Institut für
Meteorologie
und Klimatologie

Leibniz
Universität
Hannover

# Research area
# Radiation and Remote Sensing

**Prof. Dr. Gunther Seckmeyer**

Dipl. Geophys. Holger Schilke
M. Sc. Angelika Niedzwiedz

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# Research areas

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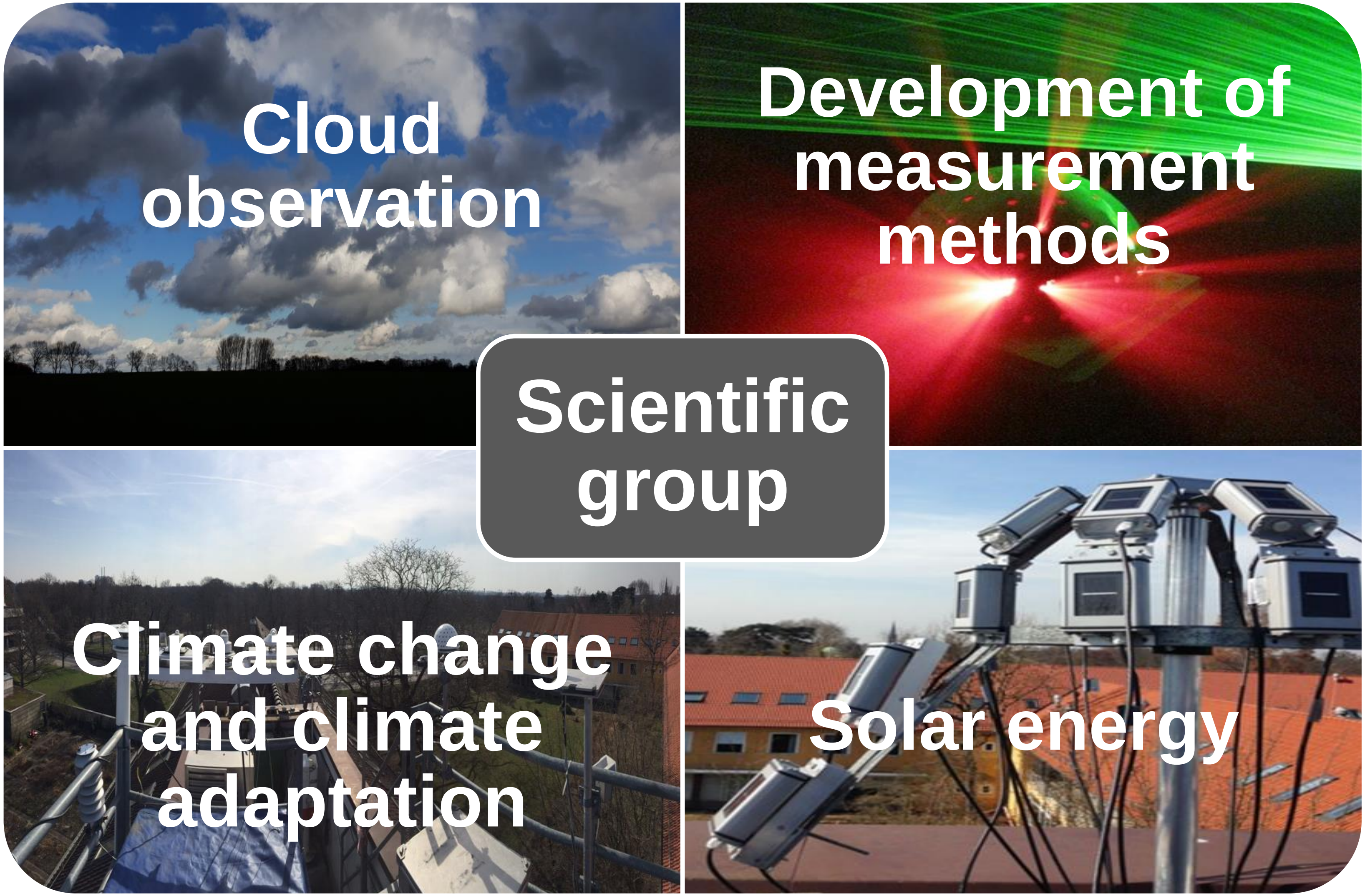
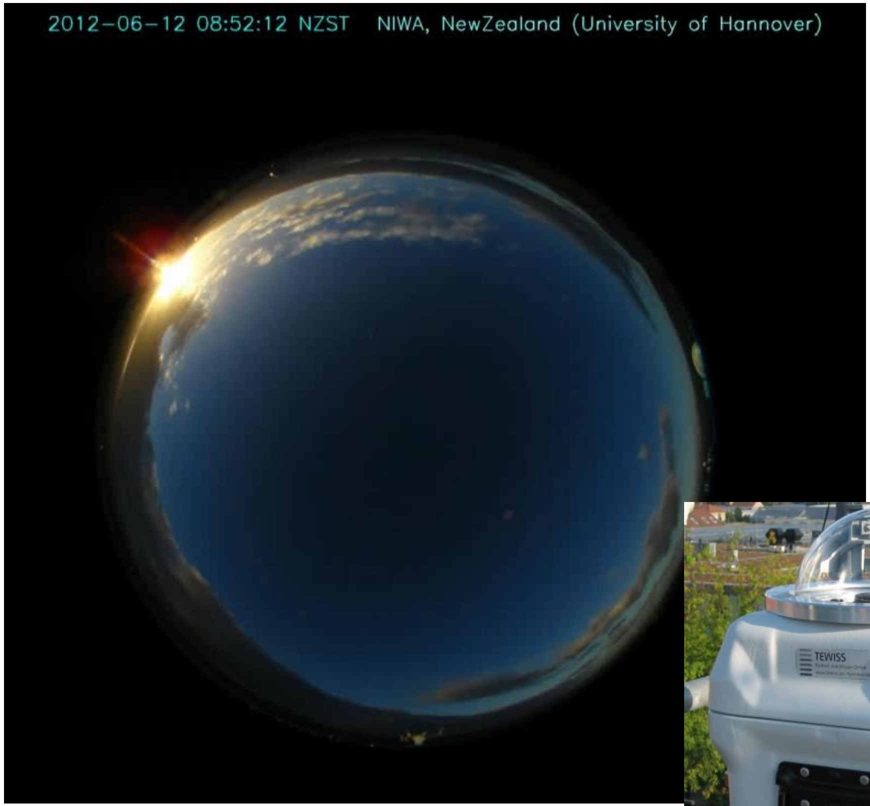


