ČESKÝ
HYDROMETEOROLOGICKÝ
ÚSTAV

Groundwater drought monitoring in Czech republic

František Pešek

CHMI

Groundwater department

Groundwater monitoring network

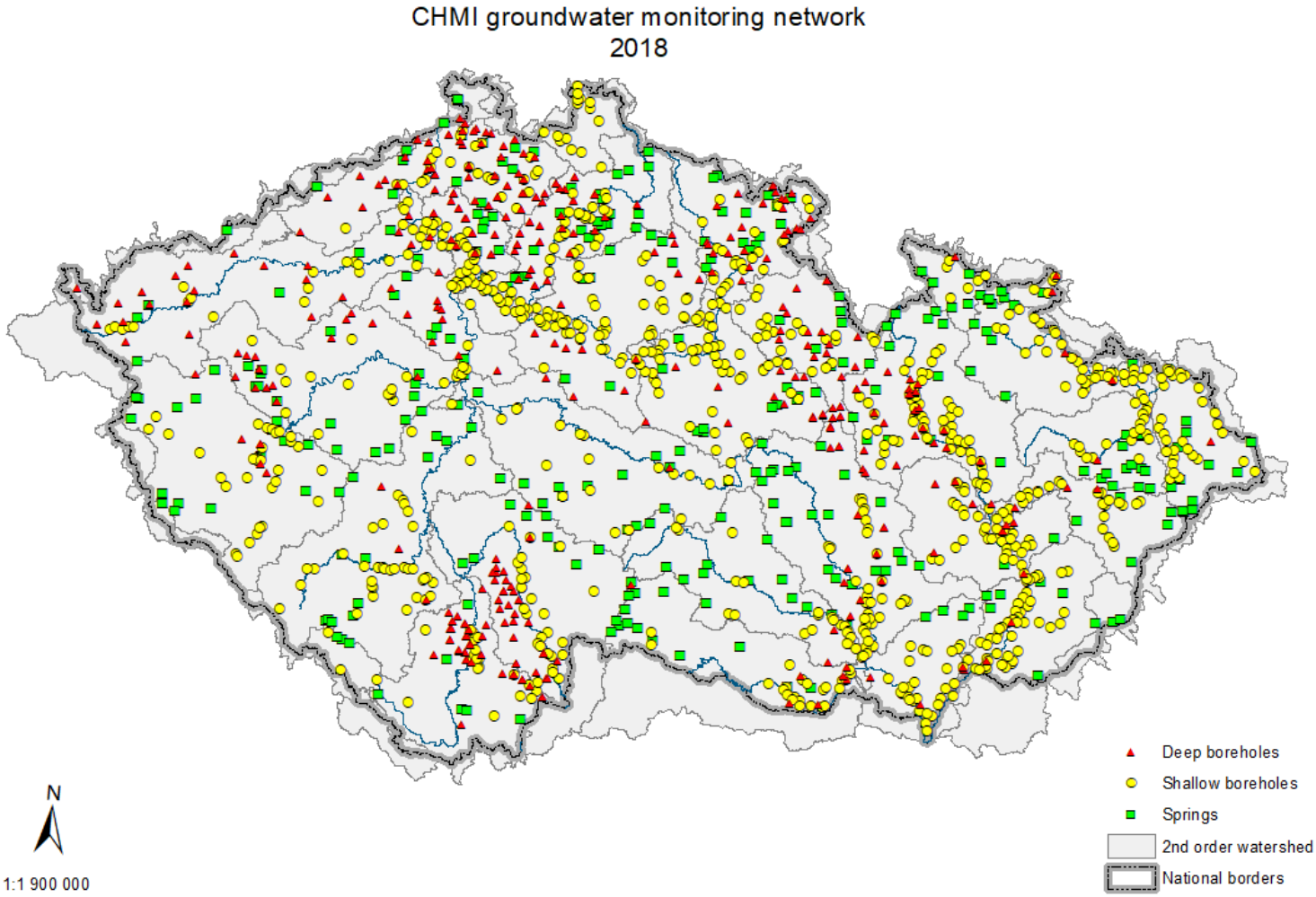
CHMI 2018

- Total number of objects: 1785
  - shallow boreholes: 1048
  - deep boreholes: 416
  - springs: 321

Emergency network

- shallow boreholes ~ 200
- deep boreholes ~ 80
- springs ~ 160

Monitoring network 2018



Data collection and assesment

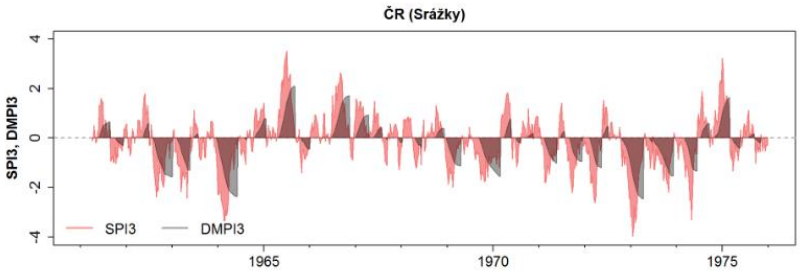
- Data collection
  - daily on boreholes and springs (where AMS)
  - weekly on springs (where is not AMS)

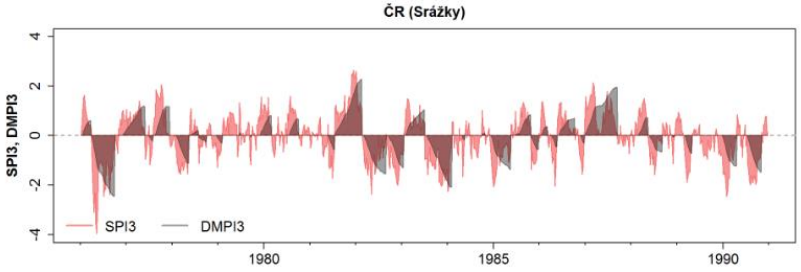
- Data assessment
  - 1981 - 2010 normal period
  - weekly (only shallow boreholes & springs)
  - monthly
  - annually

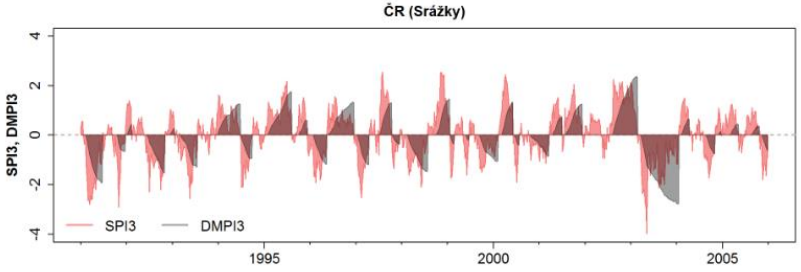
GW drought in Czech rep.

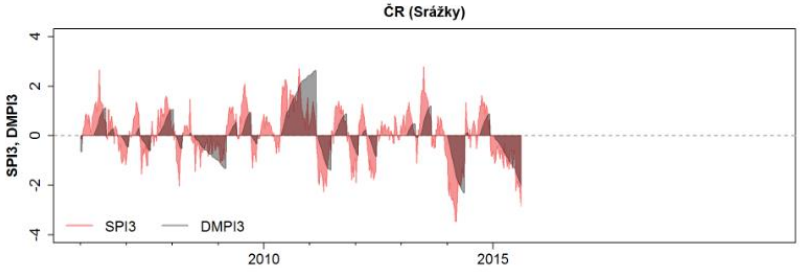
- Main groundwater drought periods recorded in last 50 years
  - 1974 – whole country
  - 1983 – southern Bohemia, eastern Moravia
  - **1991 – 1993**
    - 1991 – Bohemia, partially western Moravia
    - 1992 – western & central Bohemia, southern Moravia
    - 1993 – Moravia, partially western & central Bohemia
  - 2003 – eastern Bohemia, eastern Moravia
  - **2015 – 20??**
    - 2015 – north-eastern Bohemia, northern Moravia/Silesia
    - 2016 – central & north-eastern Bohemia, partially Moravia
    - 2017 – central & southern part of Czech republic
    - 2018 – whole country

