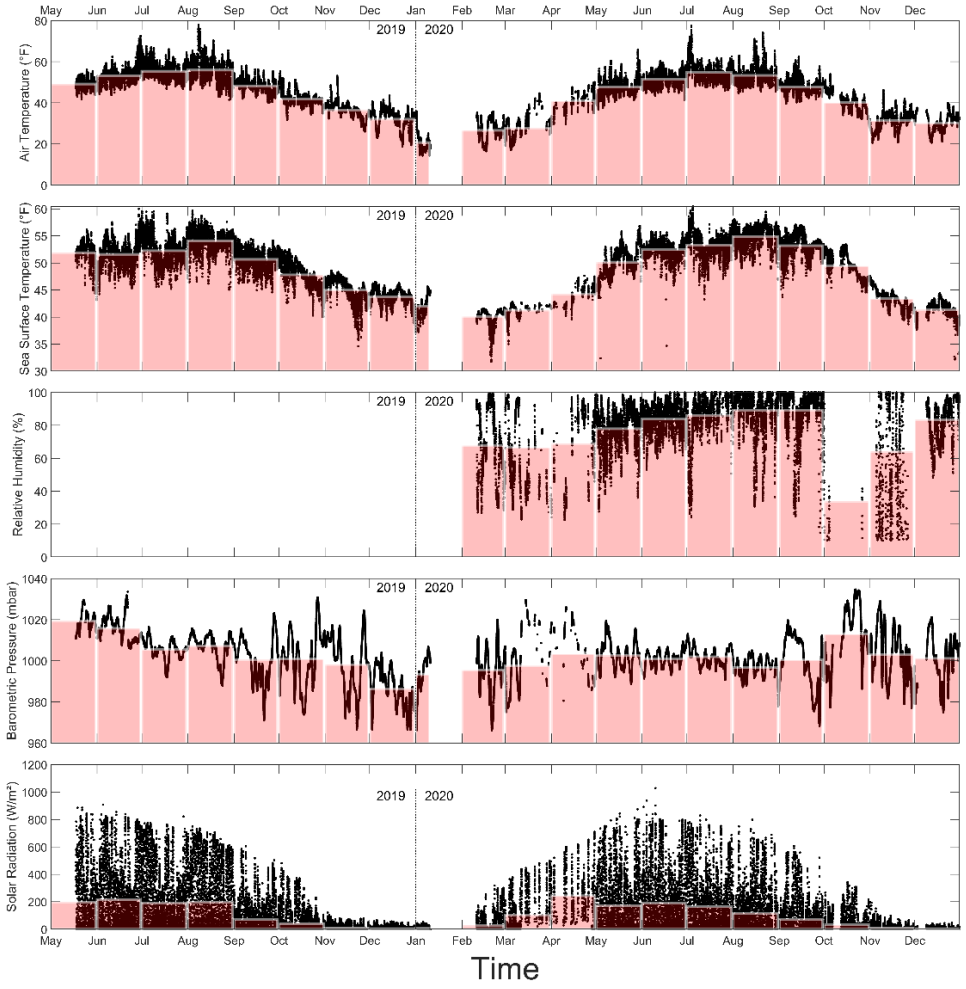
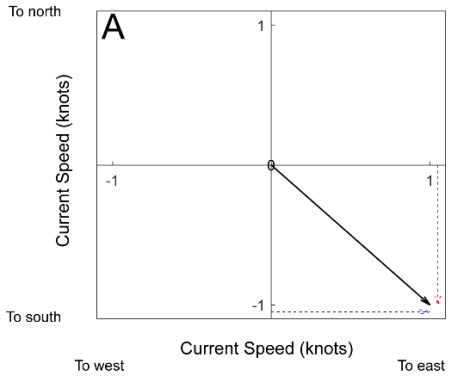
Port Valdez Weather Buoy Analysis

