Innsbruck University
Institute of Ecology

Long-term EC measurements over a pre-alpine lake

EGU General Assembly 2016, Vienna, Austria

Katharina Scholz, Albin Hammerle, Georg Wohlfahrt

Institute of Ecology, University of Innsbruck

ÖAW Österreichische Akademie der Wissenschaften

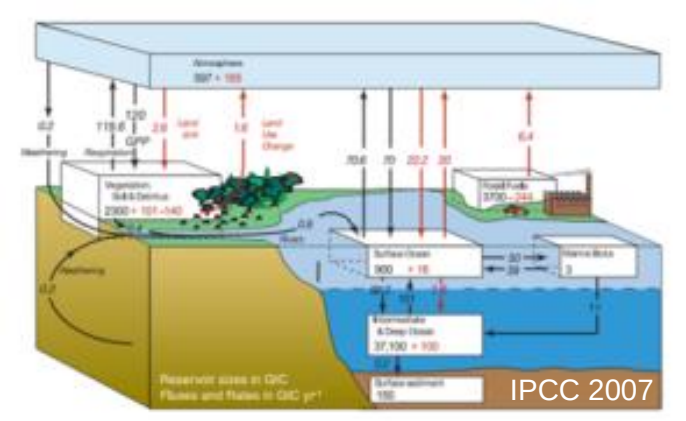
universität innsbruck

wasser cluster lunz

Motivation

Innsbruck University
Institute of Ecology

- Carbon cycle is important for climate
  - CO_2 plays important role in earth`s energy budget
- The biosphere exchanges large amounts of CO_2 with the atmosphere
- Inland waters cover only a small fraction of surface area
  - Usually supersaturated with respect to CO_2
- Formation of new lakes and man-made reservoirs



Motivation

Innsbruck University
Institute of Ecology

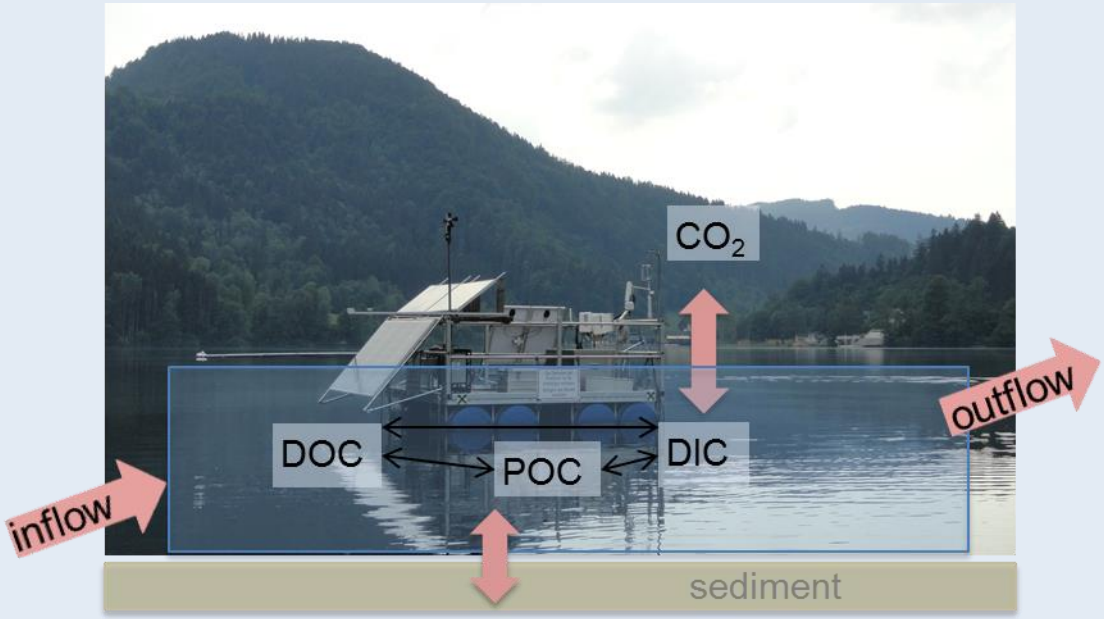
- Recent estimates show that inland waters are an active component of the global carbon cycle
- Empirical data on lake-atmosphere exchange largely based on indirect and/or small-scale measurements
- For terrestrial ecosystems: Eddy Covariance
  - FluxNet: global network ~20 yrs
- So far only very few (long-term) EC measurements at lake sites

