Bundesministerium
für Bildung
und Forschung

TERENO
TERRESTRIAL ENVIRONMENTAL OBSERVATORIES

CT Atmosphere

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Long-Term Objectives for Exosystem-Atmosphere Observations (Hypotheses):

- A shift from large-scale to more small-scale (convective) **precipitation pattern** will occur, and **alter the hydrological balances** in the catchment areas.
- Climate change induced **vegetation and land-cover changes will modify energy and matter fluxes form the surface to the atmosphere** and related feedbacks.
- Projected shifts towards a **more soil-moisture-controlled evapotranspiration regime** will **lead to increased influence of land-atmosphere coupling** effects on temperature and precipitation variability.
- **Carbon storage potential and greenhouse gas emission** in the study areas will **substantially change with land management**.

- Objectives to examine these hypotheses: very high goals!
- Can be assessed only after several years of observation and analysis
- **... meanwhile: do the measurements make sense?**

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Meteorological parameters, instruments and methods for the different station types

Parameter	Instruments/Methods	Station type
Standard climate station - Incoming short wave radiation - Precipitation - Air humidity - Air temperature - Windspeed/ -direction	 Pyranometer Tipping-bucket gauges, present weather sensors MeteoMS Multisensor	Standard Monitoring Station
Precipitation drop size distribution Isotopes in Precipitation Sap flow Through fall Stem flow	Laser distrometer IRMS, WS-CRDS (automatic sampler, weekly probing) Granier Tipping-bucket gauges Tipping-bucket gauges	Intensive Monitoring Station
Eddy covariance (EC)-Station - Albedo / Radiation budget - Sensible and latent heat flux - Greenhouse gas fluxes - Soil heat flux	 4 component net radiation sensors Eddy covariance (EC) (H_2O, T, u, v, w, pressure) EC (CO_2) - Heat flux plates; - Soil temperature probes	SoilCan Station
ICOS compatible EC-Station - Albedo / Radiation budget - Spectral reflectance - Photosynthetic active radiation (PAR) - Sensible and latent heat flux - Greenhouse gas fluxes Snow height	 4 component net radiation sensors Spectrometers (400 -1150 nm) Filter radiometers - EC (H_2O, T, u, v, w, pressure) - Gradient method with 5 levels (H_2O, T) - EC (CH_4, N_2O, trace gases) - Gradient method with 5 levels (CO_2, N_2O, CH_4) Snow height sensors	ICOS Station
Precipitation Regional GHG fluxes Area-averaged sensible heat flux Surface temperature map	Weather radar, rain scanner Airborne GHG fluxes (Eco-Dimona) Large aperture scintillometer Airborne hyperspectral sensors	Regional Monitoring

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EC Tower Station Wüstebach

(operated by Uni Trier, constructed 2009/2010, height: 36 m)

source: Clemens Drüe, Uni Trier

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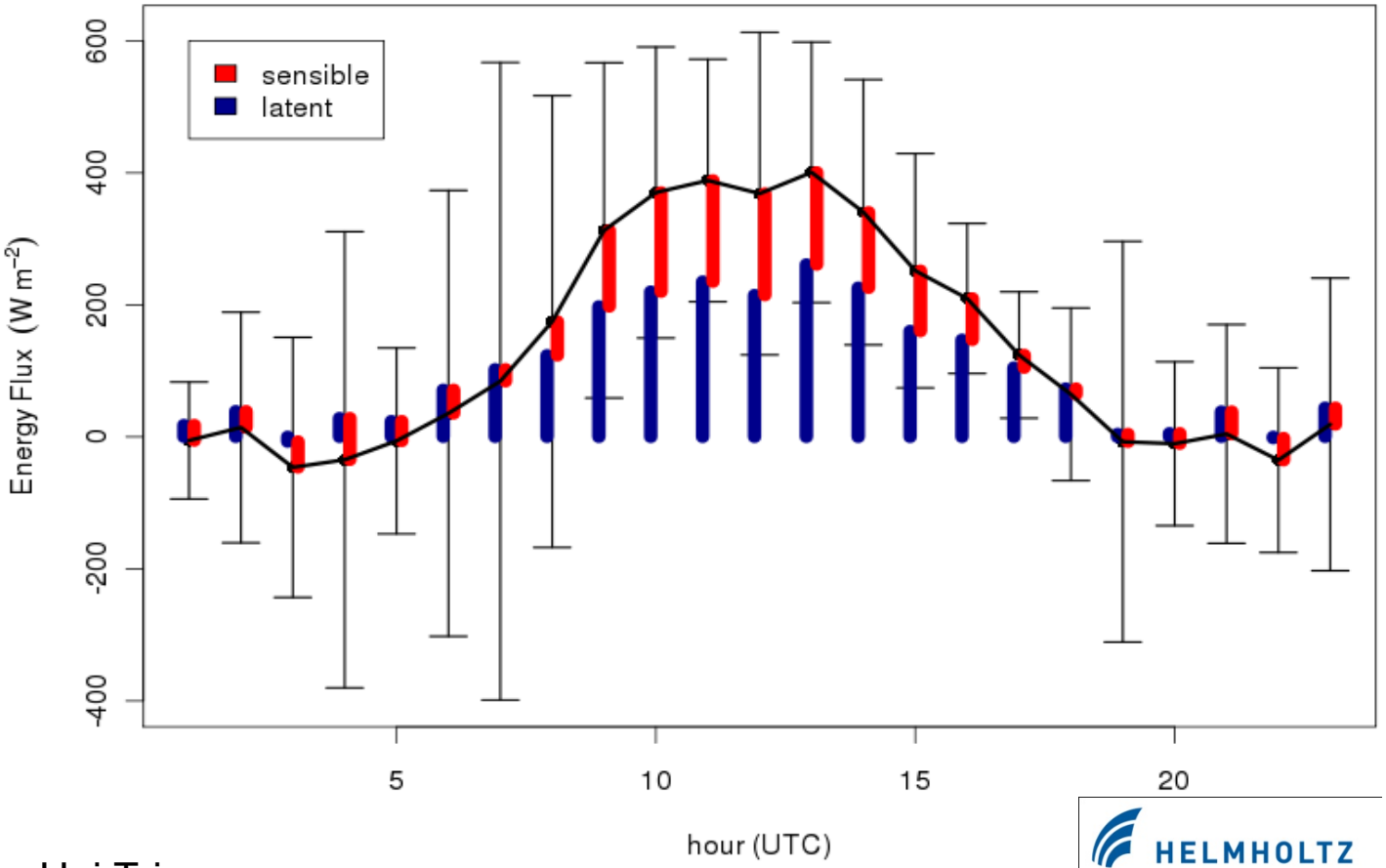
EC Station Wüstebach: First Results

