

**(031) ΜΕΛΕΤΗ ΤΗΣ ΕΠΙΔΡΑΣΗΣ ΤΗΣ ΟΡΟΓΡΑΦΙΑΣ ΤΗΣ ΕΛΛΑΔΑΣ
ΣΤΑ ΠΕΔΙΑ ΤΟΥ ΑΝΕΜΟΥ ΚΑΙ ΤΟΥ ΥΕΤΟΥ ΜΕ ΧΡΗΣΗ
ΑΡΙΘΜΗΤΙΚΟΥ ΜΟΝΤΕΛΟΥ ΚΑΙΡΟΥ**

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ΠΕΡΙΛΗΨΗ

Στην εργασία αυτή μελετάται η επίδραση της ορογραφίας της Ελλάδας στα πεδία του ανέμου και του υετού στον Ελλαδικό χώρο, με τη χρήση του επιχειρησιακού αριθμητικού προγνωστικού συστήματος της ΕΜΥ “SKIRON” και την εισαγωγή διαφόρων τύπων ορογραφίας της Ελλάδας σε αυτό. Ειδικότερα, για μερικές επιλεγμένες περιπτώσεις, γίνεται επεξεργασία των ίδιων αρχικών δεδομένων με το ίδιο μοντέλο, αλλά με εισαγωγή διαφορετικών τύπων ορογραφίας και ακολούθως, με υποκειμενικές και αντικειμενικές μεθόδους, αξιολογούνται τα αριθμητικά αποτελέσματα στα πεδία του ανέμου και του υετού στον Ελλαδικό χώρο.

**(031) STUDY OF THE INFLUENCE OF THE OROGRAPHY OF GREECE
ON THE FIELDS OF WIND AND PRECIPITATION USING NUMERICAL
WEATHER PREDICTION MODEL**

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ABSTRACT

In the present study the influence of the orography of Greece on the fields of wind and precipitation over Greek Area is studied using the operational numerical weather prediction system of HNMS “SKIRON” and various types of the orography of Greece. Specifically, for a few chosen cases, the same model runs several times, each time with the same initial data but with different type of orography and then using subjective and objective evaluation methods the numerical results on the fields of wind and precipitation are assessed.

(032) εφαρμογή τριών δορυφορικών τεχνικών για την εκτίμηση του ύψους βροχής σε περιπτώσεις ΕΝΤΟΝΩΝ βροχοπτώσεων στην Ελλάδα

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ΠΕΡΙΛΗΨΗ

Τρεις τεχνικές εκτίμησης του ύψους βροχής δεδομένα του Meteosat στο υπέρυθρο, οι μέθοδοι Arkin (ARKT), Negri-Adler-Wetzel technique (NAWT) και convective stratiform technique (CST), εφαρμόστηκαν για την περιοχή της Ελλάδας με σκοπό την εξέταση της επίδοσής τους καθώς και της δυνατότητας βελτιστοποίησής τους για τη συγκεκριμένη αυτή περιοχή με έμφαση στις ισχυρές βροχοπτώσεις. Έγινε ποσοτική σύγκριση των 12-ωρων υψών βροχής που καταγράφηκαν από επίγειους σταθμούς με τις αντίστοιχες εκτιμήσεις των δορυφορικών τεχνικών με βάση στατιστικά μεγέθη, για τέσσερις περιπτώσεις ισχυρών βροχοπτώσεων στην Ελλάδα. Βρέθηκε ότι και οι τρεις μέθοδοι υπερεκτιμούν, αν και σε διαφορετικό βαθμό, τη βροχόπτωση στην περιοχή της Ελλάδας. Γενικά, η μέθοδος CST βρέθηκε να αναπαριστά με τον καλύτερο τρόπο την βροχόπτωση που καταγράφηκε από τους σταθμούς. Τα αποτελέσματα της ανάλυσης της ευαισθησίας των τεχνικών ARKT και NAWT στις διάφορες παραμέτρους τους, όπως το κατώφλι θερμοκρασίας λαμπρότητας και η αποδιδόμενη ένταση βροχής, δείχνουν ότι αυτές μπορούν να βελτιστοποιηθούν σημαντικά πριν την εφαρμογή τους για περιπτώσεις ισχυρών βροχοπτώσεων στη Ελλάδα.

