



Drought Risk and Drought Risk Management in Romania and in Europe

October 31st, 2023

DROUGHT MONITORING IN ROMANIA



METEO ROMANIA

Daniel ALEXANDRU
National Meteorological Administration, Bucharest

AGROMETEOROLOGY
DEPARTMENT



WHO WE ARE?

National Meteorological Administration is the national authority in the meteorological field in Romania, with a **continuous service since 1884**. NMA is subordinated to the Ministry of Environment and Forests (MEF), functioning on the basis of Law 216/2004.

- ⑩ The National Meteorological Observation Network within the NMA is made up of **7 Regional Meteorological Centers** / RMC.
- ⑩ Romania is a **founding member** of the **International Meteorological Organization** (IMO), and beginning with **1948** it has become a full member of the World Meteorological Organization (WMO).

⑩ <http://www.meteoromania.ro/>

THE NATIONAL AGROMETEOROLOGY NETWORK in ROMANIA 7 REGIONAL METEOROLOGICAL CENTERS

- 7 Regional Meteorological Centers;
- 68 agrometeorological stations
- phenological observations and soil moisture measurements (winter wheat, maize, sunflower, rape, fruit trees and vines).

OLTENIA

DOBROGEA

MOLDOVA

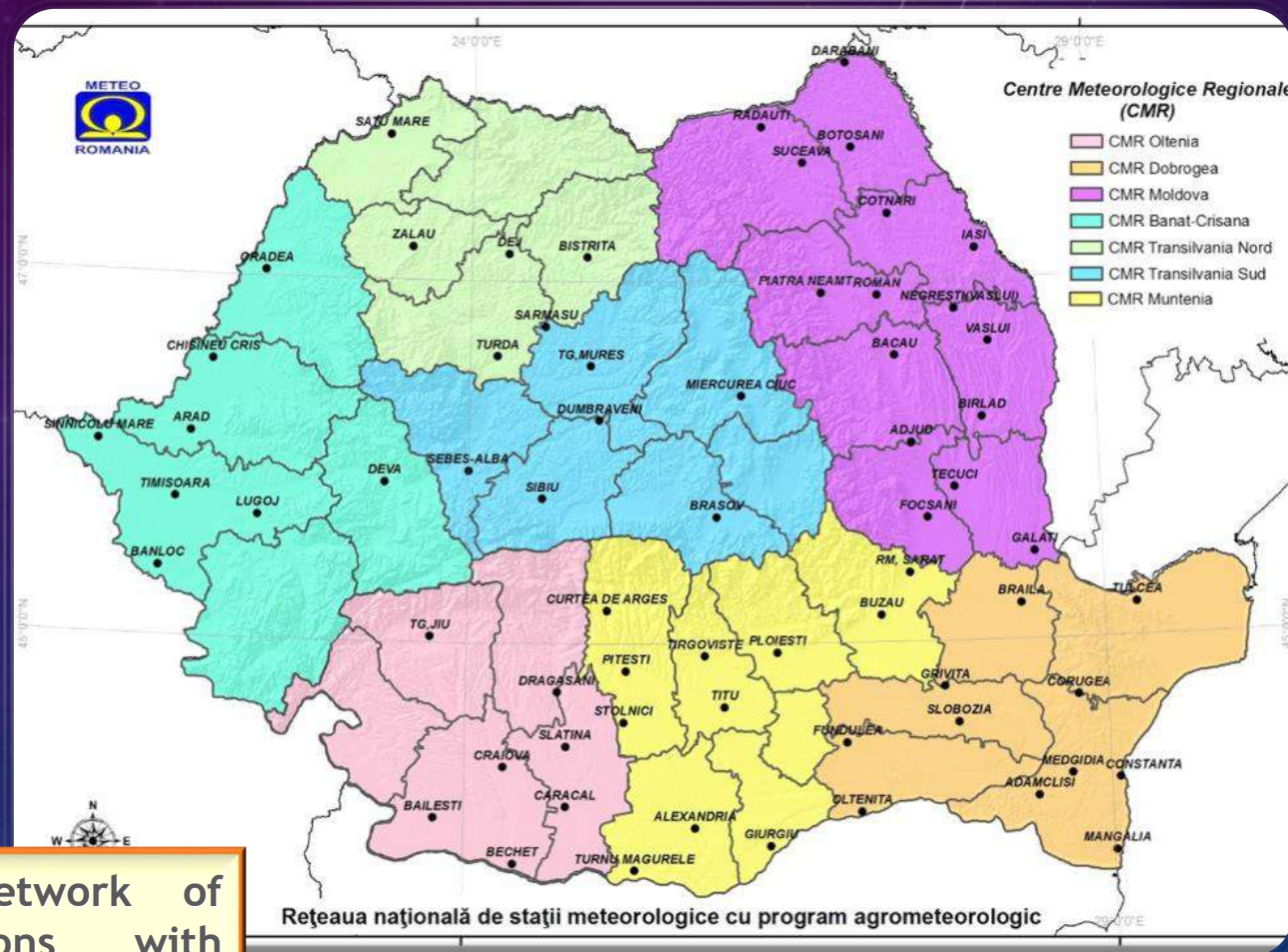
Transilvania
Nord

Banat-
Crisana

Transilvania
Sud

MUNTENIA

In Romania, the network of meteorological stations with agrometeorological program operates according to the recommendations of W.M.O. and is administered by the National Meteorological Administration.



Daily agrometeorological prognosis / diagnosis, weekly, monthly and seasonal

Parameters and maps of thermal vulnerability and risks at national level, regional / local (*soil and air temperature, cold/frost units, intensity and duration of the scorching heat, etc.*)

Indicators of water stress at national, regional and local level (ETP, relative air humidity, rainfall, etc.)

Aridity indices (standardized for the National Agrometeorological Network)

Weekly Agrometeorological bulletin includes specific information (*precipitation, ETP, soil moisture, crop water requirement*) useful for assessing the occurrence of drought

Specialized agrometeorological studies

Soil moisture maps, weekly agrometeorological information and seasonal forecasts which are updated daily according to the operational activity are made available to the public on the **NMA website** (www.meteoromania.ro)

WHAT WE DO?



HOW WE DO?



ROMANIAN NATIONAL AGROMETEOROLOGICAL MONITORING NETWORK

ROMANIAN AGROMETEOROLOGICAL PLATFORMS

- IN – SITU SOIL MOISTURE MEASUREMENTS
- PHENOLOGICAL OBSERVATIONS OF CROPS
VEGETATION PHASES ROMANIAN
AGROMETEOROLOGICAL PLATFORMS

Agro-meteorological data and the specific phenological observations are used for the current agro-meteorological service, and for agro-meteorological data of The National Meteo Data Base for the purpose of their use in scientific research works and specific projects.

Agrometeorological Products

Thermal indicators



Winter severity



Spring index



Heat intensity



The first frost in the autumn (production date)



The last spring frost date (production date)

The specific thermal parameters necessary to assess the influence on the vegetation conditions of winter wheat and maize crops, were studied in direct correlation with plant water requirements, specific phases and interfaces.



Agrometeorological Products

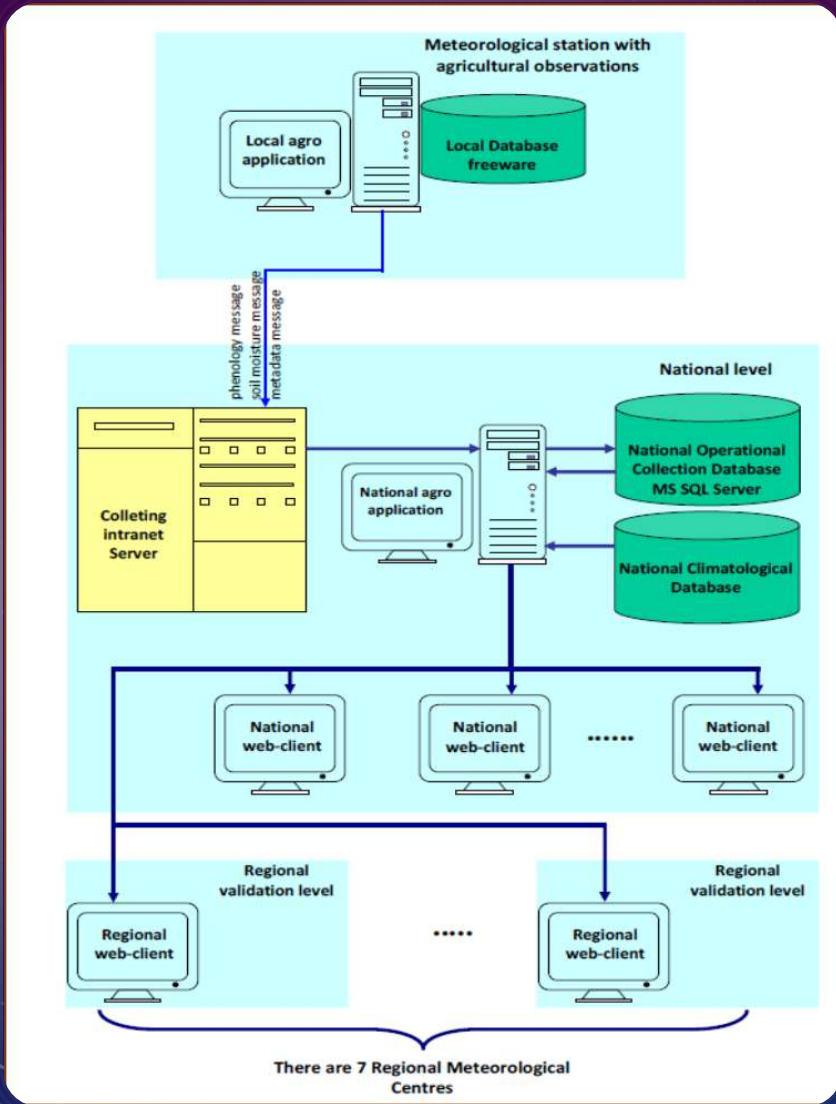
Water indexes

SOIL MOISTURE RESERVE (m³/ha)

