



HALO: Status and Vision

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and the HALO team



Deutsches Zentrum
für Luft- und Raumfahrt e.V.
in der Helmholtz-Gemeinschaft

Institut für Physik der Atmosphäre
in cooperation with Ludwig-Maximilians University Munich

Jan. 1999, HGF-Climate Reviewers: German Atmospheric Science needs a larger platform for tropospheric research



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HALO – is becoming a new airborne platform for Atmospheric and Earth system research

HALO for Earth system research: atmosphere and geophysics.

Long range (>8000 km), high altitude (up to 15500 m) and large payload (about 3 tons)

HALO science driven: more than 30 institutes with international support from EUFAR, NCAR/NSF, IOC, EU etc.

HALO belongs to the German and European Geo-science research community

Operated by DLR flight facilities on behalf of the community

German industry support
(RR Germany, RUAG, Aerostructures etc.)

Finance: BMBF/BMWi, MPG, DFG,
HGF, FZJ, FZK, DLR, GFZ, IfT

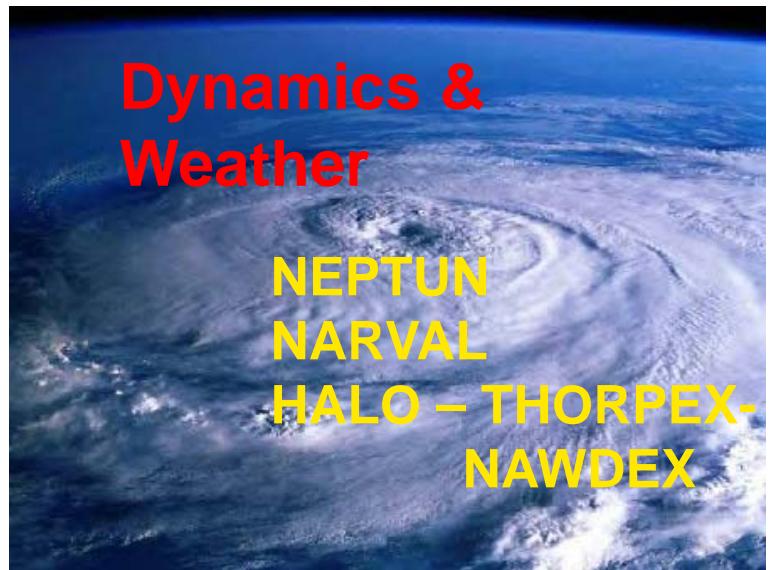
Hangar: Bayern, BMBF, DLR

Operation control: HALO Kuratorium

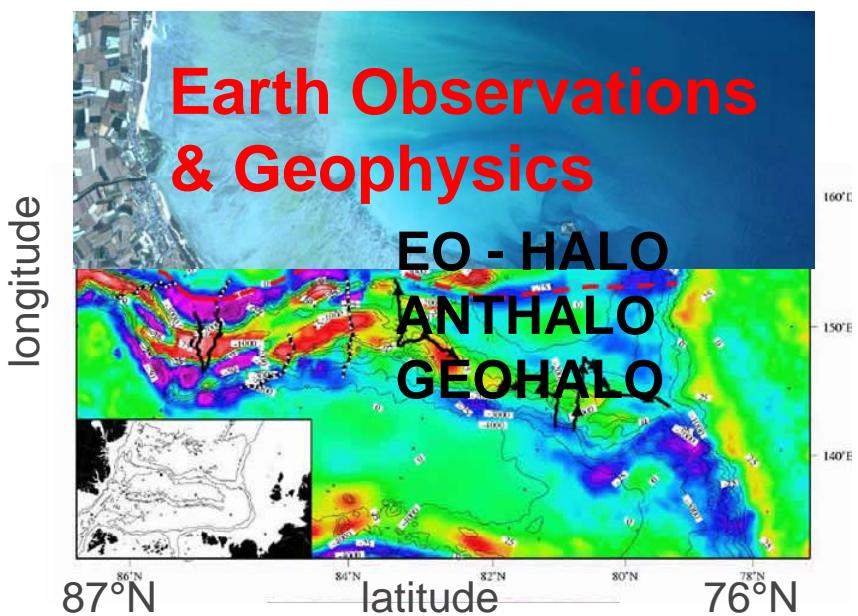
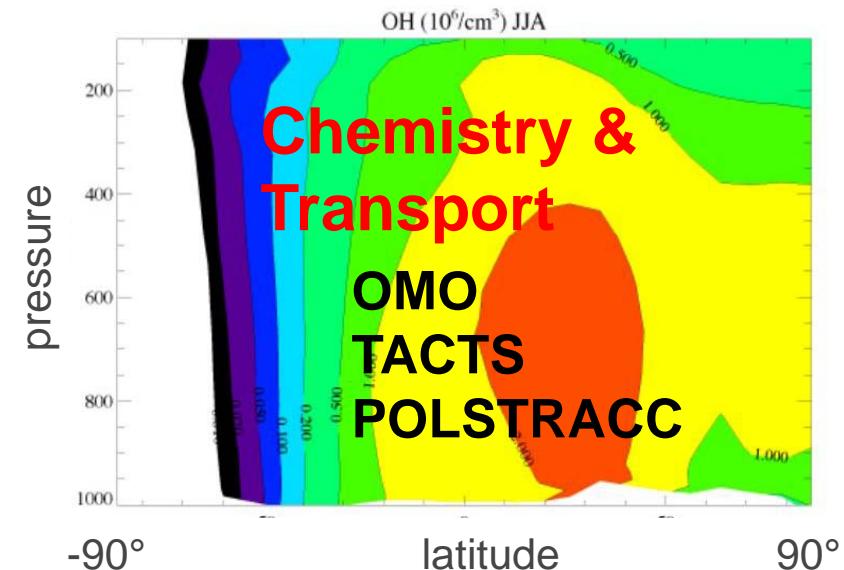
Science: guided by WLA



