First global observations of formic acid and methanol from the IASI infrared sounder

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Overview

Spectral signatures and fit examples

Method approach

Formic acid results

Methanol results

Conclusions
Weak absorbers

Main interferences by $O_3$ and $H_2O$
Fit examples

**Formic acid**

- Brightness temperature [K]
- Wavenumber [cm\(^{-1}\)]
- Fit residual
- Residual without HCOOH

**Methanol**

- Brightness temperature [K]
- Wavenumber [cm\(^{-1}\)]
- Fit residual
- Residual without CH\(_3\)OH

**Averaging kernels**

- Altitude [km]
- Averaging kernels
Formic acid

Fast approach
\[ \Delta BT = \text{mean} (\text{BT}_{\text{baseline}}) - \text{BT}_{\text{target}} \]

Correction for \( O_3 \) and \( H_2O \) [FORLI]*

Conversion to total columns after a set of retrievals in various places

* C. Scannell’s talk
• Global emission: 10 Tg/year
• Secondary biogenic emissions

• Sinks: W/D deposition (63%)
  OH oxidation (37%)
• Lifetime: 7 days
Global emission: 200 Tg/year

Primary biogenic emissions

Sinks: Dry deposition (25%)  
OH oxidation (75 %)

Lifetime: 9 days
Methanol – \( \text{CH}_3\text{OH} \)

IASI 2009

AATSR fires
IASI 2009 - IMAGESv2 2008 relative differences

CH$_3$OH IASI-IMAGES Spring

CH$_3$OH IASI-IMAGES Summer

CH$_3$OH IASI-IMAGES Autumn

Methanol – CH$_3$OH
- Good agreement for the NH
- Stronger discrepancies above dry vegetation in Africa
Unexpected result from the IASI sounder

**Formic acid:**
- IASI measurements overall lower than the model
- Model underestimation in various parts of the world, mostly in the Northern Hemisphere

**Methanol:**
- IASI measurements lower than the model
- IASI higher concentrations due to fires
- Good relative agreement for seasonal trends in the Northern Hemisphere