RAINFALL AT INTERVALS OF AGRICULTURAL INTEREST

REFERENCE EVAPOTRANSPIRATION





NATIONAL AGROMETEO DATA PLATFORM

Local level /
agrometeorological
station – metadata

National level –
web application

**Agrometeorological
monitoring & data
validation at 7 regional
centers**
friendly web interface

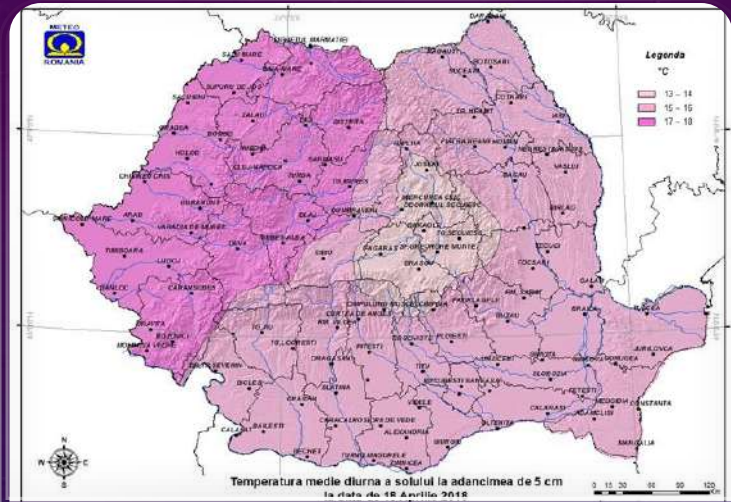
**Romanian National
AGROMETEO Data Platform**

**80 Agrometeorological
parameters and indices**

ANEXA 03 - Lista minimală indici care trebuie să fie calculați de Aplicația Națională

| NR | NUME | UM | FREQV. | dase intrare | formula/algoritm de calcul |
|----|--|-------|--------|--|--|
| 1 | Evapotranspiratia potentiala (ETP) | mo/ha | zilnic | Temperatura maxima a aerului Temperatura minima a aerului Umiditatea relativa a aerului Viteza vantului Durata de stralucire a Soarelui altitudinea stabei | |
| 2 | Evapotranspiratia reala (ETR) | | zilnic | Coefficientul de cultura-Kc (functie de faza de vegetatie a culturii) Evapotranspiratia potentiala (ETP) | ETR=ETP*Kc |
| 3 | Umiditatea solului 0-20 cm (in functie de solul cultivat in platforma) (UmidCalc) | mo/ha | zilnic | Precipitatii zilnice/interval (pp) Coeffcientul de infiltrare al solului (C.Inf) Evapotranspiratia potentiala (ETP) Evapotranspiratia reala (ETR) Umiditatea solului 0-20 cm la un moment de timp imediat anterior UmidCalc | UmidCalc=IF([UmidCalcIn]-[pp]*C.Inf.'*10); [ETR]*10]-0;[UmidCalcIn]-[pp]*C.Inf.'*10]; [ETR]*10]-0) |
| 15 | Suma din temperatura maxima a aerului >32°C, 01 iunie-31 august (unitati arsite) | °C | zilnic | temperatura maxima a aerului (Tmax) | $\sum_{T_{max} > 32} T_{max}$ |
| 16 | Numarul de zile cu temperatura maxima a aerului >32 (01 iunie-31 august) | | zilnic | temperatura maxima a aerului | |
| 17 | Numar de zile consecutive (minim 5 zile) cu temperatura maxima a aerului >32 (01 decembrie-28 februarie) | | zilnic | temperatura maxima a aerului | |
| 18 | Suma din temperatura minima a aerului <-10 (01 decembrie-28 februarie) | °C | zilnic | temperatura minima a aerului (Tmin) | $\sum_{T_{min} < -10} T_{min}$ |
| 19 | Numar de zile cu temperatura minima a aerului <-10 (01 decembrie-28 februarie) | | zilnic | temperatura minima a aerului | |
| 31 | Suma decada pozitiva (SDP) | °C | zilnic | temperatura maxima aer (Tmax) temperatura minima aer (Tmin) | $\sum_{(T_{max}+T_{min}) > 0} (T_{max}+T_{min}) / 2$ unde decada I cuprinde zilele 01 ... 10 unde decada II cuprinde zilele 11 ... 20 unde decada III cuprinde zilele 21 ... ultima zi a lunii |
| 32 | Suma lunara pozitiva (SLP) | °C | zilnic | temperatura maxima aer (Tmax) temperatura minima aer (Tmin) | $\sum_{(T_{max}+T_{min}) > 0} (T_{max}+T_{min}) / 2$ ultima zi luna prima zi luna |
| 79 | SPEI | | zilnic | precipitatii (PP) evapotranspiratia potentiala (ETP) C0, C1, C2, D1, D2, D3 alfa, beta, gamma | SPEI=W/ (C0+C1*W+C2*W*W)/(1-d1*W+d2*W*W+D3*W*W*W) unde W=2*ln(P), daca P>0.5 W=-2*ln(1-P), daca P<0.5, iar SPEI se trece cu semn schimbat P=1/(1+power((alfa/pp-elp-gamma),beta)) |
| 80 | DVI | | zilnic | SPEI unitati arsite umiditate a solului | dvi=(if(unitati_arsita<10,0;if(unitati_arsita<31,1;if(unitati_arsita<51,2,3))) + (spei<-0.99,0,(spei<-1,1),(spei<=-2,2,3))) + if(umiditate_sol<35,3,(if(umiditate_sol<65,2,(if(umiditate_sol<100,1,0))))/3^3) |

27



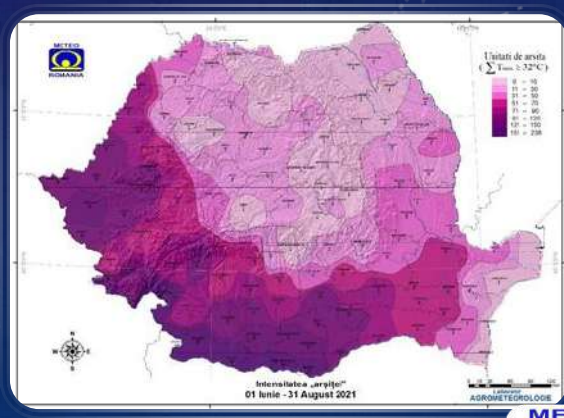
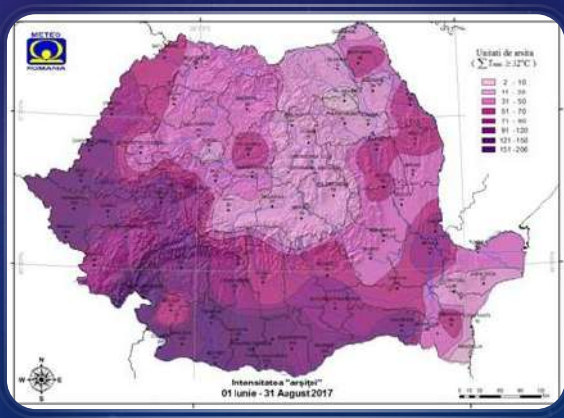
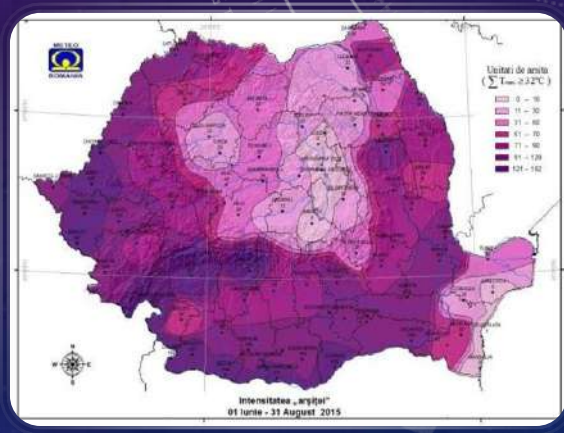
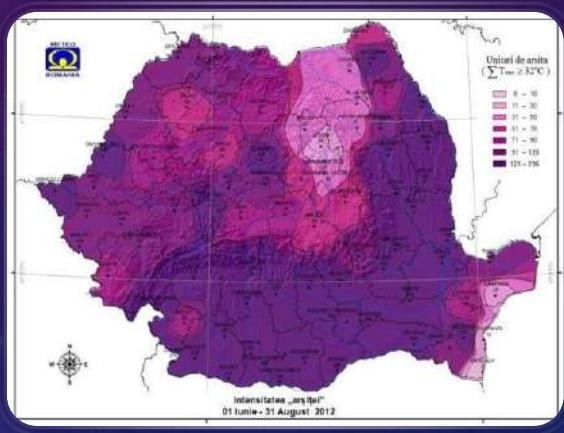
AGROMETEOROLOGICAL MONITORING INDEXES

Average daily soil temperature at 5 and 10 cm depth

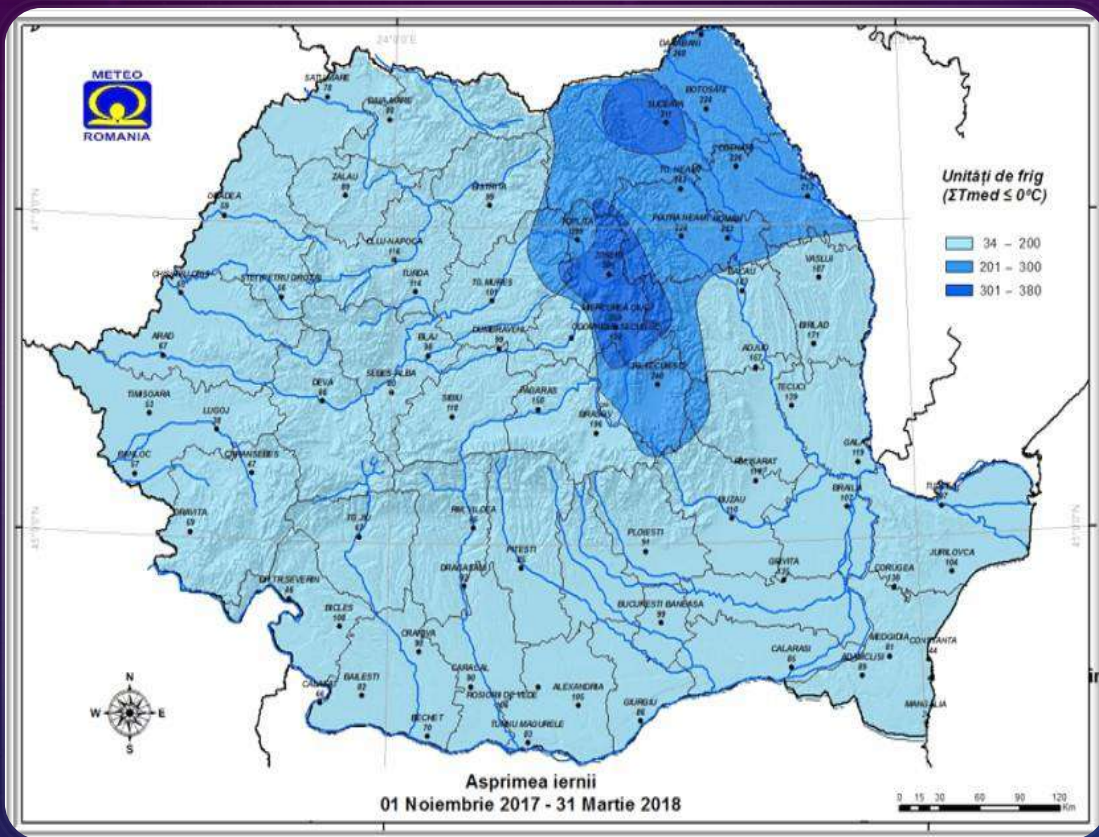
- Average daytime temperatures were generally favorable for further sowing of sowing crops (sunflower, corn, potato, sugar beet) and for sprouting germination in species sown until that date.



