

# Invitation

## Short English-language PhD course in Budapest, 27-29 November, 2023

Lecturer: Prof. Dr. **Thomas Foken**, retired, University of Bayreuth, Bayreuth Center of Ecology and Environmental Research (BayCEER)

### Probing at the Earth's Surface under the Conditions of Climate Change

#### 1. Energy balance closure at the surface

27 November (Monday) 14:30 – 16:00 [Prof. Thomas Foken - Short course - TEAMS link](#)

Meeting ID: 374 657 457 624 Passcode: HYEjPn

ELTE, 1117 Budapest Pázmány Péter s. 1/A 7. floor 7.18–21.

#### 2. Basics of mobile measurements (cars, UAS, ect.)

28. November (Tuesday) 11:30 – 13:00 [Prof. Thomas Foken - Short course - TEAMS link](#)

Meeting ID: 374 657 457 624 Passcode: HYEjPn

ELTE, 1117 Budapest Pázmány Péter s. 1/A 7. floor 7.18–21.

#### 3. Determination evapotranspiration under the conditions of climate change

28. November (Tuesday) 14:15 – 15:45 [Prof. Thomas Foken - Short course - TEAMS link](#)

Meeting ID: 374 657 457 624 Passcode: HYEjPn

ELTE, 1117 Budapest Pázmány Péter s. 1/A 7. floor 7.18–21.

#### 4. Theodore von Kármán and his influence on atmospheric turbulence research

29. November (Wednesday) 14:30 – 15:30, join [here](#) online, or onsite: HMS, Hungarian Meteorological Service 1024 Budapest Kitaibel Pál str. 1., room: 116

**The PhD course was advertised at ELTE Doctoral School of Earth Sciences**

FÖL/1/39 Micrometeorology

**The PhD course was advertised at ELTE Doctoral School of Environmental Sciences**

KÖR-2/-201 Special topics in environmental science I

*Written exam:* short scientific paper in the theme of the course after consultation with Prof. Thomas Foken.

**Course organiser:** Tamás Weidinger, ELTE FFI Department of Meteorology, [weidi@staff.elte.hu](mailto:weidi@staff.elte.hu)

**We welcome all interested for each lecture!**

**Department of Meteorology, Eötvös Loránd University (ELU, Meteorological Dep.)**

**Atmospheric Dynamics and Synoptic Meteorology Subcommittee of the Scientific Committee of Meteorology of Hungarian Academy of Sciences (MTA MTB Subcomm.)**

**Hungarian Meteorological Society (MMT)**

**Róbert Mészáros**  
head, Met. Dep., chair, Subcomm.

**Hajnalka Breuer, secretary**  
MTA MTB Subcomm.

**Mónika Lakatos, chair**  
MMT



# PhD course 27–29 November, 2023

## Probing at the Earth's Surface under the Conditions of Climate Change

Lecturer: Prof. Dr. **Thomas Foken**, retired, University of Bayreuth, Bayreuth Center of Ecology and Environmental Research (BayCEER)

*Climate change is not only manifested by an increase in air temperature. Rather, it is processes that change or intensify and are perceived more clearly than the increase in air temperature. The lecture series highlights the changing energy conversions at the Earth's surface, possible measurement methods especially in urban areas and consequences on the water balance.*

### 1. Energy balance closure at the surface

**27 November (Monday) 14:30 – 16:00**

ELTE, 1117 Budapest Pázmány Péter s. 1/A 7. floor 7.18–21.

### 2. Basics of mobile measurements (cars, UAS, ect.)

**28. November (Tuesday) 11:30 – 13:00**

ELTE, 1117 Budapest Pázmány Péter s. 1/A 7. floor 7.18–21.

### 3. Determination evapotranspiration under the conditions of climate change

**28. November (Tuesday) 14:15 – 15:45**

ELTE, 1117 Budapest Pázmány Péter s. 1/A 7. floor 7.18–21.

### 4. Theodore von Kármán and his influence on atmospheric turbulence research

**29. November (Wednesday) 14:30 – 15:30**

HMS, Hungarian Meteorological Service 1024 Budapest Kitaibel Pál str. 1., room: 116

**The PhD course was advertised at ELTE Doctoral School of Earth Sciences**

FÖL/1/39 Micrometeorology

**The PhD course was advertised at ELTE Doctoral School of Environmental Sciences**

KÖR-2/-201 Special topics in environmental science I.

**Written exam:** short scientific paper in the theme of the course after consultation with Prof. Thomas Foken.

**Course organiser:** Tamás Weidinger, ELTE FFI Department of Meteorology,  
[weidi@staff.elte.hu](mailto:weidi@staff.elte.hu)

There is a way before lectures for consultation with the course organizer related to micrometeorology -related topics. Please keep the contact with Tamás Weidinger ([weidi@staff.elte.hu](mailto:weidi@staff.elte.hu)).

