

**ANALELE  
UNIVERSITĂȚII DIN CRAIOVA  
- SERIA GEOGRAFIE -**

---

**ANNALS  
OF THE UNIVERSITY OF CRAIOVA  
- SERIES GEOGRAPHY -**



**ANII 2014-2015, VOL. XVI**

---

**EUC**

**EDITURA UNIVERSITARIA**

**2014-2015**

**ANNALS OF THE UNIVERSITY OF CRAIOVA**  
**- SERIES GEOGRAPHY -**

**EDITORIAL ADVISORY BOARD**

<b>Dan BĂLTEANU</b>	- <i>Institute of Geography, Bucharest, Romania</i>
<b>Nicolae BOBOC</b>	- <i>Institute of Ecology and Geography of the Academy of Sciences of Moldova, Chişinău, Moldova Rep.</i>
<b>George ERDELI</b>	- <i>University of Bucharest, Bucharest, Romania</i>
<b>B. ESWARAPPA</b>	- <i>Bangalore University, Bangalore, India</i>
<b>Sergey GOVORUSKO</b>	- <i>Pacific Geographical Institute, Russian Academy of Sciences, Vladivostok, Russia</i>
<b>Meryem HAYIR</b>	- <i>University of Sakarya, Sakarya, Turkey</i>
<b>Ioan IANUŞ</b>	- <i>University of Bucharest, Bucharest, Romania</i>
<b>Maria RĂDOANE</b>	- <i>Ştefan cel Mare University, Suceava, Romania</i>
<b>Vasile SURD</b>	- <i>University Babeş-Bolyai, Cluj-Napoca, Romania</i>
<b>Petru URDEA</b>	- <i>West University, Timişoara, Romania</i>
<b>Antonin VAISHAR</b>	- <i>Mendel University of Agriculture and Forestry, Brno, Czech Republic</i>

**Editor in chief: Costela IORDACHE**

<b>EDITORIAL BOARD</b>	Sorin AVRAM, Amalia BĂDIŢĂ, Sandu BOENGIU, Gheorghe CURCAN, Oana IONUŞ, Mihaela LICURICI, Emil MARINESCU, Ioan MARINESCU, Mirela MAZILU, Ştefan NEGREANU, Liliana POPESCU, Cristina ŞOŞEA Cristiana VÎLCEA, Alina VLĂDUŢ
<b>LANGUAGE REVIEWERS</b>	Amalia BĂDIŢĂ, Mihaela LICURICI, Cristina ŞOŞEA, Cristiana VÎLCEA, Alina VLĂDUŢ
<b>TECHNICAL EDITOR</b>	Cristina ŞOŞEA
<b>WEBSITE MANAGEMENT</b>	Cristina ŞOŞEA

*We exchange similar publications with similar institutions of our country and from abroad*

---

**Address:**  
**University of Craiova, Faculty of Sciences,**  
**Department of Geography, Al. I. Cuza Street, no. 13, 200585, Craiova, Romania**  
**Tel. 0251/415077,**  
**e-mail: [contact@analegeo.ro](mailto:contact@analegeo.ro)**  
**website: <http://analegeo.ro/>**  
**<http://cis01.central.ucv.ro/geography/>**  
**ISSN: 1224-4112**

**THE CLIMATIC RISK OF THE PLUVIOMETRIC DEFICIT  
REGIME IN THE COLD SEMESTER. A COMPARATIVE STUDY  
BETWEEN THE OLTENIA PLAIN AND THE SOUTHERN  
DOBROUJA PLATEAU**

**RISCUL CLIMATIC AL DEFICITULUI REGIMULUI  
PLUVIOMETRIC ÎN SEMESTRUL RECE. STUDIU  
COMPARATIV ÎNTRE CÂMPIA OLTENIEI ȘI PODIȘUL  
DOBROGEI DE SUD**

Iulica VĂDUVA<sup>1</sup>, Ion MARINICĂ<sup>2</sup>, Andreea Floriana MARINICĂ<sup>3</sup>