3-month precipitation

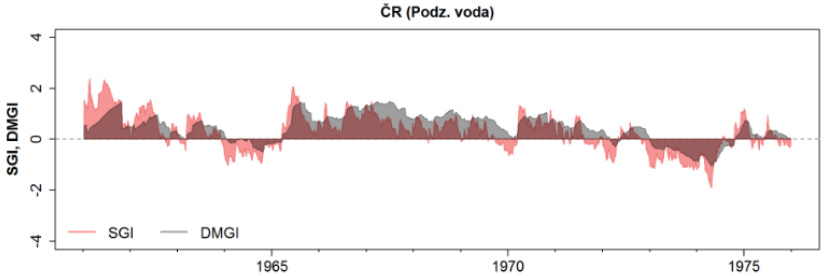


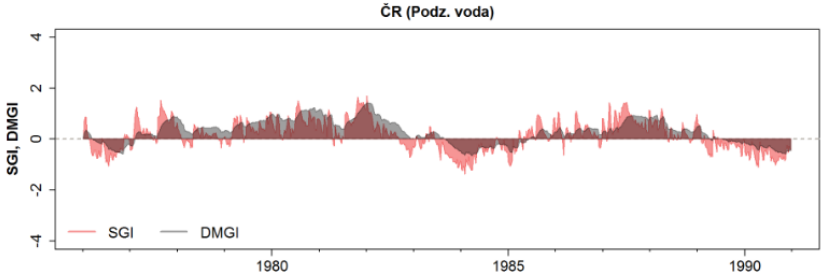


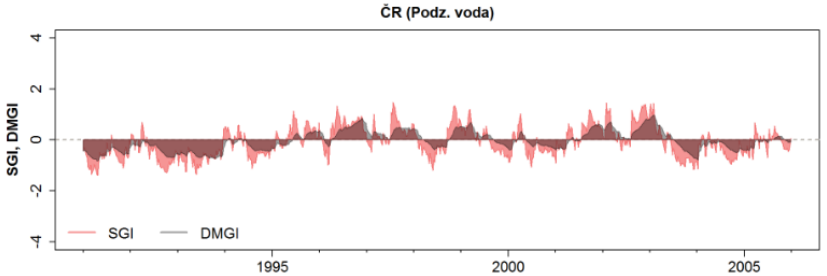


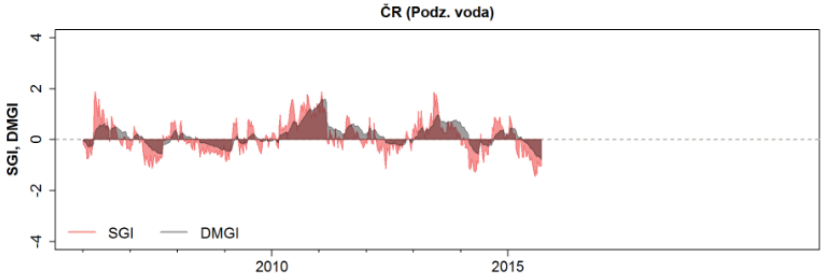


Water level – shallow boreholes



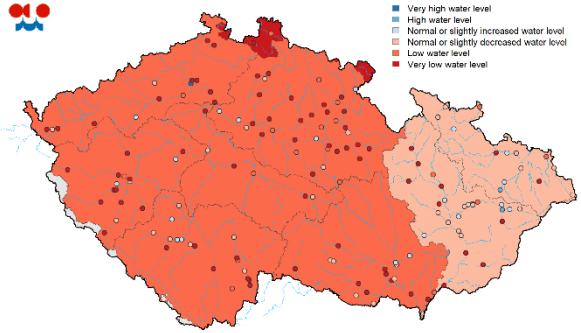






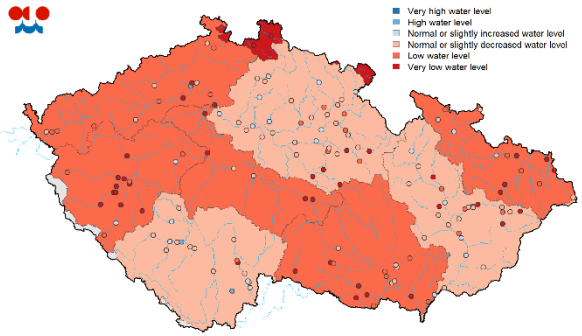
Annual water level in shallow boreholes

year 1991



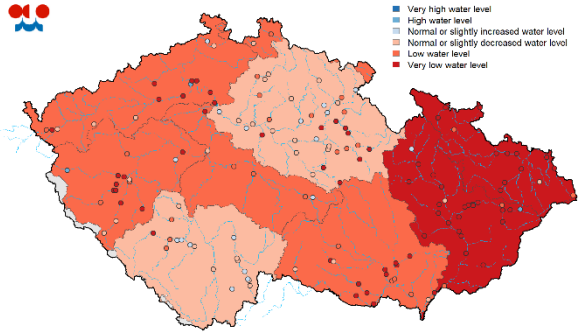
Annual water level in shallow boreholes

year 1992



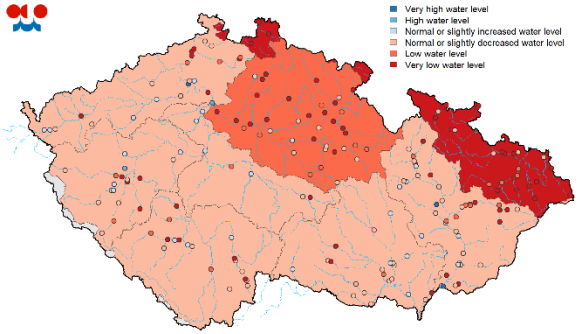
Annual water level in shallow boreholes

year 1993



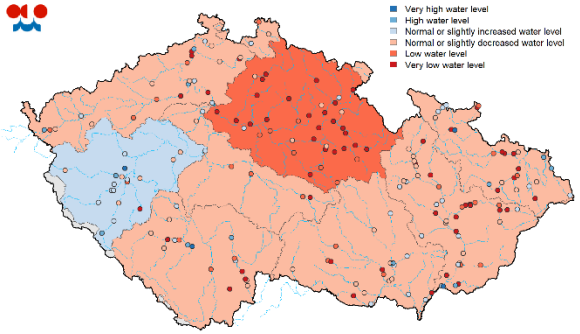
Annual water level in shallow boreholes

year 2015



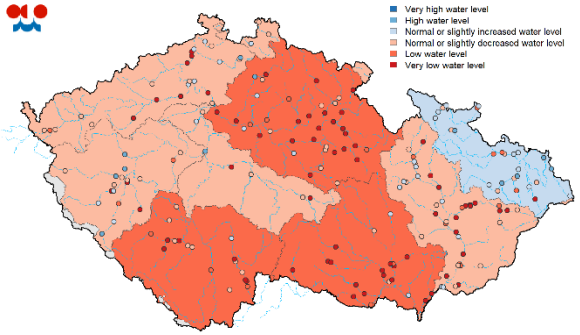
Annual water level in shallow boreholes

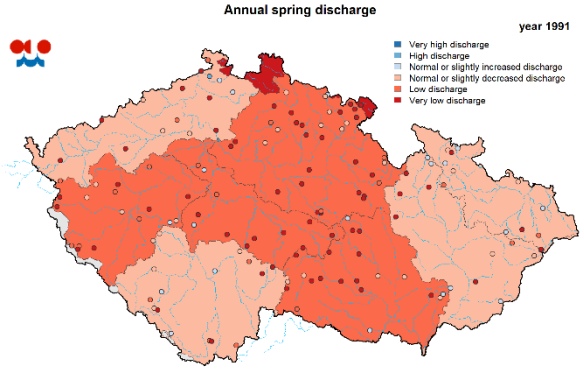
year 2016

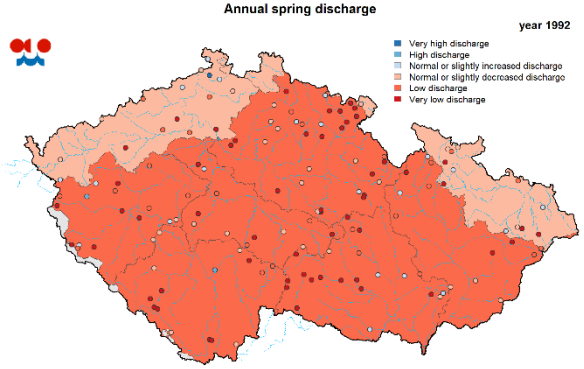


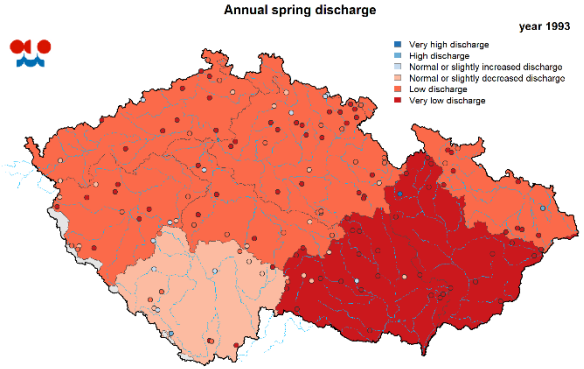
Annual water level in shallow boreholes

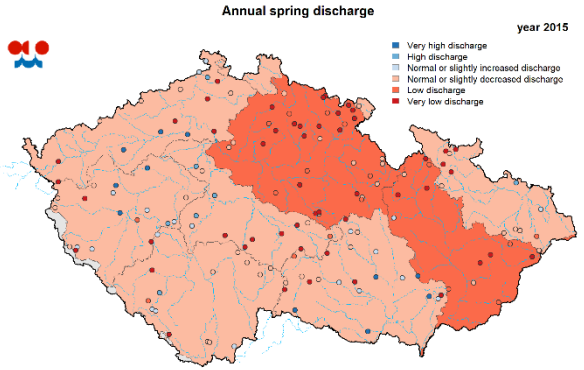
year 2017

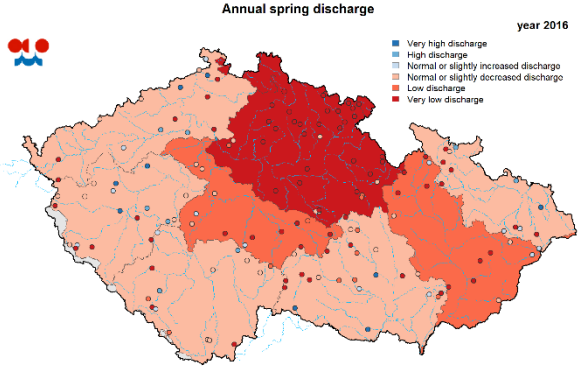


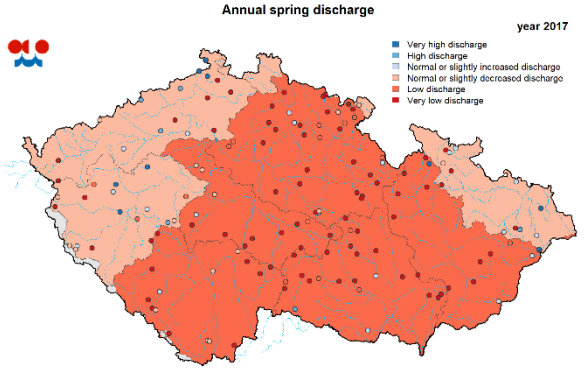

Annual spring discharge
year 1991
Very high discharge
High discharge
Normal or slightly increased discharge
Normal or slightly decreased discharge
Low discharge
Very low discharge