AGROMETEOROLOGICAL MONITORING INDEXES SCORCHING HEAT ($\Sigma T_{MAX} \geq 32^{\circ}C$)



AGROMETEOROLOGICAL MONITORING INDEXES WINTER SEVERITY



Assessment of wintering conditions of autumn species.

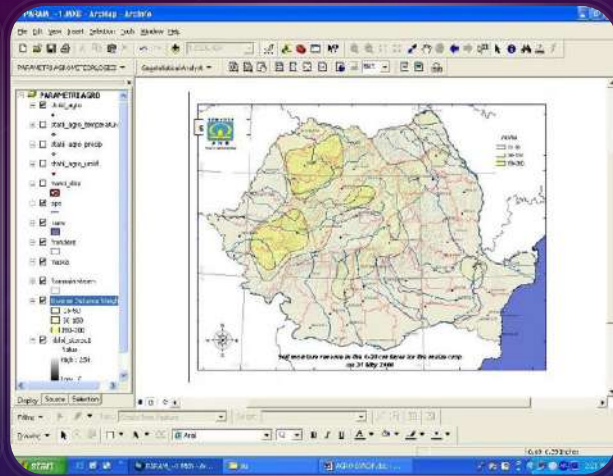
Agro-meteorological parameter characterizing the cold season.

The average daily negative air temperature ($\Sigma T_{med} \leq 0^{\circ}C$ / "cold units").

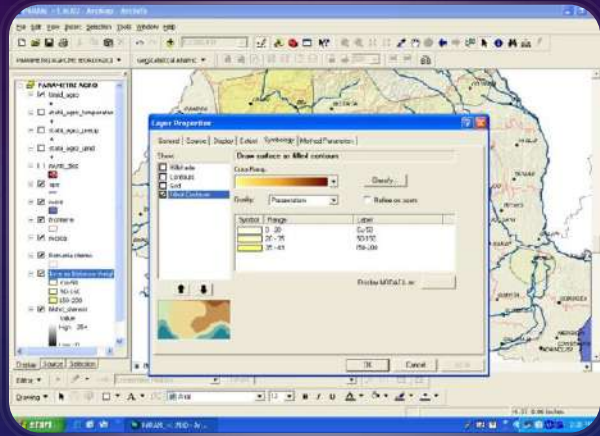
mild winter / <200 "cold units" / low intensity;

➤ **normal winter** / 201-300 "cold units" / moderate intensity;

➤ **cold winter** / 301-380 "cold units" / high intensity.



NATIONAL AGROMETEORO DATA PLATFORM



MODULE /
Soil moisture

IN-SITU MEASUREMENTS SOIL MOISTURE

For the purpose of continuous monitoring of the soil moisture status of the agricultural areas of Romania, **68 stations**, distributed evenly in the agricultural territory, have a complete soil moisture determination program in the meteorological network.

At these stations, soil samples are taken at the main field crops, forage crops and vineyard plantations, up to a depth of **100 cm** to determine soil moisture.

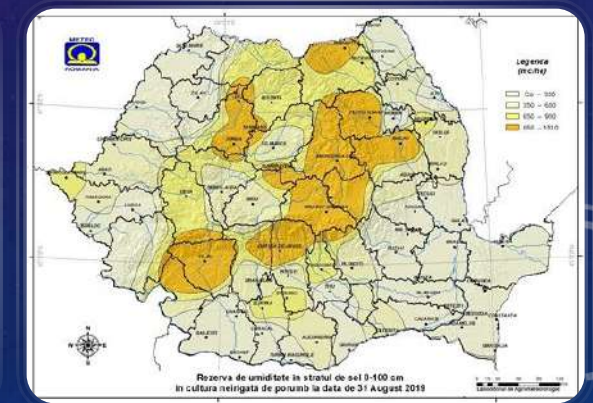
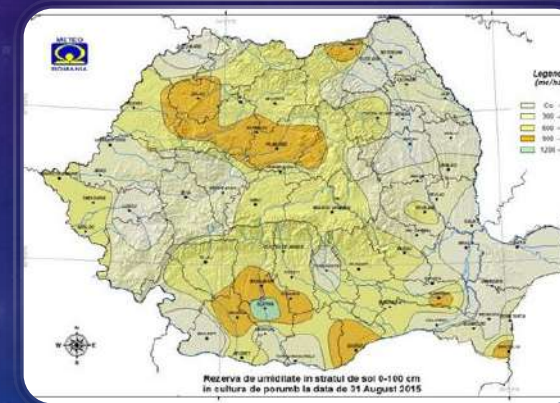
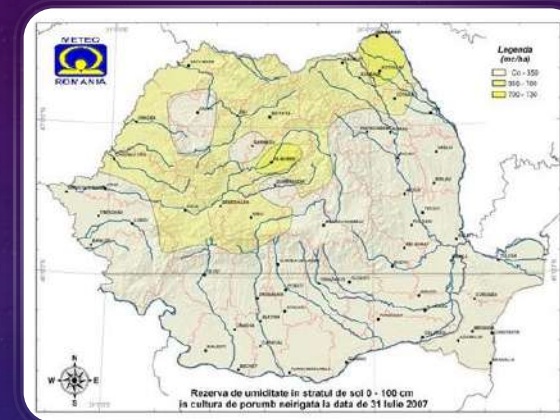
Humidity measurement at agro-meteorological stations uses the **Theta Probe - ML2x/d** soil moisture measurement systems and **Stevens Water Field POGO System** (plus "Hydra Probe" and "Stevens Water Hydramon App" for the tablet).



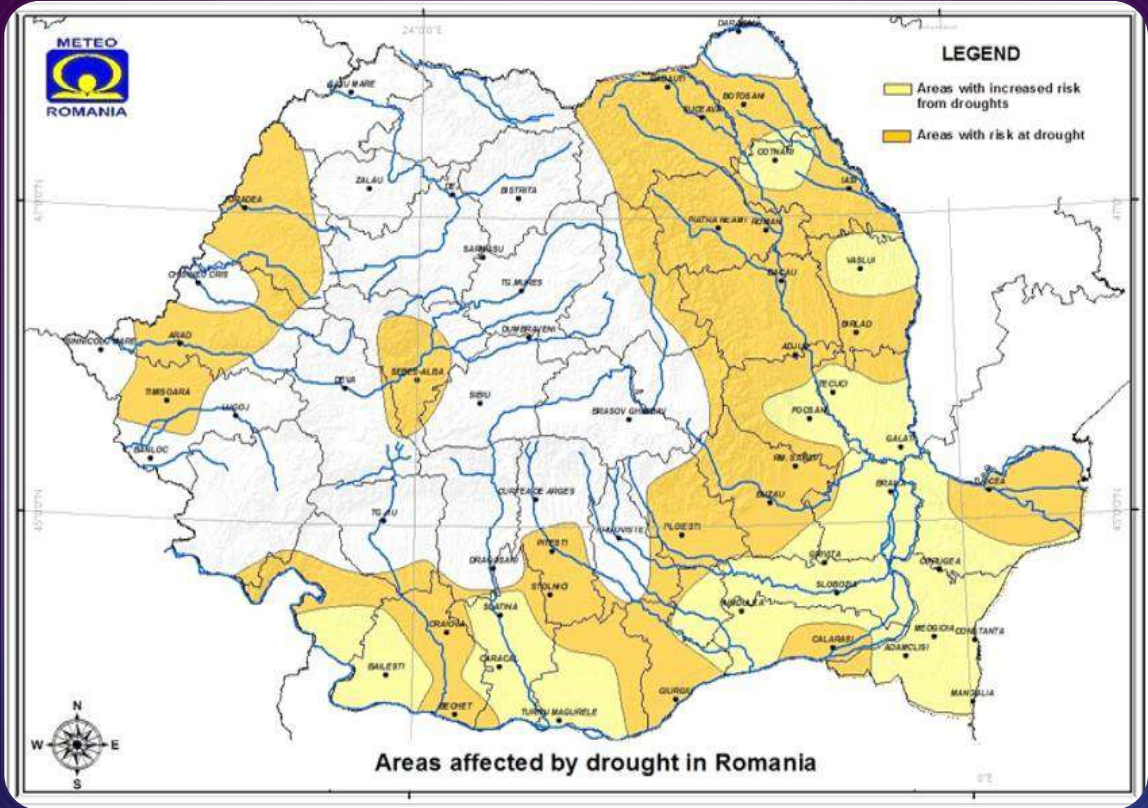
AGROMETEOROLOGICAL MONITORING INDEXES

Maize soil moisture July-August Most droughty years 2012 / 2012 / 2015 / 2019

- MAIZE CROP
- EXTREME PEDOLOGICAL DROUGHT
- STRONG PEDOLOGICAL DROUGHT
- MODERATE PEDOLOGICAL DROUGHT
- SATISFACTORY SUPPLY