**Abstract:** This paper analyses the pluviometric deficit regime during the cold semester, in the Oltenia Plain and the Southern Dobruja Plateau in the last half of the century (beginning with 1961), by treating comparatively this issue. The climatic evolutions in the last interval of time refer both to the tendency of sudden fall of atmospheric precipitations and to the tendency of air temperature increase in the last decades. The scanty precipitations registered for years on Earth extended surfaces led to phenomena of drought, which have been signalled also on the territory of our country, including in the two analysed regions. The significant differences we have found prove clearly the tendency of climate aridity in these regions situated in the two southern, south-western and namely south-eastern extremes of Romania.

**Key-words:** *precipitation deficit, drought, anticyclone regime, climatic influences, aridity*  
**Cuvinte cheie:** *deficit pluviometric, secetă, regim anticiclonic, influențe climatice, ariditate*

## **I. INTRODUCTION**

The Oltenia Plain and the Southern Dobruja Plateau are two Romanian regions located in the two southern extremities of the country – Oltenia in the south - west and Dobruja in the south-east; they display different climatic features, which we will enumerate further on. Generally speaking, the climatic conditions of Oltenia are similar to those in the south of Banat. Winter and the influence of the East-European Anticyclone are felt (especially in the east of the region).

The southern half of Oltenia is characterised by an annual average temperature exceeding 10°C (at Drobeta Turnu-Severin the annual mean is of 11.7°C, as a consequence of warming during the transition seasons, through foehn processes, at

---

<sup>1</sup> iulicaVaduva@yahoo.com

<sup>2</sup> Dr. CS III, MMP1, Centrul Meteorologic Regional Oltenia, ionmarinica@yahoo.com.

<sup>3</sup> B.Sc., Jacobs University Bremen, Germany, marinica.andreea@gmail.com

Drăgășani, 10.4°C). The annual isotherm of 11.0°C passes in the north of Drobeta-Turnu Severin, north of Vânju Mare, south of Segarcea and east of this locality near the isohypse of 100 m altitude.

Autumns are, in general, long and warmish, for example the average temperature of October at Drobeta-Turnu Severin is of 12.5°C and at Drăgășani of 11.2°C, values higher than the annual mean. In the Oltenia Plain, the invasions of polar cold or arctic air are rarer than in other regions of the country. As a measure of the frequency of these type of air masses penetrations we can show, for example, that in Craiova the visibility is so high that the Carpathians Mountains can be seen (Great Parâng) of 18-20 times a year and 3-4 times a year the Carpathians Mountains and Balkan Mountains can be seen (it is known that in the polar and arctic air masses, the visibility is very good, the air is free of impurities and it is very clear). Due to the advections of more accentuated cold air, in Oltenia the absolute minimum values are 7-13°C higher (in the Oltenia Plain the absolute thermal minimum values are comprised between: -35.5°C at Craiova registered on January 25, 1963 this being also the absolute thermal minimum value within the Romanian Plain and -26.0°C at Calafat registered on January 13, 1985) than, for example, in the Southern Dobruja Plateau (the absolute minimum thermal values are comprised between -17.5°C at Constanța, a value registered in January 2006 and -23.2°C at Adamclisi registered on January 31, 1987).

The position of the Carpathians Mountains and Subcarpathians compared to the penetration directions of air masses driven by the main baric centres which influence Oltenia has repercussions on the distribution of annual average temperatures which decrease from west to east and from north to south (for example: Drobeta-Turnu Severin 11.7°C, Strehăia 10.8°C, Craiova 10.9°C, Drăgășani 10.4°C, Slatina 10.4°C). The altitude influences air temperature in an obvious way, the highest average thermal values being registered in the south of Oltenia (The Oltenia Plain).

The Southern Dobruja Plateau is individualised best from a climatic point of view since it is in the region with the highest degree of continentality. This phenomenon can be explained, in the first place, due to its position and geographic individuality compared to the neighbouring relief units, over which the influence of the main baric centres of atmospheric action superposes. Due to its position in the south-eastern extremity of Romania, near the Black Sea, Dobruja Plateau is overall characterised by the most frequent and persistent phenomena of dryness and drought that render a dominant climatic note to this territory, in which the Southern Dobruja Plateau is also included.

