Universität Stuttgart
Institut für Raumfahrtsysteme

Flying Laptop Abschlussworkshop

Erdbeobachtung und Nutzlastdatenprozessierung

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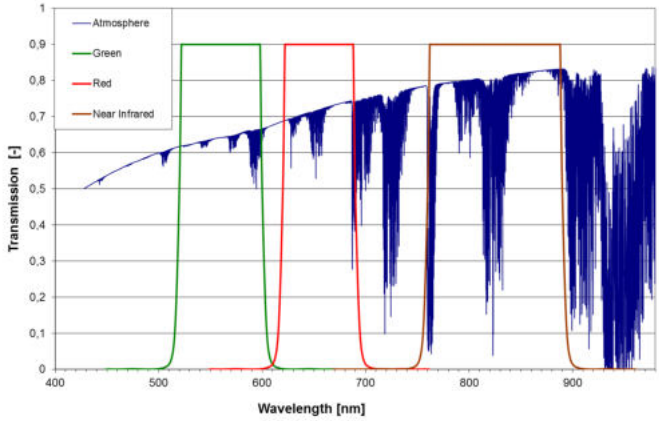
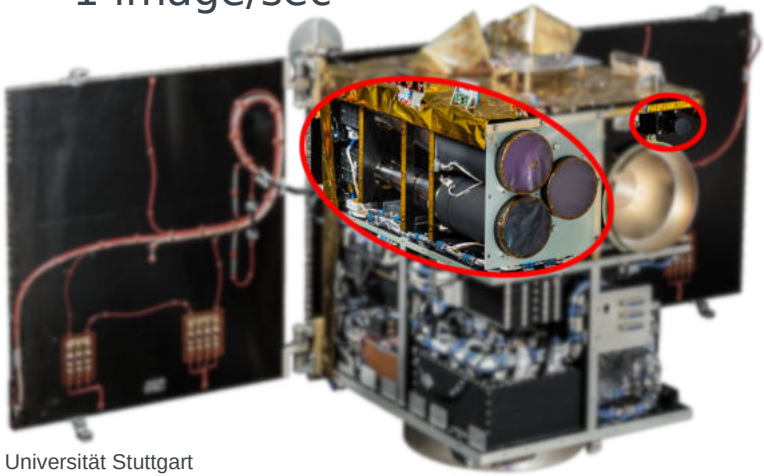
Flying Laptop Cameras

- MICS
  - Multi-spectral Earth observation for land surface classification
  - Green, Red and NIR channel
  - 1024x1024x12bit Pixel
  - 21m GSD
  - 1 image/sec