DROUGHT INDICATORS / AGROMETEOROLOGICAL OPERATIONAL USE AND RESEARCH ACTIVITIES



THE SOUTH, SOUTH-EAST AND EAST OF ROMANIA ARE THE REGIONS WITH RISK OF WATER SCARCITY AND DROUGHT



climatic indicators: SPI, Aridity index, etc

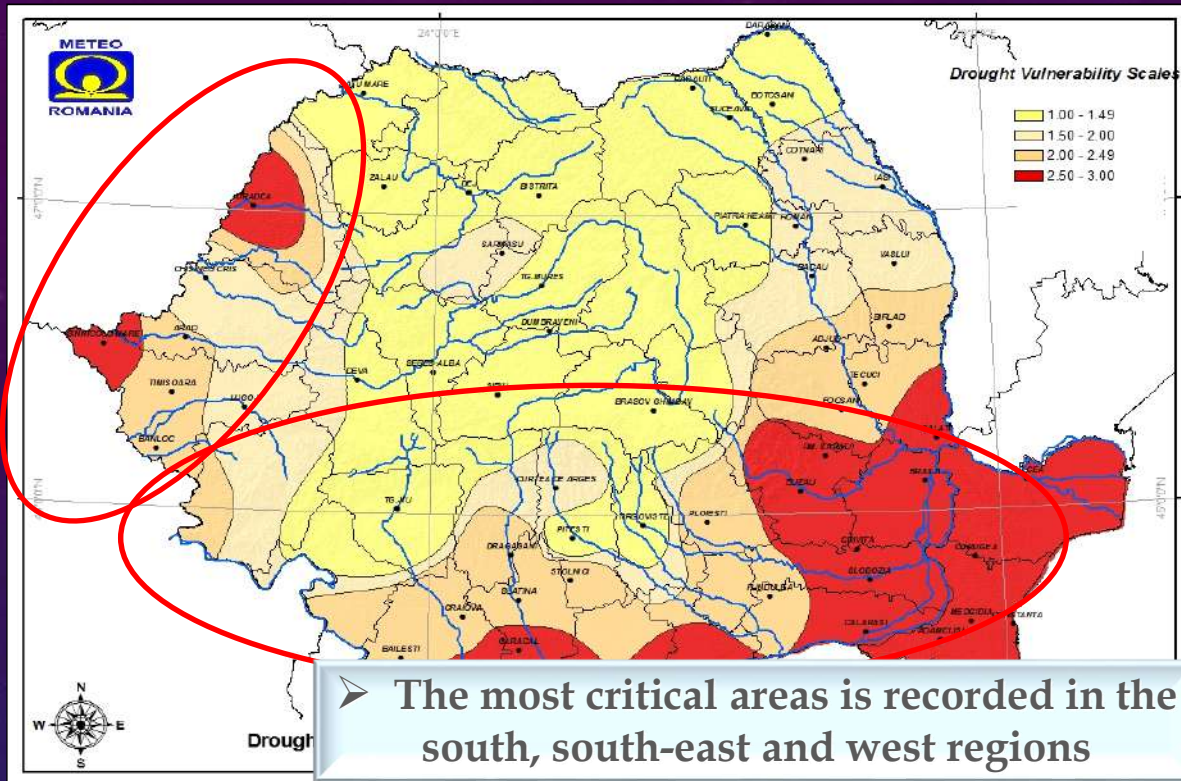


agrometeorological indicators: Soil moisture, scorching heat indicator, etc



satellite-derived products: Normalized Difference Water Index (NDWI), Leaf area Index (LAI); Fraction of Absorbed Photosynthetic Solar Radiation (fAPAR)

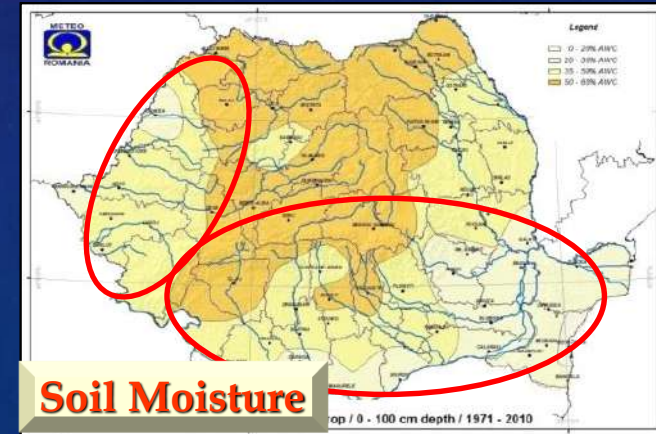
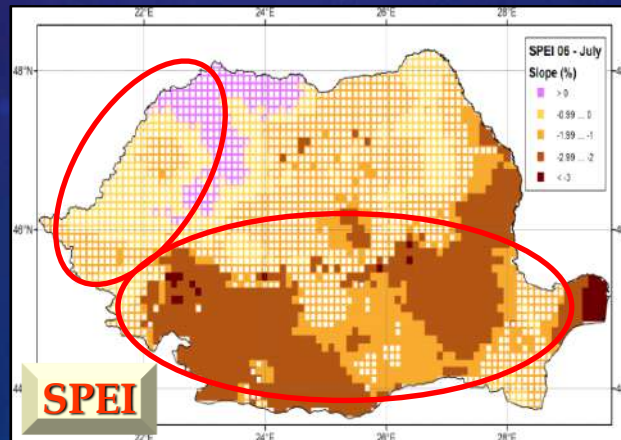
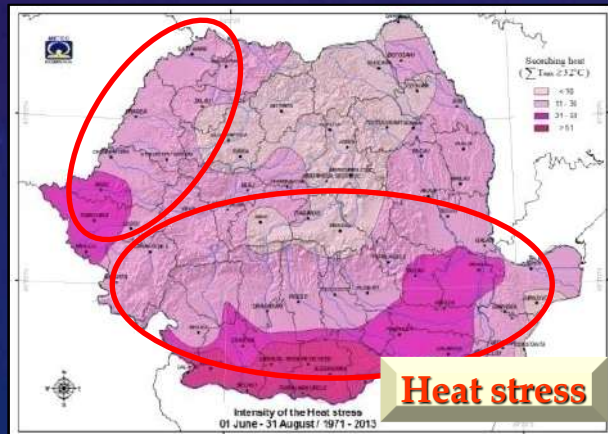
Drought Vulnerability Index for maize crop during the critical period for water plant needs (August) based on climatic variables



| DVI | Vulnerability Scales | Color scale |
|-------------|--------------------------|--------------|
| 0.00 – 0.49 | No or less vulnerability | Green |
| 0.50 – 0.99 | Low vulnerability | Light Green |
| 1.00 – 1.49 | Medium vulnerability | Yellow |
| 1.50 – 1.99 | High vulnerability | Light Orange |
| 2.00 – 2.49 | Very high vulnerability | Orange |
| 2.50 – 3.00 | Extreme vulnerability | Red |

Vulnerability has been expressed as a function of exposure and intensity at different level in time and space.

The approach is useful in evaluating the vulnerability of crop systems to drought and may help the decision makers to formulate more specific and targeted climate adaptation policies to reduce production losses in agriculture.



Agrometeorological indicators / products (maps, charts, graphics)

- **921** thematic maps: soil moisture, actual evapotranspiration, thermal indicators (heat intensity, cold and frost units, spring index), water indices (intervals with precipitation, days without precipitation)
- **141 charts/graphics** (with maximum and minimum values of air and soil temperature, highest and lowest amount of precipitation by agricultural regions and in reference intervals specific to the weekly agrometeorological newsletters)

Agrometeo products which include processed products:

- **47** weekly **agrometeorological** bulletins at **national level** (which contain diagnoses and prognosis) <http://www.meteoromania.ro/>
- **365** weekly **regional agrometeorological forecasts** (Oltenia-52, Muntenia-53, Moldova-52, Transilvania and Maramures-52, Dobrogea-52, Banat-Crisana-52)

Agrometeorological diagnosis July 23 - 29, 2021

Table 2 shows the extreme values of soil surface temperatures (°C), by agricultural region, from 23 to 29 July 2021.

| Agricultural region | Soil surface temperature (°C) | Maximum value | Minimum value |
|----------------------------|-------------------------------|---------------|---------------|
| Moldova | Value | 19.0/28.07 | 8.8/23.07 |
| Dobrogea | Value | 14.6/18.07 | 11.2/24.07 |
| Muntenia | Value | 17.0/28.07 | 12.5/23.07 |
| Oltenia | Value | 19.0/28.07 | 11.0/24.07 |
| Banat | Value | 19.0/24.07 | 12.8/23.07 |
| Crisana | Value | 18.0/24.07 | 11.8/23.07 |
| Transilvania and Maramures | Value | 18.0/24.07 | 11.8/23.07 |

Soil thermal regime

On 29 July 2021, the soil surface temperature (°C) shows the following values:

- Minimum temperatures: 8...23 °C, to the whole country;
- Maximum temperatures: 26...47 °C, in most cultivation areas.

Rainfall regime

Amounts of precipitation (l/imp) recorded between 22 and 28 July 2021:

- Reduced in quantity and even absent, 0-10 l/imp, in Dobrogea, Oltenia, Banat, Crisana and Maramures, on large agricultural areas in Moldova, Muntenia and Transilvania;
- Normal, 10-25 l/imp, locally in the north, east and isolated center of Moldova, central and western of Transilvania, northern, northwestern and southern Maramures;
- High, 25-39 l/imp, isolated in northwestern of Transilvania, Figure 1.

| Years | Authorities (ministries, research institutions, etc.) | Mayors | Agricultural companies / associations / farmers | Other (insurance companies) | Total /Year |
|--------------|---|--------|---|-----------------------------|-------------|
| 2016 | 4 | 1 | 6 | 1 | 12 |
| 2017 | 4 | 1 | 15 | 2 | 22 |
| 2018 | 20 | 2 | 19 | 1 | 42 |
| 2019 | 6 | 1 | 14 | 1 | 22 |
| 2020 | 22 | 1 | 52 | 3 | 78 |
| 2021 | 10 | 0 | 17 | 1 | 28 |
| TOTAL | | | 204 | | |

Beneficiaries type of Agrometeorological indicators and products by request

Agrometeorological indicators and products contracts with media

- **Agrometeorological products for specialised media tv and magazines**
 - **250** daily diagnoses/prognosis for AGRO TV;
 - **51** weekly articles for magazine "Profitul Agricol"
 - **24** monthly articles for magazine "GROUPAMA"

TYPE OF SERVICES

☐ Agrometeorological Bulletins

☐ National and Regional agrometeorological forecasts

☐ Agrometeorological diagnosis

☐ Specialized recommendations

☐ Agrometeorological indicators:

- Soil moisture
- Heat Intensity
- Spring Index
- Winter severity
- Rainfall
- Soil temperature
- Potential and Real evapotranspiration
- No. of days with precipitation under 1 l/mp, etc.)

☐ Agrometeorological studies by request

☐ Extreme meteorological phenomena with negative impact in agriculture

TO WHO?