HALO: Demo - Missions

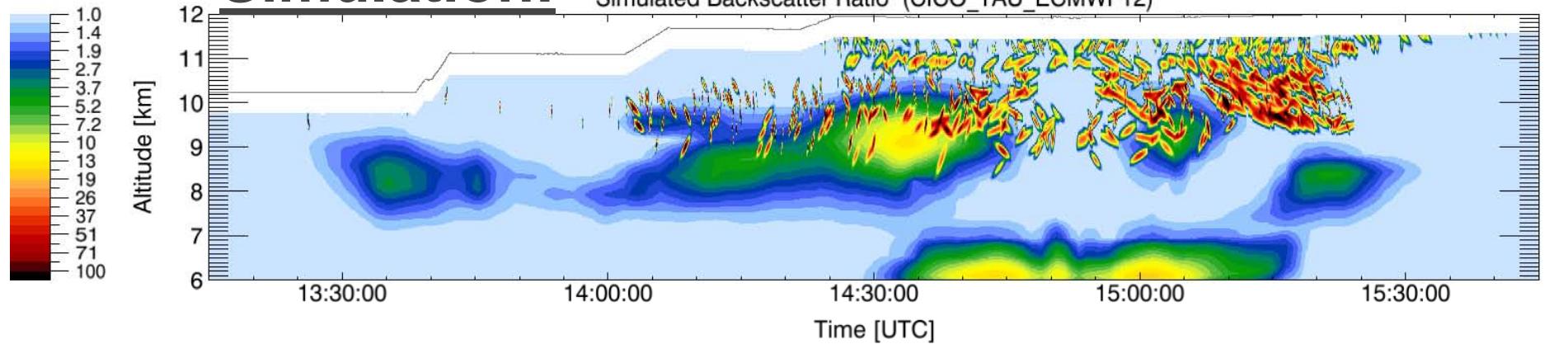


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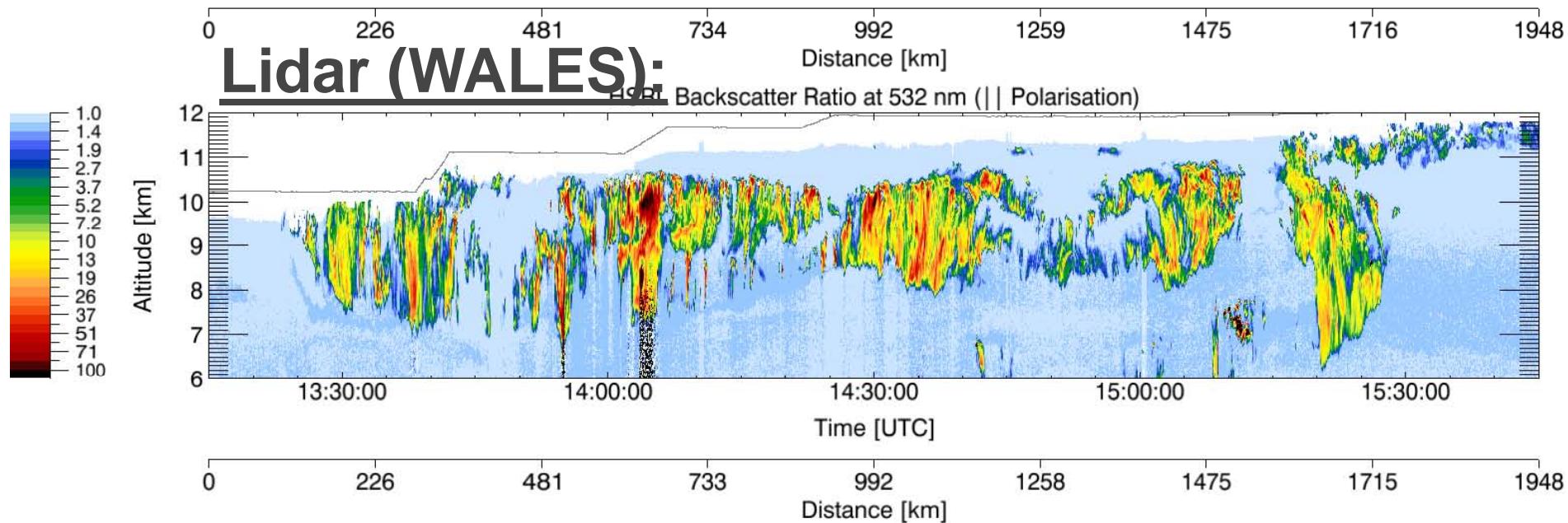


ML-CIRRUS: Natural cirrus and contrail/soot cirrus

