

# Summary of First ISSI team meeting on „Characterizing diurnal variations of ozone for improving ozone trend estimates“ (December, 2012)



# ISSI ozone team

ISSI: International Space Science Institute, Bern (<http://www.issibern.ch/>)

Team members:

Klemens Hocke, University of Bern, Switzerland  Niklaus Kämpfer, University of Bern, Switzerland  Pawan K. Bhartia, N

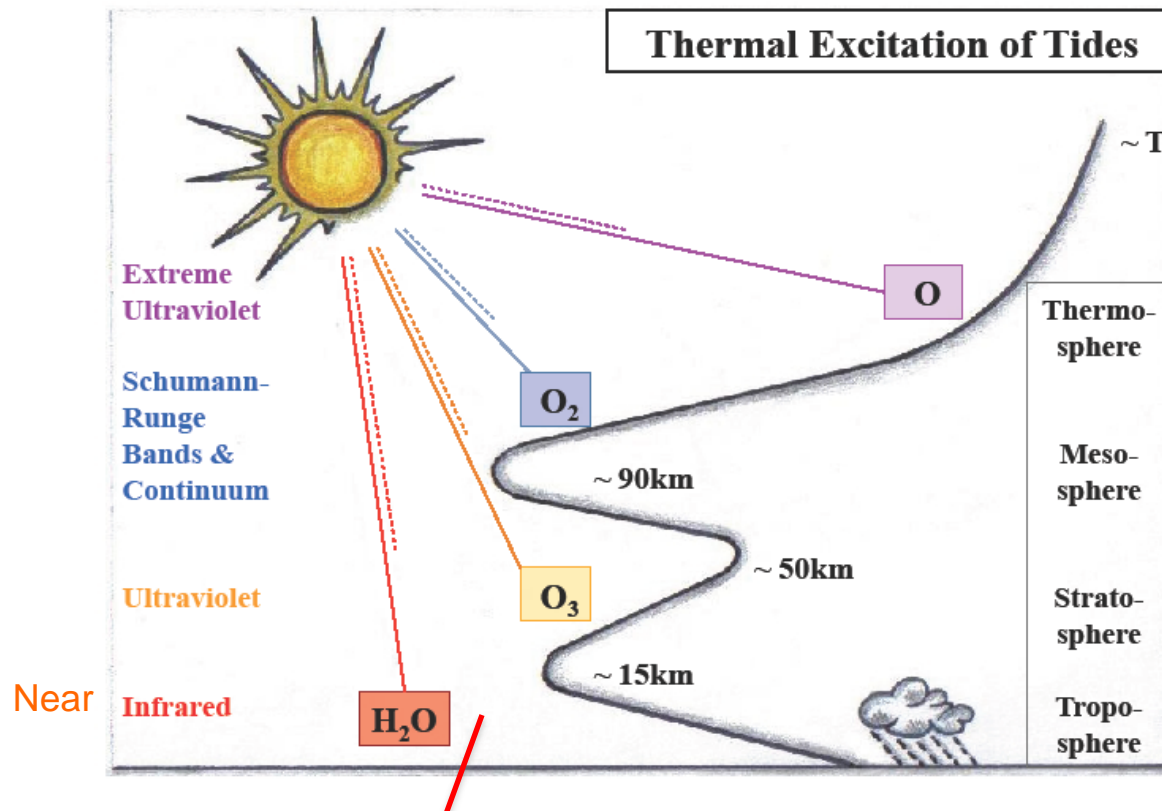
# Impression on first day

- We did not expect that 99% of the team members came to Bern

Meeting covered the areas:

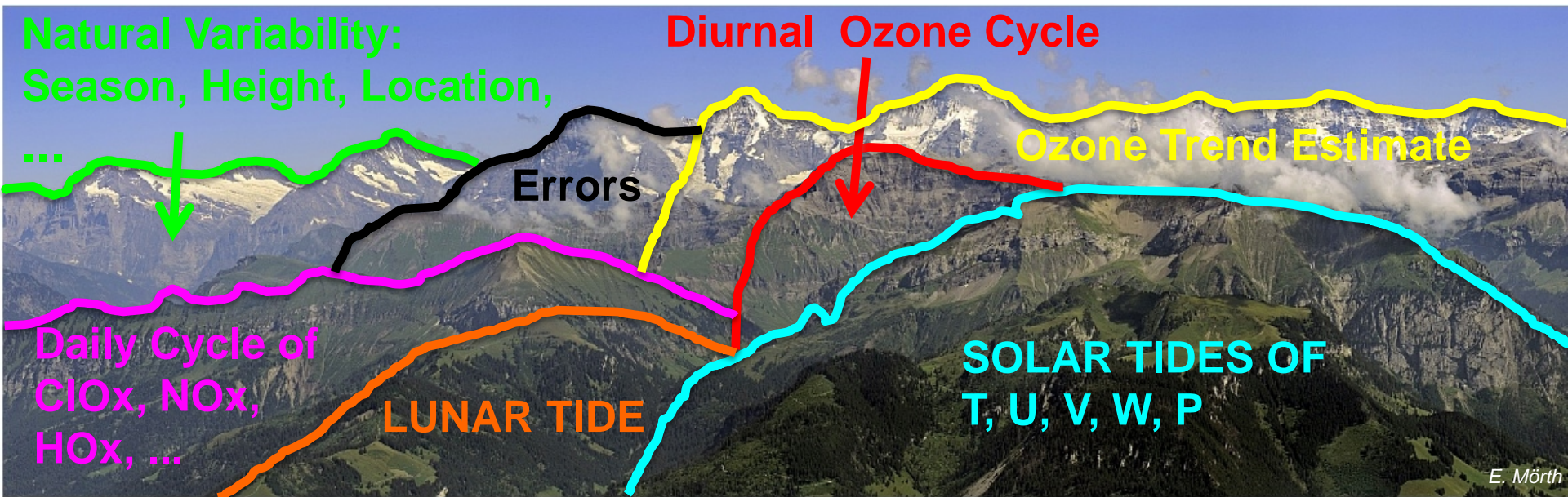
- Satellite observations (NOAA SBUV, ENVISAT/GOMOS, MIPAS)
- ISS SMILES experiment (oxygen isotopes and „diurnal chemistry“)
- Ground-based microwave radiometry
- Total ozone from ground-based Dobson and Brewer instruments
- Umkehr ozone profiles
- Modelling (WACCM, UKCA)
- Data bases (SI2N: SPARC/IOC/IGACO-O3/NDACC)

... just to recall the basic problem and the role of ozone:



Scheme is under construction,  
Simone Studer

# The Alps and Our Problem

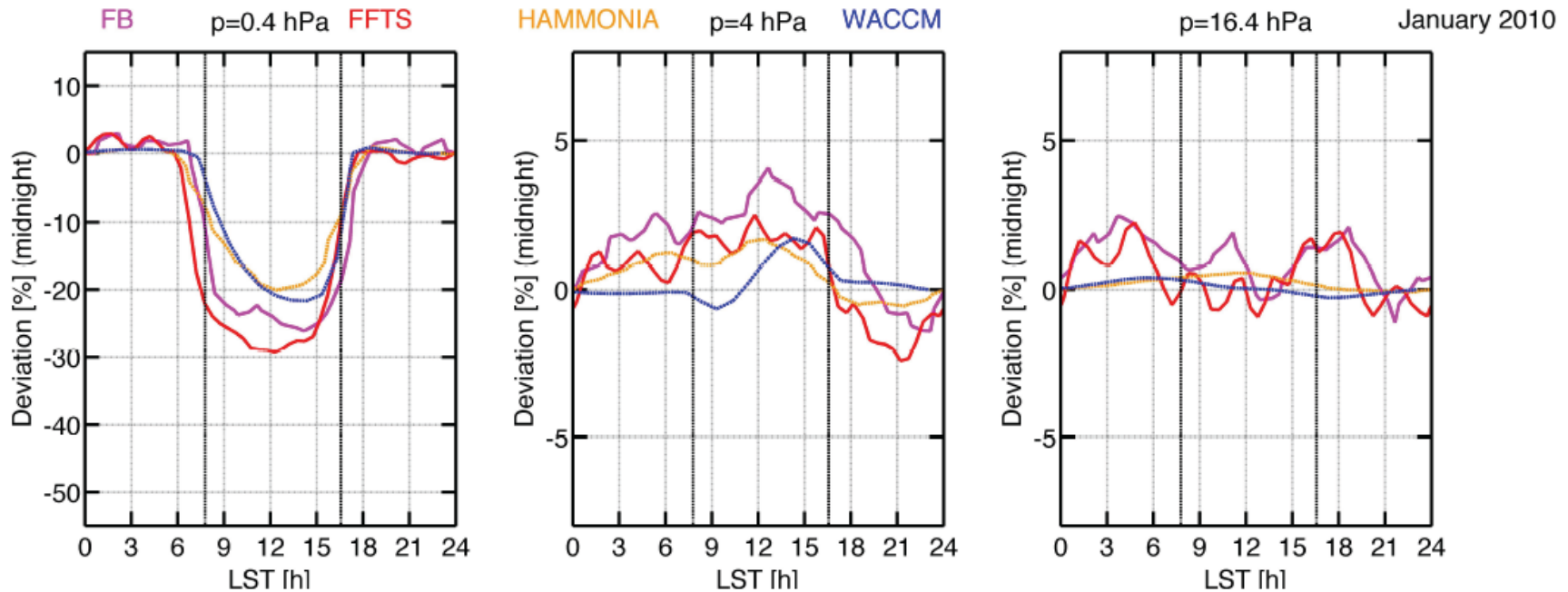


If we want to remove the effect of the daily ozone cycle in satellite observations then we have to consider a lot of other things too ...

