

Why this talk?

- I want to stimulate attention to scientific literature.
- I want to know what the scientific output of GOME/SCIA/OMI is.
- I want to check my prejudgement that the majority of papers on GSO are about methods, validation and data presentation
- I want to update my own knowledge!

Purpose of earth observation satellite instruments

- Provide new insights in earth system
- Monitor anthropogenic and natural changes, variability
 - To understand and detect
- Justification for budget spending



How to judge its value?

- New insights in workings of earth system
- Detection of unpredicted behaviour of “nature”

Demonstrated by:

- Published results in scientific literature on Earth (atmosphere, land, ocean, ...)
- Assessments (IPCC, ...)
- Informed policy decisions on environmental issues (climate change, air quality, ...)

Papers, “Half-way” to discovery

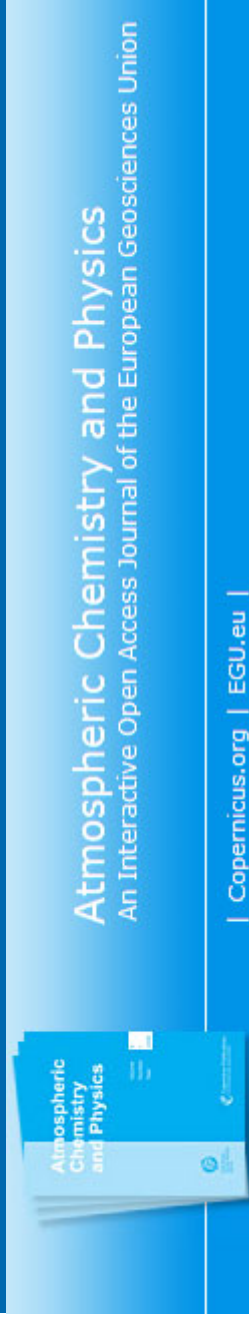
- Presentation of method
- Presentation of (first) data
- Validation results
- Intercomparison model – observations



Discovery papers

- Something has been learned about the planet,
- which is, or could be,
- of, at least some, importance
- for knowledge
- relevant to society.

SCIAMACHY Literature searches



ACP: 186 unique hits on “sciamachy” in total text

Reading only abstracts I find papers on:

- Presentation of methods
- First results (3 years of ...)
- Validation results
- Increased understanding: **Discovery papers**

Discovery papers in ACP with more than small contribution of Scia

1. Napelok et al. 2008: Case study SE US NO₂ emissions differ from model
2. Turquety et al. 2008: CO emissions Asia, suggesting underestimation of emissions
3. Myriokefalitakis et al. 2008: model underestimates CHOCHO columns observed by SCIA.
4. Konovalov et al. 2008 and 2006: check of NO₂ emission (trends) with EMEP
5. Schaub et al. 2007: check of emission inventory & NO₂ lifetimes
6. von Savigny et al. 2005: detection of descend of PSCs
7. Keil et al. 2007: causes of ultra low ozone over UK using Scia O₃ columns
8. Simpson et al 2007: Analysis of halogens in polar BL. Use of SCIA and GOME BrO give insight in chemistry.
9. Grannas et al. 2007: snow photochemistry. Scia shows that BrO is present.

Discovery papers, but with small Scia contribution (1)

- Effects of methane outgassing on the Black Sea atmosphere, K. Kourtidis: Scia might be of value ...
- Vogel et al. 2008: using MIPAS, only referring to Scia
- Gerasopoulos et al. 2008: The total solar eclipse of March 2006, SCIA Total ozone used as illustration
- Sioris et al. 2007: NO₂ from lighting using OSIRIS limb, Scia & OMI NO₂ columns used to detect horizontal extend.
- Dufour et al. 2005: NO_y partitioning in polar strat. Using balloons. Reference to Scia special issue!
- Coheur et al. 2007: detection of photochemistry of biomass burning plume using ACE. Scia in reference.
- Kleinbohl et al. 2005: rapid meridional transport using aircraft data. Performed during scia-value campaign.

Discovery papers, but with small Scia contribution (2)

- Elias & Roujean 2007: aerosol forcing using meteosat-7. “Our method could benefit from Scia ...”
- Huntrieser et al. 2007: Lightning produced NO₂ over Brazil using aircraft. Scia NO₂ columns are used to detect the outflow. ***
- Muller et al. 2008: isoprene emissions using models only. Reference to Scia formaldehyde paper.
- Boersma et al. 2005: NO₂ from lightning using GOME. Scia in outlook
- Uno et al. 2007: NO₂ emissions in Asia are found to be higher than thought using GOME. Scia in outlook.
- Lang and Lawrence 2005: errors found in hydrological cycle model using WV data from GOME. Scia in outlook and level 1 data from Scia DC!
- Ferreti et al. 2006. CH₄ emission from plants using CH₄ isotopes in ice cores. Scia in reference to Frankenberg
- Rosevall et al. 2006: polar ozone depletion quantified using MIPAS and ODIN. Scia in description of Envisat.
- Beirle et al. 2006: Lightning NO₂ using GOME. Scia in outlook.

Discovery papers, but with small Scia contribution (3)

- Nauss & Kokhanovsky 2006: discrimination of raining and non-raining cloud using MODIS. Scia in reference to cloud paper
- Schaub et al. 2004: transboundary transport using GOME NO2. Scia in outlook.
- Beirle et al. 2004: Weekly cycle of NO2 using GOME. Scia in outlook.
- MORE ...

