



## **Twin Experiment Study Using a Discretized Adjoint Model for SWAN**

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The SWAN wave model solves the spectral action balance equation and is widely used to produce forecasts and event-specific wave climatologies. Walker (2006) achieved some success in tests with a simplified analytical adjoint to SWAN. However, its application to data assimilation was limited to stationary conditions and did not account for waves generated by winds or non-linear interactions (e.g., Veeramony et al., 2010).

To overcome these deficiencies, a numerical adjoint is being developed that will directly reflect the properties of the discretized forward SWAN model, including non-linear interactions, depth-limited breaking, and non-stationary conditions. This presentation describes the initial stages of the project, focusing on the creation and evaluation of a simplified numerical adjoint framework limited to stationary conditions and small nearshore domains. The assimilation system will be tested with a twin experiment – the full SWAN model will be used to simulate observations in a idealized domain and the assimilation system will be used recover the boundary conditions used by the full SWAN model. The results will be compared to those from the Walker (2006) analytical adjoint.

### References:

Veeramony, J., D. Walker, and L. Hsu (2010). A variational data assimilation system for nearshore applications of SWAN. *Ocean Modelling*, doi:10.1016/j.ocemod.2010.07.008, in press.

Walker, D.T. (2006). Assimilation of SAR imagery in a nearshore spectral wave model. Tech. Rep. 200236, GDAIS.