

**O40.6****Intertidal habitat monitoring using Earth Observation data and Machine Learning techniques - TEMITH Project**

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**Abstract**

Mudflats, seagrasses, and saltmarshes are ecologically and economically valuable intertidal habitats, however, globally they are in decline due to numerous stressors, such as overexploitation, physical modification, and pollution. Achieving total ecosystem management (TEM) to support conservation and sustainable exploitation of the intertidal ecosystem requires extensive habitat monitoring and assessment of pressures, however, budgets for conservation and management are often limited and relevant data may not be collected or may be difficult to access or visualise in a holistic way. The Total Ecosystem Management of the InterTidal Habitat (TEMITH) project, a collaboration between Deimos Space UK and the University of Portsmouth, explored the feasibility of using Earth Observation data and artificial intelligence to facilitate the assessment of key pressures in the intertidal zone. The heavily protected, yet heavily exploited, Solent region on the south coast of England was used as a case study. Convolutional neural network (CNN) models were trained to achieve detections of three key sediment disturbance activities (bait digging, shellfish dredging, and boating) from drone and aerial imagery and from high resolution satellite imagery. Models were developed for the detection of algal mats, which can indicate nutrient enrichment, as well as seagrass and saltmarsh (intertidal vegetation of conservation importance) from high resolution satellite imagery (CNNs) and from Sentinel-2 imagery (Random Forest model). Feedback from prospective end users in an external Evaluation Workshop highlighted the relevance of the TEMITH outputs and the potential to achieve a more holistic overview (spatial/temporal) of the detected features with further development of the TEMITH services. TEMITH concluded in 2020, however further development of the algorithms is being taken forward under new pathways in 2021.

**Keywords**

Earth Observation, Machine Learning, Intertidal Habitats