

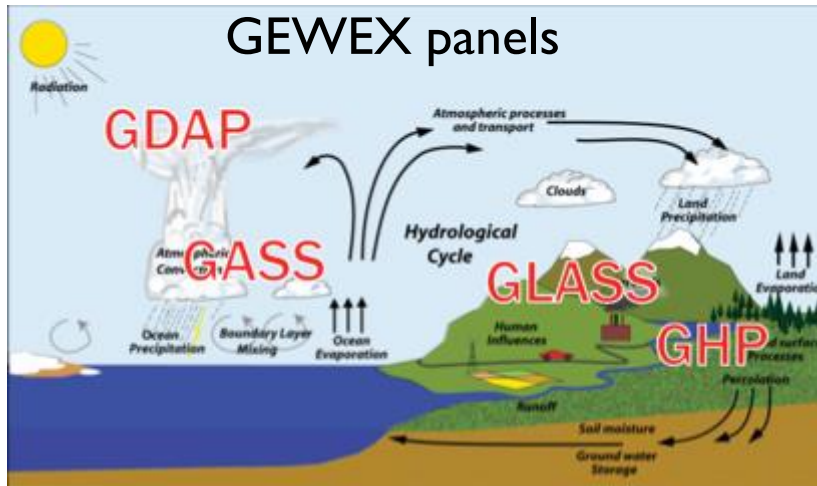


## PannEx: Towards a Regional Hydroclimatology Project in the Pannonian Basin - tasks and opportunities

IPC: Monika Lakatos, Ivan Guettler, Danijel Jug, Tamás Weidinger, Vladimir Djurdjevic, Adina Croitoru, Branka Ivancan Picek, Joan Cuxart Rodamilans

# Motivation-WCRP-GEWEX: Global Energy and Water Cycle Exchanges Project

**GEWEX:** understanding Earth's water cycle and energy fluxes at the surface and in the atmosphere



The GEWEX Hydroclimatology Panel (**GHP**) aims to understand and predict continental to local-scale hydroclimates for hydrologic applications.

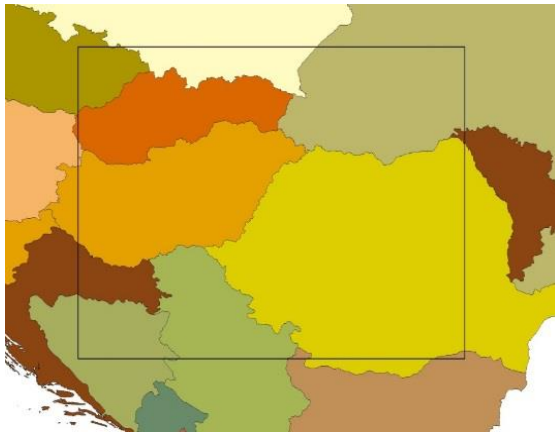
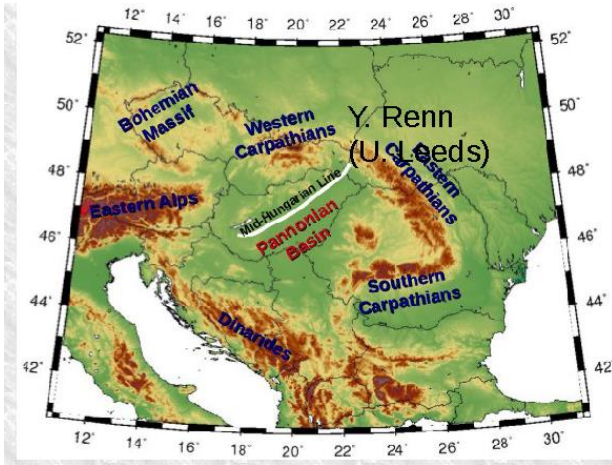
**PannEx:** RHPs are generally large, regionally-focused multidisciplinary projects that aim to improve the understanding and prediction of that region's weather, climate and hydrology.

