

Dieter Scholz

## Aircraft Contrails – Observation and Prediction

**Purpose** – In this project contrails in the sky are observed. Their existence and persistence is compared with calculations.

**Methodology** – Photos are taken of aircraft and of their contrails passing by in cruise. The contrails are categorized according to their lifespan. The website flightradar24.com is used to obtain flight data (altitude and temperature). Also, satellite images and contrail recordings were collected from other publicly available websites. The Schmidt-Appleman diagram and the Schmidt-Appleman criterion were used for predicting contrail existence and persistence. Input data is altitude, temperature, and relative humidity. Relative humidity was obtained via the website windy.com from the European Centre for Medium-Range Weather Forecasts (ECMWF).

**Findings** – Contrails can be predicted with the method. For contrail lifespan three categories were defined: no contrails, transient contrails (lifespan of a few seconds up to five minutes), and persistent contrails. The lifespan of contrails was correctly categorized based on predictions.

**Research Limitations** – The observation took place with the naked eye and a smartphone camera. Accordingly, no observations could be made during the night. In addition, only a limited number of aircraft were observed. The resolution of the relative humidity is limited with respect to altitude and time.

**Practical Implications** – A hands-on approach is presented, ready for everyone to apply.

**Social Implications** – Contrails can be seen by everyone. Systematic contrail observations readily expose the aviation industry as fostering or boycotting avoidance of warming contrails.

**Originality** – The well-known idea of contrail observation and prediction from the ground may have been deemed too simple and unworthy of science so far to be applied in a project.

<https://nbn-resolving.org/urn:nbn:de:gbv:18302-aero2024-03-14.019>

*This is an abstract answering the Call for Papers of the German Aerospace Conference 2024 for an informative poster at the conference.*

Prof. Dr.-Ing. Dieter Scholz, MSME  
Hamburg University of Applied Sciences  
Department of Automotive and Aeronautical Engineering  
Aircraft Design and Systems Group (AERO)  
<http://www.ProfScholz.de>  
[info@ProfScholz.de](mailto:info@ProfScholz.de)