Deutscher Wetterdienst
Wetter und Klima aus einer Hand

Meteorologisches Observatorium Lindenberg (MOL)

MOL4 – Radiative Processes

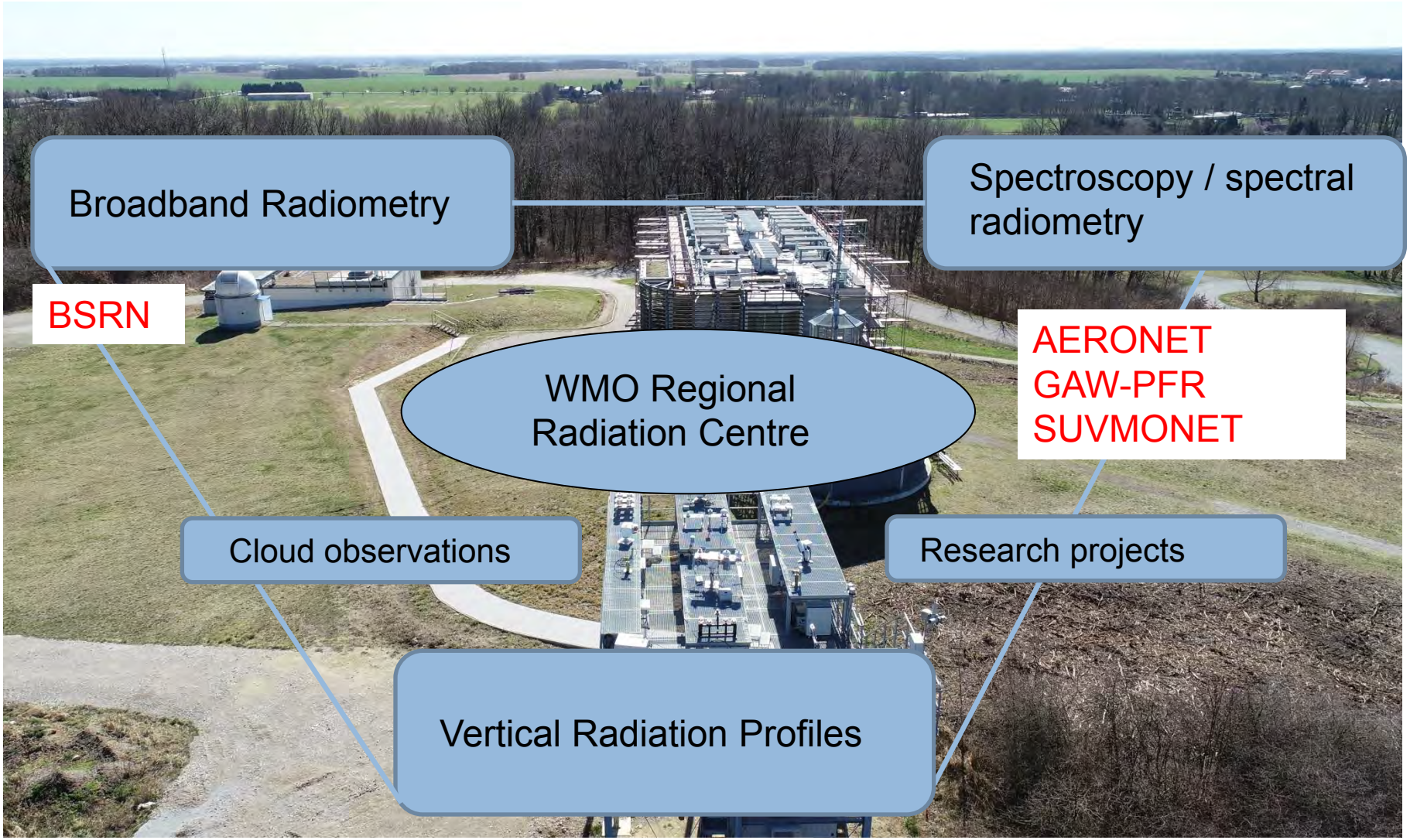


Foto: R. Leinweber

1. Broadband Radiometry – Baseline Surface Radiation Network (BSRN)

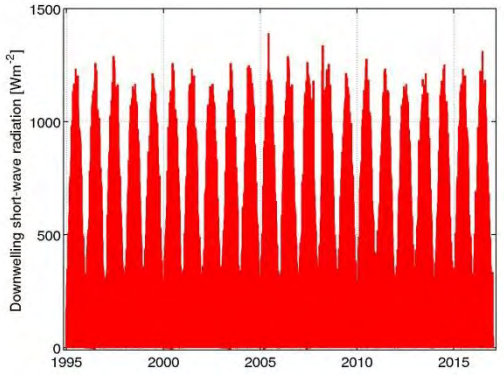
Lindbenberg since 1.10.1994

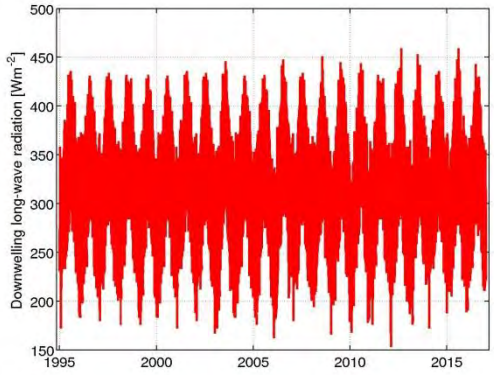
Continuous and redundant high precision observations of broadband downwelling short-wave (direct, diffuse, global) and long-wave radiation since 1994

BSRN – Climate monitoring

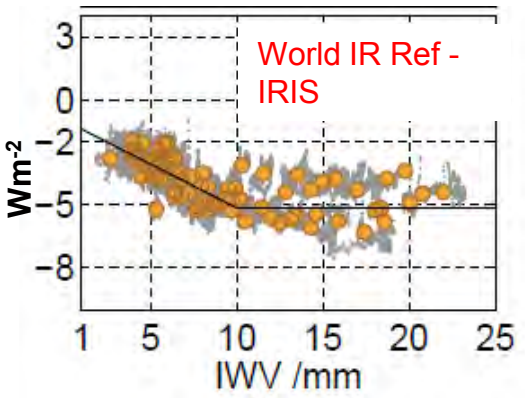
Research interests:

- ➔ Determination of long term changes in the radiative fluxes and their causes
- ➔ Determination of the cloud radiative effect
- ➔ Reduction of the uncertainties in broadband long-wave radiation observations using windowless radiometers





