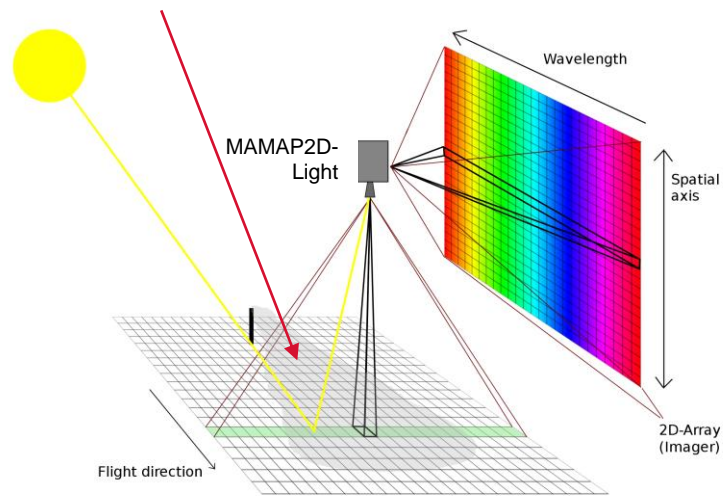


The New Imaging Spectrometer MAMAP2D-Light – First Measurement Results

Jakob Borchardt, Konstantin Gerilowski, Sven Krautwurst, Wilke Thomssen, Jan Franke, Martin Kumm, Pascal Janßen, Jens Wellhausen, Heinrich Bovensmann, John P. Burrows

- MAMAP2D-Light: airborne push broom imaging spectrometer for detection and quantification of anthropogenic CH₄ and CO₂ point source emissions

Emission source, e.g. power plant or pipeline leak



- Integrated in underwing pod of Dimona HK 36 TTC ECO of Jade Hochschule Wilhelmshaven
- Low fuel consumption and noise emissions
- Easy and fast to deploy

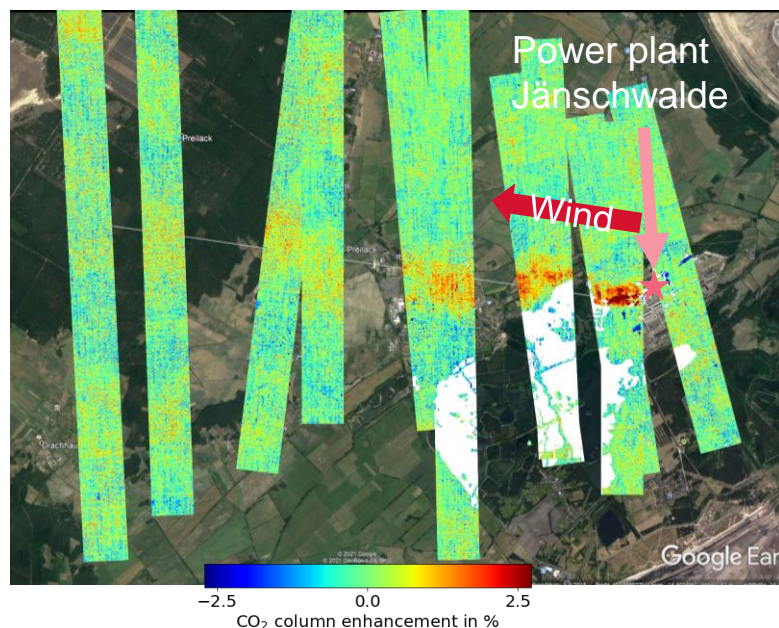
Spectral range	1559.5 nm – 1689.9 nm
# of spectral points	384 pixels
Spectral resolution (FWHM)	1.1 nm – 1.2 nm
SNR at half detector filling	~ 800
Spatial samples	28 ground scenes
Typical across track spatial resolution*	15 – 30 m
Typical along track spatial resolution*	5 – 10 m
Total weight	43.8 kg

* At 1000m – 2000m flight altitude above ground

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- Measurement flight over emission plume of power plant Jänschwalde on 17.06.2021
- Retrieval of CO₂ column enhancements with the WFM-DOAS method



- Emission flux estimate with cross sectional flux method, uncertainty with gaussian error propagation:

$$F_{ct} = f \cdot \sum_i xCO_{2,enh,norm,i} \cdot CO_{2,back} \cdot k \cdot u \sin \alpha \cdot dx_i$$

- Estimated emission: **(10.8 ± 1.9) Mt CO₂/yr**
 - Emission based on activity data: **~11.7 Mt CO₂/yr**
 - Largest uncertainty contribution from wind speed uncertainty (**± 1.6 Mt CO₂/yr**)
 - Uncertainty due to measurement noise negligible (**± 0.006Mt CO₂/yr**)
 - Precision of MAMAP2D-Light CO₂ column enhancements ~0.7% on single measurements, ~0.23 % binned to 100x100 m ground scenes
- ⇒ **MAMAP2D-Light performed well during first measurement flight**