Motivation

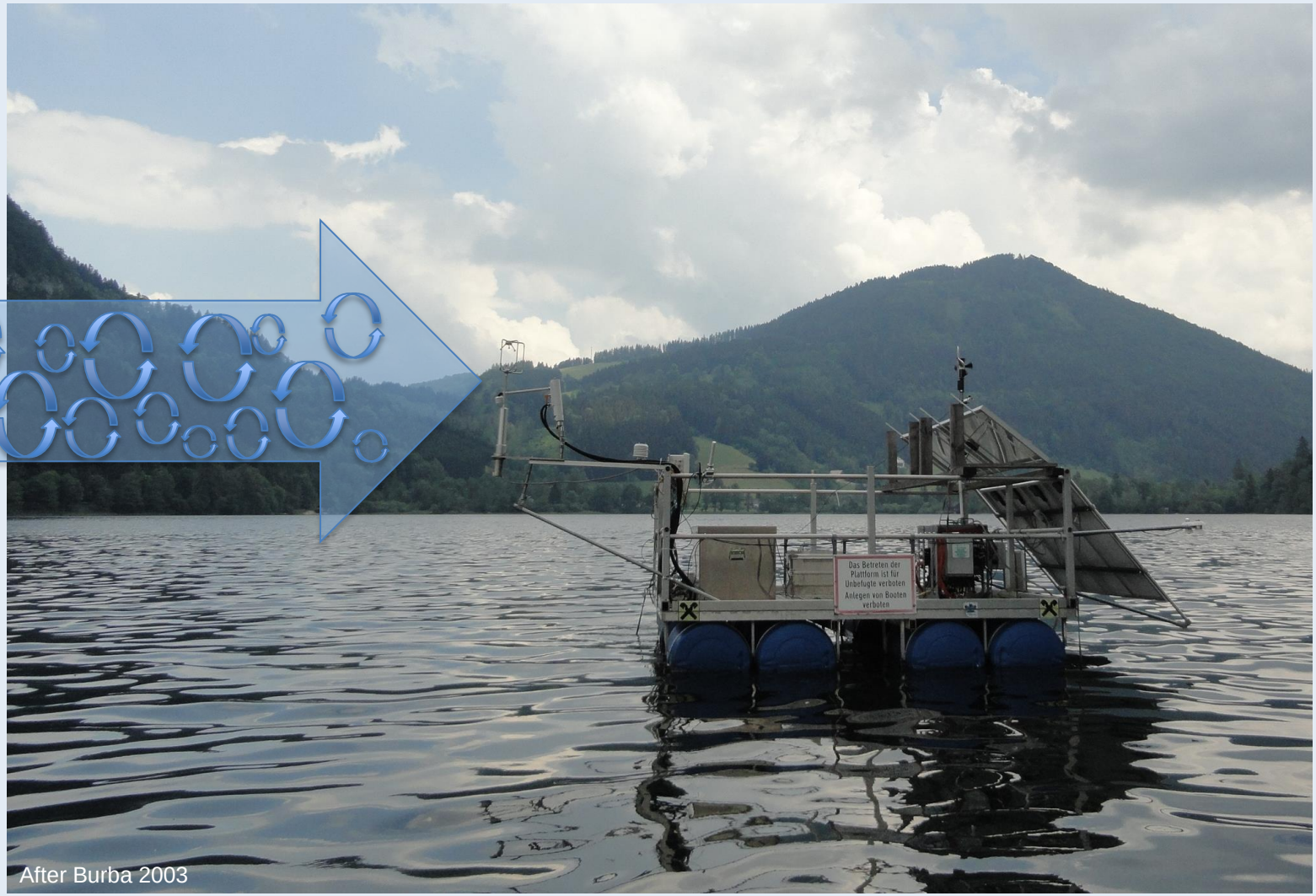
Innsbruck University
Institute of Ecology

Analyze influence of climatic extremes on carbon balance of a lake

- Monitor most important C fluxes from stream-lake continuum
  - EC-measurements of CO_2-fluxes
  - Measurement of other C-components by project partners