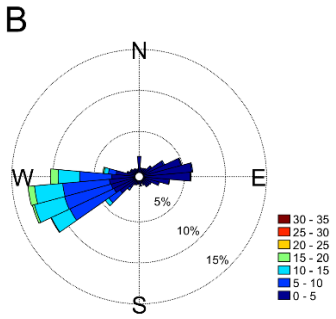
PWSRCAC Board Meeting, 19 Sept. 2024

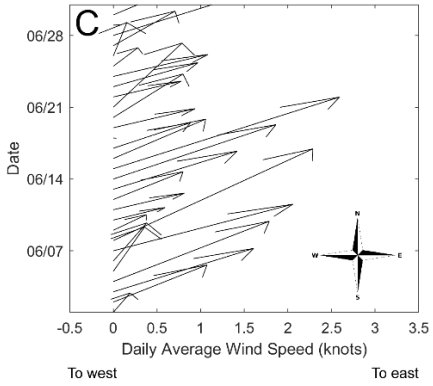
Rob Campbell
PWS Science Center

Scalars vs vectors



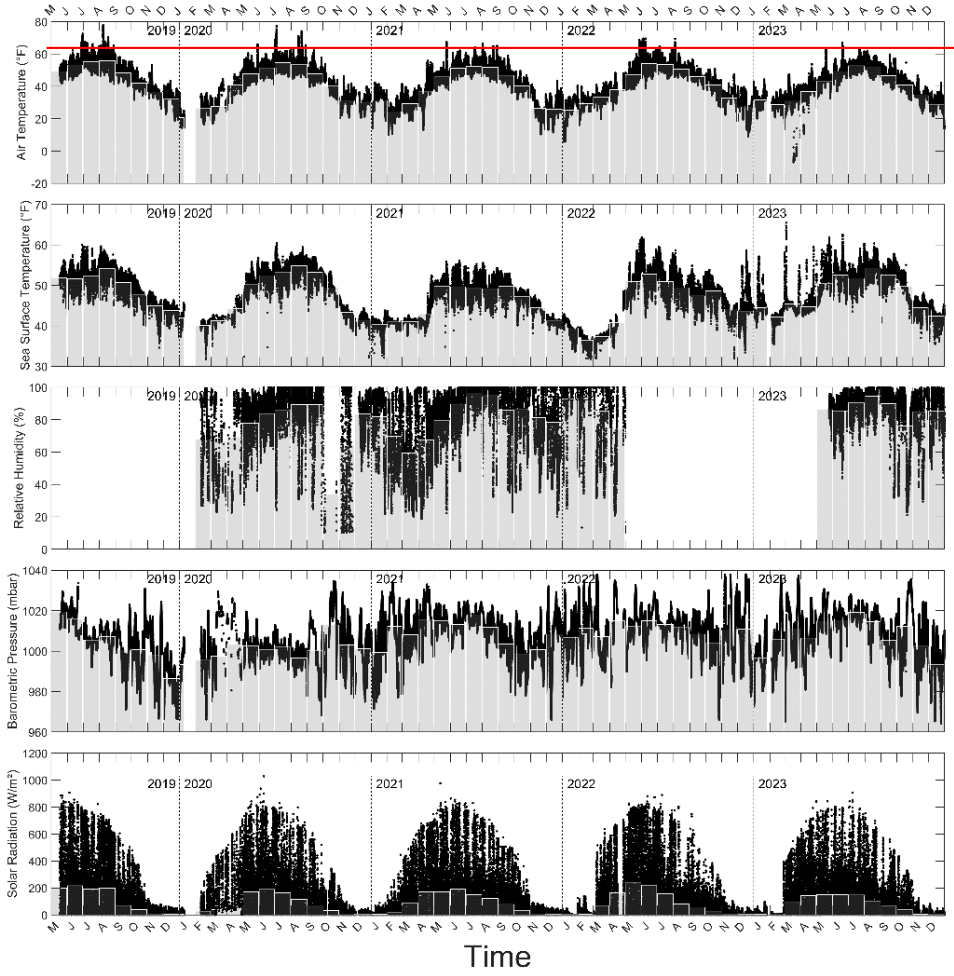




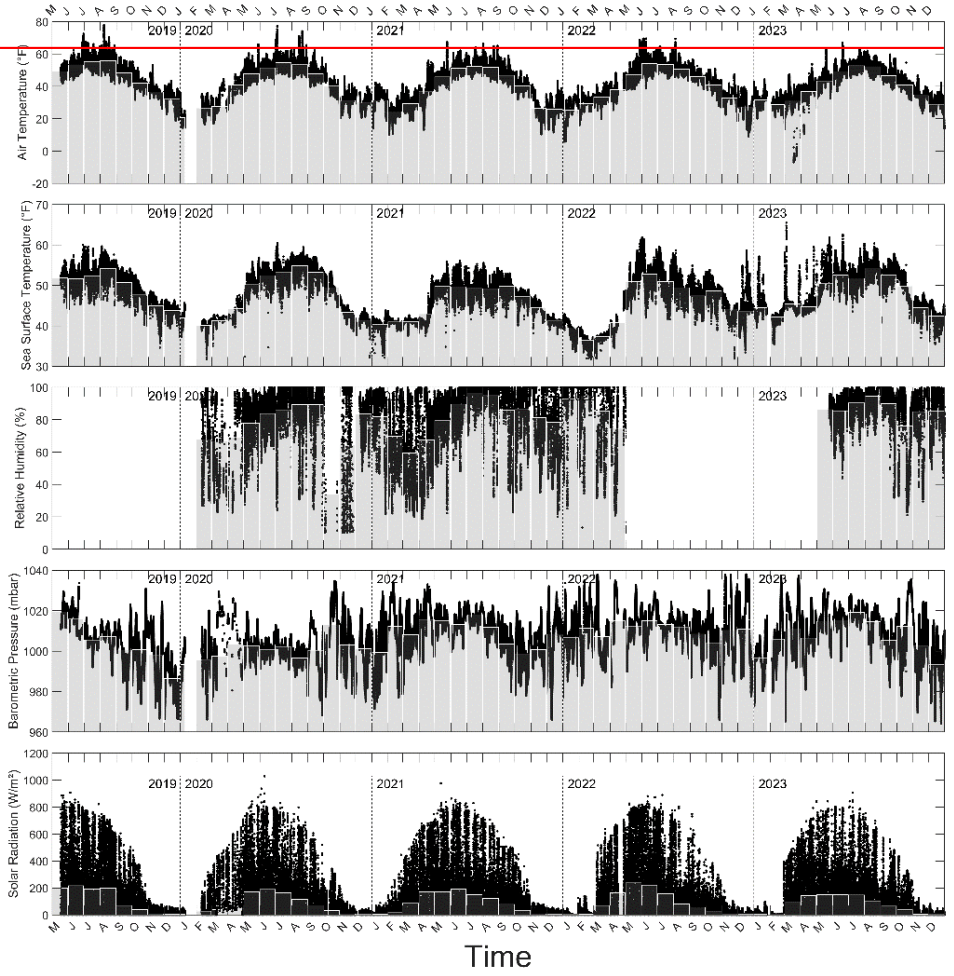


Monthly averages – met and oceanographic

VMT

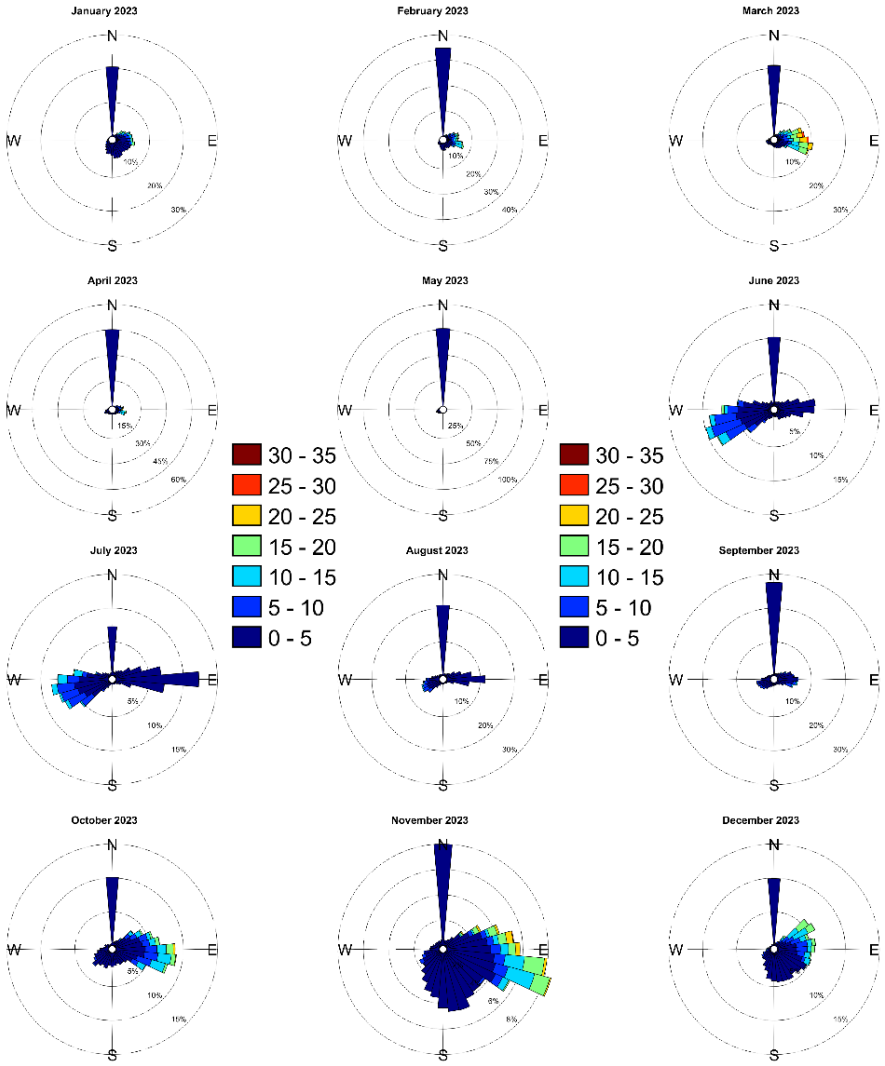


Duck Flats

