BOEM
Bureau of Ocean Energy Management

Wind Resource Analysis

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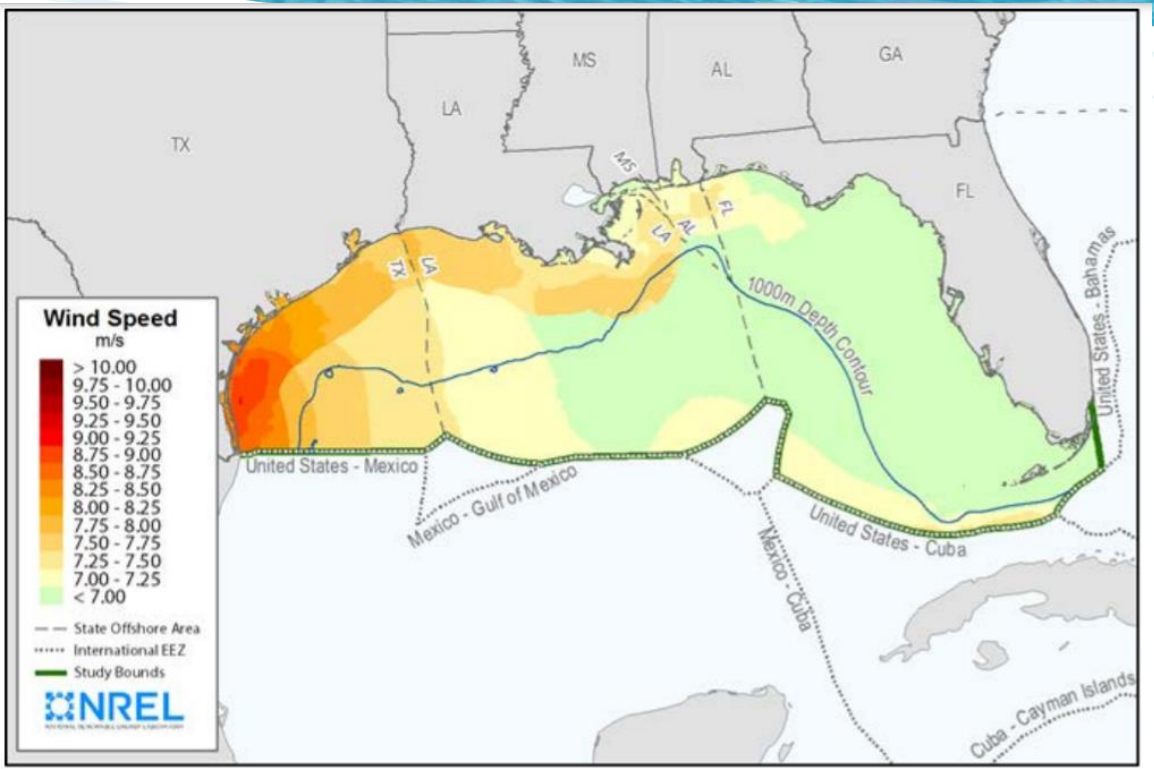
Gulf of Mexico Region Task Force Meeting

