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Horizon 2020
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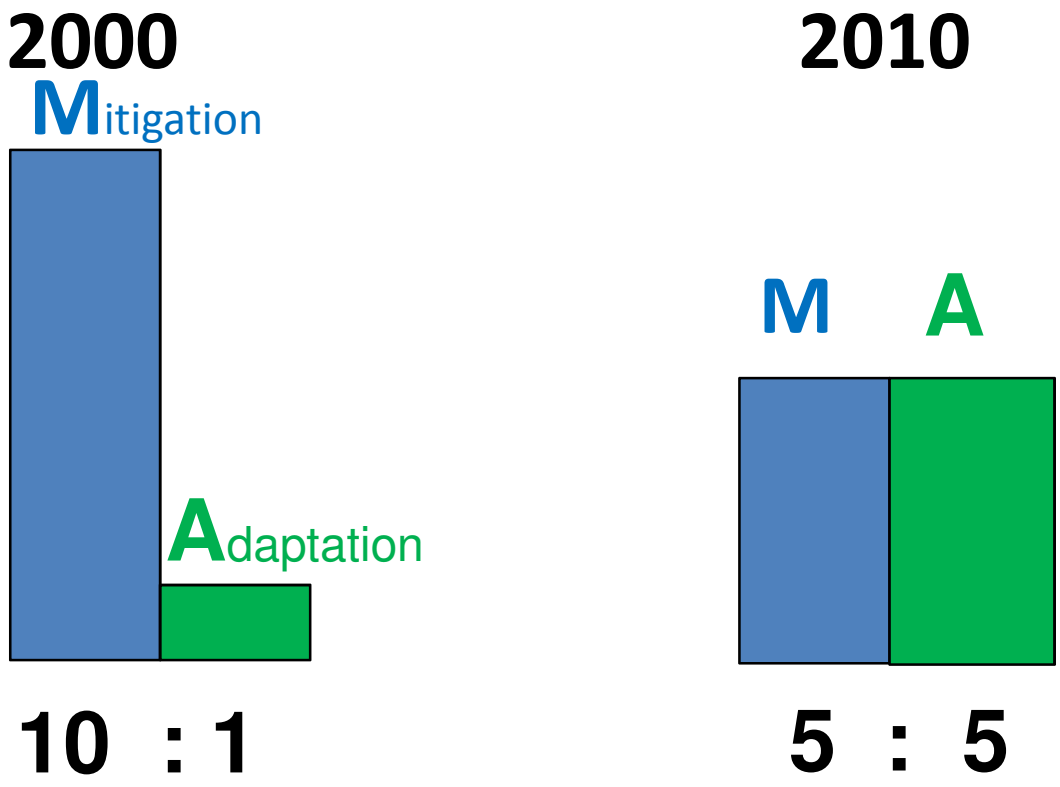
Workshop 2018

Drought and its monitoring in Slovakia

Pavol Nejedlik,
Livia Labudova

Earth Science Institute of Slovak Academy of Science
Slovak Hydrometeorological Institute

EEA reports, scientific articles, EU projects



Who wants/needs drought information?

Main water consumers in Slovakia

- Industry (up to 80%)
- Water mains (up to 15%)
- Agriculture (up to 10%)

Drought information customers portfolio

- **Farmers and agricultural plants**
- Water management authorities
- Civil protection
- Municipal bodies
- Public

Legislative support

Governmental Decree 148/2014
Adaptation strategy of SR to adverse impacts of climate change

Ministerial decree 22/2014
Conceptual framework for revitalization of hydromelioration systems in Slovakia

Governmental Decree 110/2018
Action plan to manage the impacts of drought and water scarcity

Slovak agriculture

- Cultivated area occupies about 1,9 mil. ha, it is shrinking, animal husbandry is diminishing
- Agricultural production forms about 4-5% of GDP, up to 5% of labor is involved in agriculture

- Strong change in agricultural production after entering the EU in 2004
  - Moderate decrease of cereals production but a strong one in potato, legume and vegetable
  - Strong increase in the production of oil producing crops
  - Mostly rainfed production, low level of irrigation