Beneficiary:

❖ Ministries:

- Ministry of Environment, Waters and Forests
- Ministry of Agriculture and Rural Development

❖ Farmers and farmers associations

❖ Specialized magazines: Ferma, Groupama

❖ Insurance companies

❖ Media TV

❖ Meteo Romania Web-site: <http://www.meteoromania.ro/>



Vaslui/Moldova



Călărași/Muntenia



Iași/Moldova



Adamclisi/Dobrogea



Călărași/Muntenia



Iași/Moldova

Extreme weather **IMPACTS** in Romanian agriculture - case study 2018

March 2018

SNOW



April 2018

FLOOD



DROUGHT

May 2018



Maize crop



Winter wheat

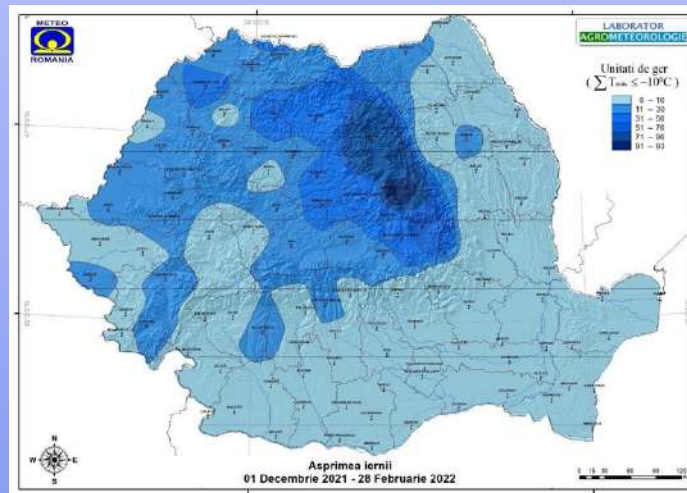
Droughty/rainy years in Romania /1901-2022

| DECADE | XX-TH CENTURY | |
|------------------|---|-------------------------------|
| | EXTREMELY DROUGHTY YEARS | EXTREMELY RAINY YEARS |
| 1901-1910 | 1907-1908 | 1910 |
| 1911-1920 | 1917-1918 | 1911, 1912, 1915, 1919 |
| 1921-1930 | 1923-1924, 1927-1928 | 1929 |
| 1931-1940 | 1934-1935 | 1937, 1939, 1940 |
| 1941-1950 | 1945-1946, 1947-1948, 1949-1950 | 1941, 1944, 1947 |
| 1951-1960 | 1952-1953 | 1954, 1955, 1957, 1960 |
| 1961-1970 | 1962-1963, 1964-1965 | 1969, 1970 |
| 1971-1980 | 1973-1974, 1975-1976 | 1972, 1974, 1975, 1976 |
| 1981-1990 | 1982-1983, 1985-1986, 1987-1988 | 1981, 1990 |
| 1991-2000 | 1992-1993, 1997-1998, 1999-2000 | 1991, 1997 |
| | XXI-ST CENTURY | |
| 2001-2010 | 2000-2001, 2001-2002, 2002-2003, 2006-2007, 2008-2009 | 2005, 2006, 2008, 2010 |
| 2011-2020 | 2011-2012, 2014-2015, 2015-2016, 2016-2017, 2017-2018, 2019-2020 | |
| 2021-2030 | 2021-2022 | |

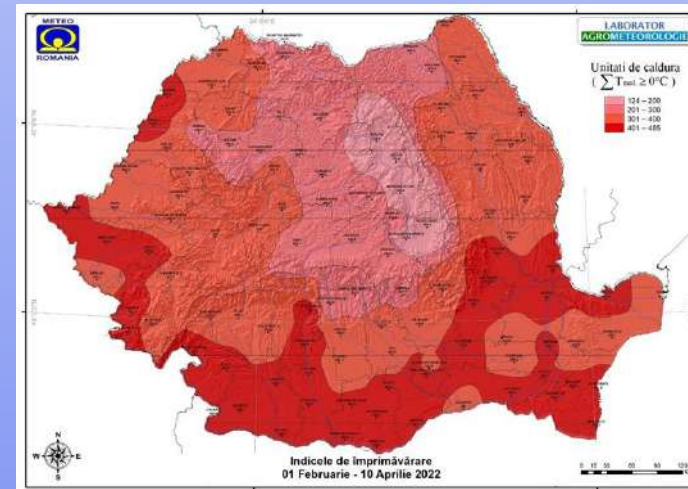
Since 1901 until now, Romania has seen in every decade one to four extremely droughty/rainy years, an increasing number of droughts being more and more apparent after 1981

AGROMETEOROLOGICAL INDICATORS

2021-2022 AGRICULTURAL YEAR

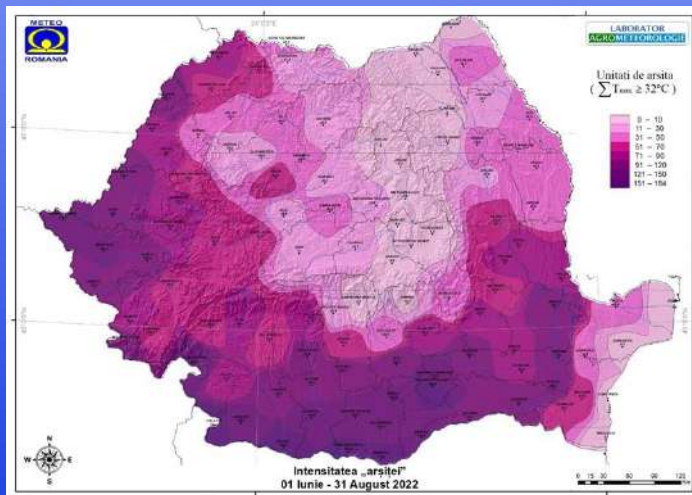


WINTER HARSHNESS
01 DECEMBER 2021 - 28 FEBRUARY 2022

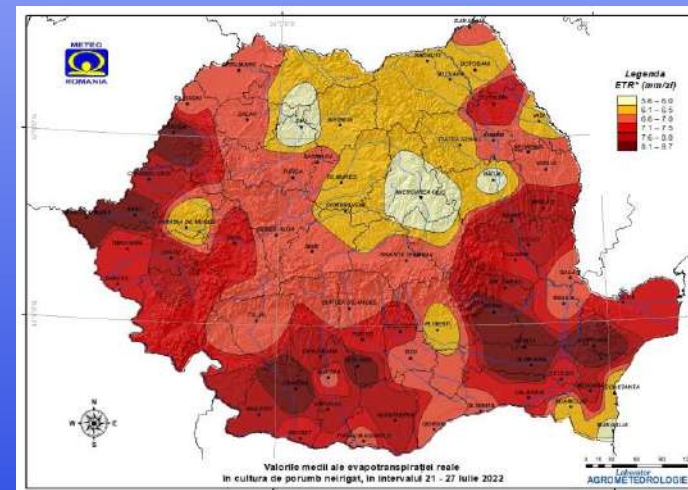
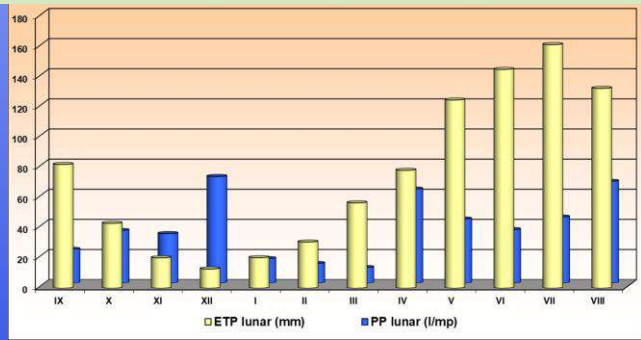


SPRING INDEX
01 FEBRUARY - 10 APRIL 2022

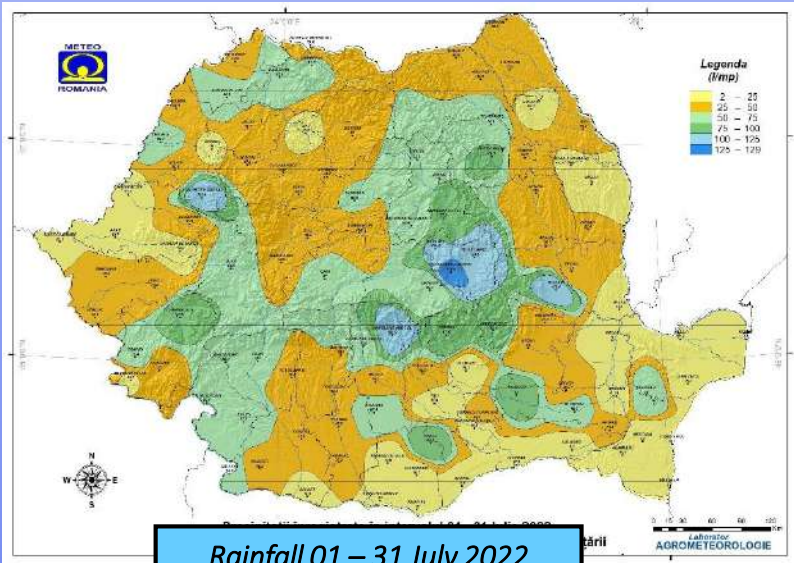
SCORCHING HEAT INTENSITY
01 JUNE - 31 AUGUST 2022



Monthly mean values of the reference evapotranspiration for the maize crop in comparison to monthly rainfall / 2020-2021 Agricultural year



REFERENCE EVAPOTRANSPIRATION IN MAIZE CROP
21 - 27 JULY 2022



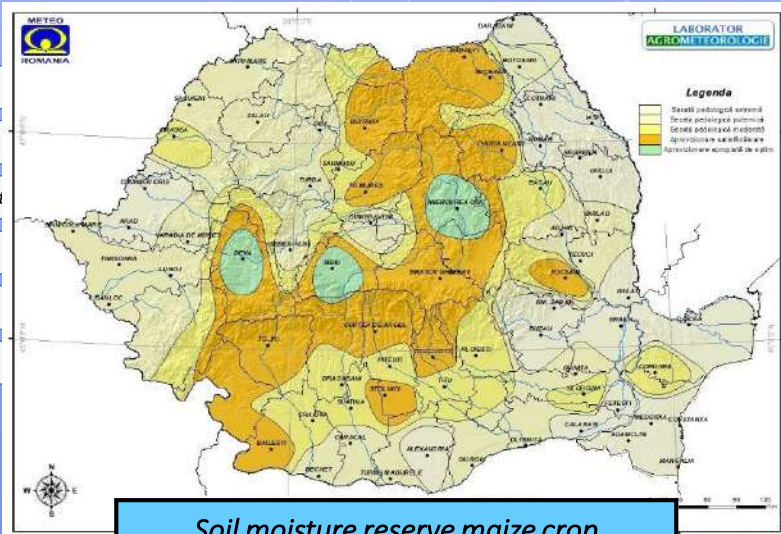
Rainfall 01 – 31 July 2022



Focșani– CMR Moldova 19.07.2022

- Extreme pedological drought
- Severe pedological drought
- Moderate pedological drought
- Satisfactory supply
- Supply close to optimum
- Optimum supply

