

Fleet-Level Oceanic Service Optimisation: AI-Assisted Real-Time Decision Support for Weather-Aware Flight Profile Changes



This ESGI195 challenge is presented by NATS: nats.aero

Aircraft crossing the North Atlantic often operate within the Organised Track System (OTS), which helps manage eastbound and westbound traffic flows across oceanic airspace. These tracks are planned using airline route preferences, expected demand, weather, separation requirements, airspace constraints and traffic density. Oceanic operations have longer planning horizons than domestic radar-controlled airspace, so any change to a flight profile must remain safe and conflict-free for a longer period, not just solve an immediate issue.

This challenge looks at how mathematical modelling, optimisation, AI and machine learning can support oceanic controllers in making better **fleet-level decisions in real-time operations**. Airlines request routes and flight levels that support fuel, time and cost efficiency, but these profiles may need to change during operation because of bad weather, traffic complexity, conflict risk or level allocation constraints. The aim is to generate a small number of clear and practical options for the controller, such as changing flight level, using an alternative track, making a short-term conflict free (at fleet level) deviation around bad weather and then returning to the original route, or selecting a better rejoin point.

The problem is not about finding the best route for one aircraft in isolation. A change to one aircraft's profile can affect many other aircraft in the same airspace. For example, moving one flight around bad weather may create future conflicts, increase traffic on another track, or reduce options for other aircraft later in the crossing. The challenge is therefore to find profile changes that are useful in real time, respect airline preferences where possible, and keep the wider fleet safe, efficient and conflict-free over a longer look-ahead period. The expected outcome is not an operational tool, but a set of ideas, models and recommendations that show how future decision-support systems could help controllers assess changing traffic situations and provide better real-time profile options at fleet level.