IRIS



Gröbner et al., JGR, 2012

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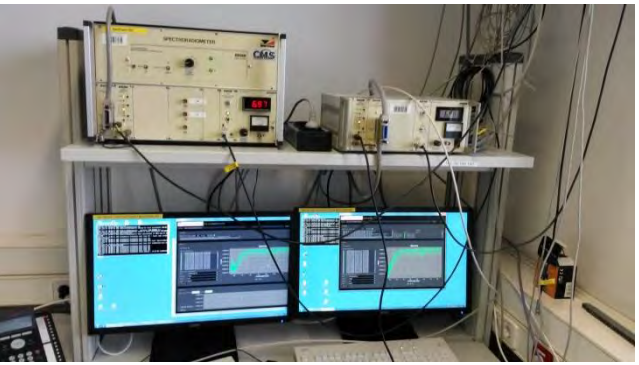
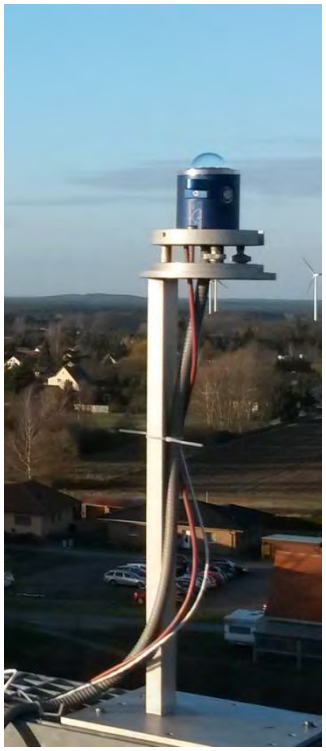
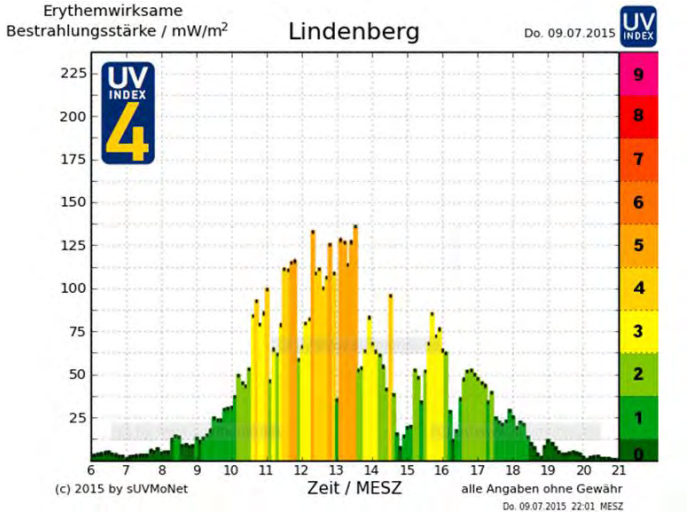
2. Spectroscopy

➔ Monochromators (Bentham, Brewer) in the UV







SUVMONET – UV network of the German Federal Office for radiation protection

Spectroscopy

- Array detector spectroradiometers: Direct and global spectral irradiance (UV – near infrared)
- Planned products: spektral AOD

PSR

SPJ-1009

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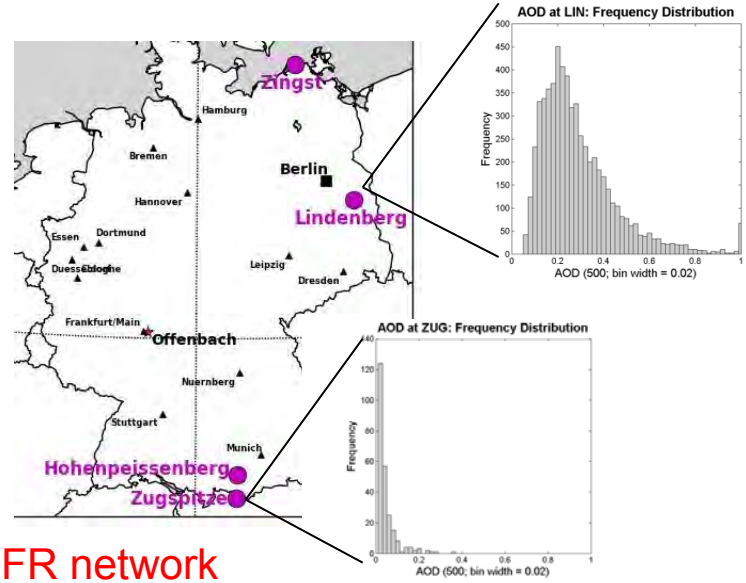
Spectral observations – AOD, PWV

- Sun and moon photometers
  - Cimel sun and moon photometer C318T (Lindenberg)
  - POM-2: Filterradiometer by Prede Inc (Lindenberg)
  - PFR: Precision filter radiometer by PMOD/WRC