- **Mean Daily Cycle of EC Fluxes of Latent & Sensible Heat (over July-Sept. 2010)**

- **black line**: turbulent flux sum
- vertical bars show range of values



source: Clemens Drüe, Uni Trier

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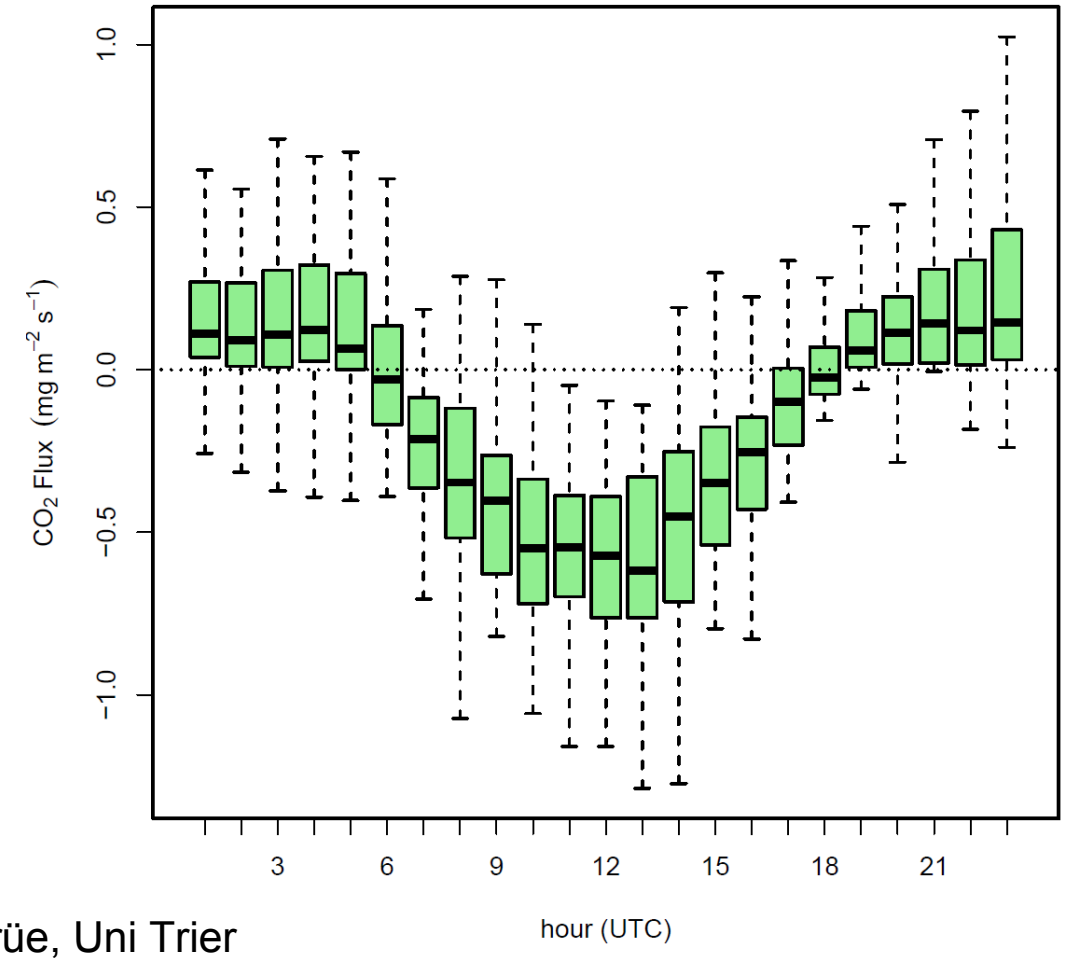
EC Station Wüstebach: First Results