EC method



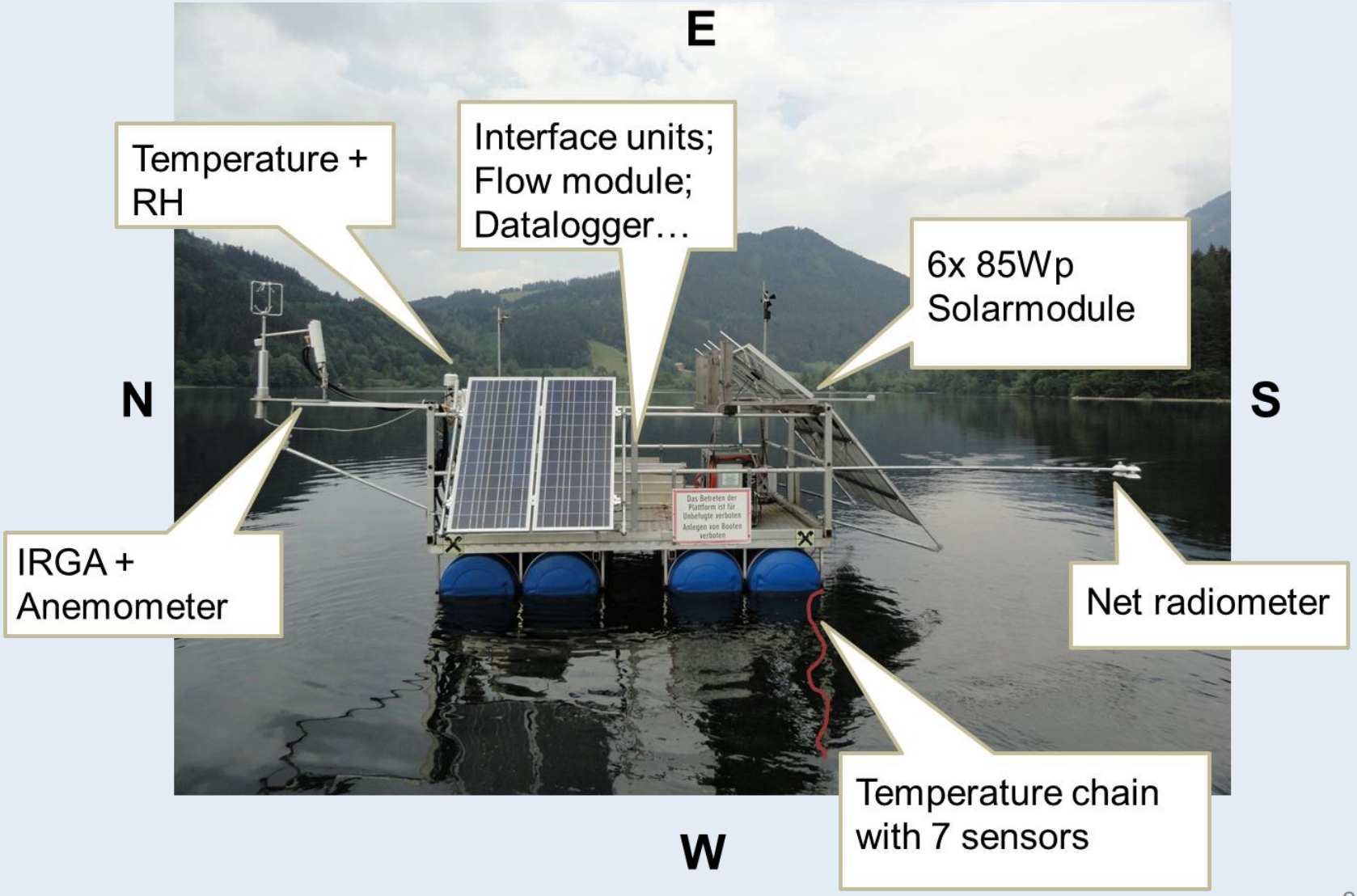
After Burba 2003

Field site

- Lake Lunz
- Natural, pre-alpine lake in Lower Austria (608 m a.s.l.)
- Area: 68 ha; (1.7 km x 0.5 km);
  13.6 mio m^3
- Mean depth: 20 m;
  max. depth: 34 m

Site set up

Innsbruck University
Institute of Ecology



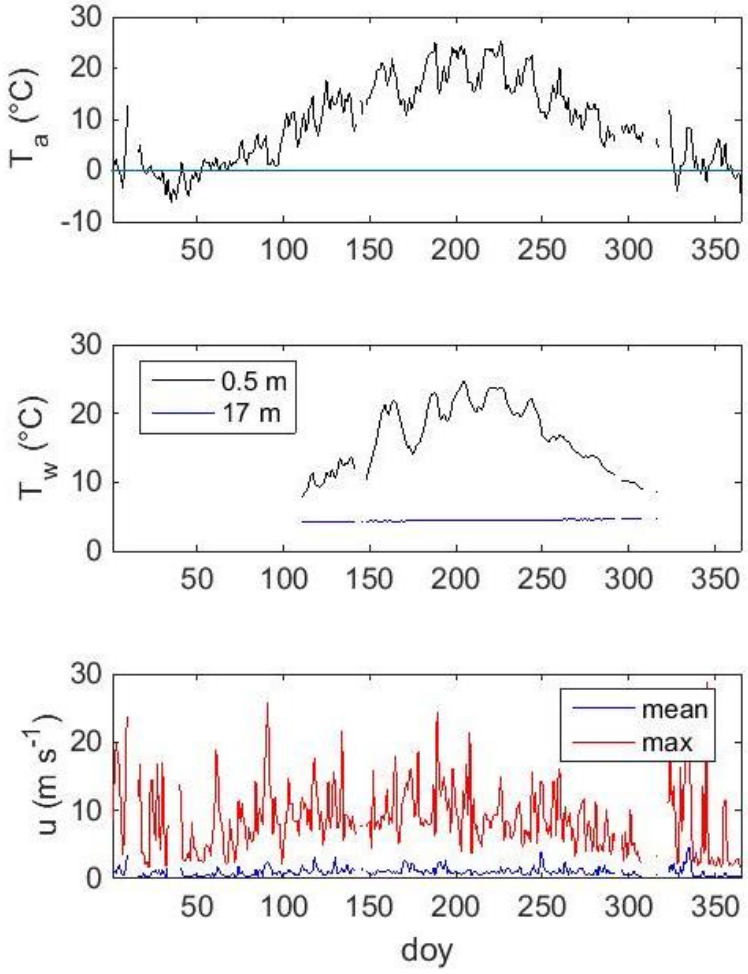
Site set up

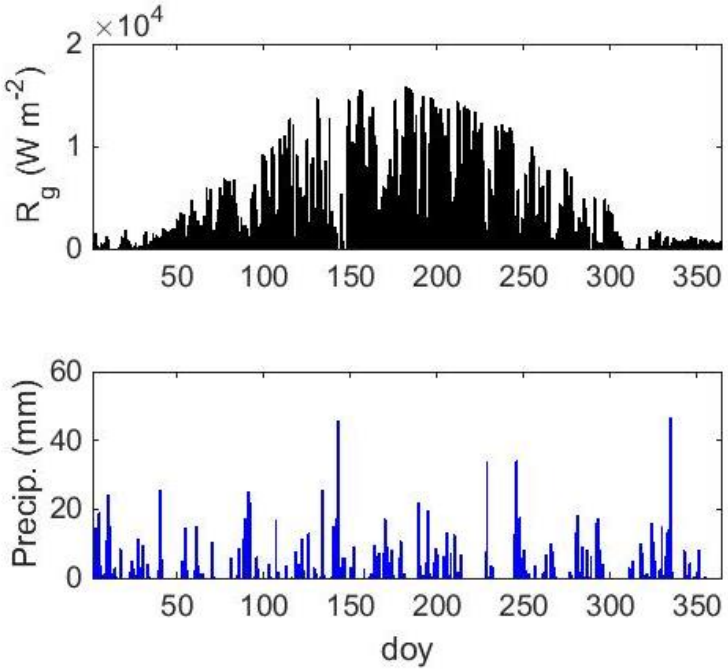
Innsbruck University
Institute of Ecology

