**4 Conclusion**

This comprehensive climatological analysis of fog and mist occurrences at Pula Airport from 2001 to 2020 has provided valuable insights into the changing patterns of these meteorological phenomena. By combining classical statistics and neural networks, the study produced noteworthy results.

The observed statistically significant decreasing trend in the frequency of fog and mist at the airport is consistent with similar findings in Europe, such as at Zagreb Airport (Zoldoš and Jurković, 2016) and Milano Airport (Mariani, 2009). While the decrease in Zagreb and Milan is largely attributed to reduced air pollution, this conclusion is more challenging to apply to Pula. As a smaller city with less industrial development, Pula’s impact on neighboring suburban and rural areas is not as pronounced. While a decrease in fog and mist frequency has been observed across Europe, the effect is more prominent in continental Europe than in the Mediterranean region (Vautard et al., 2009).

Global warming and climate change are key drivers behind the long-term decline in fog frequency. Contributing factors include rising temperatures in Pula and the surrounding Istria region (Bonacci, 2010; Šimunić et al., 2021), increased sea surface temperatures (SST) throughout the Mediterranean (Pastor et al., 2018) and global trends in ocean stratification (Li et al., 2020). Climate model reanalysis for the Adriatic Sea from 1987 to 2017 shows clearly positive SST trends, especially in summer (Tojčić et al., 2023). Positive wind trends have been observed over the sea and along the Adriatic Coast, between 0.1 and 0.2 m s-1 per decade (Tojčić et al., 2023), which could influence fog formation. Warmer SSTs reduce the temperature gradient required for fog formation and increase evaporation rates, promoting fog advection when winds are favorable. In Pula, these favorable winds, which blow over the sea, play a significant role in fog and mist formation.

Analyzing the classified synoptic patterns—a key focus of this study—reveals that the patterns conducive to fog and mist generally have a negative trend. For example, quasi-non-gradient synoptic situations, the most common favorable pattern, have shown predominantly negative trends. This decline in quasi-non-gradient synoptic situations has already been documented during the summer months (Belušić Vozila et al., 2021). As these favorable synoptic patterns decrease, the accompanying winds that facilitate the advection of evaporated moisture from the sea to the land—strongly influenced by SST and air temperatures—are also reduced. Consequently, the number of days with fog and mist is expected to decline over time.

Overall, these findings provide a strong foundation for further research, facilitating a deeper understanding of the meteorological and oceanographic factors that influence fog and mist at Pula Airport. This is especially significant as it marks the first scientific study on fog in the Pula region in over 50 years, a period during which climate change has notably impacted the local climate. Future projections suggest these changes will intensify, including lower wind speeds in coastal areas and more extreme contrasts such as increased droughts and heavy precipitation events (Tojčić et al., 2024). This study has taken on the broad task of identifying synoptic patterns conducive to fog and mist formation. Since fog and mist are mainly influenced by wind speed and moisture advection, there is potential for coupled atmospheric-oceanographic modeling that incorporates local topography and enhances the parameterization of processes at finer temporal and spatial scales. Such advancements would provide a more comprehensive understanding of local meteorological phenomena and their implications for various applications, including aviation meteorology and environmental monitoring.