- **Mean Daily Cycle of CO_2 Flux (over July-Sept. 2010)**



source: Clemens Drüe, Uni Trier

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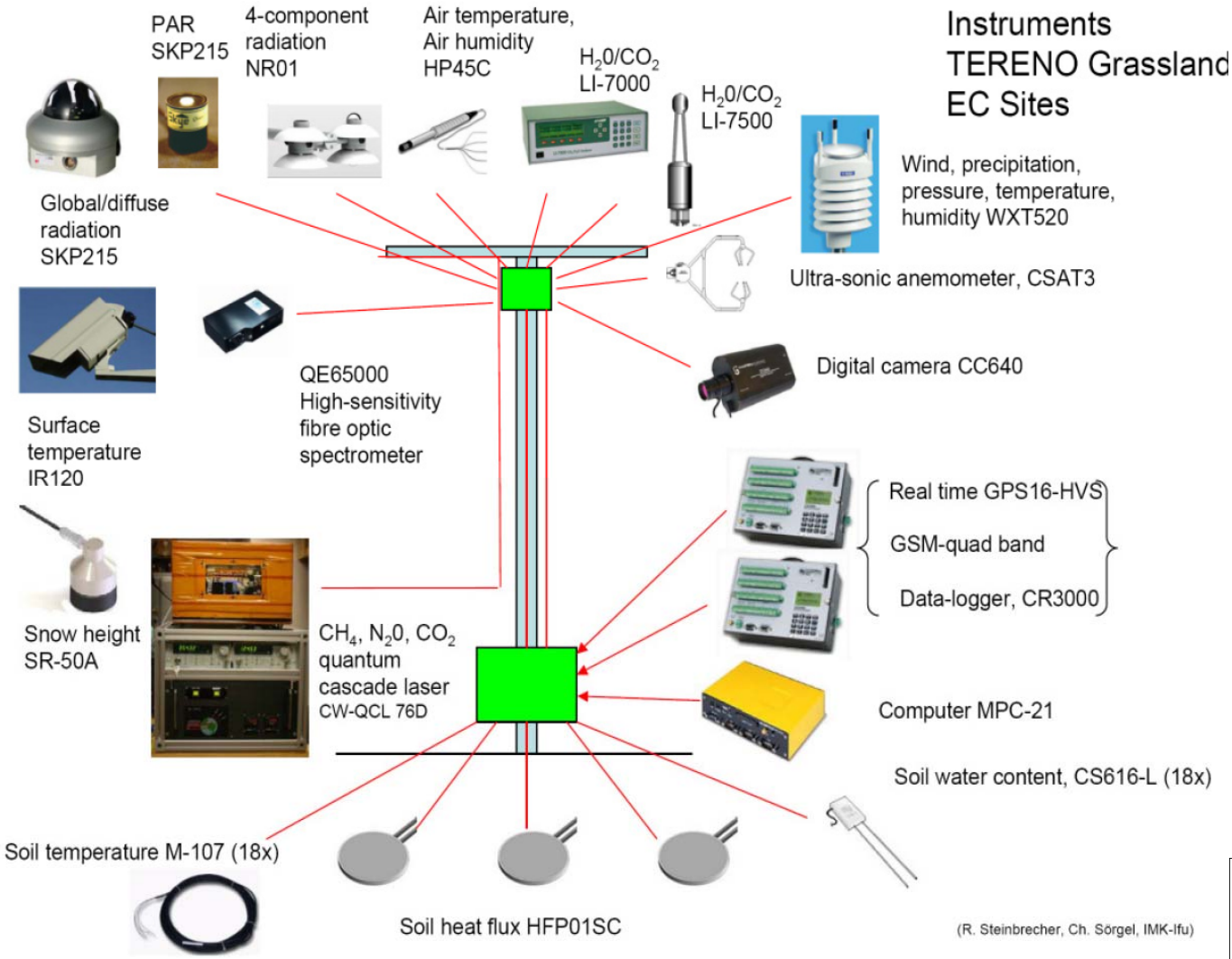
TERENO EC-Station (Instrumentation)