Annual spring discharge
year 1992
Very high discharge
High discharge
Normal or slightly increased discharge
Normal or slightly decreased discharge
Low discharge
Very low discharge


Annual spring discharge
year 1993
Very high discharge
High discharge
Normal or slightly increased discharge
Normal or slightly decreased discharge
Low discharge
Very low discharge

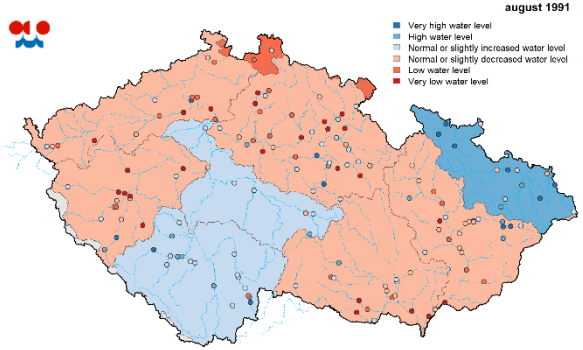

Annual spring discharge
year 2015
Very high discharge
High discharge
Normal or slightly increased discharge
Normal or slightly decreased discharge
Low discharge
Very low discharge


Annual spring discharge
year 2016
Very high discharge
High discharge
Normal or slightly increased discharge
Normal or slightly decreased discharge
Low discharge
Very low discharge


Annual spring discharge
year 2017
Very high discharge
High discharge
Normal or slightly increased discharge
Normal or slightly decreased discharge
Low discharge
Very low discharge

