



Institute of Meteorology and Water Management
National Research Institute

Małgorzata Kępińska-Kasprzak

**AGROMETEOROLOGICAL SERVICE
PROVIDED BY
INSTITUTE OF METEOROLOGY
AND WATER MANAGEMENT –
NATIONAL RESEARCH INSTITUTE
- POLAND**

Agrometeorologists for farmers
in hotter, drier, wetter future

Ljubljana , 2016



Aktualne warunki uprawy roślin

Pogoda

Wystąpienie zagrożeń agrofagami

Dane historyczne

Słownik pojęć

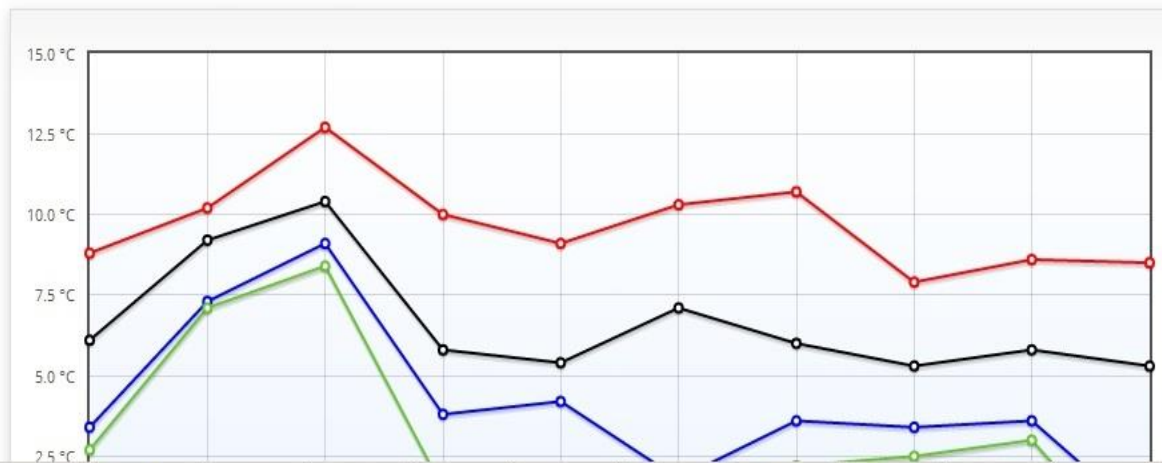
Obrazy satelitarne

Fenologia





Warszawa

POKAŻ WARUNKI

Warszawa - Temperatura powietrza [° C]



Legenda

-  Tmin na wysokości 2m
-  Tmin przy pow. gruntu (wysokość 5cm)
-  Tśred na wysokości 2m
-  Tmax na wysokości 2m

AGROMETEO

Actual
weather
conditions
of plant
cultivation

Weather
forecast

Risk
of
pests

Histo-
rical
data

Satellite
data

Pheno-
logy

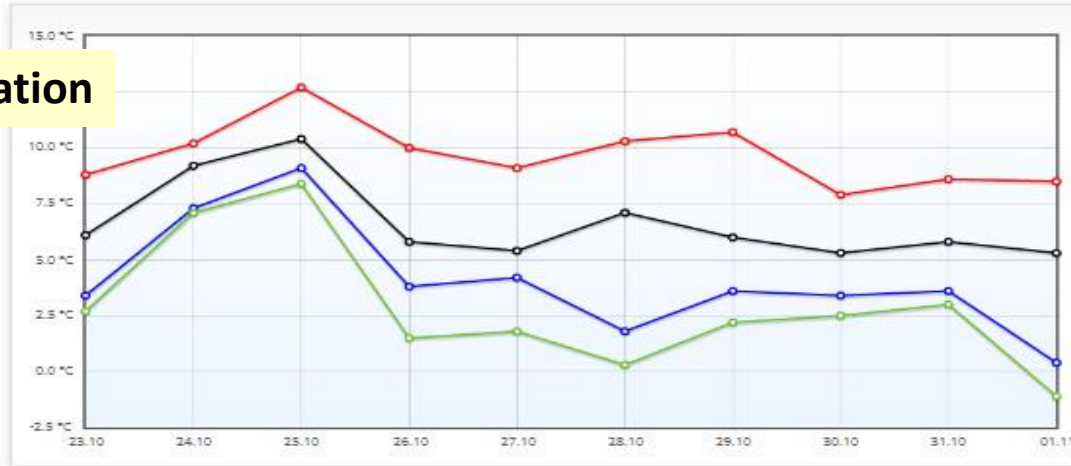
Dictionary

Actual weather conditions of plant cultivation - data for last 10 days

Warszawa

POKAŻ WARUNKI

Warszawa - Temperatura powietrza [° C]



Legenda

- T min na wysokości 2m
- T min przy pow. gruntu (wysokość 5cm)
- T śred na wysokości 2m
- T max na wysokości 2m

2 m
T min
T max
T mean
T at 5cm

Warszawa - Temperatura gruntu na głębokości 5 cm [° C]



Legenda

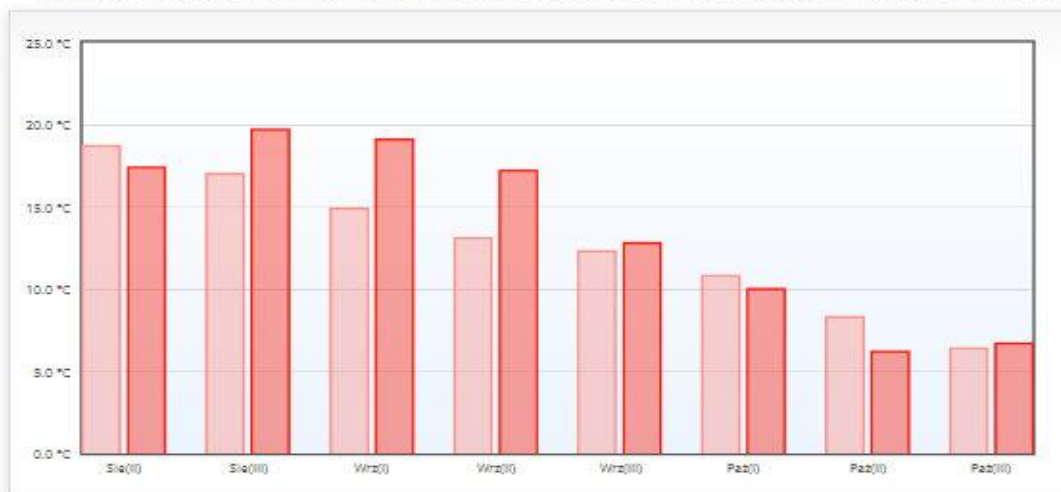
- T max
- T min
- T śred

5 cm depth
T min
T max
T mean

choice of station

Actual weather conditions of plant cultivation - last 8 decades in comparison to 30 year average

Warszawa - Średnia dekadowa temperatura powietrza w odniesieniu do średniej z lat 1981-2010 [°C]

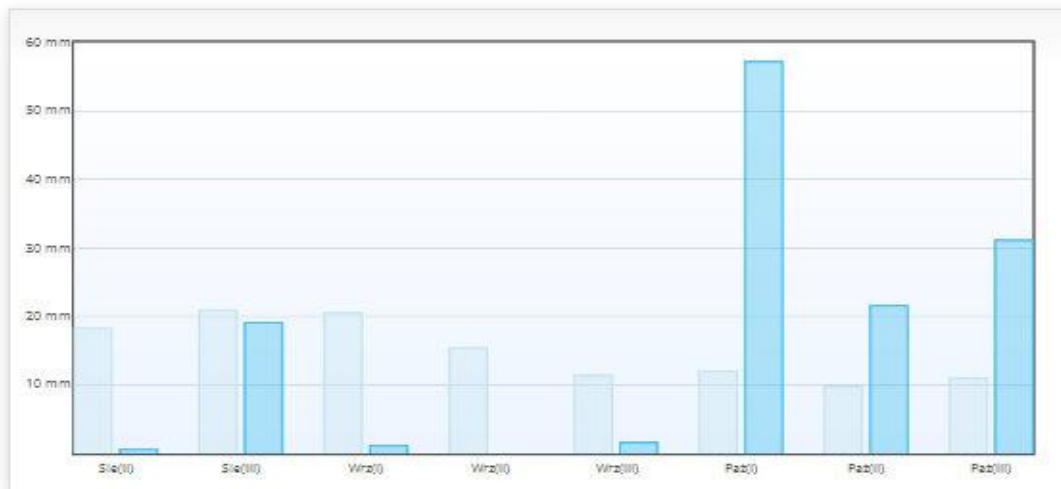


Legenda

- Temperatura średnia wieloletnia (1981-2010)
- Temperatura średnia w ostatnich dekadach

Temperature
- average for each decade

Warszawa - Suma dekadowa opadów atmosferycznych w odniesieniu do średniej z lat 1981-2010 [mm]



Legenda

- Średnia wieloletnia suma opadów (1981-2010)
- Średnia suma opadów w ostatnich dekadach

Precipitation
- average sum for each decade

Weather forecast

Model COSMO
Dokładna Prognoza
Numeryczna

środa
02.11.2016

czwartek
03.11.2016

piątek
04.11.2016

sobota
05.11.2016

choice of Model and day

Model GFS
Prognoza Długoterminowa

środa
02.11.2016

czwartek
03.11.2016

piątek
04.11.2016

sobota
05.11.2016

niedziela
06.11.2016

poniedziałek
07.11.2016

wtorek
08.11.2016

środa 02.11.2016	Model COSMO							
	01:00	04:00	07:00	10:00	13:00	16:00	19:00	22:00
temperatura powietrza na wys. 2m [°C]	7	7	6	6	7	6	5	3
temperatura przy powierzchni gruntu [°C]	7	7	6	6	7	6	4	3
prędkość wiatru [m/s]	4	5	4	6	7	5	6	6
kierunek wiatru [°]	273	273	254	243	268	286	289	293
zachmurzenie [%]	100	100	99	100	100	100	100	70
ciśnienie [hPa]	1002	1001	1000	999	997	997	999	1001
wilgotność względna powietrza [%]	92	85	89	86	84	86	80	81
wilgotność właściwa gleby [kg wody/kg gleby]	0.006	0.006	0.006	0.005	0.006	0.005	0.005	0.004
rodzaj opadu	brak opadu	deszcz	brak opadu	deszcz	brak opadu	deszcz	brak opadu	deszcz
wysokość opadu [mm/3h]	0	śląd opadu	0	0.1	0	0.8	0	0.1
temperatura [°C] gleby na głębokości:								
6 [cm]	8	7	7	7	7	6	6	4
18 [cm]	9	8	8	8	8	8	7	7
54 [cm]	9	9	9	9	9	9	9	9
162 [cm]	12	12	12	12	12	12	12	12

- Temp at 2meters
- Temp at 5cm
- wind speed
- wind direction
- cloudiness
- air pressure
- humidity
- soil moisture
- precipitation
- T of soil at
6, 18, 54, 162 cm

Risk of pests

Poznań

SUMA TEMP. EFEKTYWNYCH

ZABIEGI AGROTECHNICZNE

TERMINY POJAWIENIA SIĘ SZKODNIKÓW

choice of place (village)

best time for agricultural treatments

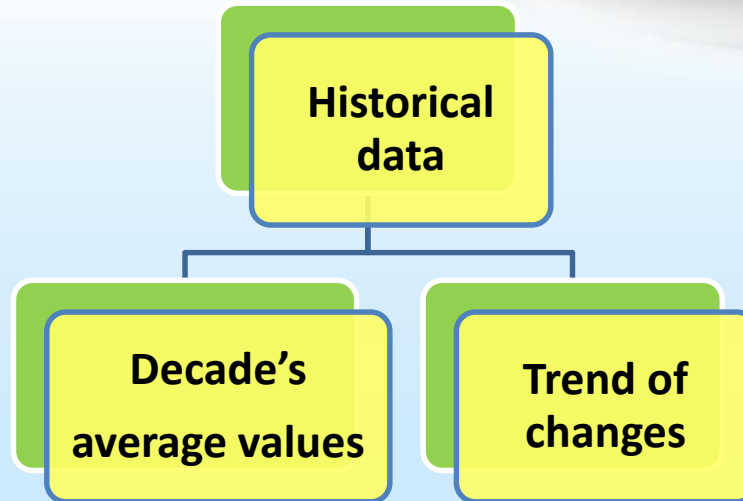
risk of chosen pest beginning

Środa 02.11.2016								czwartek 03.11.2016								piątek 04.11.2016								sobota 05.11.2016													
00	03	06	09	12	15	18	21	00	03	06	09	12	15	18	21	00	03	06	09	12	15	18	21	00	03	06	09	12	15	18	21						
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	+	+	+	+	+	0	0	+	+	0	0	0	+	+	+	+	prędkość wiatru					
+	+	+	+	+	+	+	0/1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	opad deszczu		
0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	temp. powietrza	
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	temp. gleby na głębokości 5cm	
0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0	wilgotność względna powietrza

0 Warunki złe, nie wykonywać opryskiwania
 0/1 Warunki umiarkowanie dobre, można wykonywać opryskiwanie
 + Warunki optymalne, zaleca się wykonywać opryskiwanie