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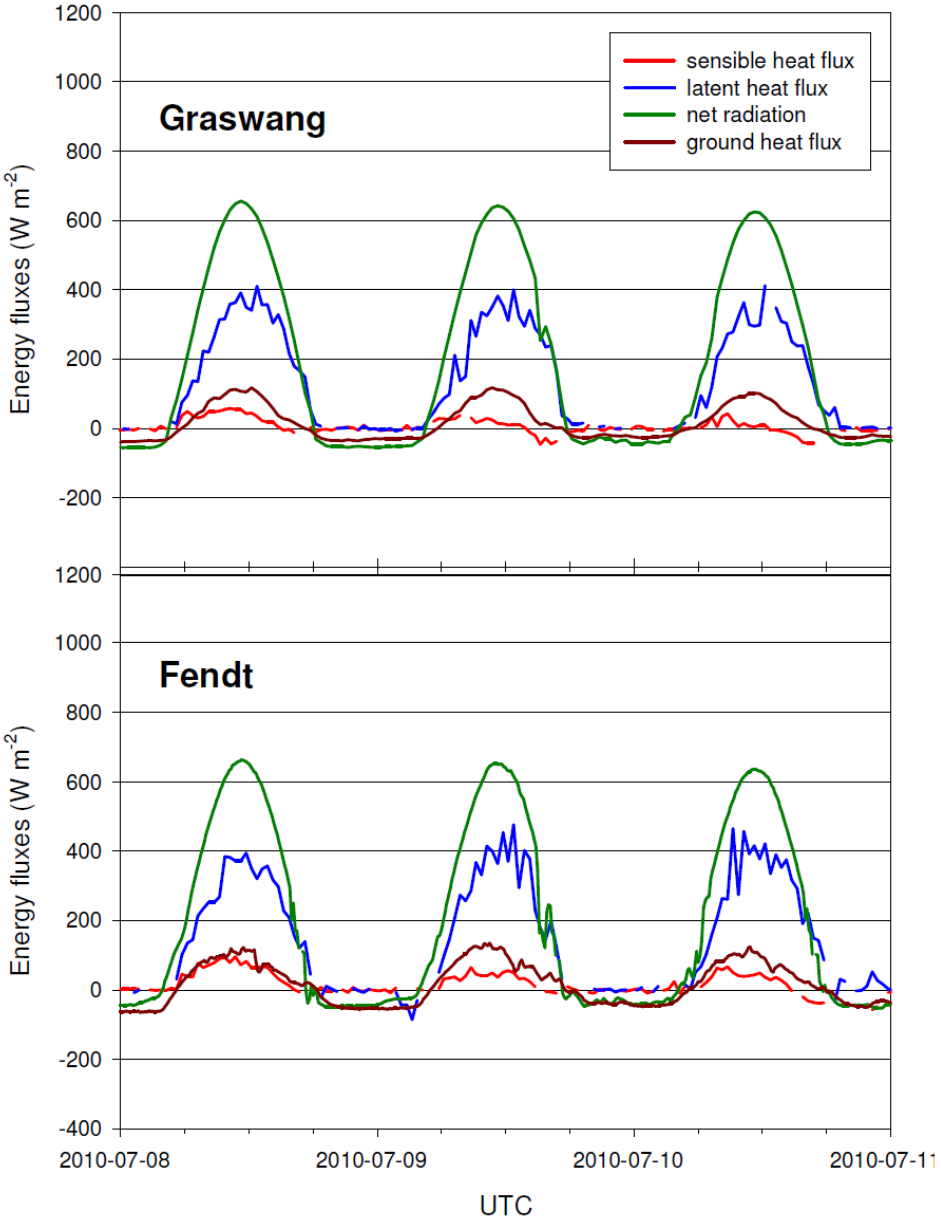

Surface Energy Exchange

July 8-10, 2010

at

- Graswang (865 m)
- Fendt (600 m)

- both sites grassland
- net radiation similar (cloud free)
- flux magnitudes and partitioning similar

