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# Ocean-Atmosphere Observations and Key Results from the 2021-2023 Atlantic Hurricane Saildrone Missions

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During the 2021-2023 Atlantic hurricane seasons, 24 Saildrone uncrewed surface vehicles (USVs) were deployed in the western Atlantic Ocean, Caribbean Sea, and Gulf of Mexico to collect ocean-atmosphere data within hurricane eyewalls. Sixteen different USVs intercepted tropical storms and hurricanes a total of 26 times, all with sustained wind measurements of at least tropical storm force (34 kt). Four USVs measured sustained hurricane-force winds (64+ kt) in the eyewalls of Hurricanes Sam (2021), Fiona (2022), Idalia (2023), and Lee (2023). An important advantage of the USVs compared to other observing platforms is that they can be actively steered into the paths of hurricanes and record data continuously during eyewall transects, enabling new insights into air-sea interaction processes in extreme conditions. This presentation gives an overview of the key observations and scientific results from the 2021-2023 missions. Direct measurements of the air-sea momentum flux and drag coefficient (Cd) from the USVs' 20-Hz wind data show a distinct peak in Cd at wind speeds of around 40-50 kt and then a decrease and leveling off as winds approach 80 kt. These results extend findings from previous studies with direct covariance flux measurements, which were limited to winds of less than 50 kt. Measurements from the USVs also show diminished surface ocean cooling under the cores of Hurricanes Sam and Idalia due to strong upper-ocean salinity stratification, emphasizing the importance of salinity observations in the western Atlantic and Gulf of Mexico for potential improvements in hurricane intensity prediction.