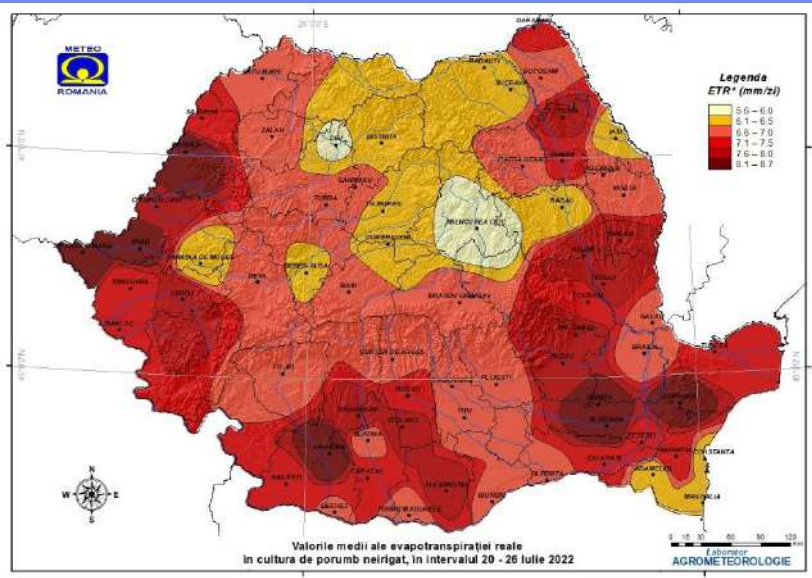
Extreme/strong/moderate drought



Soil moisture reserve maize crop 31 Iulie 2022

Reference evapotranspiration maize crop 20 – 28 Iulie 2022

| | | |
|--|-----------|---------|
| | 5.01-5.55 | 5.1-5.5 |
| | 5.55-6.01 | 5.6-6.0 |
| | 6.01-6.55 | 6.1-6.5 |
| | 6.55-7.01 | 6.6-7.0 |
| | 7.01-7.55 | 7.1-7.5 |
| | 7.55-8.01 | 7.6-8.0 |

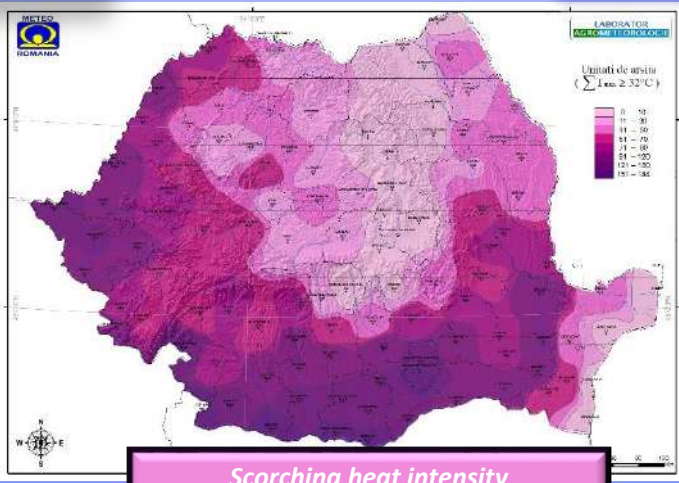


Valorile medii ale evapotranspirăției reale în cultura de porumb neirgat, în intervalul 20 - 26 Iulie 2022



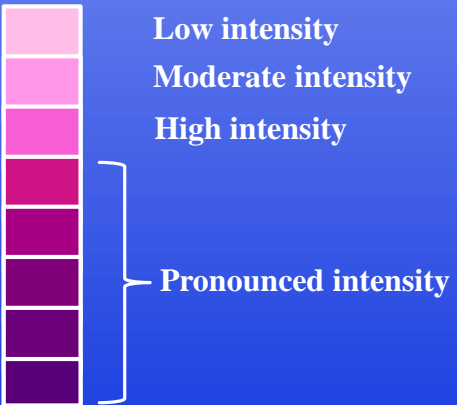
Tecuci– CMR Moldova 07.07.2022

Scorching heat intensity 01 June – 31 August 2022



Scorching heat intensity
($\sum T_{max} \geq 32^\circ\text{C}$ /scorching heat units)

Maximum values, especially in the south and west of the country at the Calafat (183.7), Turnu Măgurele (152.8), Sânnicolau Mare (126.5) stations.



Maize 05 July 2022



Maize 22 July 2022



Maize 22 July 2022



Vaslui, Focșani, Tecuci – CMR Moldova

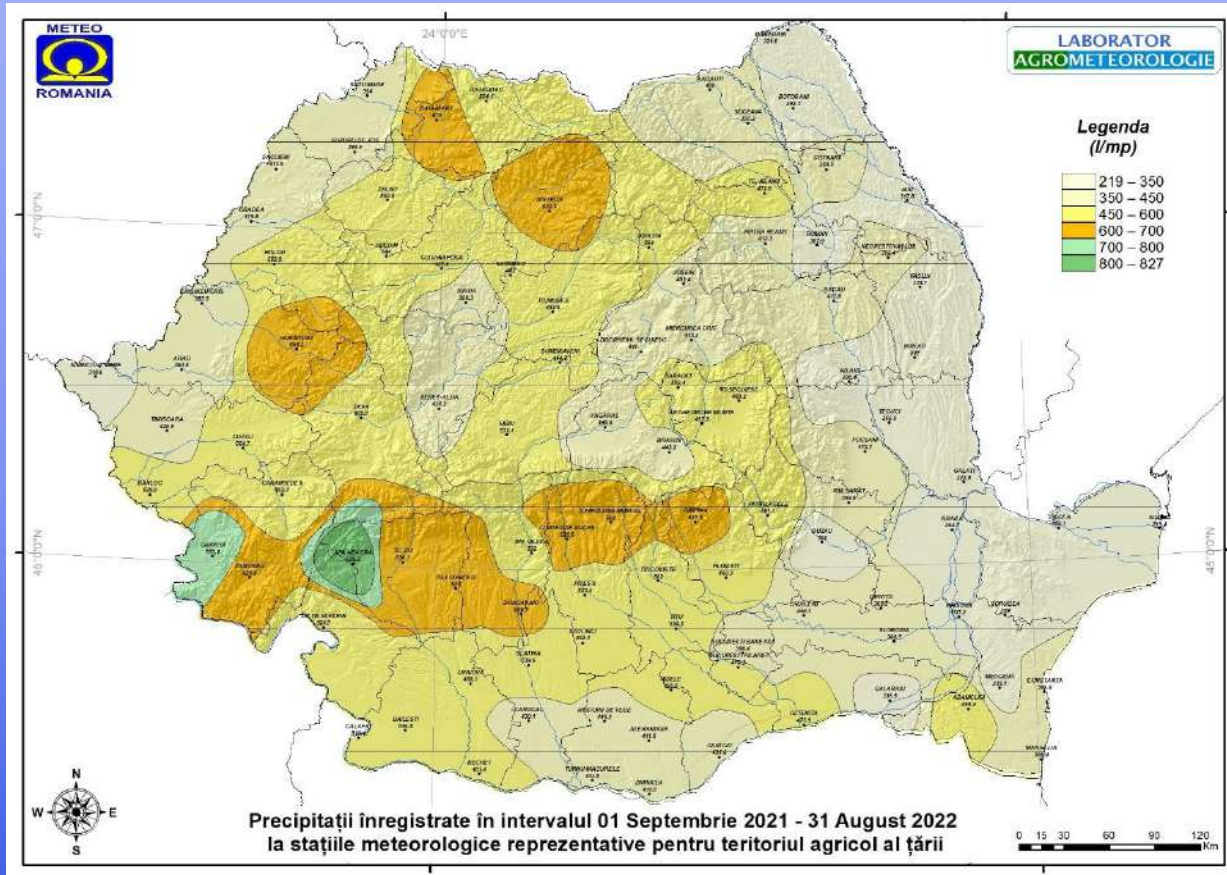
Phenological phases forced
Temporary wilting
Yellowing and premature drying of the leaf apparatus
Low accumulation of dry matter in the grain (small spikelets).



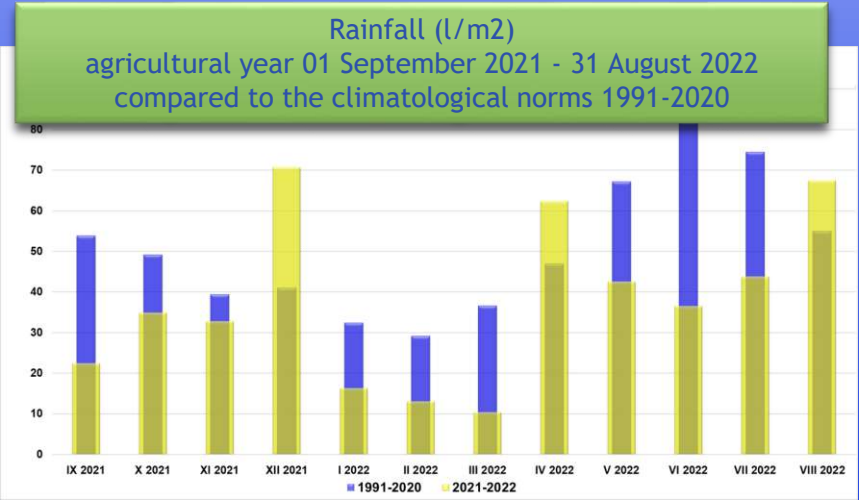
Rainfall

01 Septembrie 2021 – 31 August 2022

August

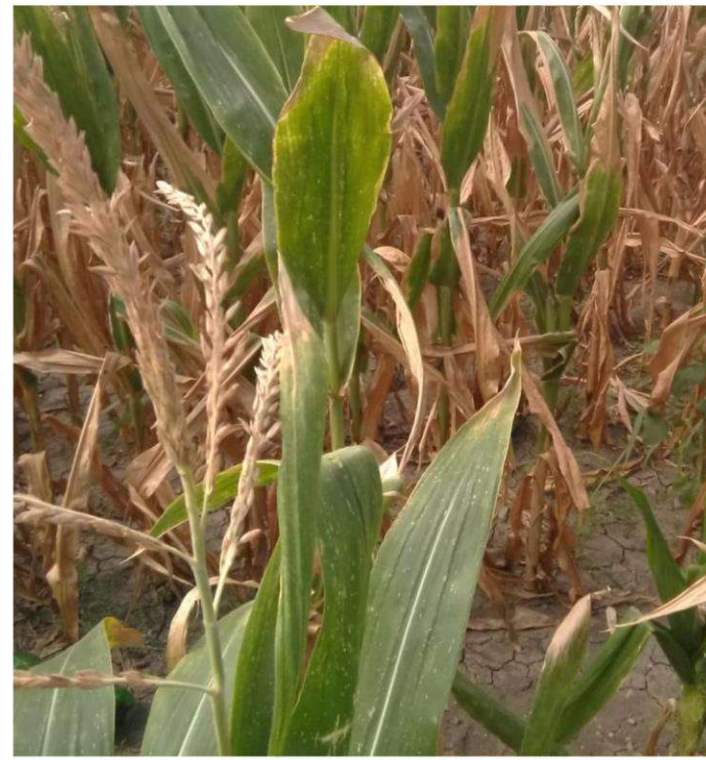


Sebeș- CMR Transilvania Sud 31.08.2022



Dry and excessively dry rainfall (< 600 l/mp) in most agricultural regions

The total precipitation recorded at the stations with agrometeorological program was 454.3 l/sqm compared to a multi-year average of 608 l/sqm, which means a precipitation deficit of 25.3%