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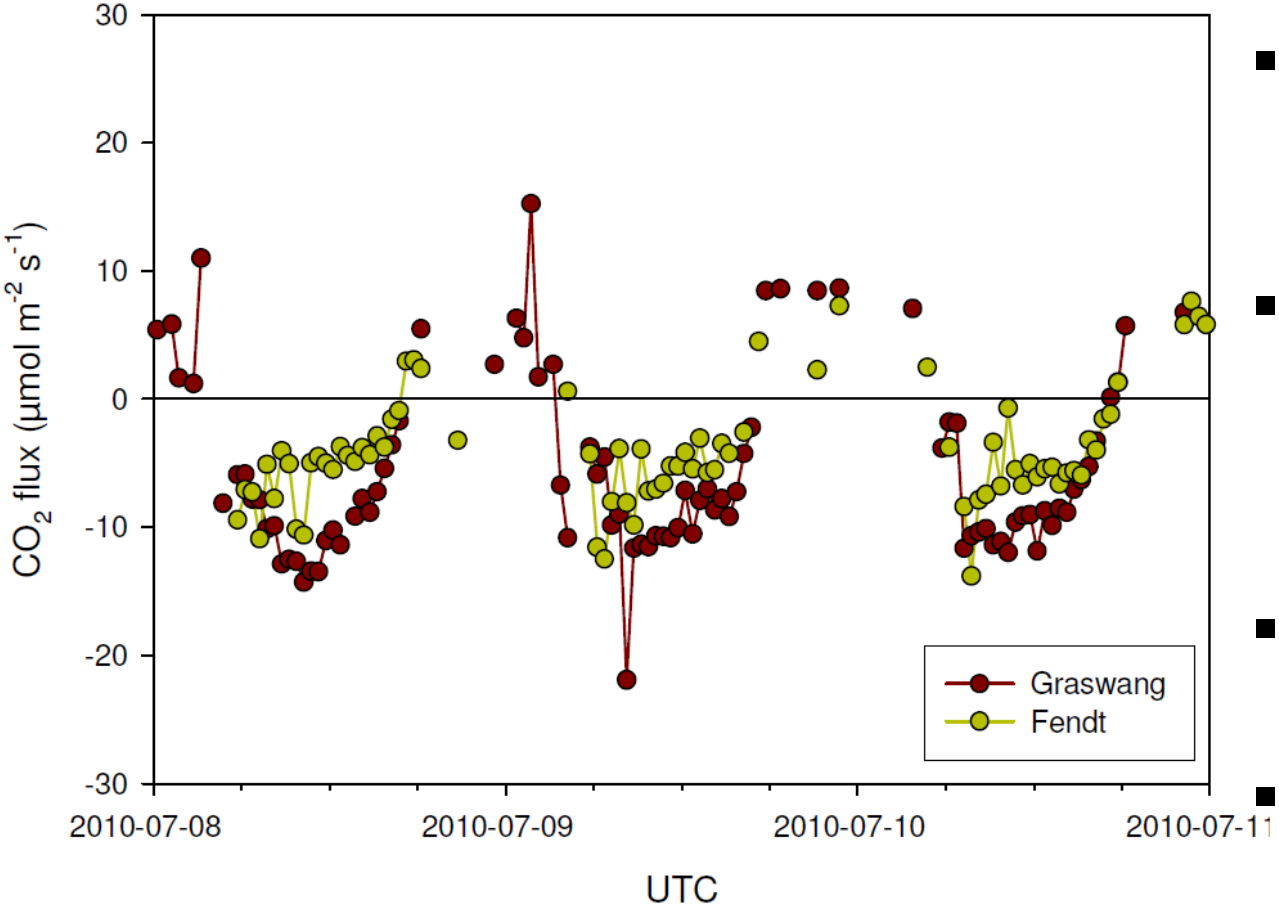
CO_2 Fluxes,

July 8-10, 2010 at Graswang (865 m) and Fendt (600 m)



- daytime uptake at Graswang larger than at Fendt
- grass at Graswang ~20cm, recent cut at Fendt ~10 cm
- reduced LAI at Fendt
- no effect on ET!

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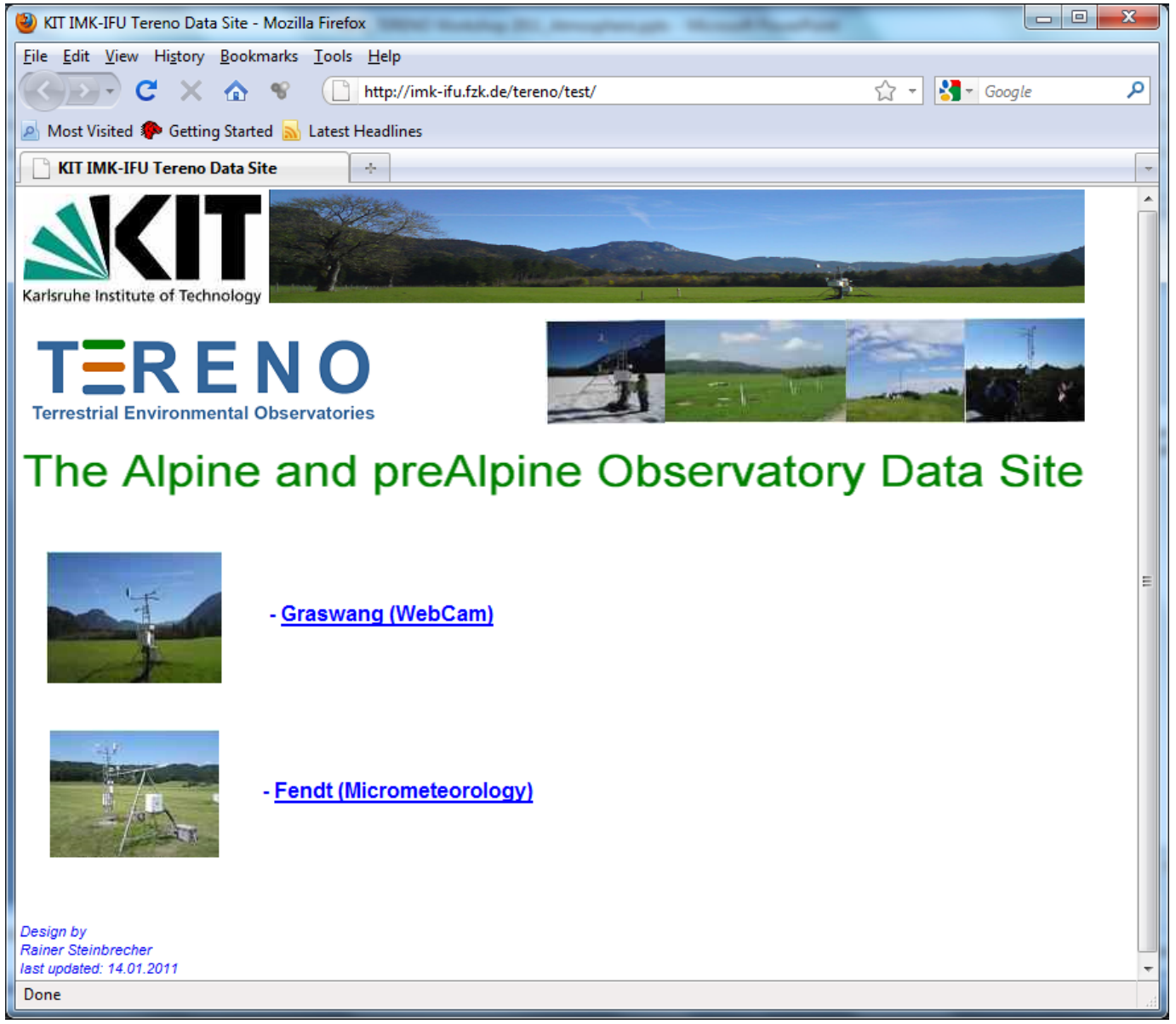