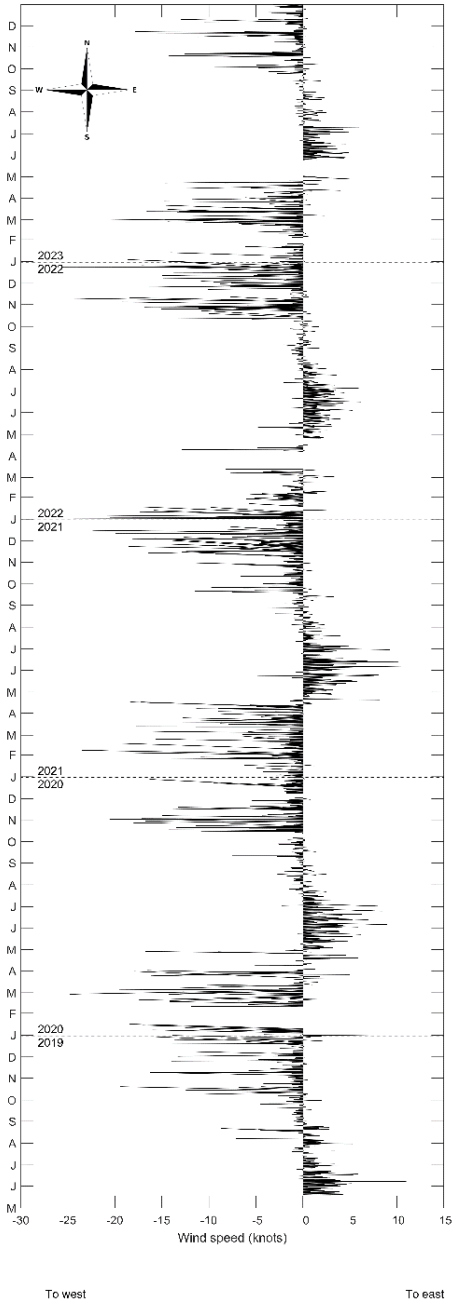


Winds - VMT

2022 wind roses

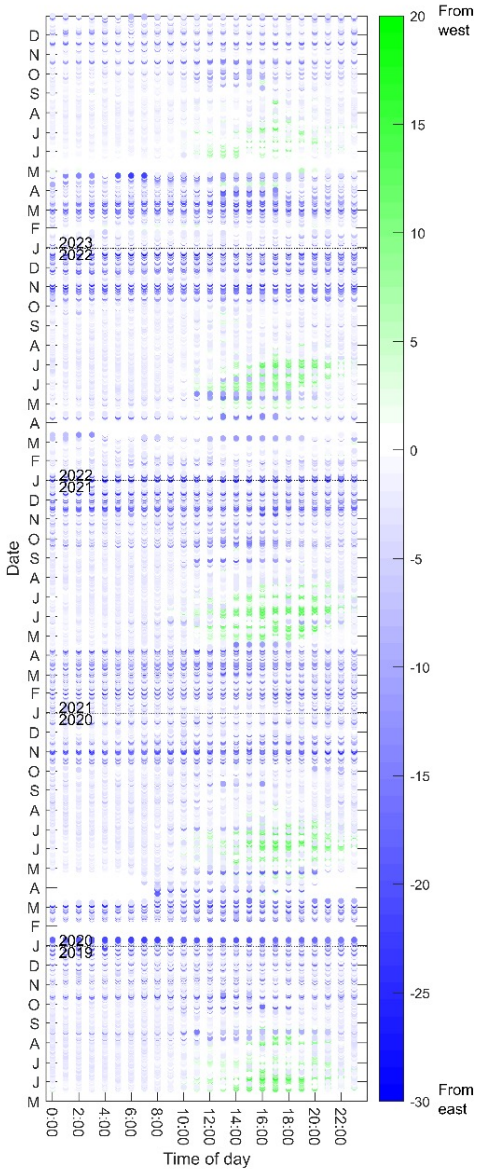


Full time series



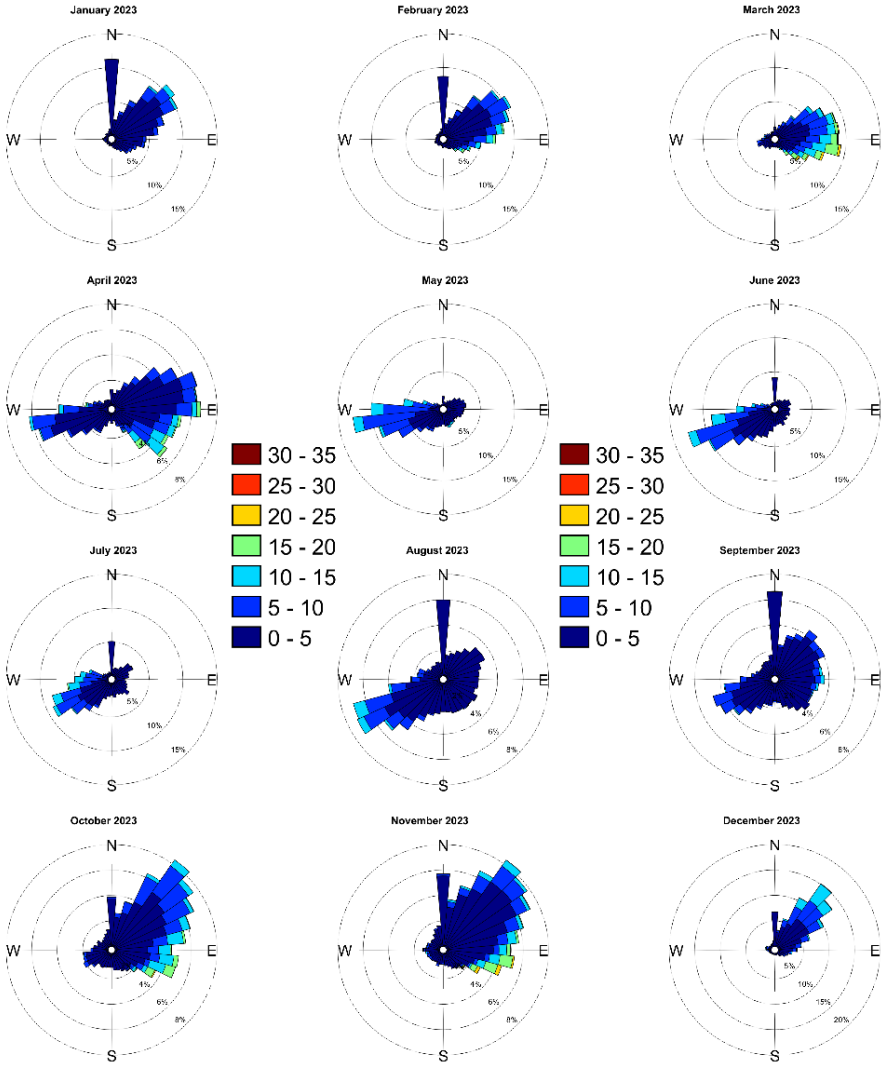
Sea breezes at VMT

Daily average East-West winds

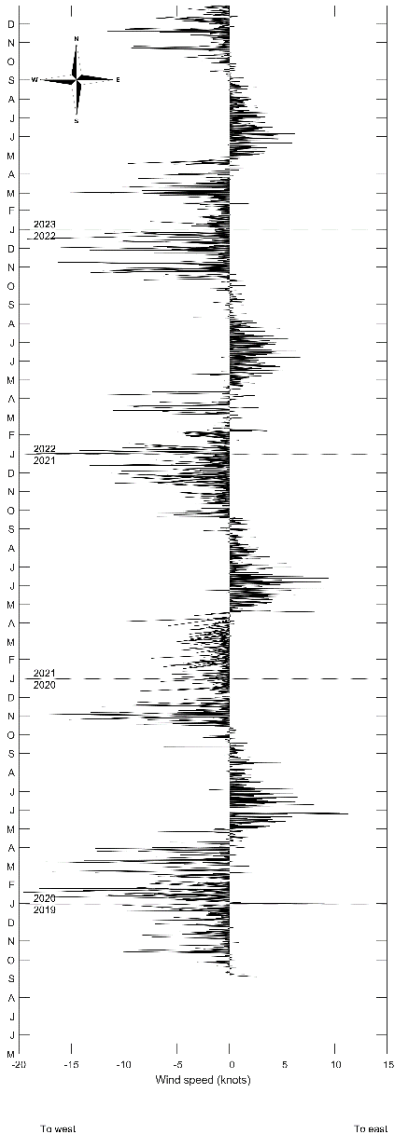


Winds – Duck Flats

2022 wind roses

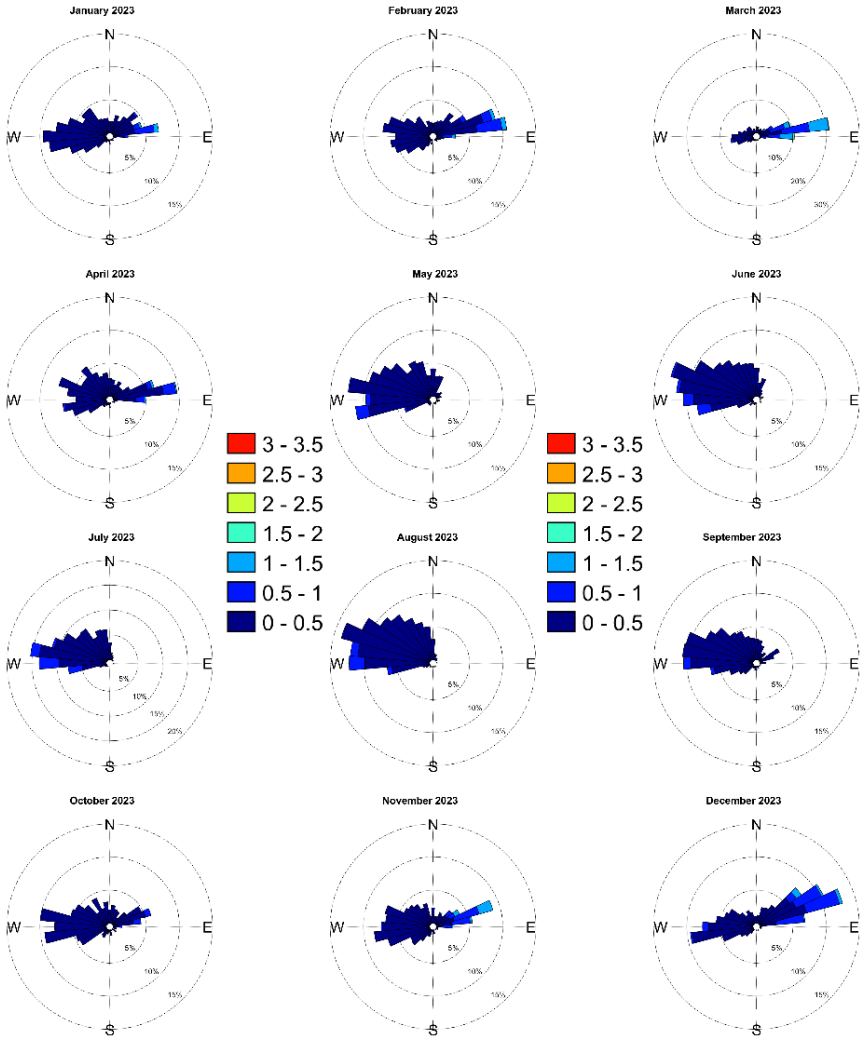


Full time series