Poznań		Terminy pojawienia się szkodników roślin uprawnych i sadowniczych											
Prognozowane elementy		niedziela 30.10.2016	poniedziałek 31.10.2016	wtorek 01.11.2016	środa 02.11.2016	czwartek 03.11.2016	piątek 04.11.2016	sobota 05.11.2016	niedziela 06.11.2016	poniedziałek 07.11.2016	wtorek 08.11.2016	środa 09.11.2016	czwartek 10.11.2016
		dni poprzednie					prognoza						
		Szkodniki roślin uprawnych i sadowniczych (terminy pojawienia wyznaczone na podstawie Σ_{DD}) - sum temperatur efektywnych)											
Stonka ziemniaczana ($T_0 = 11,5^\circ\text{C}$)	$\Sigma_{DD}=106^\circ\text{C}$ $\Sigma_{DD}=220^\circ\text{C}$	1114,75	1114,75	1114,81	1114,81	1114,81	1114,81	1114,81	1114,81	1114,81	1114,81	1114,81	1114,81
Pioniarzka zbożówka ($T_0 = 8,0^\circ\text{C}$)	$\Sigma_{DD}=400^\circ\text{C}$	1716,13	1716,77	1718,15	1718,15	1718,15	1718,15	1718,15	1718,37	1718,37	1718,37	1718,37	1718,37
Rolnica zbożówka ($T_0 = 10^\circ\text{C}$)	$\Sigma_{DD}=1000^\circ\text{C}$	1356,89	1356,89	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36
Pacjornica lucernianka ($T_0 = 9,0^\circ\text{C}$)	$\Sigma_{DD}=222^\circ\text{C}$	1531,37	1531,59	1532,47	1532,47	1532,47	1532,47	1532,47	1532,47	1532,47	1532,47	1532,47	1532,47
Owocówka jabłkowieczka ($T_0 = 10^\circ\text{C}$)	$\Sigma_{DD}=155^\circ\text{C}$	1356,89	1356,89	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36
Owocówka śliwkowieczka ($T_0 = 9,0^\circ\text{C}$)	$\Sigma_{DD}=230^\circ\text{C}$	1356,89	1356,89	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36
Mazyca brzoskwińniowa ($T_0 = 3,0^\circ\text{C}$)	$\Sigma_{DD}=650^\circ\text{C}$	1356,89	1356,89	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36	1357,36
Mazyca jabłoniowa ($T_0 = 7,0^\circ\text{C}$)	$\Sigma_{DD}=106^\circ\text{C}$	1531,37	1531,59	1532,47	1532,47	1532,47	1532,47	1532,47	1532,47	1532,47	1532,47	1532,47	1532,47
Nasionnica trzcinówka ($T_0 = 7,0^\circ\text{C}$)	$\Sigma_{DD}=120^\circ\text{C}$	1531,37	1531,59	1532,47	1532,47	1532,47	1532,47	1532,47	1532,47	1532,47	1532,47	1532,47	1532,47
Mazyca brzoskwińniowa ($T_0 = 3,0^\circ\text{C}$)	$\Sigma_{DD}=137^\circ\text{C}$	2809,66	2814,66	2820,16	2822,66	2823,61	2824,99	2826,68	2830,68	2832,18	2833,24	2834,24	2835,24
Mazyca jabłoniowa ($T_0 = 7,0^\circ\text{C}$)	$\Sigma_{DD}=114^\circ\text{C}$	1911,78	1913,00	1914,97	1915,16	1915,16	1915,16	1915,16	1915,80	1915,80	1915,80	1915,80	1915,80
Nasionnica trzcinówka ($T_0 = 7,0^\circ\text{C}$)	$\Sigma_{DD}=317^\circ\text{C}$	1807,32	1808,07	1809,29	1810,24	1810,68	1810,84	1811,02	1812,02	1813,02	1813,52	1813,52	1813,52

Historical data calculated for synoptic stations (30 years)



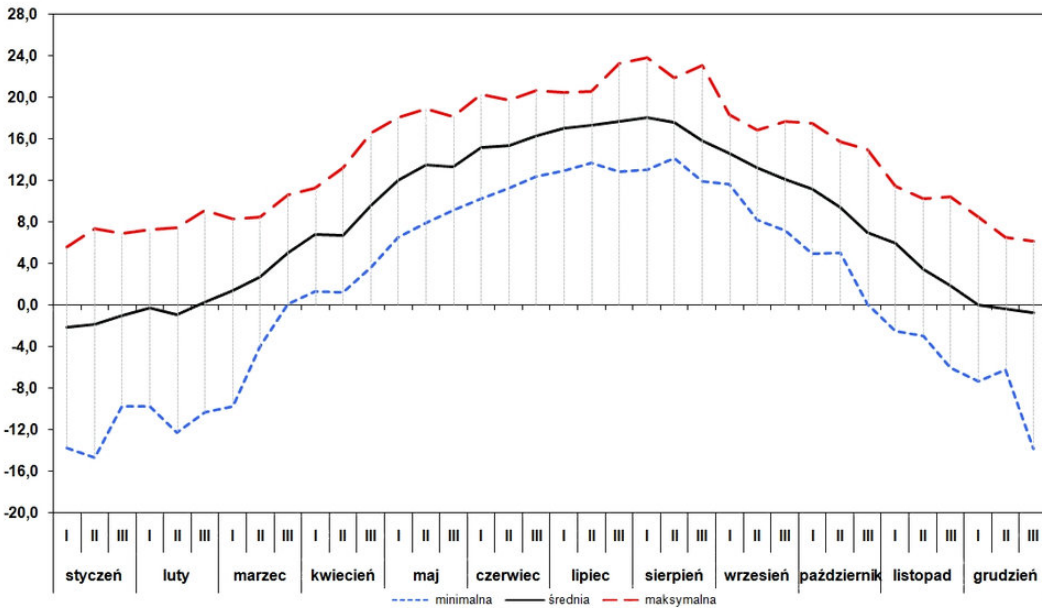
18 different agrometeorological indices

(temperature, precipitation, sunshine duration, evapotranspiration, snow cover, humidity, cloudiness, amount of hot days, amount of days with frost etc.etc.)

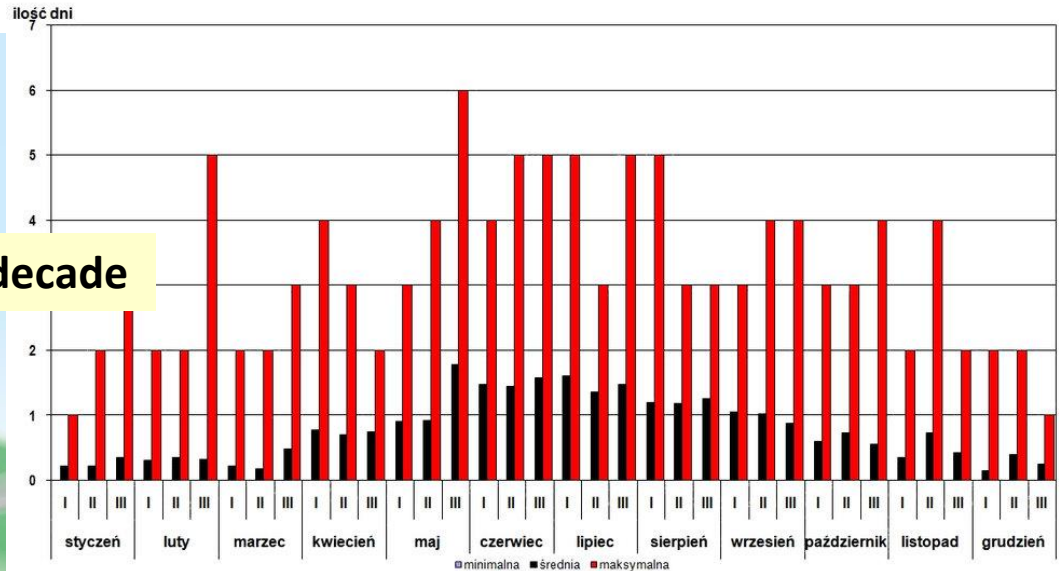
Historical data

Average values for decades

average temperature in each decade

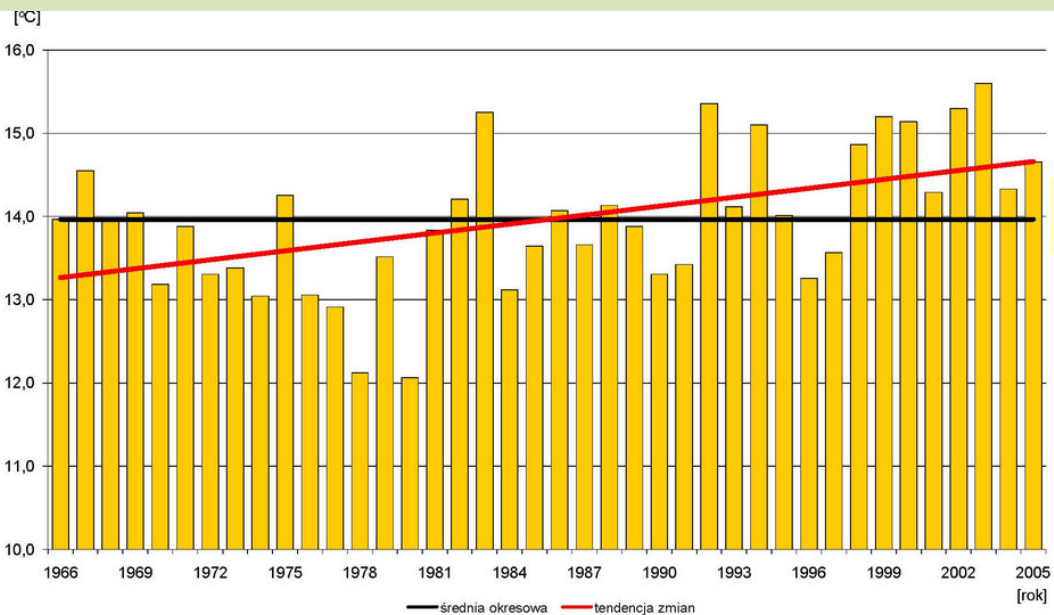


average sum of precipitation in each decade



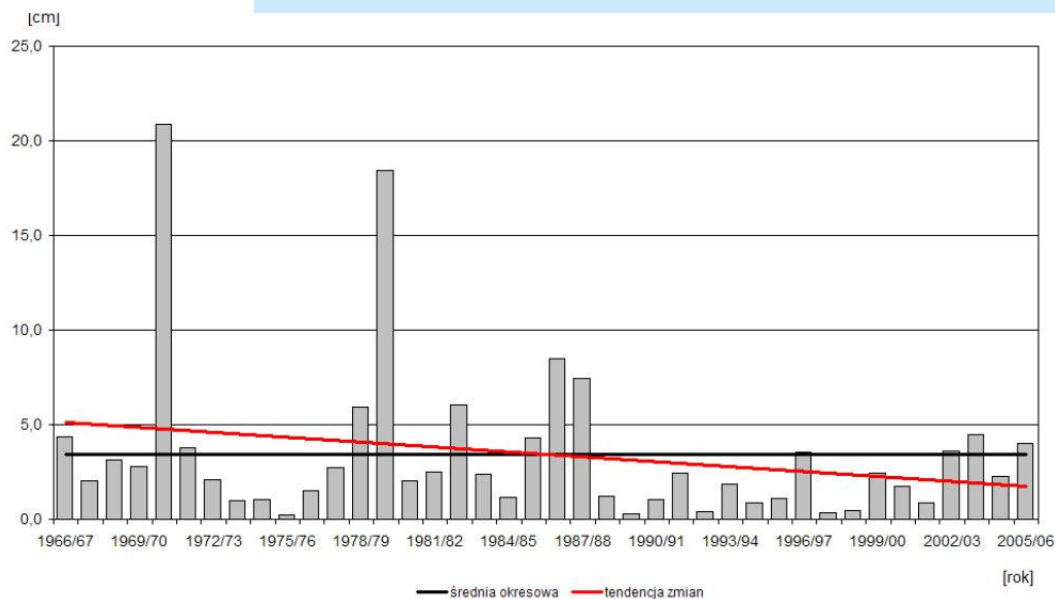
Historical data

Trend of changes



trend of the average air temperature

trend of the snow cover



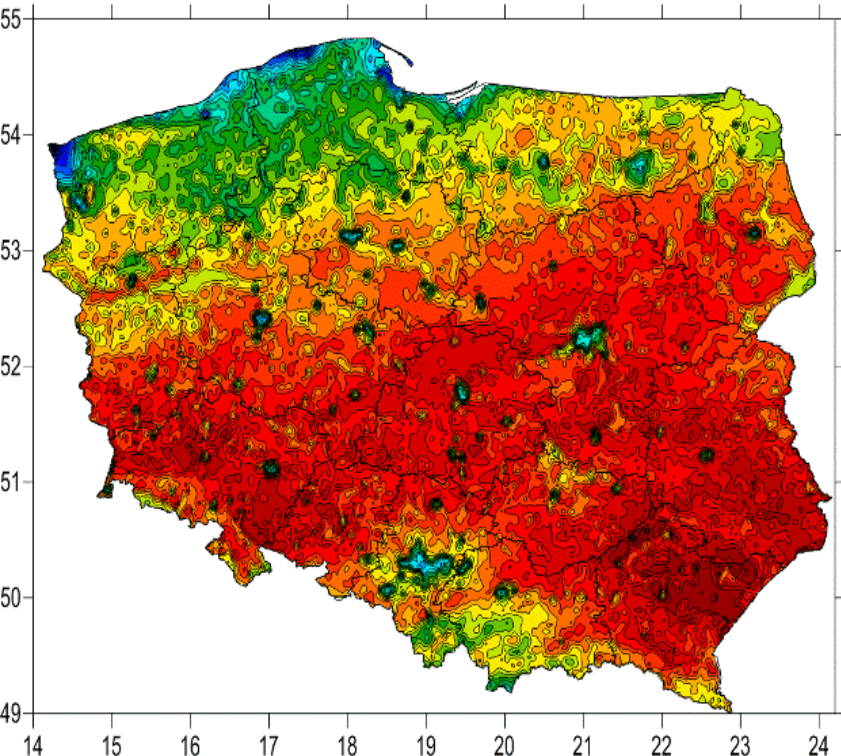
Satellite data

Spatial distribution of 12 different information based on satellite products:

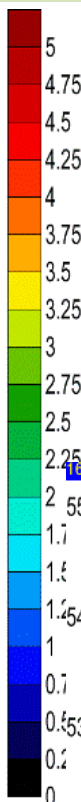
- Evapotranspiration – sum for last 24h; last decade; last 30 days
- Downwelling Surface Shortwave radiation energy – sum for last 24h; last decade; last 30 days
- Soil moisture – layer 0-7 cm
 - layer 7-28 cm
 - layer 28-100 cm
 - layer 100-289 cm
- Leaf Area Index (LAI)
- Fraction of Absorbed Photosynthetic Active Radiation (fAPAR)