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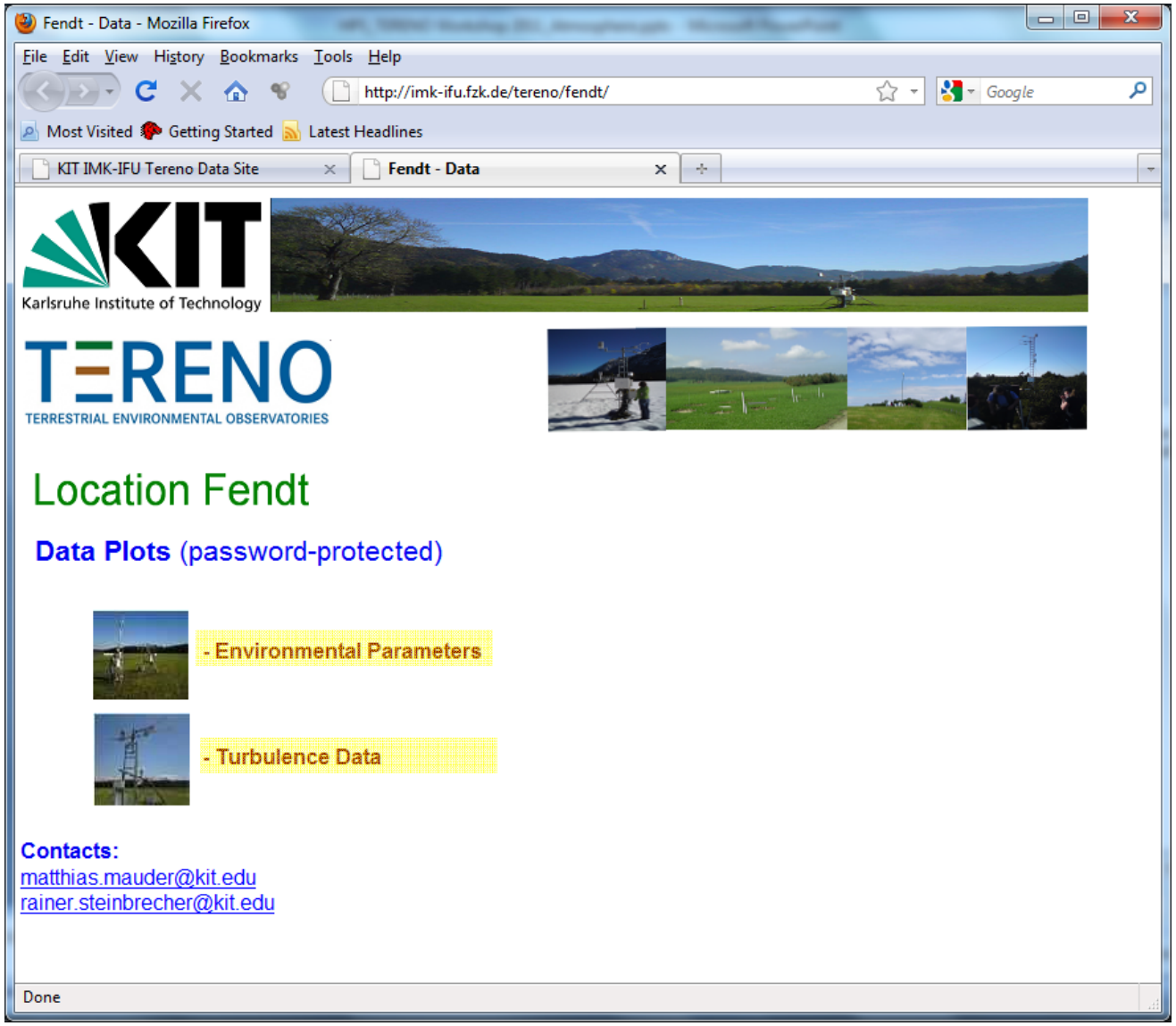
Fendt - Data - Mozilla Firefox
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http://imk-ifu.fzk.de/tereno/fendt/
Google
Most Visited Getting Started Latest Headlines
KIT IMK-IFU Tereno Data Site
Fendt - Data
Karlsruhe Institute of Technology
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Location Fendt
Data Plots (password-protected)
- Environmental Parameters
- Turbulence Data
Contacts:
matthias.mauder@kit.edu
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Done

