Wind Networking in North Atlantic Oceanic Airspace

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Résumé

North Atlantic oceanic airspace accommodates air traffic between North America and Europe. Radar-based surveillance is not available in this vast and highly congested airspace. For conflict-free flight progress, the Organized Track System is established in North Atlantic, and flights are prescribed to follow pre-defined oceanic tracks reporting their positions at waypoints. Aircraft over the North Atlantic are subjected to very strong winds caused by the presence of the jet stream. The flight progress is predicted based on meteorological data forecast (wind maps). The roughness in these data often results in large differences between the predicted and the actual times at waypoints, what in tern increases the uncertainty in conflict detection and resolution. All aircraft are equipped with tools to perform instant meteorological (temperature, pressure, wind speed) measurements. Implementing new technologies will enable aircrafts to exchange these measured data with each other directly. Thus, one aircraft following other aircraft on the same track can obtain information about winds on this track from the preceding aircraft and adjust its route accordingly. This process is called wind networking. As the data obtained with wind networking is much more accurate than the initial forcast, the adjusted prediction will be much closer to the reality. In our work, we perform simulations of the wind networking process. Our results quantify the benefits of using such an approach in comparison to standard prediction based on wind forecasts.

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