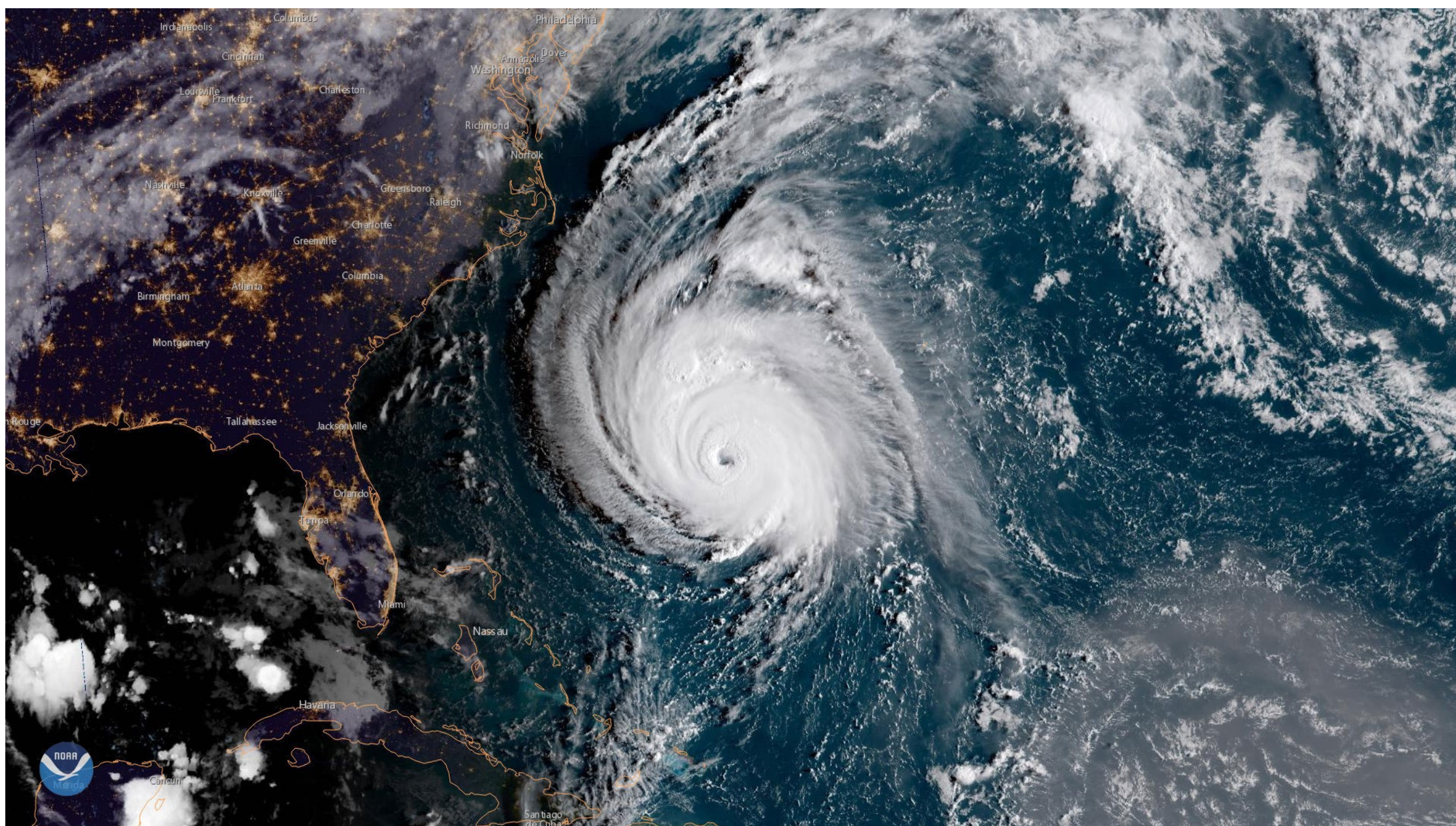




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How to rock the Earth without an earthquake?



In addition to earthquakes, seismometers record ground motions generated by various environmental surficial processes, the ocean, the atmosphere, and anthropogenic activities, and the continuous seismic records are mainly these non-earthquake signals. However, these signals are complex and difficult to interpret, leaving their source mechanisms poorly understood. Therefore, these signals are often considered as noise and have received limited observational or theoretical attention. Here, using ten years of continuous records from more than 2000 seismic stations spanning the whole U.S. continent and a novel surface wave detection method, we identify and locate various unusual environmental seismic sources. In this seminar, I will show the discovery of abundant submarine landslides in the Gulf of Mexico. Specifically, we find 85 previously unknown submarine landslides in the Gulf of Mexico. Ten of the 85 landslides occurred spontaneously without preceding earthquakes, while the remaining 75 occurred nearly instantaneously after the passage of surface waves from distant earthquakes, and hence were likely dynamically triggered by the earthquakes. I will also discuss a newly discovered geophysical phenomenon - stormquakes, involving the coupling of the atmosphere-ocean and solid Earth. We discovered that large storms such as hurricanes and Nor'easters can excite coherent transcontinental seismic surface waves as large as those excited by M3.5 earthquakes. These stormquakes are fundamentally different from previously reported atmosphere-ocean-solid Earth couplings that produce incoherent seismic noise. These discoveries suggest the richness of the continuous seismic wavefield and hint future research directions.