Simulation:



Lidar (WALES):



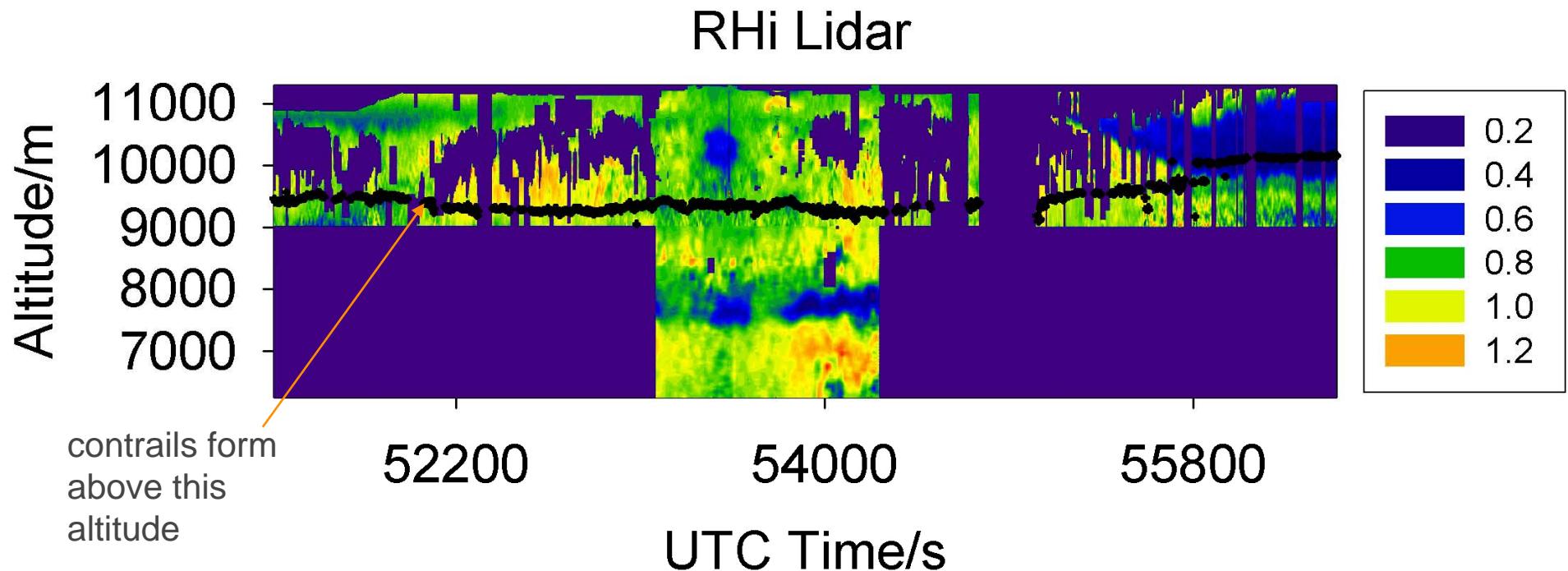
WALES: 4- λ water vapor differential absorption lidar, Wirth et al. (2009, Appl. Phys. B)



