Interannual Variability of the Wind Stress Curl in the Black Sea

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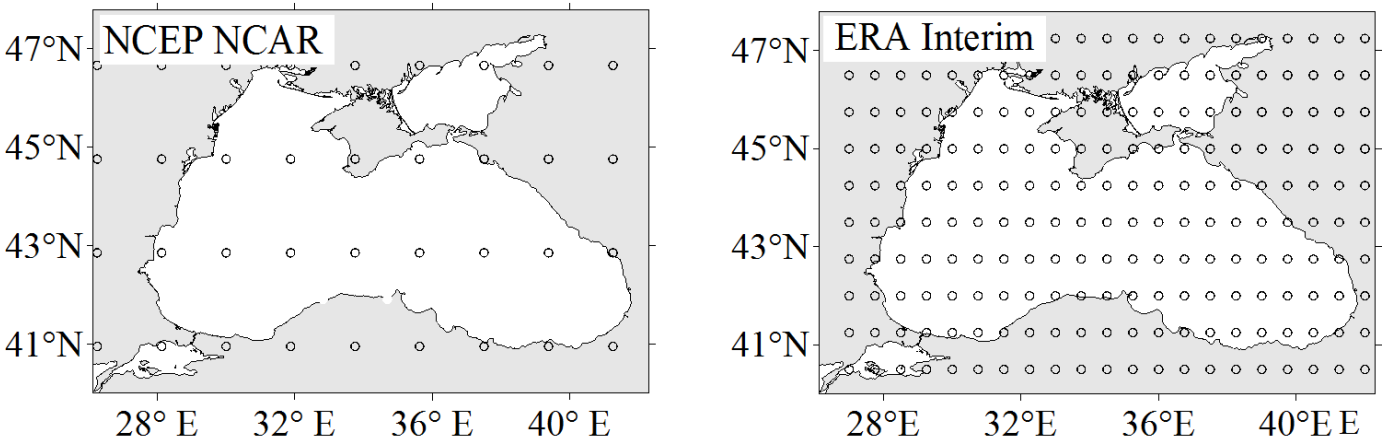
Wind stress curl is a consequence of the wind field heterogeneity and it is an important factor affecting the sea circulation and vertical mixing

The purposes

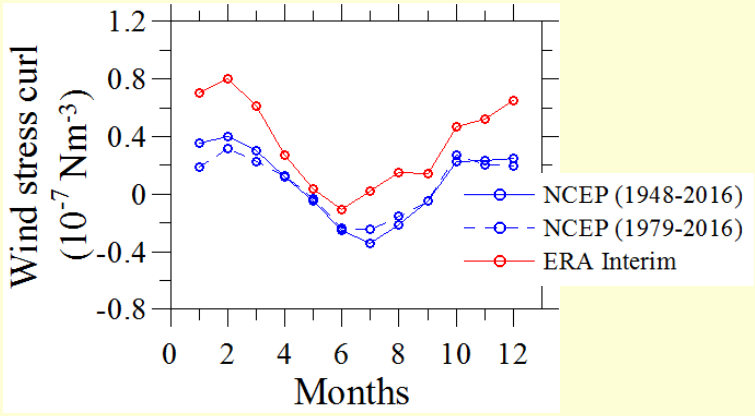
- ***to reveal trends of the interannual variability of wind stress curl in the Black Sea and to analyze the response of the wind stress curl magnitude to changes of the direction of the prevailing over the sea wind***
- ***to compare the spatial and temporal variability of the wind stress curl of the NCEP\NCAR reanalysis (since 1948)***
  and the ERA Interim reanalysis (since 1979, but with a higher spatial resolution)

