

離岸風場之水下背景噪音量測與模擬 II

執行單位

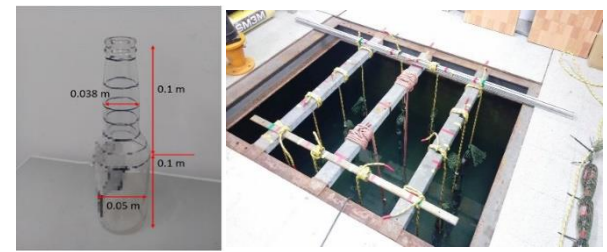
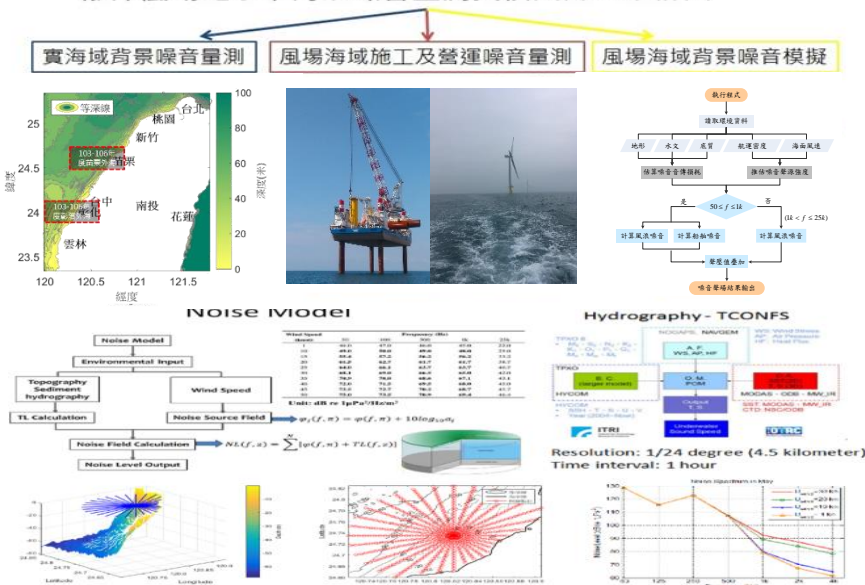
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計畫主持人

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- 本計畫目標為配合離岸風場規劃建置，針對臺灣西部海域進行水下背景噪音量測及模擬，採用同時多點量測以描述風場海域背景噪音的分佈特性，並開發模擬背景噪音位準工具作為日後風機施工之環境影響參考基準。
- 藉由分析施工噪音特性及施工前後之低頻噪音差異，作為日後離岸風機施工之環境影響評估基準，並發展西部海域風場營運後之水下背景噪音預估模式，作為離岸風力發電對水下環境影響之評估工具。
- 於開發離岸風場時基於環境永續經營之理念，研擬水下噪音減噪工法以減輕其對當地海域環境及海洋生態之干擾，期許在生態保育與再生能源開發取得平衡。

離岸風場之水下背景噪音量測與模擬計畫架構圖



- 103-105年度建立西部海域之水下背景噪音數值模式、噪音方向性模式及水下背景噪音預估模式，提供對水下噪音環境影響之評估工具，目前已將海洋模式TCONFSS整合，將針對資料與模式之差異持續進行改善。
- 106年度針對離岸風機之運轉噪音進行模擬和分析，已完成苗栗外海21號風機及28號風機近期之營運噪音量測資料初步分析，此頻段之結果與本團隊預估模擬參數相同，後續將與業者營運之相關資料相互比對。
- 103-107年度利用多組水下錄音器進行彰化與苗栗外海不同點位之量測，完成背景噪音資料之分析，並透過與典型水下背景噪音頻譜的比較，瞭解各點位之背景噪音特性。提供量化之水下背景噪音值供日後離岸風機選址參考及施工環境影響評估之基準。
- 減噪工法已於106年度12月11日成功取得中華民國新型專利(M552935)號:「水下減噪模組」，後續將在實驗水槽進行玻璃瓶幕減噪效益實驗，驗證控制減噪頻段之參數，搭配模擬軟體做比對，找出更加環保之減噪方式，降低建置風機之施工噪音對環境生態之影響。
- ◆ 103年底舉辦海域結構可靠度監測管理技術國際研討會，邀請國際知名學者將離岸風電實際經驗介紹給國內相關人士。
- ◆ 104年度五月將台灣西海岸離岸風場水下環境噪音之模擬、量測成果發表於西班牙OCEANOISE2015國際研討會，及同年度12月新加坡12th WESPAC國際研討會
- ◆ 104年度發表氣球幕之水下減噪相關成果於2015義大利熱那亞之IEEE OCEANS'15國際研討會
- ◆ 105年度發表台灣西岸水下背景噪音量測亦發表於相關成果於中國哈爾濱之IEEE/OES China Ocean Acoustics 2016。
- ◆ 105年度發表水下噪音對環境的衝擊之相關成果於2016年7月愛爾蘭都柏林之第四屆The Effects of Noise on Aquatic Life國際研討會。
- ◆ 105年度發表研究題目Noise field characterization in the habitat of the East Taiwan Strait Indo-Pacific Humpback Dolphin during the pile driving activity of demonstration offshore wind farm，於2016年11月美國夏威夷之第五屆美國聲學會議及日本聲學學會聯合會議
- ◆ 106年度五月發表< Pile Driving Noise Measurement of the First Offshore Wind Turbine in Taiwan>於 Oceanoise2017,
- ◆ 106年度六月發表<Noise Field Characterization in the Habitat of the East Taiwan Strait Indo-Pacific Humpback Dolphin during the Pile Driving Activity of Demonstration Offshore Wind Farm>於Acoustical Society of America European Acoustics Association, 2017