Satellite data

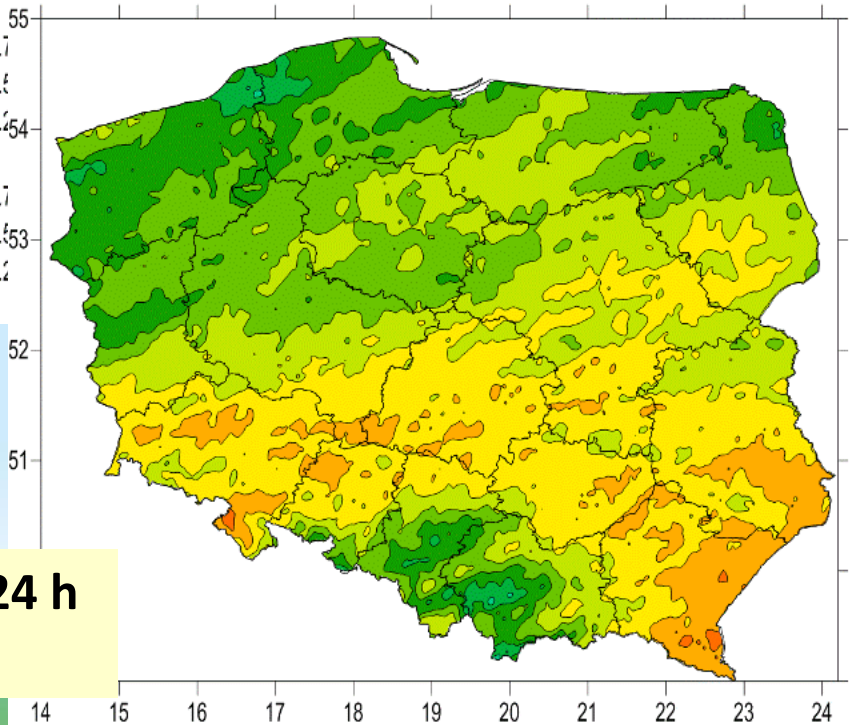
16.06.2013 Land SAF E1 dobowa [mm]



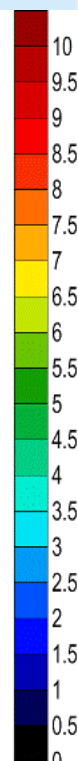
Evapotranspiration - sum for 24 h
16.06.2013



16.06.2013 Land SAF DSS1 suma dobowa [kWh/m2]

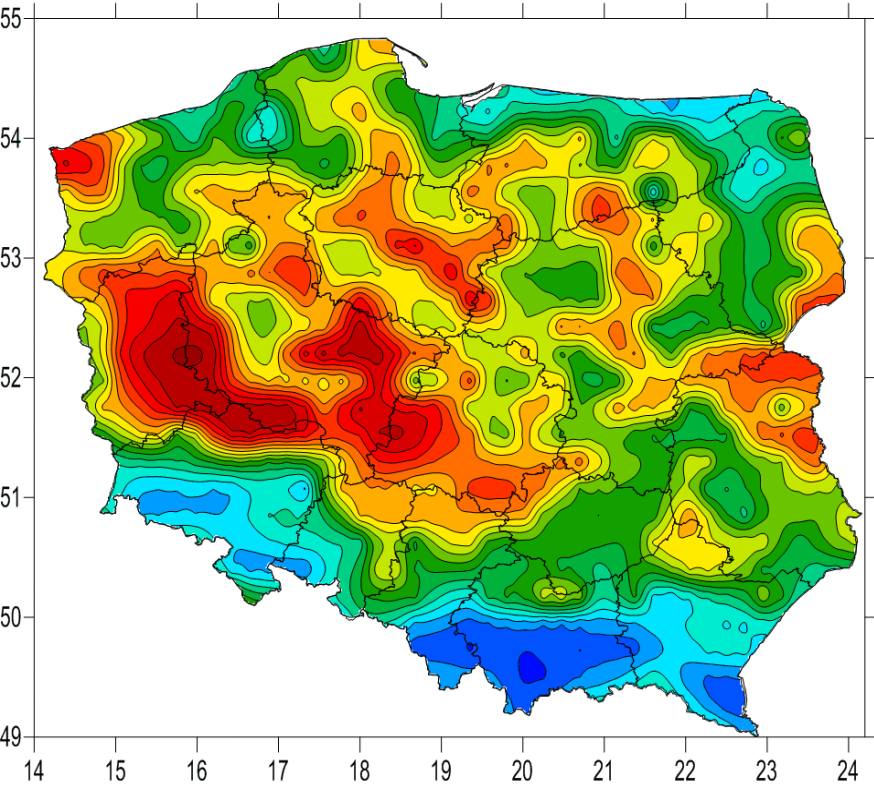


Shortwave radiation - sum for 24 h
16.06.2013

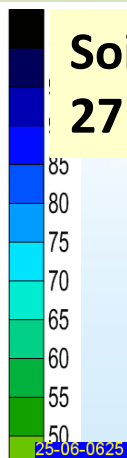


Satellite data

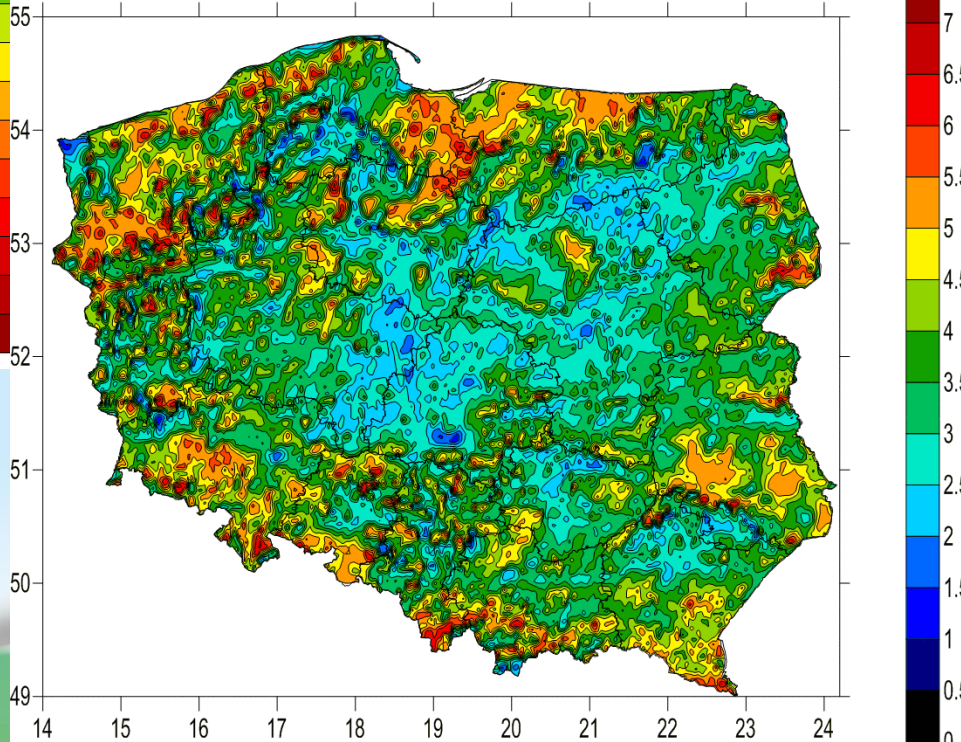
27.09.2016 H-SAF H-14 - Wskaznik wilgotnosci gleby, warstwa 7-28 cm.



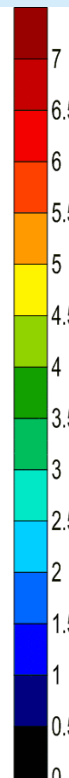
Soil moisture
27.09.2016



25-06-0625



LAI
25.06.2015



Phenology



Phenology

Phenological seasons

AGROMETEO
POGODYNKA

SERWIS IMGW-PIB
DLA ROLNIKÓW

POLEUB
MAS

Aktualne warunki uprawy roślin

Pogoda

Wystąpienie zagrożeń agrofagami

Dane historyczne

Słownik pojęć

Obrazy satelitarne

Fenologia

Fenologiczne pory roku | Automatyczne obserwacje fenologiczne

phenological seasons

zmarznięte roślinami znacznikowymi
tył rozkład na obszarze Polski



zaczatek wiosny



wczesna wiosna



pełnia wiosny



wczesne lato



lato



wczesna jesień



jesień

Phenology

Phenological seasons

New network of the phenological observations conducted by IMGW since 2007 :

- 50 synoptic stations
- 10 wild plants
- 5 pheno-phases
- on this base 7 phenological seasons are determined (earliest spring, early spring, spring, early summer, summer, early autumn, autumn)
- date of the beginning of the phenological season:
average date of the beginning of phenological phases

Maps of phenological seasons

earliest spring

early spring

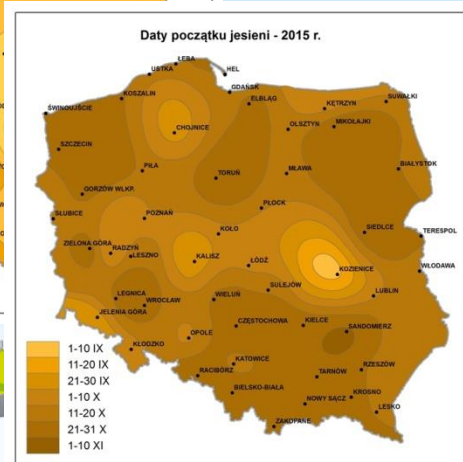
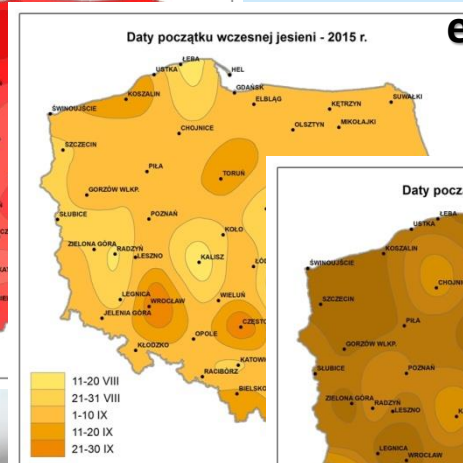
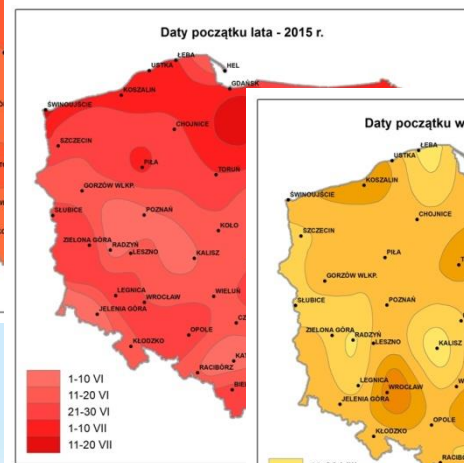
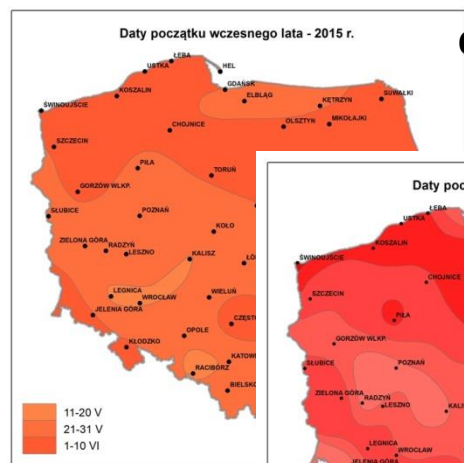
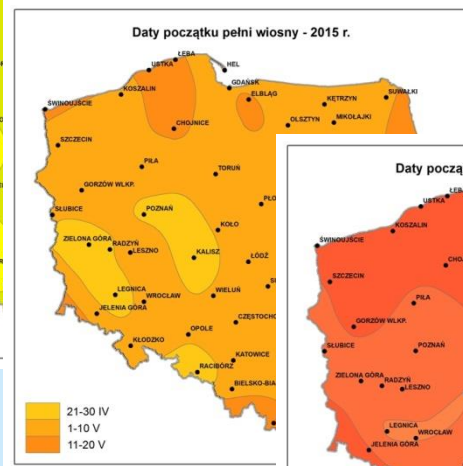
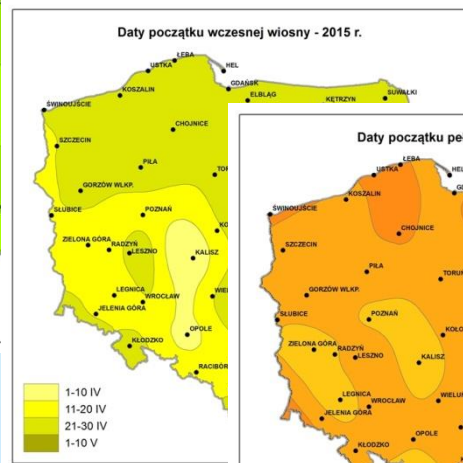
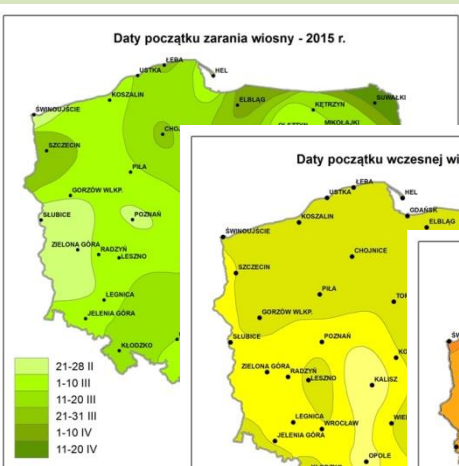
spring

