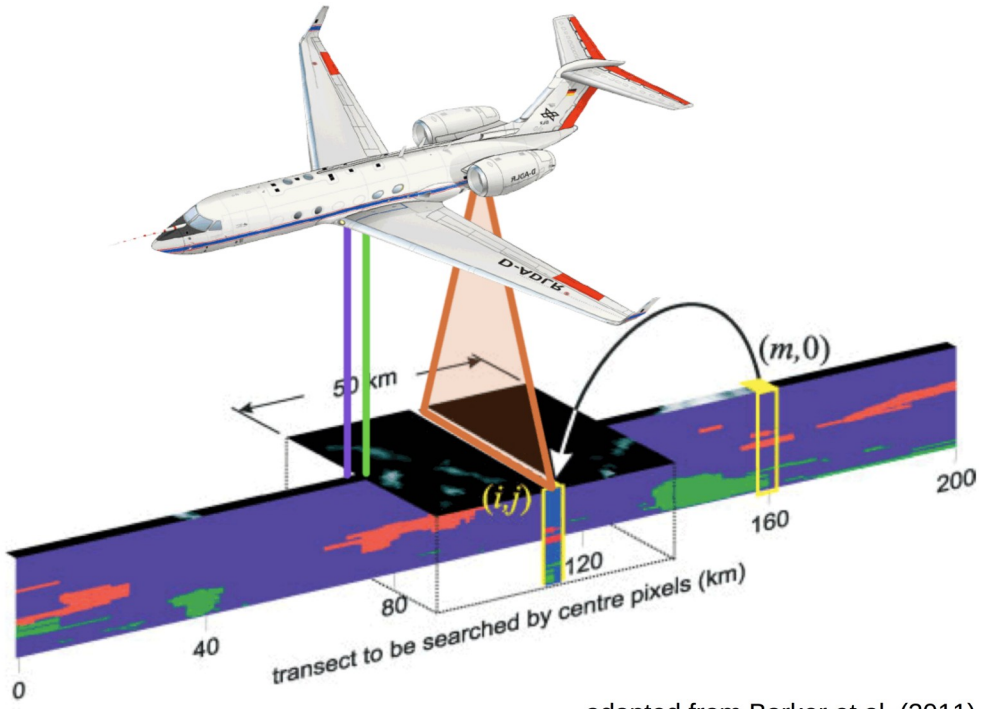
specMACS for NARVAL-II

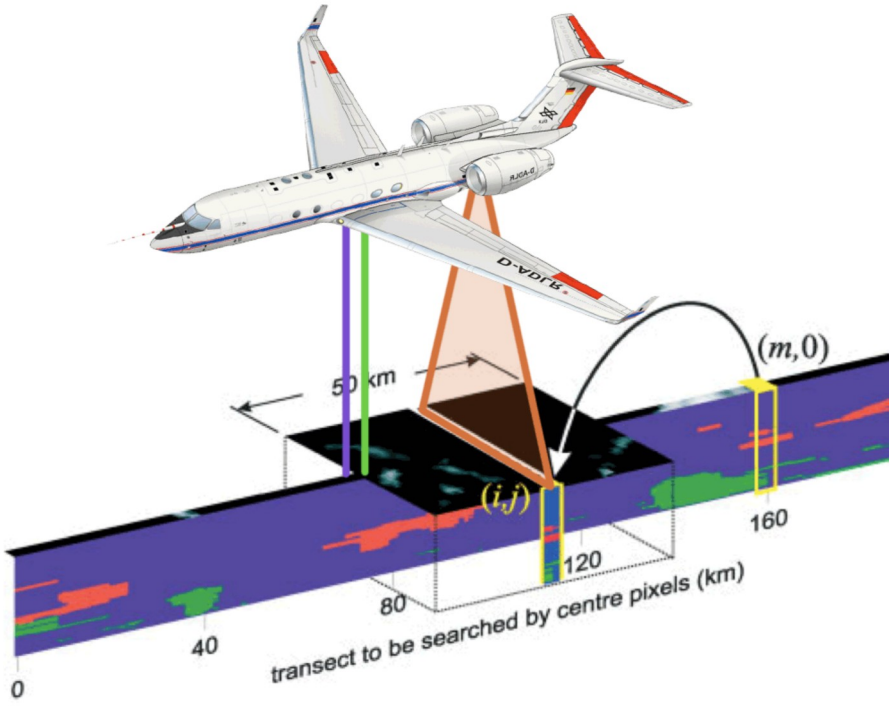


adapted from Barker et al. (2011)