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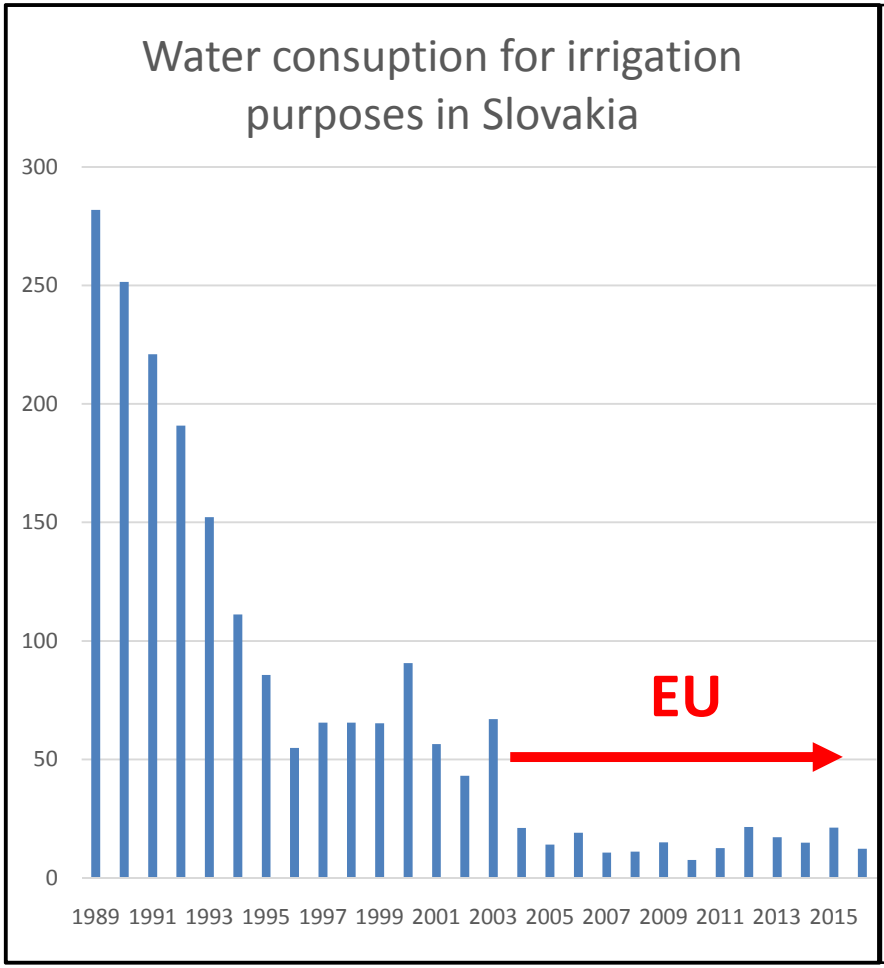
Irrigation in Slovakia (1989-2016)



1989 -about 320 000 hectars under irrigation, 282 mil m^3 of water consumed for irrigation

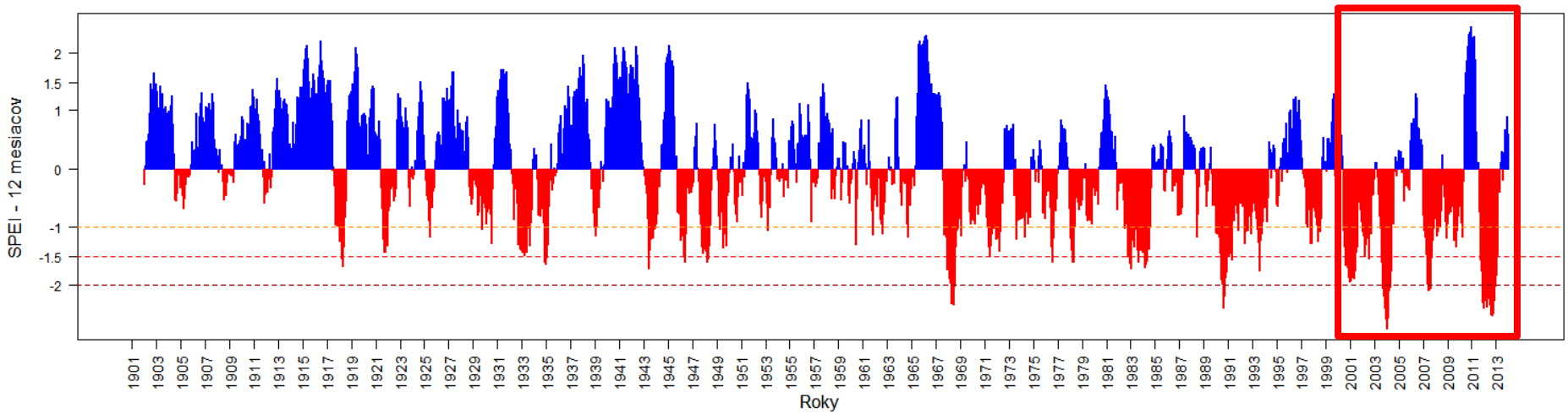
2004 - about 55 000 hectars irrigated, 21 mil m^3 of water consumed

since 2005 mostly 10-20 mil m^3 of water consumed yearly for irrigation

about 460 000 ha under drainage (big part of drainage systems not functioning)

Drought in Slovakia

12-monthly SPEI at the station Hurbanovo (southwestern Slovakia)



Types of drought monitoring

- **Precipitation totals only monitored and drought episodes evaluated until 2015 in Slovakia (past-casting)**

- Meteorological drought
  - **precipitation deficit -** SPI
  - **water deficit –** SPEI, Palmer‘s CMI
- Soil drought
  - **integrated system** for soil drought monitoring **– Interdrought**
  - soil moisture calculated using detailed soil model
- Hydrological drought
  - near-real time discharges compared to the M-day flows
  - water table level compared to the reference period 1981 - 2010

Coming soon:

- **Drought User Service** of the DriDanube project
  - based on satellite products

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Comparison of the calculated (1961-2011) and projected (2001-2100) frequency of dry months based on SPI1 and SPEI1