**GEWEX**

**WCRP**  
World Climate Research Programme

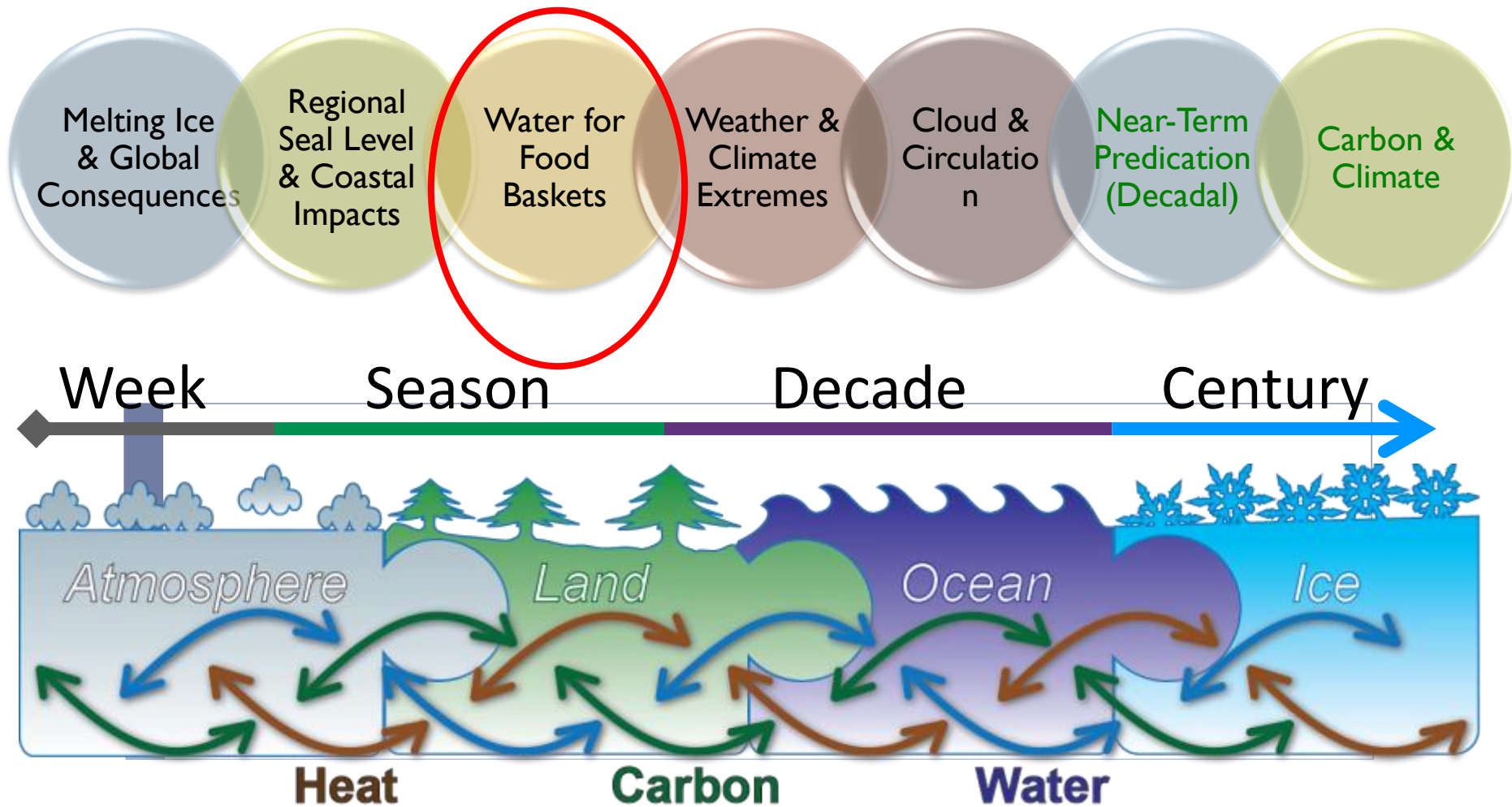


# Physical motivation and Opportunity



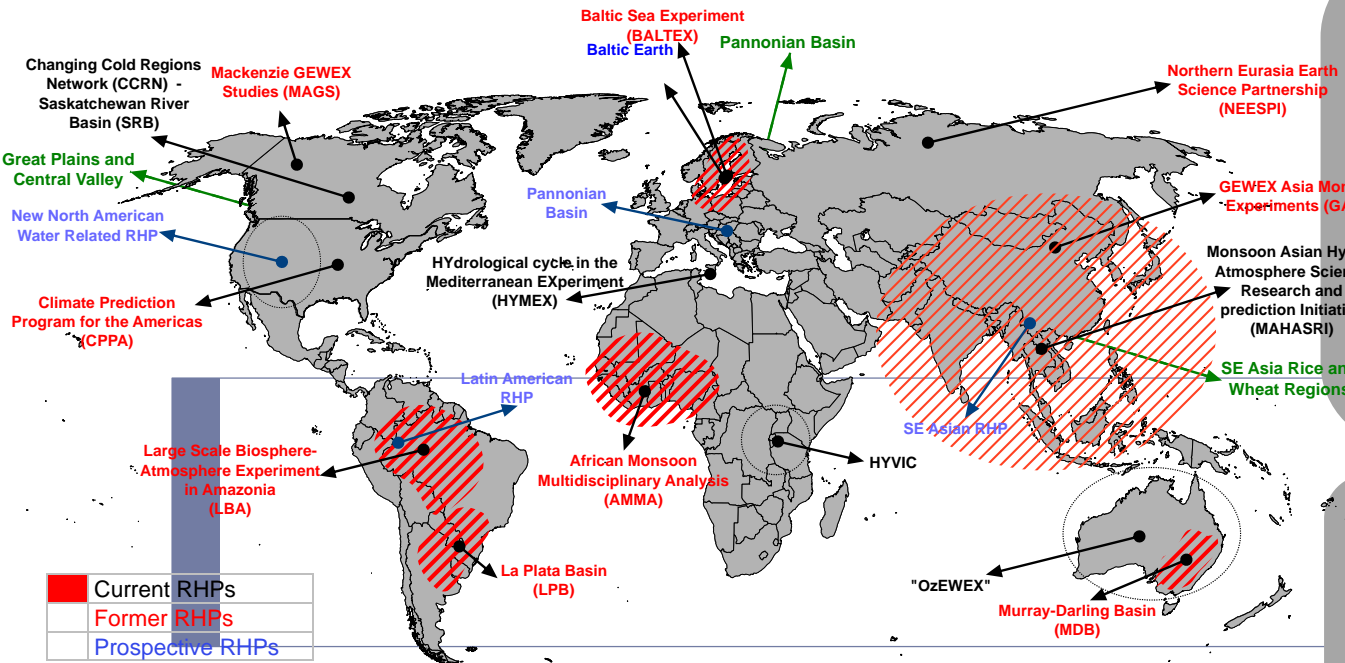
- ▶ A **closed** basin with only one outflow, the wind gates
- ▶ **large low central plain** (100 m asl) surrounded by mountains with elevations nearing 2000 m asl
- ▶ being a very good **test area** for many geophysical processes (natural or human-induced)
- ▶ The Pannonian basin is a **transition area** between mediterranean, atlantic and continental climates
- ▶ The area is **fragmented** in many different countries, sometimes with difficult communication amongst them
- ▶ Several **research institutions and universities** are well recognized, some recent activities of **networking** are established, but the recognition of them is not widespread
- ▶ Countries are in good position to apply EU research **funding**.
- ▶ Pannonian Basin lies in between the **HyMeX and Baltic Earth** areas with opportunity for future collaboration

# WCRP Grand Challenges (GC)





# WATER FOR FOOD BASKETS



How will a warming world affect the available fresh water resources globally?  
 (Focus on the geophysical processes and the anthropogenic influences on these processes)

How does this translate specifically to the food basket regions of the world?