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RHi and Contrail-Threshold altitude



RHi from WALES-Lidar-H₂O-MR and ECMWF-temperature

gaps because too strong cirrus backscatter from 11.8 km Falcon altitude

far better measurements possible with HALO from 1 or 2 km higher altitude

HALO is not yet as ready as we wished it would be

HALO in OP: January 24, 2009

Ground vibration tests Feb-March 2009

First successful flight tests for data acquisition, noseboom etc in Nov. 2009

First scientific demo missions (OMO, ML-CIRRUS,...) now scheduled for summer 2011

The certification task was underestimated



HALO within DLR:



Operation by Flight Facilities OP

Basic engineering provided by DLR-Institutes for
Aeroelasticity (GÖ),
Structures and Design (ST),
Flight Mechanics and Aerodynamics (BS)
“Entwicklungsbetrieb (EB)” (Stephan Kommallein, BS)

DLR is one of the HALO science users

DLR coordinates HALO project with users: Helmut Ziereis, IPA+FB

DLR chairs the HALO Kuratorium

HALO issue 1: Aeroelastic Flatter tests - Status

Large structures mounted on wing and fuselage- > flatter danger.

Flatter analysis without mountings finished; report sent to LBA 2009

Belly Pod/Ventral Fin: flight tests summer 2010

Wing pod: needs discussion with Gulfstream (this week)

PMS flatter analysis in progress

Flight tests with wing pod and PMS carrier: 2010 - 2011



HALO issue 2: Bird Strike certification for inlets etc.

Bird strike in (rigid) inlets may cause unacceptable fuselage damages.

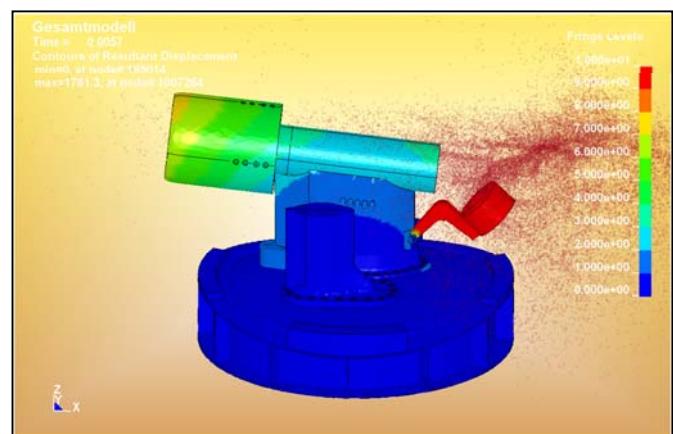
Nevertheless, permission for a few test flights can be expected