Meteorological station	2001-2050		2051-2100		2001-2050		2051-2100	
	SPI 1	SPEI 1	SPI 1	SPEI 1	SPI 1	SPEI 1	SPI 1	SPEI 1
	moderate		moderate		severe		severe	
Hurbanovo-KMNI	-0.06	-0.35	-0.11	-0.22	0.27	0.21	0.23	0.18
Jaslovské - KMNI	-0.05	0.02	-0.06	-0.39	0.10	0.23	0.10	0.42
Milhostov - KNMI	-0.29	0.13	-0.18	0.01	0.17	-0.06	0.10	-0.03

Meteorological station	2001-2050		2051-2100	
	SPI 1	SPEI 1	SPI 1	SPEI 1
	extreme		extreme	
Hurbanovo-KMNI	-0.04	-0.12	-0.08	-0.06
Jaslovské - KMNI	0.01	-0.10	0.01	-0.12
Milhostov - KNMI	0.04	0.06	0.08	0.09

Drought frequency

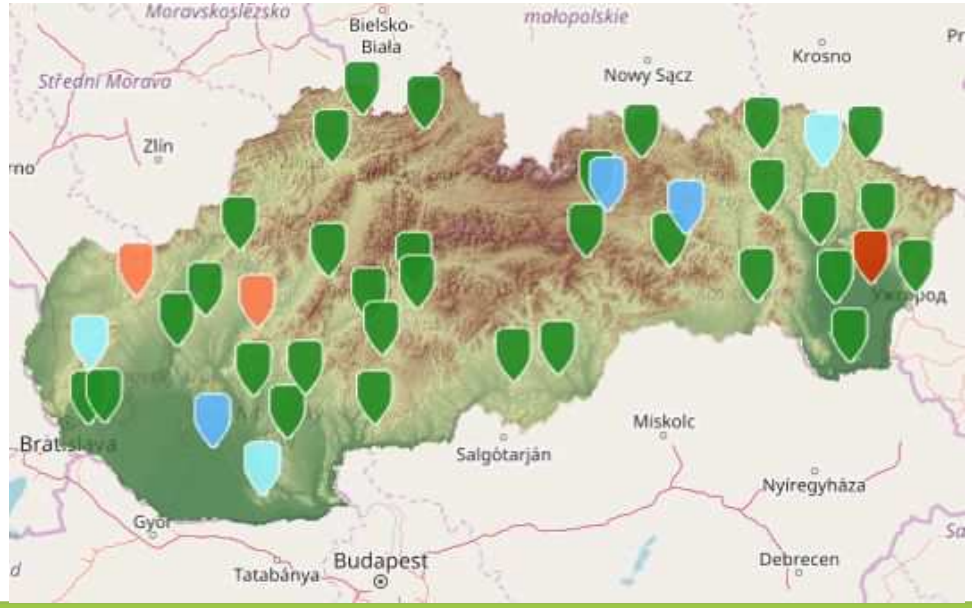
moderate – slight decrease

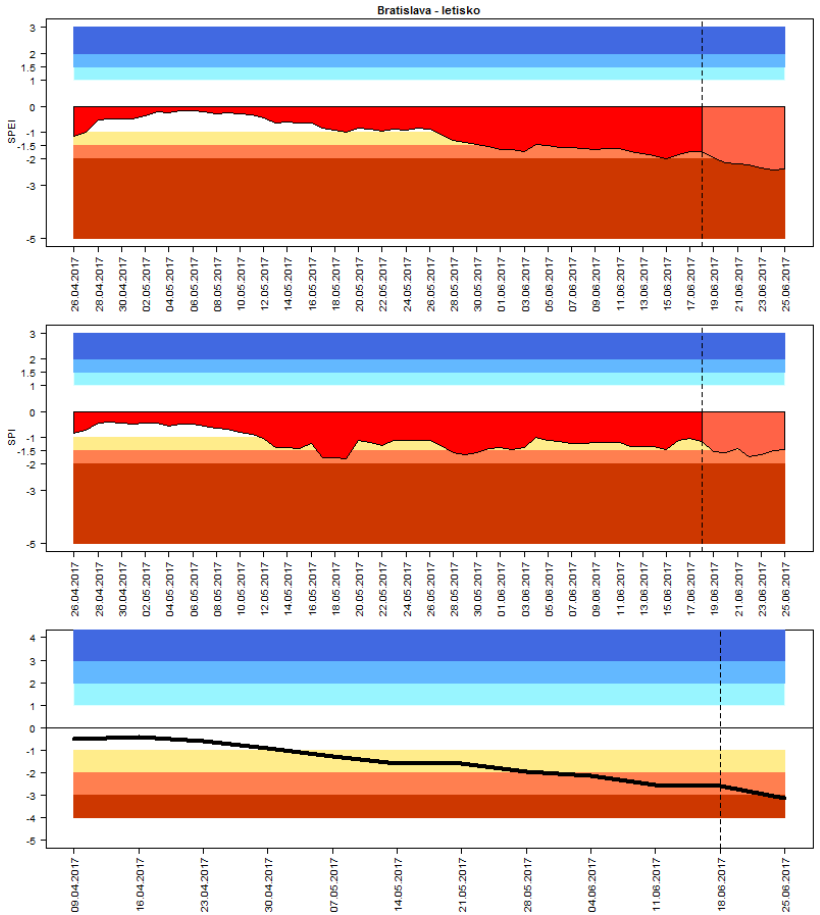
severe – slight increase

extreme – no change

Meteorological drought monitoring

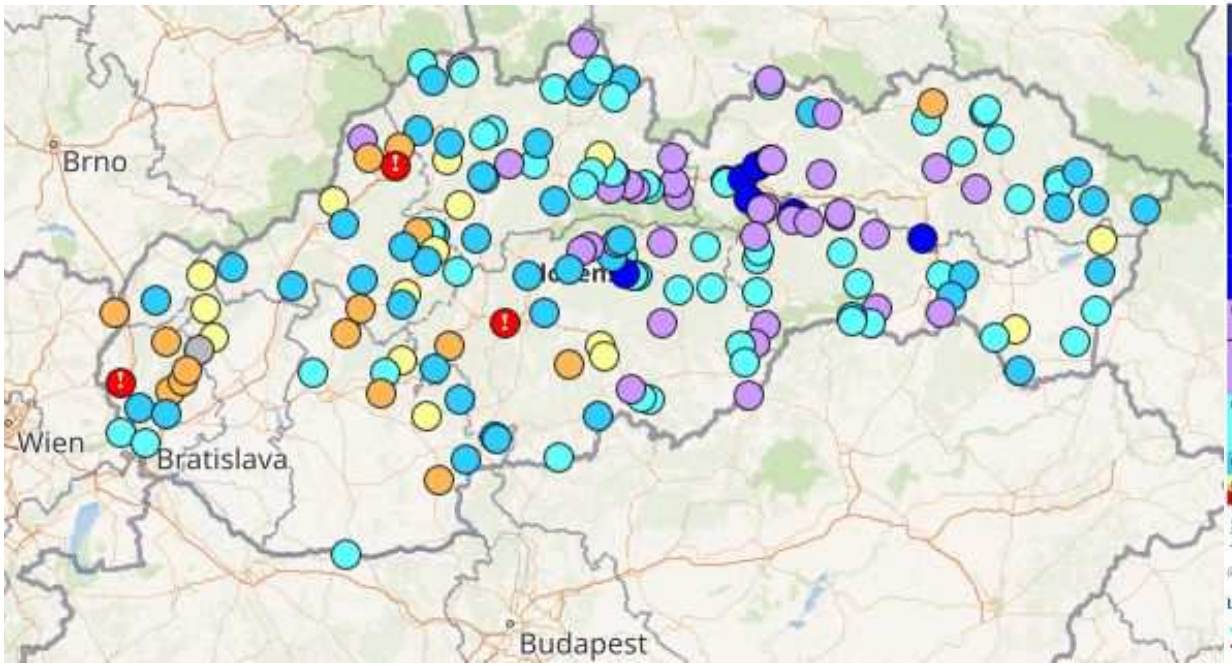
- started in March 2015
- 42 stations
- updated weekly on Monday
- **freely available** for general public at **www.shmu.sk**

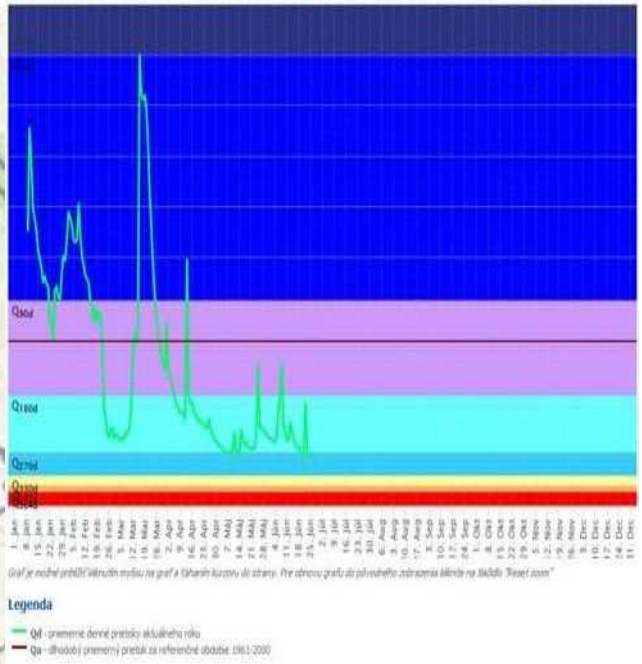




Hydrological drought monitoring

-near-real time discharges compared to the M-day flows,
-reference period 1981
-daily update, more than 200 profiles (stations)