*The announced lecture series is open to other universities and institutions.*



# PhD course 27–29 November, 2023

## Probing at the Earth's Surface under the Conditions of Climate Change

Lecturer: Prof. Dr. **Thomas Foken**, retired, University of Bayreuth, Bayreuth Center of Ecology and Environmental Research (BayCEER)

*Climate change is not only manifested by an increase in air temperature. Rather, it is processes that change or intensify and are perceived more clearly than the increase in air temperature. The lecture series highlights the changing energy conversions at the Earth's surface, possible measurement methods especially in urban areas and consequences on the water balance.*

### 1. Lecture: Energy balance closure at the surface

*Closing the energy balance at the Earth's surface is a fundamental micrometeorological problem, since it is generally not possible to realize this closure by means of measurement. Originally, metrological causes were assumed, now local circulations are held responsible. Since climate change increases longwave downwelling radiance, it is important to know how this affects other energy and radiation fluxes. The problem is extremely critical, since obviously the sensible heat flux is underdetermined, but convective processes increase due to climate change.*

### 2. Lecture: Basics of mobile measurements (cars, UAS, ect.)

*Due to climate change, the effect of the urban heat island is significantly amplified, not only by the maxima of air temperature during the day, but also in a reduced cooling at night. Mobile measurements on the ground (cars, bicycles, etc.) or at low altitudes (UAS) seem to be suitable measurement systems to localize especially critical urban areas. The presentation will consider the capabilities of the techniques and their spatial resolution.*

### 3. Lecture: Determination evapotranspiration under the conditions of climate change

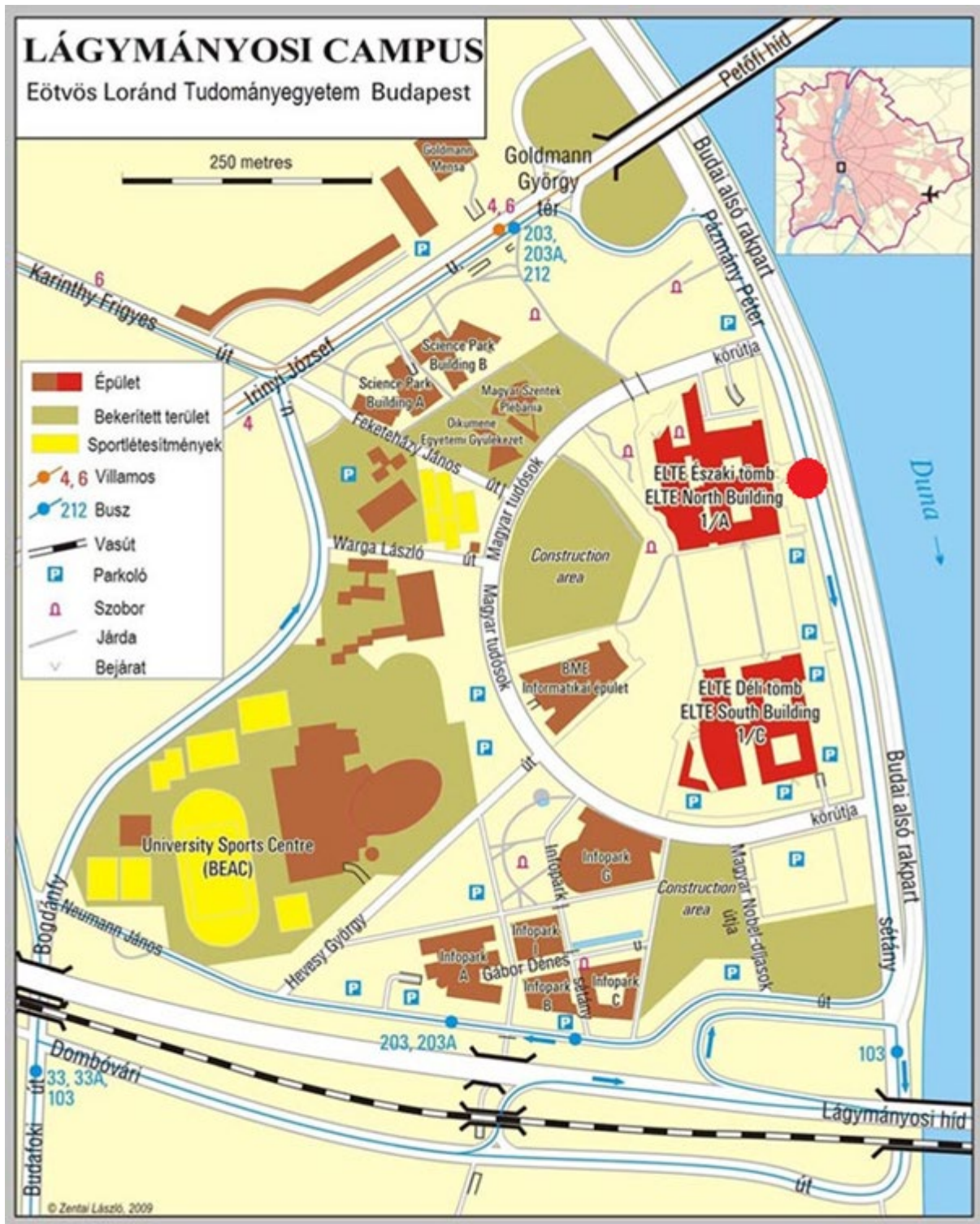
*Due to climate change and the associated higher water uptake of the atmosphere (Clausius-Clapeyron equation), evapotranspiration is increasing, in some cases significantly. The experimental determination of evapotranspiration is very complex, so that empirical methods are generally used. Due to climate change, these methods are no longer valid for the locations for which they were once determined, and thus most of them can no longer be applied. However, even more elaborate methods can no longer be used, especially when drought conditions are too severe, because the transfer resistances are not adequately parameterized for these conditions.*