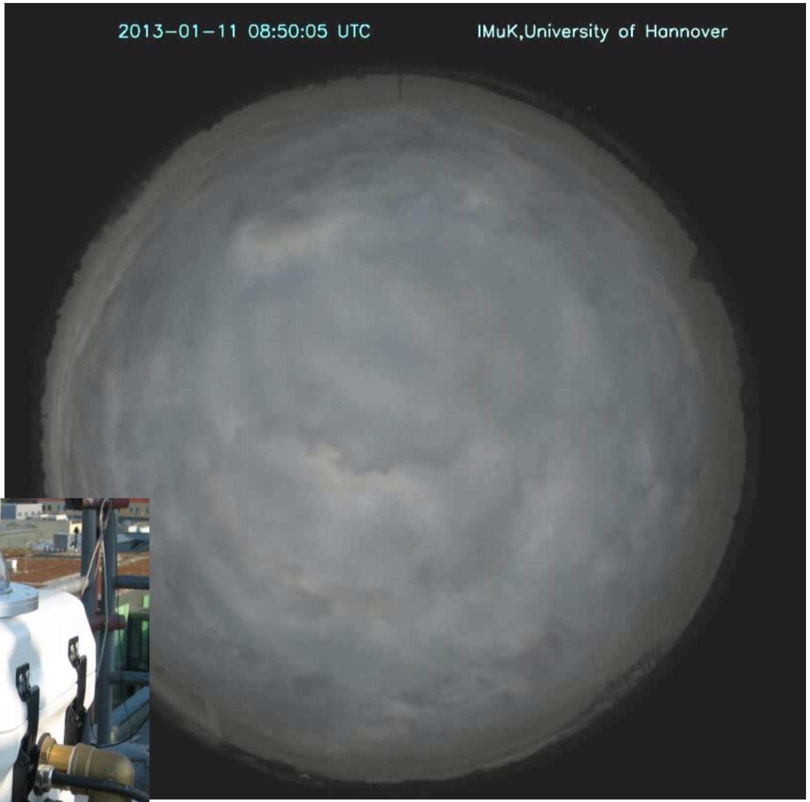
# Cloud observation

What is the difference between winter in New Zealand and Hannover?