>30d 30-90d 90-180d 180-270d 270-330d 330-355d 355-364d <364d

M-dennosť priemerných denných prietokov aktuálneho roku – 2018

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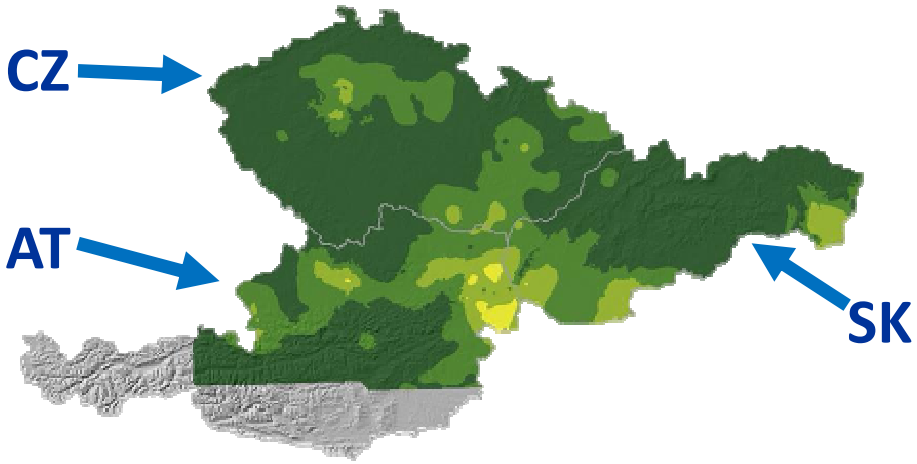
Soil drought monitoring

- started in September 2015
- updated weekly on Monday
- maps represent situation on Sunday at 7 a.m.
- **freely available** for general public at **www.intersucho.sk**



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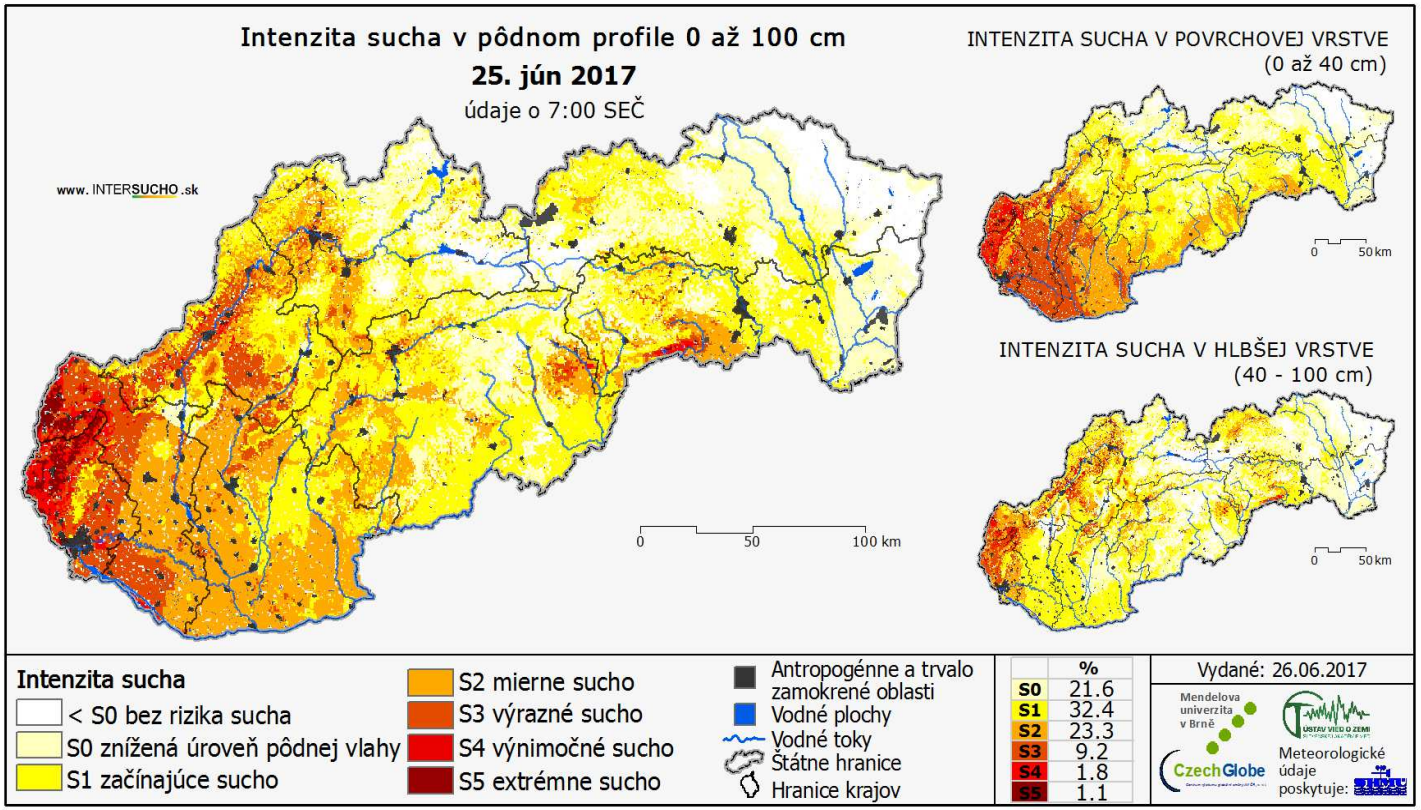
Soil drought monitoring

Intensity of soil drought

- comparison of recent situation to reference period 1961 – 2010
- soil layers 0-40 and 40-100 cm
- calculation done for grids 0,5x0,5 km