early summer

summer

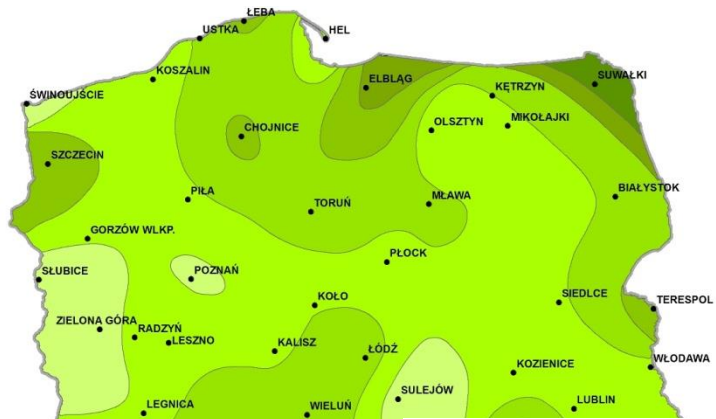
early autumn

autumn

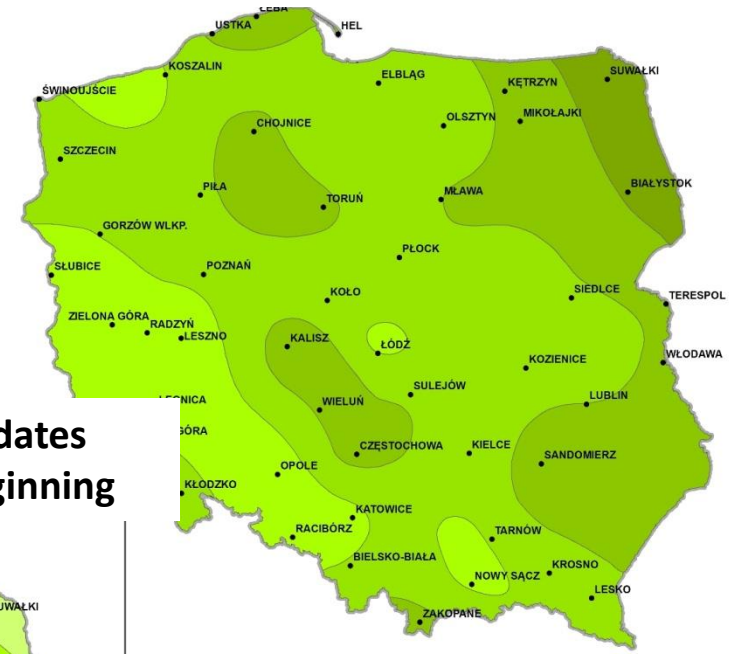


Maps of phenological seasons

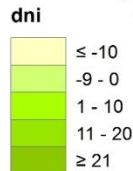
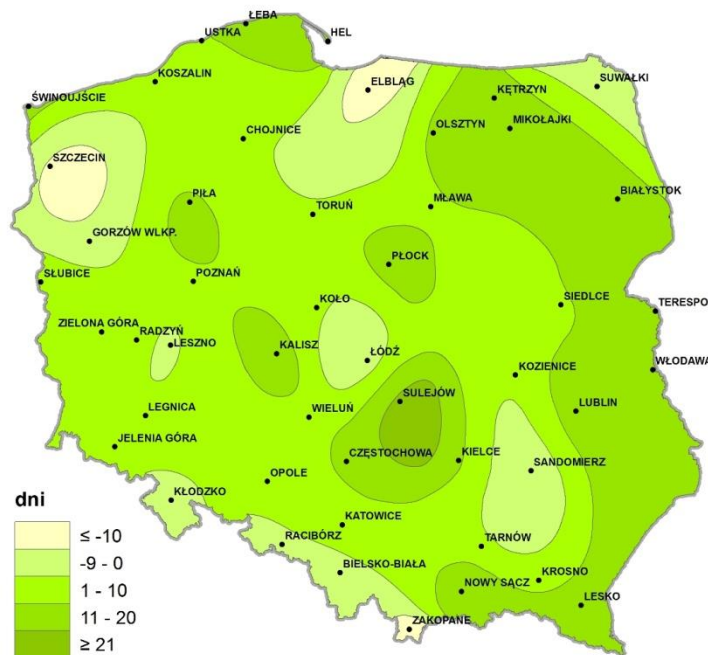
Date of the earliest spring beginning



Average dates of the earliest spring beginning (2007-2014)



Differences (in days) between average dates and year 2015 of the earliest spring beginning

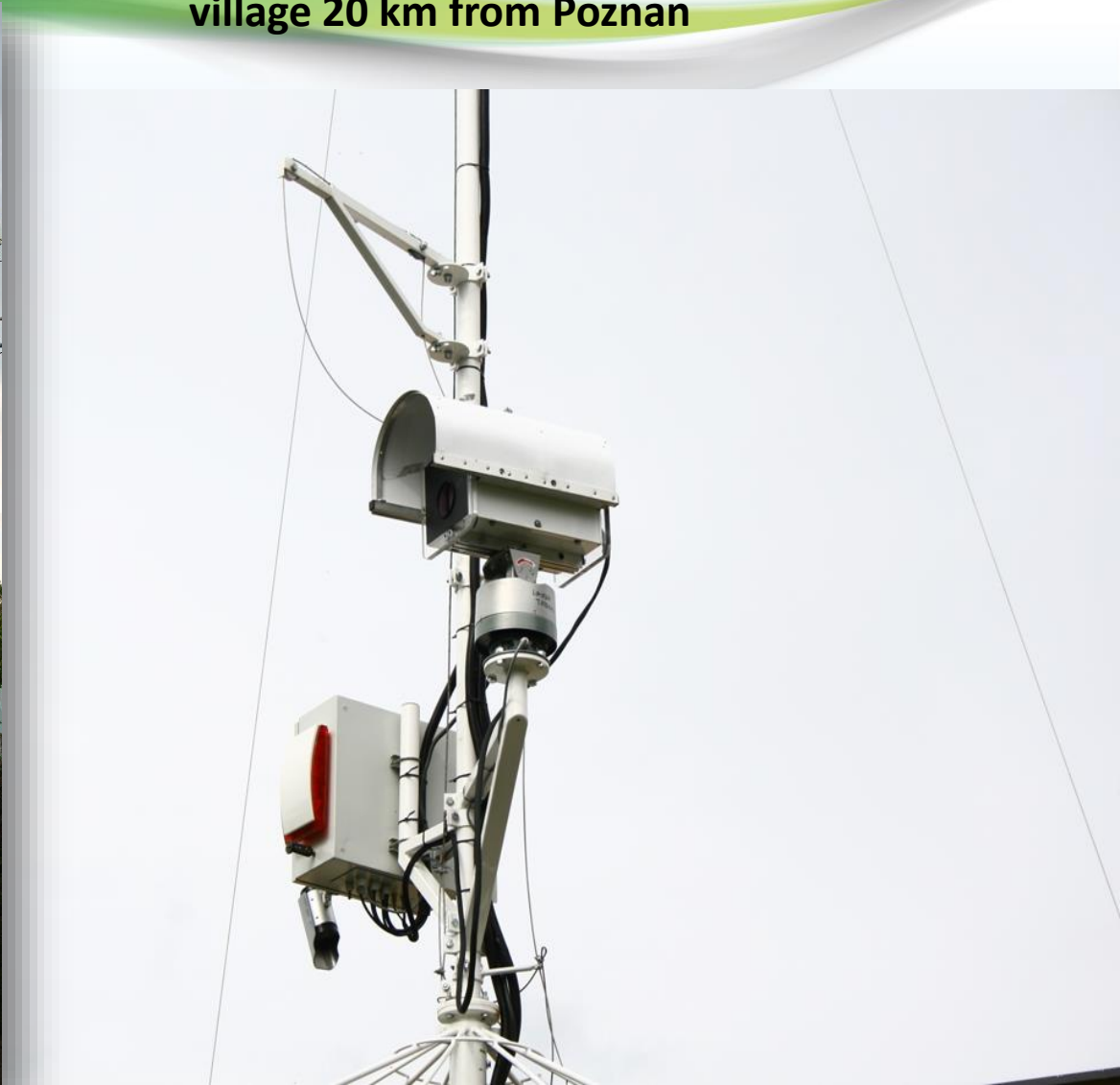


„ + „ earlier beginning
 „ - „ later beginning

Phenology

Automatic phenological observations

village 20 km from Poznan



Automatic phenological observations

Observed 6 wild plants:

- horse-chestnut (*Aesculus hippocastanum* L.)
 - black locust (*Robinia pseudoacacia* L.)
 - small-leaved lime (*Tilia cordata* Mill.)
 - dog rose (*Rosa canina* L.)
 - European larch (*Larix decidua* Mill.)
 - common lilac (*Syringa vulgaris* L.)
- and a cultivated field (2015: maize; 2016: winter triticale)

Automatic phenological observations

Filtr

Zakres zdjęć

Od 01/02/2014 00:00:00

Do 07/04/2014 23:59:59

Wybór sceny

Scena Grochodrzew

max. powiększenie
 średnie powiększenie
 szeroki kąt

Status zdjęć

Niezweryfikowane
 Zaakceptowane
 Odrzucone

Odśwież

Informacje o zdjęciu

Ogólne

Data
Gatunek
Scena
Kadr

Metadane

Komentarze

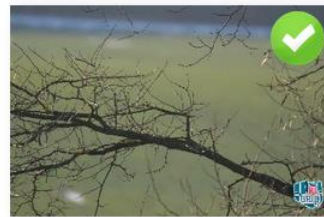
Tagi

Status

Przeglądarka zdjęć



Grochodrzew 03-02-2014 09:11:01



Grochodrzew 04-02-2014 09:11:43



Grochodrzew 04-02-2014 15:12:57



Grochodrzew 05-02-2014 09:13:29



Grochodrzew 05-02-2014 12:18:39



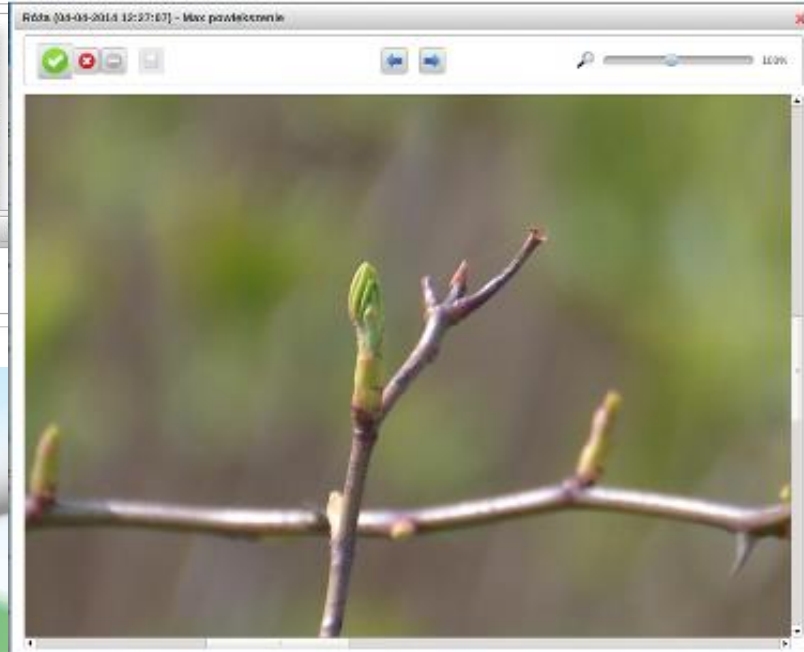
Grochodrzew 06-02-2014 09:10:38



1 2 3 4 5 6 7 8 9 10

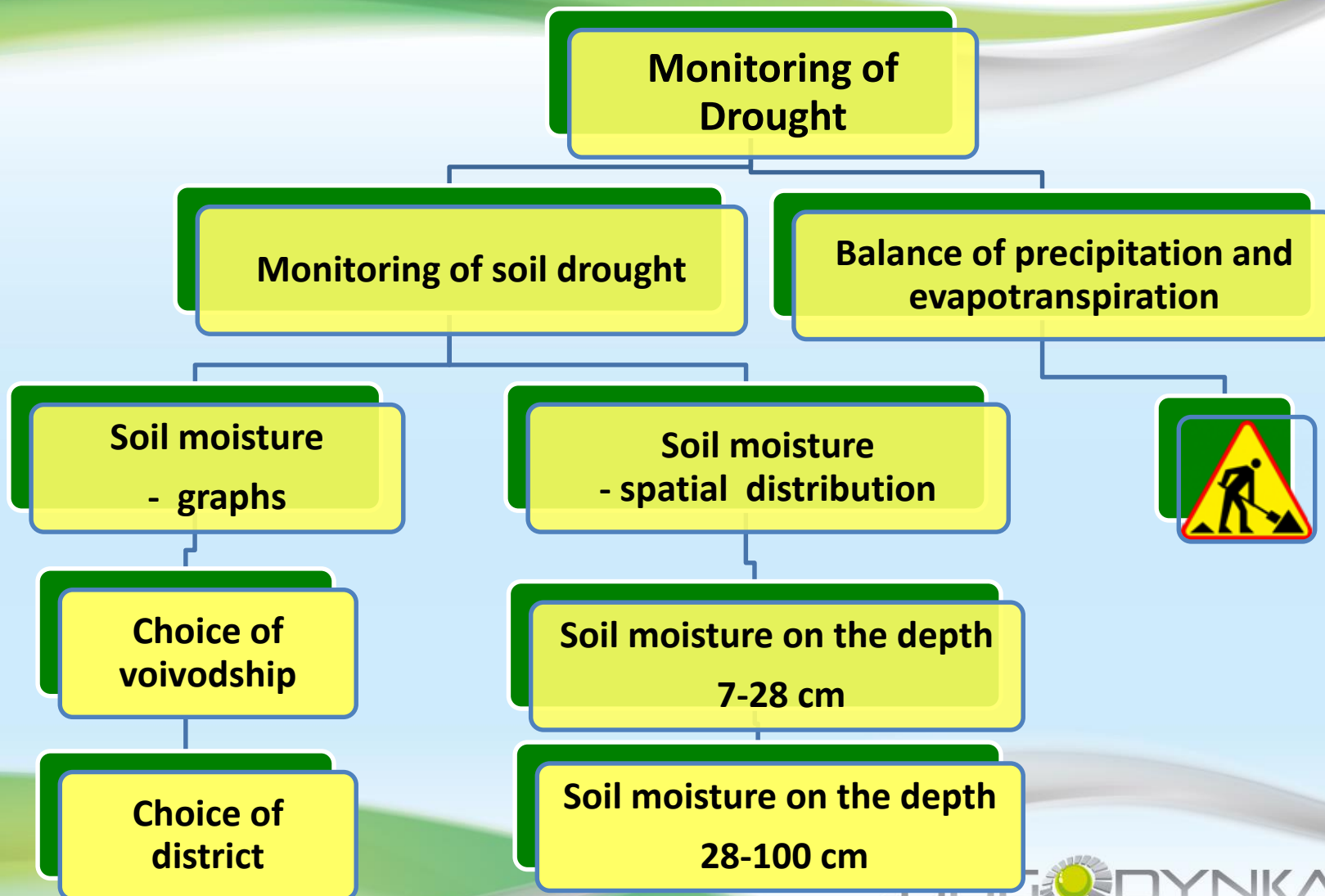
Zapisz

Zasilane przez [Liferay](#)

