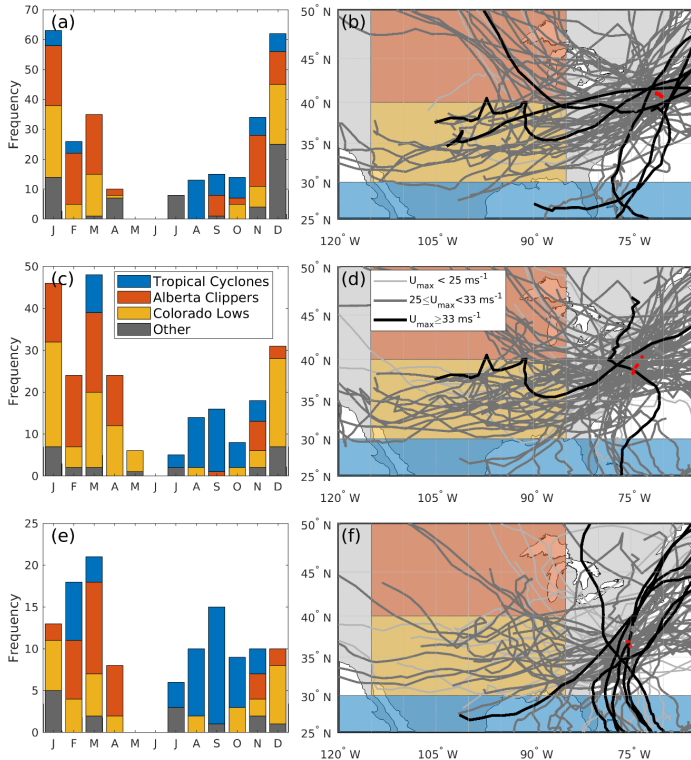


Extreme wind & waves along the U.S east coast



Seasonality of annual maximum wind events for each three locations along with U.S. east coast associated with Tropical Cyclones (TC) (blue), Alberta Clippers (AC) (red), Colorado Lows (CL) (yellow) and 'other' (grey). Storm tracks associated with annual maximum wind speeds at 100 m within the 40 year record where the shade of grey encodes the value (darkest denoting wind speeds in excess of 33 ms^{-1})

Barthelmie R.J., Dantuono K., Renner E., Letson F.W. and Pryor S.C. (2021): Extreme wind and waves in U.S. east coast offshore wind energy lease areas. *Energies* 14 1053 doi: 10.3390/en14041053.

Scientific Achievement

We identify meteorological causes of extreme wind and waves along the U.S. east coast and develop robust estimates of long-return period wind and waves. Annual maximum wind speeds and waves frequently derive from the same cyclone source and often occur within a 6 hour time interval, leading to high joint extreme loading on coastal infrastructure including offshore wind turbines.

Significance and Impact

Coastal infrastructure is vulnerable to the occurrence of extreme wind and wave events. Here we quantify the meteorological causes of extreme wind and waves, their co-occurrence and quantify low probability, long-return period wind and waves that are used in engineering applications for the U.S. east coast.

Research Details

This analysis employs 40 years of ERA5 reanalysis output a cyclone tracking algorithm and Generalized Extreme Value distribution approaches.