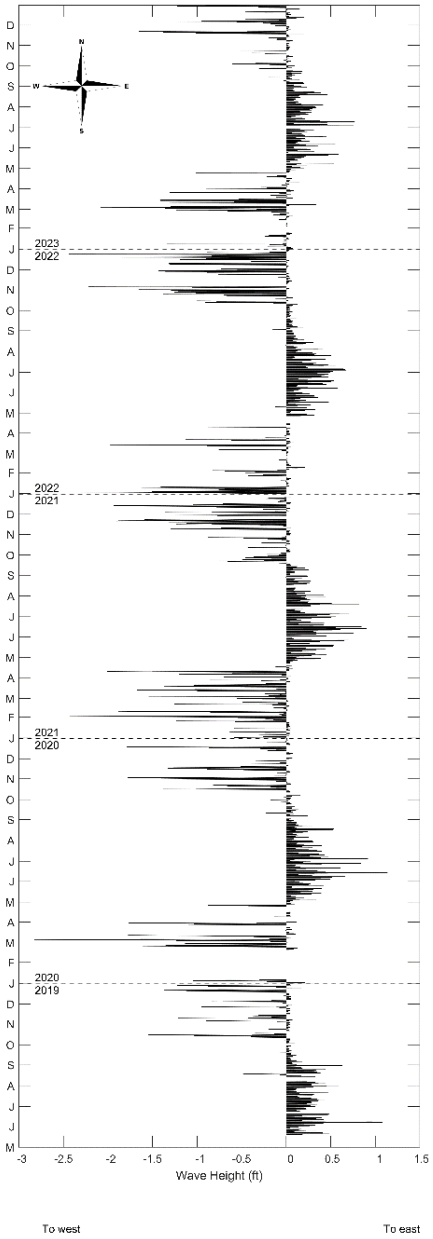


Waves - VMT

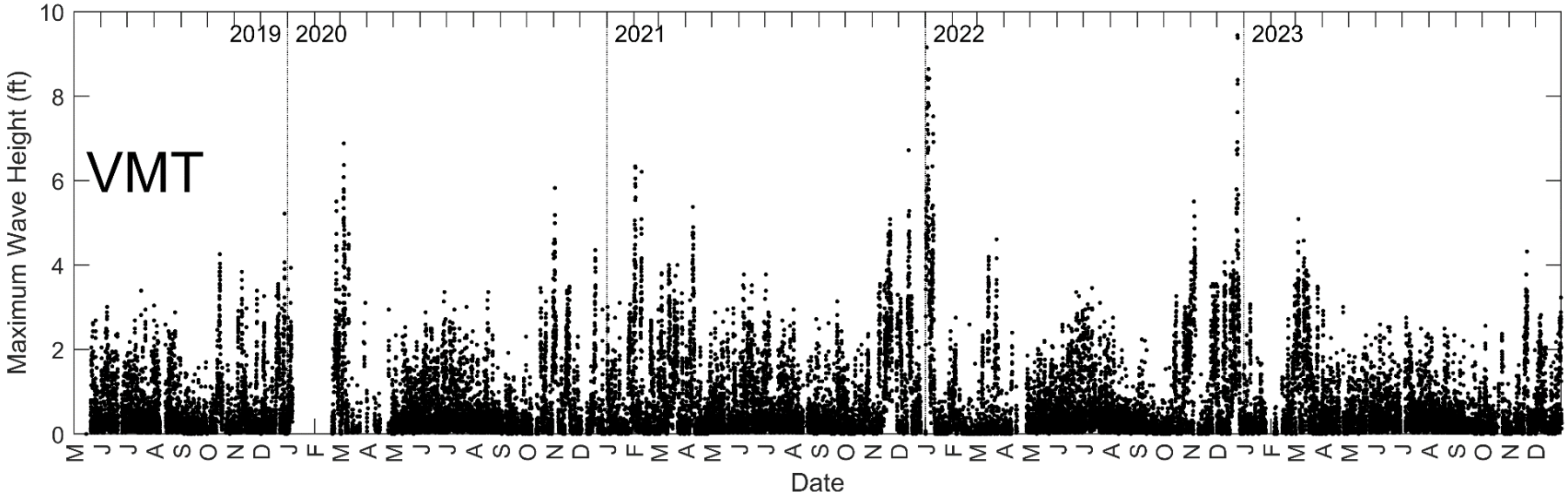
2022 wave roses



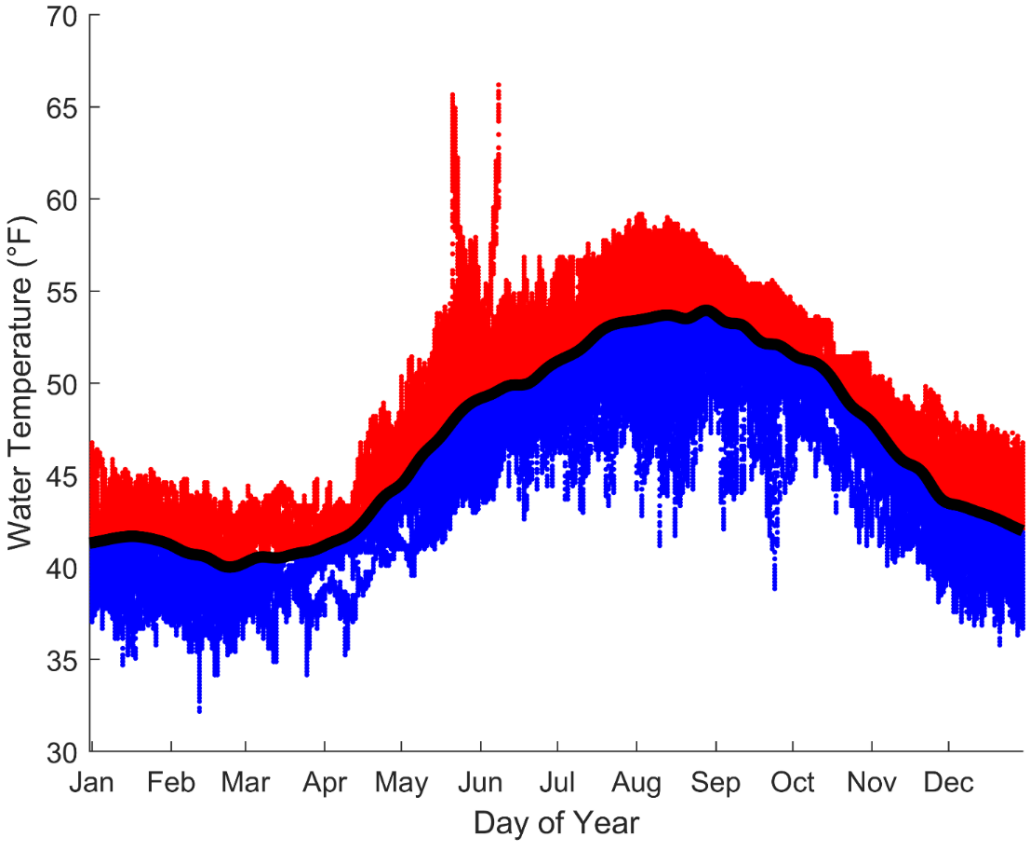
Full time series

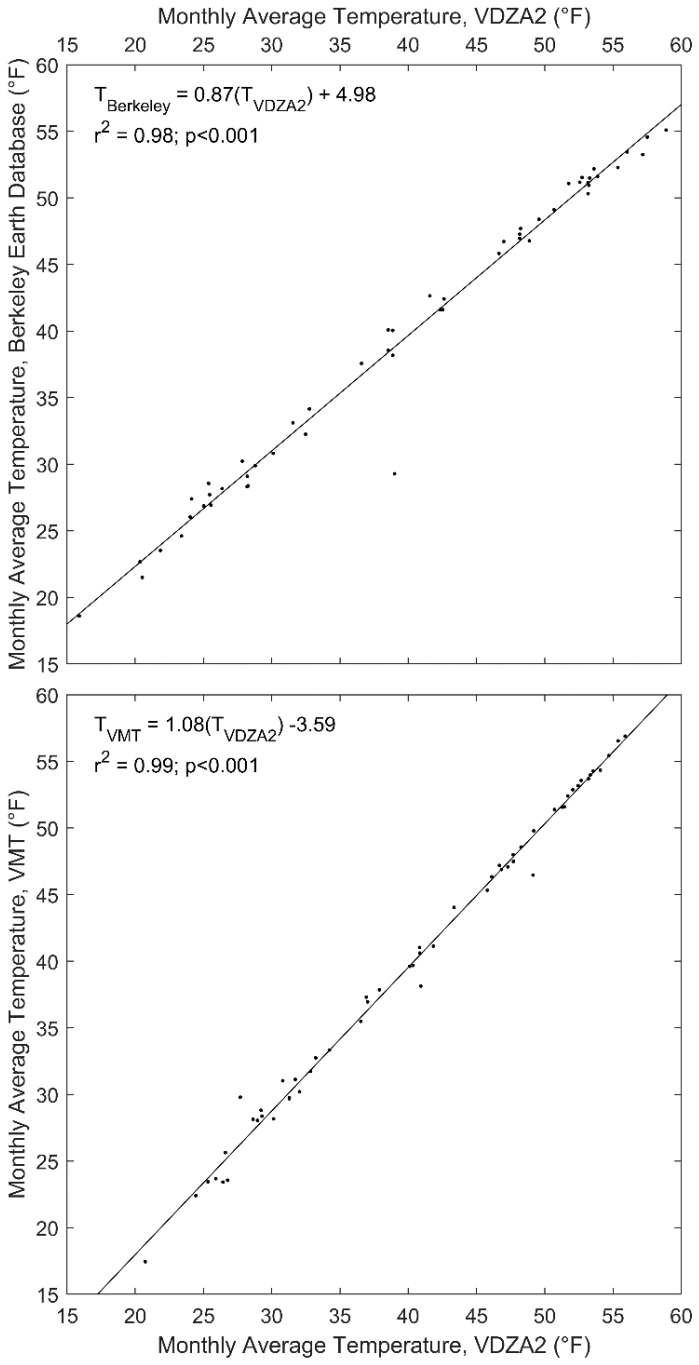


Max wave height - VMT

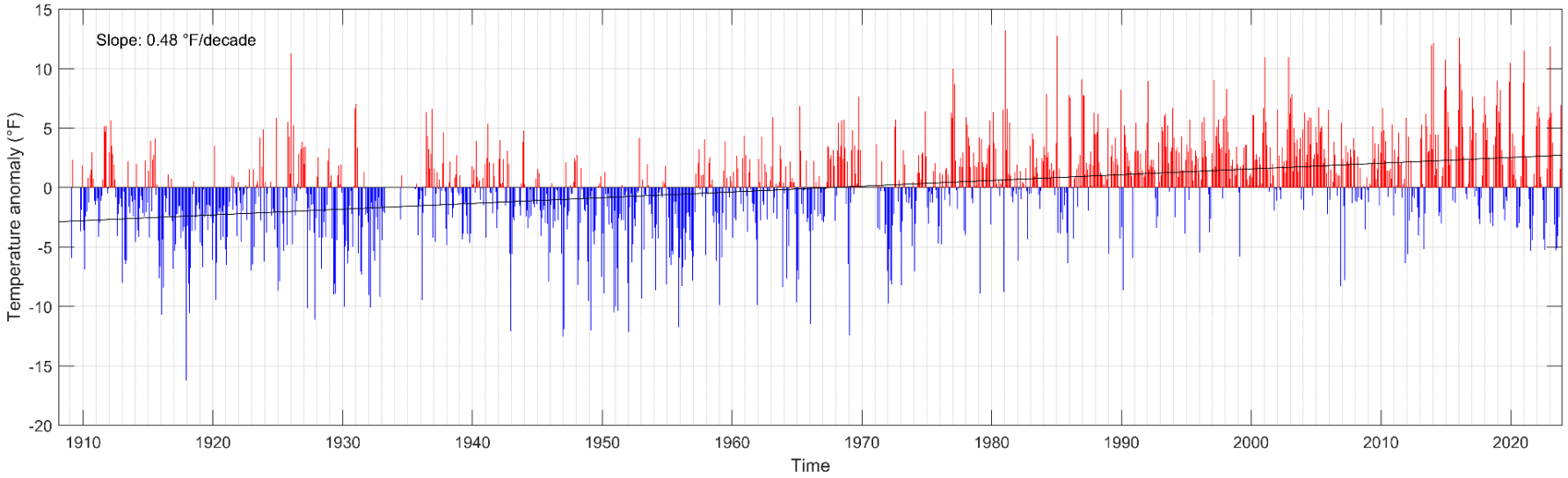


Temperature anomalies





VDZ monthly air temperature anomaly 1908-2022