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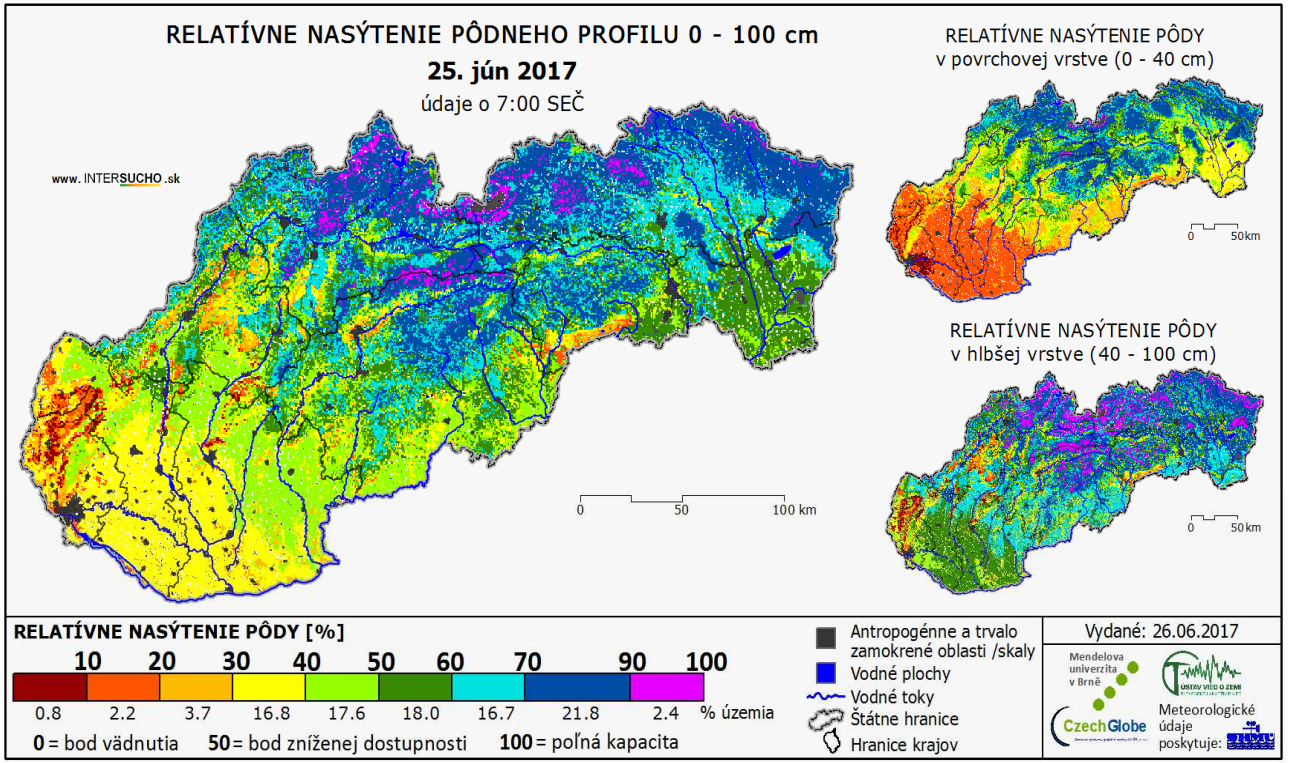
Soil drought monitoring

Relative soil humidity

- recent situation with no comparison to the reference period
- relative values in % of water field capacity
- soil layers 0-40 and 40-100 cm