Tobias Kölling, Hans Grob, Florian Ewald,
Silke Groß, Tobias Zinner, Bernhard Mayer, Ulrich Schwarz

Cloud Properties & Cloud Heating Rates

- stereo, O2A, lidar derived maps of cloud top height
- maps of cloud top phase, reff and optical thickness
- Synergetic retrieval (Delanoe et al.) ice cloud cross section

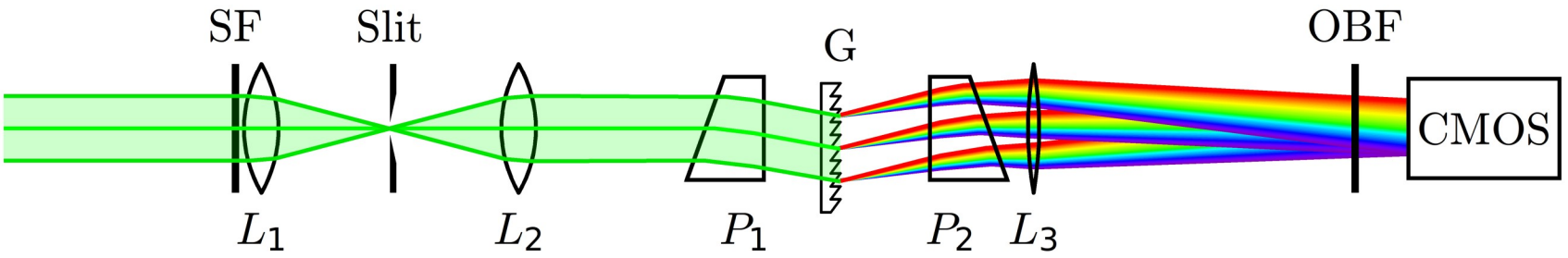


adapted from Barker et al. (2011)

➔ 3D cloud property distribution

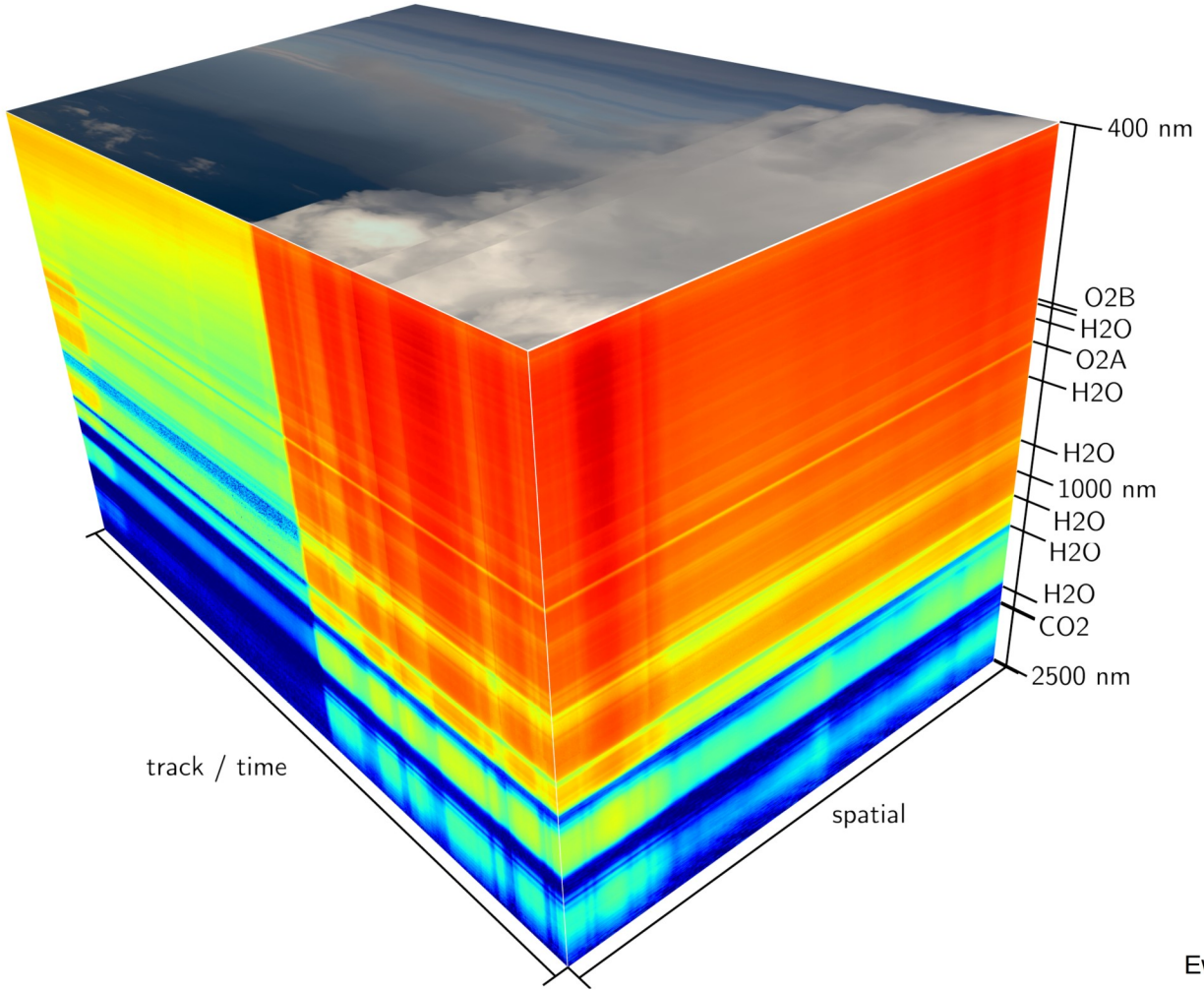
➔ 3D heating rate and cloud albedo distributions ◄► Comparison with SMART radiance and irradiance