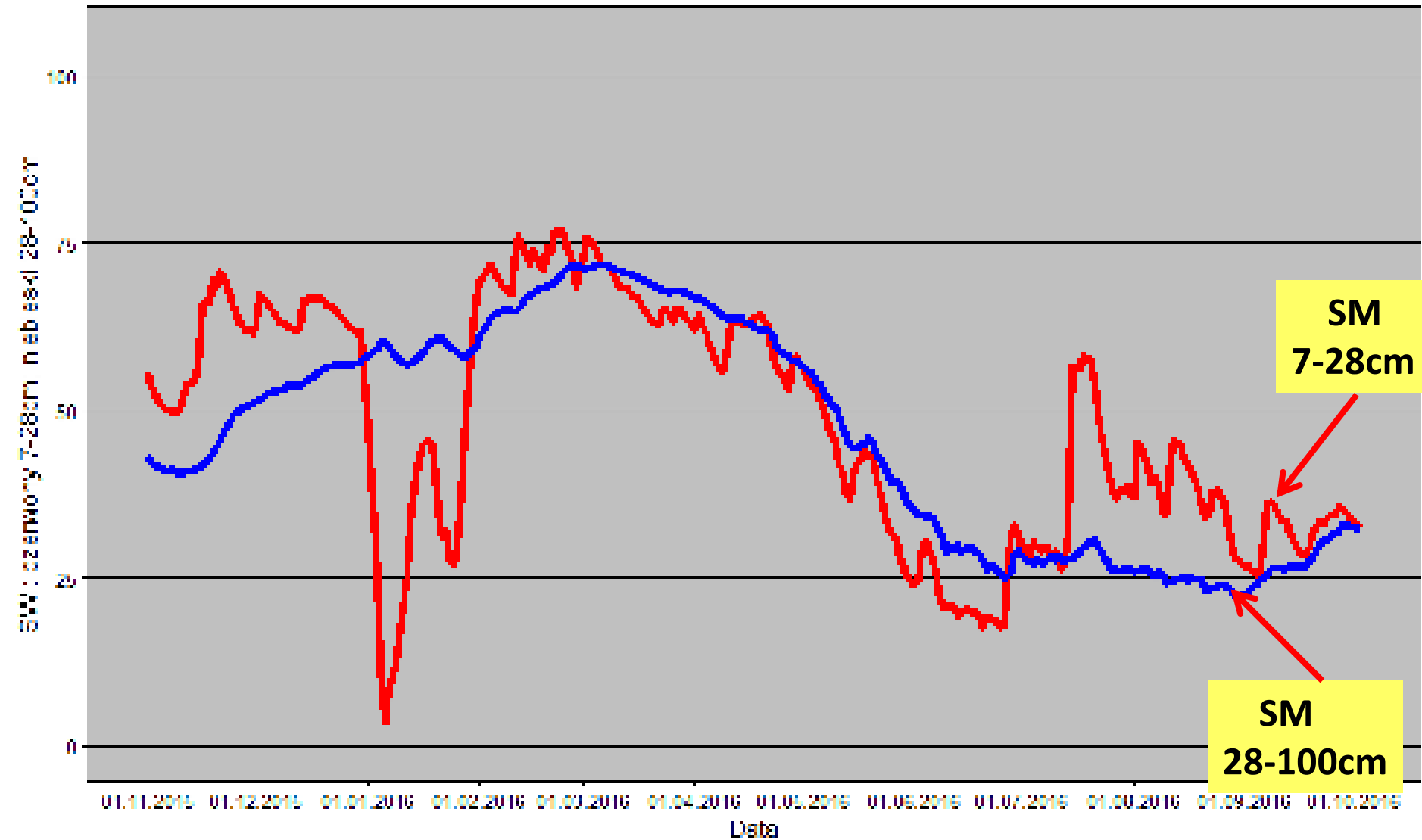


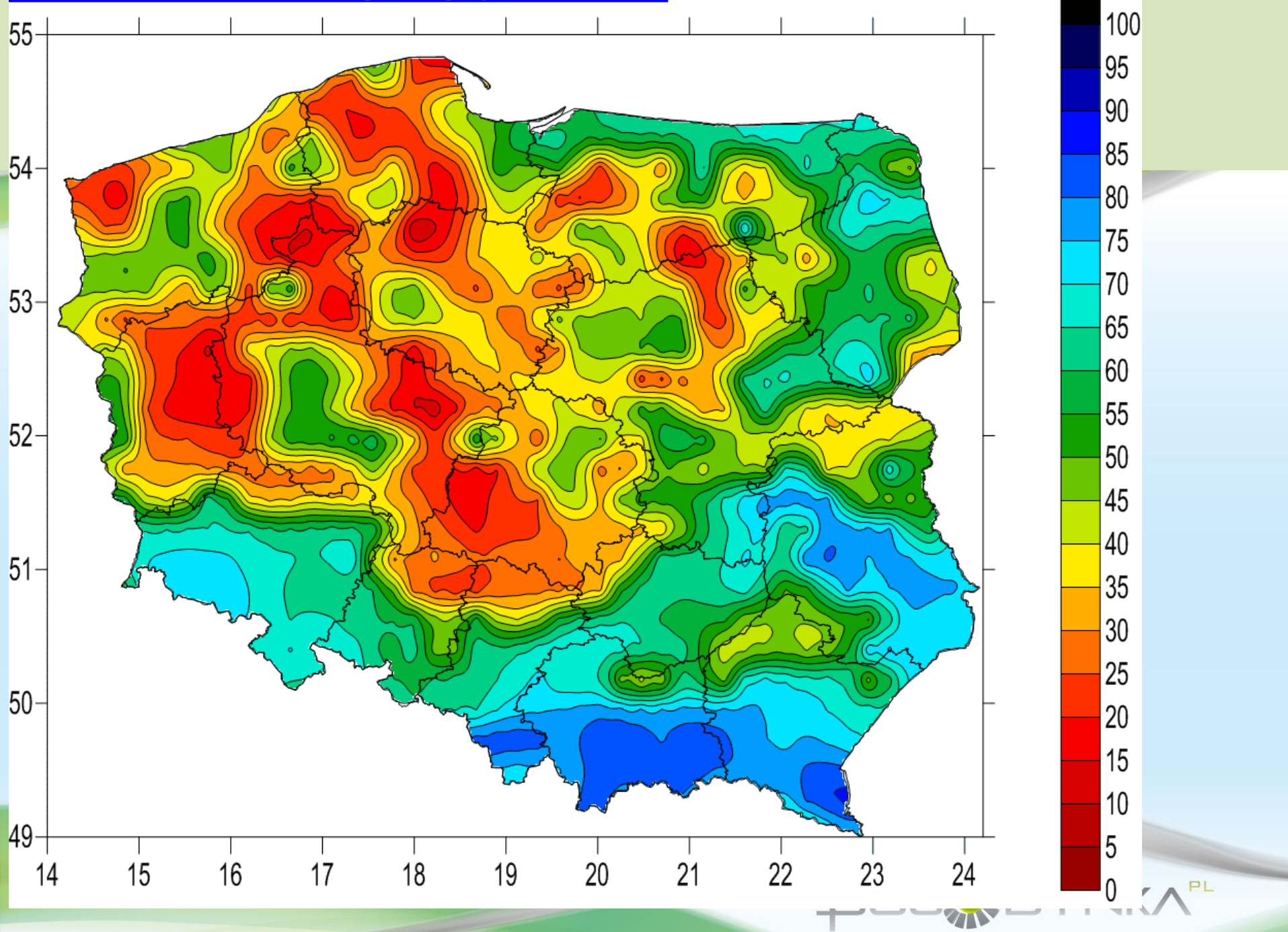


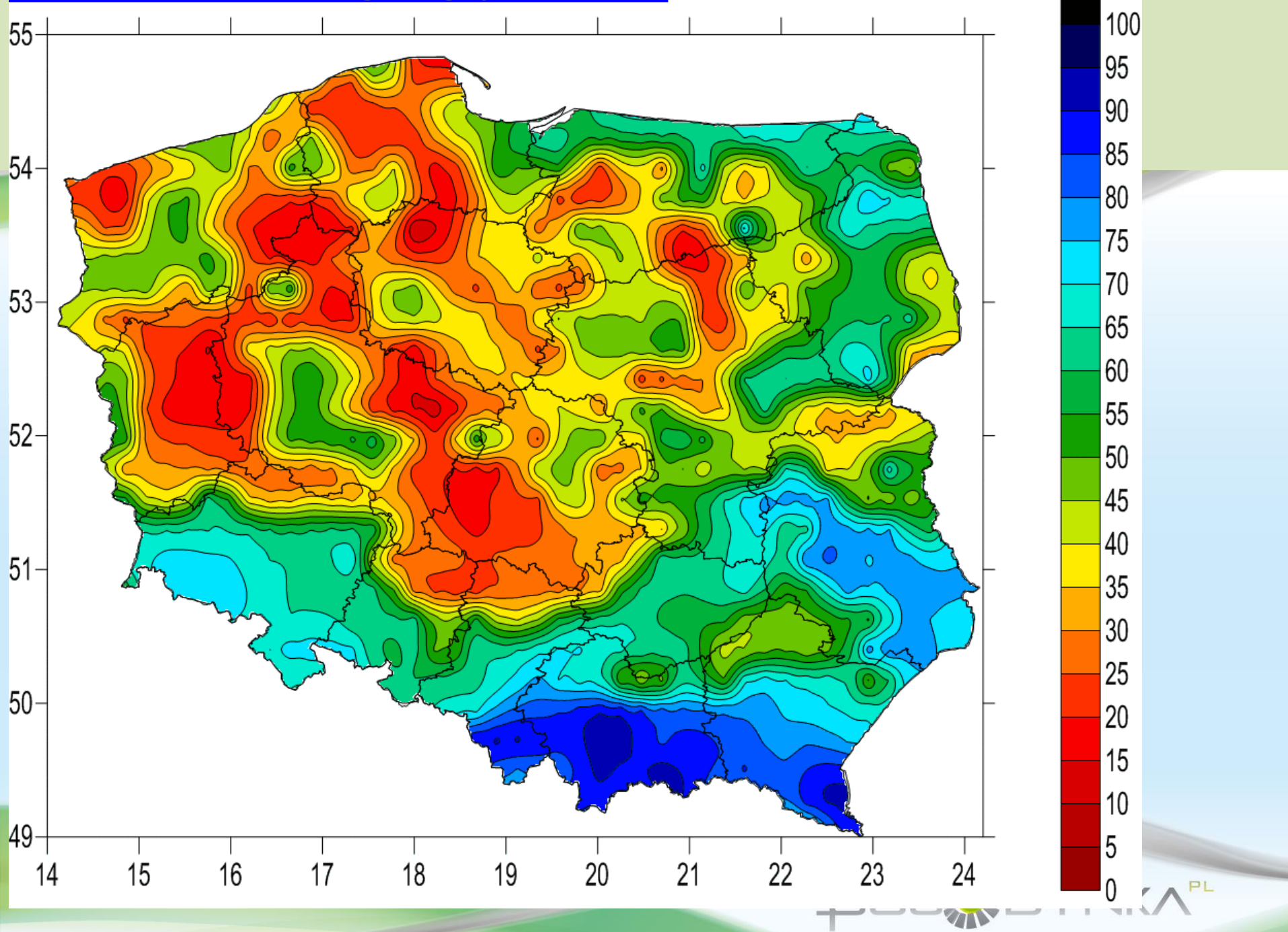
Plans for future (just in preparation!)

