Climate & Environmental Change – MAIOLICA

Regional Integration Experiment

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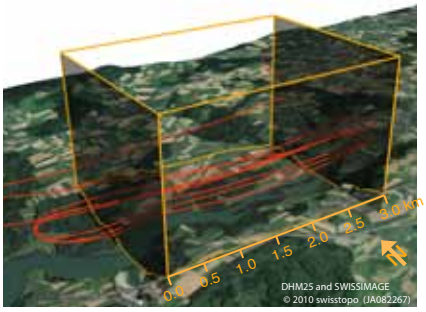
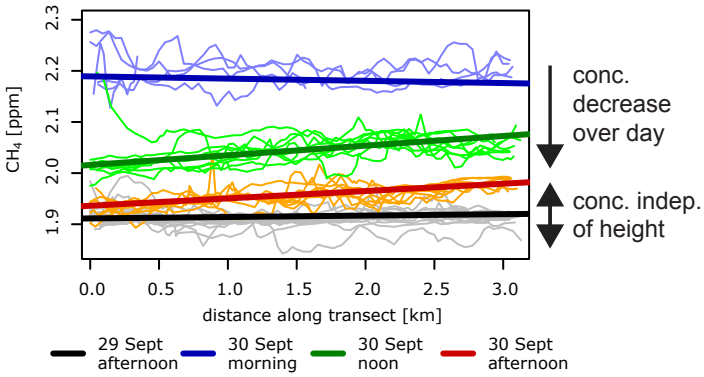
Airborne based CH_4 flux estimates at Lake Wohlen

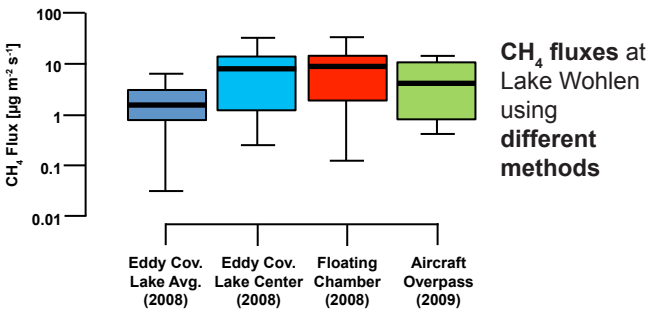
Continuous on-board measurements of CH_4 (Fast Methane Analyzer, Los Gatos Research Inc., USA) allow to quantify the methane flux along the flight legs over the lake.



Block picture: the **red path** shows the afternoon **flight track** on Sept 30th 2009, the **orange line** the **box** used for the **flux calculations**



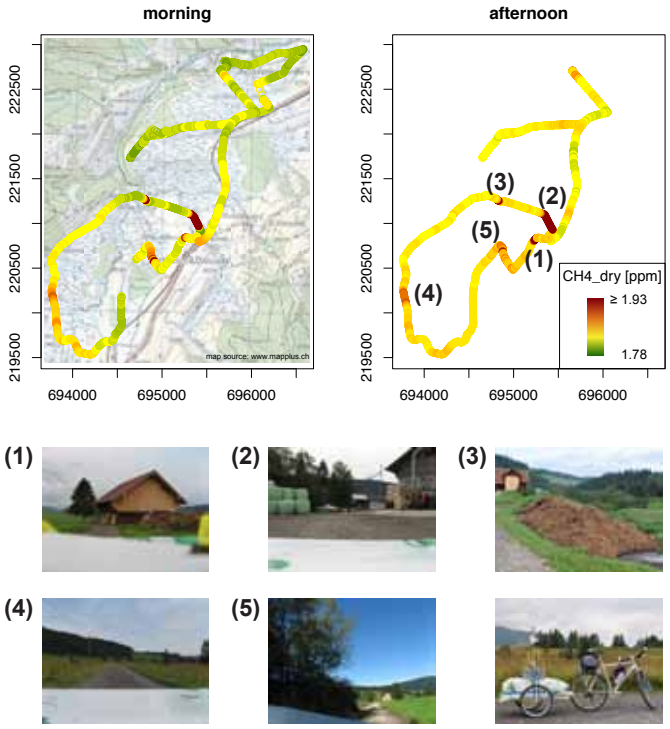
CH_4 gradients along west-east transects:
Conc. increase the longer the air parcel travels over the lake
- Morning: neg. gradient with down-valley winds (easterlies)
- Noon/Afternoon: pos. gradient with up-valley winds (westerlies)



CH_4 fluxes at Lake Wohlen using **different methods**

Ground based measurements by bicycle at the raised bog of Rothenthurm

Complementary ground based measurements were performed to gather information about local CH_4 sources. We installed a Fast Greenhouse Gas Analyzer (Los Gatos Research Inc., USA) on a bicycle trailer to measure CH_4, CO_2 and H_2O concentrations. The cycling route was recorded by a GPS unit.



Regional CH_4 distribution on Aug 26th 2010
Slightly higher concentrations in the afternoon, but regional picture remains constant, including local hot spots. The hot spots are numbered in the afternoon track, referencing the corresponding photos. The last photo shows the bicycle trailer.

Conclusions

- Aircraft based measurements are a powerful tool to estimate regional scale fluxes
- The magnitude of aircraft based flux estimates is comparable to ground based flux measurements for rather homogeneous sources
- To distinguish different local sources, complementary ground based measurements are needed