specMACS
Working Principle



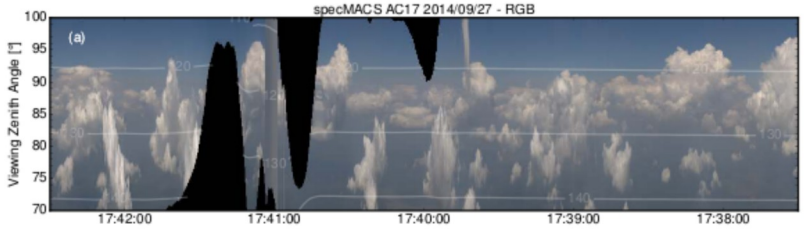
Ewald et al. (2016)

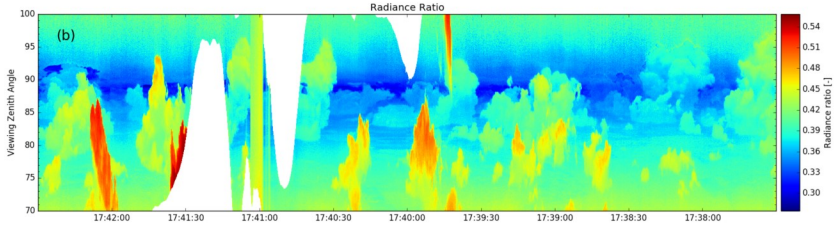
Data Cube

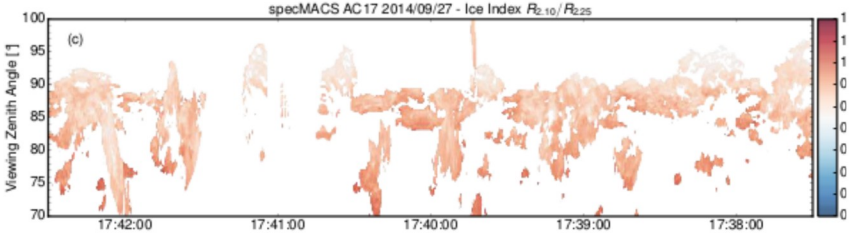


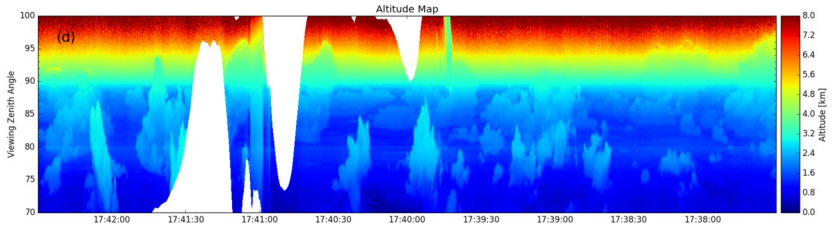
Ewald et al. (2016)