Results

Innsbruck University
Institute of Ecology

2015



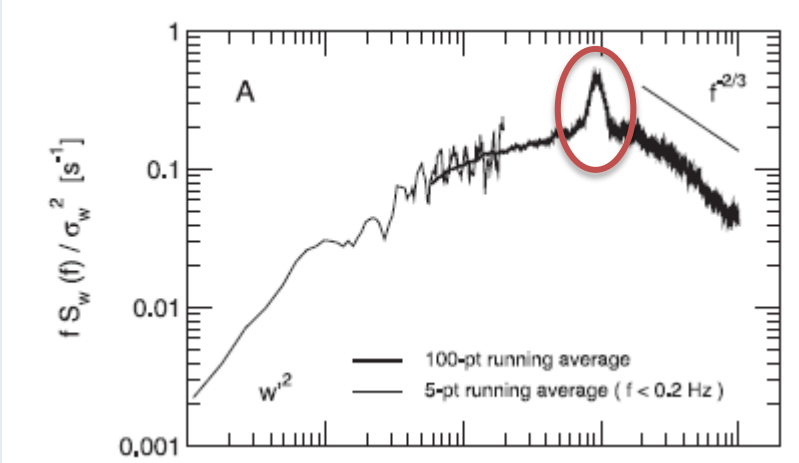


mean windspeed: 1.04 m s^{-1}

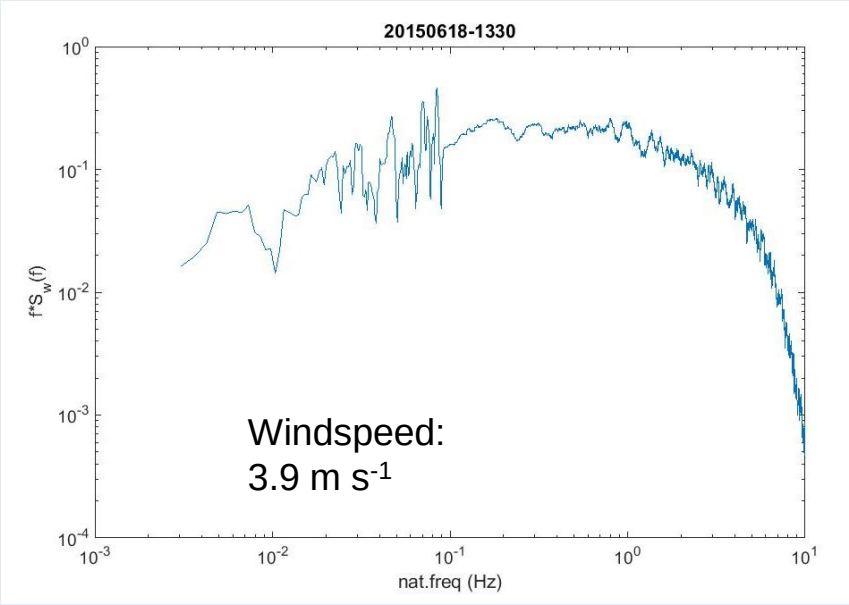
70 % of time unstable (z/L < 0)
30 % stable (z/L > 0)

