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Integrating Weather Impact in Air Traffic Controller Shift Scheduling in Remote and Conventional Towers

This research studies the impact of various weather phenomena on air traffic controller (ATCO) task load through structured interviews with ATCOs. Task load-driven impact factors and the corresponding thresholds for the intensity of the weather phenomena at several Swedish airports are taken into consideration and analysed. To account for the uncertainty in the weather prediction, the research obtained probabilistic weather data from Ensemble Prediction Systems. The prior mixed integer programming model was adjusted for remote tower centre staff scheduling to account for uncertain impactful weather occurrences and yield a distribution for the necessary number of ATCOs for remote tower centre staff scheduling. The framework can be used for conventional towers as well. The impact of weather is quantified by comparing the number of controllers necessary to operate at five Swedish airports from a remote tower during two example days in 2020, with and without taking weather events into account. The calculations use historical weather and flight data to show that ignoring weather impact may lead to significant understaffing at a remote tower centre.