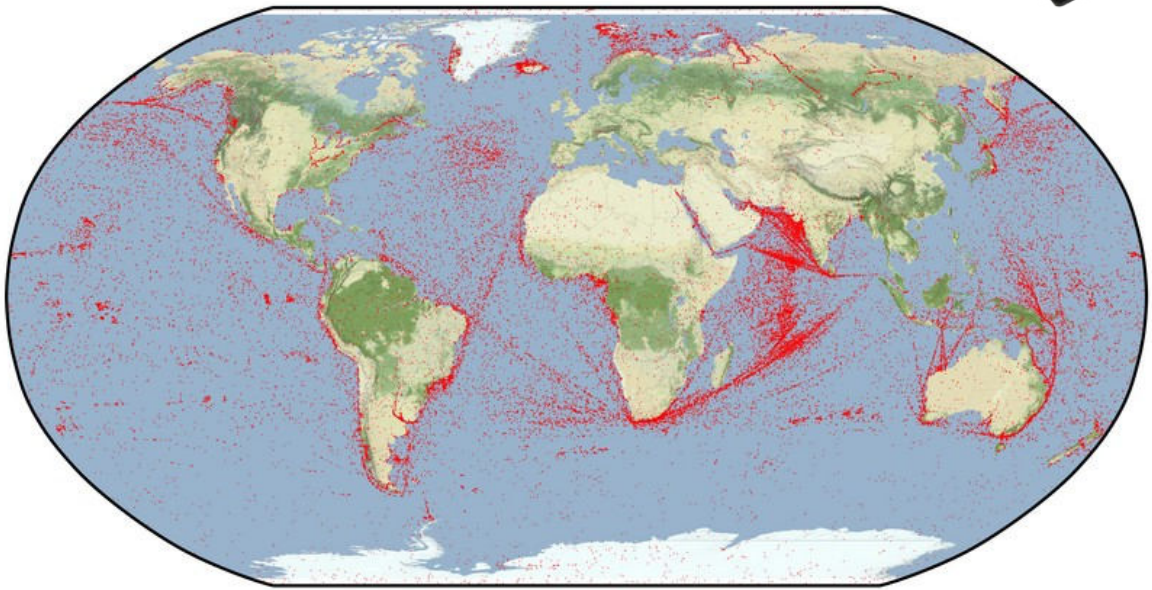




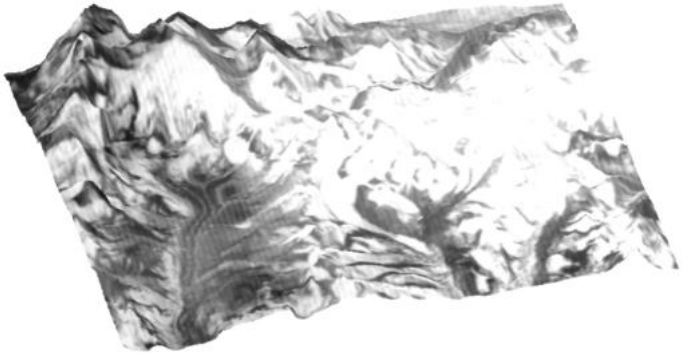
- PAMCAM
  - 170m GSD
  - 1280x1024x10bit Pixel
  - Bayer Pattern color mosaic
  - Wide angle color images for public outreach

AIS Ship Receiver

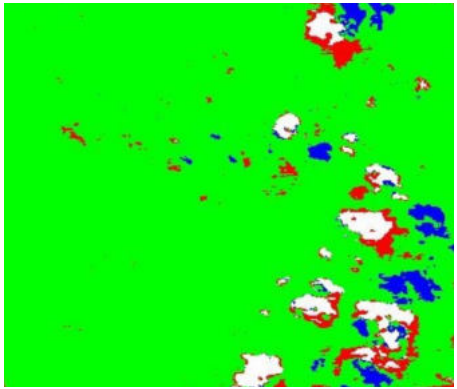
- Worldwide ship tracking
- Ships with a cargo bay > 300 register tons obliged to send AIS
- Ship position and status transmitted
- FOV = FLP Horizon = 132°



