

# *An Approach to Define Adverse Wx Zones Based on the Flight Management Performed by Pilots in Convective Weather Events*

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**DFS** Deutsche Flugsicherung

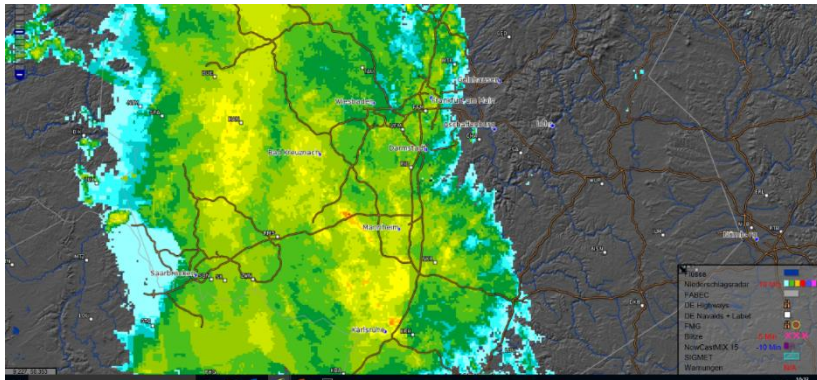
# Motivation and objectives

- In ATM and ATC often only ground based weather radar data is used to determine areas with adverse convective weather (Adverse Wx Zones) events like thunderstorms.
- 37dBZ radar reflectivity is the threshold value used in Germany then aircraft avoid such weather events.
- But: no one / few ever had verified this threshold and ever evaluated if more meteorological data is needed (e.g. lightning) for ATCO / pilot interaction in a typical airspace
- Modification or (new) combined product is needed?
- Real-time simulations for validation purposes
- Integration into controller assistance
- SESAR 2020 PJ10 Advanced Separation Management task
- Partners: DWD, MeteoSolutions, DFS
- Duration: 12/2019