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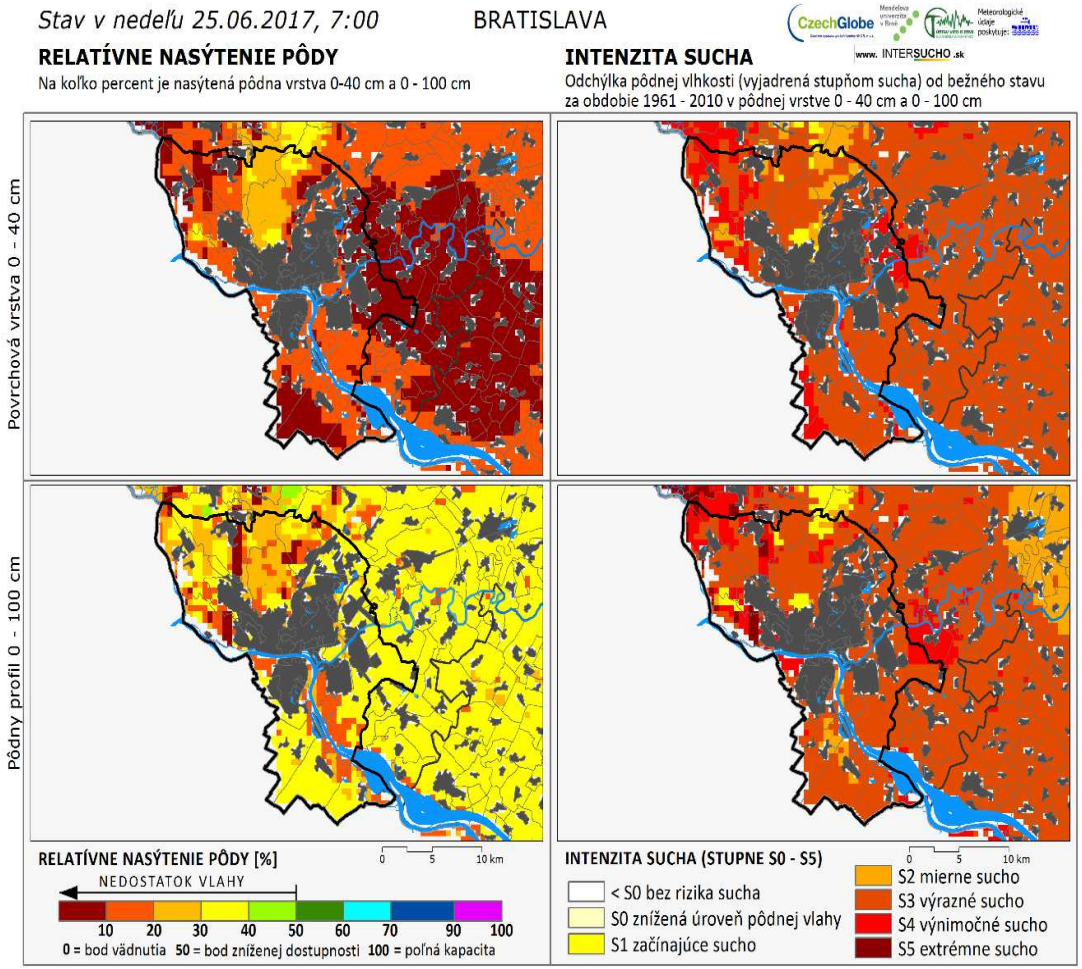
Soil drought monitoring

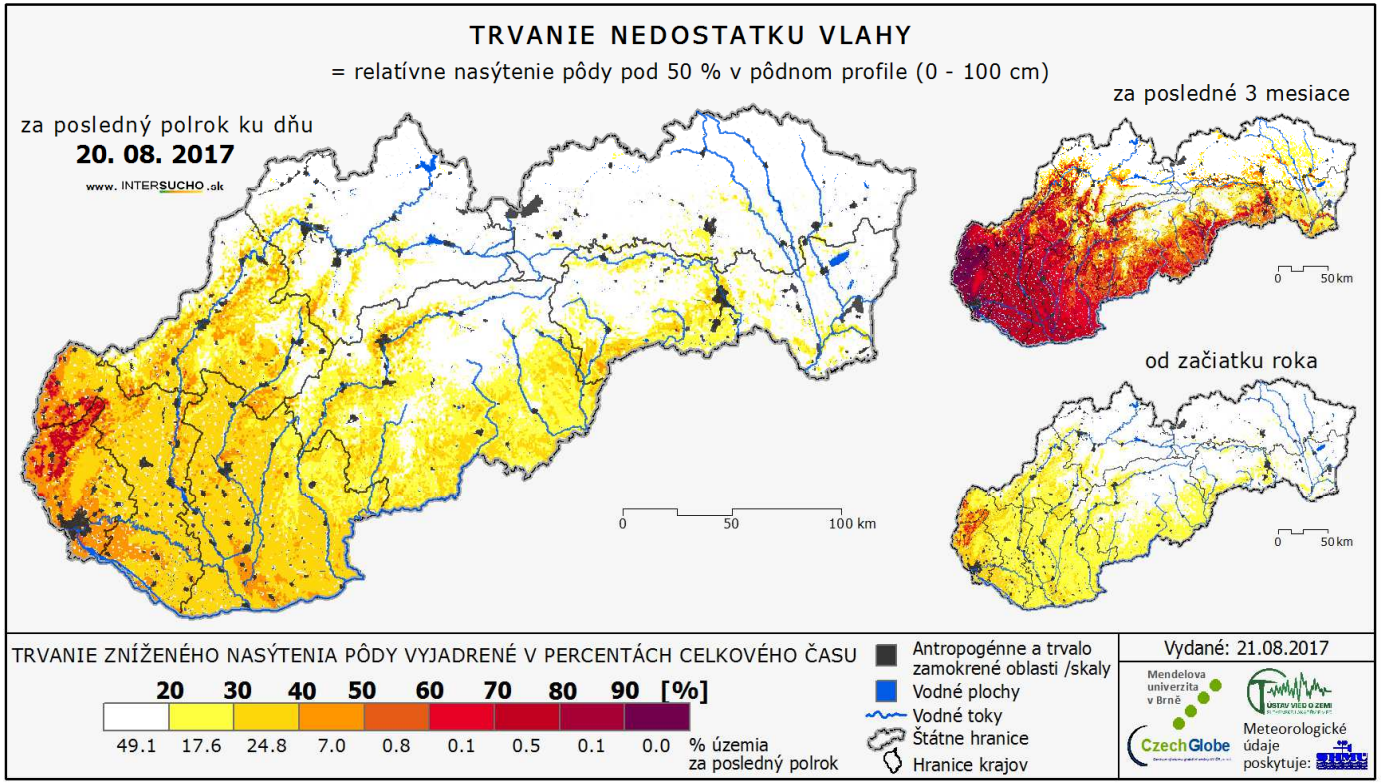
Detailed information on the district level (NUTS4)