Frustrating: almost all discovery papers with SCIAMACHY somewhere in the text do NOT use Scia!



Discussion

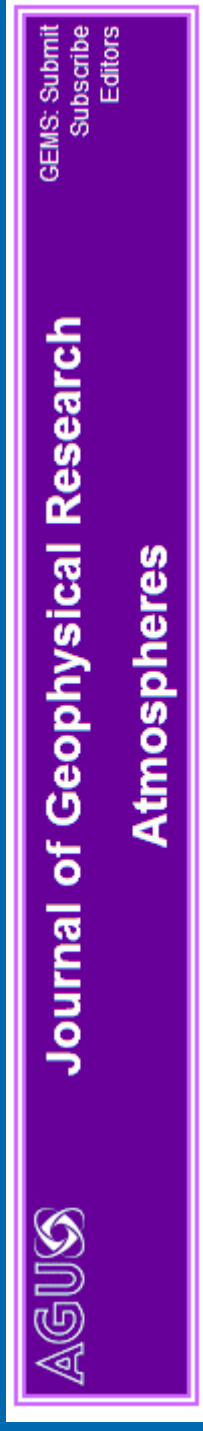
- Very low percentage discovery papers!
9 out of 186

Questions:

- What is the significance of discoveries?
- What is impact of discovery papers? > # citations

To do: repeat for GOME (222 hits), later OMI (70)

SCIAMACHY Literature searches



JGR & GRL (AGU Journals)

“sciamachy” in abstract:

60 hits

Period 2000 – now



Discovery papers (1)

1. Richter et al. 2004: NO₂ emission by ships is detected using Scia
2. Afe et al. 2004: BrO is NOT detected for volcanic eruptions
3. Rohen et al. 2005: ozone depletion detected during solar proton events
4. Bertram et al. 2005. Soil NO₂ emission model improved using Scia NO₂
5. De Laat et al. 2006: Scia CO: seasonality of CO is OK in models, except biomass burning
6. Frankenberg et al. 2006: CH₄ emissions in models are too small in tropics
7. Van der A et al. 2006: quantification of NO₂ trend in China
8. Sioris et al. 2006: Better understanding of chemistry & transport of Bry in lower-stratosphere

Discovery papers (2)

9. Martin et al. 2006: NO₂ emissions in US from lightning and land differ from inventories
10. Jacobi et al. 2006: very low polar boundary layer ozone better understood by using Scia Bro
11. Houweling et al. 2006: more insight in CH₄ emissions by vegetation
12. Wittrock et al. 2006: CHOCHO & HCHO ratio agree with model, abundances over tropical oceans are higher than expected.
13. Gloudemans et al. 2006: Better understanding in emissions and transport of CO from BB in SH.
14. von Savigny et al. 2007: Noctilucent clouds (Scia) disappeared during 2005 solar proton event when mesosphere warms.
15. Bergamaschi et al. 2007: model CH₄ emissions are OK, except for tropics

Discovery papers (3)

16. Von Savigny et al 2007: particle distribution size of noctilucent clouds determined with Scia limb spectra
17. Cook et al. 2007: Scia NO₂ is used to constrain chemistry in BB plumes over Atlantic (small contribution)
18. Martin et al. 2007: Scia NO₂ used to constrain NO lightning emissions
19. Boussez et al. 2007: Scia NO₂ us used to show that MOCAGE simulates transport & chemistry in plumes over Atlantic well
[Blond et al. 2007 Scia NO₂ vs Chimere: demonstration]
21. *[De Laat et al. 2007: demonstration of value of Scia CO]*
22. Siaz-Lopez et al 2007: IO is widespread over sea-ice covered areas in the Southern Ocean
23. Zhang et al 2007: NO₂ emissions trends over China larger than inventory

Discovery papers (4)

24. von Savigny et al. 2007: Quasi 5-day waves in mesosphere seen in NLCs Scia limb observations
25. van der A et al. 2007: Global NO₂ trends
26. Stavrakou et al. 2008: Global NO₂ emissions and trends
27. Boersma et al. 2008: different diurnal variation of NO₂ for BB and industrial
28. Scharringhausen et al. 2008: meteoric Mgl and MgII in thermo- and mesosphere are not understood.
29. Fu et al. 2008: Scia glyoxal are used to understand formation of secondary organic aerosol
30. Frankenberg et al. 2008: CH₄ emissions over tropics is lower than previous Scia results, but still higher than model
31. Meirink et al. 2008: CH₄ emissions: increase in the tropics, a decrease in South Asia, and a decrease at northern hemispheric high latitudes.

Discussion

- 31/60 discovery papers in JGR/GRL !
- Subjects:
 - Emissions: NO₂, CH₄ (main part)
 - NLC in mesosphere

Science, Nature

Nature:

Richter et al. 2005, NO₂ trend over China

Science:

Frankenberg et al. 2005: CH₄ higher over
tropics



Answers

- Scientific output:
- Seems to be OK, but what is impact?
- Most papers half-products?
- Yes: 40 out of 246 in ACP&JGR&GRL

More questions

- More journals? *Atm. Env.* (10 hits), *QJRMS* (3), ...
- What is the impact of the papers?
- What are the results for GOME?
- and OMI?

Who wants to follow-up on this?