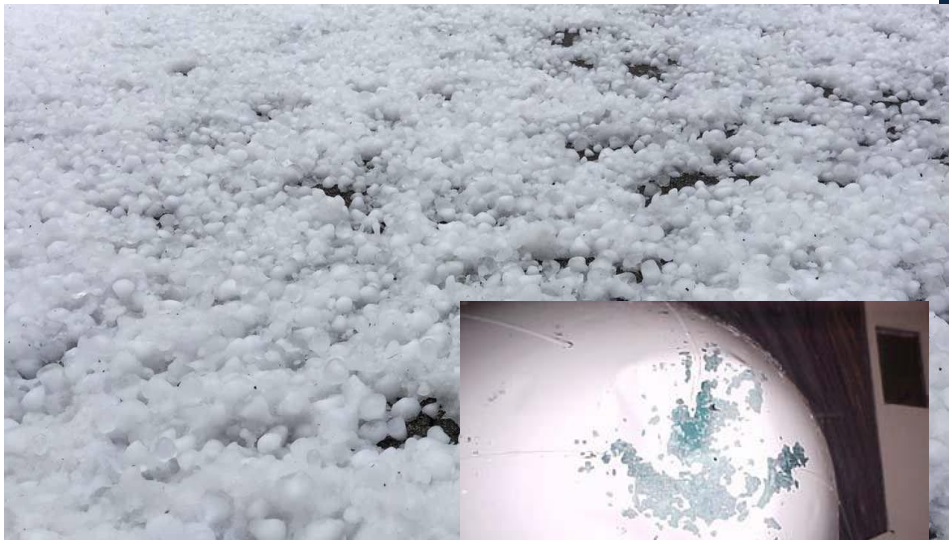


# Current status: single products of WX phenomena

## Weather radar reflectivity



## Lightning



## Hail



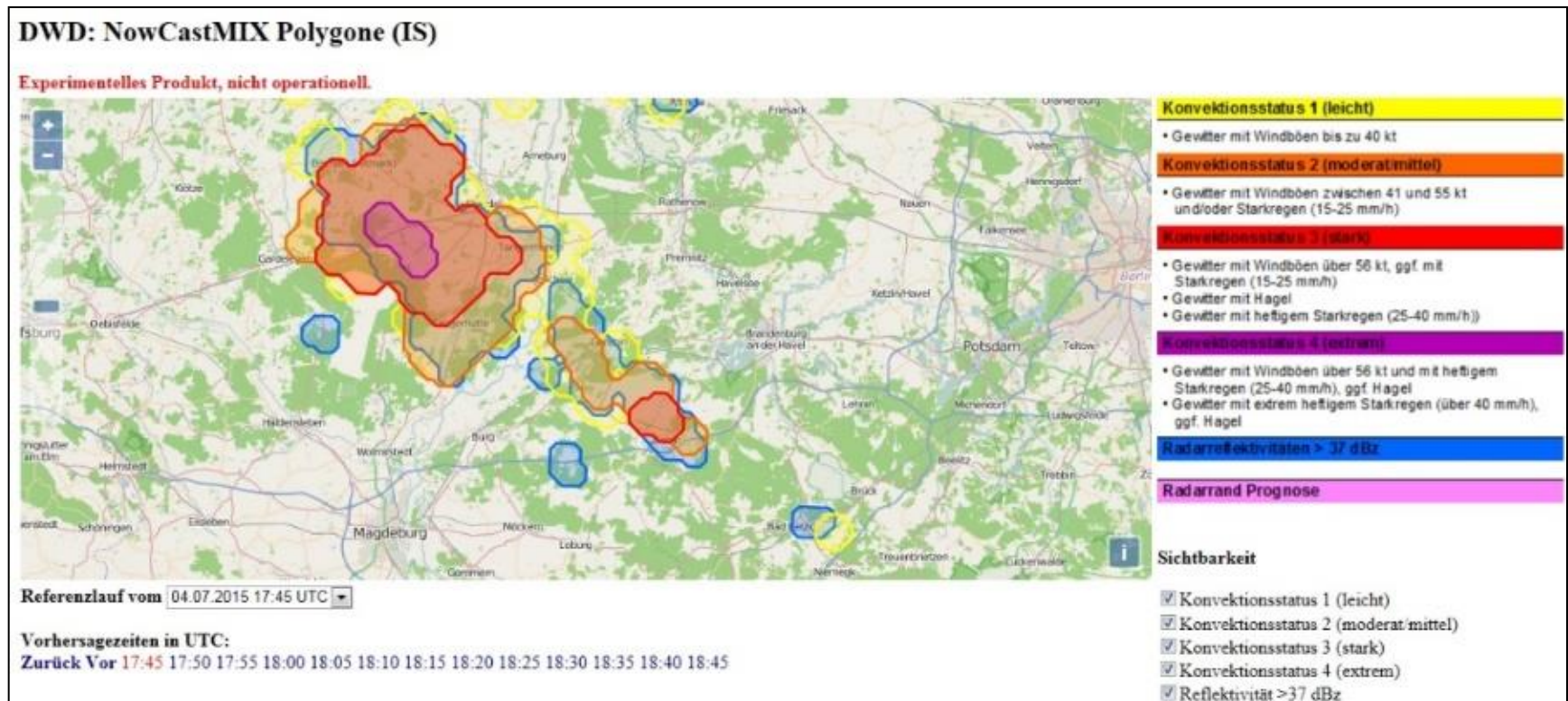
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## Rain



# New combination product of DWD (nowcast mix aviation)

- Four convective warning classes plus weather radar activity (> 37 dBZ)
- These areas are a combination of radar intensity, lighting, hail, rain, gusts
- Current situation and nowcast (+1h)



# Lateral avoidance behavior: Results of commercial pilots' interviews

## Meteorological aspects:

- Cockpit weather radar (intensity: reflectivity dBZ)
- Cockpit weather radar (area, gradient, 3D shape)
- Cockpit outside view (form, lightning activities)
- Moving direction of cells