CIMEL AERONET

PFR

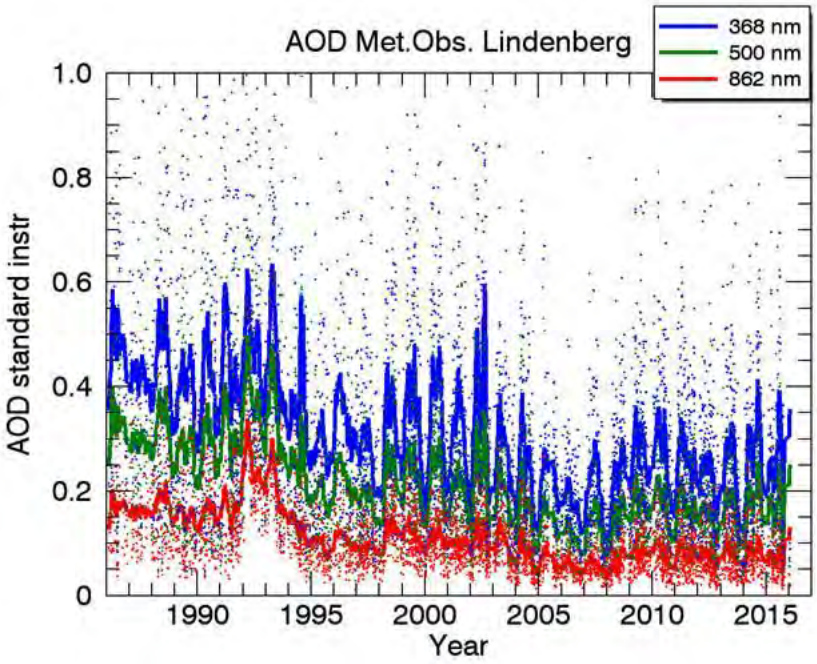


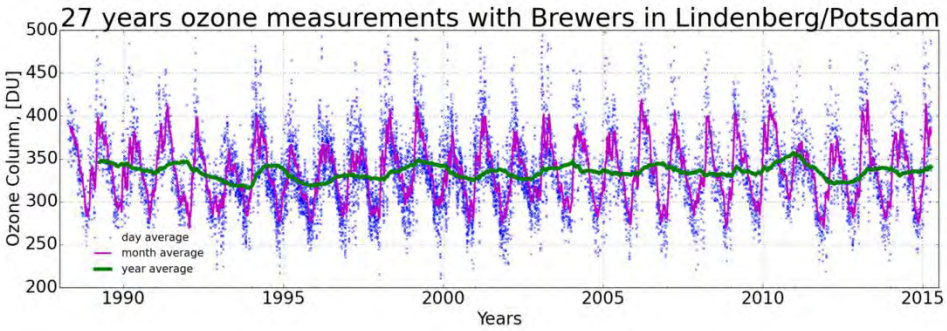
POM-2

Associate sites of GAW-PFR network

Remote sensing of AOD, PWV and ozone

- Representative AOD product from various sun photometers
- Long-term analysis
- Combining sun-, moon-, and star photometry