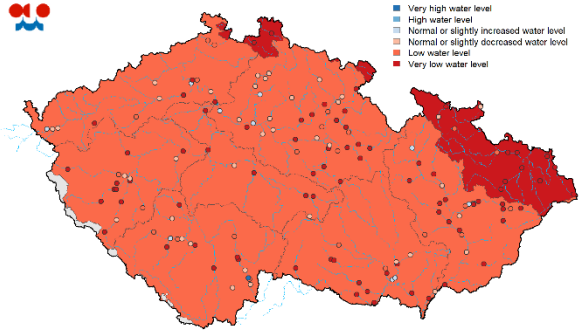
Waterlevel in shallow boreholes

august 1991



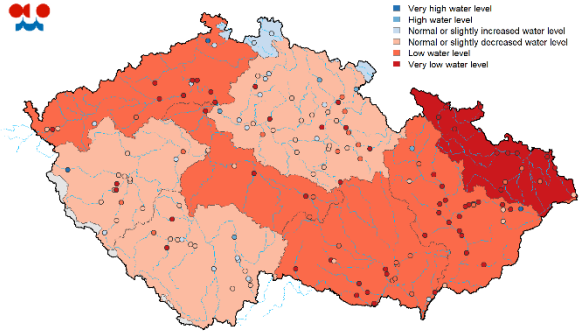
Waterlevel in shallow boreholes

august 1992



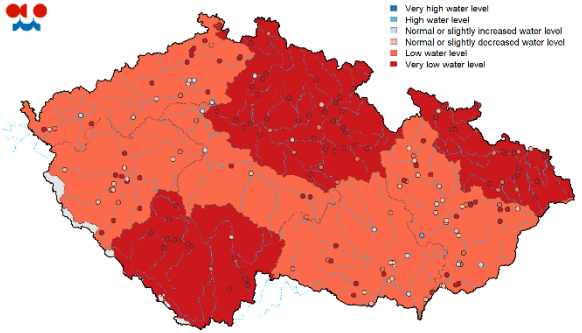
Waterlevel in shallow boreholes

august 1993



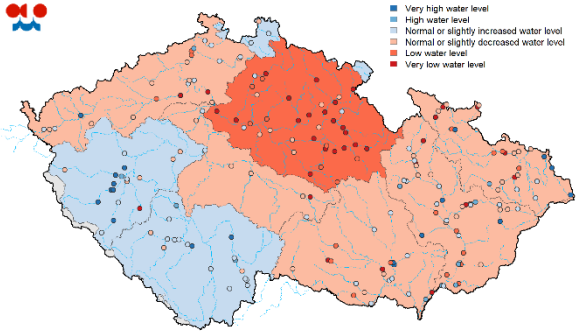
Waterlevel in shallow boreholes

august 2015



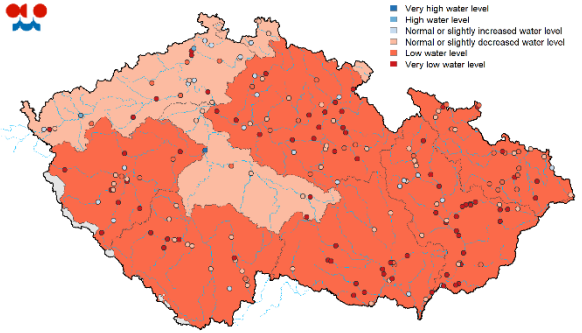
Waterlevel in shallow boreholes

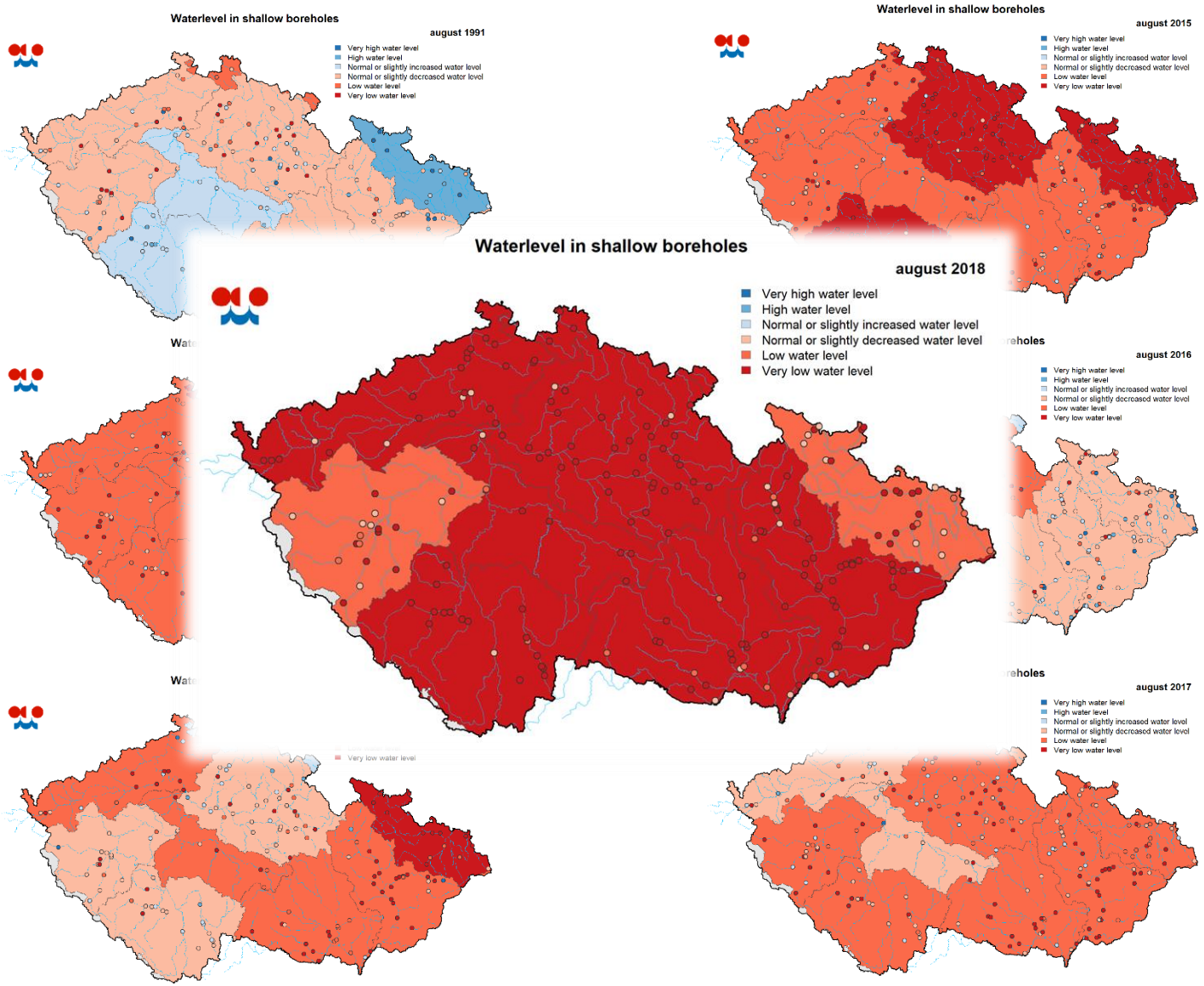
august 2016



Waterlevel in shallow boreholes

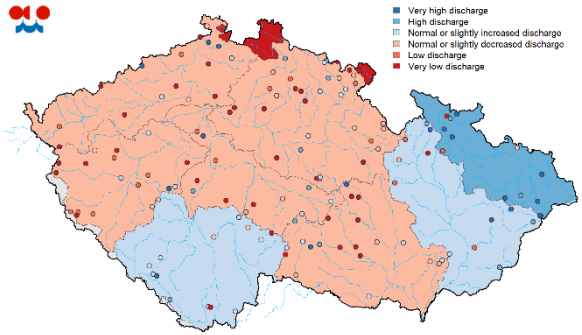
august 2017




Waterlevel in shallow boreholes
august 1991
Very high water level
High water level
Normal or slightly increased water level
Normal or slightly decreased water level
Low water level
Very low water level
Waterlevel in shallow boreholes
august 2015
Very high water level
High water level
Normal or slightly increased water level
Normal or slightly decreased water level
Low water level
Very low water level
Waterlevel in shallow boreholes
august 2018
Very high water level
High water level
Normal or slightly increased water level
Normal or slightly decreased water level
Low water level
Very low water level
august 2016
Very high water level
High water level
Normal or slightly increased water level
Normal or slightly decreased water level
Low water level
Very low water level
august 2017
Very high water level
High water level
Normal or slightly increased water level
Normal or slightly decreased water level
Low water level
Very low water level