Source: phenological observations
from **R**omanian **N**ational
Agrometeorological **M**onitoring
Network
Focșani, Tecuci, Oradea, Sebeș



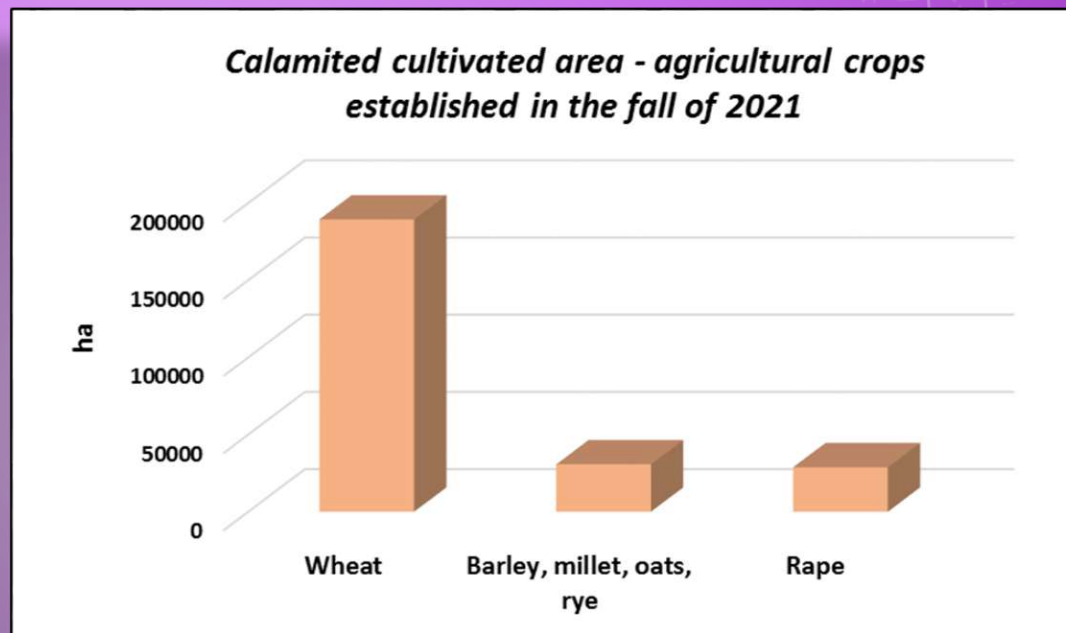
**Total area affected by drought
250.000 ha**



**365 million lei
≈
73.000.000 €
in
compensation**



**16.000
farmers
affected by soil
drought**



| Autumn crops | Suprafata (ha) |
|---------------------------|----------------|
| Winter wheat | 189 339 |
| Barley, millet, oats, rye | 30 698 |
| Rape | 26 805 |

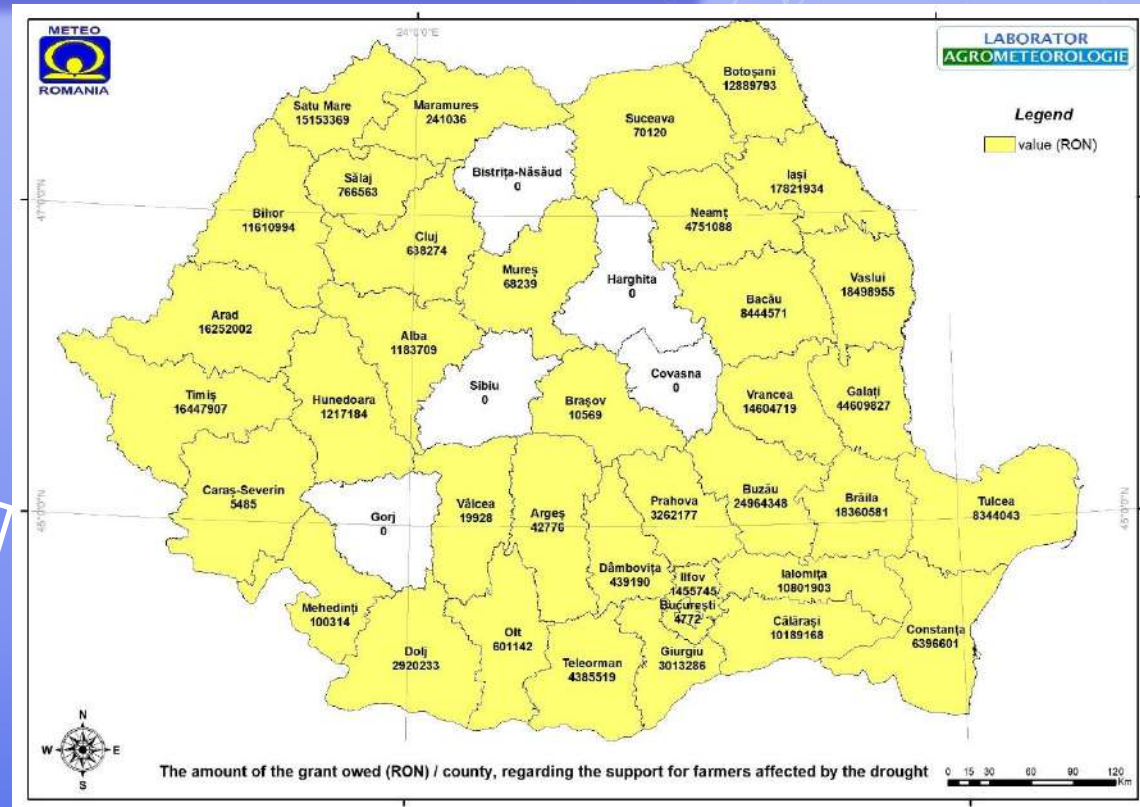
**Source: Ministry of Agriculture and Rural Development 17.11.2022*

Harvest losses areas in the 2021-2022 agricultural year / spring crops

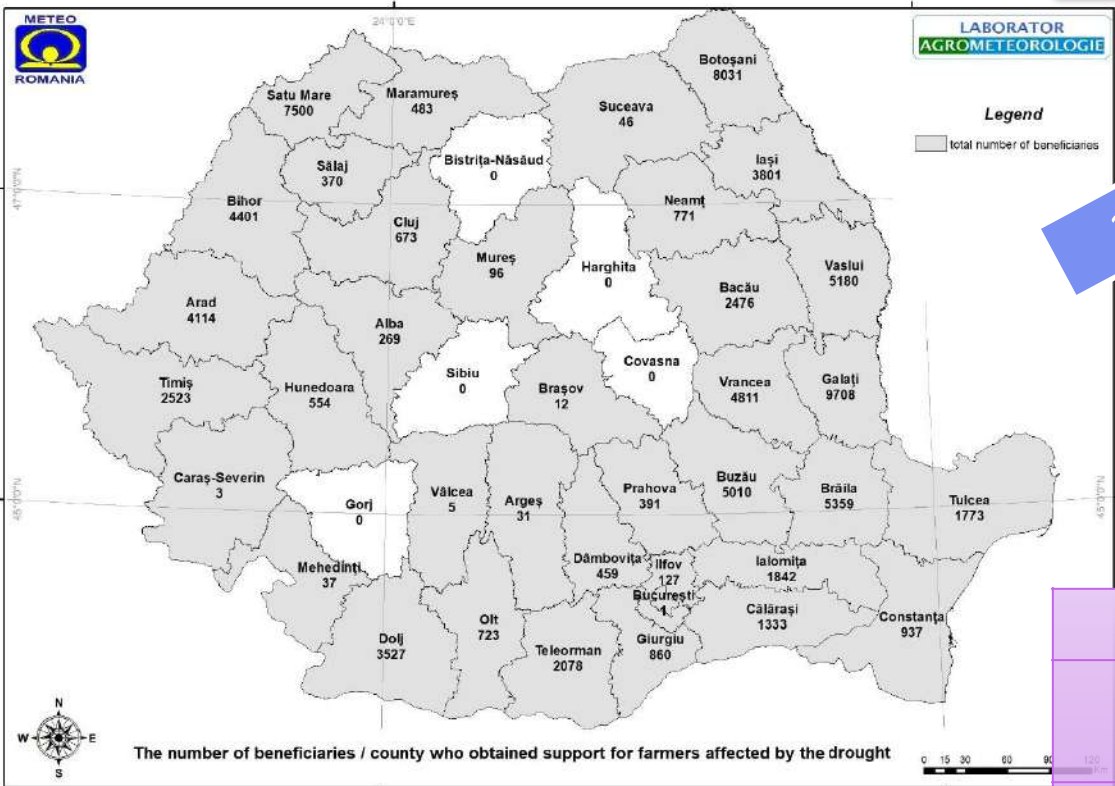


280.588.065 lei
 ≈
56.117.613 €
in compensation

80.315
farmers affected by soil drought



37 counties



Total area affected by drought
1.110.000 ha

| Crop | Surface (ha) |
|-----------|-----------------------------|
| Maize | 135.000 ha (losses 30-69%) |
| | 570.000 ha (losses 70-100%) |
| Sunflower | 139.000 (losses 30-69%) |
| | 220.000 ha (losses 70-100%) |

***Source: Ministry of Agriculture and Rural Development**



EUROPEAN COMMITMENT

PARTNERSHIP



Soil moisture reserve in the 0-20 cm,
0-50 cm, 0-100 cm depths,
for winter wheat and maize crop