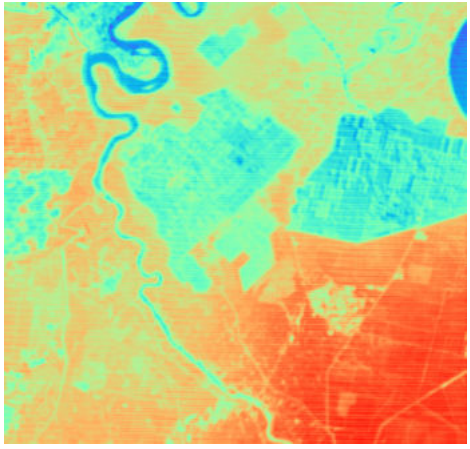
Results MICS



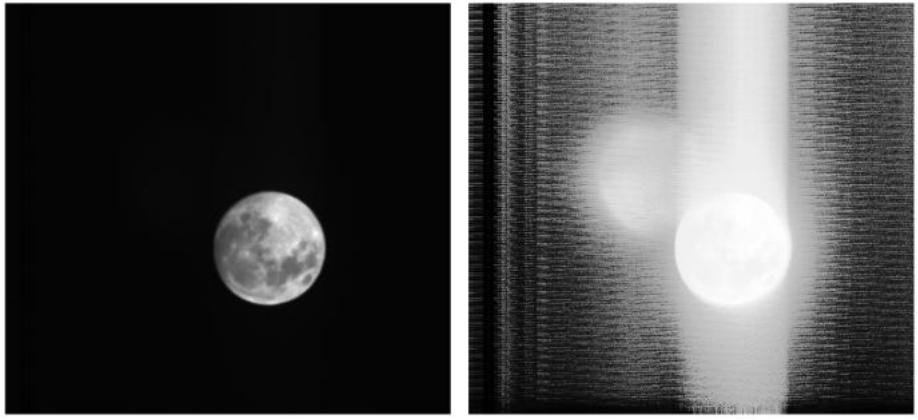
Orthorectification



Cloud detection

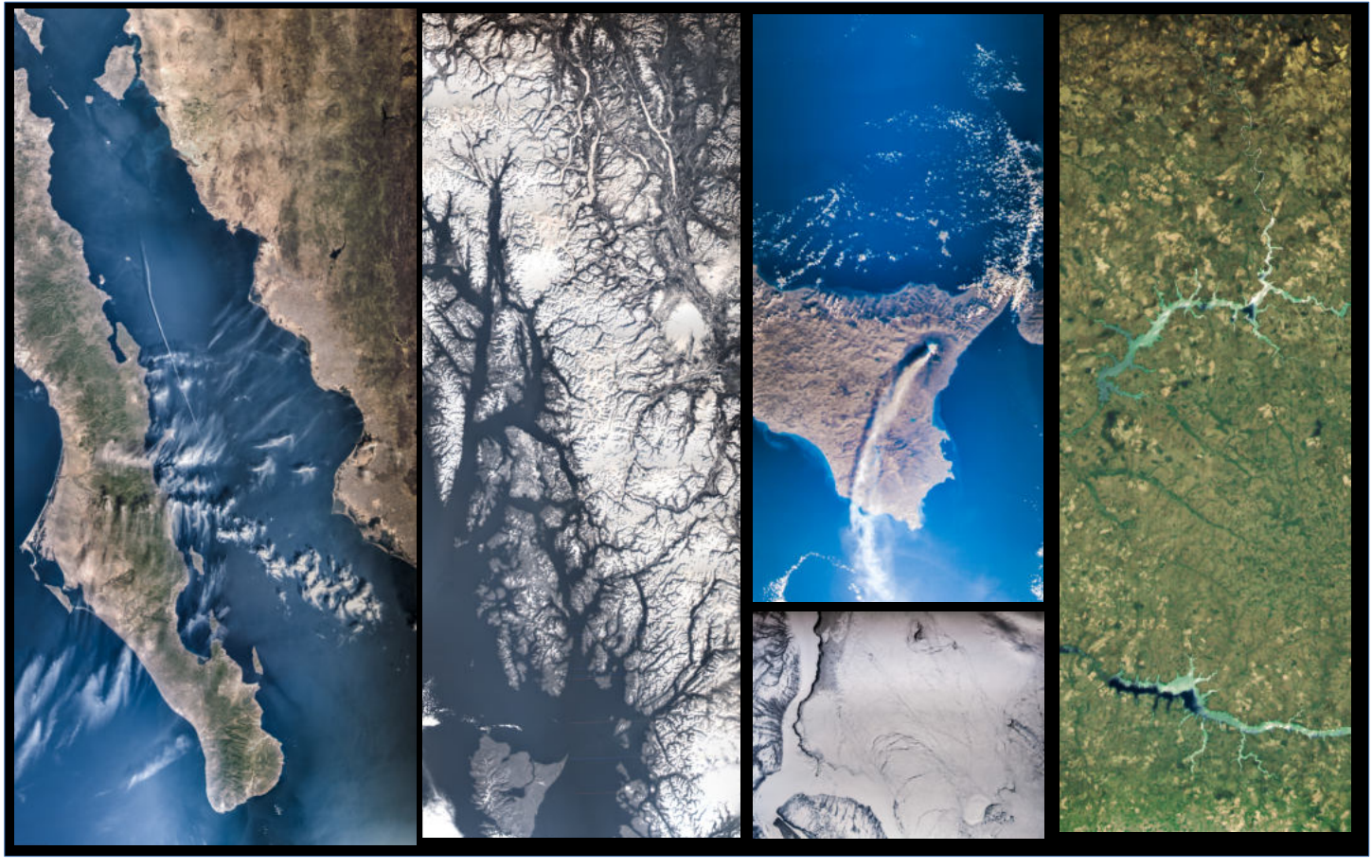


Vegetation Index (NDVI)



Earth Albedo measurements with the moon