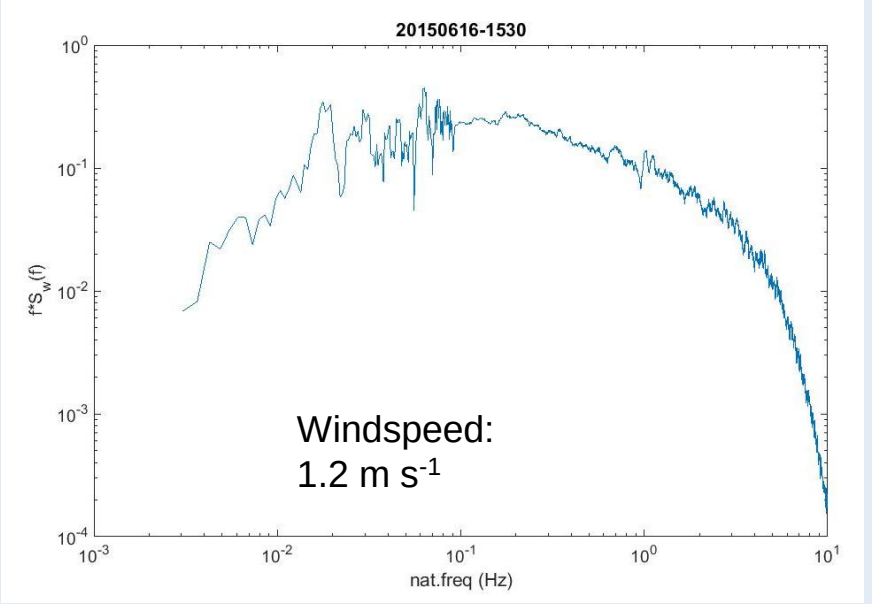
37 days with ice

Results



Eugster et al. 2003

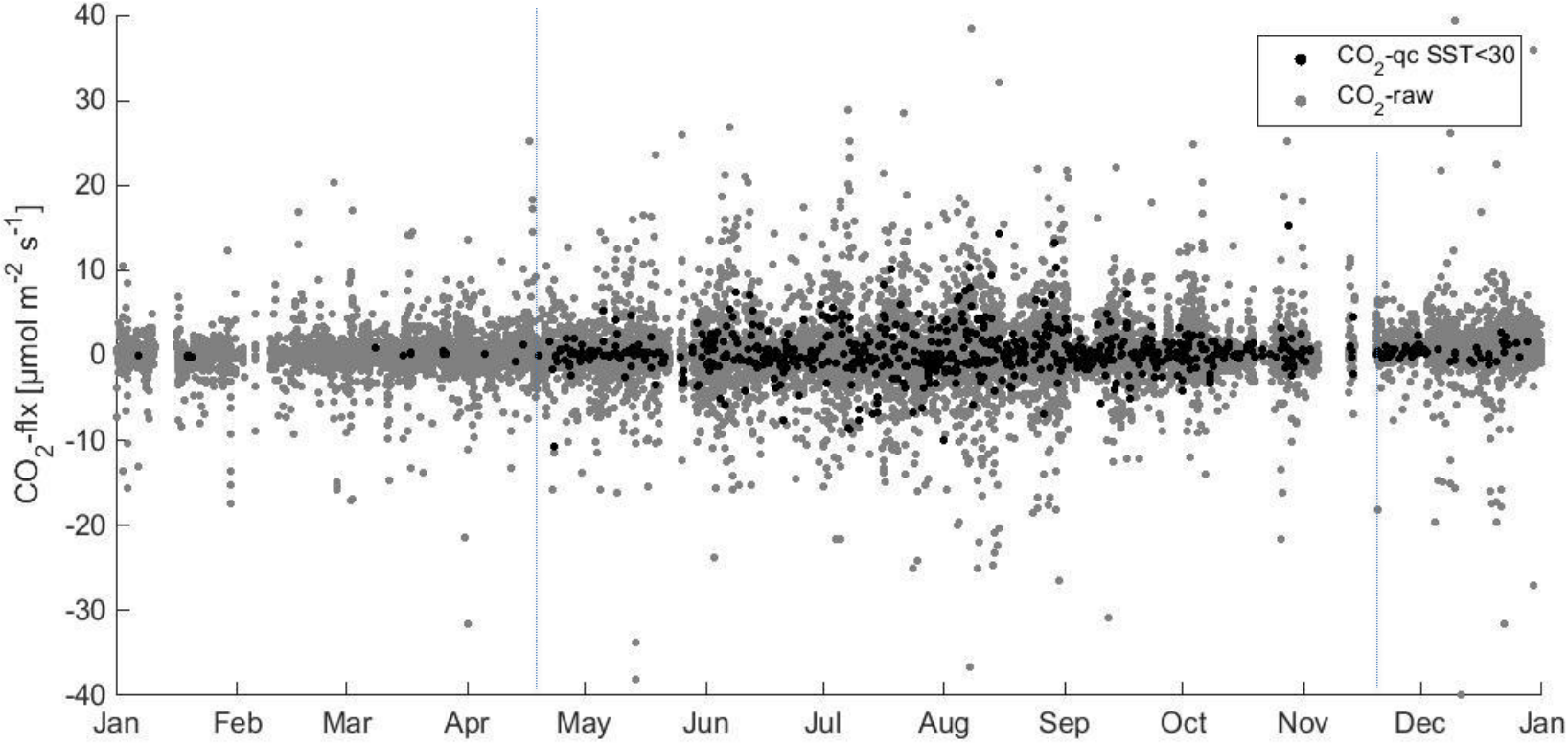