2012-06-12 NIWA, New Zealand

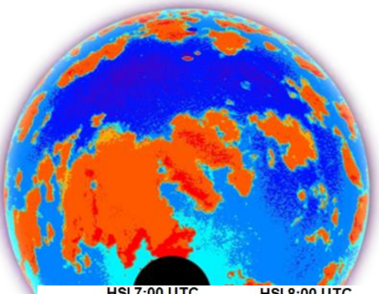



2013-01-11 IMuK, University Hannover

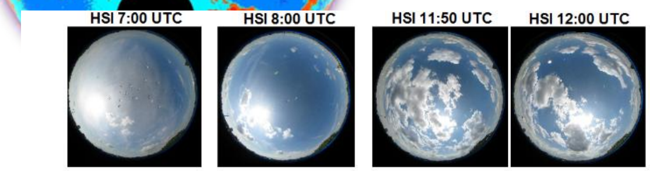



# Cloud observation

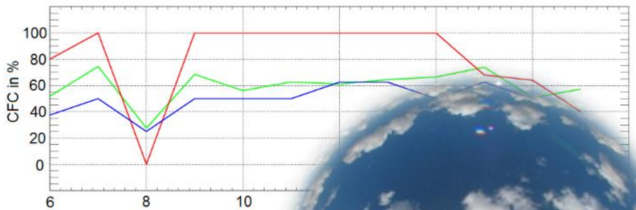


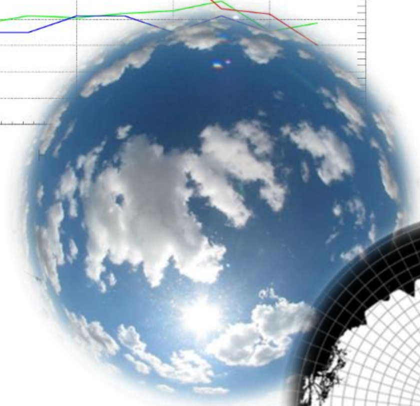


**Changes in the cloud cover due to climate change**

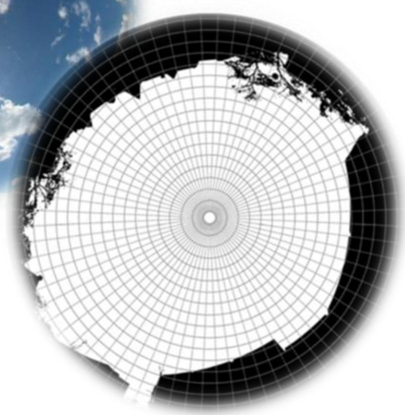



**Comparison and possible validation of satellite data**



**Automated determination of cloud type by artificial intelligence AI**



**Determination of the surrounding shading**

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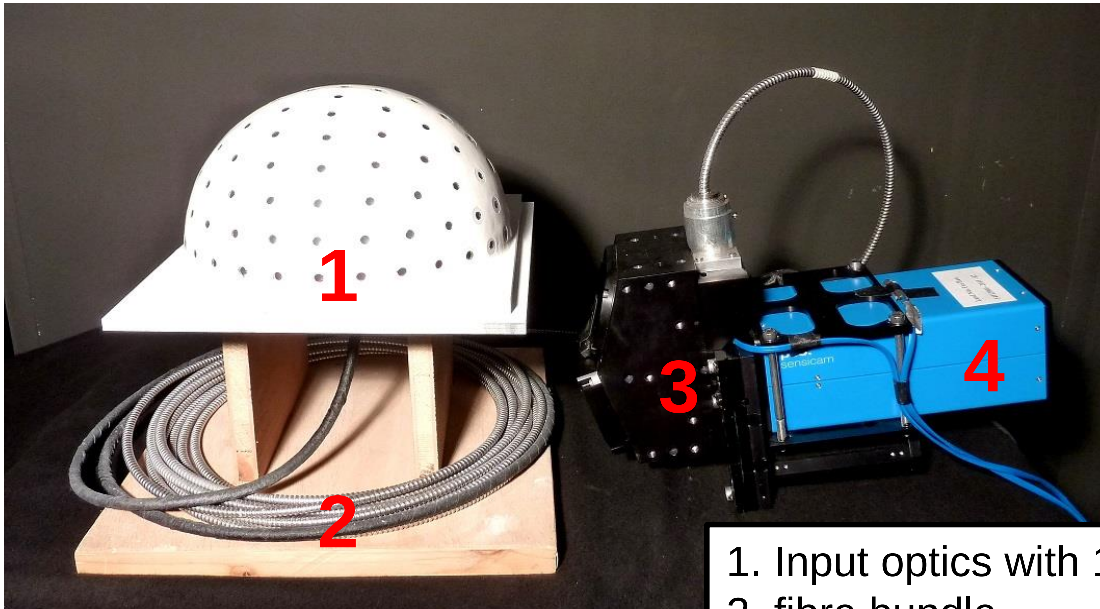
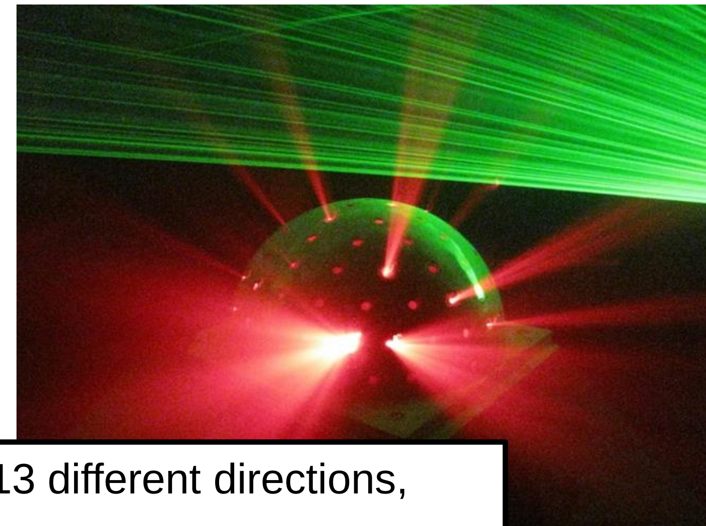
# Development of measurement methods