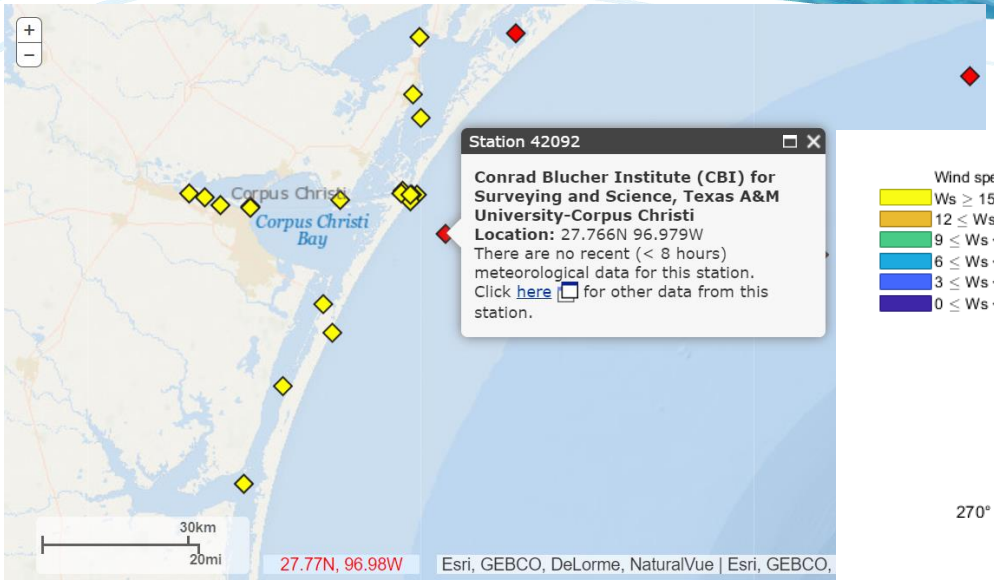
June 15, 2021

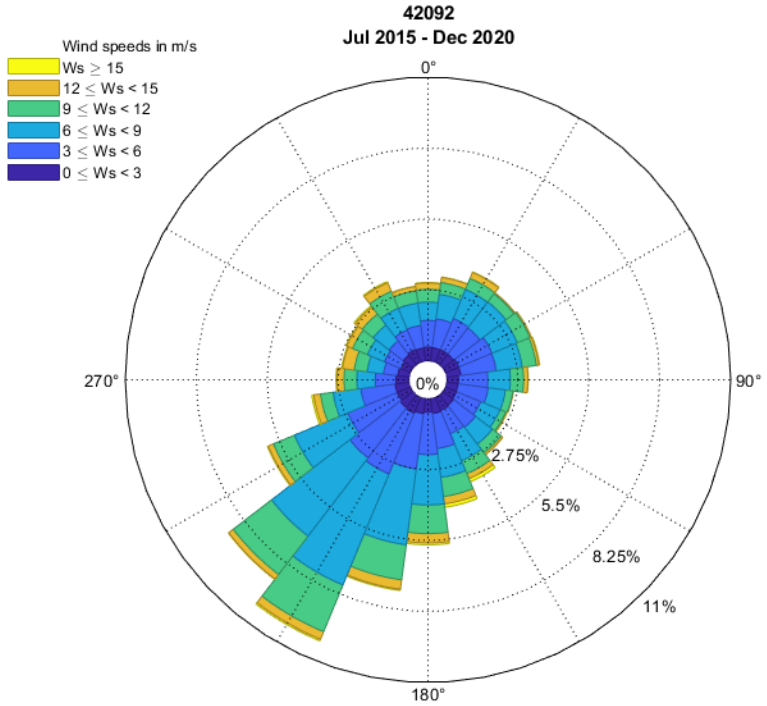
Available Wind Resource

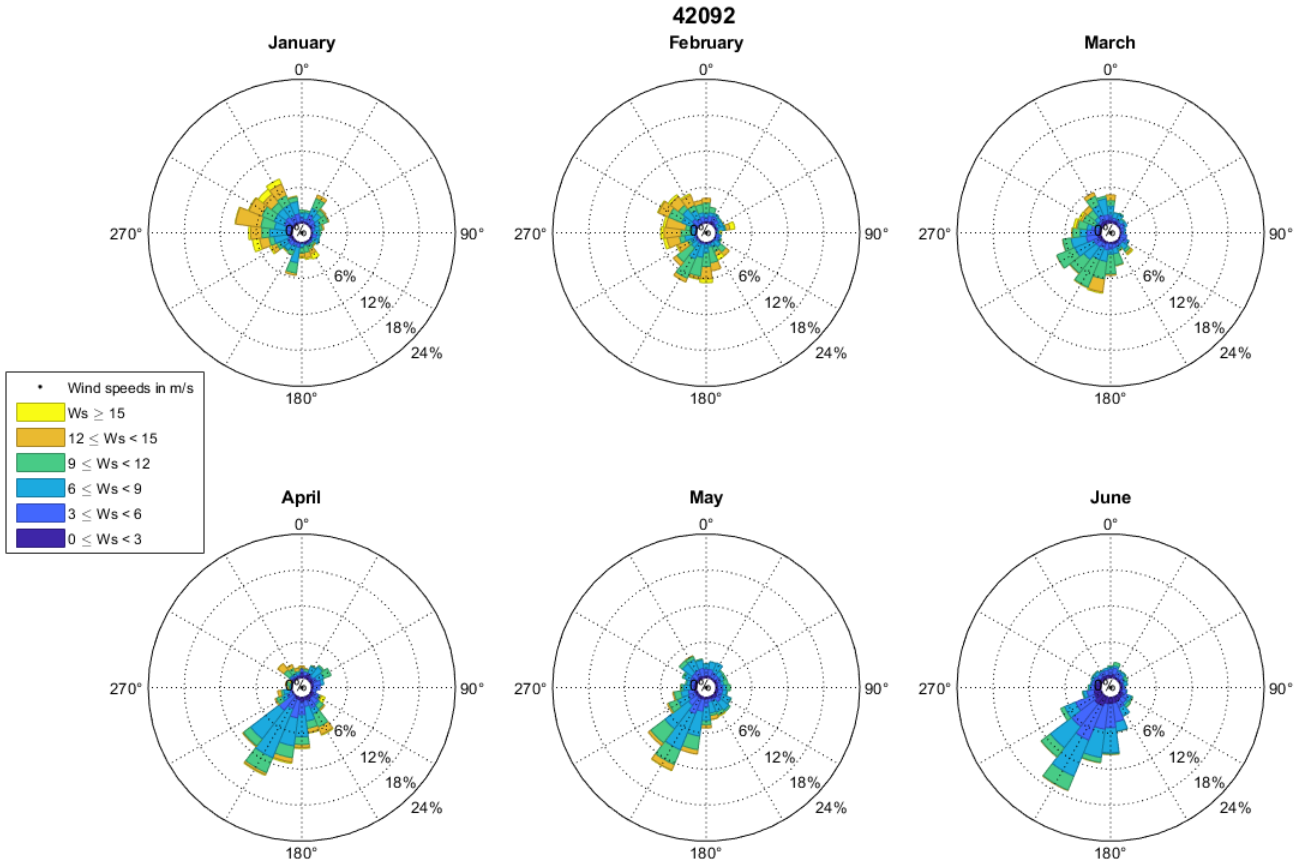


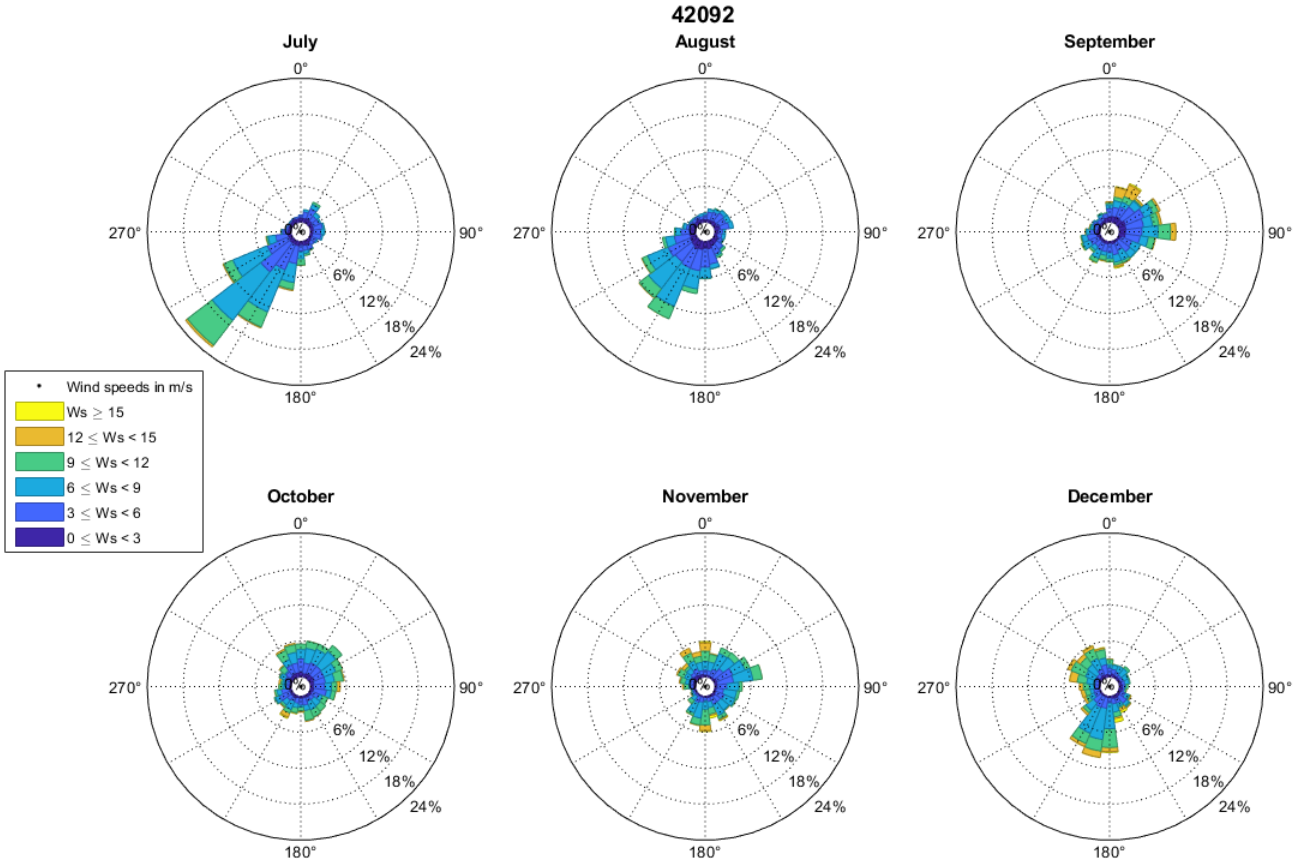
Musial W, Tegen S, Driscoll R, Spitsen P, Roberts O, Kilcher L, Scott G, and Beiter P (National Renewable Energy Laboratory and the Alliance for Sustainable Energy, LLC, Golden, CO). 2019. Survey and assessment of the ocean renewable resources in the US Gulf of Mexico. New Orleans (LA): Bureau of Ocean Energy Management. Contract No.: M17PG00012. Report No.: OCS Study BOEM 2020-017.