The influenced of Black Sea aquatic surfaces in the eastern side and the Danube surfaces on the western and northern peripheries, which, due to the processes of air descent, lead to the appearance of some “thermal dams”, with more moderate temperatures and the predominance of fine weather, while inside the Dobruja plateau, the convective and radiative processes stimulate distinct thermal-pluviometric contrasts. On the other hand, between the neighbouring aquatic and continental surfaces, plateau, obvious climatic contracts appear, which dominate due to the intensity of the warming and cooling processes on which the local air dynamic,

the frequency of diurnal and nocturnal nebulosity, the reduction of precipitations, the occurrence of dryness and drought phenomena of the abundance of dew deposits, especially near water sources, are dependent.

Consequently, the most persistent dryness and drought phenomena occur on the seaside, namely on the plateau eastern side, neighbouring the Black Sea, as on its Danube western side. The cause is represented by the position of stations which bear the influence of the Black Sea and Danube, and on their surface temperature inversions occur, which tears the cloudy system favouring the intensification of sunstroke processes, dryness and drought phenomena; in the case of Hârşova station we can add the presence of limestone which maintain a drier topoclimate than inside the plateau (Văduva et al., 2009).

Under the influence of Black Sea which conditioned the reduced nebulosity and the long duration of Sun brightness in the seaside (Constanța, Mangalia), the multiannual average air temperature reaches and even exceeds 11.5°C. Inside the Dobruja land (Trajan's Wall, Medgidia, Adamclisi) the values drop to 10.7-10.8°C, and afterwards they start again to grow near Danube (Hârşova, 10.9°C), whose influence is more limited than the latter. The multiannual average temperature decreases from east towards west, simultaneously with the increase of land influence.

On the seaside, the increase of air temperature is due to the high values of radiative and caloric balance, which is higher than in the rest of Dobruja territory, but also to the urban topoclimate (Văduva, Rîșnoveanu, 2005, Văduva, 2005).

In the cold semester the temperature means vary from 3.6°C in Hârşova and 5.4°C in Mangalia. Their territorial distribution falls within the general distribution tendency of monthly and annual average values from the analysed region, being higher in the seaside, under the influence of the Black Sea and lower towards the center and west under the influence of continental air (Văduva, 2005, 2008).

As a consequence of the obvious differences in the climatic regime, there are also significant differences in the precipitation regime in these two regions of Romania. Our study aims at emphasizing these differences and contrasts registered by precipitation regime. Within this framework, we stopped upon the pluviometric deficit for cold semester of the year, as this has severe consequences upon environment and economy over long periods of time.

## **II. DATA AND METHODS**

For the The Oltenia Plain we used the pluviometric data from the present meteorological stations: Craiova, Băilești, Bechet, Calafat, Dr. Tr. Severin, Caracal, and Slatina (Fig. 1).

For the Southern Dobruja Plateau we used the pluviometric data supplied by the following meteorological stations (Fig. 1): Mangalia, Adamclisi, Medgidia, Constanța, Hârşova, which are representative for all landforms of the region.

The processed data generally covered the interval 1961-2008 (48 years, a significant interval of time of almost half of century). The main used method was Hellmann's criterion, which gives us the opportunity of rendering the pluviometric deficit, allowing both a quantitative and qualitative analysis.



**Fig. 1. Localisation of meteorological stations**

### III. RESULTS AND DISCUSSIONS

In the cold semester (the interval X-III) low amounts of water from precipitations fall in general, because on the territory of the country, the anticyclone regime predominates, and the clouds and the precipitations of thermal convection are merely developed.