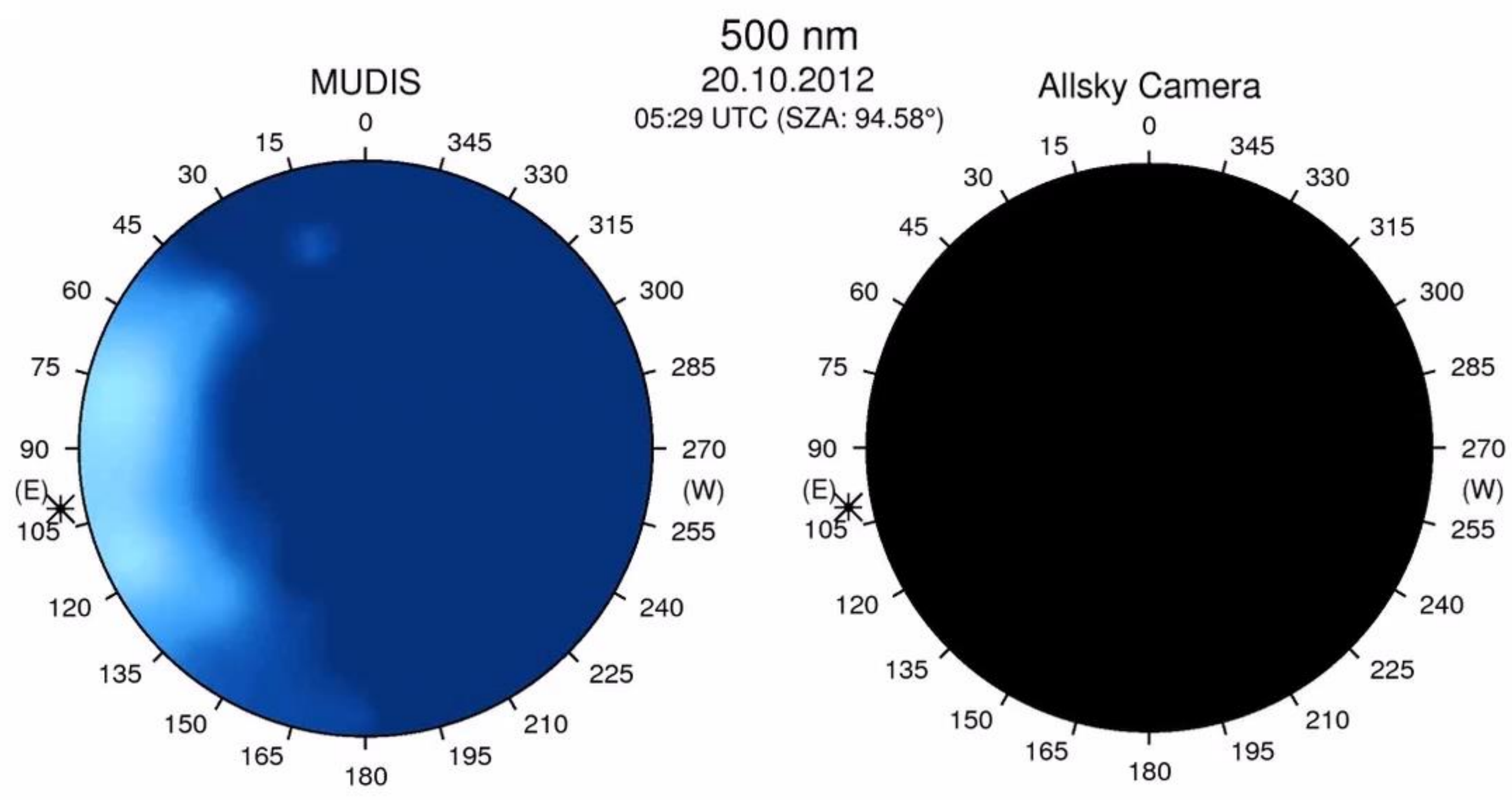
1. Input optics with 113 different directions,
2. fibre bundle,
3. spectrometer,
4. CCD camera

