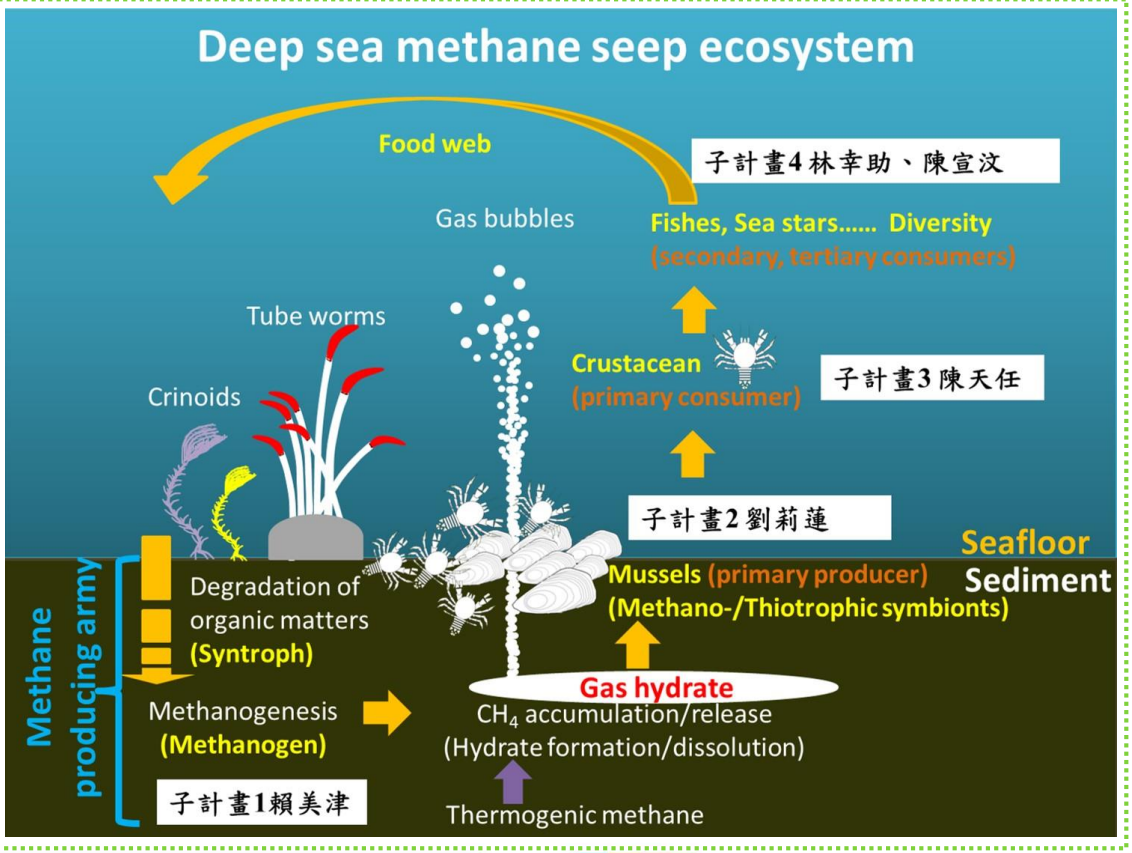
天然氣水合物對於深海生物多樣性之影響評估II

執行單位	國立中興大學	計畫主持人	賴美津

- **計畫目標:**本計畫擬釐清天然氣水合物賦存區之天然氣水合物與當地深海生物群聚多樣性和生態系功能之間關係，以期能評估天然氣水合物資源開發，對深海生物群聚與生態系功能之可能衝擊影響，並研擬規劃後續開發之長期監測計畫。

圖片說明:
深海天然氣水合物賦存區冷泉生態系之微生物作用、化合共生機制、底棲生物與大型游走生物營養互動與各子計畫主題示意圖。於深海底泥之有機物經甲烷古菌共棲微生物降解後成甲烷古菌進行甲烷化作用的碳源，產生的甲烷為甲烷水合物主要的甲烷來源(子計畫一研究主題)；甲烷冷泉區域的主要生產者為具嗜甲烷或硫共生菌之冷泉貽貝(子計畫二研究主題)；而鎧甲蝦等甲殼類為常見的冷泉初級消費者(子計畫三研究主題)；往上更高食物鏈階層與整個冷泉生態系及周緣生態系的生態系統中生物量的生成、利用與流動進行各子計畫間的關聯與整合(子計畫四研究主題)。