Measurement and Simulation of Underwater Ambient Noise in Offshore Wind Farm II

Execution Unit

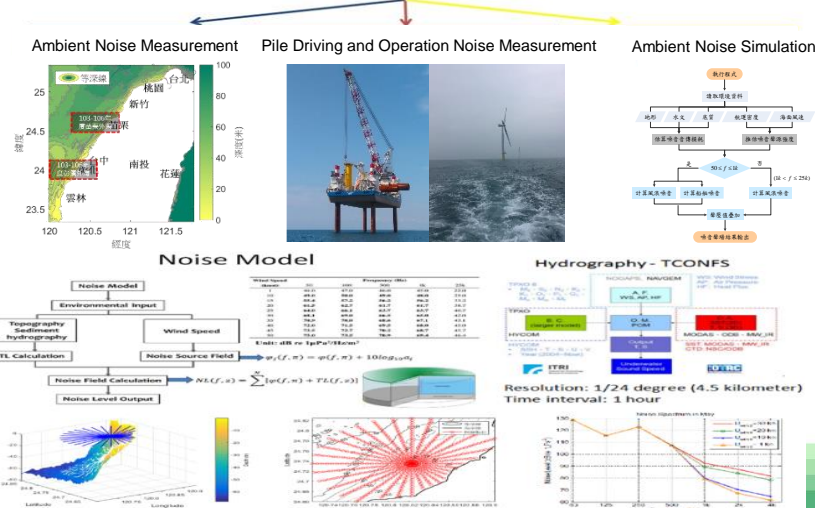
National Taiwan University

Project Director

Wei-Shien Hwang

- The objective of the project is to cooperate with the construction of offshore wind farms. Measure and simulate the underwater ambient noise in western Taiwan. And develop a simulated ambient noise level tool as a reference for the future environmental impact of wind turbines construction.
- Analyzing the different before and after pile driving construction, as a benchmark for assessing the environmental impact of offshore wind turbines constructed in the future. And to develop a prediction model of underwater ambient noise after operation of offshore wind farms in western Taiwan.
- Based on the sustainable development of the environment, studying the underwater noise mitigation method, to reduce the disturbance to the marine environment and ecology.

Process of Measurement and Simulation of Underwater Ambient Noise of Offshore Wind Farm



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- 2014-2016 Establishing a numerical model of underwater background noise in western Taiwan. The ocean model TCONFS has now been integrated and the differences between data and models will continue to improve.
- 2017 To simulate and analyze the operation noise of offshore wind turbines, we have completed the recent operation noise analysis of the 21 turbine and the 28 turbine in Miaoli, and the follow-up data will be compared with the actual operation.
- 2014-2018 Measurement of ambient noise at different points in Changhai and Miaoli areas using multiple sets of underwater tape recorders to complete the analysis of ambient noise data. Compare noise spectrum to provide quantified noise for future site selection and construction of offshore wind turbine reference.
- Noise reduction method On December 11, 2017, successfully obtained the Republic of China New Patent (M552935): "UNDERWATER NOISE MITIGATION MODULE". Follow-up will be glass bottle noise mitigation experiments to identify more environmentally friendly noise mitigation methods.
- ◆ 2014 Holding an International Symposium on "Health Monitoring and Reliability Management Technologies for Offshore Structures"
- ◆ 2015 <Underwater Soundscape along West Coast of Taiwan> OCEANNOISE,2015,Spain
<Measurement and Simulation of Underwater Sound in Offshore Wind Farm Sites along Western Coast of Taiwan>WESPAC,2015,
<Noise Mitigation with Balloon Arrays during Pile Driving Activities in the Underwater Environment > IEEE OCEANS'15,Italy
- ◆ 2016 <Environmental Impact Study Concerning Underwater Noise in Taiwan> IEEE/OES China Ocean Acoustics 2016,China
<Environmental Impact Study Concerning Underwater Noise in Taiwan>The Effects of Noise on Aquatic Life 2016,Ireland
<Noise field characterization in the habitat of the East Taiwan Strait Indo-Pacific Humpback Dolphin during the pile driving activity of demonstration offshore wind farm>American Acoustics Conference and Japan Acoustics Conference,2016,USA
- ◆ 2017 < Pile Driving Noise Measurement of the First Offshore Wind Turbine in Taiwan> Oceanoise2017
<Noise Field Characterization in the Habitat of the East Taiwan Strait Indo-Pacific Humpback Dolphin during the Pile Driving Activity of Demonstration Offshore Wind Farm>Acoustical Society of America European Acoustics Association, 2017