In the Southern Dobruja Plateau the average amounts of precipitation totalize 1/3 of the annual mean. The precipitation distribution in this period highlights even better aspects related to the excessive continental influences, through values of 170.1 mm in Hârșova, 176.6 mm in Medgidia, 194.3 mm in Mangalia, 201. mm in Constanta and 203.4 in Adamclisi emphasizing the drought regions, a phenomenon that occurs due to the low amounts of precipitations from this period, when the water reserve necessary to the beginning of the vegetation period is formed (Văduva, 2005).

In the Southern Dobruja Plateau, the lowest semester value of precipitations registered in the interval 1961-2008 was of 61.2 mm registered in 1983 with a negative deviation of -115.4 mm (representing -34.6% from the semester mean) and the highest amount of precipitation was of 418.5 mm registered in 1966 with a positive deviation from the semester mean of +341.9 mm (representing 237.0% of the normal). It should be noticed that in the most stations the maximum value was registered in the same year 1966 and the minimum value in 1983, the only exception being the minimum value from Hârșova (1991) and Mangalia (1990).

In the The Oltenia Plain the lowest semester value of precipitations was of 46.4 mm, registered in the cold semester (2001-2002) in Calafat with a negative deviation of -218.7 mm (representing -82.5% of the normal), and the highest was of

539.6 mm registered in the cold semester 1985-1986 in Dr. Tr. Severin with a positive deviation of +191.9 mm (+55.2% from the normal).

From a quantitative point of view the highest negative deviation was of -286.5 mm in Dr. Tr. Severin in the cold semester 2001-2002 (a percentage representing -83.4% of the normal), and the highest deviation was 236.3 mm (101.5% of the normal), registered in Caracal in the cold semester 1972-1973. Therefore, we will find extremely significant differences between the pluviometric regime of The Oltenia Plain and the one in the Southern Dobruja Plateau. We will further notice that while the negative deviations can be in the worst situation, of -100% from the normal (in exceptional situations of total lack of precipitations), the positive deviations can sometimes exceeds the normal value.

The extreme situations presented show that the high intensity of drought in the interval 2001-2002 but also the exceptional value of the excess of precipitations in the intervals 1972-1973 and 1985-1986 (Marinică, 2006; Bogdan, Marinică, 2007; Văduva, 2008; Bogdan et al., 2009).

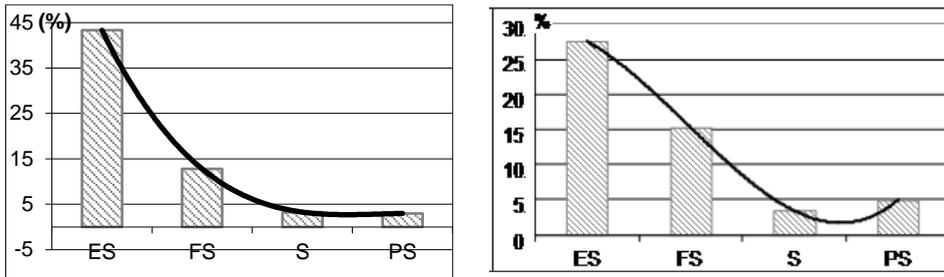
### **Pluviometric deficit during the cold semester (October-March)**

In October (Fig. 2), in the The Oltenia Plain, the general average percentage of the month with pluviometric deficit for the entire territory was of 62.4%, and in the territory the percentage of the months October with pluviometric deficit was comprised between 59.4% at Slatina and 66.7% at Calafat (in all meteorological stations there have been values  $\geq 60.0\%$  exception Slatina station) with a difference of 7.0%.

The general average percentage of the excessively drought months of October was of 43.3% being 2/3 of the one of the months with a pluviometric deficit, and the percentage values in the meteorological stations were comprised between 37.5% in Bechet and 46.9 in Slatina with a difference of almost 10%.

The general average percentage of the very droughty month of October was of 12.8%, and in territory was comprised between 10.4% in Caracal and Craiova and 16.6% in Bechet, with a difference of 6.0%. The general average percentage of the months of October with a complex drought was of 56.1% with 7.0% lower than the months with a pluviometric deficit, which shows that the months of October with a complex drought are dominant.