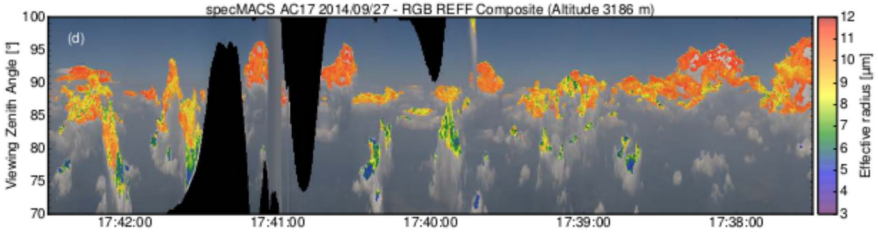
Effective radius & height



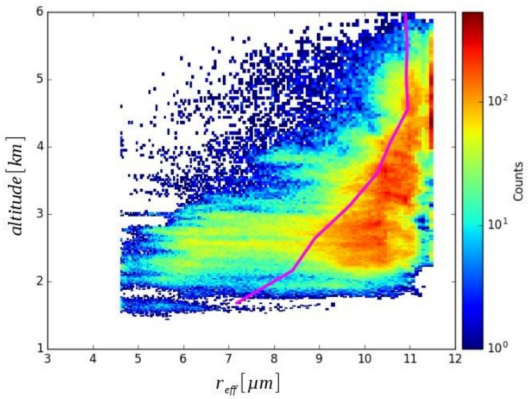






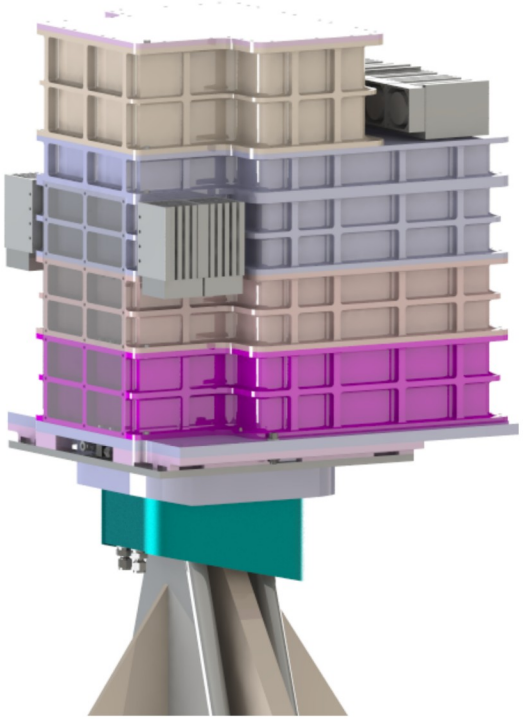


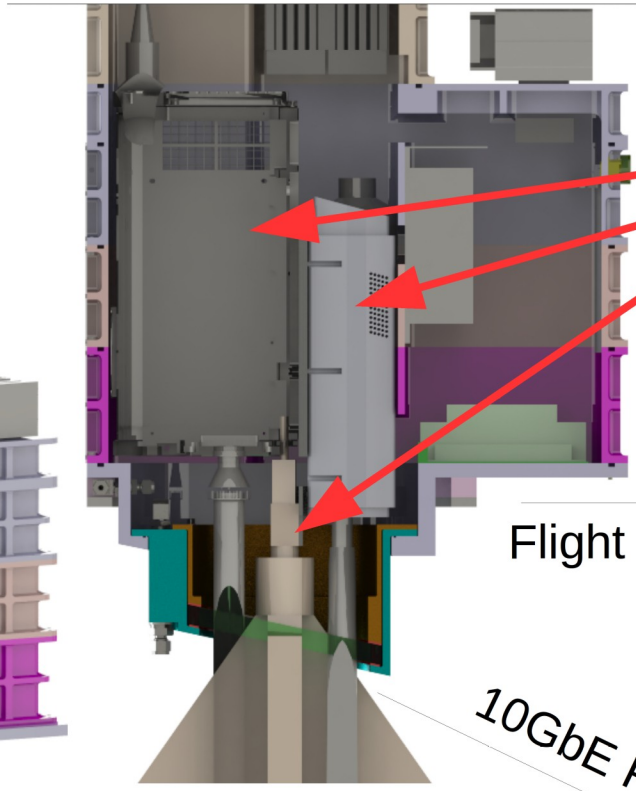
Ewald (2016)



Schwarz (2016)

Current State





Cameras:
- 1D-SWIR
- 1D-VNIR
- 2D-RGB

in pressurized containment (boiler room)

Flight direction

Data storage PC in SMART rack (cabin)

10GbE Fiber

Illustrations from enviscope GmbH

Integration steps

Finished:

- System Design
- Dimension check with mockup in HALO
- Start of manufacturing
- Critical Design Review