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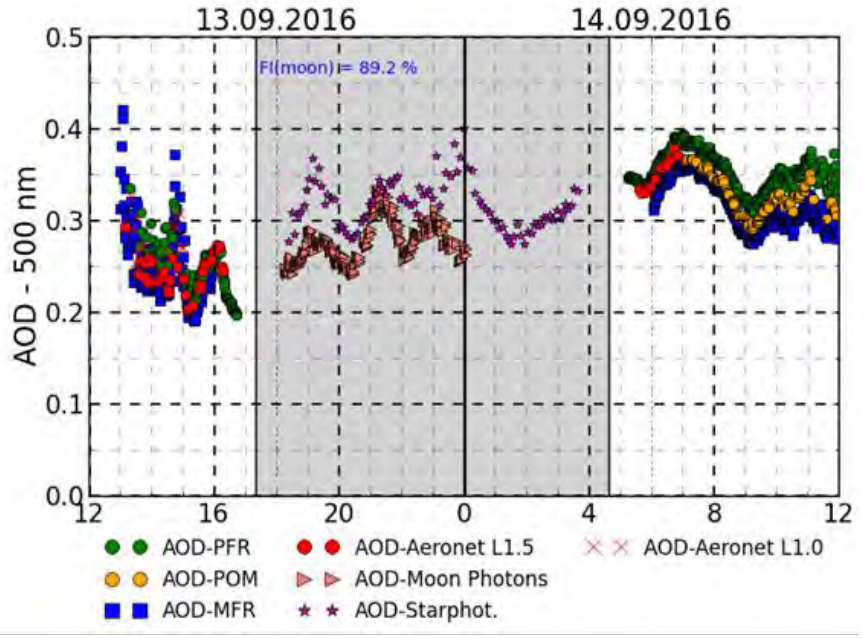
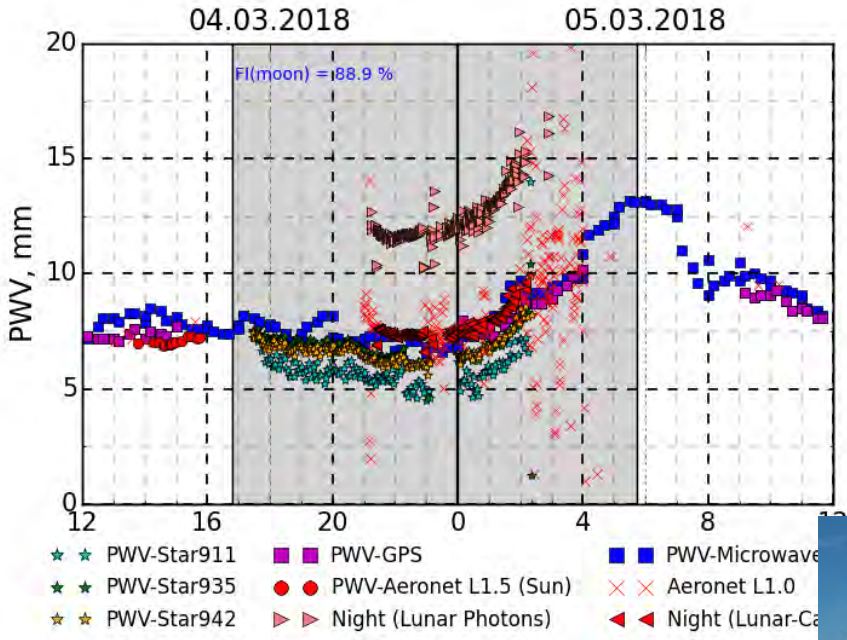
Sun-, moon- and starphotometrie at MOL

MOL is one of only 3 sites worldwide where sun-, moon- and starphotometry are conducted