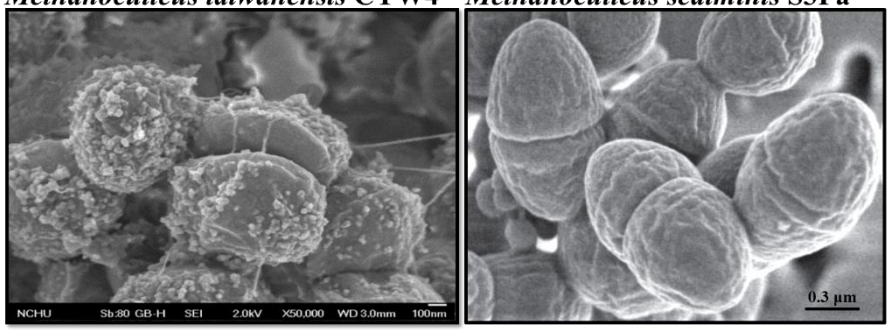


天然氣水合物對於深海生物多樣性之影響評估II

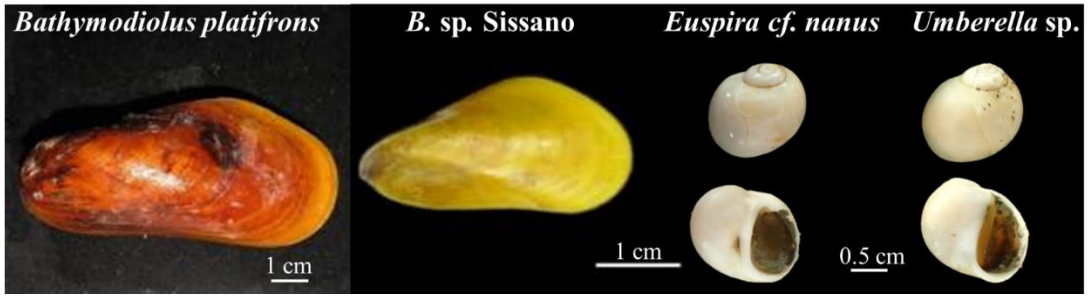
台灣西南海域天然氣水合物棲地生物多樣性之調查結果

- **甲烷古菌的多樣性**

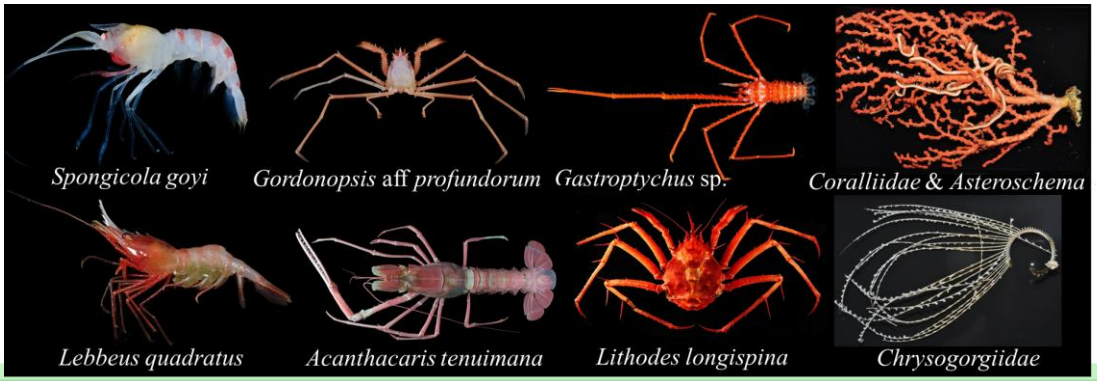
Methanoculleus taiwanensis CYW4^T *Methanoculleus sediminis* S3Fa^T