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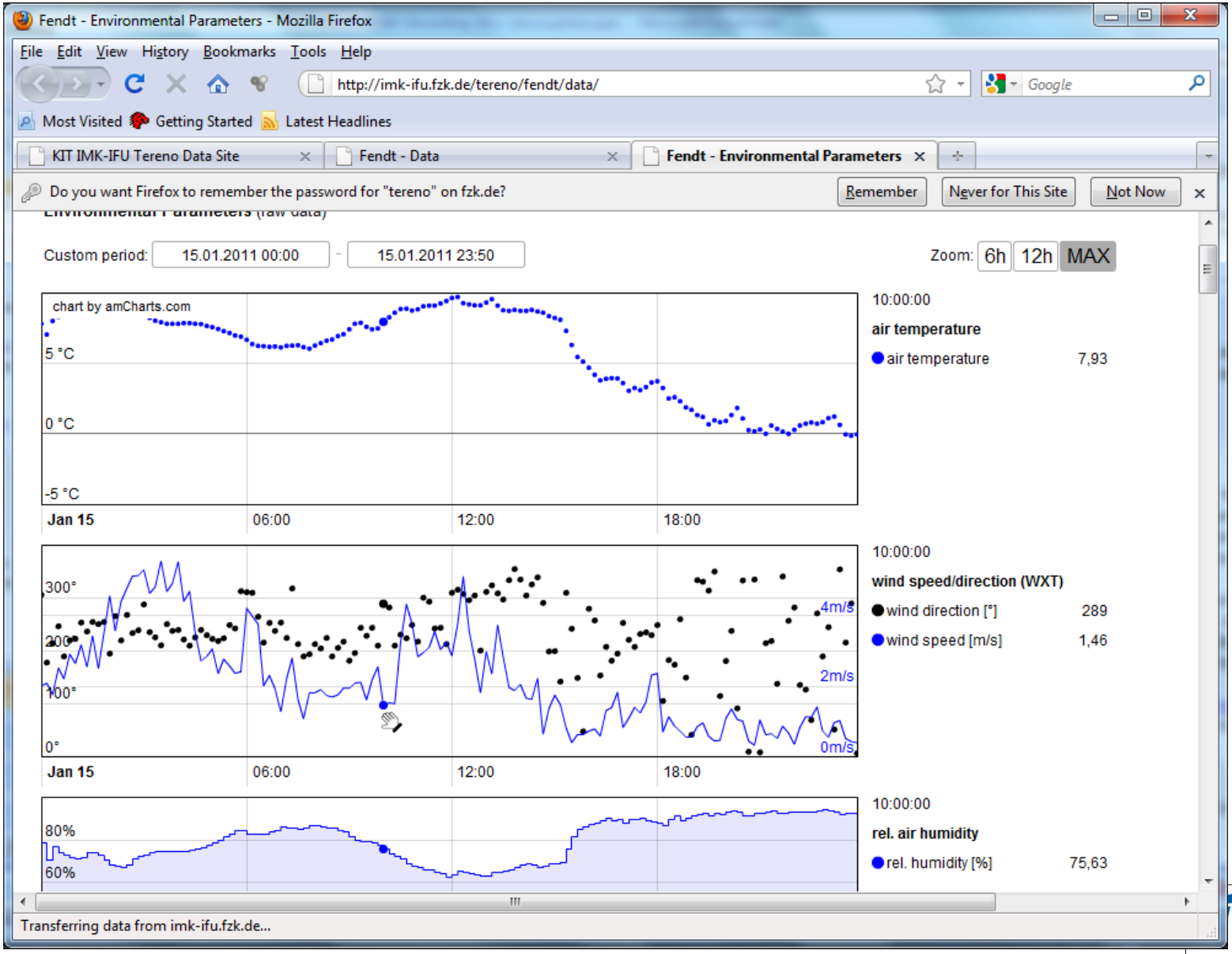

