The distribution of wind speed is usually well-fit by a Weibull distribution (See Panoksky and Dutton, p 332).

\[ p(U) = \frac{b}{a} \left( \frac{U}{a} \right)^{b-1} \exp\left[ -\left( \frac{U}{a} \right)^b \right] \]

The mean and standard deviation are given by:

\[ \bar{U} = a\Gamma(1 + 1/b) \]

\[ \sigma_u = a\left[ \Gamma(1 + 2/b) - \Gamma(1 + 1/b)\Gamma(1 + 1/b) \right] \]

The recent paper [Monahan, J. CLIM vol 19, 497-520, 2006] gives more information than you could possibly want about oceanic wind distributions. He shows that in the Southern Ocean region, \( b = 3 \); thus \( a = 1.11\bar{U} \) and \( \sigma_u = \bar{U}/3 \). On an annual average, \( \bar{U} \) is about 11 m/s but I guess it might be lower in December-February.

One handy property of the Weibull distribution is the cumulative probability that \( U \) exceeds some selected threshold, \( U' \), is simply

\[ \Pr (U > U') = \exp\left[ -\left( \frac{U'}{1.1\bar{U}} \right)^b \right] \]

For example, suppose we select a region where \( \bar{U} = 10 \) m/s. Then there is about a 50% probability \( U \) will exceed 10 m/s, a 9.3% \( U \) will exceed 15 m/s and a 0.36% probability \( U \) will exceed 20 m/s. Thus, if you are in the region 30 days you can expect about 67 hours with \( U \) exceeding 15 m/s and 3 hours with \( U \) exceeding 20 m/s. I think this would be a good experiment, but it might be nice to have a little higher wind speeds.

The Atlantic wind speed boxes we have now don’t quite tell us enough. Perhaps we need average wind speed and std for the entire Dec-Feb ensemble (all years). Or perhaps, instead of mean wind speed, the probability that \( U \) exceeds 15 m/s?

Anyway, food for thought.