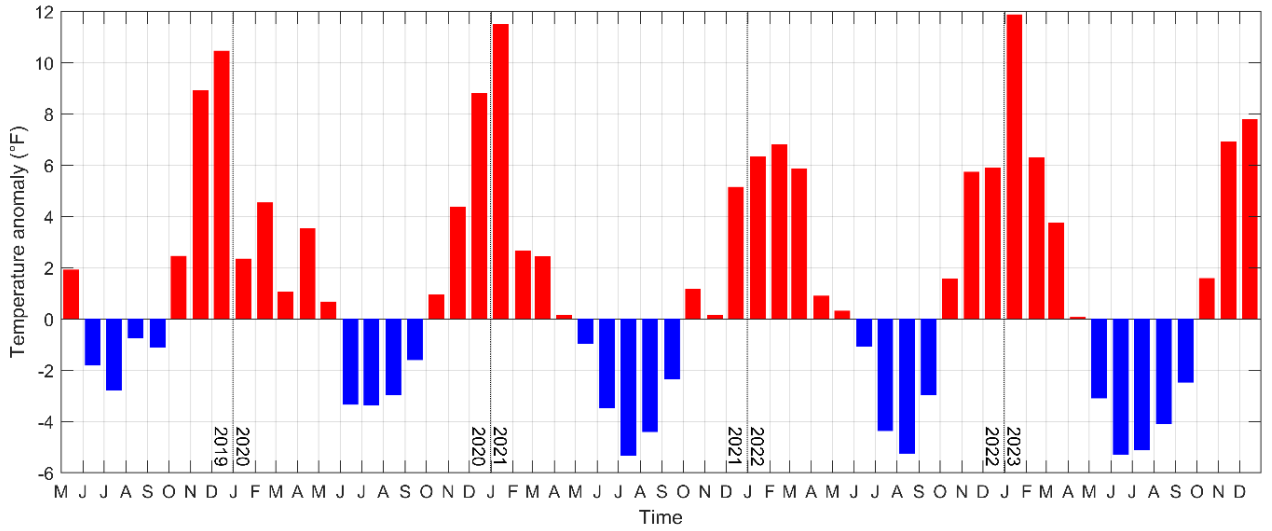


Source: Berkeley Earth database (www.berkeleyearth.org) 1908-1995

VDZA2 1996 – 2018

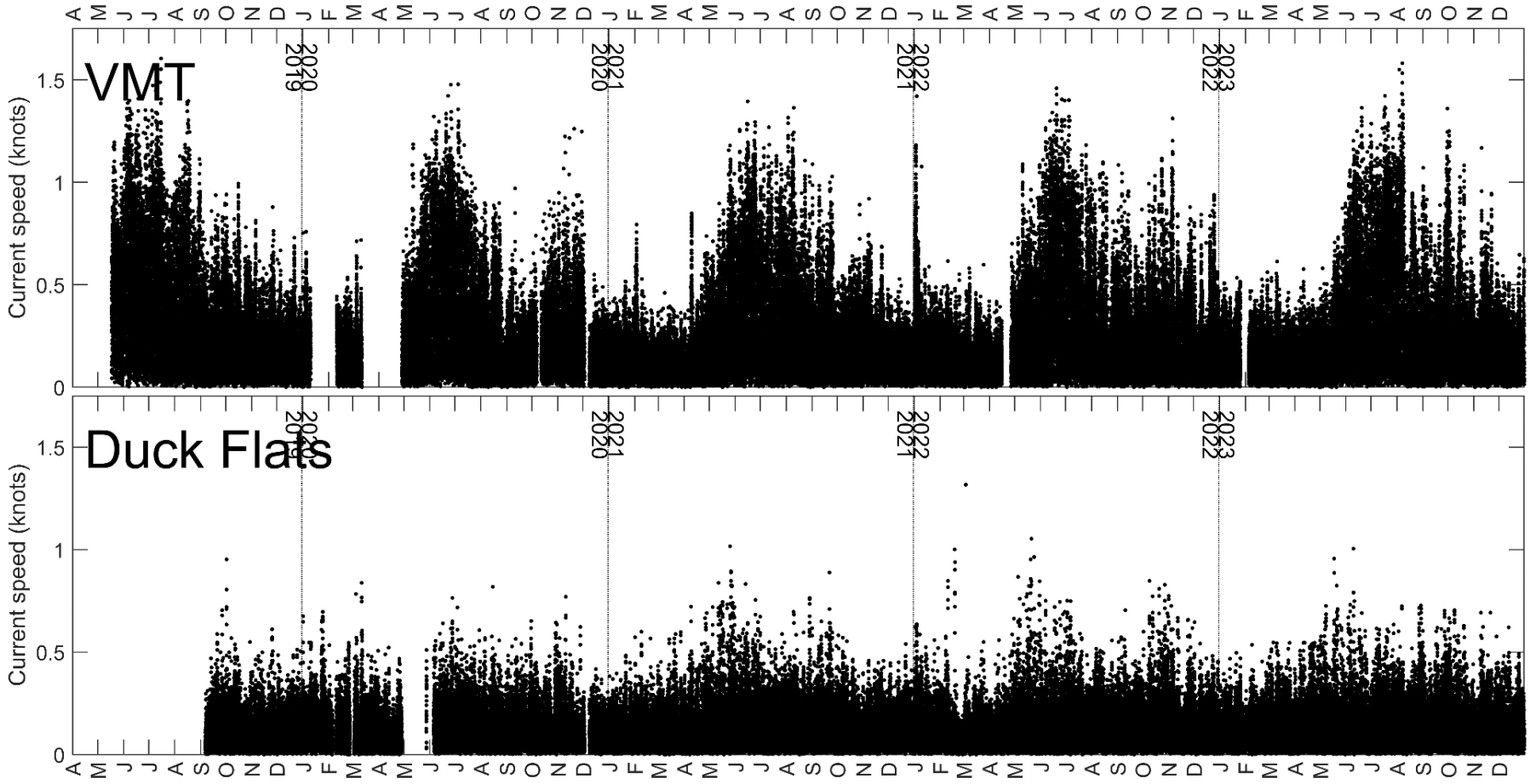
VMT 2019 - present

Buoy air temperature anomalies 2019-2020



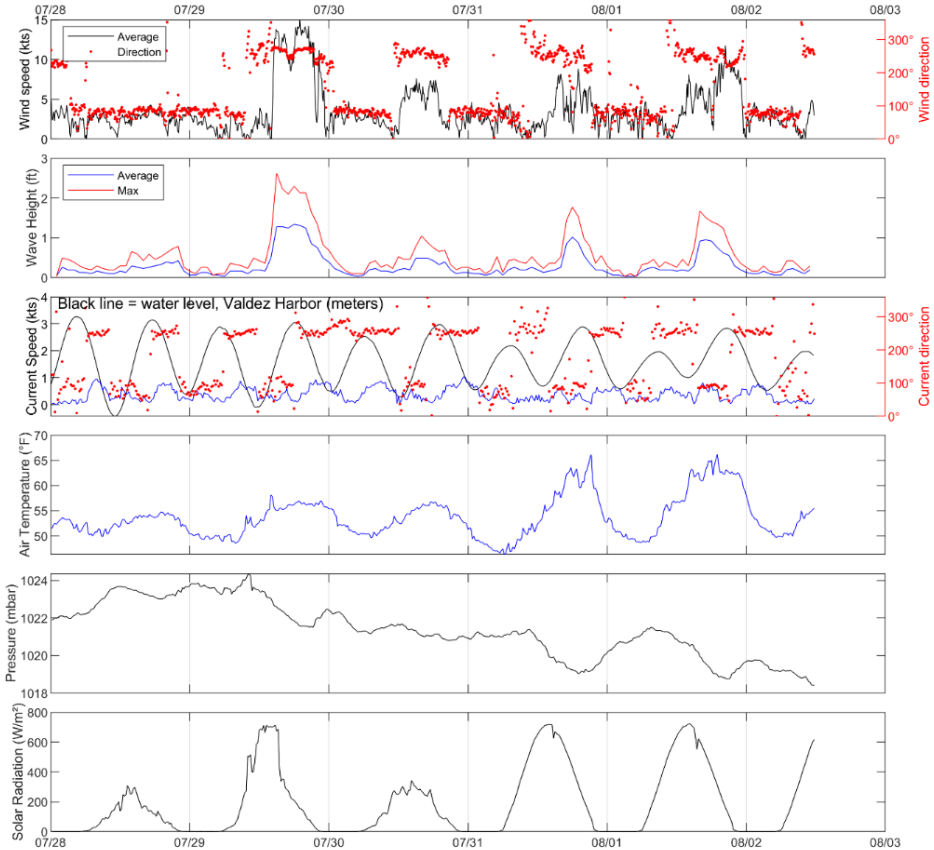
* Board Q: Do any of the trends in the data collected by the two Port Valdez weather buoys surprise you?