The general percentage of the months of October with moderate drought was of 6.3%, and in territory was comprised between 0.0% in Slatina and 10.4% in Calafat. Compared with February, the average percentage of the months with a pluviometric deficit and the excessively droughty months is slightly higher, and this is why in October the drought has a higher intensity and extension than in February. In conclusion, we can say that in October the complex drought and excessively droughty months prevail.



**Fig. 2. Pluviometric deficit (%) in October within the The Oltenia Plain (left) and the Southern Dobruja Plateau (right)**

In October (Fig. 2), in the Southern Dobruja Plateau, the general average percentage of the month with pluviometric deficit for the entire territory was of 51.16%, lower than the percentage in The Oltenia Plain with 11.0%, and in the territory the percentage of the months October with pluviometric deficit was comprised between 45.8% at Adamclisi and 58.3% at Mangalia with a difference of 13.0% namely half of the percentage in the The Oltenia Plain.

The general average percentage of the excessively drought months of October was of 27.5%, namely double compared to the percentage in the Oltenia Plain, and in the territory the percentage of the very droughty months of October was comprised between 22.9% at Hârșova and 33,3% at Mangalia, with a difference of 10.0%.

The general percentage of the months of October with moderate drought was of 42.74% with 9.0% lower than the percentage of the months of October with a pluviometric deficit and lower than the percentage in Oltenia with 15.0%. In the territory, the percentage of the months of October with complex drought was comprised between 35.4% at Adamclisi and 45.8% at Hârșova and Mangalia, with a difference of 10.0%, namely with a half more than the percentage in the Oltenia Plain, due to the lower territorial variability in the Southern Dobruja Plateau.

The general percentage of the months of October with moderate drought was of 8.42% slightly higher than the percentage in (with only 1.9%). Compared with February, in the Southern Dobruja Plateau these percentages remain lower and, thus, February is the draughtiest month of the year. In conclusion, in the Dobruja Plateau and in the Oltenia Plain, in October, the complex drought prevails, and the percentage differences in the territory are lower than in the Oltenia Plain. Therefore, October is one of poorest months in precipitation, and the Oltenia Plain is even poorer than February.

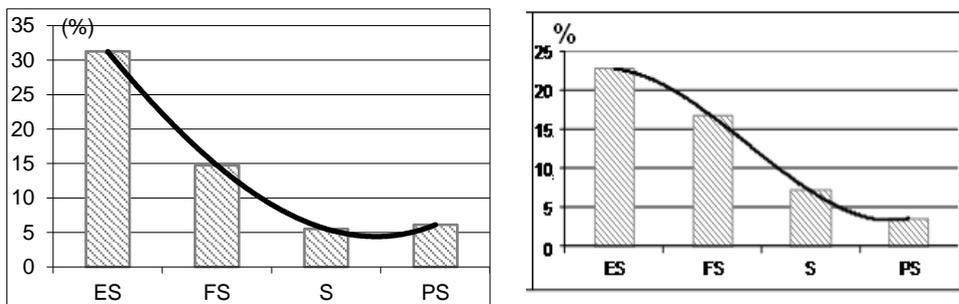
In November (Fig. 3), in the Oltenia Plain, the general average percentage of the month with pluviometric deficit for the entire territory was of 57.6% (with 5.0% lower than in October), and in the territory the percentage of the months November with pluviometric deficit was comprised between 43.7% at Craiova and 66.7% at Dr. Tr. Severin with a difference de 3.0%.

The general average percentage of the excessively drought months of November was of 31.2%, and in the territory the percentage of the very droughty months was comprised between 20.8% at Craiova and 39.6% at Calafat with a

difference de 19.0%. The average percentage of the very droughty month of November was of 14.7%, being about half of the excessively drought months and slightly higher than the percentage from October, and in the territory the percentage of the very drought months of November were comprised between 9.4% at Slatina and 20.8% at Dr. Tr. Severin with a difference of 11.0%.