Boram Lee, 2nd PannEx WS Budapest



# WATER FOR FOOD BASKETS

## Set of Sub-questions:

- What are the effects of changes in the character of precipitation (snow vs. rain, snow water equivalent etc.)?
- How do the temporal changes in precipitation regimes affect water availability?
- How will changes in the mean and variability of precipitation affect human infrastructures ?
- Which regions will see an increase vs. decrease in precipitation?
- Which regions will see an increase vs. decrease in actual and potential evapotranspiration?
- Which regions will see an increase vs. decrease in the climatically available water (P-E)
- How is groundwater recharge and availability affected?
- In which regions can groundwater pumping be sustained in a warmer climate?
- How is snow cover, depth and water equivalent affected?
- In which regions is food productions endangered by the expected changes in the water cycle?
- **Which actions need to be undertaken to improve our water management and maintain a viable agriculture?**
- How will climate change modify competing interests for water?
- How are land water exchanges affected by climate change, or affecting themselves regional climate responses (e.g. temperature and precipitation means and extremes)
- **How are changes in land-use/land cover affected by the water availability or affecting the water availability?**

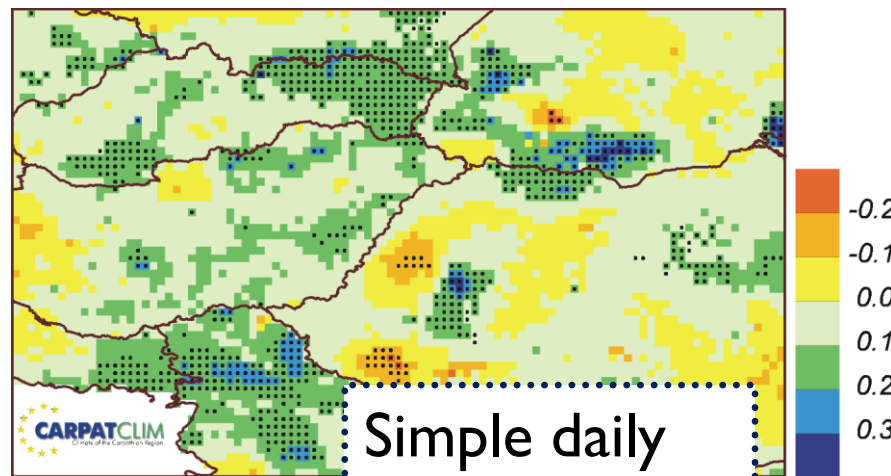
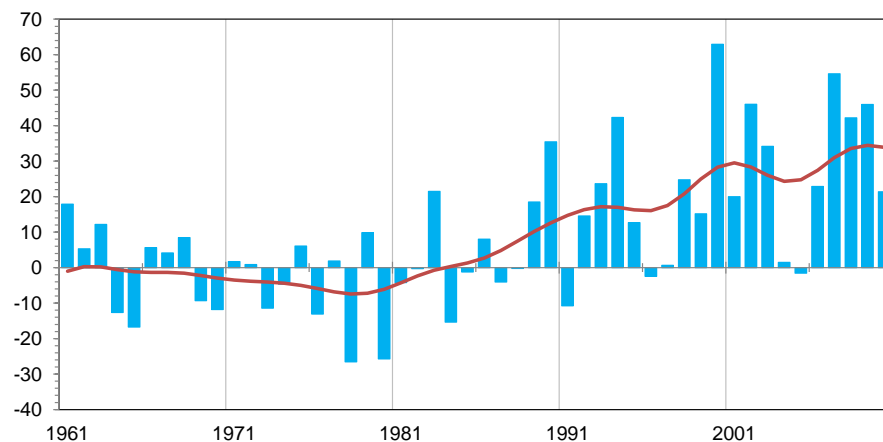
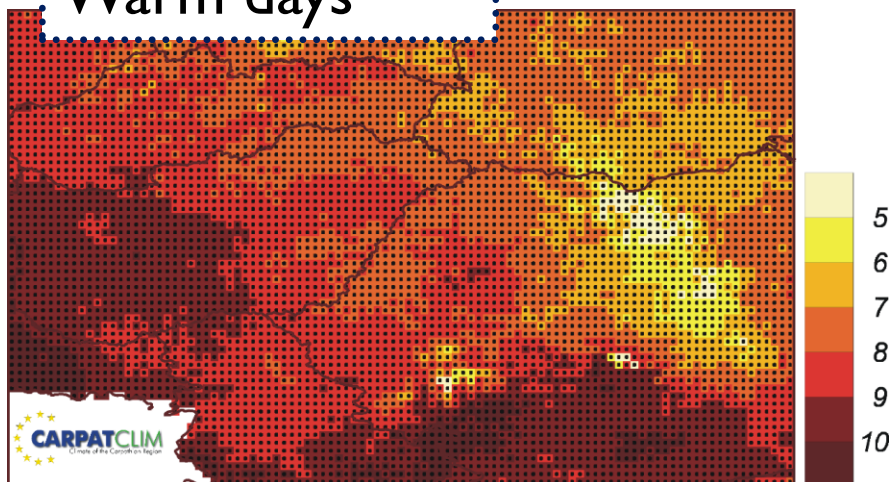
*Boram Lee, 2nd PannEx WS Budapest*