**Multidirectional spectroradiometer (MUDIS):**

- 113 directions
- Wavelength range: 250 nm - 680 nm

# Development of measuring methods

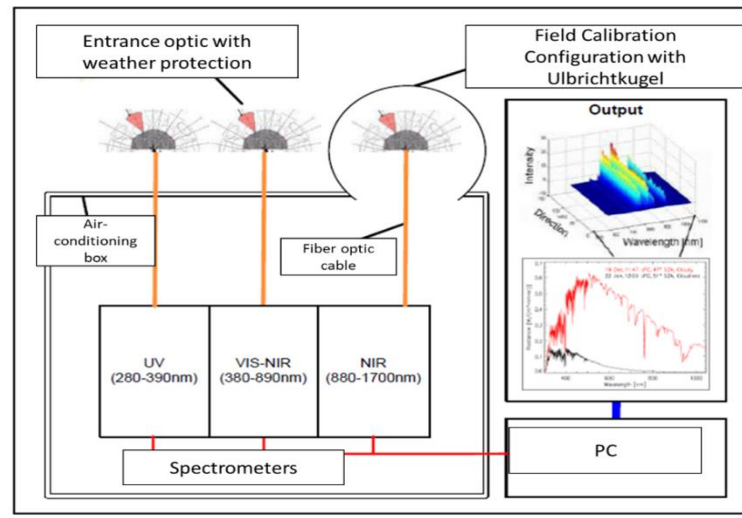




# Advanced MUDIS (AMUDIS)




- 125 directions
- Three spectrometer
- Wavelength range: 280-1700 nm

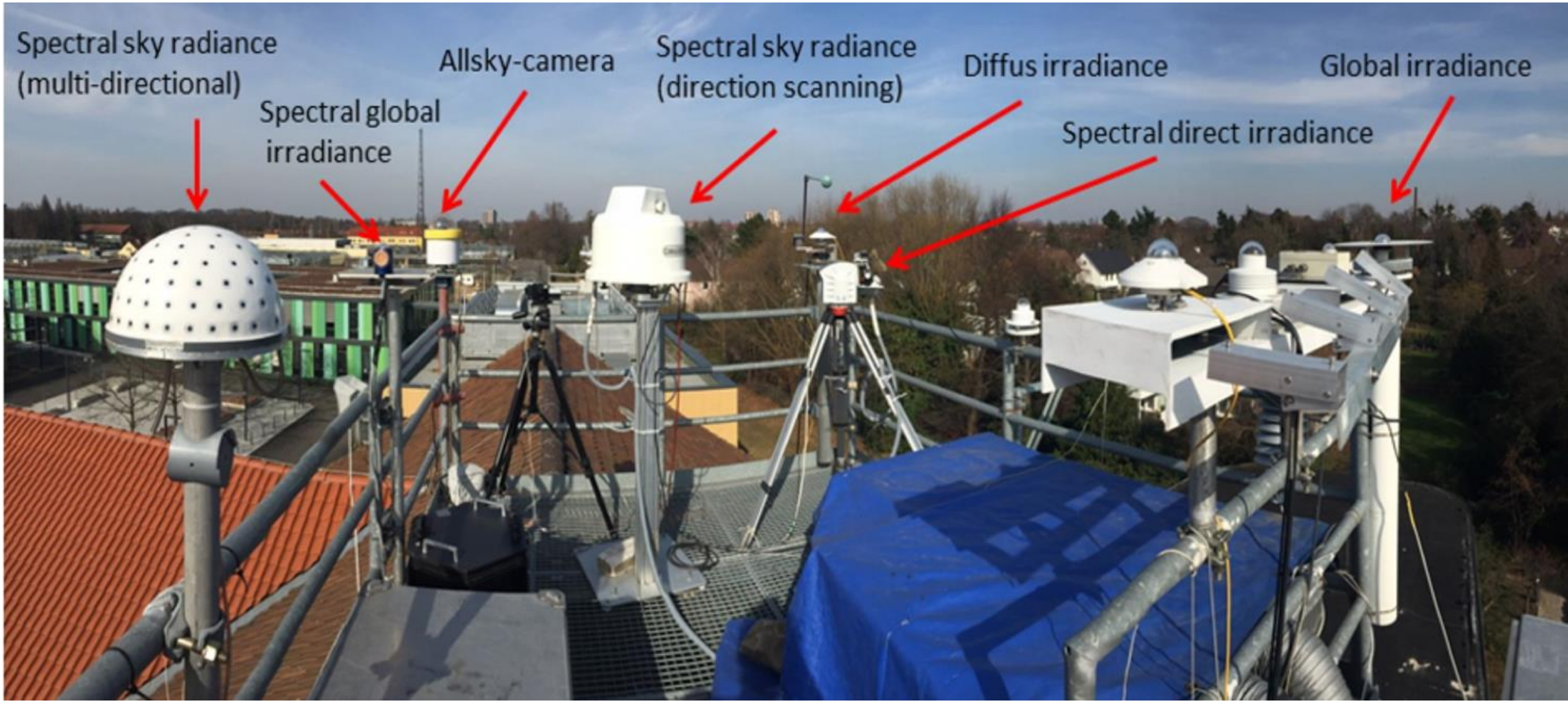



Applications

- Solar energy
- Trace gas measurements
- Material ageing measurements
- Plant growth estimation
- Calculation of
  Vitamin D weighted exposure
- Radiation overshoot determination...

# How variable is solar radiation?



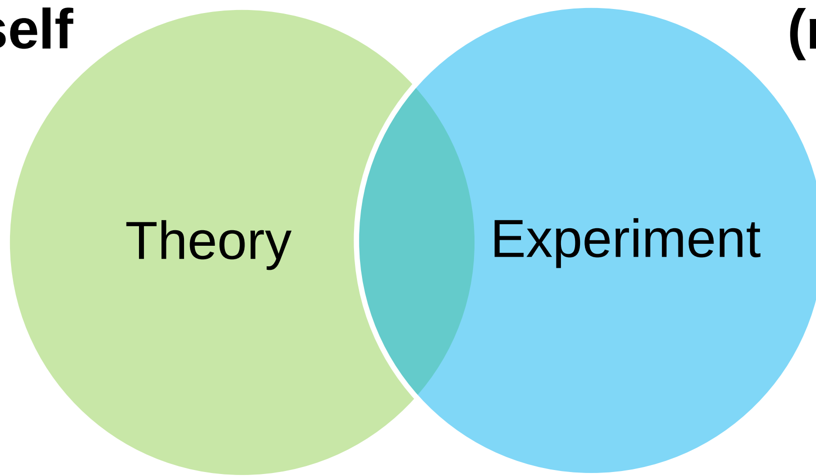


# What does the research area offer?

**Combination of theory and experiment**

**Possibilities to create experiments yourself**

**Outdoor experiments (measuring field, roof platform)**




**International integration**

**Interdisciplinary field of work**

**Nice colleagues**

**Research at the top international level**

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# The scientific reasarch group

- Prof. Dr. Gunther Seckmeyer
- Holger Schilke — HSI, IT + Operating of measuring instruments

PhD:

| | |
|---|---|
| • Riyad Mubarak | Directional dependencies of solar radiation |
| • Cristian Crisosto | Solar nowcasting by neural networks |
| • Angelika Niedzwiedz | Spectral radiance measurements |
| • Mario Tobar | Variability of radiance |
| • Dirk Friedrich, PTB | Testing solar panels by direct solar irradiance |
| • Jens Duffert | AMUDIS |
| • Anton Kopatsch | Solar simulator for plant research |
| • (Juliane Kalla | Ozone) |