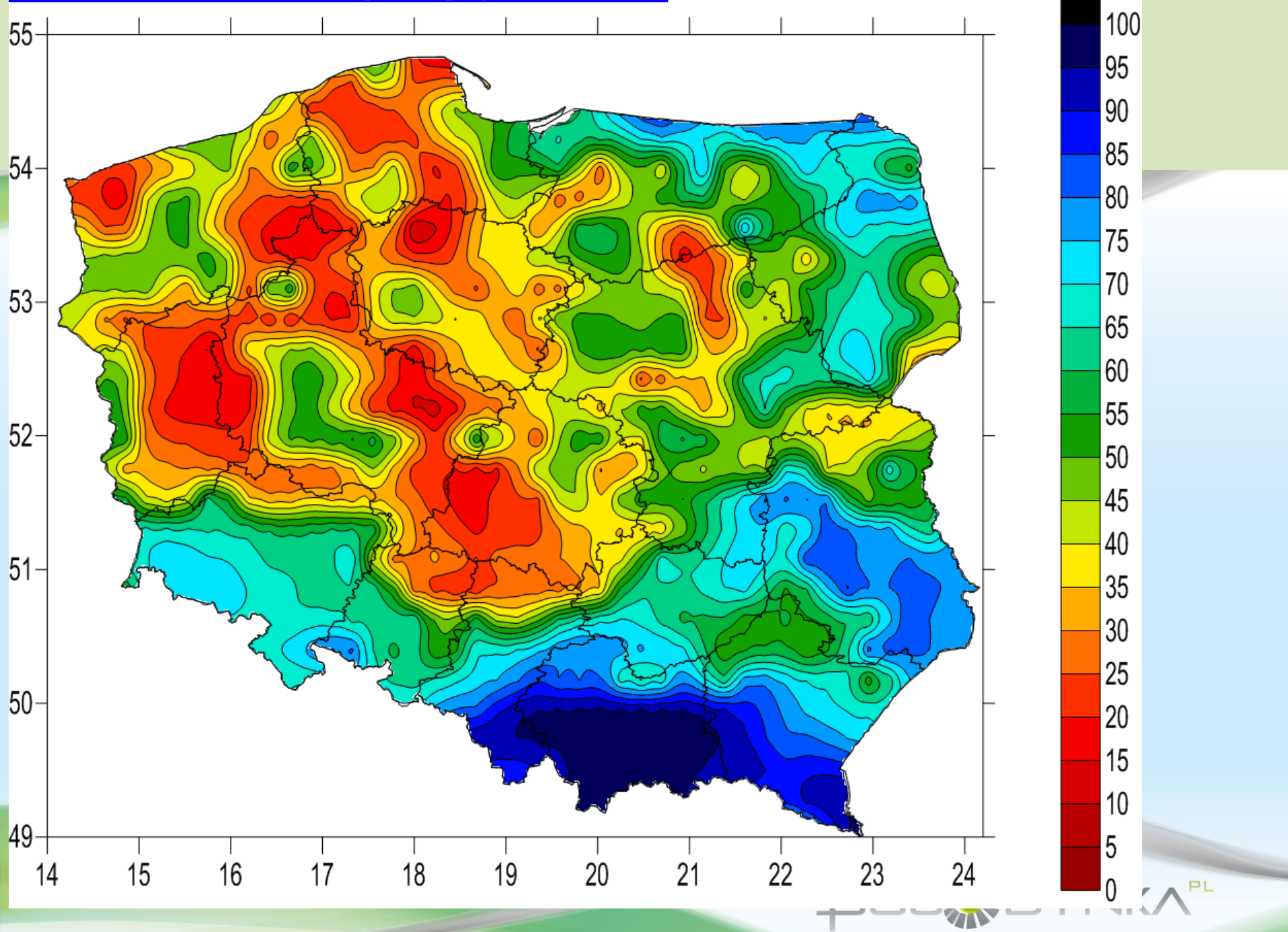


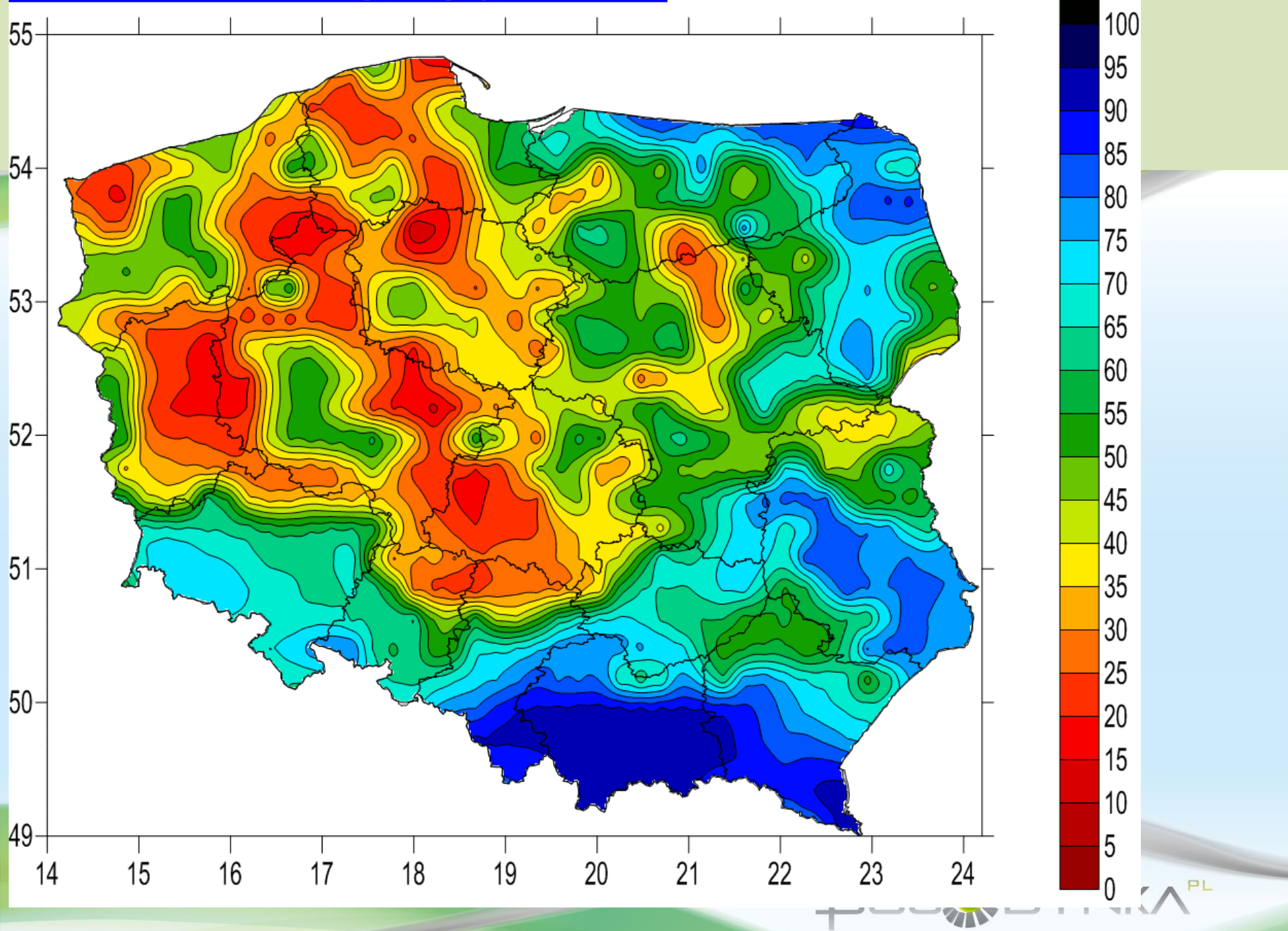
Soil moisture – Graphs an example for 2016 – Opoczno district