(032) VALIDATING THREE INFRARED-BASED RAINFALL

RETRIEVAL ALGORITHMS FOR INTENSE CONVECTIVE ACTIVITY

OVER GREECE

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ABSTRACT

Three different estimation techniques of rainfall rate, the Arkin technique (ARKT), the Negri-Adler-Wetzel technique (NAWT) and the convective stratiform technique (CST), based on hourly infrared data from Meteosat were applied to four convective systems over Greece to test their performance and to examine the possibility of their optimisation for this particular geographical region with a broader

perspective dedicated to flood episodes. A comparison between satellite estimates and corresponding 12-hourly accumulated precipitation data from ground stations has been made through the analysis of quantitative errors. The quantitative analysis showed that all three techniques, though in different extent, have the common characteristic of overestimating the precipitation in the area of Greece. In general, the CST method was found to best represent the rainfall pattern observed in the rain gauge network. Moreover, the sensitivity analysis of the ARKT and NAWT method to their rain determination parameters including threshold brightness temperature and attributed rain rate suggests how these two techniques could be optimised locally before application in the detection and quantification of heavy rainfall events.

(033) RECONSTRUCTION OF THE PERMIAN PERIOD CLIMATE

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ABSTRACT

Early Permian was the only geological period during which creatures with large spiny back-sails had evolved. These creatures included the reptiles *Dimetrodon* and *Edaphosaurus* as well as the amphibian *Platyhystrix*. An even earlier form of reptile, *Ianthasaurus*, existed which evolved a sail.

This paper examines the body temperature variation of *Dimetrodon* during the different seasons of the year. The effect of the sail of *Dimetrodon* on its body temperature is also evaluated by means of a computer program written for this purpose and validated from experiments with a model animal. Many suggestions were proposed as to the function of the sail in a debate that lasted for a century. Among the first suggestions was the utilisation of the sail for camouflage, waiting for prey while among reeds, or for using the sail literally as a sail on a boat. Today the most widely accepted view is that the sail was used as a solar collector allowing *Dimetrodon* to absorb heat from the sun when it was cold in the morning. By warming up as fast as possible during the day, being a cold blooded animal *Dimetrodon* would have a distinct advantage over its prey and its rivals.

The fact that at least two different types of spine bearing reptiles (*Dimetrodon* and *Edaphosaurus*) appeared and disappeared at approximately the same geological period suggested strongly that environmental factors may have given the spines significant survival value. In this study it is assumed that the sail was an important thermoregulatory element of the animal. Therefore, instead of assuming weather conditions for the Permian period, those of Cyprus, which exhibit great diurnal and seasonal variations, are used in order to reconstruct the climate condition of the Permian period.

It is shown that the sail of pelycosaurs provided an advantage to the reptile by warming it up quicker in the morning in cold environments. This would be a benefit, allowing *Dimetrodon* to prey on large reptiles, above 55 kg, in the early morning while they were sluggish. From the results presented a climate similar to that of March for Cyprus could be representative of that of the Permian period. When the climate became warmer the presence of the sail became unnecessary, increasing the body temperature above the lethal point. This may resulted in the extinction of these reptiles.

(034) 20TH CENTURY VARIATIONS OF THE SOIL MOISTURE CONTENT IN EAST-HUNGARY IN CONNECTION WITH GLOBAL CLIMATE CHANGE

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ABSTRACT

The supposed change of the climate is one of the most current questions of our age. The supposed climate change, which may result in important changes in the climate of Hungary, may exert a more substantial influence on the climate of the Great Hungarian Plain. Change of the climatic parameters requires analysis of their regional consequences, such as sinking of ground water level, decrease of water supply, drying out of upper soil layers, etc. The aim of the study is to detect temporal change of the water soil content in the Great Hungarian Plain in the 20th century and to establish its connection with the northern hemispheric average temperature. The analysis was made with producing objective time series, based on real meteorological data, which were then examined with multi-variate statistical methods. Besides, from climatologic point of view, representatively long dry and wet periods were fixed which would hopefully help further inter-scientific analysis of agro-ecological problems influenced by the water soil content. The Palmer Drought Severity Index (PDSI) time series in the growing season were produced and analysed for five meteorological stations in the Great Hungarian Plain for the period between 1901-1999. Monthly PDSI data series of five stations were determined for the 20th century (99 years) in three versions: *a*) plant-covered surface (maize plant) and homogenised (i.e. against possible non-representative peculiarities of the stations or the observations); *b*) bare (not plant-specific) surface, homogenised; and *c*) plant-covered surface, but non-homogenised meteorological data. Among them, we consequently consider the first alternative, i.e. the homogenised data sets for plant-covered surface as the most important, basic version. Analysis of the other two versions aimed to examine whether our consequences could be influenced by the homogenisation and by some hidden features connected to the evapotranspiration of the selected plant. The following questions were answered in the study:

- What kind of slow changes occurred in the time series of the PDSI in the 20th century?
- Did these local changes show statistical connection to the synchronous temperature characteristics of the Northern Hemisphere?
- Did any sufficiently long periods occur in the 20th century, PDSI indices of which differed significantly from those of the whole period in the given month?

It is detected that the water soil content of the Great Hungarian Plain showed significant slow fluctuations in the 20th century and, within this period, gradually decreased. This change is identified with the break-point analysis as a significant break; furthermore, decennial dry and wet analogous periods were defined with this method in order to make climatic analysis. According to the method of „slices”, which examines the connection between the regional changes of the soil water content and the hemispheric average temperature, the warming of the Northern Hemisphere in the 20th century was parallel with decreasing of the water supply in Great Hungarian Plain. Finally, with the analysis of alternative PDSI time series, we certified that our establishments depend partly from the choice of the formula of the potential evaporation which is required for calculating the PDSI and the homogenization of the input meteorological parameters, respectively.

(035) MODELLING EXTREME PRECIPITATION EVENTS IN THE CZECH REPUBLIC USING THE REGIONAL APPROACH

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ABSTRACT

Extreme high and low precipitation amounts, resulting in floods and droughts, are among environmental events with the most disastrous consequences for human society. Their impacts may become more pronounced in a future climate since an increase in their frequency and severity is expected and/or observed in large parts of Europe. This research was motivated by the recent occurrence of severe summer floods (in 1997, 1998 and particularly 2002) and spring-summer droughts (2000, 2003) in central Europe. It makes use of the recent development in environmental sciences, the L-moment based method of regional frequency analysis. Benefits of the regional frequency analysis of precipitation extremes compared to the at-site analysis are examined in this contribution. The main aims of the study are (i) to find the best method for the identification of homogeneous regions and to divide the area of the Czech Republic into regions; (ii) to select the distribution which fits the data best and to compare results of single-samples goodness-of-fit tests for different distributions with results of the regional goodness-of-fit test and the L-moment ratio diagram; and (iii) to estimate parameters and quantiles of the fitted distribution and their uncertainty, with an emphasis on return periods of the 1997, 1998 and 2002 extreme high precipitation amounts and the 2000 dry spells. The study is supported by the Grant Agency of the Academy of Sciences of the Czech Republic under project B3042303.