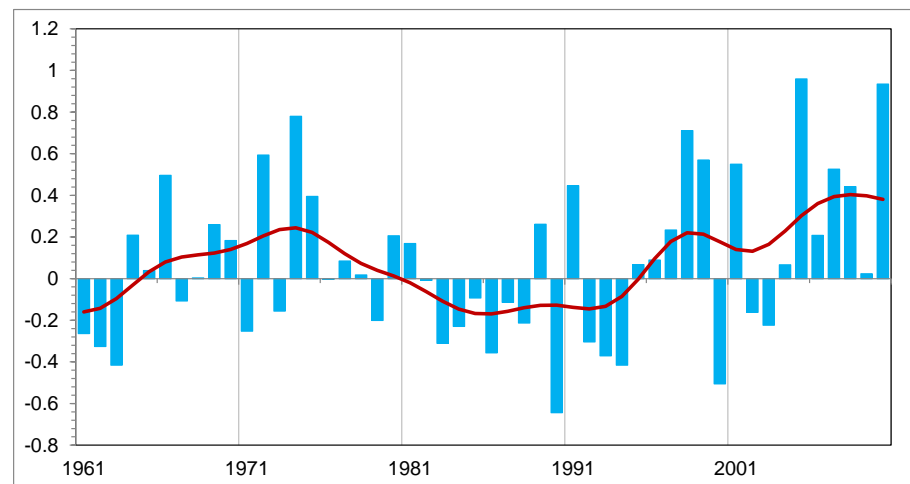
# Changing in extremes in the Carpathian region



## Warm days



## Simple daily intensity



# PannEx is a prospective Regional Hydroclimatology Project in the Pannonian Basin

---

## Activities till now

- ▶ PannEx initiated by GEWEX Hydrology Panel
- ▶ **1st WS**: GEWEX-promoted workshop took place at the Faculty of Agriculture of the University of Osijek, 9 - 11 November 2015
- ▶ **2nd PannEx WS** Budapest, 1-3 June, Hungarian Meteorological Service
- ▶ **White book** is ready, 76 pages long, ~60 contributors from the region
- ▶ **Next WS** in Romania, Cluj-Napoca, 20-22 March, 2017, main focus is the discussion of the PannEx „Science plan”

## Growing community



1st PannEx WS Osijek

~Half year

2nd PannEx WS  
Budapest, 1-3 June





# The PannEx Flagship science Questions and Cross Cut subjects

---

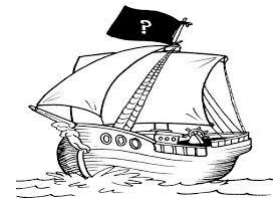
**FQ1:** Adaptation of agronomic activities to weather and climate extremes