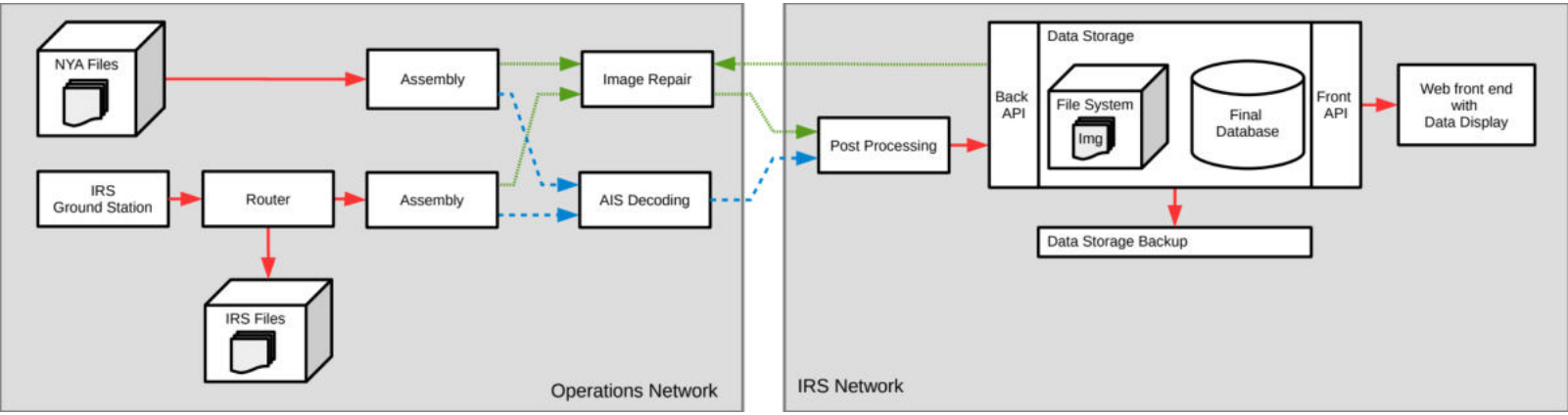
Results PAMCAM



Payload Data Handling Concept - Requirements

- CCSDS conformity
- Multiple input streams (ground stations)
- Easy access with multiple programming languages
- Multiple payloads
- Multiple missions
- Scalable