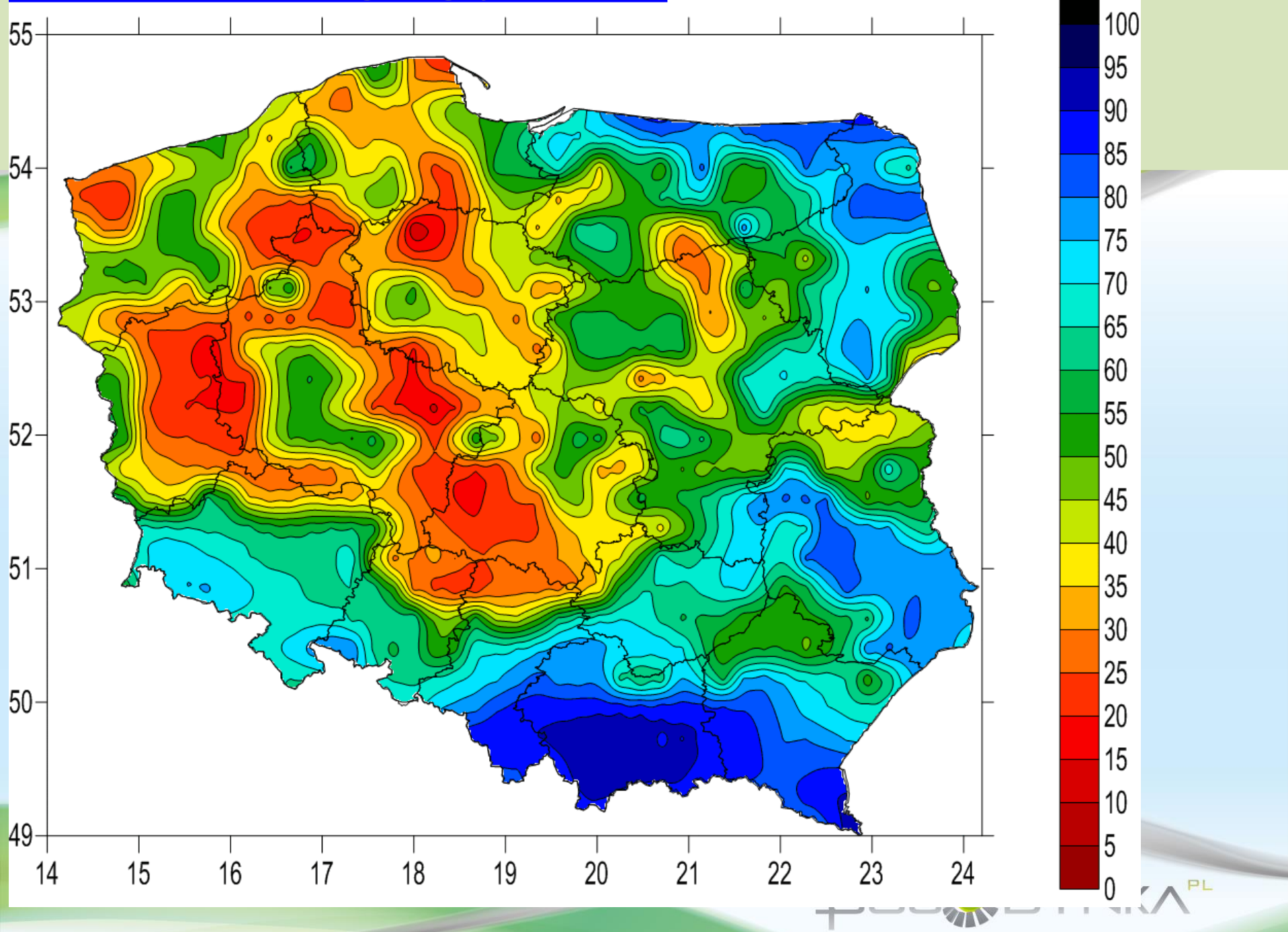


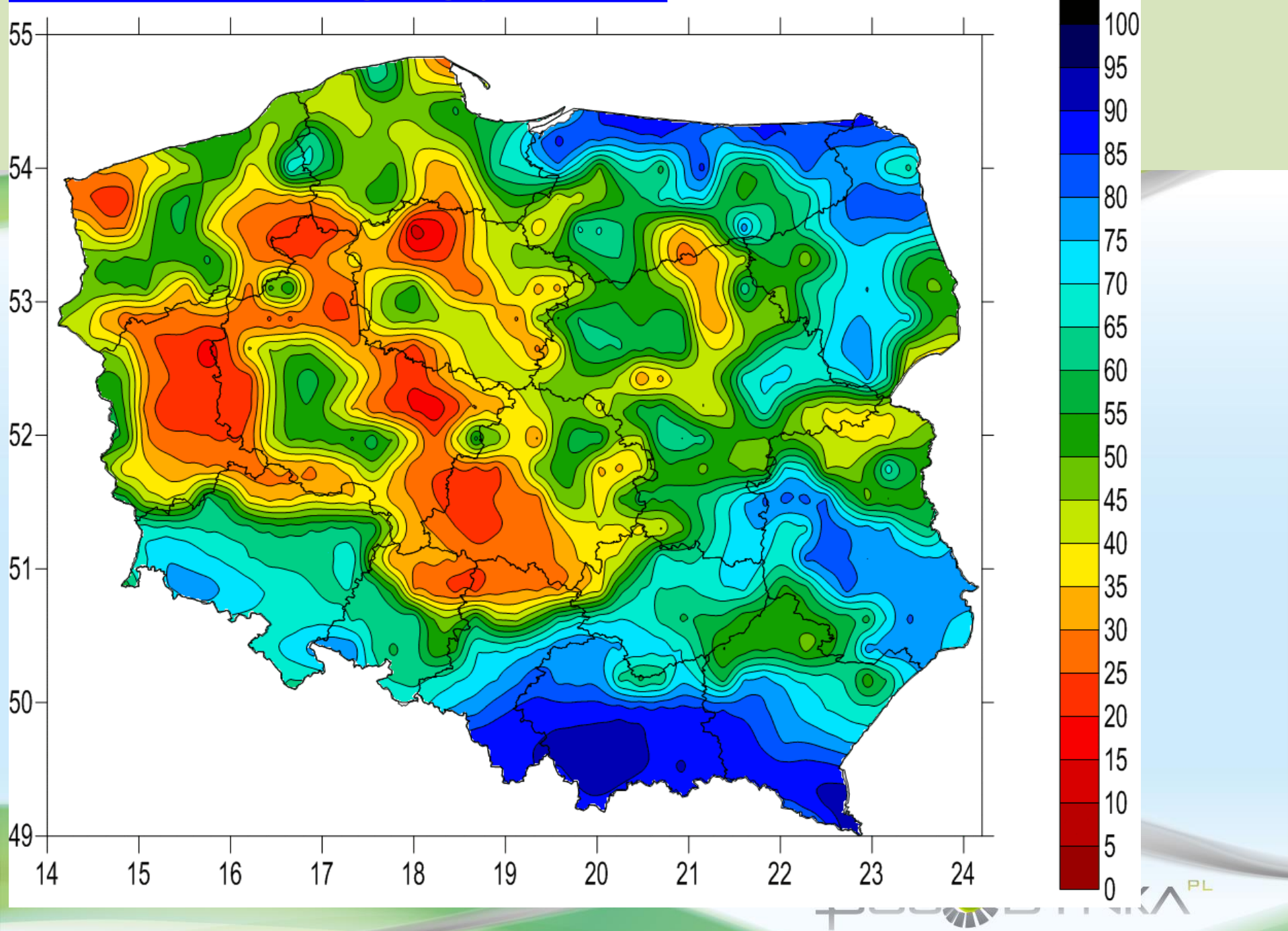


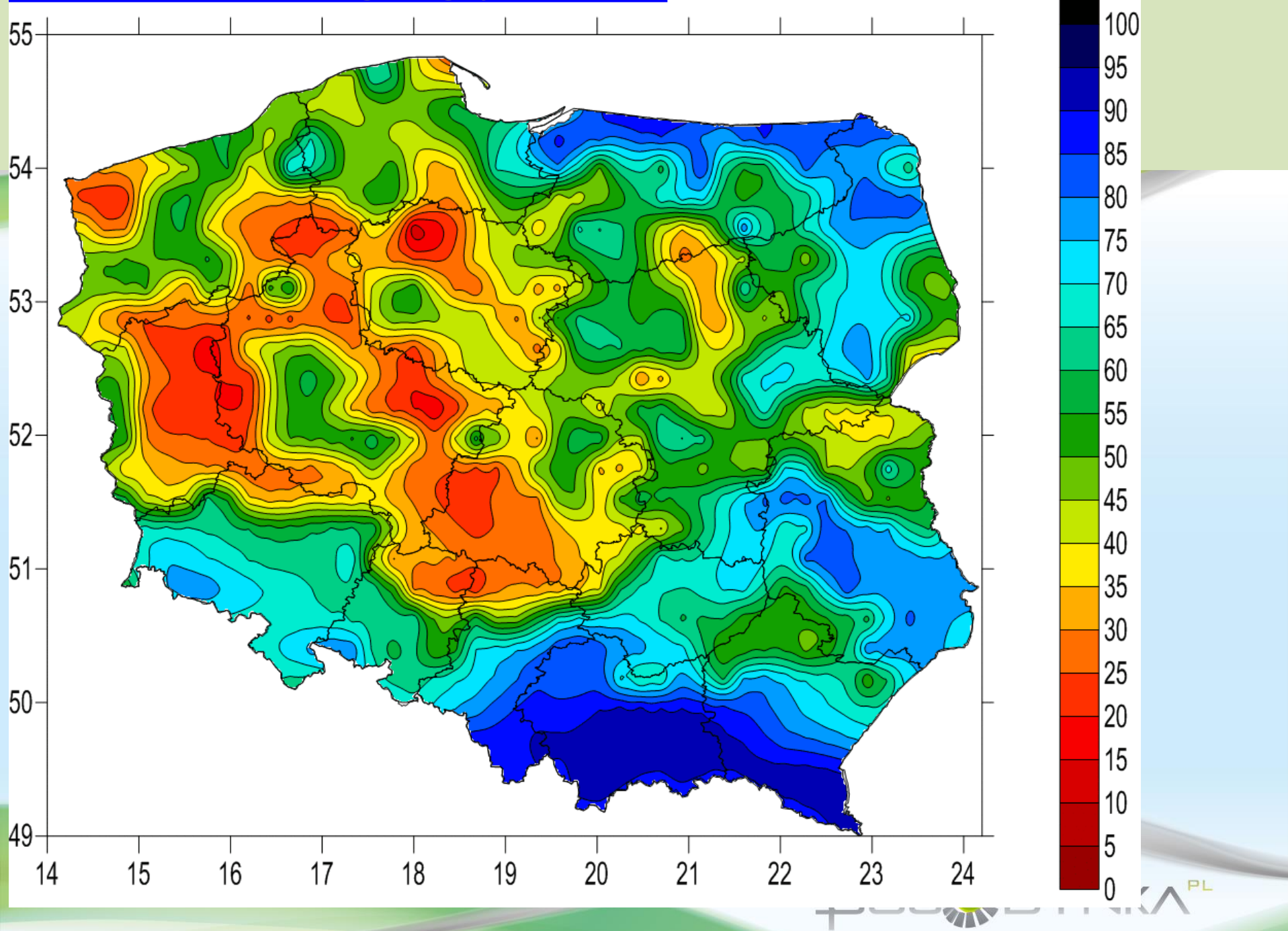


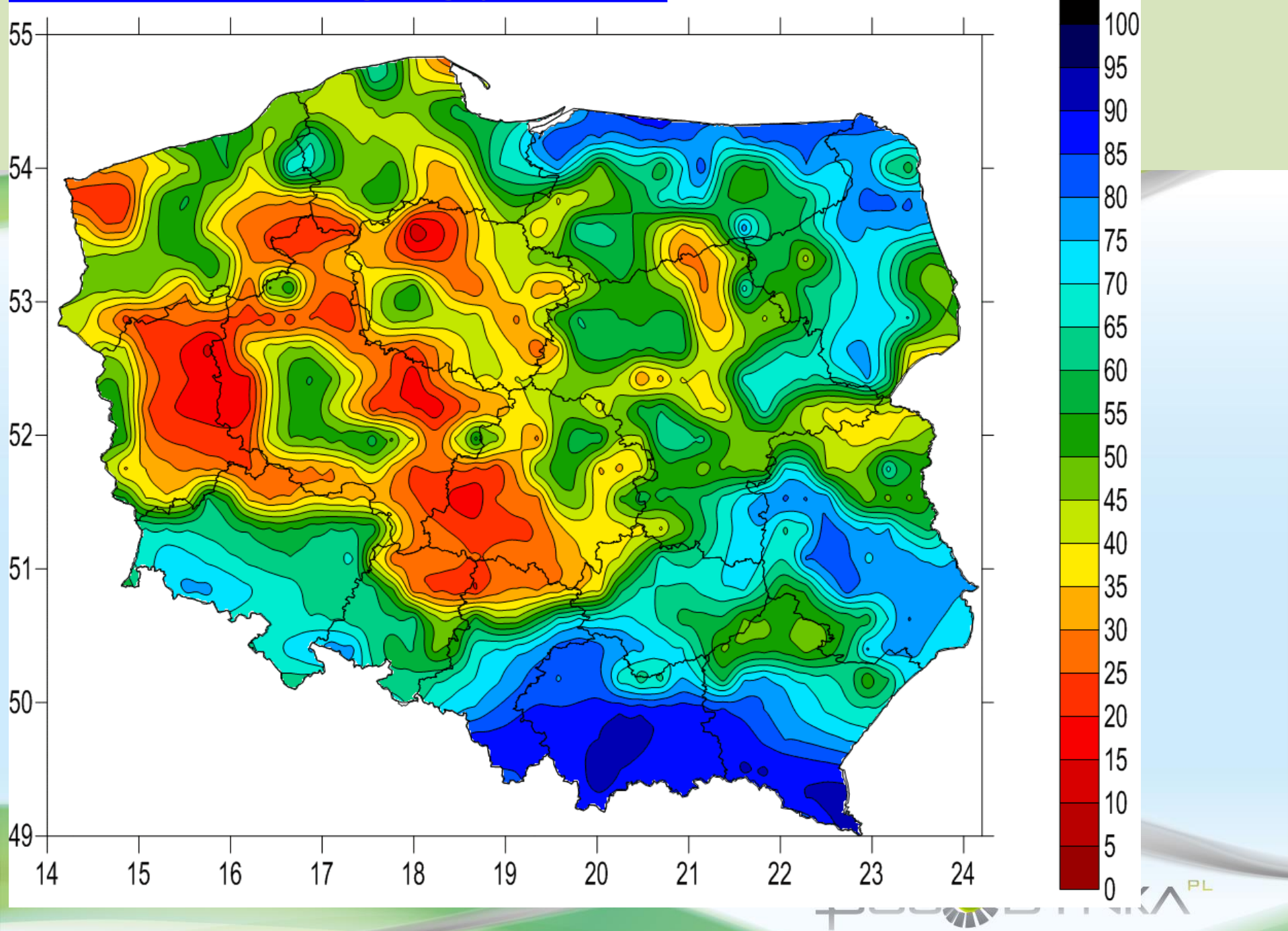


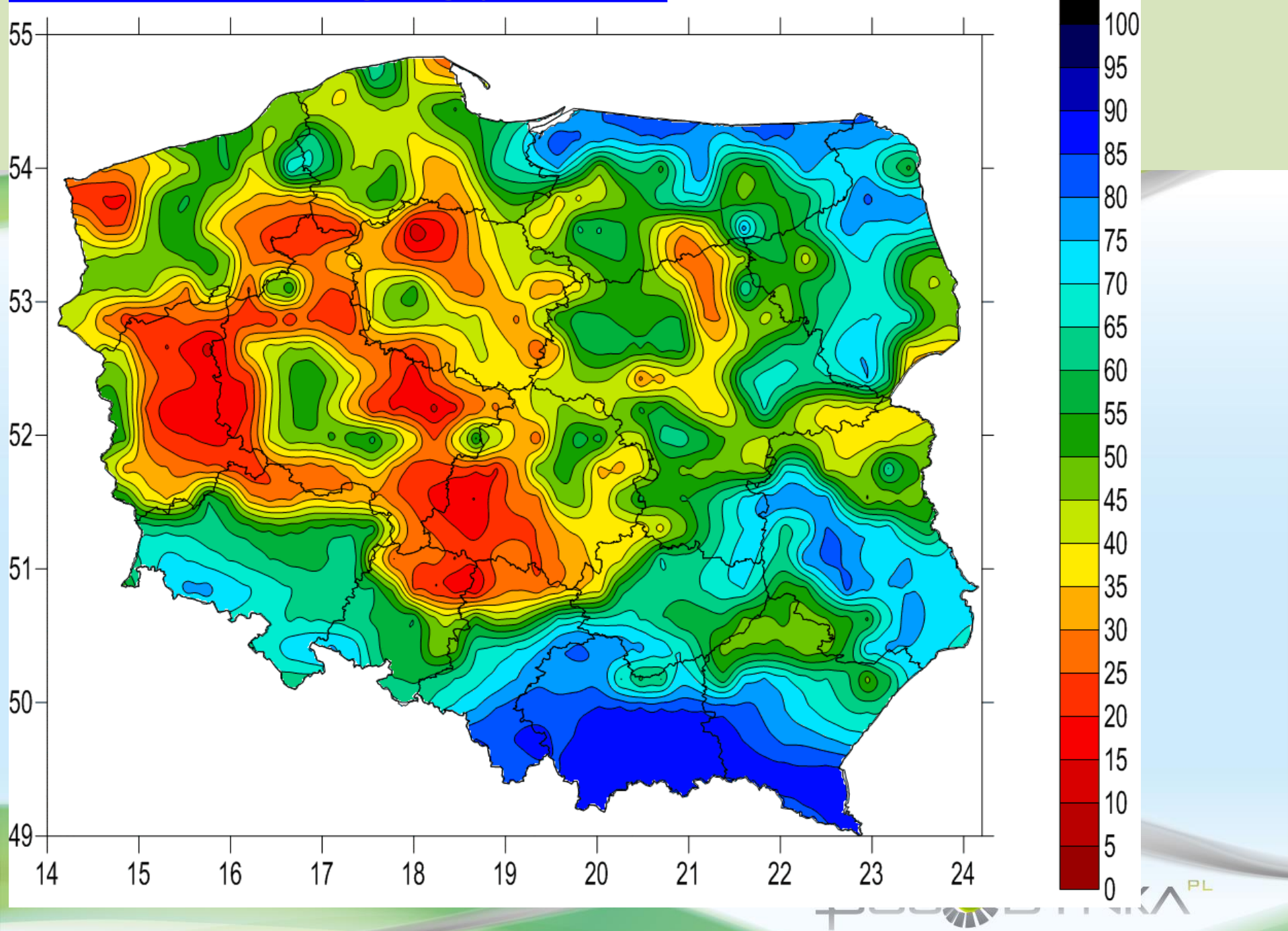


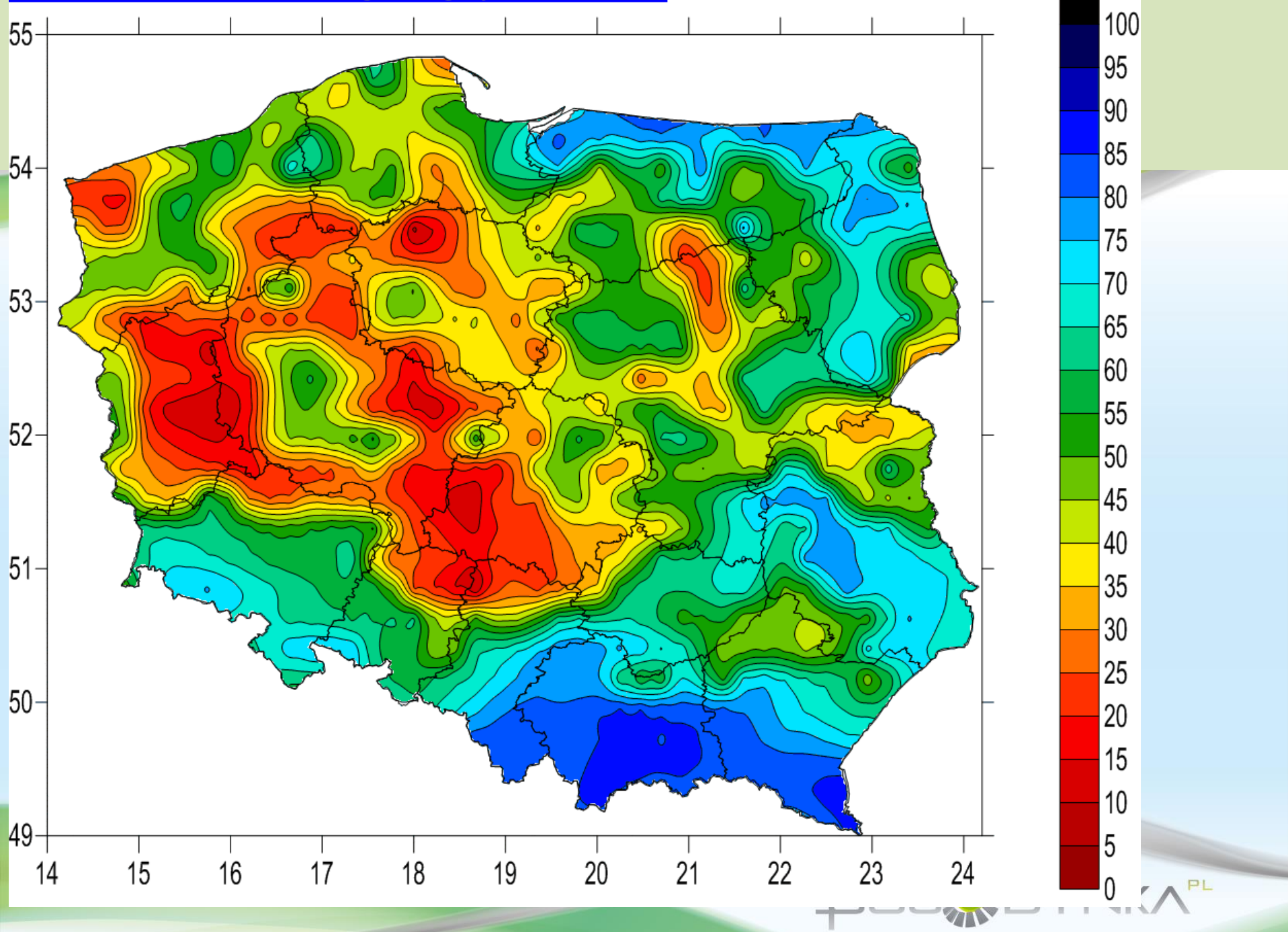






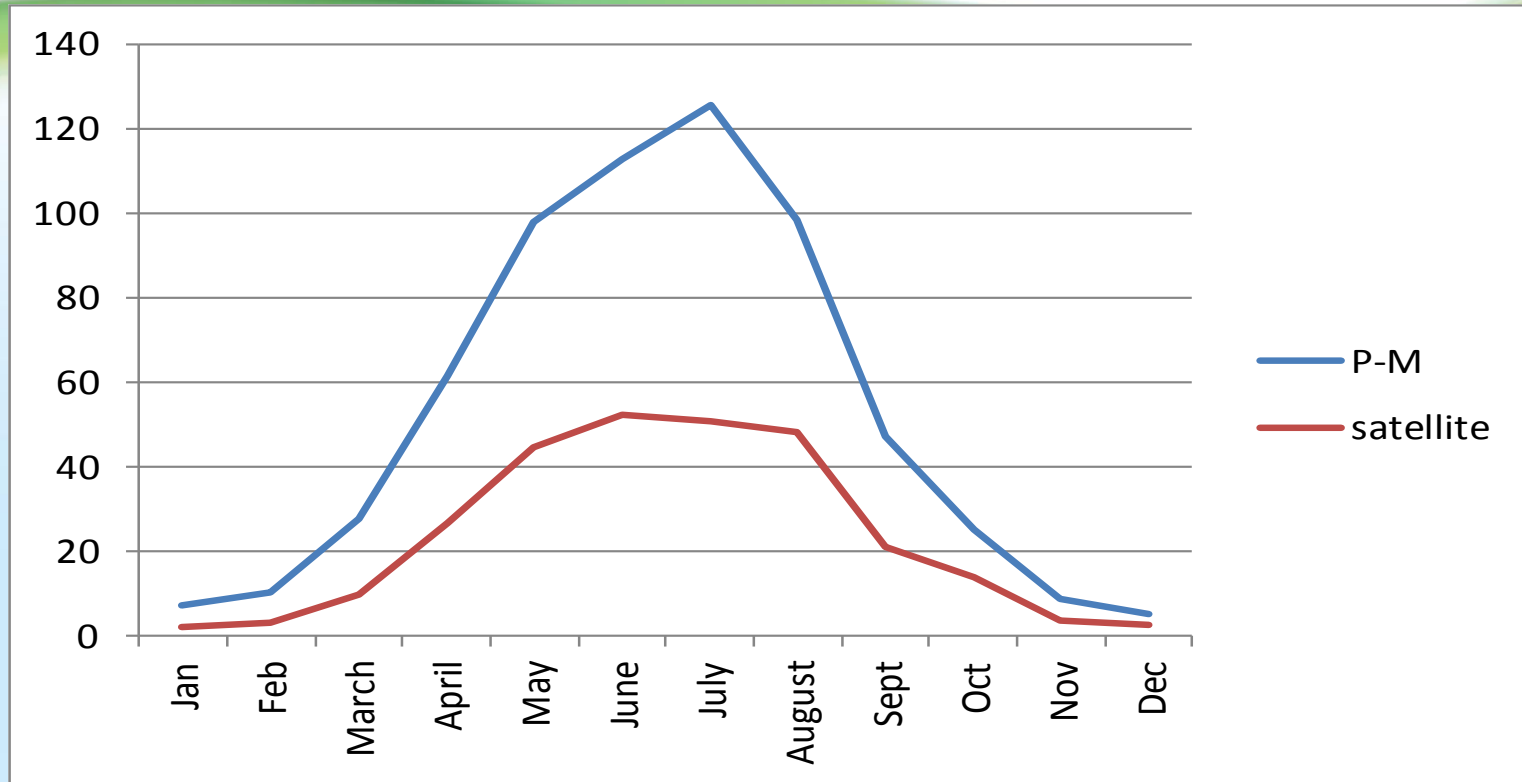






Plans for future

Balance of precipitation and ACTUAL evapotranspiration



Actual evapotranspiration during summer months in Poland in 2015 was significantly lower than potential evapotranspiration.

