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The effect of experimental warming on the resistance of salt-marsh vegetation to hydrodynamic forcing

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Facing the consequences of climate change like sea level rise and an intensified storminess, salt marshes will play an increasingly important role in future coastal protection. The vegetation of salt marshes contributes significantly to the protection function as the plants reduce erosion and act as obstruction to hydrodynamic forces resulting in wave attenuation. Yet, how other global change factors such as higher temperatures will affect salt marshes and their potential to protect our coasts against high wave intensities, e.g. during storm surges, is largely unknown.

In a world-unique whole ecosystem warming experiment (MERIT) we increased air and soil temperature in a salt marsh at the German North Sea coast. Here, we aimed to examine effects of warming on plant characteristics critical for withstanding hydrodynamic forces. Besides quantifying biomechanical and biochemical properties, that are known to affect plant rigidity, we additionally measured spectral reflectance to assess the NDVI of the canopy. This was done to quantify the expected shifts in the growing season due to warming (i.e. earlier green-up in spring and/or delayed senescence in autumn) that would possibly coincide with the storm surge season in NW European salt marshes. Results of this study will contribute to a better understanding of future marsh resilience and wave attenuation capacity in a warmer world.