Results

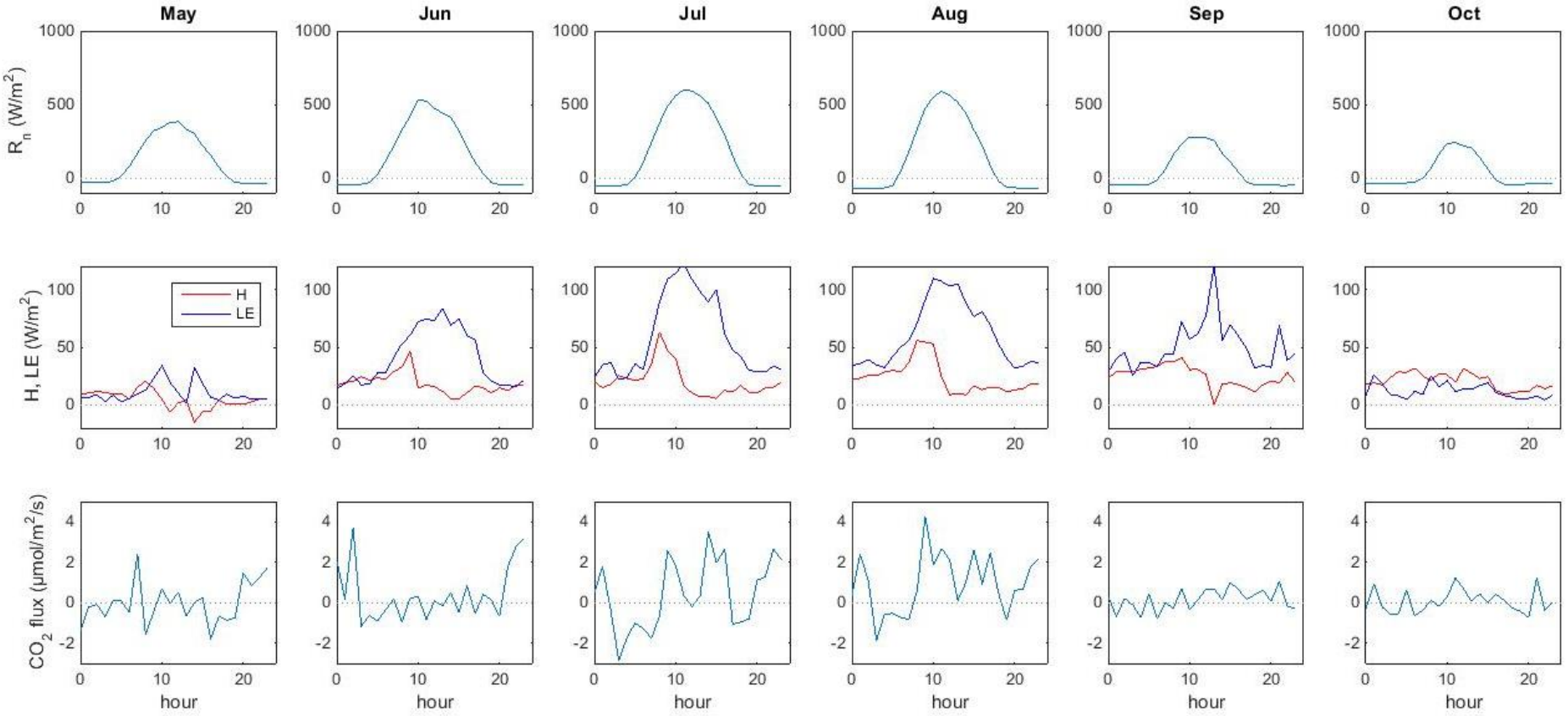
Innsbruck University
Institute of Ecology