Normal Site Conditions – Western Gulf

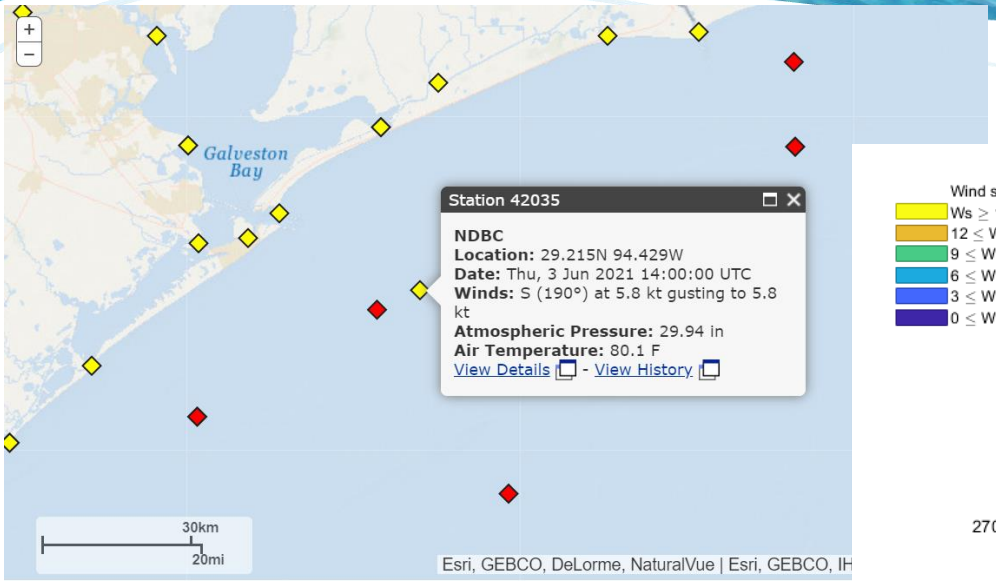


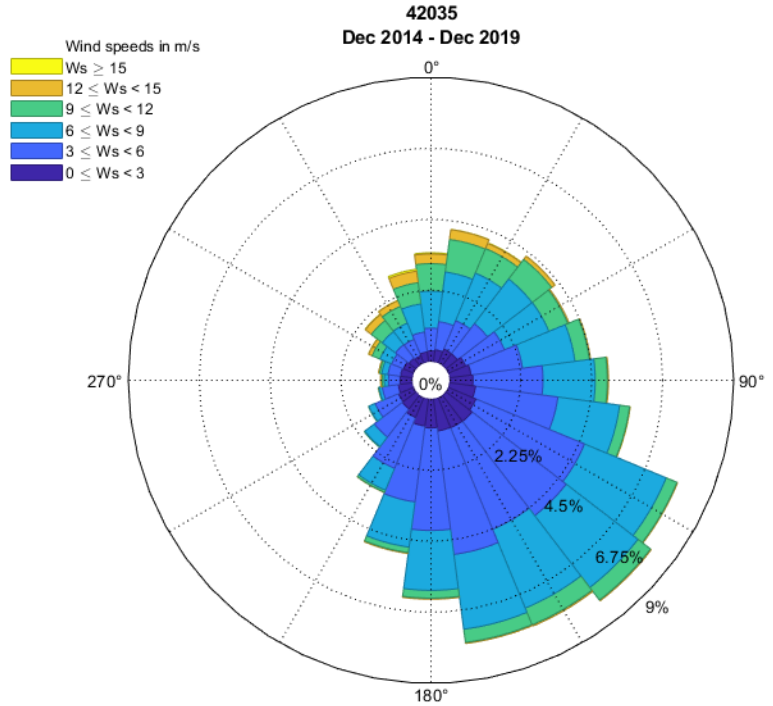


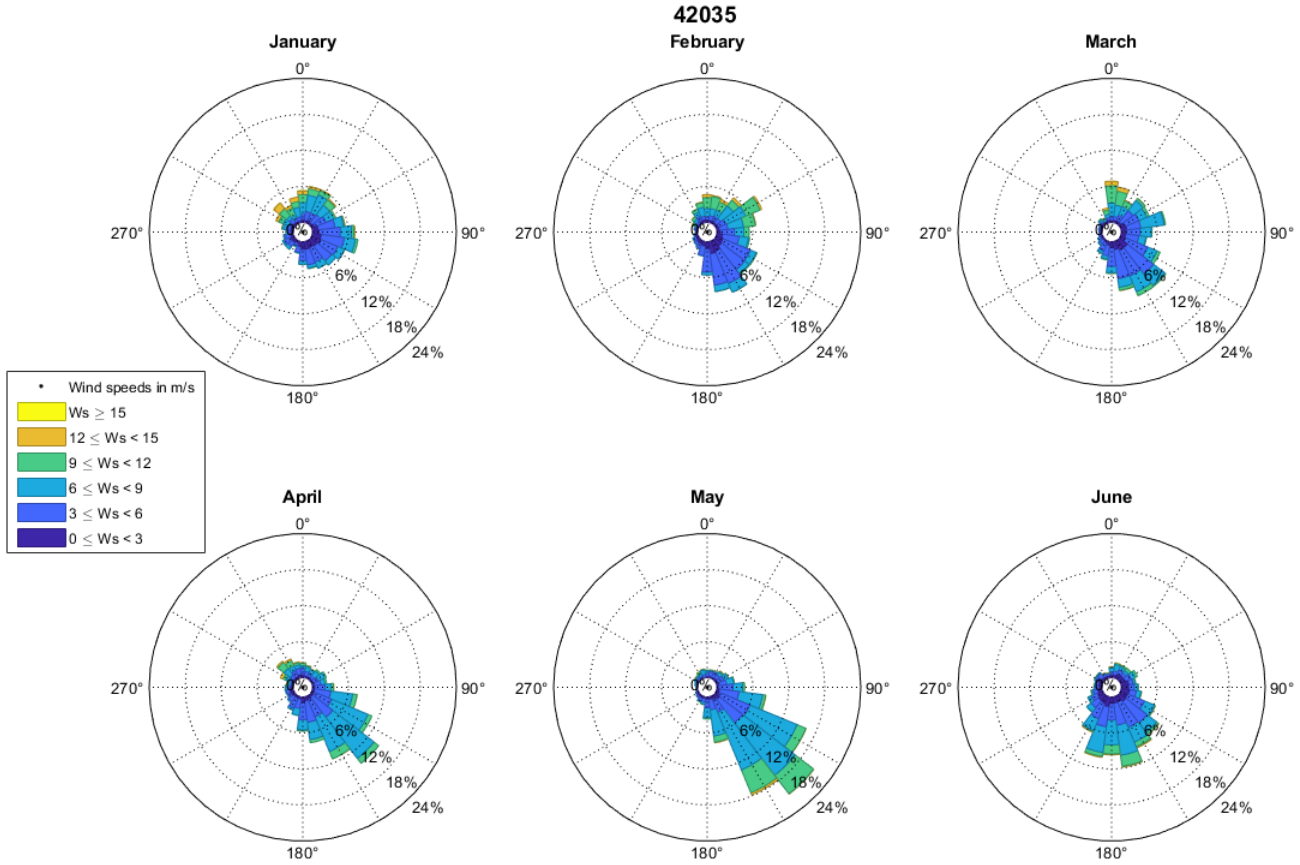

42092
January
February
March
April
May
June
0°
90°
180°
270°
6%
12%
18%
24%
Wind speeds in m/s
Ws ≥ 15
