Geophysical Research Abstracts
Vol. 21, EGU2019-6060-1, 2019
EGU General Assembly 2019

Utilizing Generative Models to Predict High-Resolution Bathymetry

Benjamin Phrampus (1), Warren Wood (2), Jeffrey Obelcz (3), and Taylor Lee (2)

(1) ASEE Postdoctoral Research Fellow, US Naval Research Laboratory, Stennis Space Center, MS, United States (benajmin.phrampus.ctr@nrlssc.navy.mil), (2) US Naval Research Laboratory, Stennis Space Center, MS, United States, (3) NRC Postdoctoral Research Fellow, US Naval Research Laboratory, Stennis Space Center, MS, United States

With recent development of novel algorithms and the increased availability of high-performance computing, deep learning techniques have become attractive to earth science researchers for their performance in learning features from high resolution datasets. Several new methods have been developed, including Generative Models (GMs) such as Generative Adversarial Networks, to create intelligent models that determine features and augment large-scale datasets. In this research, we use GMs in two different methods to predict bathymetry at ∼100m resolution, comparable to multibeam echo sounders (MBES). (1) We train a model over a region where we have both marine gravity data from satellite altimetry and high-resolution MBES. This model is then used to predict high-resolution bathymetry in regions where only gravity derived altimetry exists. (2) We also apply a "void-filling" model to generate semantically plausible data between MBES recordings and fill data gaps. These methods represent a generic proof of concept that establish GMs and other deep learning models as viable methods in predicting unobserved high-resolution bathymetry. Future endeavors include extending these methods to global predictions, predicting quantities other than bathymetry, and adding additional input layers from various data sources to improve predictions.