Continuous CO$_2$/CH$_4$ measurement at Zotino Tall Tower Observatory (ZOTTO) in Central Siberia

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# Acknowledgements

## ZOTTO staff

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<td>V. Rudneva</td>
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## ZOTTO consortium:

- Picarro Inc.
ZOTTO site

- Siberia is important for carbon cycle:
  - ~10% of global terrestrial carbon (vegetation + soils)
  - ~5-10% of global terrestrial productivity
  - ~65% of Siberian forests contain permafrost

Integrated ZOTTO footprint

STILT transport model, 1.5.-30.11.2009, 301 m, -5 days
ZOTTO setup

- Measure with 1 instrument the air from 6 tower levels

[Image of ZOTTO setup diagram]

- Measure with 1 instrument the air from 6 tower levels

[Winderlich et al., AMTD, 2010]
ZOTTO setup

- Measure with 1 instrument the air from 6 tower levels

[ZOTTO setup diagram]

[Image of tower setup]

[Winderlich et al., AMTD, 2010]

[Winderlich et al., AMTD, 2010]

[CRDS analyzer]

Picarro Inc.
EnviroSense 3000i G1301
ZOTTO setup

- Measure with 1 instrument the air from 6 tower levels

[Image: Diagram of the ZOTTO setup with labels for inlet, purging pump, tubing, buffer, CRDS analyzer, calibration gas, and water correction]

[Winderlich et al., AMTD, 2010]
ZOTTO setup

- Measure with 1 instrument the air from 6 tower levels

[Winderlich et al., AMTD, 2010]
300 m data

a) 

b) 

CO$_2$ mixing ratio [ppm]
360 370 380 390 400

full time resolution data
Fourth harmonic function
(only 14:00–17:00 data)

Jun 1, 2009  Jul 1, 2009  Aug 1, 2009  Sep 1, 2009  Oct 1, 2009  Nov 1, 2009

CH$_4$ mixing ratio [ppb]
1850 1950 2050 2150
July 2009

CO₂ mixing ratio [ppm]
370 380 390

CH₄ mixing ratio [ppb]
1900 2000 2100

Temperature [°C]
14 18 22 26

Time of day [h]
18:00 00:00 06:00 12:00

- 301m
- 92m
- 227m
- 52m
- 157m
- 4m
22-23 July 2009

CO₂ mixing ratio [ppm]

1900 2000 2100

CH₄ mixing ratio [ppb]

Krasnoyarsk winter time [h]

Temperature [°C]

18 22 26 30

Time of day [h]

CO₂ mixing ratio [ppm]

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Krasnoyarsk winter time [h]

Temperature [°C]

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Time of day [h]

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Flux estimates

→ Estimate regional C-release in PBL

- CO₂ mixing ratio [ppm]
- Tower height [m]
- Respiration flux [µmol/m²/s]
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<tbody>
<tr>
<td>00:00</td>
<td>370</td>
<td>0</td>
</tr>
<tr>
<td>05:00</td>
<td>390</td>
<td>6</td>
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Flux estimates

Estimate regional C-release in PBL
Flux estimates

→ Estimate regional C-release in PBL
Conclusions

Setup

• Buffer volume

→ Continuous, low noise data

• No drying

• Minimal calibration

→ Low maintenance

Now: Local flux estimates

Future: Regional inversion model

→ Flux estimates for central Siberia

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Conclusions

Setup
- Buffer volume
  ➔ Continuous, low noise data
- No drying
- Minimal calibration
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Now: Local flux estimates

Future: Regional inversion model
  ➔ Flux estimates for central Siberia

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Thank you for your attention!