12 ≤ Ws < 15
9 ≤ Ws < 12
6 ≤ Ws < 9
3 ≤ Ws < 6
0 ≤ Ws < 3

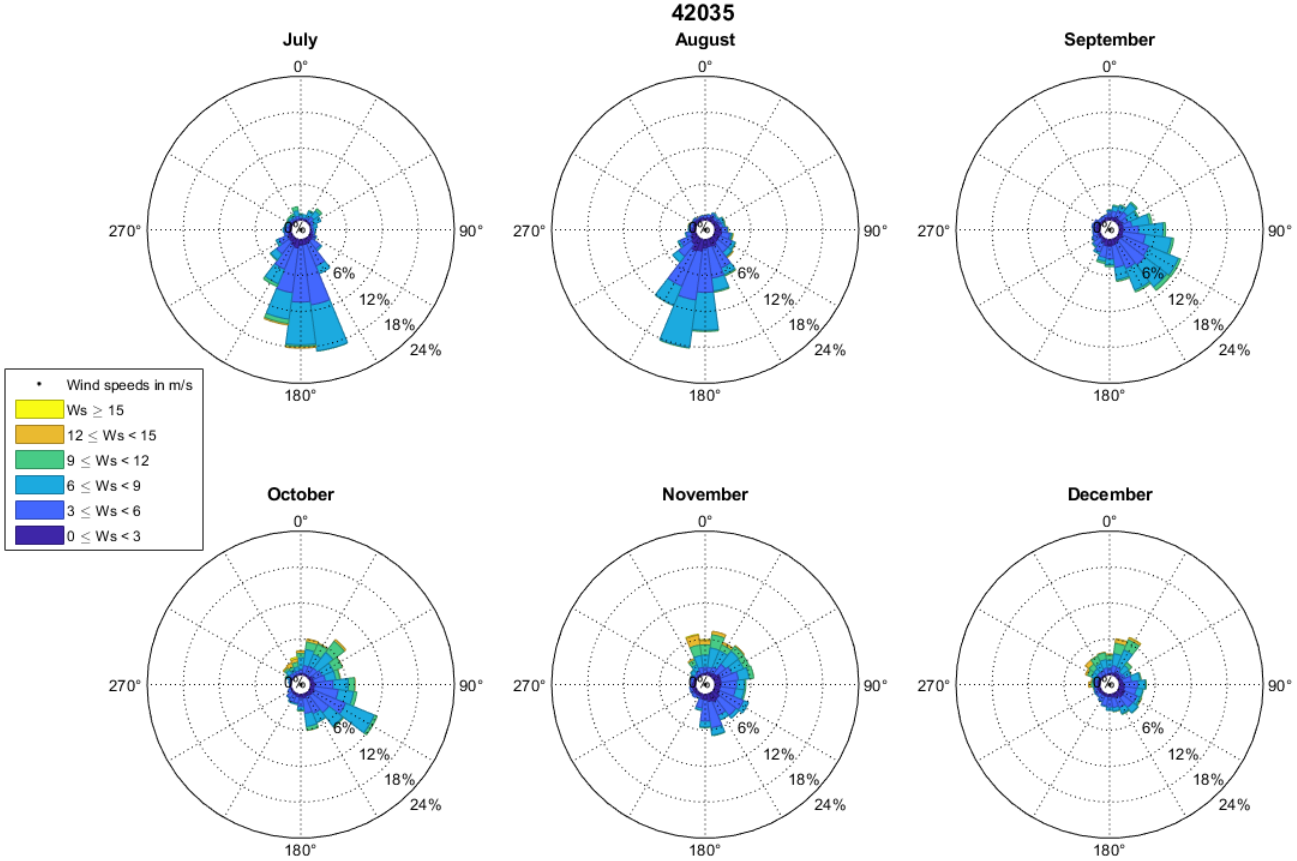

42092
July
August
September
October
November
December
0°
90°
180°
270°
6%
12%
18%
24%
Wind speeds in m/s
Ws ≥ 15
12 ≤ Ws < 15
9 ≤ Ws < 12
6 ≤ Ws < 9
3 ≤ Ws < 6
0 ≤ Ws < 3