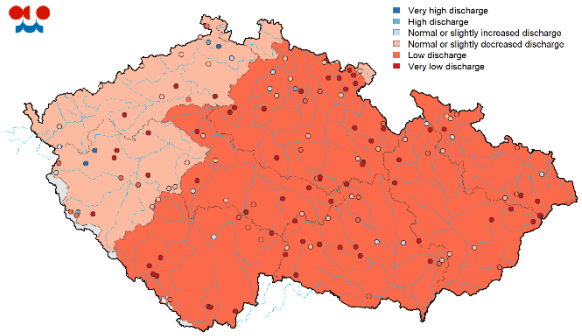
Spring discharge

august 1991



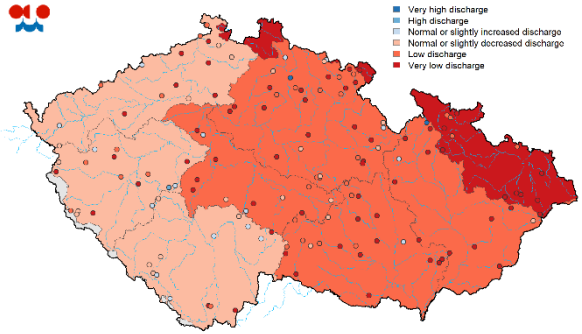
Spring discharge

august 1992



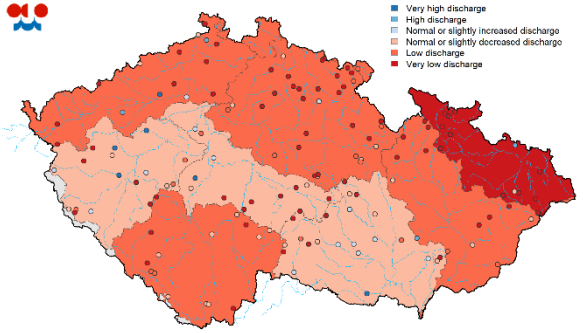
Spring discharge

august 1993



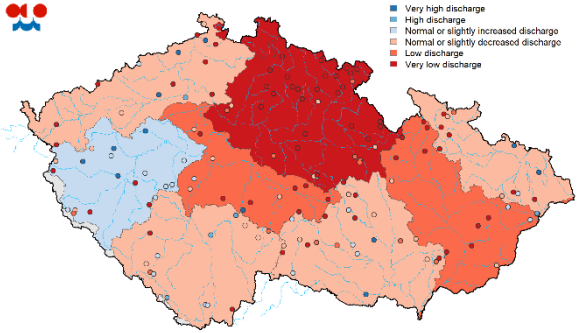
Spring discharge

august 2015



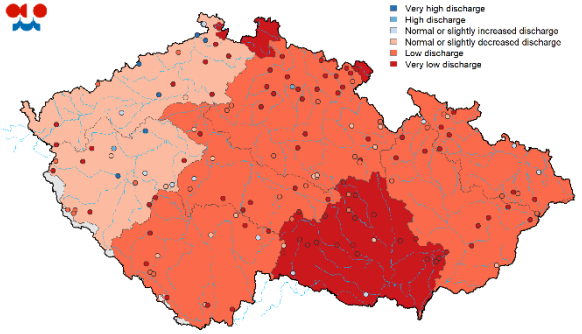
Spring discharge

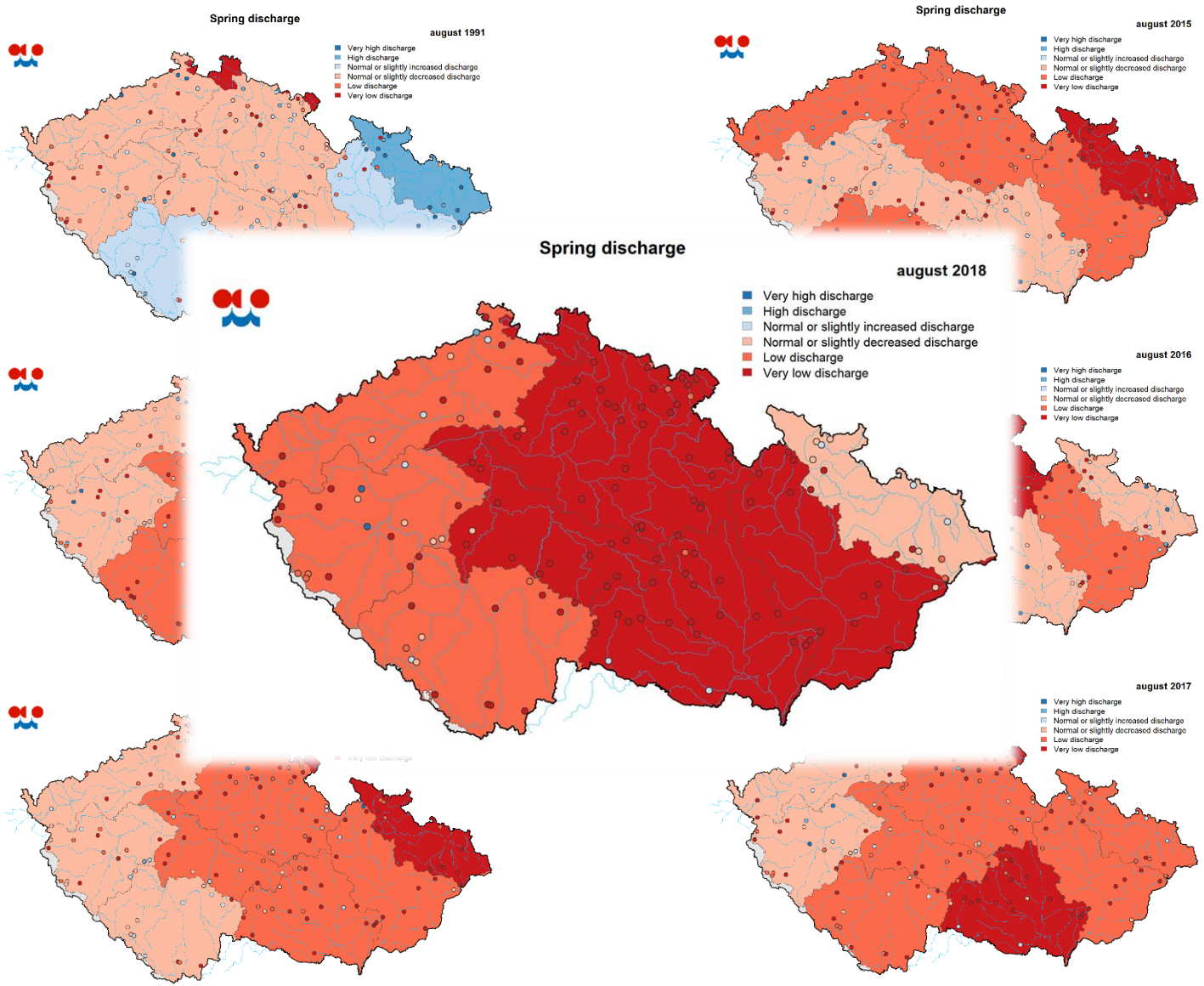
august 2016

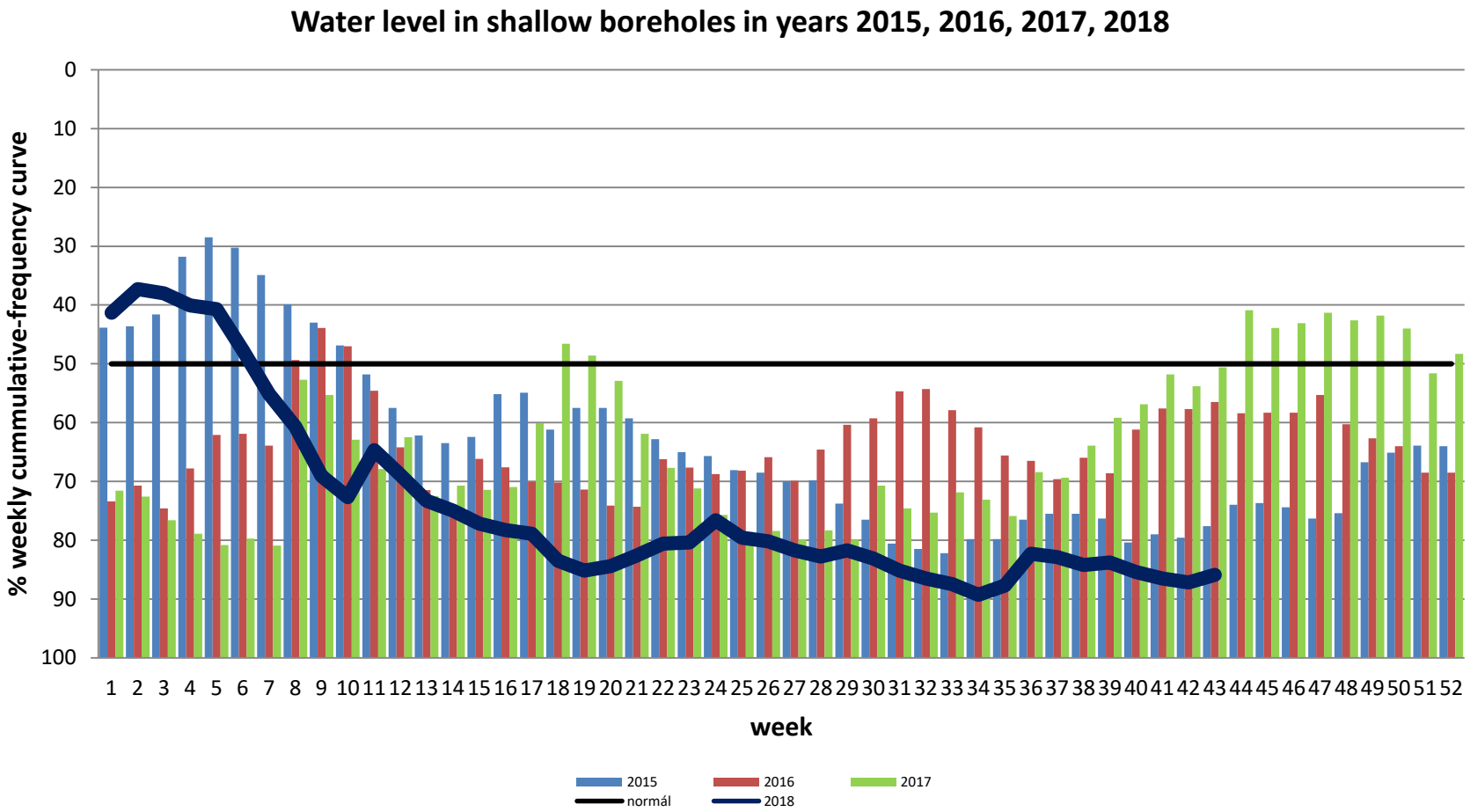


Spring discharge

august 2017

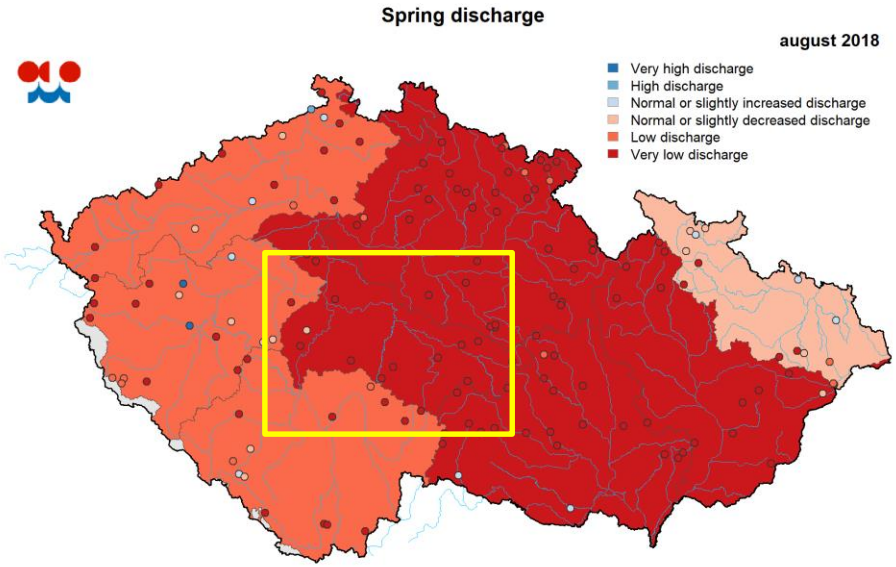


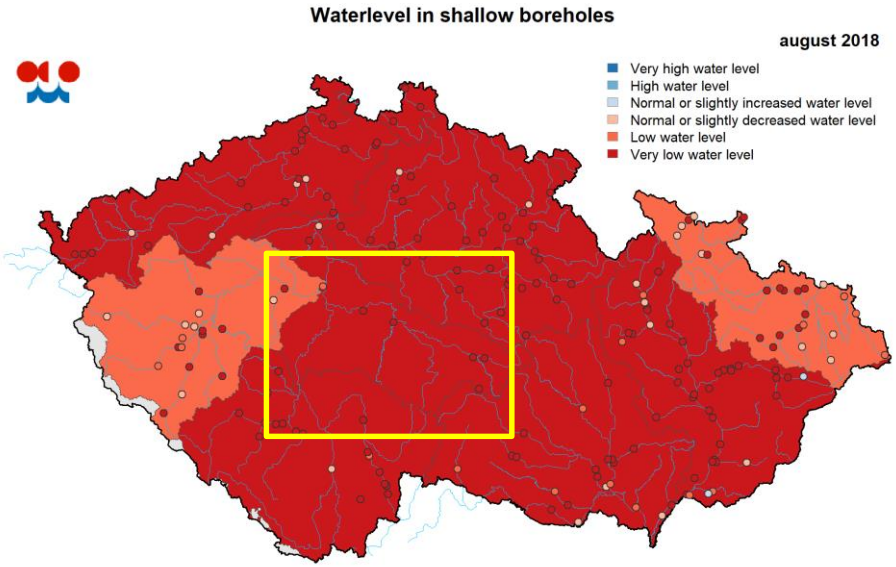

Spring discharge
august 1991
Very high discharge
High discharge
Normal or slightly increased discharge
Normal or slightly decreased discharge
Low discharge
Very low discharge
Spring discharge
august 2015
Very high discharge
High discharge
Normal or slightly increased discharge
Normal or slightly decreased discharge
Low discharge
Very low discharge
Spring discharge
august 2018
Very high discharge
High discharge
Normal or slightly increased discharge
Normal or slightly decreased discharge
Low discharge
Very low discharge
august 2016
Very high discharge
High discharge
Normal or slightly increased discharge
Normal or slightly decreased discharge
Low discharge
Very low discharge
august 2017
Very high discharge
High discharge
Normal or slightly increased discharge
Normal or slightly decreased discharge
Low discharge
Very low discharge


Water level in shallow boreholes in years 2015, 2016, 2017, 2018
% weekly cummulative-frequency curve
0
10
20
30
40
50
60
70
80
90
100
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
week
2015
2016
2017
normál
2018