Surface currents

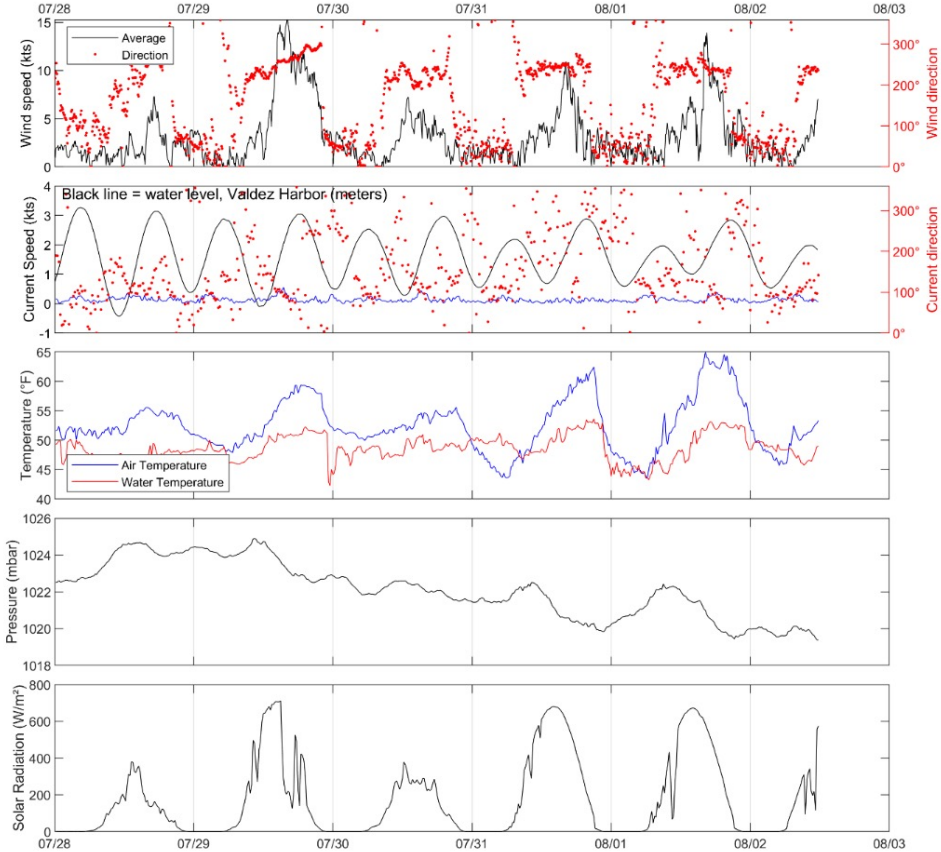


Tidal currents

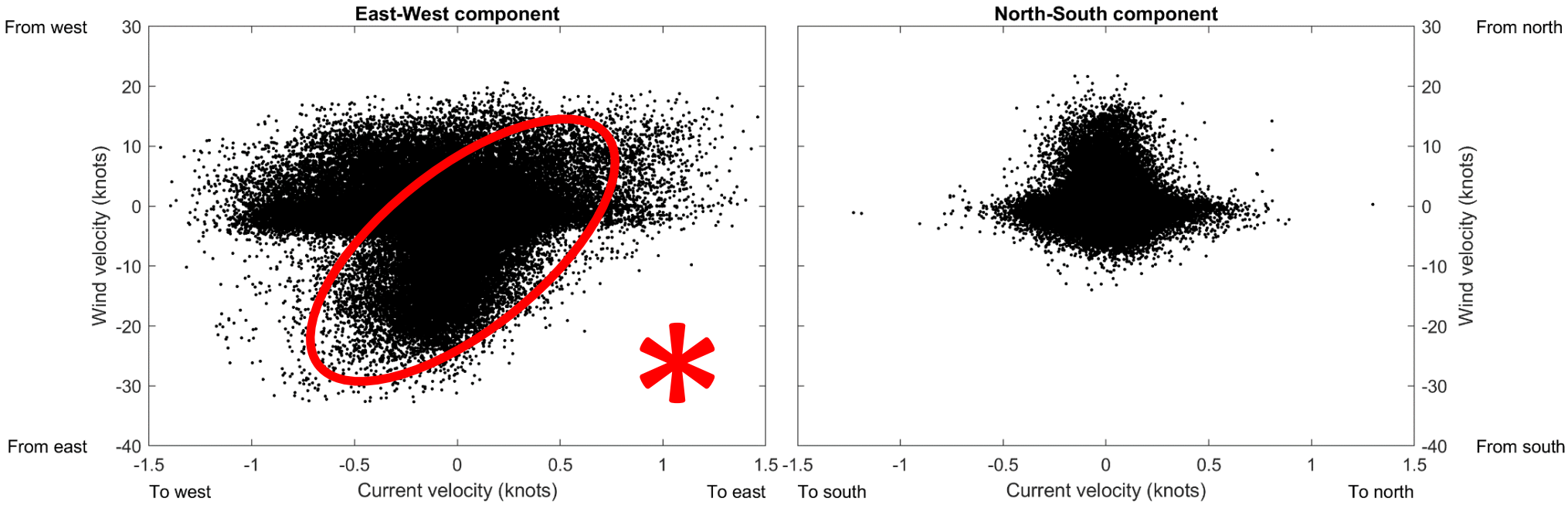
VMT



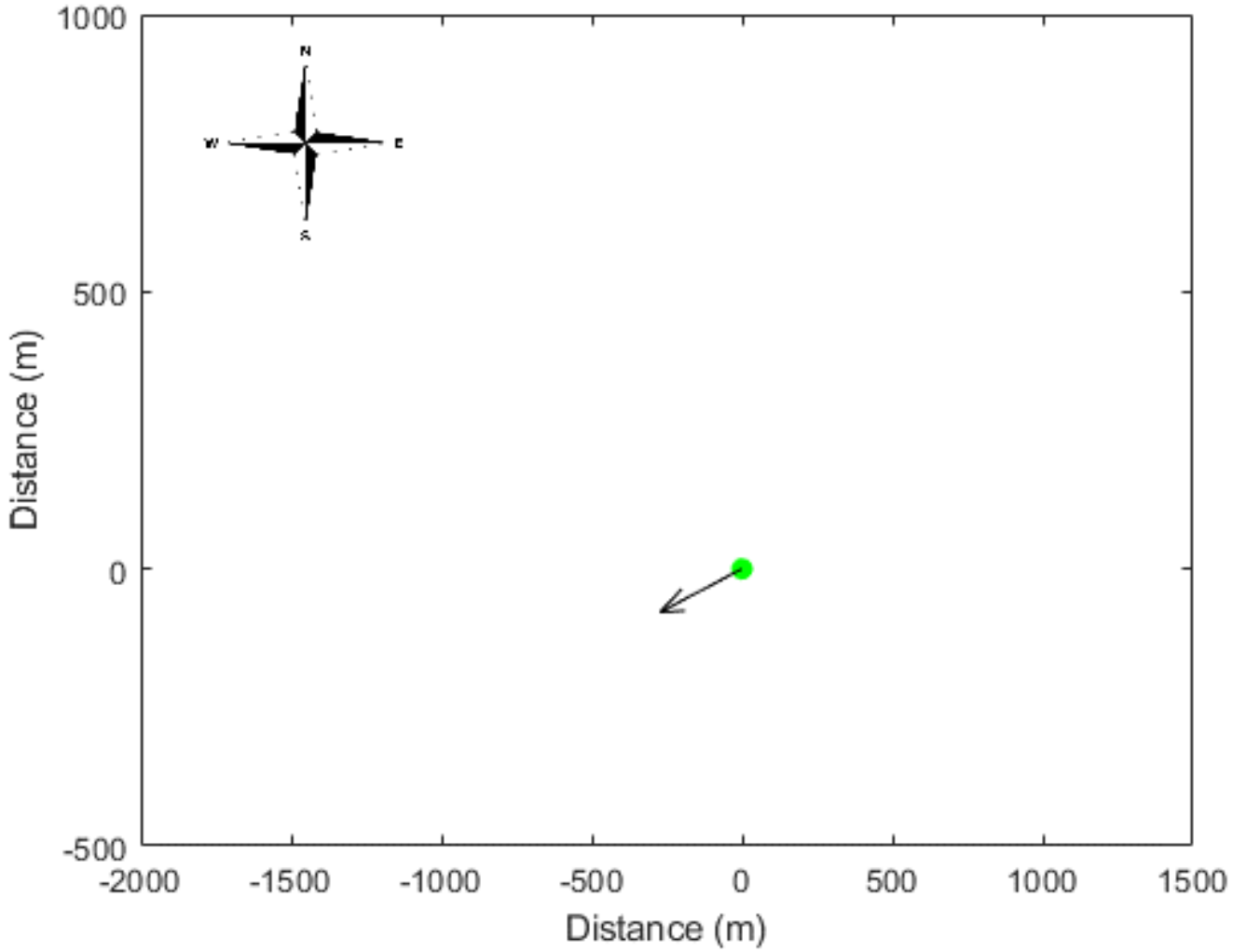
Duck Flats



Currents & Wind

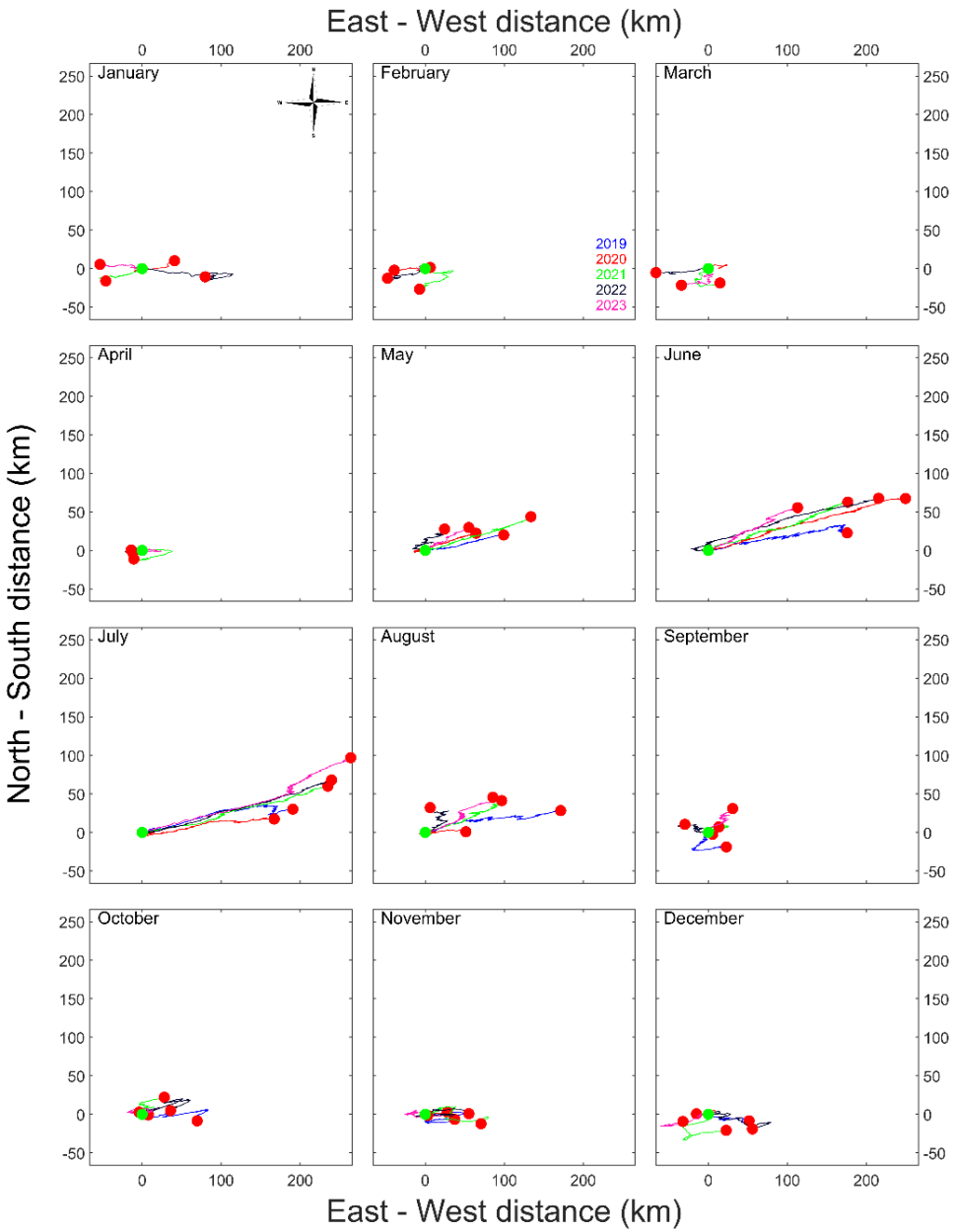


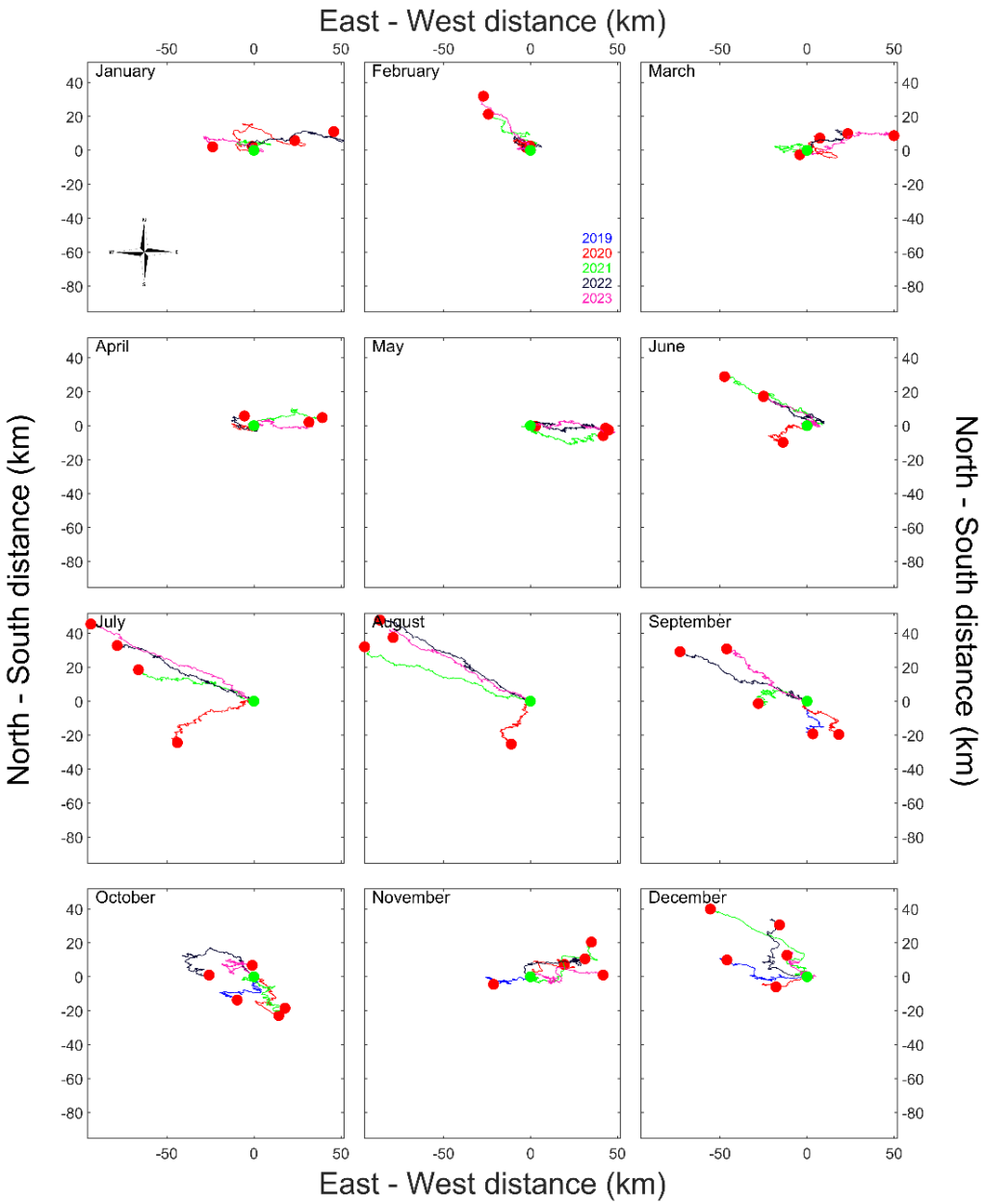
Progressive Vector Diagrams



PVDs VMT

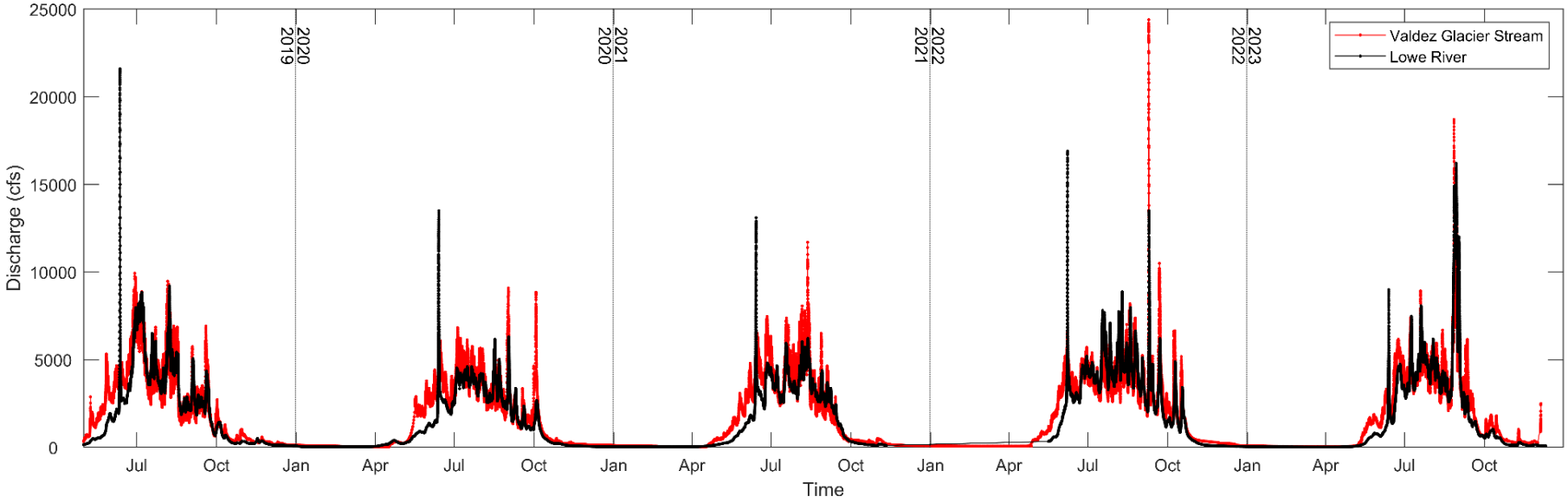
Duck Flats



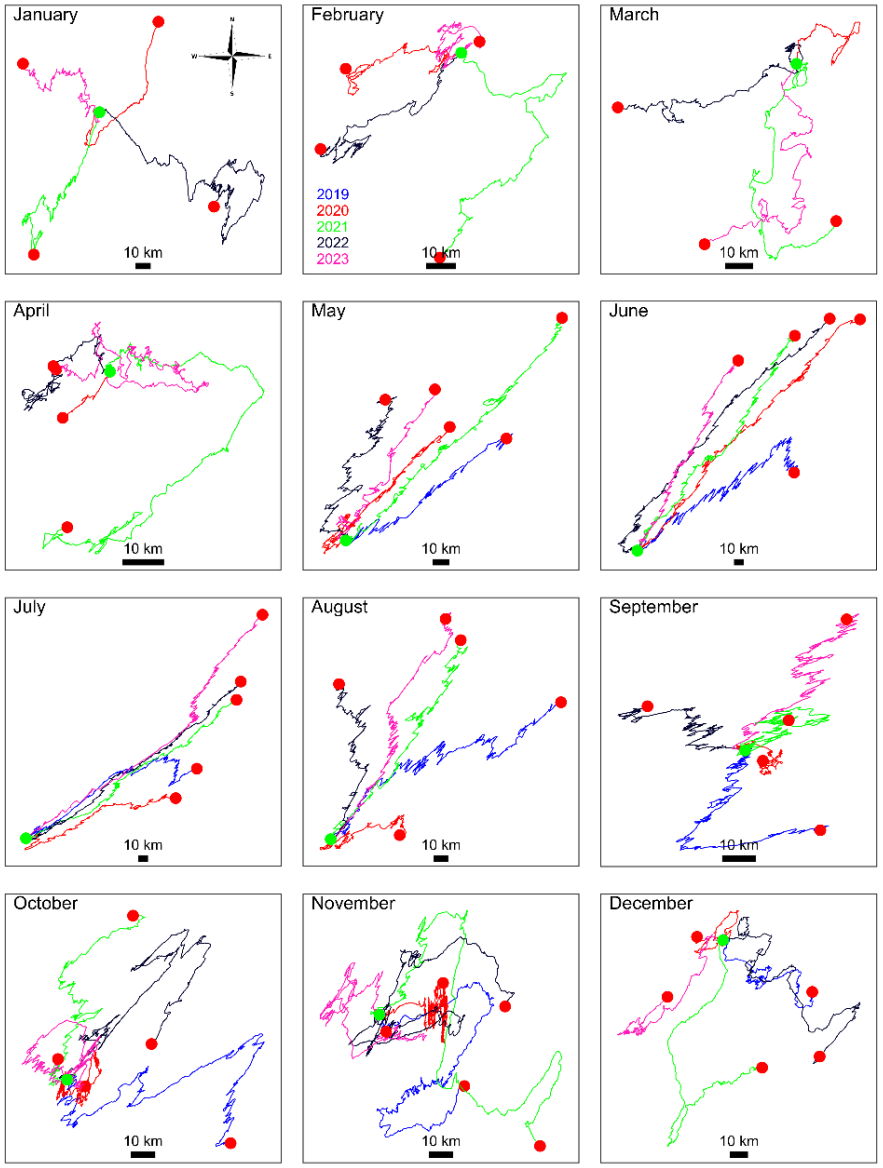


Note: Same axes but different between locations

Lowe & Valdez Glacier Stream discharge



PVDs VMT



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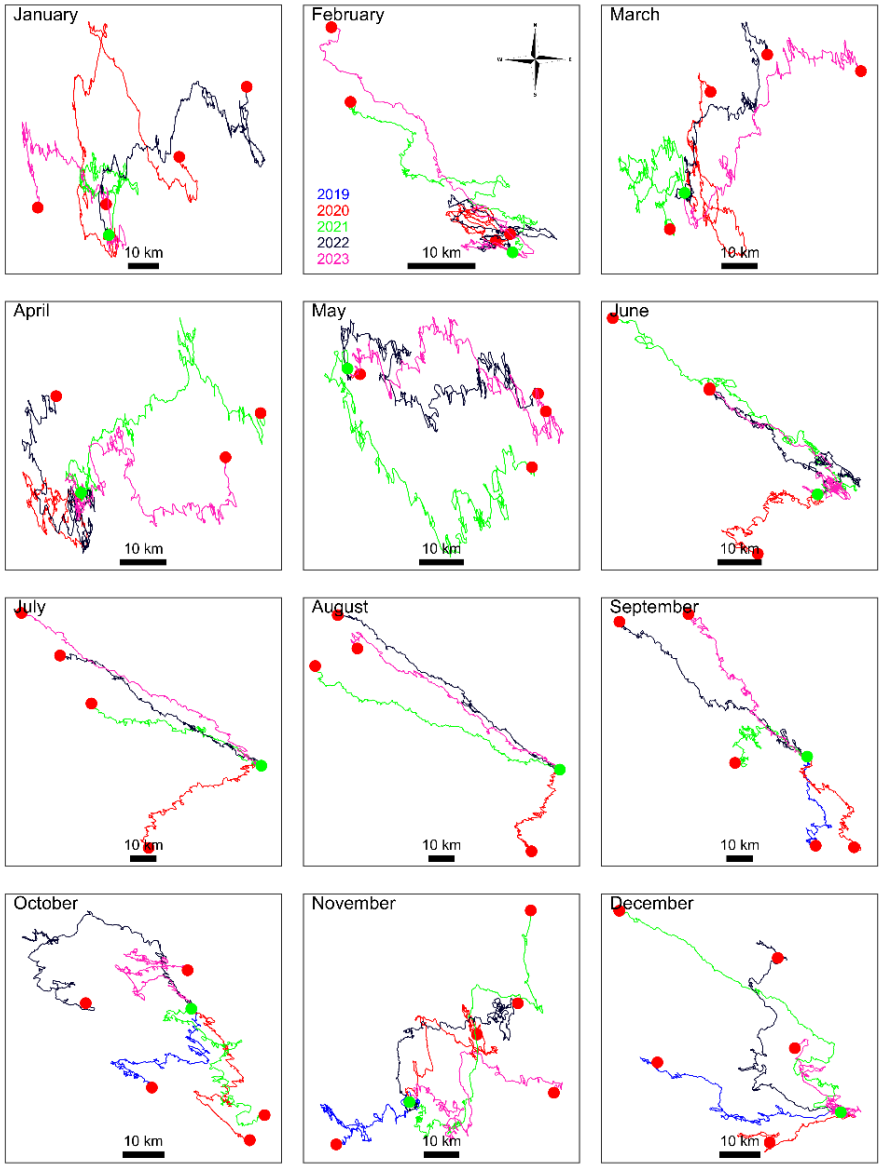


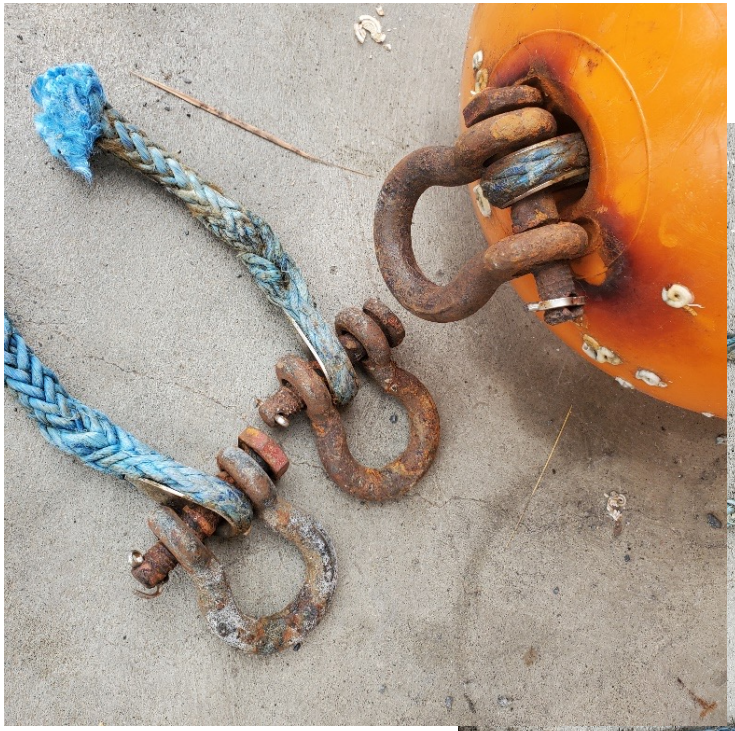
Note: Axes “zoomed” to each month

Conclusions