**FQ2:** Understanding of air quality under different weather and climate conditions

**FQ3:** toward a sustainable development

**FQ4:** water management, droughts and floods

**FQ5:** Education, knowledge transfer and outreach



**CCI:**  
Data/knowledge rescue and consolidation

**CC2:** Process modelling

**CC3:**  
Development and validation of modelling tools

# The PannEx Flagship science Questions and Cross Cut subjects

---

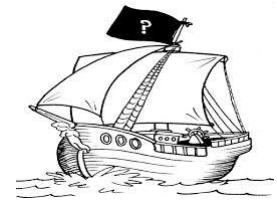
**FQ1:** Adaptation of agronomic activities to weather and climate extremes

**FQ2:** Understanding of air quality under different weather and climate conditions

**FQ3:** toward a sustainable development

**FQ4:** water management, droughts and floods

**FQ5:** Education, knowledge transfer and outreach



**CCI:**  
Data/knowledge rescue and consolidation

**CC2:** Process modelling

**CC3:**  
Development and validation of modelling tools

# FQ1: Adaptation of agronomic activities to weather and climate extremes

FQ1 chapter – group of writers - Coordinator: Danijel Jug (*status 2016-05-31*)

Contributors	Field of expertise	Country	Contact
Danijel Jug	Conservation agriculture, agroclimatology	Croatia	<a href="mailto:djug@pfos.hr">djug@pfos.hr</a>
Bojan Stipešević	Basic crop production, tropical crops	Croatia	<a href="mailto:bojans@pfos.hr">bojans@pfos.hr</a>
Jozef Eitzinger	Agricultural meteorology	Austria	<a href="mailto:josef.eitzinger@boku.ac.at">josef.eitzinger@boku.ac.at</a>
Irena Jug	Agroecology, Ecophysiology	Croatia	<a href="mailto:ijug@pfos.hr">ijug@pfos.hr</a>
Márta Birkás	Soils and crop management	Hungary	<a href="mailto:Birkas.Marta@mkk.szie.hu">Birkas.Marta@mkk.szie.hu</a>
Vesna Vukadinović	Pedology	Croatia	<a href="mailto:Vesna.vukadinovic@pfos.hr">Vesna.vukadinovic@pfos.hr</a>
Boris Đurđević	Soil science	Croatia	<a href="mailto:bdurdevic@pfos.hr">bdurdevic@pfos.hr</a>
Bojana Brozović	Weed science	Croatia	<a href="mailto:bojana.brozovic@pfos.hr">bojana.brozovic@pfos.hr</a>
Marton Jolankai	Crop production	Hungary	<a href="mailto:Jolankai.Marton@mkk.szie.hu">Jolankai.Marton@mkk.szie.hu</a>
Mirjana Brmež	Nematode ecology, environmental sciences	Croatia	<a href="mailto:mbrmez@pfos.hr">mbrmez@pfos.hr</a>
Marijana Tucak	Perennial forage crops, breeding, genetic diversity	Croatia	<a href="mailto:mtucak@poljinos.hr">mtucak@poljinos.hr</a>

## **FQ1 (Flagship Questions) identified in Osijek:**

### **[Adaptation of agronomic activities to weather and climate extremes]**

- Weather scale predictions of yields and plant phenology
- Response to climate change (farming practices, crop types, pests and diseases)
- Water management and irrigation
- Land and soil use changes
- Perception of agricultural stakeholders and evolution of European policies
- Preserving ecological services

## Knowledge gaps and relevance

- **With regional differences agriculture is affected by ongoing climate change in the Pannonian region increasingly, for example:**
  - extreme weather events such as drought, dry winds, wet spells, intensive precipitation, frosts, heat and cold waves,
  - **soil salinization,**
  - **decline of SOM (soil organic matter),**
  - better weeds response in growth and reproduction (compare to crops),
  - decrease of crop growth and development because of higher air temperatures,
  - increasing spatial and inter-annual yield variability due to extreme weather,
  - annual rainfed summer crops with high water demand (e.g. sugar beet) are already disappearing in some regions by climatic reasons (where irrigation systems or water is not available or economic),
  - **potential increasing of soil erosion,**
  - change of pest and disease occurrence; pests are generally considered by farmers as the second important danger beside of drought,
  - shortening of the cropping cycle, effecting field work timing.