(036) ΑΠΟΣΥΡΘΗΚΕ – WITHDRAWN

(037) SELF-ORGANISED MAPS OF PRECIPITATION IN SPAIN

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ABSTRACT

IN ORDER TO STUDY THE CLIMATIC BEHAVIOUR OF SPANISH PRECIPITATION IT IS NECESSARY TO ISOLATE REGIONS THAT ARE CHARACTERISED BY SIMILAR EVOLUTION. THE SELF-ORGANISED MAPS OR COHERENT SPATIAL STRUCTURES ARE DETERMINED BY A CLASSIFICATION OF PRECIPITATION TIME SERIES THAT SHOULD BE OBJECTIVE, MATHEMATICALLY RIGOROUS AND NON-LINEAR. IN THIS WORK, A METHODOLOGY THAT COMBINES BOTH WAVELET AND NEURONAL NETWORK THEORIES IS PROPOSED FOR DETERMINING THE PRECIPITATION SPATIAL COHERENT STRUCTURES. THE OBSERVATIONAL DATA ARE EXTRACTED FROM THE WHOLE DAILY DATA CONTAINED IN THE HISTORICAL DATABASE OF THE SPANISH METEOROLOGICAL CENTRE (INM) FOR THE CLIMATIC STATE 1961-1990. THE SPATIAL DISTRIBUTION OF THE OBSERVATORIES IS IRREGULAR AND THEIR NUMBER DEPENDS ON THE TIME PERIOD. FOR EXAMPLE, FOR THE LAST TIME PERIOD, THERE WERE 4617 PLUVIOMETRIC AND 164 COMPLETE OBSERVATORIES. FROM THESE DATA, THE SERVICIO DE DASARROLLOS CLIMATOLOGICOS OF INM HAS BUILT A DATABASE OF DAILY PRECIPITATION BY MEANS OF SPATIAL INTERPOLATION IN A GRID OF 25 KM USING A KRIGING METHOD. THIS DATABASE IS SPATIALLY AND TEMPORALLY HOMOGENEOUS WITHOUT MISSING DATA. THE SELF-ORGANISED MAPS ARE OBTAINED IN TWO STEPS. FIRST, THE PRECIPITATION SIGNAL IS FILTERED BY DISCRETE WAVELET DECOMPOSITION; THE SYMMLET WAVELET FAMILY IS USED WITH A DECOMPOSITION LEVEL THAT CORRESPONDS TO A CHARACTERISTIC PERIOD OF 10 DAYS. SECOND, CONGLOMERATES ARE OBTAINED FROM A KOHONEN NEURAL NETWORK APPLIED TO THE WAVELET COEFFICIENTS. AS A RESULT, THE ORIGINAL PRECIPITATION TIME SERIES ARE CLUSTERED IN TERMS OF THEIR NON-LINEAR SIMILAR BEHAVIOUR AT THE SELECTED FREQUENCY. INDEPENDENT SPATIAL COHERENT STRUCTURES OR SELF-ORGANISED MAPS ARE ISOLATED IDENTIFYING ZONES CHARACTERISED BY DIFFERENT CLIMATIC REGIME IN AN OBJECTIVELY WAY.

(038) AIR POLLUTION RELATED OBJECTIVE CLASSIFICATION OF AIR MASS TYPES FOR SZEGED, HUNGARY

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ABSTRACT

The aim of the study is to determine characteristic air mass types for Szeged, Hungary for the summer (June, July, August) and the winter (December, January, February) seasons with the concerning concentrations of the main air pollutants. For each air mass types mean atmospheric pressure distribution maps for the Atlantic-European region were constructed in order to detect connection of the atmospheric circulation with air pollution levels in Szeged. The data basis consists of daily values of twelve meteorological and eight pollution parameters for the period between 1997-2001. The classification of the characteristic air mass types was performed by using the methods of factor analysis and cluster analysis. According to the results, for the winter season five, while for the summer season ten prevailing air mass types were detected, respectively. Then, characteristic increase and decrease of the pollutants' concentrations were determined with respect to the air mass types.

**(039) ΔΙΕΡΕΥΝΗΣΗ ΤΩΝ ΜΕΓΙΣΤΩΝ ΚΑΙ ΕΛΑΧΙΣΤΩΝ
ΘΕΡΜΟΚΡΑΣΙΩΝ ΣΤΟΝ ΕΛΛΗΝΙΚΟ ΧΩΡΟ ΜΕ ΤΗΝ ΧΡΗΣΗ ΣΤΟΙΧΕΙΩΝ
ΠΛΕΓΜΑΤΟΣ ΚΟΜΒΩΝ ΑΝΑΛΥΣΗΣ 1,88° ΓΕΩΓΡΑΦΙΚΟΥ ΜΗΚΟΥΣ
ΚΑΙ 1,9° ΓΕΩΓΡΑΦΙΚΟΥ ΠΛΑΤΟΥΣ**

Α. ΠΑΤΡΑ

*ΤΟΜΕΑΣ ΜΕΤΕΩΡΟΛΟΓΙΑΣ ΚΑΙ ΚΑΙΜΑΤΟΛΟΓΙΑΣ, ΤΜΗΜΑ ΓΕΩΛΟΓΙΑΣ, ΑΡΙΣΤΟΤΕΛΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ
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ΠΕΡΙΛΗΨΗ

Στην παρούσα εργασία διερευνάται η χρονική και χωρική κατανομή των μεγίστων και ελαχίστων θερμοκρασιών αξιοποιώντας 36 κομβικά σημεία πλέγματος γεωγραφικού μήκους 1,88° και πλάτους 1,9° ενός παραθύρου που καλύπτει τον ευρύτερο Ελληνικό χώρο (18,75° - 28,13°Α και 33,33° - 42,86°Β). Τα δεδομένα είναι μέγιστες και ελάχιστες ημερήσιες τιμές θερμοκρασίας αέρα επιφανείας εδάφους για την συνεχή περίοδο 1958 – 2000, και προέρχονται από το NCEP/NCAR Reanalysis System σύμφωνα με την τελευταία του αναθεώρηση, όπου το θερμοκρασιακό πεδίο προσδιορίζεται και από πραγματικές παρατηρήσεις και με βάση χαρακτηριστικά του μοντέλου (φυσικές παραμετροποιήσεις). Διαθέσιμα δεδομένα είναι και τα πραγματικά στοιχεία από T_{max} και T_{min} από 7 επιλεγμένους Ελληνικούς σταθμούς που καλύπτουν την περιοχή μελέτης.