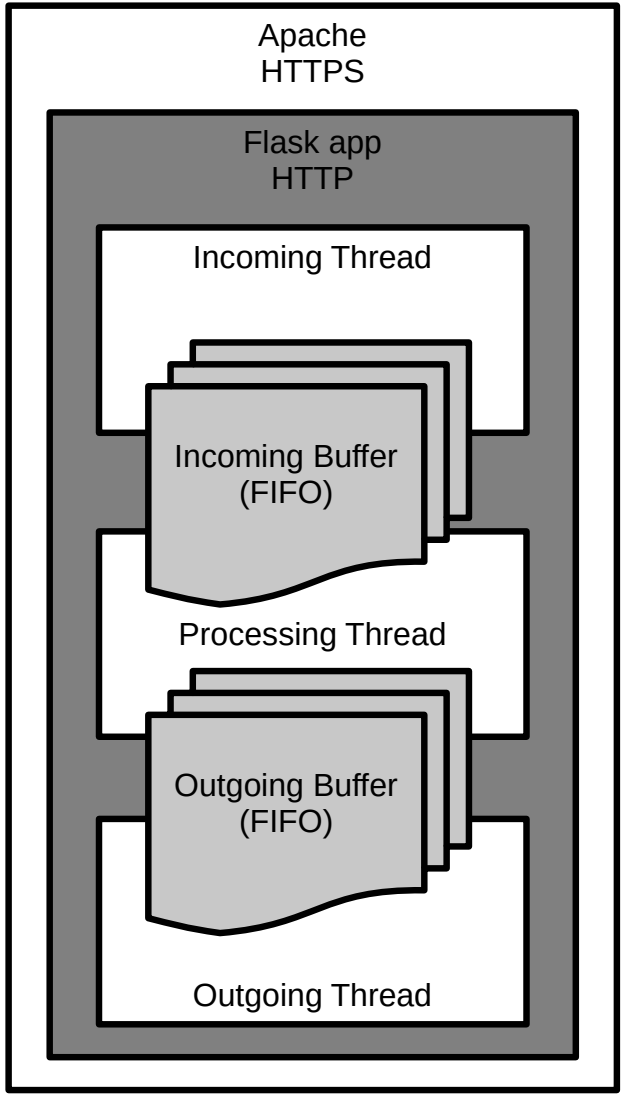
FLP Nodes



- Data from the Institute of Space Systems (IRS) and Ny-Ålesund ground station
- All payloads: red
- Images : green
- AIS: blue

Interface and Node Concept

- Client - Server
- HTTP server wrapped with HTTPS
- JSON / BSON
- Monitoring server
- Multi threaded

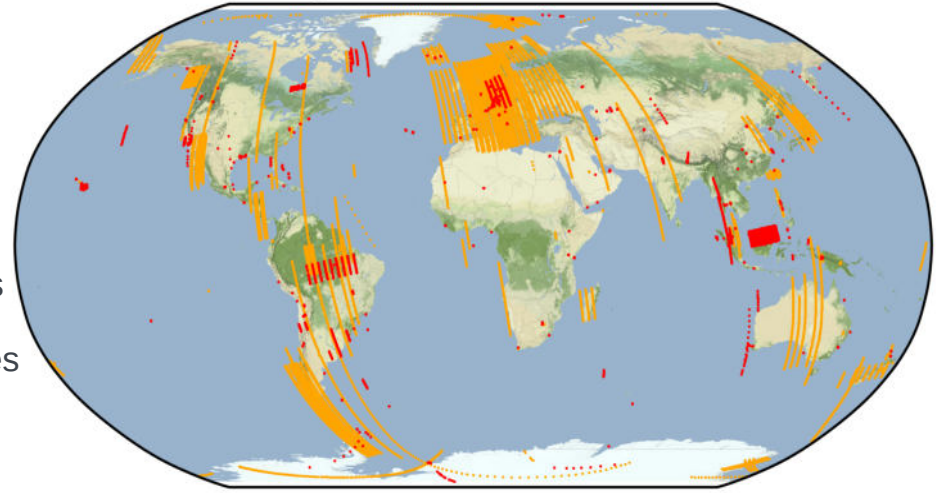


Performance and Limitations

- > 1600 tickets for payload operations planned
- > 1900 passes scheduled for downlink
- Satellite downlink: 10 Mbit / s → 1.8 images / s
- 825 Mbyte maximum per contact

- 3.25 images / s can be extracted from the stream
- No parallel handling so far

- 28,587 unique MICS images
- 31,651 unique PAMCAM images
- 142,129 decoded AIS messsages



Images taken with the Flying Laptop
(PAMCAM: orange, MICS: yellow)

Vielen Dank!

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