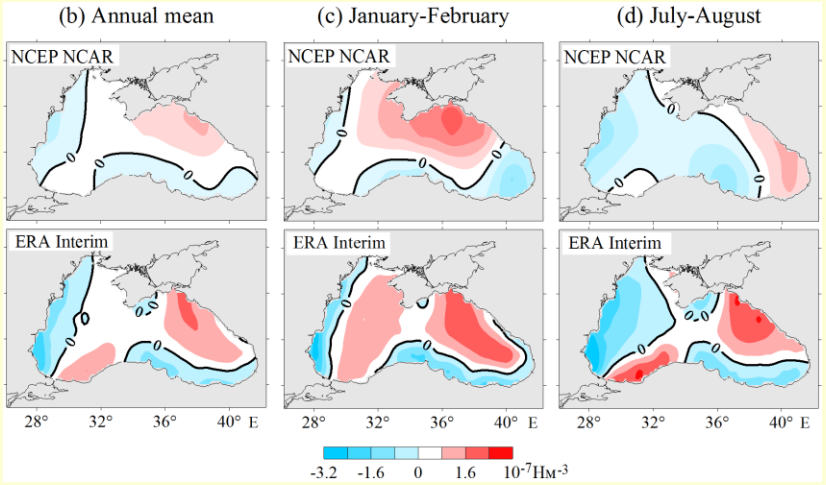


wind stress curl = $\mathrm{rot}_z \boldsymbol{\tau} = \partial\tau_y / \partial x - \partial\tau_x / \partial y$ (Nm^{-3})

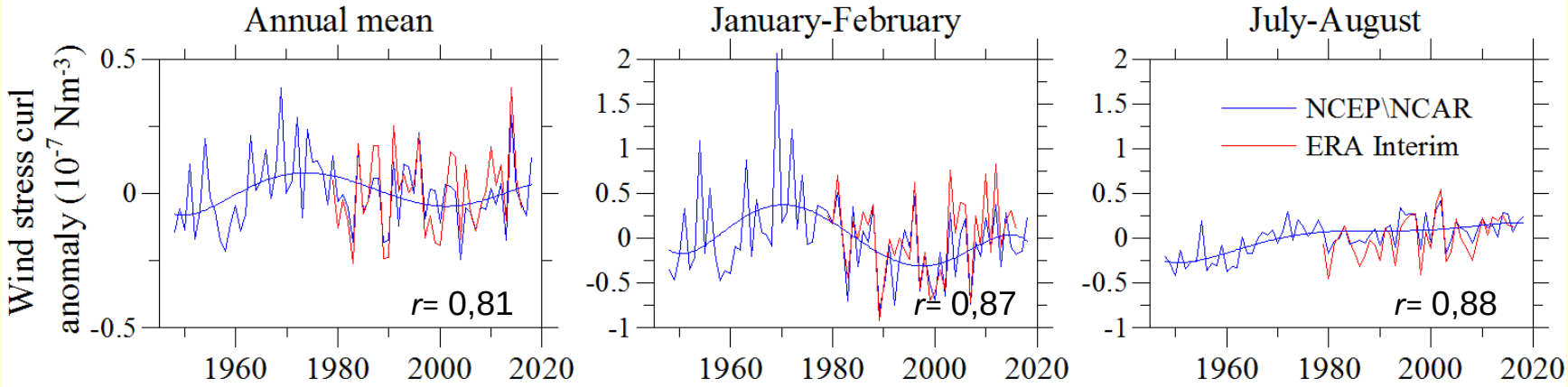
Comparison the variability of the wind stress curl according to NCEP and ERA Interim reanalysis