Normal Site Conditions – Central Gulf

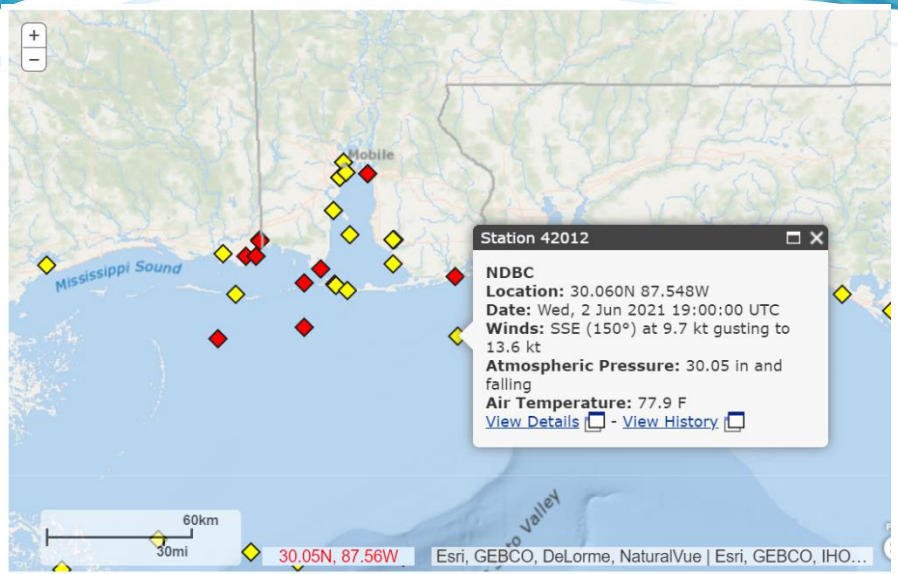


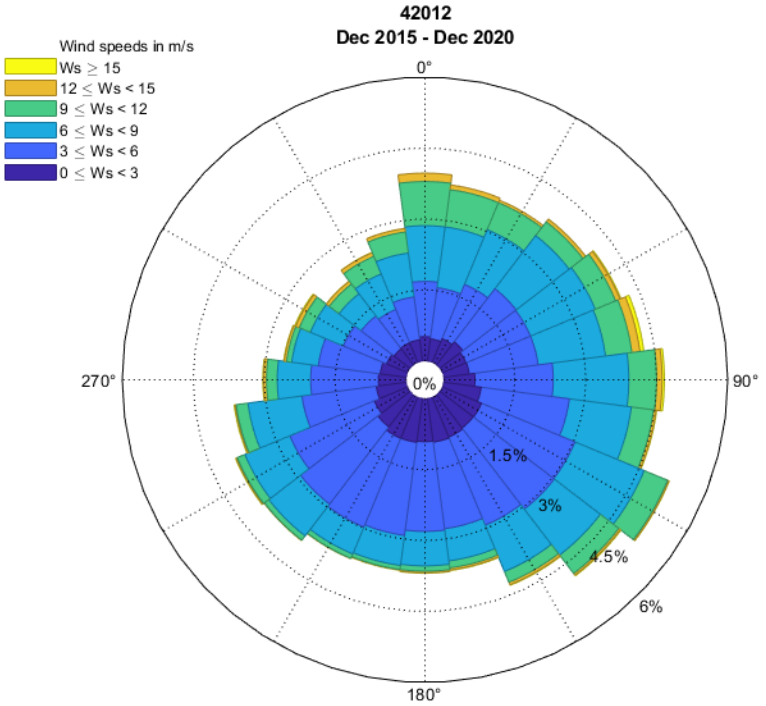


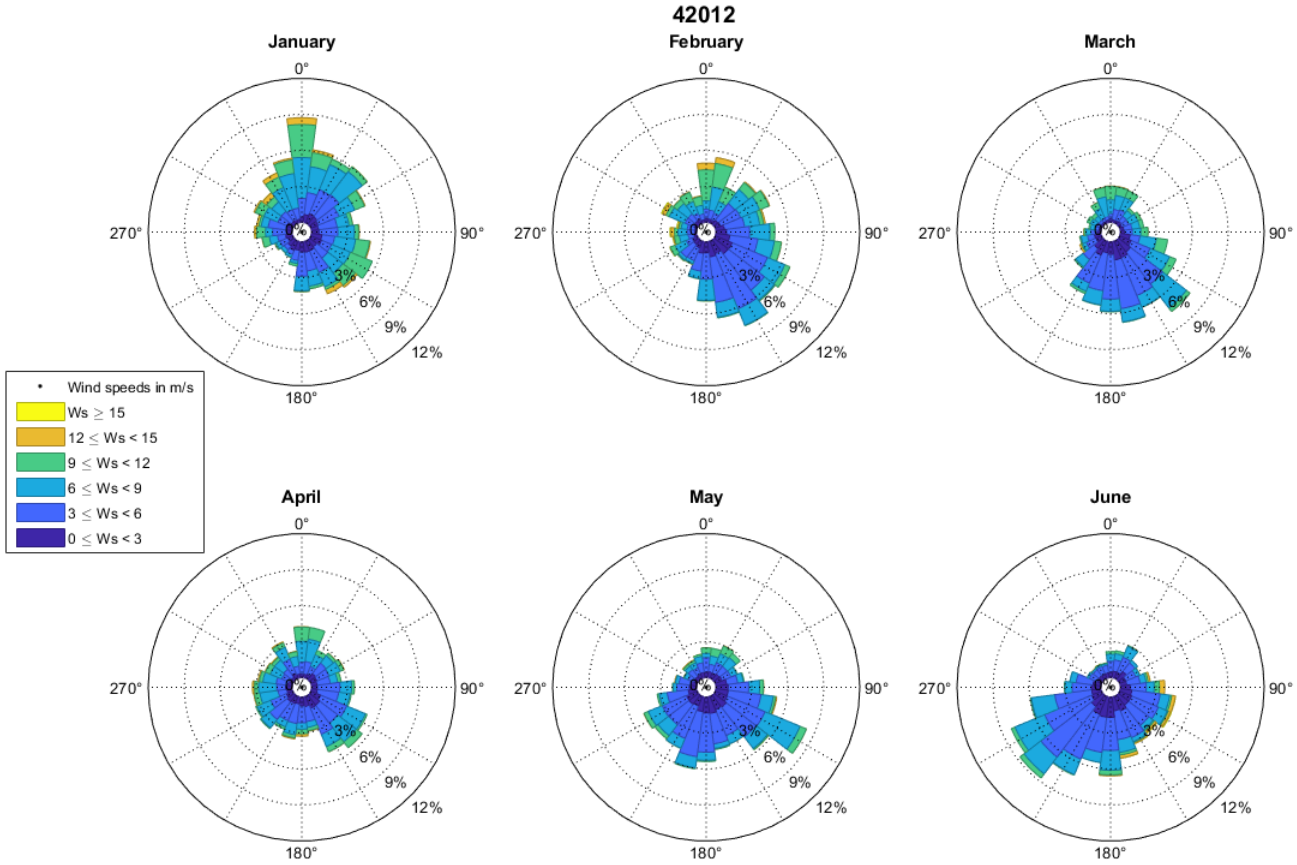

42035
January
February
March
April
May
June
0°
90°
180°
270°
0%
6%
12%
18%
24%
Wind speeds in m/s
Ws ≥ 15
12 ≤ Ws < 15
9 ≤ Ws < 12
6 ≤ Ws < 9
3 ≤ Ws < 6
0 ≤ Ws < 3