Starting: January 2023
Delivered: 10 day basis

WHAT NEXT

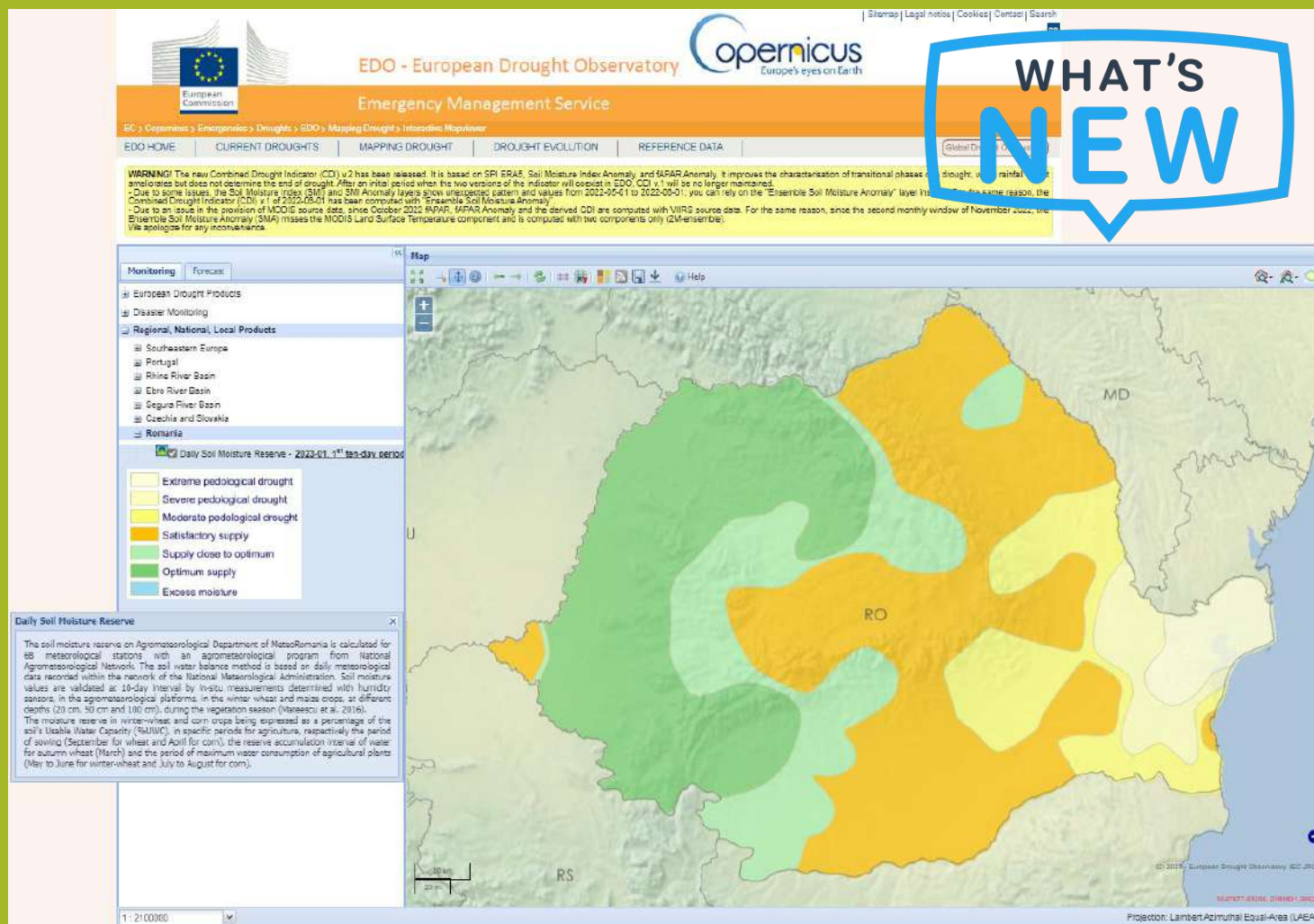


Average soil temperature at 5 cm
and 10 cm depths, for winter wheat
and maize crop

Starting: April 2023
Delivered: 10 day basis



Geographic MapViewer - European Drought Observatory - JRC European Commission (europa.eu)
Monitoring -> Regional, National, Local Products -> Romania -> **Daily Soil Moisture Reserve**



WE WORK ONLINE

Virtual training course: Vegetation indexes, in-situ phenology observations and remote sensing products for monitoring the cereal crops, forest and pastures Malawi and Tanzania
06-09 September 2021



ETRP Moodle Site English (en) Daniel Alexandru

Agrometeorology Course for Malawi and Tanzania

Dashboard / My courses / Agrometeorology for Malawi and Tanzania

Vegetation indexes, in-situ phenology observations and remote sensing products for monitoring the cereal crops, forest and pastures

06-08 September 2021

an online course to support NMHS Malawi and Tanzania staff's use of vegetation indexes in agriculture, pastoralism and forest applications.

ETRP Moodle Site English (en) Daniel Alexandru

WMO/FAO/EUMETSAT/MeteoRomania Virtual Training Course on the Use of Satellite Products on Drought Monitoring and Applications in Agrometeorology

Dashboard / My courses / Drought Monitoring and Agrometeorological Applications

Welcome to the course



23 November - 11 December 2020

An initiative by:



Virtual Training Course on the Use of Satellite Products on Drought Monitoring and Applications in Agrometeorology
WMO/FAO/EUMETSAT/MeteoRomania
23 November – 10 December 2020

INTERNATIONAL PROJECTS RELATED TO DROUGHT
AND IMPACT ON AGRICULTURE

❑ National projects:

- ❖ Project **ADER 12.3.1**: The portal for soil information 'in mirror' to that achieved by Joint Research Centre in Europe (JRC). (2015-2018);
- ❖ **Operational Sectoral Programme for Environment (POS-MEDIU)**-The development of the national system of monitoring and warning of extreme weather phenomena for the protection of life and property materials (2014-2020).
- ❖ **National Risk Assessment - RO RISK** - (SIPOCA code: 30, co-financed under EFS through Operational Programme Administrative Capacity) under coordination of General Inspectorate for Emergency Situations (2015-2016)

❑ European Projects:

- ⇒ INTERREG IVC/ **WATERCoRe Project**: Water scarcity and drought - Co-ordinated activities in European Regions", 2010-2013 (<http://www.watercore.eu>)
- ⇒ SEE Project **ORIENTGATE** - A structured network for integration of climate knowledge into policy and territorial planning ", 2012-2014. (<http://www.orientgateproject.org>).
- ⇒ **Green Path to Sustainable Development** project - European Economic Area Financial Mechanism, 2009-2014, <http://caleaverde.ro/>
- ⇒ **IRIDA** Project - Innovative remote and ground sensors, data and tools into a decision support system for agriculture water management - Programul ERA-NET Cofund Water Works 2014, Research and Innovation for Developing Technological Solutions and Services for Water Systems (2016-2019).
- ⇒ **DRI-DANUBE** project: "Drought Risk in the Danube region" 2017-2019;
- ⇒ **CAMARO-D** project- "Cooperating towards Advanced Management Routines for land use impacts on the water regime in the Danube river basin", 2017-2019

FUTURE REGIONAL PERSPECTIVES

REGIONAL AGROMETEOROLOGY CENTER FOR THE WMO EUROPE REGION RA-VI

Launching the initiative



Date: 8 June 2019

Place: Geneva, World Meteorological Organization

Event: 18th World Meteorological Congress

Launch: *Regional Agrometeorology Center for the WMO Europe Region RA-VI*

SUPPORT



INFRAMETEO PROJECT APPROVAL

Infrastructure upgrading for monitoring and warning of severe hydro-meteorological phenomena in order to ensure the protection of life and material goods. SMIS 2014+ 128047

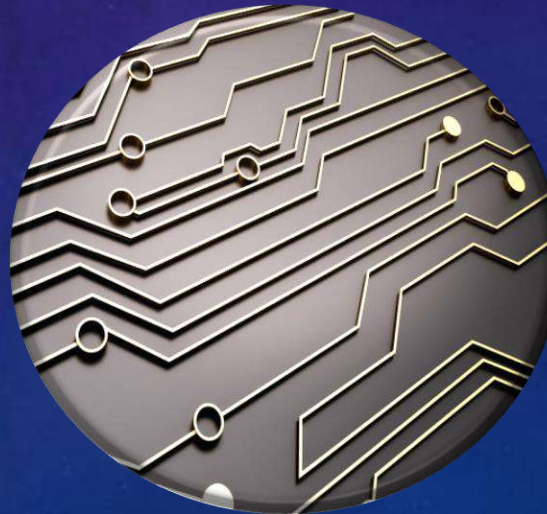
UNDER IMPLEMENTING



Starting Date: July 1st 2020

Ending Date: December 31st 2024

Place: **National Meteorological Administration headquarters**



REGIONAL AGROMETEOROLOGY CENTER FOR THE WMO EUROPE REGION RA-VI

Providing relevant agrometeorological data and information such as soil moisture and phenology, agrometeorological bulletins and products/services and training activities to Region VI European countries.

Main goals:

- **Cooperation** and further bond with the Drought Management Centre for South-East Europe and Integrated Drought Management Program;
- **Strengthen** regional cooperation and national capacities for agrometeorology activities and drought monitoring in Europe;
- **Development** of training and education programs within WMO initiatives and Regional Training Centre objectives;
- Cooperation with WMO Global Campus for exchange of agrometeorological products and technologies developed by different Global Centers of Research and Excellence in AgroMeteorology (GCREAMs).



REGIONAL AGROMETEOROLOGY CENTER FOR THE WMO EUROPE REGION RA-VI



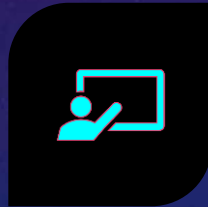
SMART & GREEN



DATA CENTER



RESEARCH



COMMUNICATION



TRAINING



REGIONAL AGROMETEOROLOGY CENTER FOR THE WMO EUROPE REGION RA-VI

OPERATIONAL ACTIVITIES

In-situ soil moisture monitoring
Main crops phenology observations
Agrometeorological diagnosis/forecasts
Monthly bulletins
Agrometeorological indicators

LOGISTICAL SUPPORT

IT Data Center
Web-Portal communication
Agrometeorological platform
Network and Security
Virtual IT infrastructure
Conference rooms

RESEARCH

EU pilot projects in common thematic areas /
climate change impacts and water resources
management, etc
The **impact of extreme weather events** on existing
and future agricultural systems, food security
Enhanced capability in development of
weather/**climate-agricultural decision support
systems**
Good practice guides for long-term sustainability
in agriculture for **RA VI Europe**

EDUCATION

Development knowledge transfer
Trainings: workshops, webinars, field days
E-learning
Virtual courses



REGIONAL AGROMETEOROLOGY CENTER FOR THE WMO EUROPE REGION RA-VI

The Centre will contribute to determine the impact of the weather and climate on existing and future agricultural systems as well as the actions needed to ensure the long-term sustainability of agricultural systems within **RA VI Europe**.

▪The Centre will provide relevant European agrometeorological **data and information to European countries**, such as soil moisture and phenology of plants, **bulletins and agrometeorological products / services**, as well as professional training support activities.

The operational and research activities of the European Agrometeorological Center will take place in a **Green and Smart** building at the NMA headquarters in Bucharest.

The building will incorporate modern technological instrumentation in order to achieve energy efficiency, flexibility, comfort and long-term sustainability.

Daniel ALEXANDRU
danyalex77@gmail.com

THANK YOU FOR ATTENTION!

meteoromania.ro