Starphotometer SP STP





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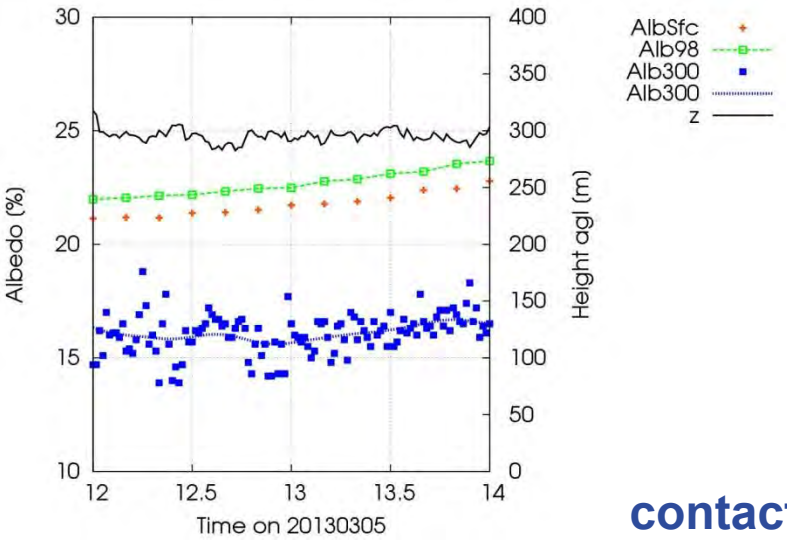
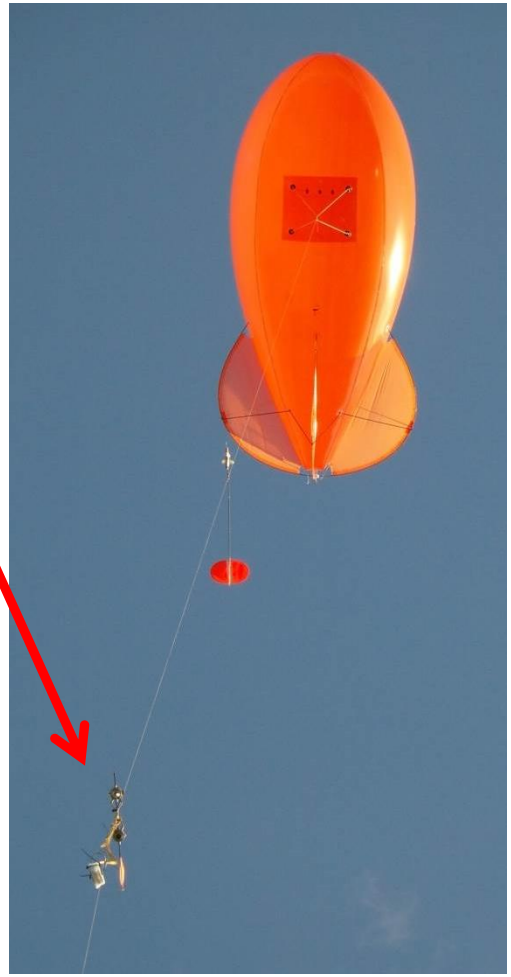
Solar and thermal radiation profiles through the atmosphere

- Tethered balloon equipped with four component short- and long-wave radiation sensors
- Determination of the radiation budget 200-300 meters above ground





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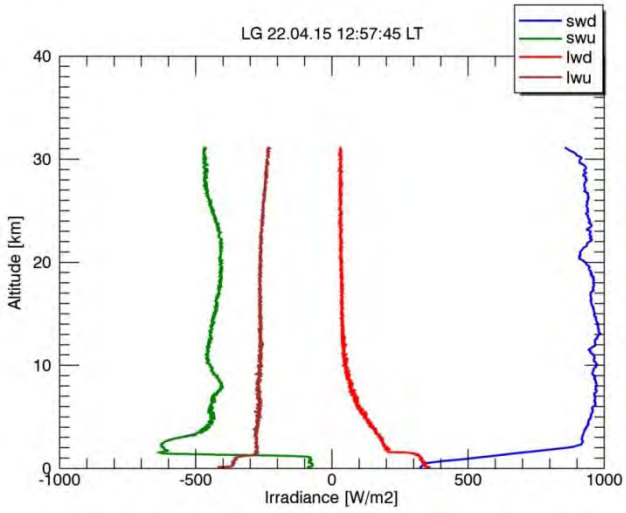
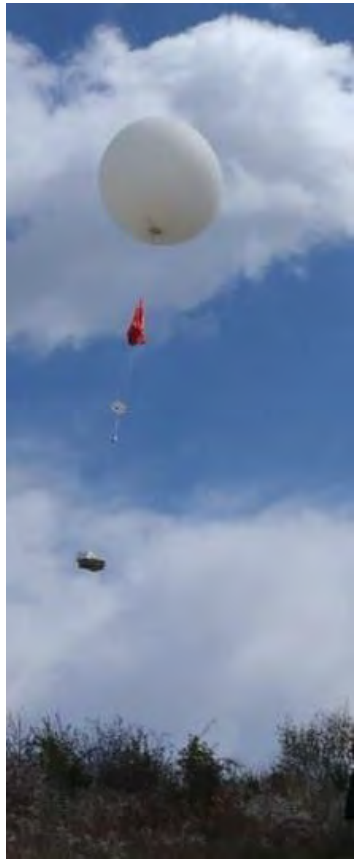
Solar and thermal radiation profiles through the atmosphere