# Preliminary intercomparison

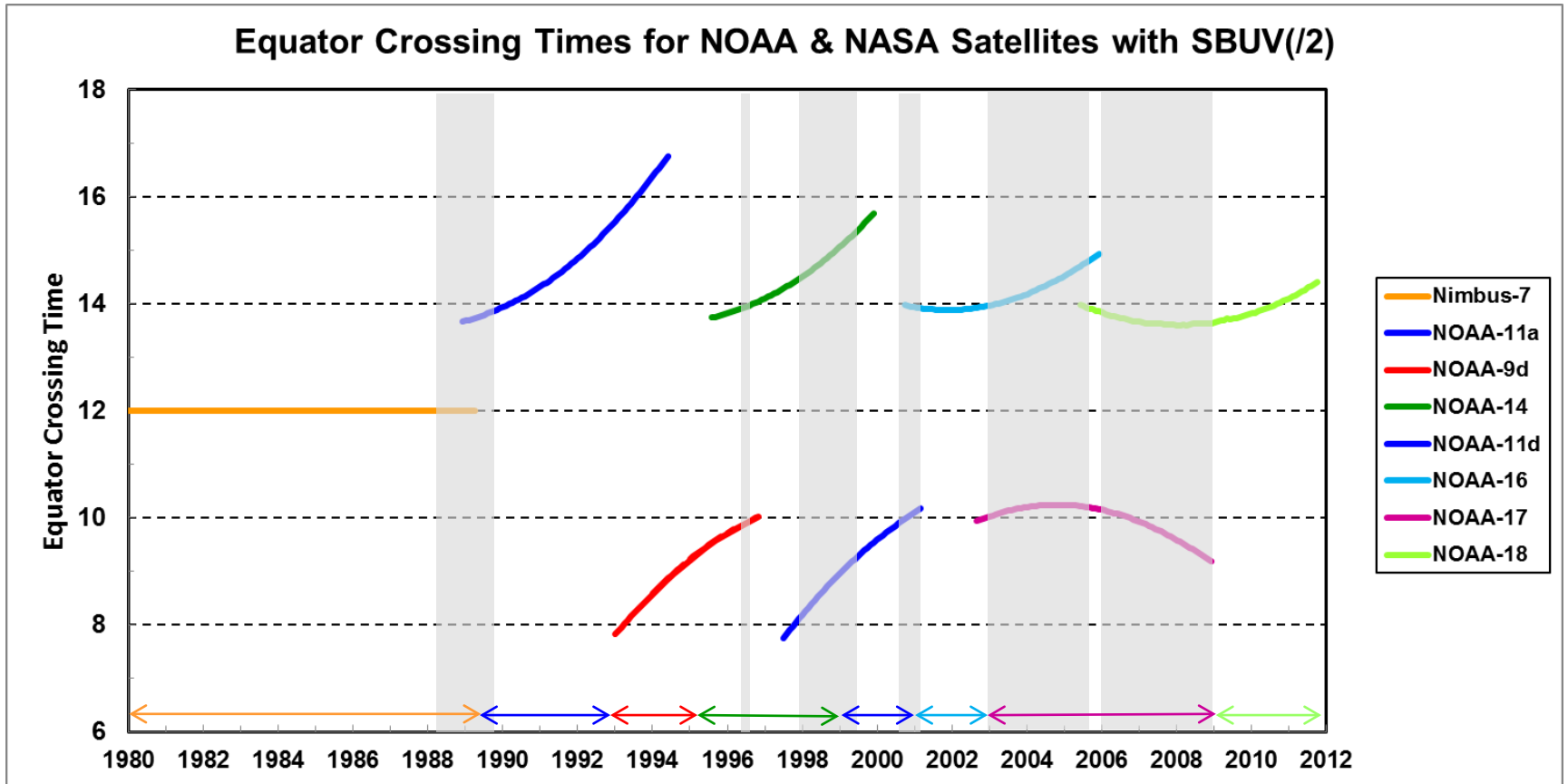
## Models and GROMOS FB +FFTS

January 2010

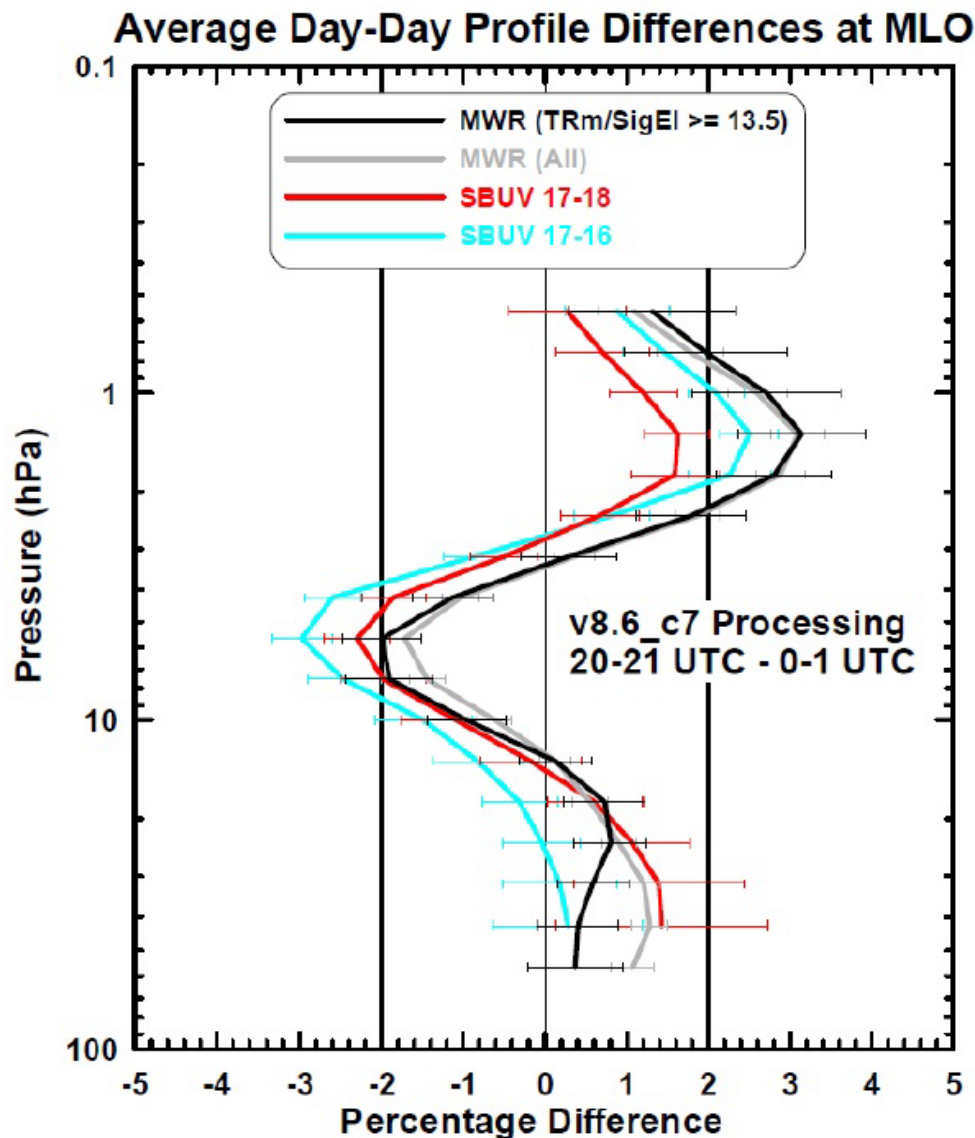


Courtesy of Simone Studer and Ansgar Schanz

# Basic Problem: SBUV/NOAA orbits are drifting in Local Solar Time



Stacey Frith, PK, Ian