Shallow borehole & spring groups course

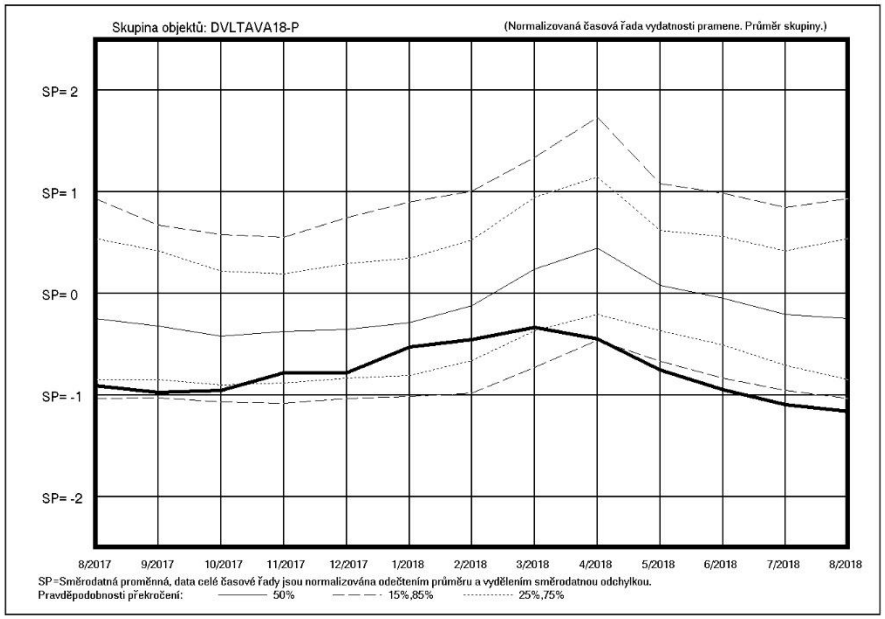
Lower Vltava

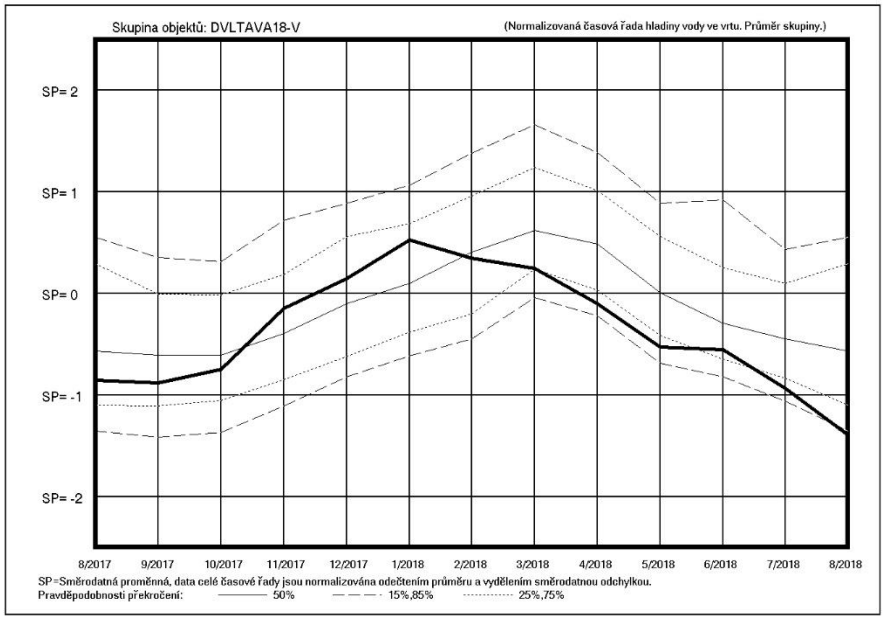




Shallow borehole & spring groups course

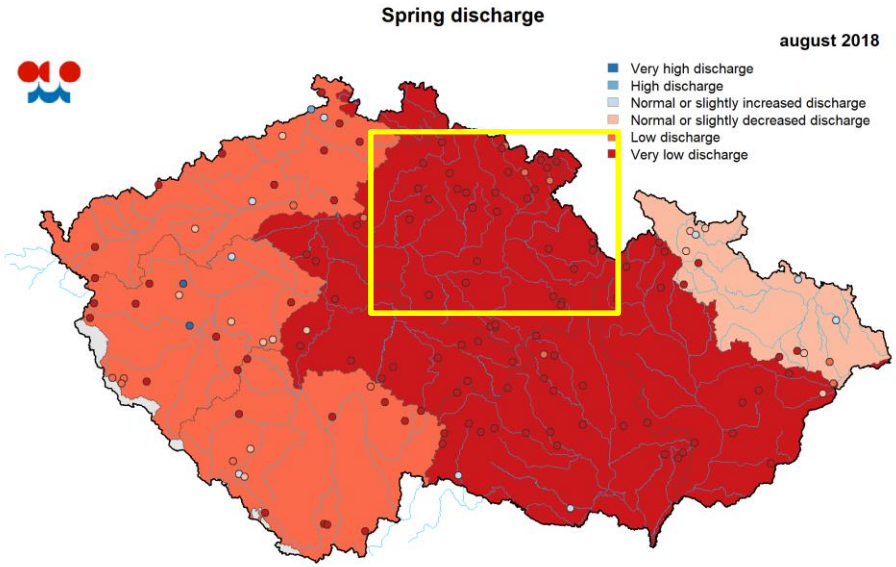
Lower Vltava

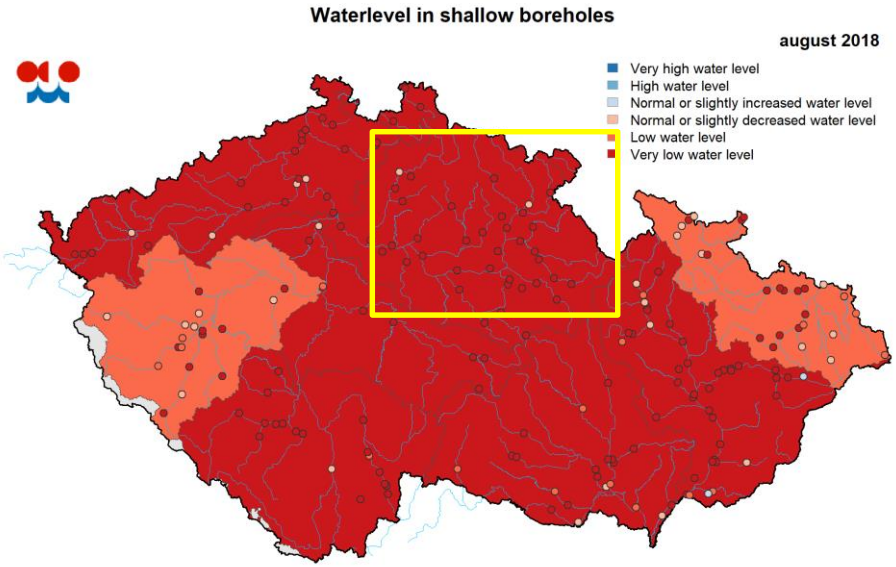




Shallow borehole & spring groups course

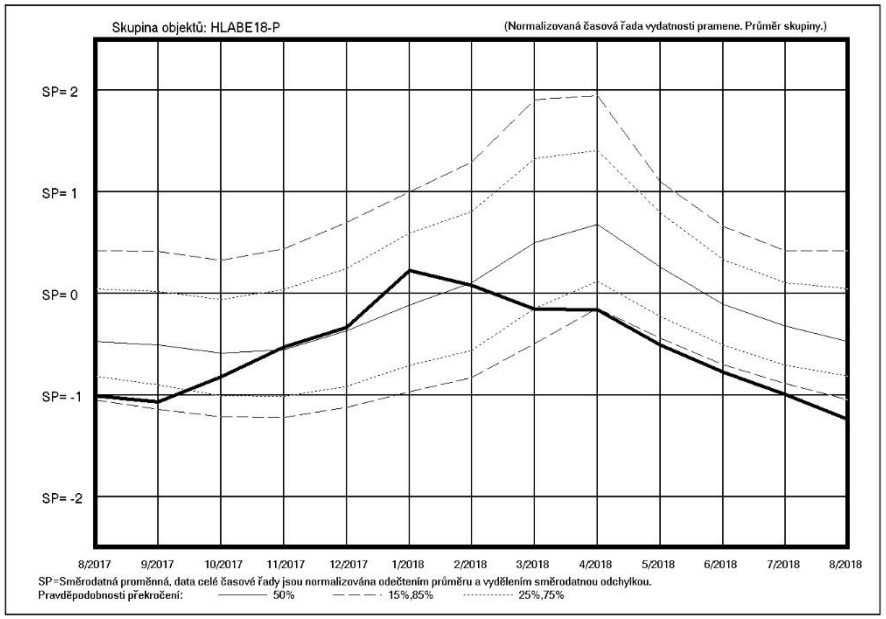
Upper Labe

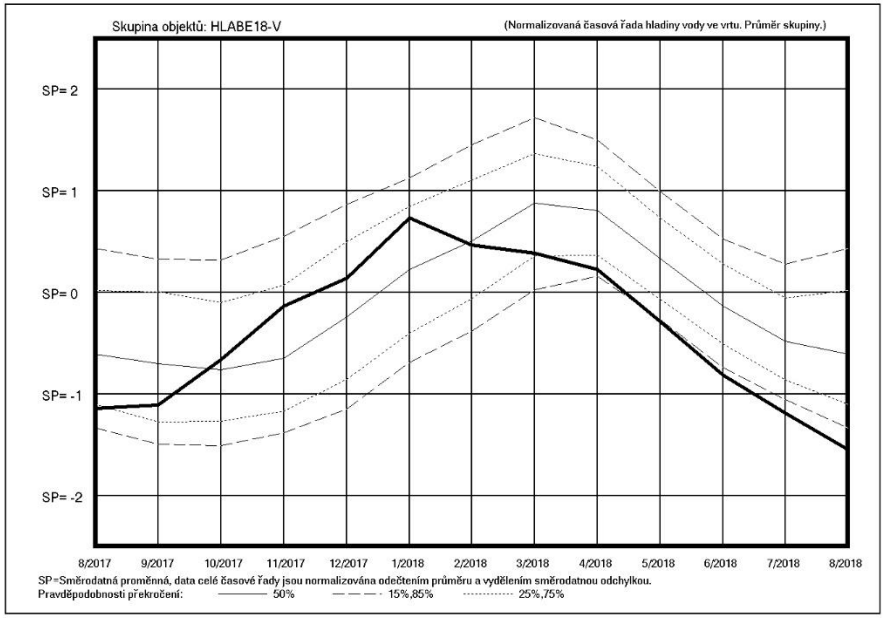




Shallow borehole & spring groups course