Soil drought monitoring

Cumulative stress

- percentage of the time with the relative soil humidity below 50 %



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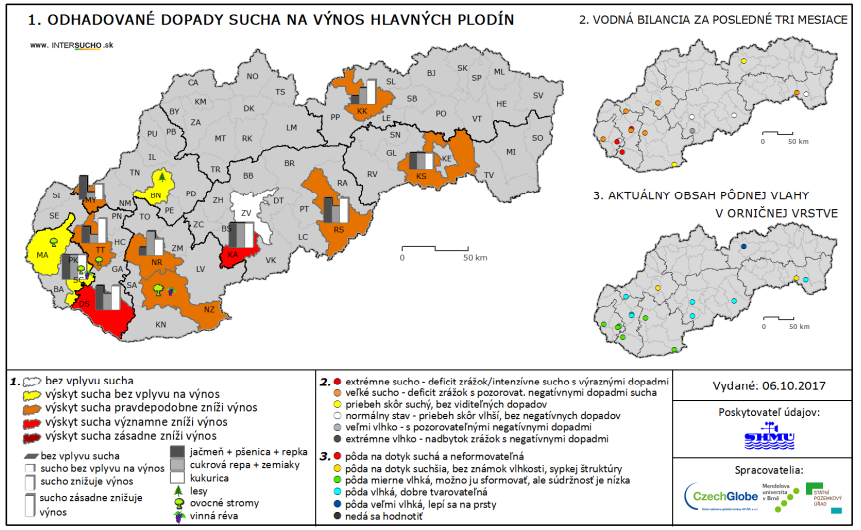
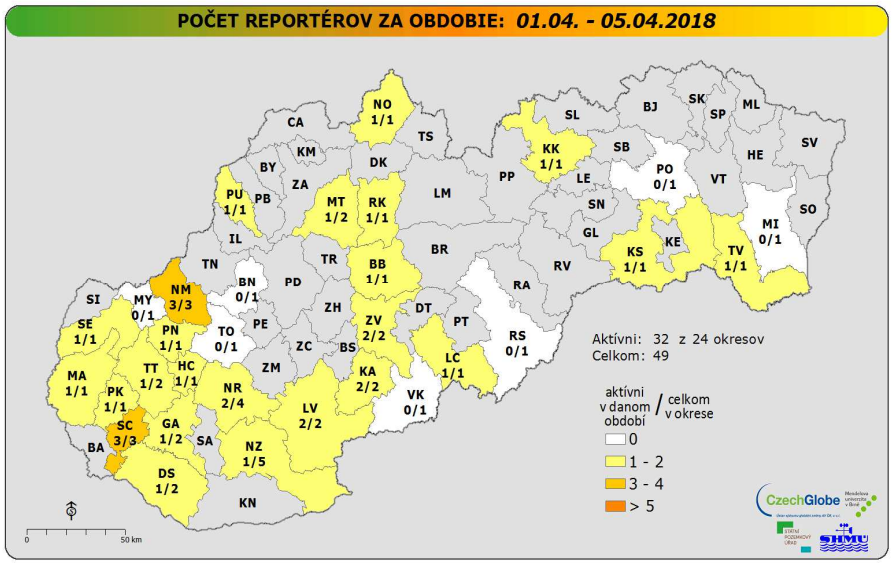
Monitoring of drought impacts

- promotion activities started in July 2017
- the first map – September 2017
- **updated weekly** according to online reports
- **freely available** for general public, policy makers and stakeholders
- **relevant information by experts** from the praxis (agronomists, farmers, fruiterers, foresters etc.)
- the main aim is to **increase the awareness** about drought in near-real time in the regions



Monitoring of drought impacts

- **voluntary reporting** in sense of loans/subventions
  - increases the sustainability of the reporting network
  - bonus forecasts for chosen area
- May 2018
  - 53 reporters from 32 districts
- **co-operation and support** by:
  - Slovak Agriculture and Food Chamber
  - Ministry of Agriculture
  - Forests of the Slovak Republic, state enterprise
  - own promotion activities



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Action plan to manage the impacts of drought and water scarcity

Main aim: to mitigate the negative consequences of drought

Meassures:

- **preventive** – focus on water retention (agriculture, forestry, urban, hydro-morphology, awareness & education)
- **operational** – focus on improved monitoring
- **crisis management** – focus on research and modelling for future preparation of the crisis plan for setting priorities for water allocation during prolonged drought events

Focus on green measures in line with EU catalogue of natural water retention measures.

Role of drought monitoring service:

- higher density of climatological and hydrological stations + new lysimetric stations
- enlarge the **national reporting network** (drought impacts monitoring)
- **forecast of crop yields** based on historical impacts and actual soil moisture conditions (project DriDanube)
- improve **drought monitoring**
  - Drought User Service (project DriDanube)
  - spatial monitoring of meteorological drought impact

Gaps and challenges?

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Thank you for your attention!

Acknowledgement

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