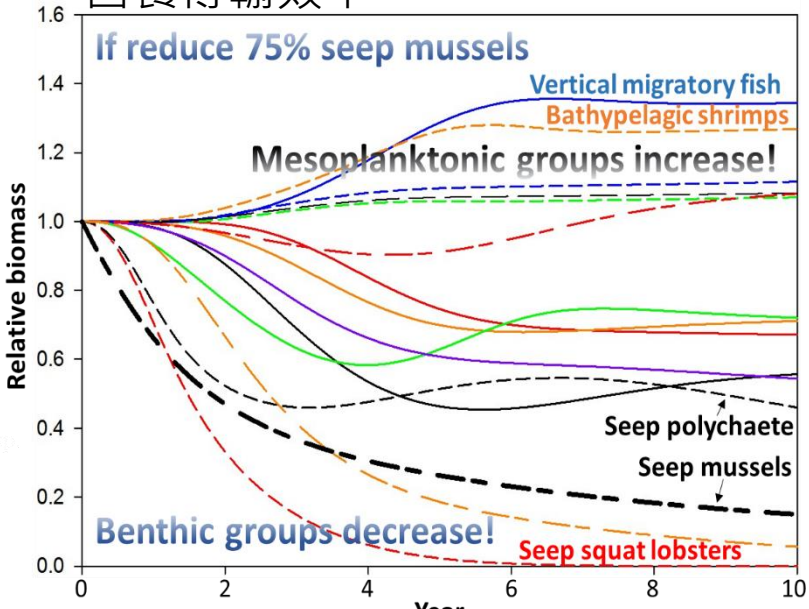
- **螺貝類多樣性:**



- **甲殼類與棘皮動物多樣性:**



- **目前水合物開發之生態評估主要成果:**未考量冷泉區面積大小與冷泉底內動物的前提下，Ecopath with Ecosim模擬顯示冷泉貽貝生物量的降幅於水合物開採十年後不超過50%，則對於系統總能量與群集組成不會有明顯變動。此結果支持中度開採干擾使生態系成熟度上升，最終還能提升平均營養傳輸效率。



The biodiversity and ecosystem functions in deepsea gas-hydrate habitats II

Execution Unit	National Chung Hsing University
Project Director	Lai, Mei-Chin

- The study is aimed to investigate biological compositions and trophic relationships of benthic megafauna at the methane seep and surrounding ecosystems of deep oceans offshore SW Taiwan for further environmental impact assessment.

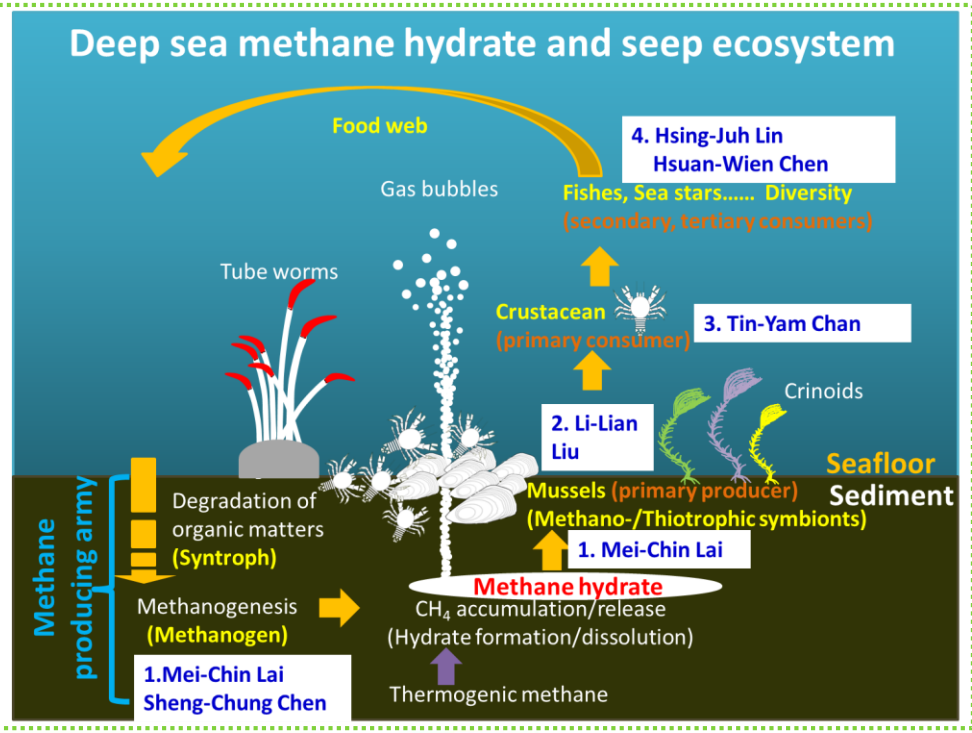
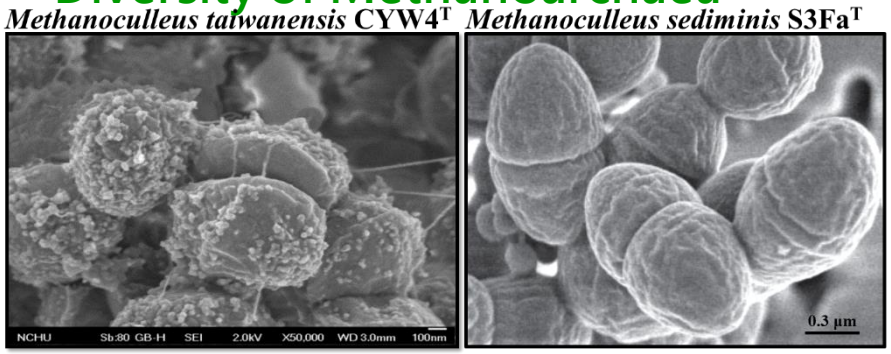