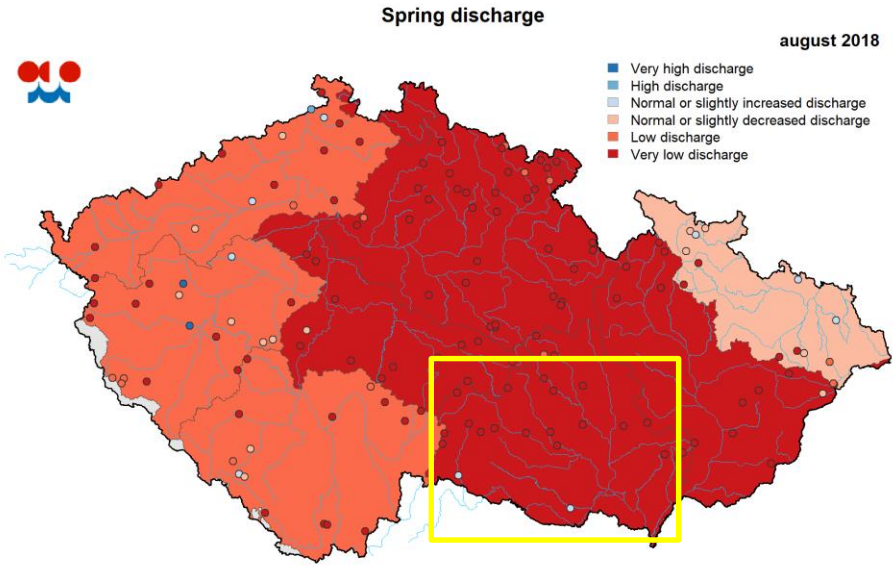
Upper Labe

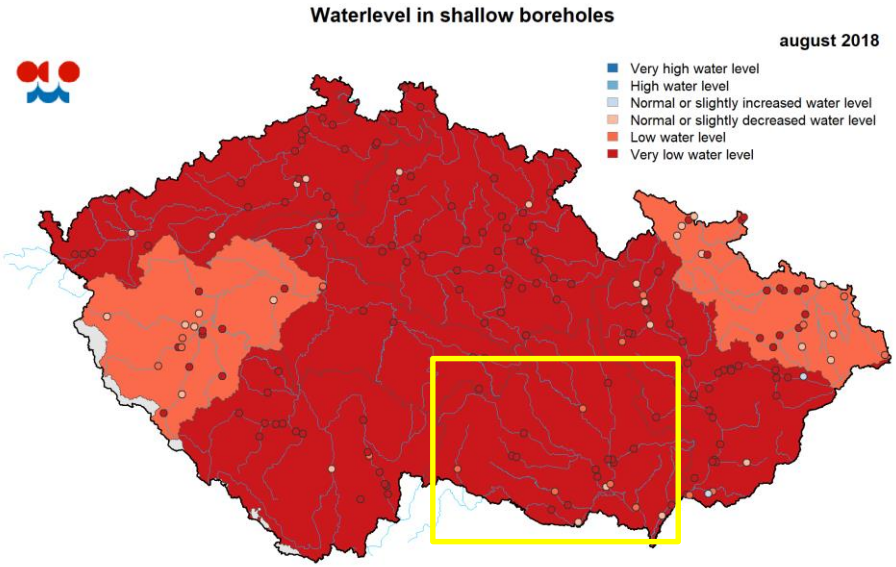




Shallow borehole & spring groups course

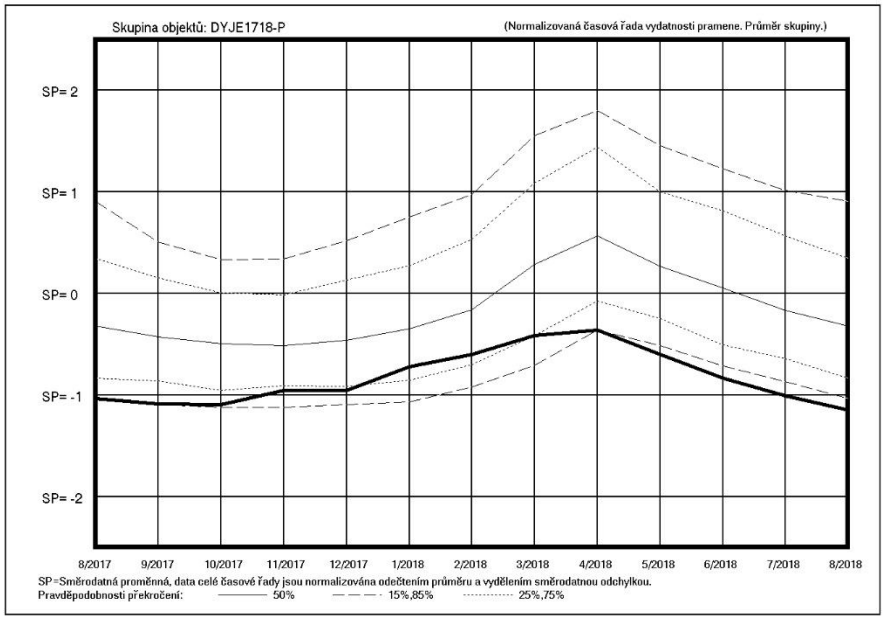
Dyje

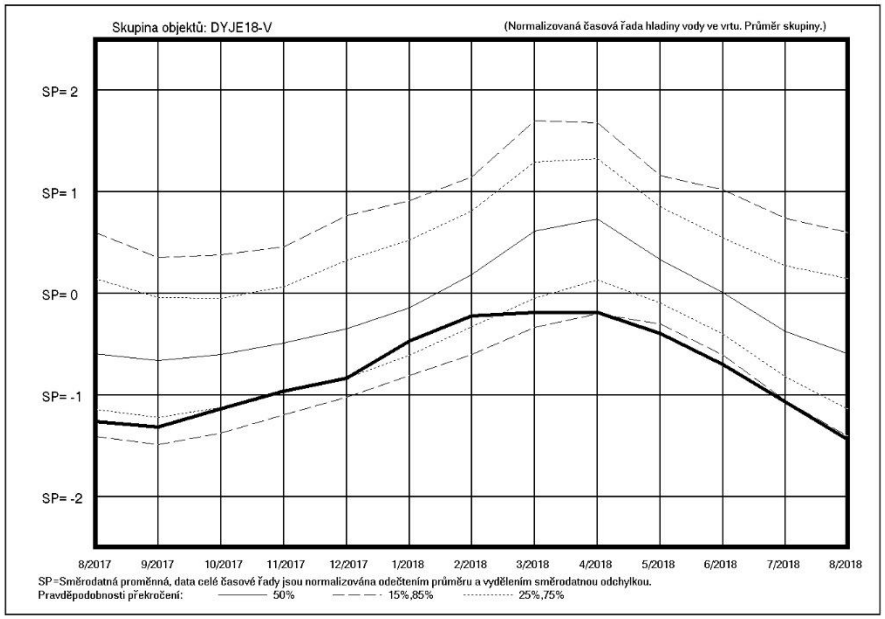




Shallow borehole & spring groups course

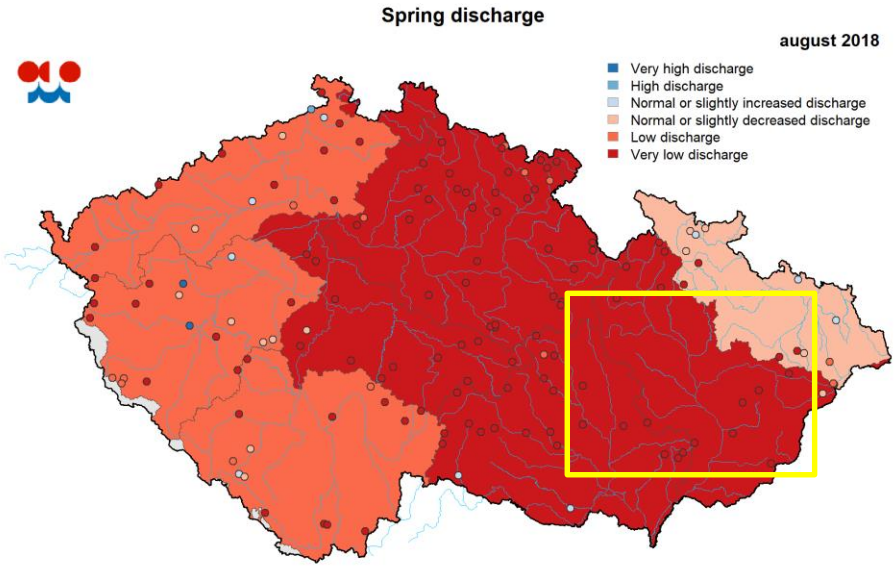
Dyje

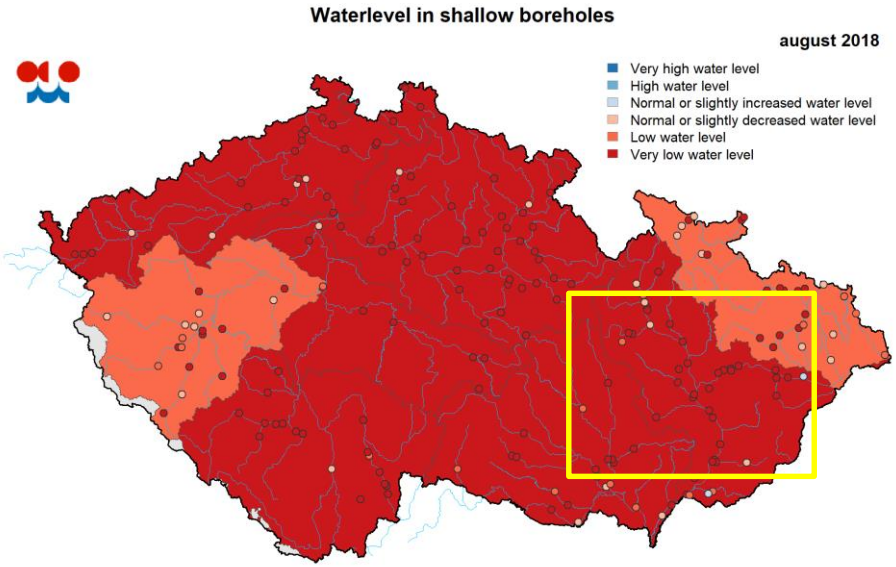




Shallow borehole & spring groups course

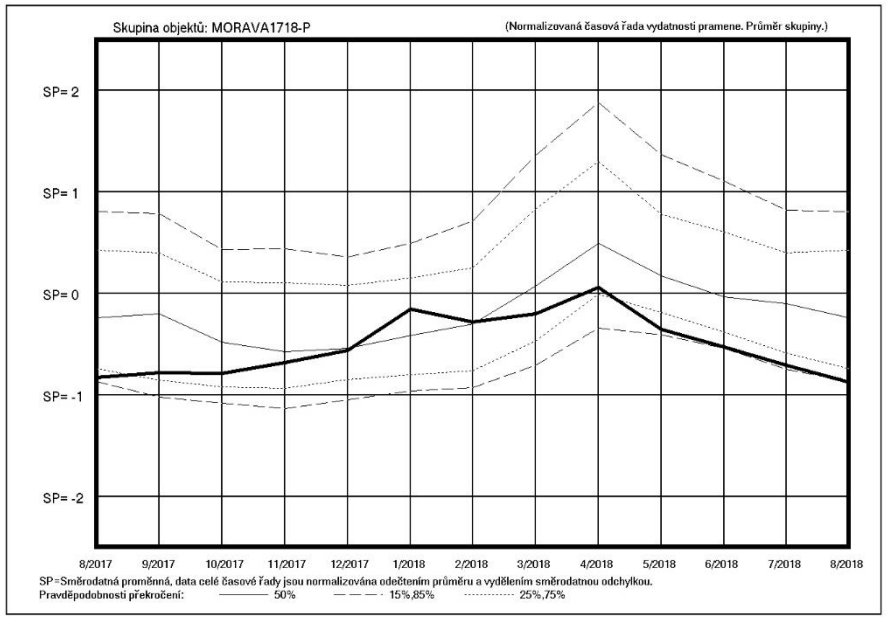