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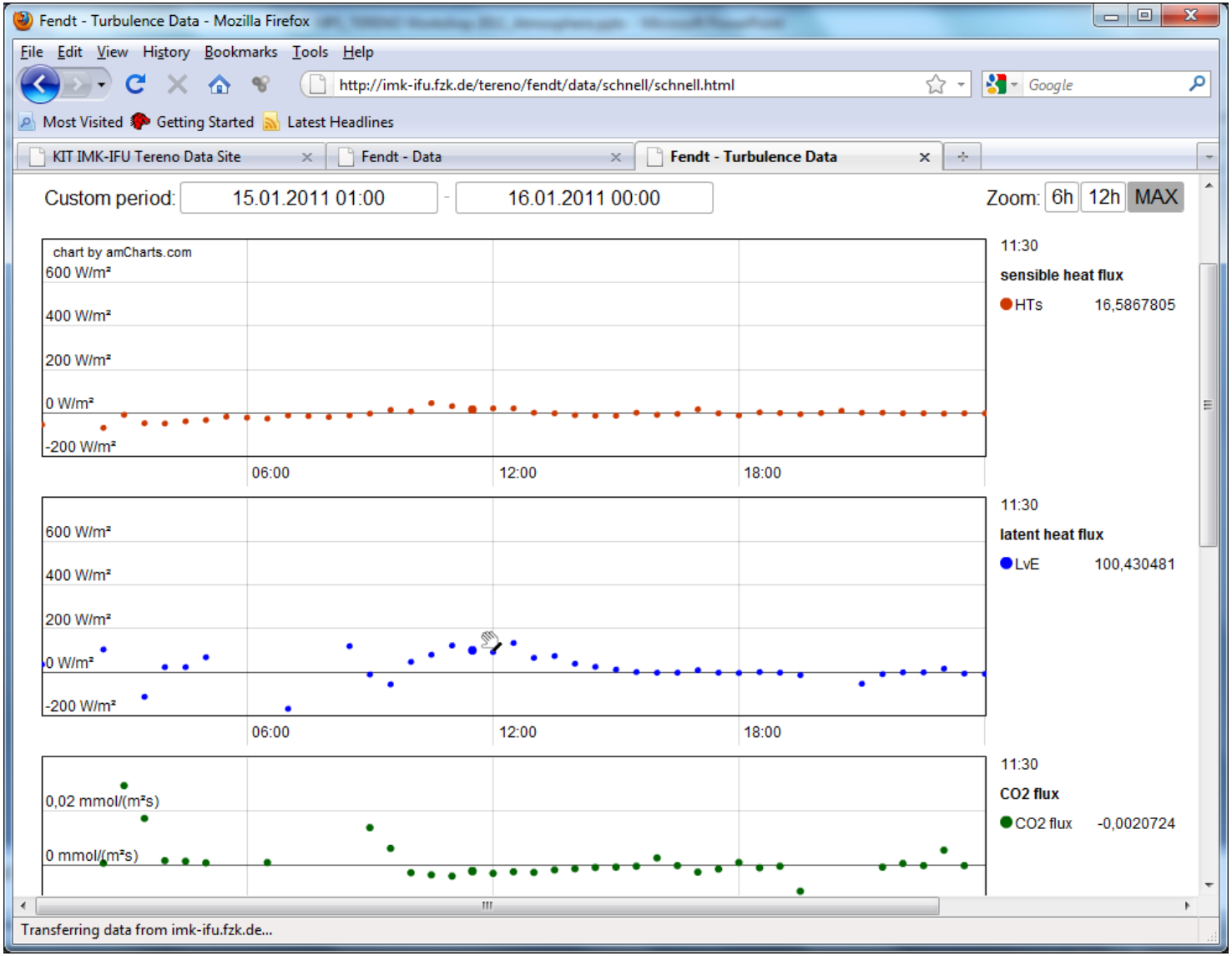

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KIT Karlsruhe Institute of Technology

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Short Course: Flux Measurement Fundamentals

April 11-15, 2011

A technical short course in the use of micrometeorological methods to obtain and analyze fluxes of momentum, heat by eddy-covariance and related techniques.

Instructors: HaPe Schmid, Matthias Mauder, Rainer Steinbrecher (Karlsruhe Institute of Technology (KIT), IMK-IFU, Garmisch-Partenkirchen)

Location: KIT/IMK-IFU, Garmisch-Partenkirchen

Important note:
Limited funding to cover the costs of accommodation and travel for Master- and Doctoral-Students is available. There is no participation fee.

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2011 Flux Course Programme

Monday, April 11 09:00 AM	**Welcome and orientation;** **Introduction to turbulent exchange measurements**	*Schmid*
01:00 PM	**Install instrumentation**	*Schmid, Mauder, Steinbrecher*
Tuesday, April 12 08:30 AM	**Download data and check system; preview data**	*Schmid, Mauder, Steinbrecher*
09:00 AM	**Boundary layer and turbulence theory;** **Programming basics**	*Schmid*
01:00 PM	**Calculations of turbulence statistics**	*Schmid*
Wednesday, April 13 08:30 AM	**Download data and check system; preview data**	*Group, Mauder*
09:00 AM	**QA/QC**	*Schmid, Mauder*
01:00 PM	**Gap-filing: issues and techniques**	*Schmid, Mauder*
evening	**Download data and check system; preview data**	*Group, Steinbrecher*
Thursday, April 14 09:00 AM	**Post-processing automation for long-term measurements**	*Mauder*
01:00 PM	**Calculation of fluxes incl. corrections and quality tests using TK2**	*Mauder*
evening	**Download data and check system; preview data; bring down instrumentation**	*Group, Mauder*
Friday, April 15 09:00 AM	**Analyze data**	*Schmid, Mauder, Steinbrecher*
01:00 PM	**Interpret, present and discuss data**	*Schmid, Mauder, Steinbrecher*
03:00 PM	**Departure**	

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