Ø 0.34 µmol m^{-2} s^{-1} → 0.35 gC m^{-2} d^{-1}



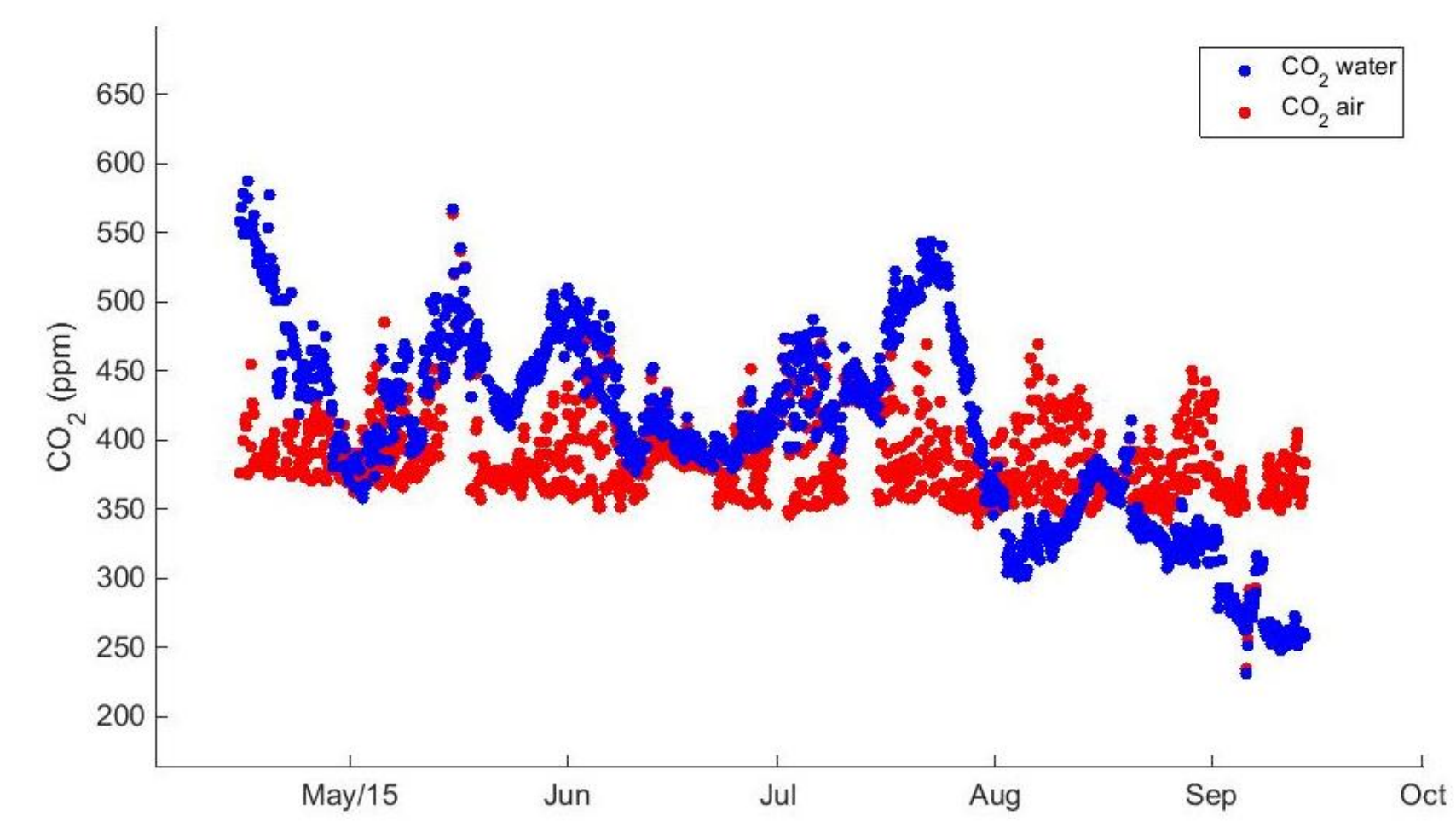
Results

Innsbruck University
Institute of Ecology



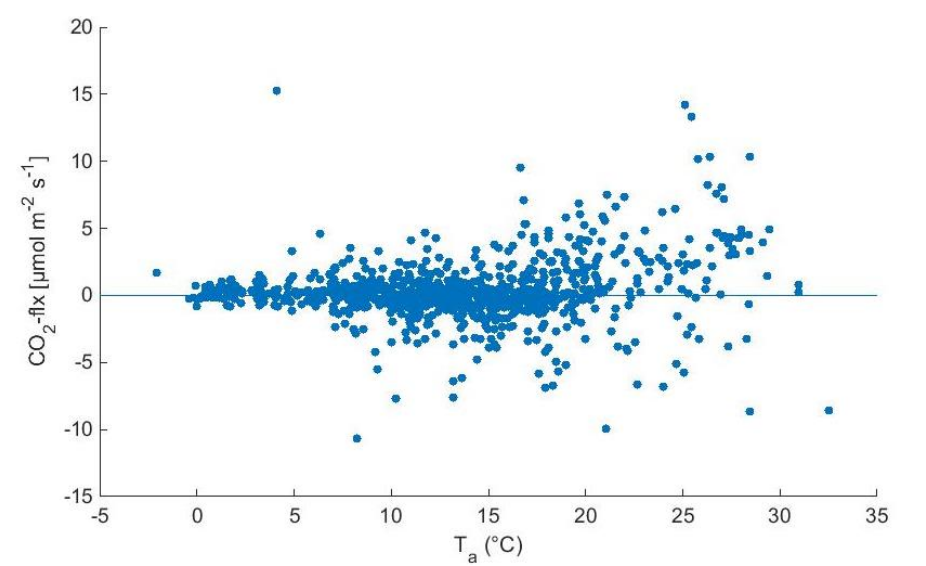
Results

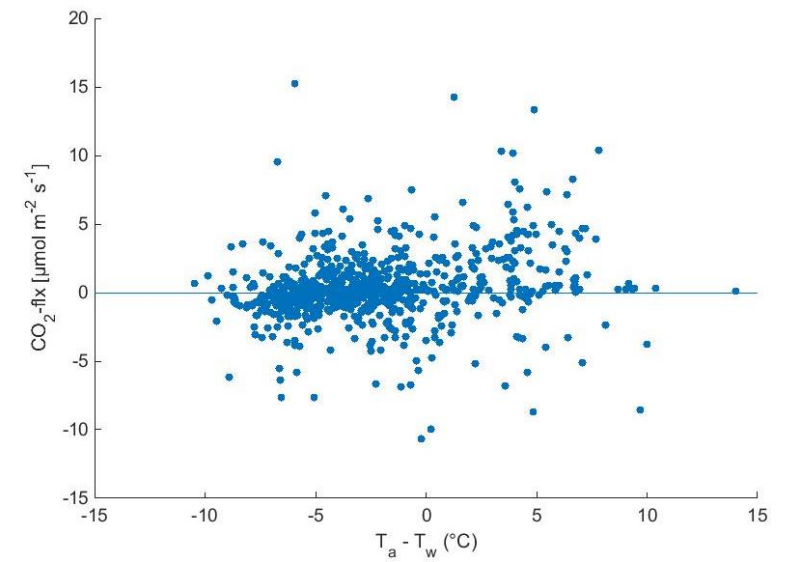
Innsbruck University
Institute of Ecology

