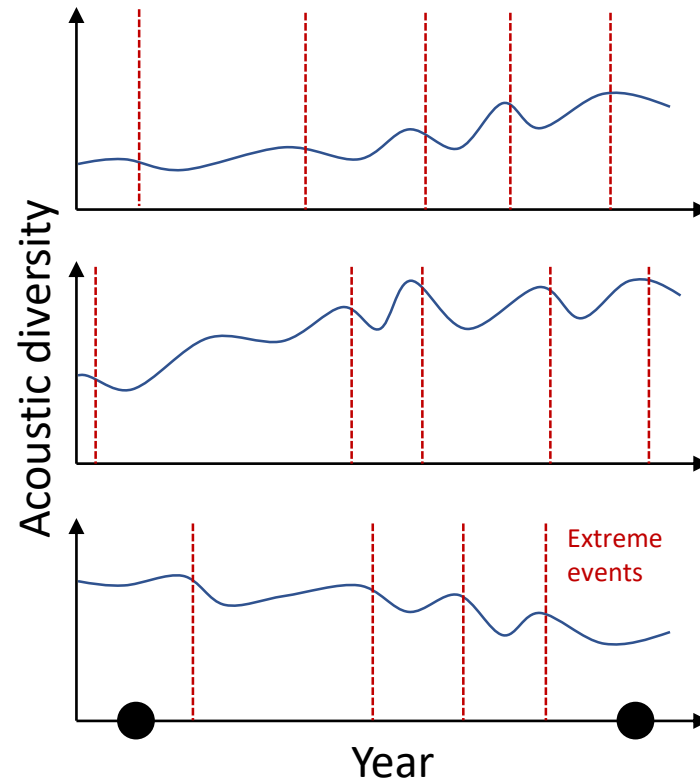
Vent sounds

Using soundscapes to assess climate change impacts

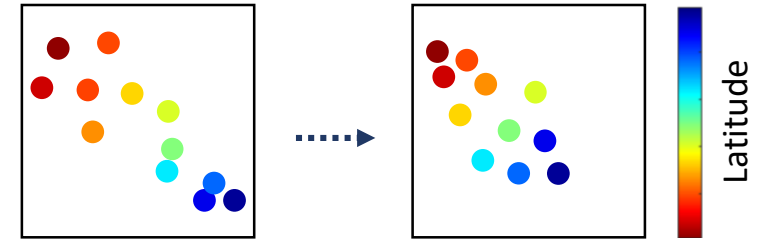
Monitoring network



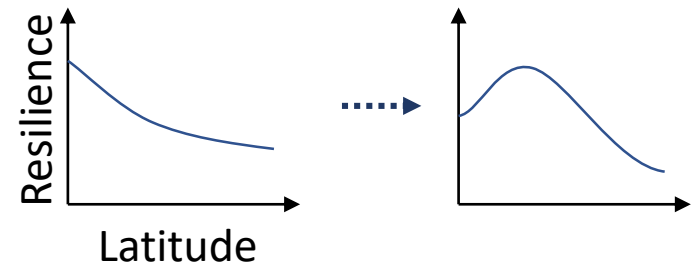
Site-specific change



Response of ecosystem diversity

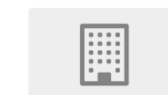
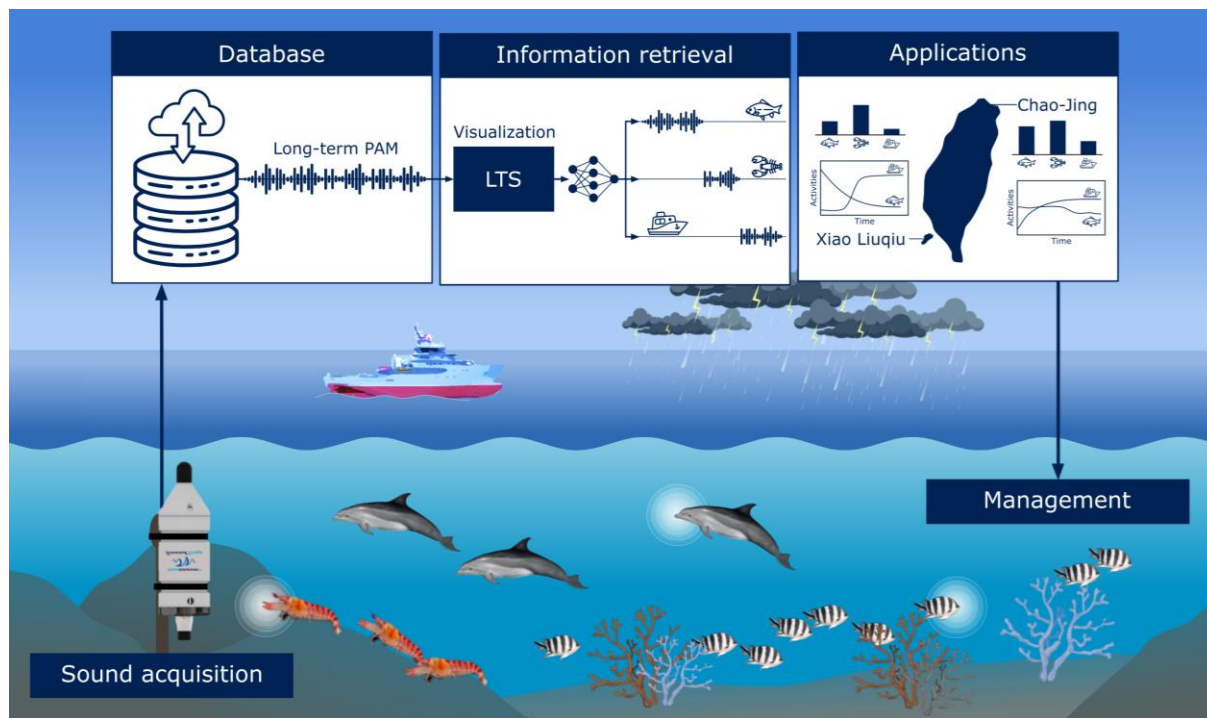


Resilience to extreme events



Ocean Biodiversity Listening Project

- Ecological applications supported by open science of soundscapes
 - Portal: <https://meil.biodiv.tw/projects/biodiversity-listening-project>
 - Open tools: https://github.com/schonkopf/soundscape_IR
 - Open data: <https://data.depositar.io/en/organization/oceanbiodiversity>



Ocean Biodiversity Listening Project

Project Website The ocean is full of sounds that are generated from geophysical events, marine animals, and human activities. By using a hydrophone (a microphone for underwater... [read more](#)

Followers Datasets

0 4

[Follow](#)

Wikidata Keywords

soundscape (4)
coral reef (1)
continental shelf (1)
Deepsea (1)
benthic zone (1)

Tags

Acoustic diversity (2)
Acoustic habitat (2)
Noise (2)
Ocean sound (2)
Remote sensing (2)

[Datasets](#) [Activity Stream](#) [About](#) [Manage](#)

[Add Dataset](#)

Search datasets...

Order by: [Relevance](#)

4 datasets found

Deep-sea soundscapes of Japan