Seasonal variability





Interannual variability of the basin-averaged wind stress curl anomaly

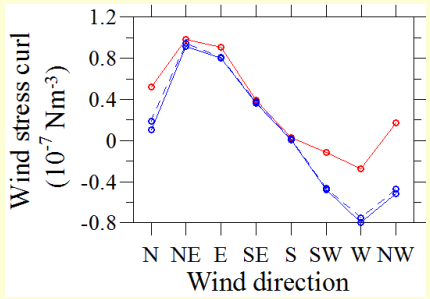


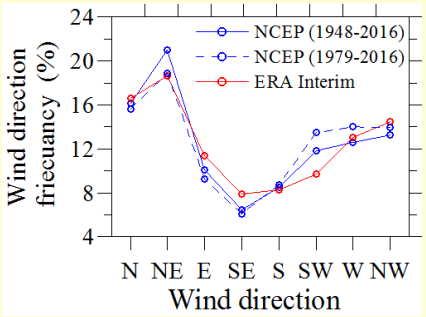
Conclusion

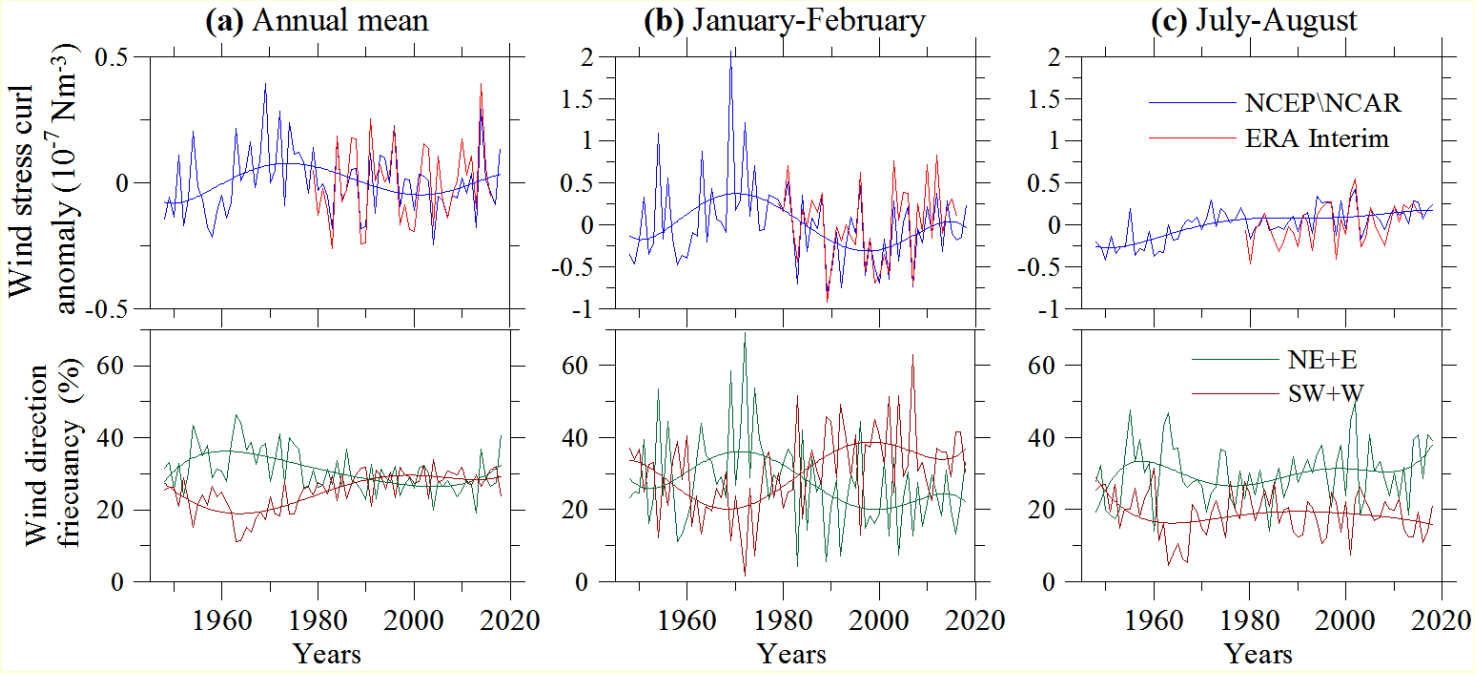
The interannual variability of the basin average wind stress curl has the same tendencies according to the NCEP\NCAR and ERA Interim reanalyzes with different spatial resolution.

Dependence of wind stress curl on direction of the prevailing wind

- **The direction of the wind prevailing over the sea area was defined for each time moment (4-time daily).**
- **Composites of wind stress curl fields are formed for events with each wind direction.**
- **Mean wind stress curl corresponding to a specific wind direction is calculated by averaging over a set of situations with this wind direction.**







r(curl,fr(NE+E))= 0,63 *r(curl,fr(SW+W))*= -0,55

r(curl,fr(NE+E))= 0,86 *r(curl,fr(SW+W))*= -0,77

r(curl,fr(NE+E)= 0,36 *r(curl,fr(SW+W))*= -0,29

Conclusion – The interannual variability of wind stress curl depends on frequency of the wind of specific direction