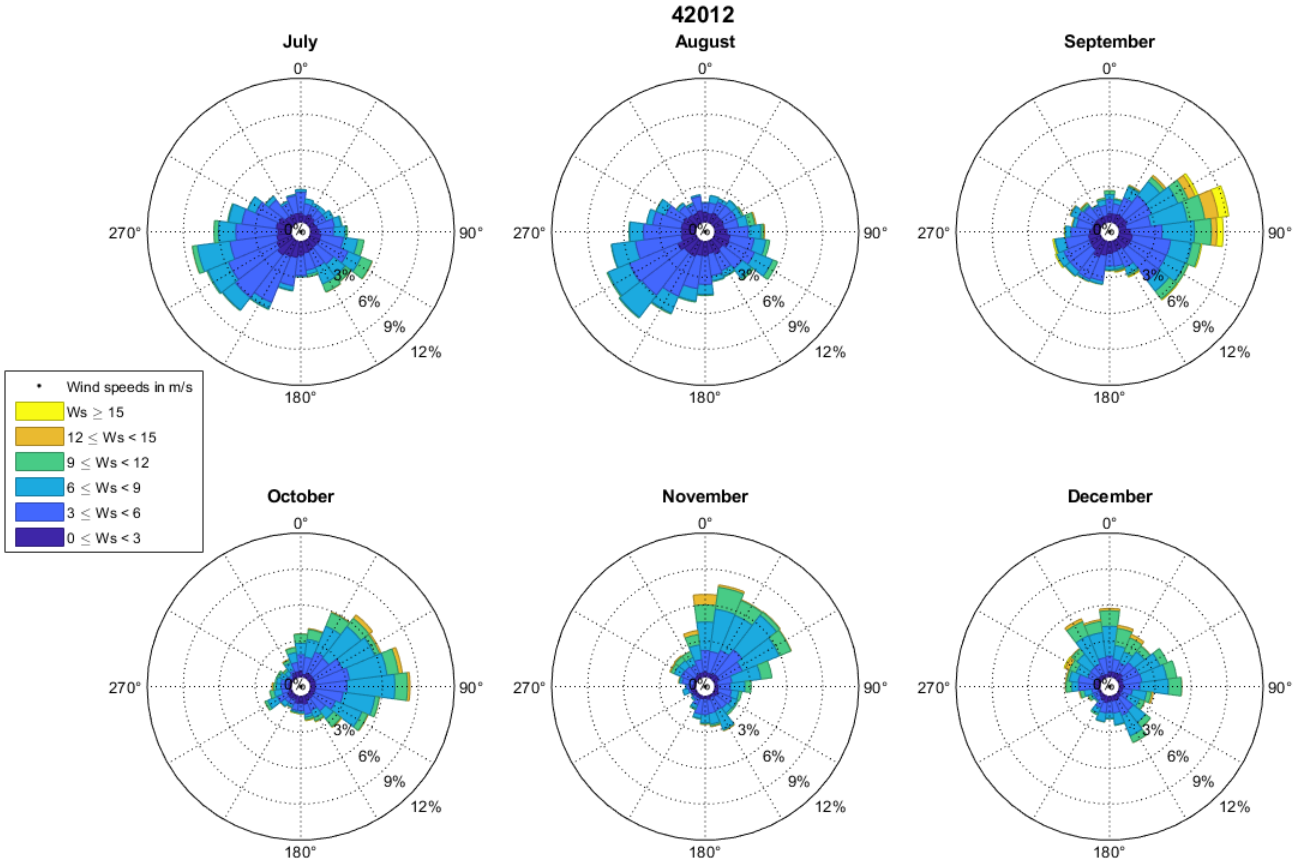

42035
July
August
September
October
November
December
0°
90°
180°
270°
6%
12%
18%
24%
Wind speeds in m/s
Ws ≥ 15
12 ≤ Ws < 15
9 ≤ Ws < 12
6 ≤ Ws < 9
3 ≤ Ws < 6
0 ≤ Ws < 3

Normal Site Conditions – Eastern Gulf






42012
January
February
March
April
May
June
0°
90°
180°
270°
3%
6%
9%
12%
Wind speeds in m/s
Ws ≥ 15
12 ≤ Ws < 15
9 ≤ Ws < 12
6 ≤ Ws < 9
3 ≤ Ws < 6
0 ≤ Ws < 3


42012
July
August
September
October
November
December
0°
90°
180°
270°
3%
6%
9%
12%
Wind speeds in m/s
Ws ≥ 15
12 ≤ Ws < 15
9 ≤ Ws < 12
6 ≤ Ws < 9
3 ≤ Ws < 6
0 ≤ Ws < 3

Extreme Conditions

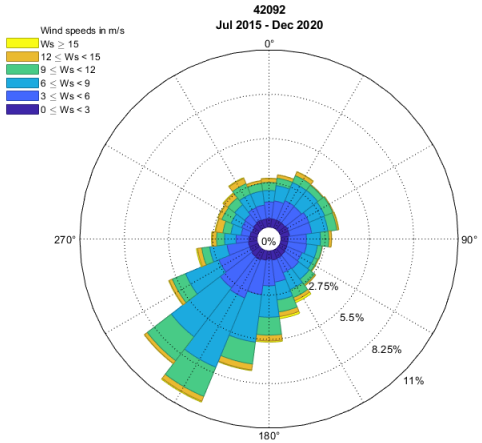
The extreme wind conditions include wind shear events, as well as peak wind speeds due to storms, extreme turbulence, and rapid extreme changes in wind speed and direction (gusts). Values of the following parameters at the wind turbine site should be estimated:

- Extreme 10-minute average wind speed at hub height with specified recurrence periods, for example:
  - 1-year, 50-year, 100-year, 500-year, 1000-year return periods
- Extreme 3-second average wind speed (gust) at hub height with specified recurrence periods
- Extreme wind shear
- Extreme deterministic wind events such as extreme gust events
- Extreme turbulence intensity
- Air density

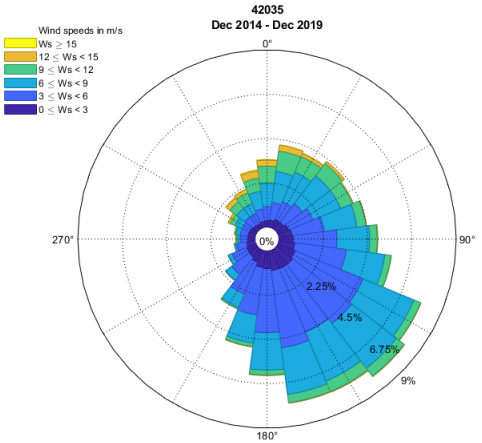
Array and Layout Considerations

- The layout of the wind facility has an impact on the wind at the individual wind turbines.
- Wake effects fade out more slowly and over longer distances offshore than they do over land.
- Wake induced turbulence within a wind facility is important for the fatigue loads in offshore wind turbine structures.

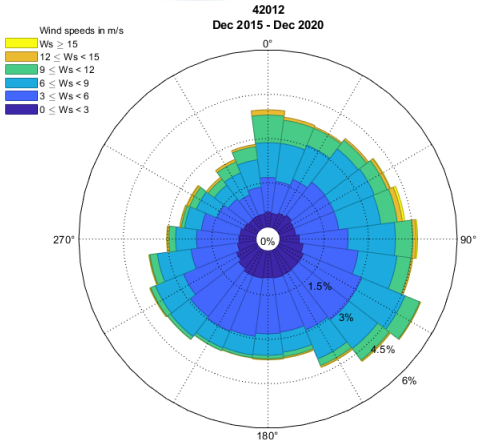
Array and Layout Considerations



Western Gulf



Central Gulf



Eastern Gulf

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