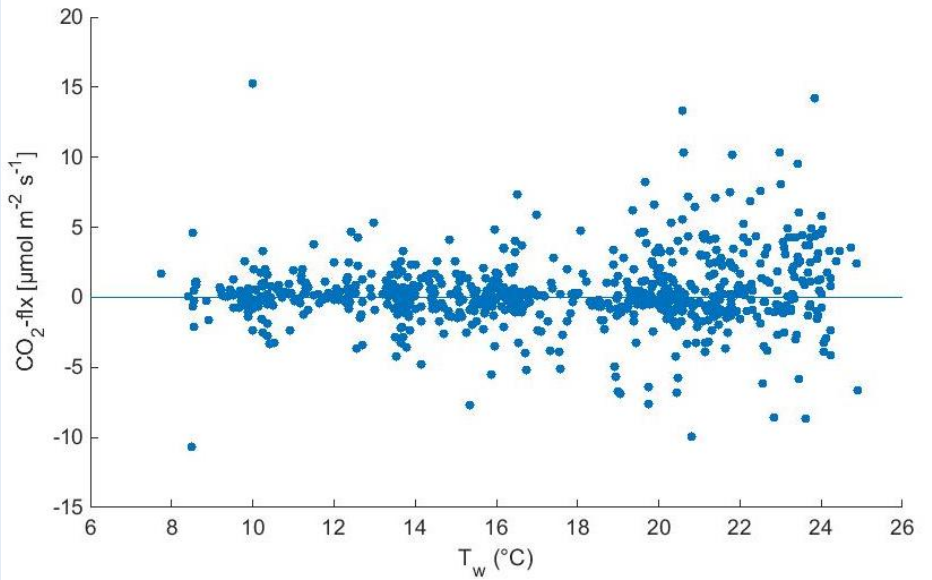


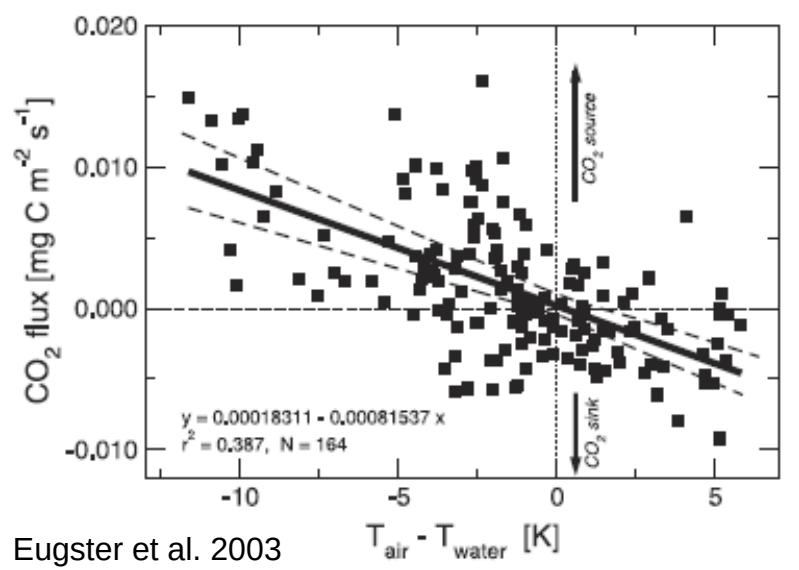
Results

Innsbruck University
Institute of Ecology





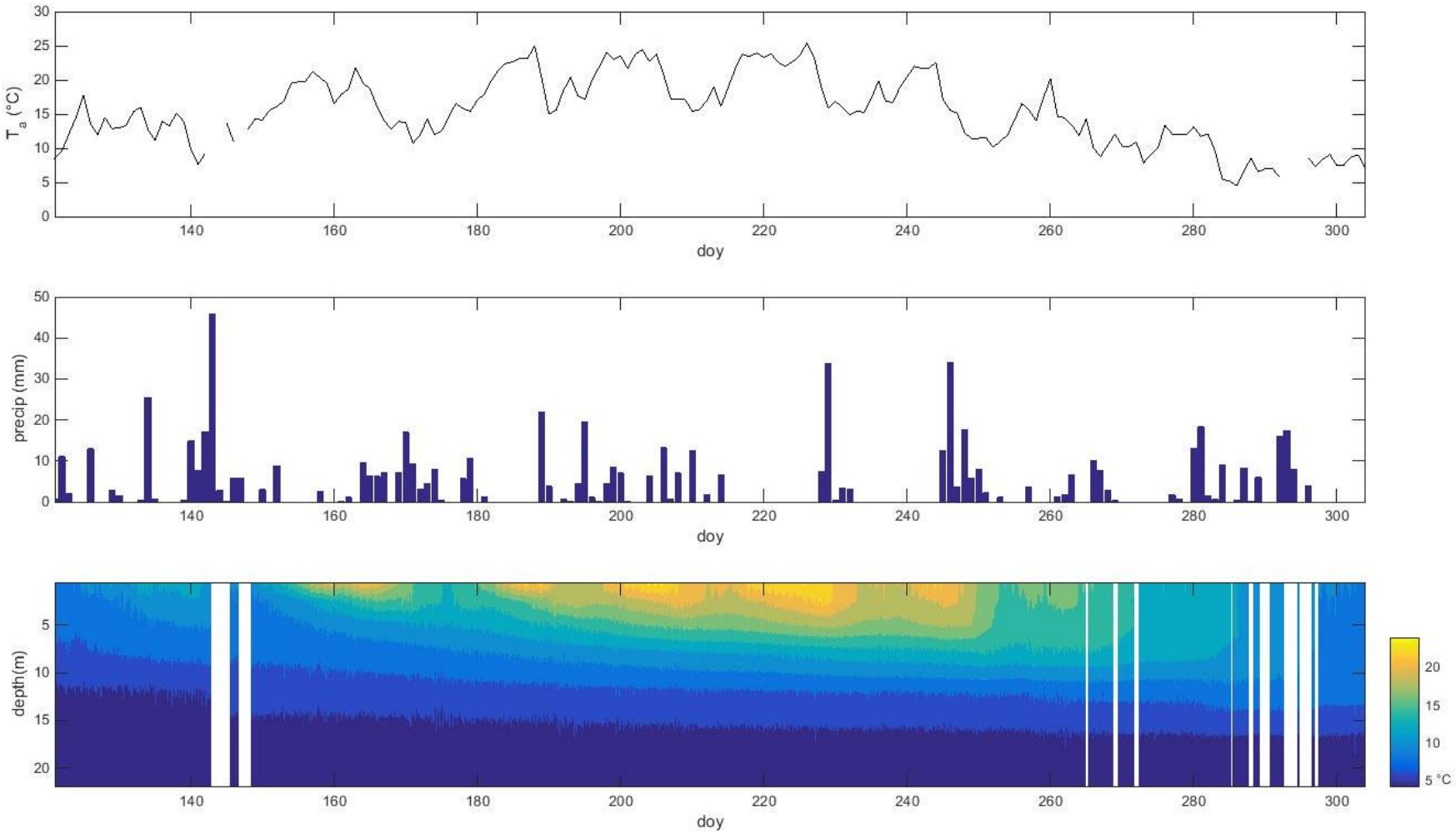




Eugster et al. 2003

Results

Innsbruck University
Institute of Ecology



Conclusion / Outlook

- Refine flux calculations
- Estimate uncertainty, flux detection limit
- Analyze energy balance closure
- Analyze CH_4 flux

biomet.co.at

visit us

Katharina Scholz

Institute of Ecology
University of Innsbruck

katharina.scholz@student.uibk.ac.at

credit: topwalls.net