# PannEx white book - FQ1 – LDN related references

---

- ▶ Related to previously, biological component of soil is mostly present in 0-30 cm of soil layer and among other things (vegetation, soil type, management practices, etc.) **strongly affected by climate change, especially extremes** (DEFRA, 2005).
  - ▶ Gregory, A.S., Ritz, K., Mcgrath, S.P., Quinton, J.N., Goulding, K.W.T., Jones, R.J.A., Harris, J.A., Bol, R., Wallace, P., Pilgrim, E.S., Whitmore, A.P. (2015): A review of the impacts of degradation threats on soil properties in the UK. *Soil Use Manag.* 31, 1–15. doi:10.1111/sum.12212.
  - ▶ Varallyay, Gy. (2010): Soil degradation processes and extreme hydrological situations as factors determining the state of the environment. *Klima-21 Füzetek* 62, pp. 4-28.
- 



# PannEx – FQ3 Toward a sustainable development

Current drafting team: Vladimir Djurdjevic, Imelda Somodi, Ákos Bede-Fazekas, Wantuchné Dobi Ildikó, Birone Kircsi Andrea, Maja Telišman Prtenjak, Andreina Belušić, Alica Bajić, Kristian Horvath, Maja Božićević Vrhovčak, Tijana Nikolic, Sonja Trifunov

## Subtopics:

1. **Preserving ecological services**
2. Hydropower potential evolution
3. Wind and solar energy potential
4. Biomass production and conflict with agronomic needs
5. Building the infrastructure for forecasting and coordination of the energy production
6. Evolution of the energy needs (cooling and heating) in a warmer climate

- ▶ **Goal 15** Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and **reverse land degradation** and halt biodiversity loss.



## **FQ3: Toward a sustainable development**

WMO underlined that National **Meteorological and Hydrological Services** **monitor** the hydrology that shapes the health of freshwater ecosystems, forests and dry land areas.

They provide essential data and forecasts that support efforts to **combat desertification and restore degraded land and soil, including land affected by drought and floods.**



# PannEx activities

---



- ▶ Science Plan will be developed this year
  - ▶ Next WS in Romania, Cluj, 20-22 March, 2017
  - ▶ National PannEx Seminars in Hungary:
    - ▶ 17 November 2016: Adaptation of agronomic activities to weather and climate extremes (José Camacho, scientific officer, World Meteorological Organization) – related to **FQ1**
    - ▶ 8 December 2016: Land Degradation Neutrality (Representative of UNCCD: The LDN Programme) – related to **FQ1, FQ3**
- 



# Potential funding in the region

---

- ▶ *Horizon2020*
- ▶ Interreg, **Danube Transnational Programme 2014-2020**
- ▶ **Balkan-Mediterranean Transnational Programme (2014-2020)**
- ▶ **COST (cost.eu)**
- ▶ *The International Visegrad Fund ([visegradfund.org/home/](http://visegradfund.org/home/))*
- ▶ *The NATO Science for Peace and Security Programme*  
([nato.int/cps/en/natolive/78209.htm](http://nato.int/cps/en/natolive/78209.htm))
- ▶ CEEPUS (Central European Exchange Program for University Studies, [ceepus.info/default.aspx#nbb](http://ceepus.info/default.aspx#nbb))
- ▶ Bilateral calls





Thank you for your kind  
attention!

Joining to the community and more info on the PannEx  
webpage:

<https://sites.google.com/site/projectpannex/home>