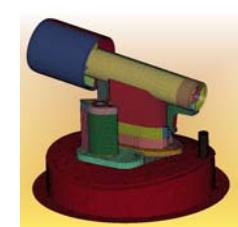
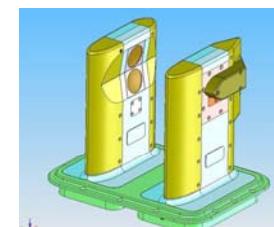
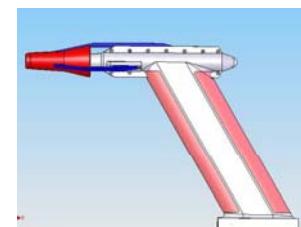
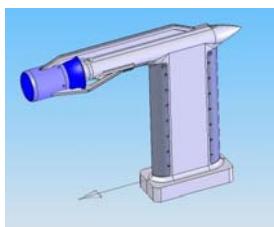
Next:

Analysis for reduced flight speed at FL < 2.4 km

Less rigid inlet design



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HALO issues: Management

More than 80 modifications; this is beyond the DLR - capacity

External companies (Gomolzig-Enviscope, Rücker, V-Plane, Optimare, Aerostruktur) are being involved

More personal for DLR-EB (total 5)

Project task force for HALO certification coordination

DLR-“Flight facilities (FB)” will be upgraded to “Flight Experiments”



HALO Techno Mission

Instrument	Mission	PI	Design
MIRAH	OMO	Uni Wuppertal	DLR
Mass spectrometer	OMO	DLR	Optimare/ DLR
SR- Radianzen	OMO	FZJ	Enviscope/ Gomolzig
WALES	ML- CIRRUS	DLR	DLR

as preparation for science missions in 2011



HALO Future: more than a Vision

2010 – early 2011: flight tests and certification

HALO Infrastruktur: trailing cone,
Lidar window, liquid cooling system,
aeroelastic flatter,
7 types of inlets,
belly pod for GLORIA and Radar,
wing pod and wing stations (PMS etc.)

mid-2010: Techno mission

4 different instruments, Els, PIs, companies, for OMO/CIRRUS

OMO: summer 2011

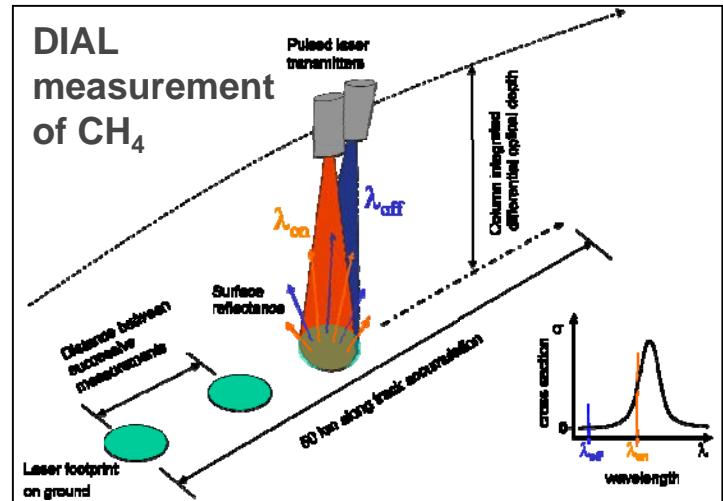
ML-CIRRUS: autumn 2011

Further science missions until 2014

HALO designed for 30 years of operation

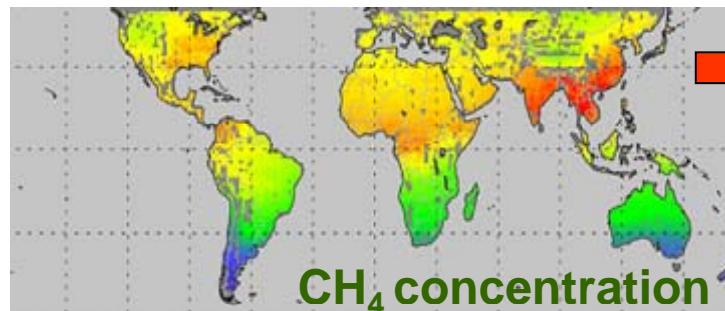


Methane-DIAL on HALO and German/French Satellite



*DIAL = Differential Absorption Lidar

Global distribution
of CH₄



CHARM - French-German Climate Monitoring Initiative

2012: CH₄/CO₂-Lidar
“CHARM-F” on HALO
(G. Ehret et al.,
funded by BMBF)

2014: Climate Satellite
CHARM on MYRIADE
(CNES & DLR)