- Radiosonde ISOLDE (Irradiation SOunding LinDEnberg)
- Determination of down-welling and upwelling short- and long-wave radiative flux profiles up into the stratosphere once a month

MOL is currently the only site worldwide where vertical radiation profiles are measured using radiosondes





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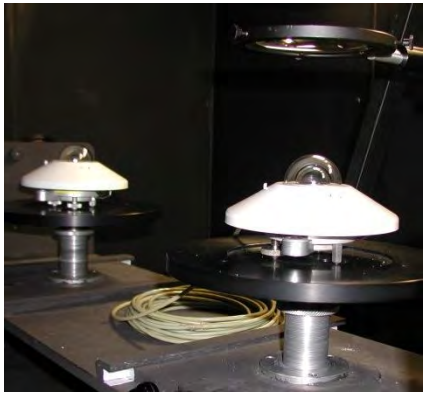
Regional and National Calibration Centre

- Calibration of broadband short-wave and long-wave radiometers
- Calibration of DWD network radiometers
- Calibration of UV filterradiometers
- Participation in the IPC, IPgC and FRC at the PMOD/WRC
- Various characterizations in the laboratory (e.g., angular response)



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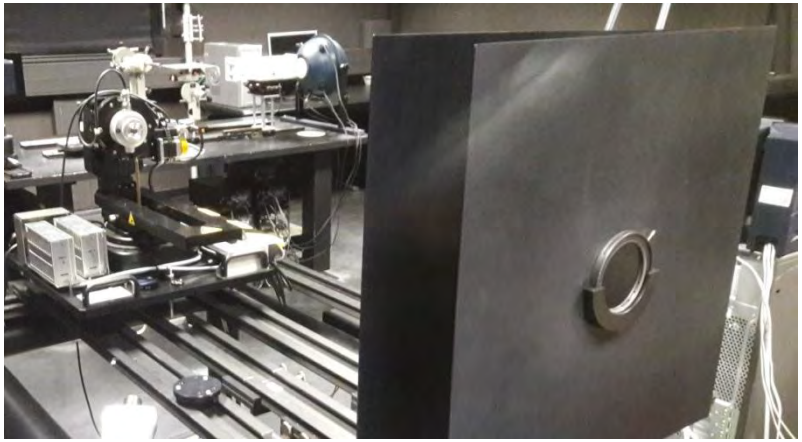

Optical bench with goniometer

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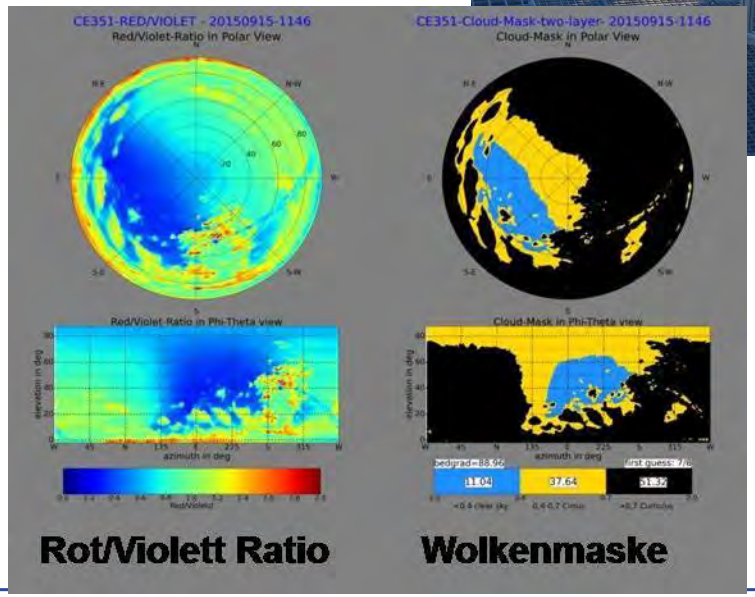
Observations of clouds

