PP07: ENVIRONMENTAL IMPACT FUNCTIONS: LINKING ENVIRONMENTAL IMPACT INFORMATION FOR PLANNING ENVIRONMENTALLY-OPTIMAL TRAJECTORIES

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Abstract. Beyond the desire to minimise fuel use and hence CO2 emissions, currently the consideration of environmental aspects in en-route flight planning has not been operational practice. The reason for this is a low TRL (technology readiness level) of a flight planning method that considers a multi-dimensional environmental impact assessment and a lack of scientific support to motivate environmental flight planning. The exploratory research project within the SESAR2020 project addresses this gap and has as main objective to explore the feasibility of a concept for environmental assessment of ATM operations working towards environmental optimisation of air traffic operations in the European airspace.

The study will present how a multi-dimensional environmental cost function (ECF) concept is established, which includes air quality impact (for key pollutants) and noise in addition to climate impact. This concept integrates existing methodologies for assessment of the environmental impact of aviation, in order to evaluate the implications of environmentally-optimized flight operations to the European ATM network, considering simultaneously different environmental impacts, comprising climate, air quality and noise impacts. These ECFs are derived from dedicated model output of atmospheric global circulation models, e.g. EMAC, local air quality tools, e.g. Open ALAQS and noise models, e.g. STAPES.

Specifically, a modelling concept for climate-optimisation which has been developed in a feasibility study for the North Atlantic (REACT4C) is expanded to a multi-dimensional environmental impact assessment, covering climate, air quality and noise. Climate cost functions were introduced, to establish a link between climate impact information and flight planning tools, in order to identify climate-optimal aircraft trajectories. This concept is expanded to cover a series of environmental impacts, by providing additional environmental change functions (ECFs) which represent a quantitative measure on impact of emissions and aircraft operations on local air quality and noise. Making available these ECFs in a flight planning tool allows assessing environmental impacts and identifying environmentally-optimal trajectories.