- Air and water temperatures, and solar radiation followed a seasonal sinusoid with maxima in August and minima in February. Relative humidity was high at both sites and followed the seasonal temperature pattern.
- Air pressure was driven by large-scale atmospheric circulations.
- Winds were mostly from the east in autumn and winter, with maximum gust on order of 25 knots, and transitioned to weak easterly and stronger westerly sea breezes during the summer months.
- Wave directions tended to match wind directions. The highest waves were observed during autumn/winter storms and were of considerable size, just under 9 feet tall; spring/summer sea breeze generated waves were 1-3 feet.
- The temperature climatology persistent warming pattern over the past 114 years. Recently winters have been warmer than average while summers have been cooler than average.
- Surface currents in Port Valdez are complex and result from the interplay of winds, tides, and freshwater inputs. At the VMT, surface currents were northeasterly during summer sea breezes, and were northwesterly at the Duck flats. Tidal oscillations were visible during calmer periods, and surface current directions were variable during autumn and winter.

Board questions

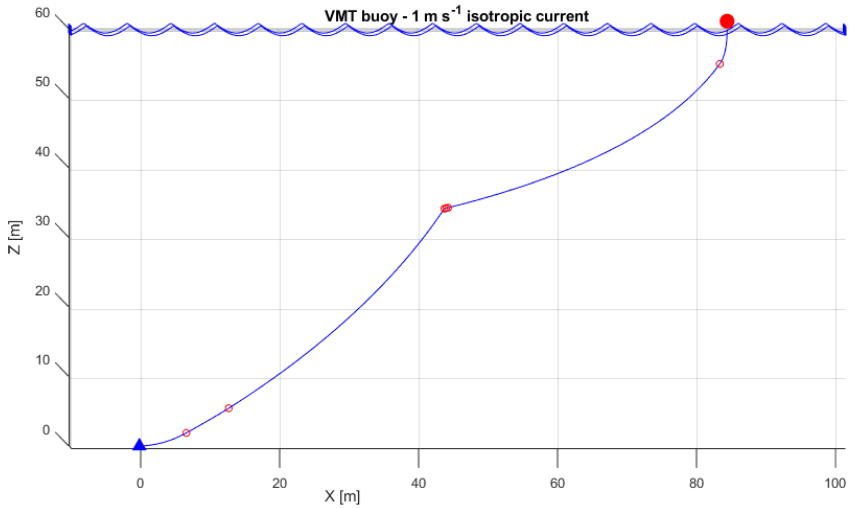
Can you provide any information on why you think the VMT weather buoy broke free from its anchoring system?



Board questions

Can you briefly describe the VMT weather buoy's new anchoring system and what was done to mitigate the risk of it breaking free again?

- New Bathymetry
- New Mooring (5/8" spectra- 10X)
- New Anchor
- New Shackles
- ROV inspection (?)



Thanks!