Σε ένα πρώτο στάδιο γίνεται έλεγχος της αξιοπιστίας του πλέγματος υπολογίζοντας τους συντελεστές συσχέτισης των παρατηρήσεων κάθε Ελληνικού σταθμού με τις αντίστοιχες τιμές όλων των κομβικών σημείων και ελέγχεται στη συνέχεια η σημαντικότητα αυτών. Σε ένα δεύτερο στάδιο, χρησιμοποιώντας την περιγραφική στατιστική υπολογίζονται οι μέσες, οι απόλυτες τιμές, οι τυπικές αποκλίσεις κατά μήνα, έτος και εποχή για το σύνολο της χρονοσειράς. Σε ένα τρίτο στάδιο χαρτογραφούνται οι χρονοσειρές των ελαχίστων και μεγίστων θερμοκρασιών για το μεγαλύτερο πλήθος των κόμβων από όπου προκύπτουν οι διακυμάνσεις θερμών και ψυχρών περιόδων (ανοδικές – καθοδικές τάσεις), καθώς επίσης και τα ψυχρότερα και θερμότερα έτη. Σε ένα τέταρτο στάδιο υπολογίζονται οι διαφορές στις τιμές των δεδομένων μεταξύ εκάστοτε σταθμού και του αντίστοιχου πλησιέστερου κομβικού σημείου καθώς και η σημαντικότητα αυτών. Η ανάλυση σε κύριες συνιστώσες επιχειρεί μια ομαδοποίηση των δεδομένων και προσδιορισμό ομογενών περιοχών στον Ελληνικό χώρο.

Κύριος στόχος είναι ο προσδιορισμός αποκλίσεων του μοντέλου από τις παρατηρήσεις, αν υπάρχουν, εκτιμώντας έτσι τον βαθμό αξιοπιστίας των παραμετροποιημένων δεδομένων και την δυνατότητα εφαρμογής τους στην Κλιματολογία σε μελέτες τοπικής και περιοχικής κλίμακας.

(039) INVESTIGATION OF DAILY MAXIMUM AND MINIMUM TEMPERATURES AT THE GREEK REGION BY USAGE OF GRID POINT DATA OF ANALYSIS 1,88° LONGITUDE AND 1,9° LATITUDE

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ABSTRACT

The hereby study investigates the temporal and spatial distribution of the maximum and minimum temperature data utilizing 36 grid points of 1,88° longitude and 1,9° latitude of a window that covers the Greek area (18,75° - 28,13°E and 33,33° - 42,86°N). The daily maximum and minimum surface temperature data are referred to the period 1958-2000 and they are derived from NCEP/NCAR Reanalysis System, in compliance with its recent updating, where the temperature field is defined by both observations and model characteristics (physics parameterization). Respective Tmax and Tmin observations are also available from 7 Greek stations, which cover the referenced region.

At a first stage, a reliability test of the grid is carried out evaluating the correlation coefficients of the observed data between each Greek station and all of the grid points, and then the significance of the results is investigated. At a second stage, using the descriptive statistics, the mean, the absolute and the standard deviation values are evaluated per month, year and season referring to the total period of series. At a third stage, the variations of warm and cold periods (up – down trends), as well as the warmest and coldest years are assessed resulting from the illustration of the series of maximum and minimum temperatures, including most of the grid points. At a fourth stage the differences between the values of each station and a grid point, the most adjacent to the station, are estimated, also including the significance of the results. By the application of the principal component analysis the grid data are categorized giving a definition of homogenized areas in Greece.

The main scope of the study is the determination of the deviations of the model from the observations, if there are any, evaluating the degree of reliability of parameterized data and the capability of their implementation to Climatology in local and regional scale.

(040) ΑΠΟΣΥΡΘΗΚΕ – WITHDRAWN