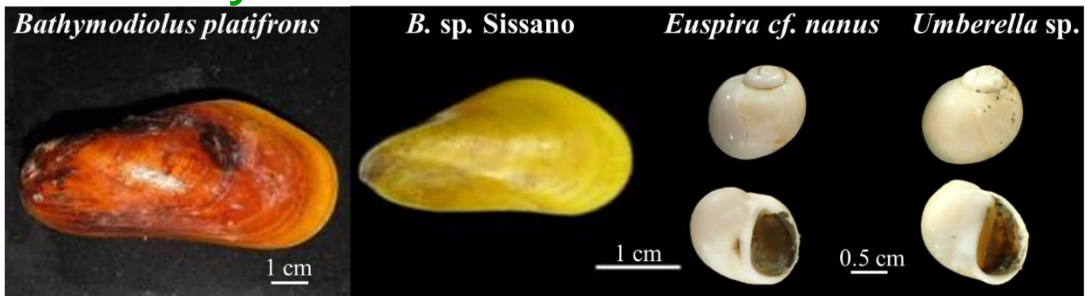
Figure: Illustration of the placements of four subprojects in the deep sea methane hydrate habitat and cold seep ecosystem.

The biodiversity and ecosystem functions in deepsea gas-hydrate habitats II

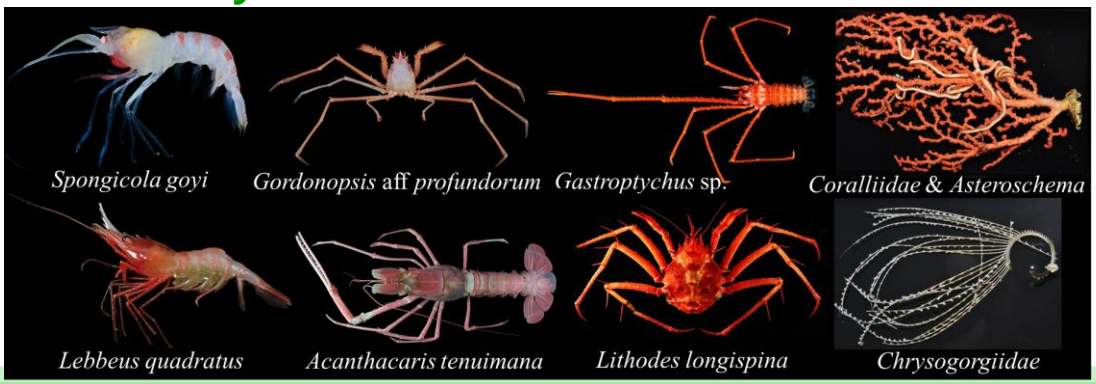
- **Diversity of Methanoarchaea**



- **Diversity of Mussels and Naticidae**



- **Diversity of Crustaceans & Echinoderms**



- **Preliminary result of assessing the anthropogenic impact on deep-sea methane seep ecosystem.**

Our simulations suggested the overall system energy, biomass, cycling but not stability indices were affected considerably when >50% of mussel biomass was depleted. Although our preliminary results indicated the isolation nature of cold seep ecosystem, the local impact of methane gas-hydrate exploration remains to be carefully assessed and monitored.