# Numerous cooperations

TROPOS
Leibniz-Institut für
Troposphärenforschung

NIWA
Taihoro Nukurangi

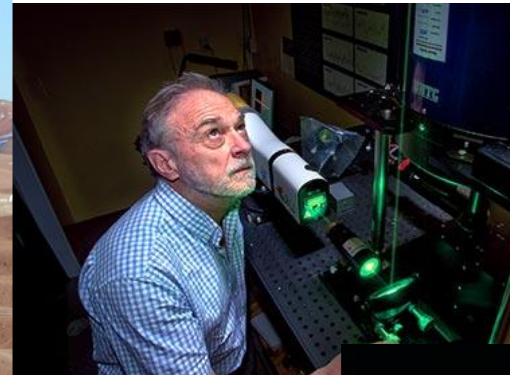
PTB
Messen ▪ Forschen ▪ Wissen

Global Monitoring Laboratory
Earth System Research Laboratories

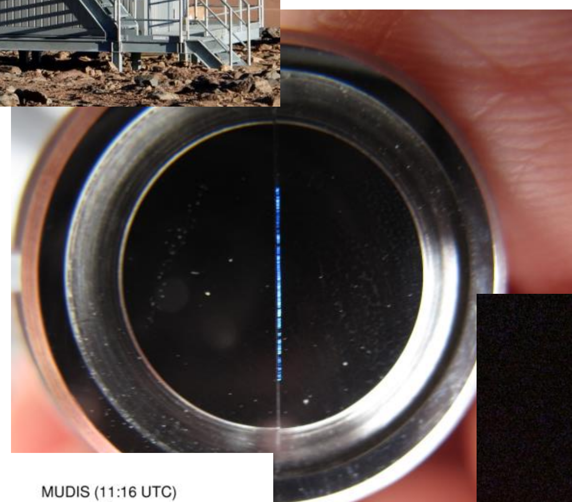
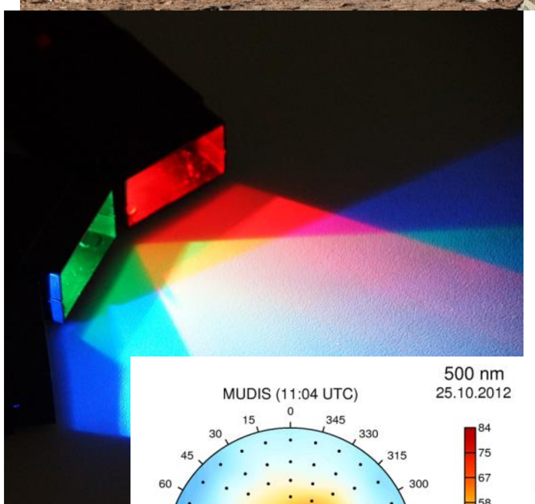
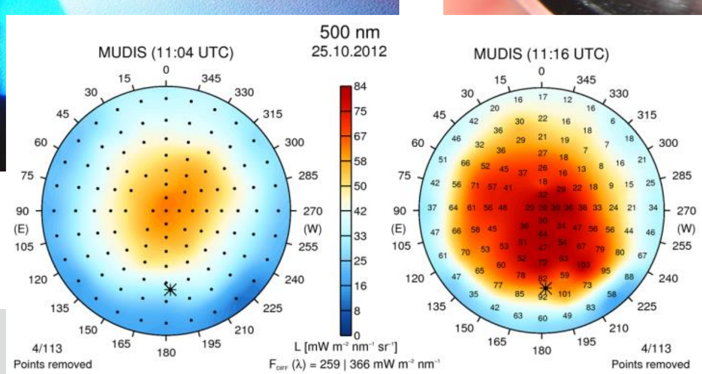
Silpakorn-Universität
มหาวิทยาลัยศิลปากร

DEPARTAMENTO DE FÍSICA
UNIVERSIDAD DE SANTIAGO DE CHILE

# Questions?

21.06.2009 21:00 MESZ
Das Ergebnis
Auf frischer Tat ertappt...




500 nm
25.10.2012
MUDIS (11:04 UTC)
MUDIS (11:16 UTC)
4/113
Points removed
L [mW m⁻² nm⁻¹ sr⁻¹]
F_DIFF (λ) = 259 | 366 mW m⁻² nm⁻¹