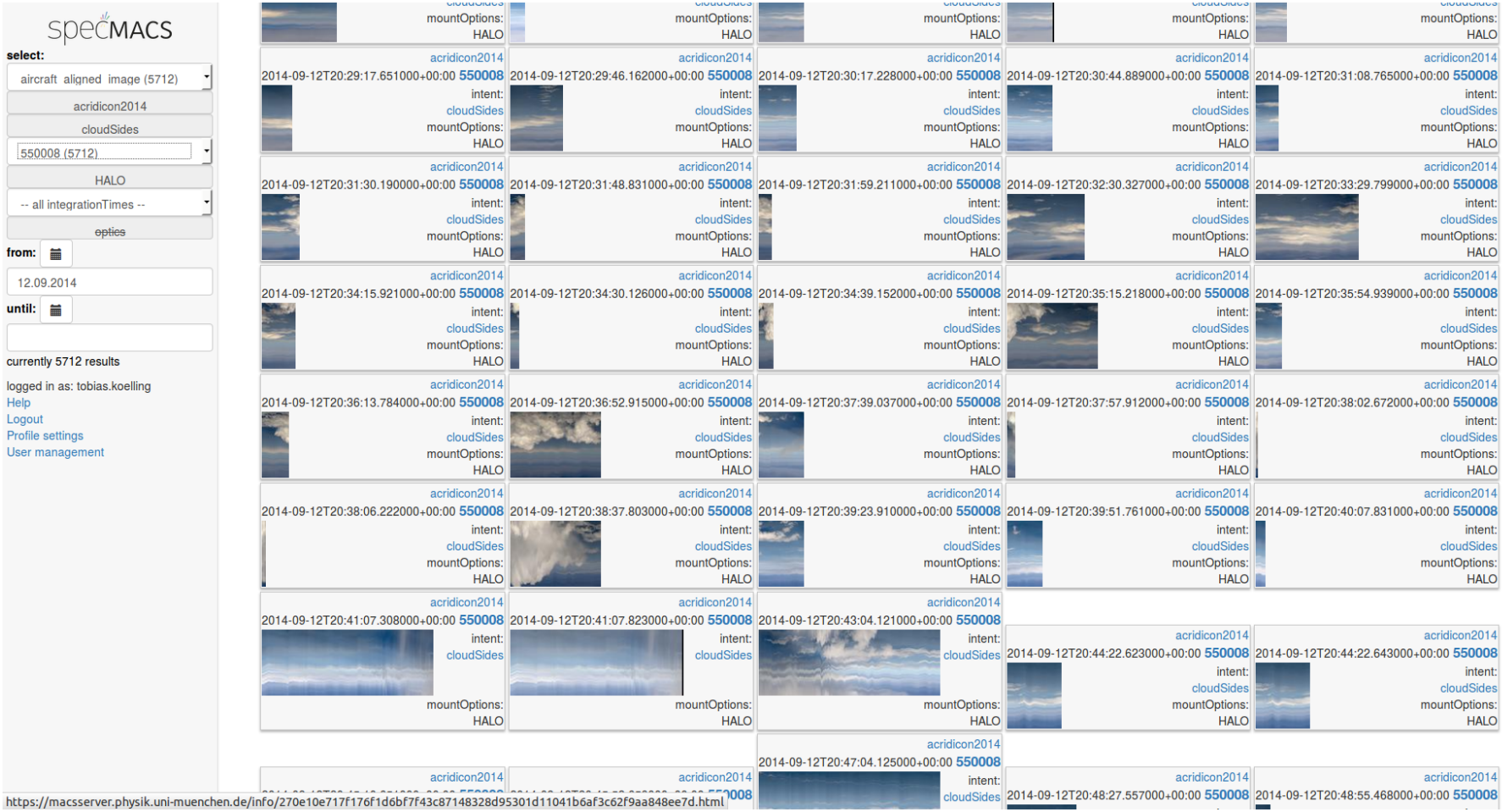
TODO:

- Finish manufacturing of new parts
- Assembly & Test
- Mission specific software modifications
  - Any requests for special live- or quicklook data?

Operational Constraints

- Can only measure in sunlight / daytime
- Can only measure below aircraft, ideally no clouds above
- Can store approx 20h of data in aircraft w/o download
- 30 fps: approx 5 km optimal working distance
- Swath @ 1.5 km:
  880 m (VNIR), 960 m (SWIR), 2.1 km (2D cam)
- Swath @ 5 km:
  2.9 km (VNIR), 3.2 km (SWIR), 7 km (2D cam)
- Resolution: approx 1…2 m / km distance

macsServer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Thank you

Thank you for your attention

General questions?

Requests for special software modifications?

Requests for special live / quicklook data?