Morava

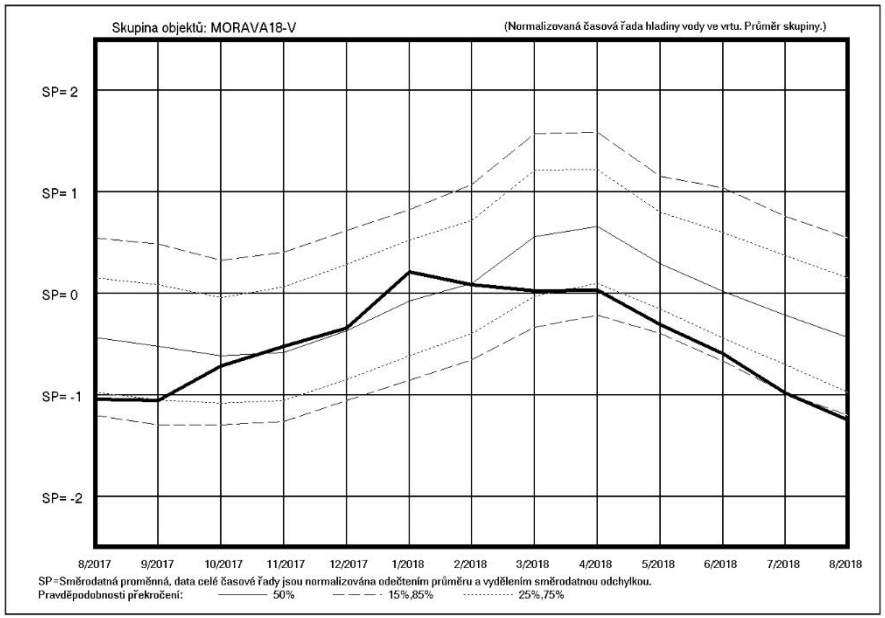




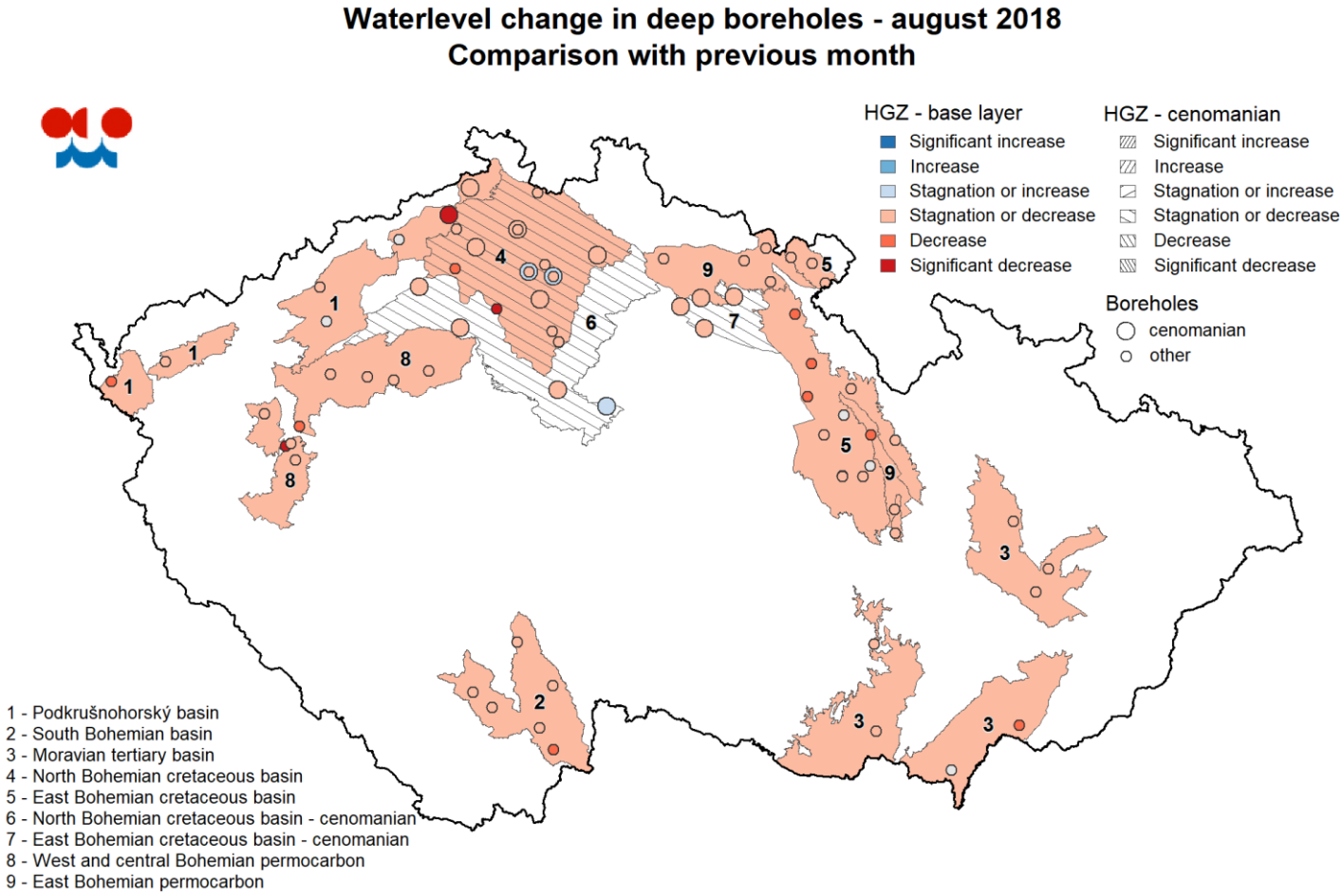
Shallow borehole & spring groups course

Morava





Deep boreholes



PP0744 Želechy

Q_{avg} = 0.62 l/s

may 2018

august 2018

PP0234 Kropáčova Vrutice

Q_{avg} = 22.35 l/s

may 2015

august 2018

PP0093 Říkovice

Q_{avg} = 11.65 l/s

march 2013

october 2018

PP0094 Říkovice

Q_{avg} = 4.93 l/s

march 2018

october 2018


OBJEKT
STÁTNÍ POZOROVACÍ SÍŤ