The general average percentage of the months of November with complex drought was of 46.0% namely lower than the percentage of the months with a pluviometric deficit with 11.0% and being with 10.0% lower than that during October, and in the territory the percentage of the months with complex drought was comprised between 33.3% at Craiova and 52.1% at Dr. Turnu-Severin, with a difference of 19.0%, reflecting a high variability.

The general average percentage of the months of November with moderate drought was of 11.6%, namely 4 times lower than the months with complex drought and almost double compared to the percentage during October, and in the territory the percentage of the months of November with a moderate drought was comprised between 6.3% in Bechet and 18.7% in Caracal, with a difference of 12.0%.



**Fig. 3. Pluviometric deficit (%) in November within the Oltenia Plain (left) and the Southern Dobruja Plateau (right)**

In conclusion, we can say that the extension and intensity of phenomena related to the precipitation deficit decrease in November compared to October and present a high variability in the territory. In November (Fig. 3), in the Southern Dobruja Plateau, the general average percentage of the months with a pluviometric deficit for the entire territory, was of 50.0% lower than the percentage in Oltenia with 7.0%, and in the territory the percentage of the months of November with a pluviometric deficit was comprised between 47.9% at Adamclisi and Hârșova and 54.2% at Mangalia, with a difference of 7.0%, much lower than the percentage in Oltenia (with 20.0%), due to the reasons presented above.

The general average percentage of the excessively droughty months was of 22.7% with 8.0% lower than the percentage in the Oltenia Plain, and in the territory the percentage of the excessively droughty months was comprised between 20.0% at Constanța and 27.1% at Mangalia (both extremes were registered in the meteorological stations located on the seaside), with a difference of 7.0%.

The general average percentage of the very droughty months of November (VD) was of 16.6% with 2.0% higher than the percentage in Oltenia, and in the territory the percentage of the very droughty months was comprised between 10.0% at Constanța and 22.9% at Hârșova with a difference of 12.9% (with 6.0% lower than the percentage in the Oltenia Plain).

The general average percentage of the months of November with complex drought was of 39.34% lower than the percentage in the Oltenia Plain with 7.0%, and in the territory the percentage of the months of November with complex drought was comprised between 30.0% in Constanța and 45.9% in Mangalia, with a difference of 15.9% (lower than the percentage in The Oltenia Plain with 5.0%).

The general average percentage of the months of November with moderate drought was of 10.66%, with 1.0% lower than the percentage in The Oltenia Plain, and in the territory the percentage of the months of November with moderate drought was comprised between 4.2% at Hârșova and 20.0% at Constanța, with a difference of 16.0% higher with 4.0% than the percentage in the Oltenia Plain.

The differences which occur can be explained due to the fact that in the last month of autumns in the Southern Dobruja Plateau the influence of the retrograde pontic cyclones appears faster, while in the the Oltenia Plain the influence of the Mediterranean Cyclones delay in some autumns and even in November.

In December (Fig. 4), in the Oltenia Plain, the general average percentage of the months with a pluviometric deficit for the entire territory was of 49.4%, with 8.0% lower than the percentage during November, and in the meteorological stations the percentage of the months with a pluviometric deficit in December was comprised between 39.5% at Bechet and 62.5% at Slatina with a difference de 25.0%. The general average percentage of the excessively droughty months of December was of 23.2%, with 8.0% lower than the percentage of the months of November, and in the territory the percentages of the excessively droughty months of December were comprised between 20.8% at Bechet and 31.3% at Slatina (between 1/5 and 1/3 of the number of months) with a difference of 11.0%.

The general average percentage of the very droughty months of December was of 11.9% namely half of the one of the excessively droughty months and with 3.0% lower than the percentage of November months, and in the territory the percentage of the very droughty months of December was comprised between 6.3% at Băilești and 16.7% at Calafat, having a difference of 13.0%.

The general average percentage of the months of December with a complex drought was of 35.1% (4/5 of the total number of the months with a pluviometric deficit), and in the territory the percentage of the months of December with complex drought was comprised between 29.1% at Bechet and 43.8% at Slatina, with a difference of 14.0%.