- Development, testing and application of methods for autonomous day and night cloud observations using
  - Radiation data
  - Pyrometer (NubiScope)
  - Thermal camera
  - All-sky imagers



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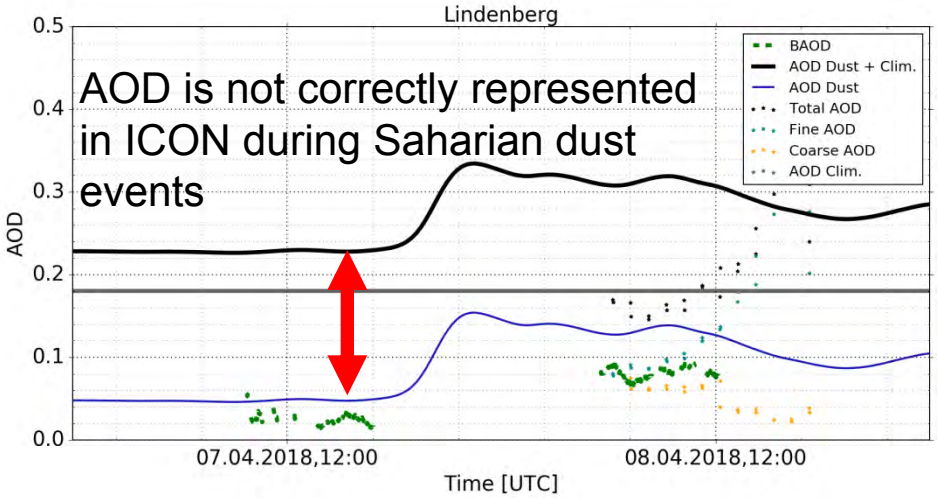
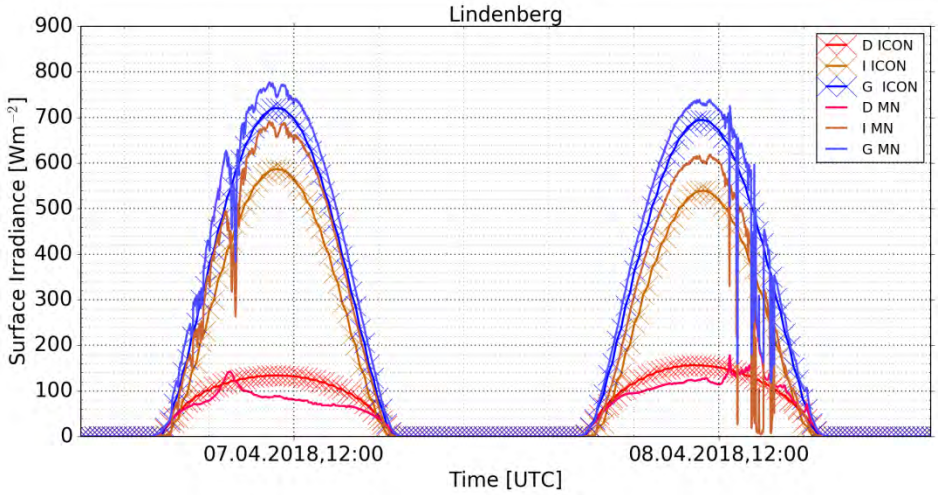
Research project

- Reduction in PV production due to Saharian dust events (**PerduS project**: DWD – KIT – Meteocontrol GmbH)
  - Model evaluation – validation project
  - Improving the German PV production prediction through an improved ICON-ART prediction of Saharian dust events
  - Incorporation of more representative AOD observations and dust deposition processes into ICON-ART.





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Thank you – Questions, Remarks?