## Flight condition related aspects:

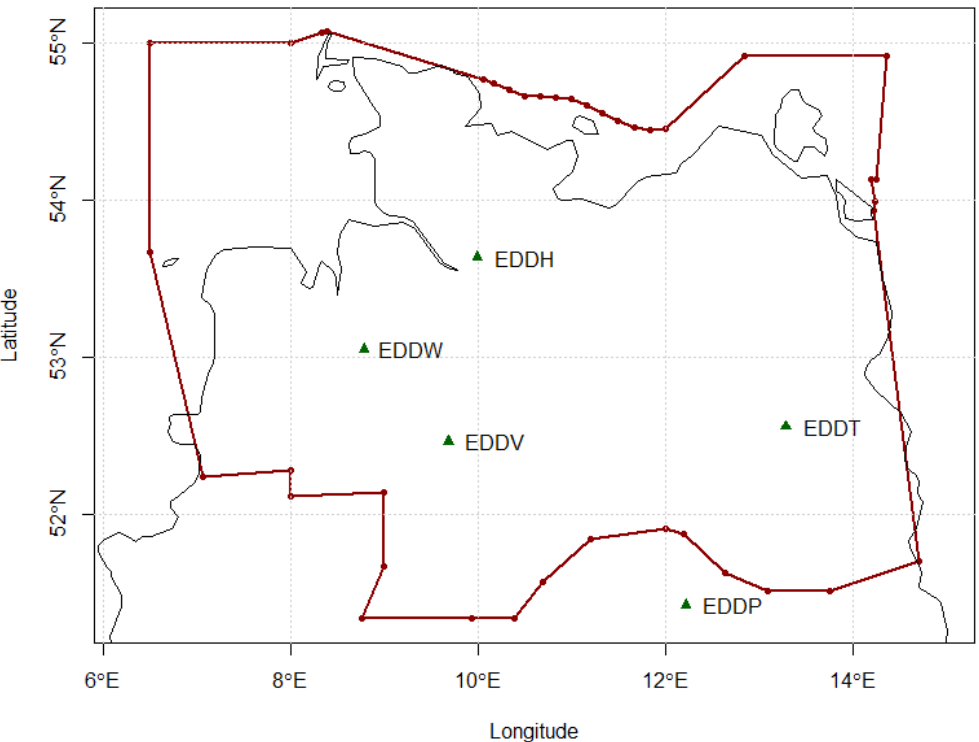
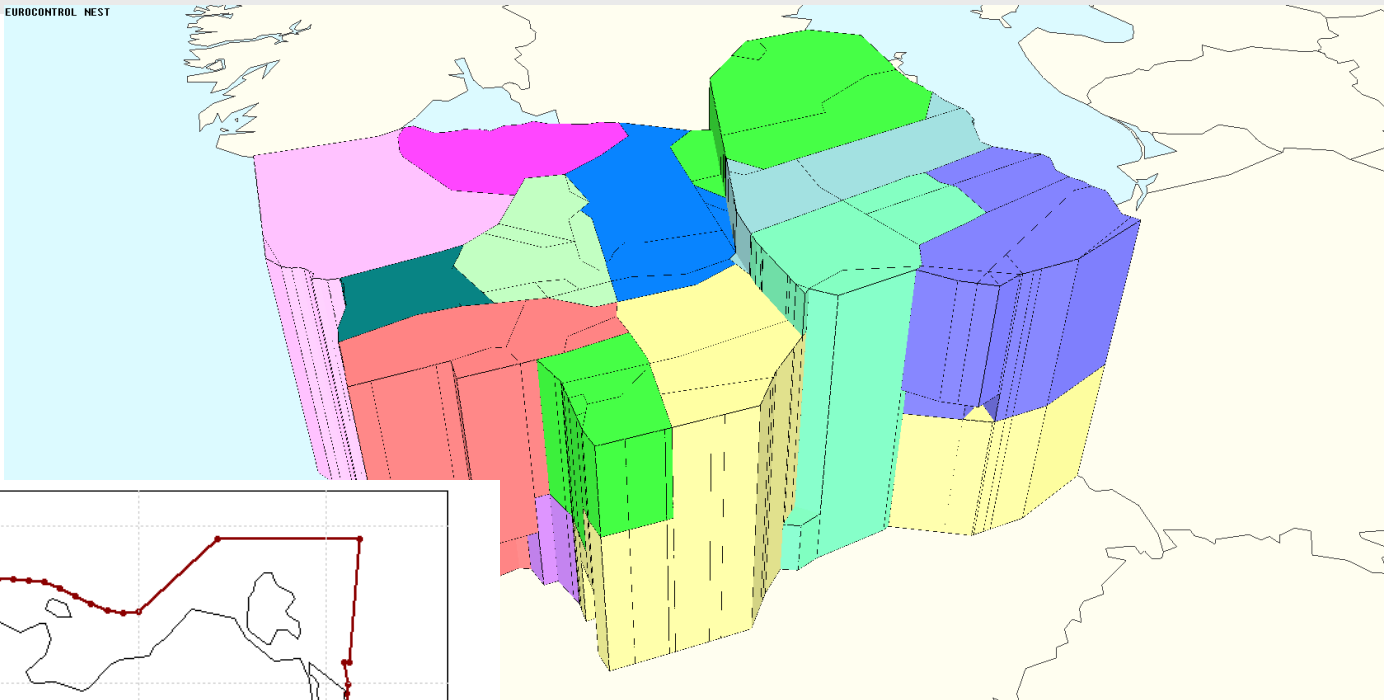
- Phase of flight
- Flight altitude versus cell altitude
- Flight distance to cell
- Planed flight route

## Less important

- Aircraft type
- Pax or freighter
- Delay situation
- Engine type
- Sector borders



# Evaluation area of lateral avoidance behavior: Bremen Flight Information Region



- Vertical borders:  
From GND to FL 245