and Alan: Good agreement of the daily ozone cycle in ground-based microwave radiometry and SBUV satellite data



Courtesy of  
Stacey, Alan, Ian



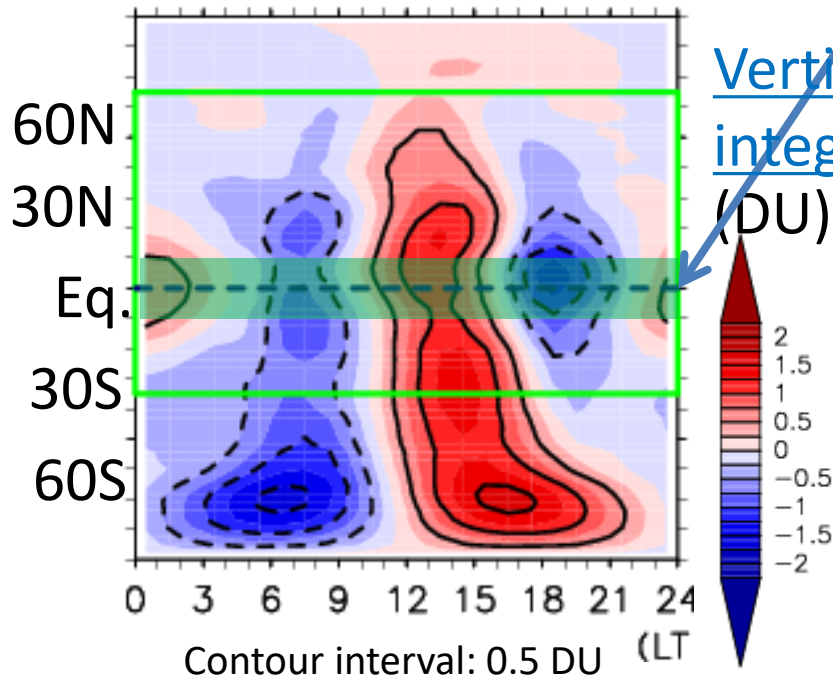
Progress through observation of diurnal chemistry by SMILES experiment ([courtesy of Yasko Kasai](#)):