This dataset is an archive of acoustic data associated with the deep-sea soundscapes of Japan. Python codes to visualize the audio data are also provided in a notebook based on...

[mat](#)

Coral Reef Soundscapes off Sesoko Island, Okinawa, Japan

This dataset is an archive of audio data of shallow-water and upper-mesophotic coral reefs off Sesoko Island, Okinawa, Japan. Python codes to visualize the audio data are also...

[mat](#)

Deep water soundscapes off northeastern Taiwan

This dataset is an archive of acoustic data associated with the soundscapes of a continental shelf environment off northern Taiwan. Python codes to visualize the acoustic data...

[mat](#)

Algal Reef Soundscapes at Taoyuan, Taiwan

This dataset is an archive of audio data of algal reefs at Taoyuan, Taiwan. Recording Locations Taoyuan algal reefs extend for a maximum of 450 m from the shore, and the tidal...

[CSV](#) [mat](#)

Strengths and weaknesses

- Soundscape monitoring and acoustic diversity estimation
 - Biotic sounds → Biodiversity
 - Environmental sounds → Weather events
 - Anthropogenic sounds → Human development
 - Time series and spatial variation prediction
- OBLP does not have long-term recording sites in polar regions
 - Soundscape change with sea ice cover
 - Open of Arctic shipping and its impact on marine soundscape/animals
 - Latitudinal response of marine ecosystems to climate change

Thank you!

Contact e-mail: lintzuhao@gate.sinica.edu.tw

Website: meil.biodiv.tw