### 4. Lecture (presentation in the Hungarian Meteorological Society)

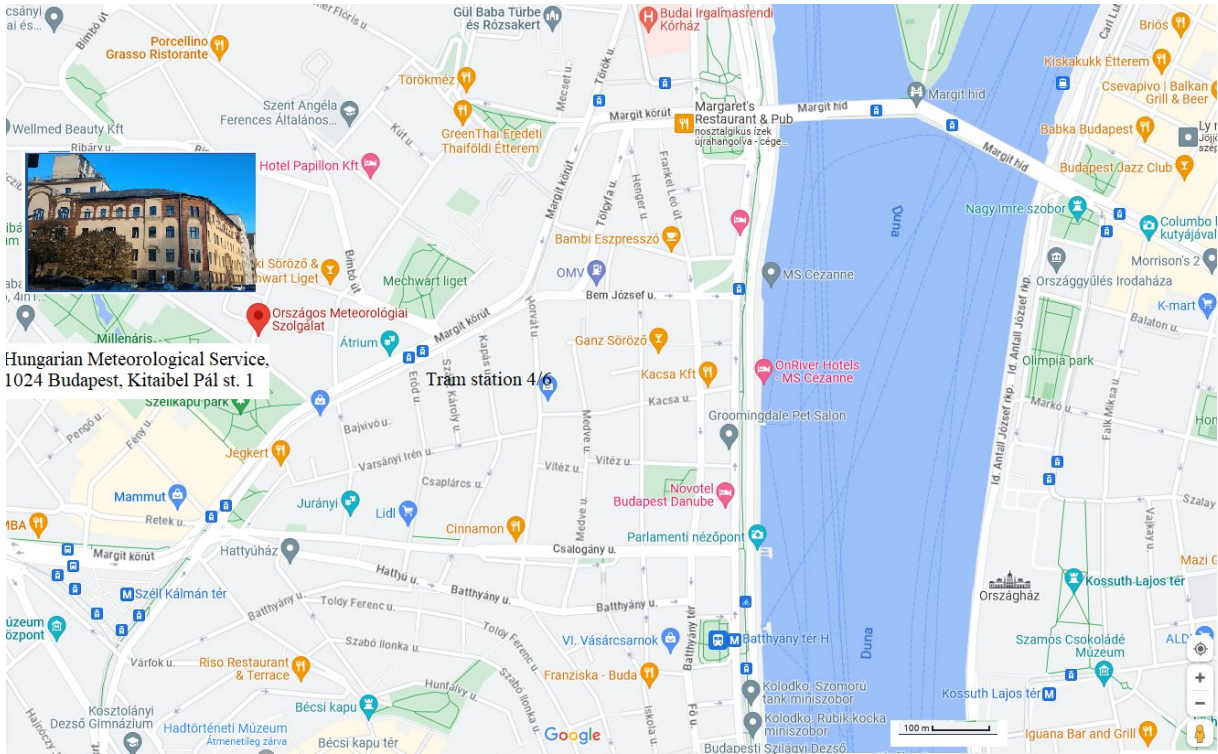
#### Theodore von Kármán and his influence on atmospheric turbulence research

*T. von Karman and T. Levi-Civita organized an "International Congress of Applied Mechanics" in Innsbruck in 1922. Shortly after the First World War, the topics were strongly influenced by aerodynamic research during the war. Nevertheless, meteorological aspects were also on the program due to the participation of Bjerkness and Ekman. The congress was chosen as a starting point to show how modern meteorology has developed from research in hydro- and aerodynamics during the last 100 years. Besides meteorologists like Schmidt, Lettau, and Rossby, aerodynamicists like von Kármán and Prandtl had a significant influence, which was not only reflected in the von-Kármán-constant and Kármán's vortex street.*

Note: The lecture was given with a slightly different emphasis in November 2022 on the occasion of the 100th anniversary of the Innsbruck Conference at a commemorative event in Innsbruck under the title "100 Years of Atmospheric Turbulence Research, The Influence of the Innsbruck Conference 1922".



ELTE North Building 1/A, 7 floor, 7.18-21  
1117 Budapest Pázmány Péter s. 1/A



**Hungarian Meteorological Service,**  
1024 Budapest, Kitaibel Pál st. 1

Tram station 4/6