Picture cannot be distributed yet  
Since it is not published yet

# What causes the semidiurnal variation?

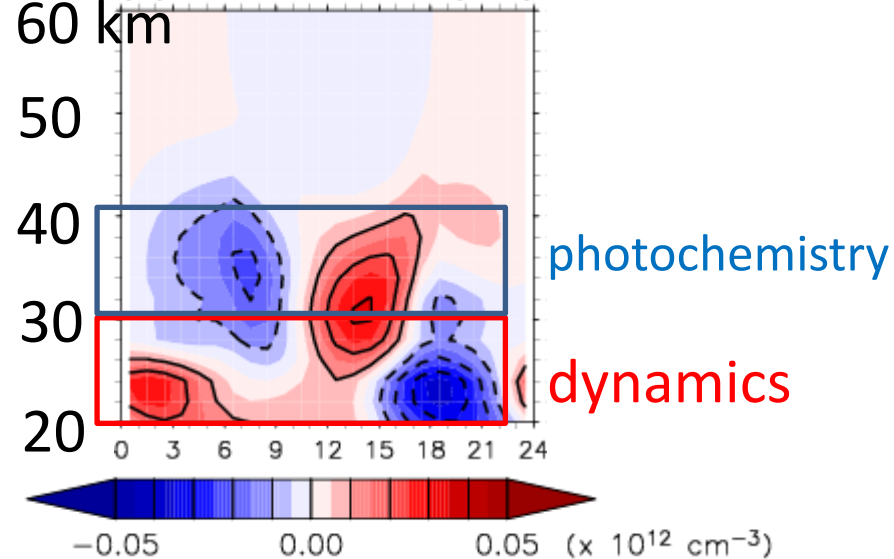
Diurnal variations in total column ozone

(d) MIROC3.2-CTM (ALL)



Diurnal variations in “ozone number density” (10°S-10°N average)

(b) MIROC3.2-CTM (ALL)



- The semidiurnal (half-day-period) variations are caused by the combination of (1) variations at 20-30 km (dynamics) and (2) variations at 30-40 km (photochemistry).

# Main result of ISSI ozone team

Progress can be achieved by combination of

- satellite observations (SMILES, SBUV, ...)
- ground-based microwave radiometry
- models such as SD-WACCM, UKCA, CTM

*=> communication of modellers and observers is important*



# Action items and planned cooperations

- more intercomparisons between SMILES, models, and ground stations
- UKCA model output (Neil Harris) of monthly-averaged daily ozone cycle at the locations of ground stations (e.g., Bern, Mauna Loa, ...) for several years
- climatologies of daily ozone cycle (SMILES, GROMOS, ...)
- make a website for exchange of data and infos (Yasko)



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## AS3.19

### Atmospheric tides and diurnal variations of chemical species for improving trend estimates and satellite validations

Conveners: Philippe Keckhut , Klemens Hocke 

[Abstract Submission](#) [Convener Login](#)

Atmospheric observations either from space and ground are obtained at different local times. Because of the diurnal solar forcing and the photochemistry, dynamical parameters and chemical species exhibit systematic fluctuations over a period of 24 hours or related harmonics. Such fluctuations are often larger than expected agreements during instrumental inter-comparisons and inter-annual change investigations either natural or anthropic. When the solar-time of the measurements varies or are different, it could be a source of uncertainty. While most of these fluctuations are known to exist, their exact amplitude as a function of altitude and season, and their variability under different forcing are not well known. Also there is a strong need for long-term satellite validations while the orbits of the space platforms drift. The validation of these fluctuations simulated in numerical climate models can be also of interest to validate radiative schemes and could be important for improving assimilation attempts of data satellite in numerical models. Methods developed to overcome these limitations or satellite validation/data comparisons showing such problems could be discussed during this session.

The abstract deadline is passed ...  
but Philippe Keckhut may consider a contribution by you!

## Latest News from EGU

**AS 3.18 (Atmospheric Tides ...)** got 9 very interesting abstracts (many from the SMILES group)

It is not enough for own session but we possibly merge with a related group:

**AS3.8 Atmospheric Composition: Variability and Trends**  
(Oksana Tarasova)