It was result of the severe drought which occurred in Poland in 2015. In such conditions, the amount of the available water for evaporation and transpiration is very low and the total sum of the evapotranspiration is much lower than calculated from Penman-Monteith formula.

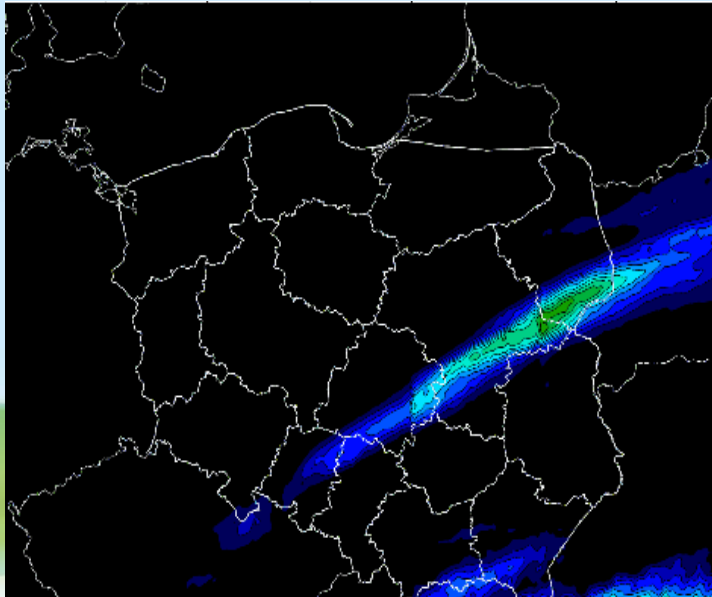
Plans for future

Balance of PRECIPITATION and actual evapotranspiration

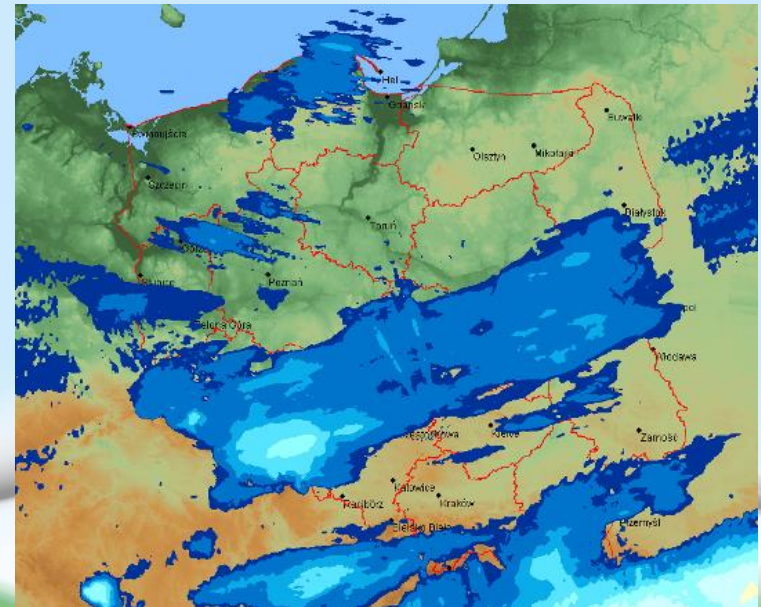
Values of the precipitation measured on meteorological stations, usually are lower than the real amount of rain/snow. Information from satellites also has not very good quality.

The new **blended precipitation product** of IMGW-PIB, called „**Rain GRS**”, could be the good alternative solution to the balance calculation.

Sum of 3-hours rain from satellite picture (left) and from GRS product (right). It is evident that satellite data show too lower values of rain in that and many other cases.

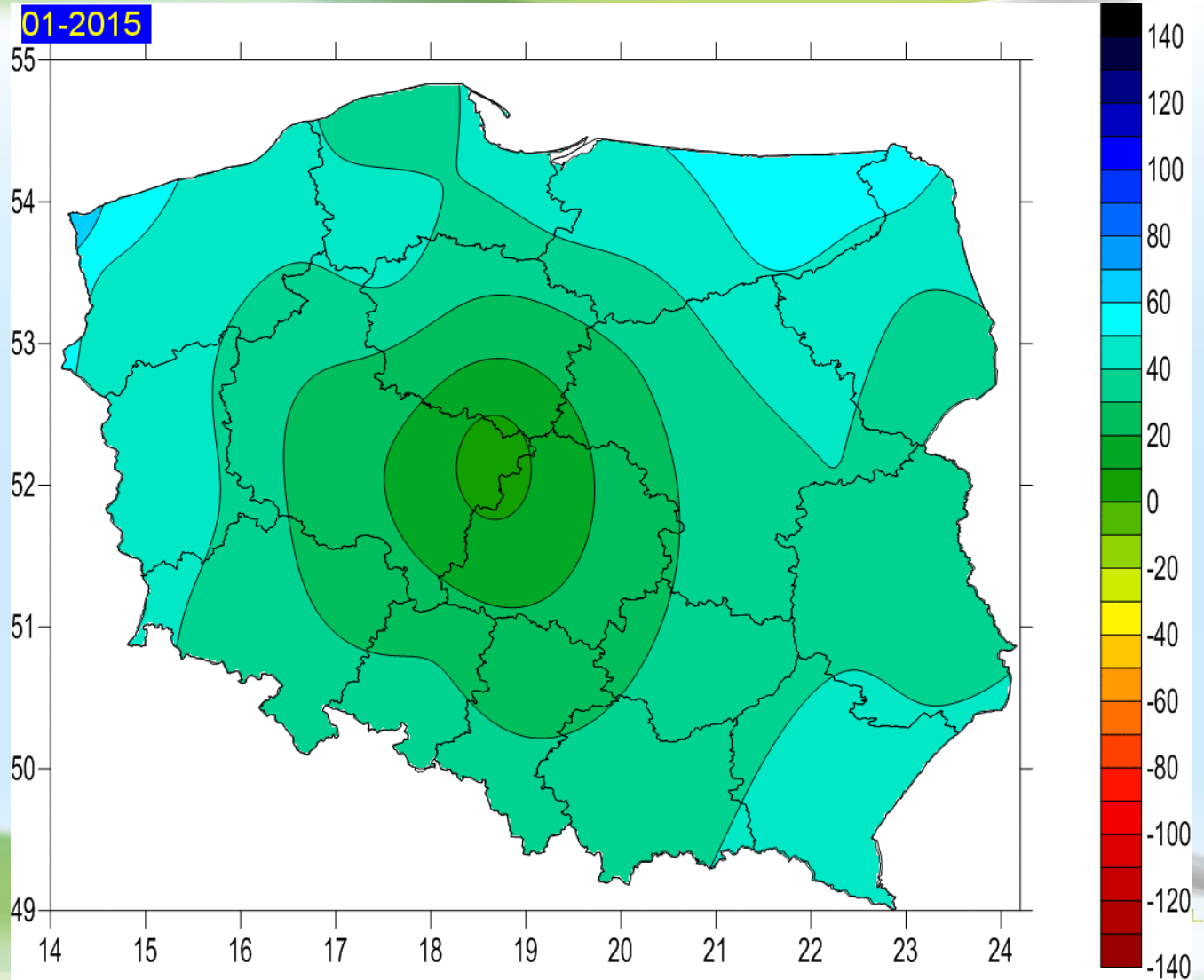


other cases.



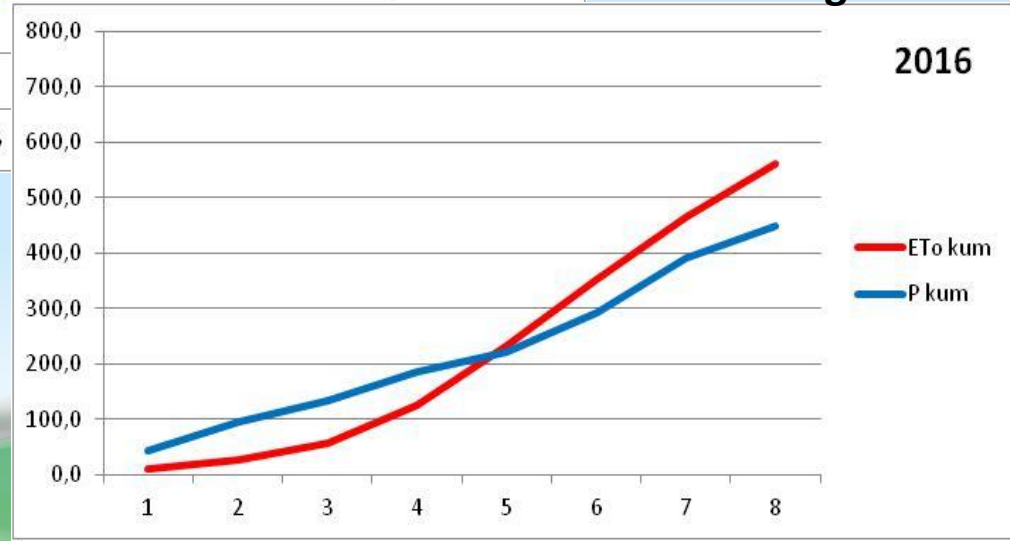
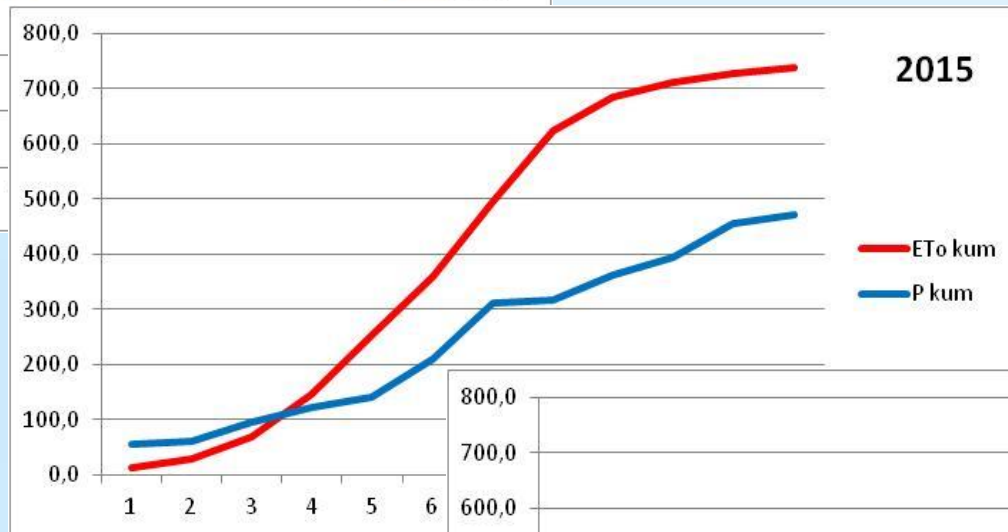
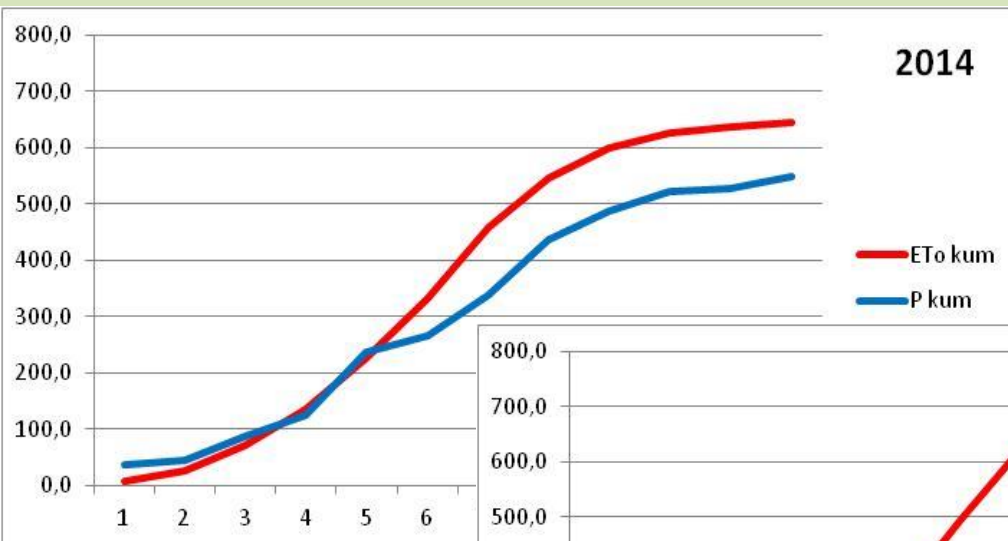
In preparation

Balance of precipitation and actual evapotranspiration



Plans for future

Balance of precipitation and potential evapotranspiration



data till Aug 2016



Institute of Meteorology and Water Management
National Research Institute

THANK YOU
FOR YOUR ATTENTION

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