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International Journal of Current Research
Vol. 11, Issue, 09, pp.7315-7324, September, 2019

DOI: https://doi.org/10.24941/ijcr.36626.09.2019

ISSN: 0975-833X

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

WAVELET ANALYSIS OF ANNUAL DYNAMICS OF MAXIMUM TEMPERATURE FROM 1878 TO 2017 AND FORECAST DATA HADLEY CENTER CENTRAL ENGLAND TEMPERATURE (HADCET)

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ARTICLE INFO

Article History:
Received 12th June, 2019
Received in revised form
18th July, 2019
Accepted 20th August, 2019
Published online 30st September, 2019

Key Words:

Central England, The Maximum Annual Temperature, the Dynamics from 1879 to 2017, Wavelet Analysis, Quanta of Behavior.

ABSTRACT

The wavelet analysis of the dynamics of the maximum annual temperature of Central England according to HadCET is carried out by the method of identification of stable regularities. The dynamic series is decomposed into 57 wavelets with a maximum relative error of 0.42%. Based on the forecast of 57 members of the model, 15 members were placed, and 42 members or 73.68% affect the future. Valentina Zharkova's forecast for a small ice age is confirmed, and it will be from 2032 to 2046. The nonlinear two-term trend shows the influence of two forces: the first term is global cooling (the influence of space on the earth's atmosphere), and the second – global warming (the influence of the Earth and humanity). The negative for the third and fourth members is that the fluctuation periods fall from 632.5 and 14.6 years for 1878 to 32 and 5.5 years for 2017. And by 2032, the third member reaches a half-period of 1.4 years. Since 1879, there is an increase in fluctuations and periods decreased by 19.8 and 10.4 times. The increase in frequency indicates a loss of climate stability over 140 years. The forecasts stage from 2018 to 2031 gives further warming from 13.13 to 15.92 ^{0}C. Taking into account the underestimation in the models by 2031, the maximum air temperature can reach 17.51 ^{0}C. At the stage from 2031 to 2046 will be cold from 15.92 to 10.25 ^{0}C. The air temperature will decrease by 55.32%. However, from 2046 to 2051, warming is expected from 10.25 to 13.30 ^{0}C. But then from 2051 to 2066 there will be a heat stroke with an increase in air temperature to 38.36 ^{0}C in 2061 and then a sharp decline to 3.21 0C in 2066. From 2061 to 2074 is the next global cooling from 38.36 to -120.38 ^{0}C. But until 2080 it will be replaced by a rapid rise in temperature to 100.25 ^{0}C. Since then, the oceans will begin to boil and by 2088 the temperature will be as on the planet Venus, reaching a maximum of 795 ^{0}C. The earth will also become lifeless.

***Citation: Mazurkin Peter Matveevich.* 2019.** "Wavelet analysis of annual dynamics of maximum temperature from 1878 to 2017 and forecast data hadley center central England temperature (HADCET)", *International Journal of Current Research*, 11, (09), 7315-7324.

INTRODUCTION

Unprecedented intensification of extreme weather conditions motivates research to understand long-term climate change [Zappalà, 2018]. But the average amplitude for 10 years is used. Therefore, many studies use transformed measurement series. Mathematical methods are limited only by linear trends and averaging. For example, the article [Wang, 1880] shows the dynamics of air temperature on the surface of the world since 1880, the so-called «linear objective assessment". From the standpoint of quantum entanglement [Mazurkin, 2019; Mazurkin, 2019; Mazurkin, 2019; Mazurkin, 2019] in the article [Wang, 1880] "a new analysis of the average annual global air temperature on The earth's surface since 1880, which has a greater coverage and less uncertainty than previous distributions, was carried out».

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However, we believe that the global indicators are also grouped data should therefore be taken only at the beginning point of the measurement, we adopted the initial measurement of the greatest series for Central England (ssn_HadCET_max.txt). Another methodological drawback, for example, of the article [Alvarez-Castro, 2018], is the inclusion of primitive linear models in more complex models of atmospheric circulation. Moreover, the atmospheric dynamics leading to Western European hot summer temperatures since 1851, as stated in the same article, the models of atmospheric circulation, leading to the most intense thermal events, have changed over the last century. Another disadvantage of this article is that temperatures are reduced by removing the linear trend calculated from the time series of summer seasonal means. The purpose of detrending is to eliminate the effect of a well-documented rise in temperature in Europe, which does not depend on weather conditions. Then it turns out that the true picture of the dynamics of a well-known indicator is hidden behind the mathematical tricks of variance analysis.

Unprecedented intensification of extreme weather conditions motivates research to understand long-term climate change [Zappalà, 2018]. But the average amplitude for 10 years is used. Therefore, many studies use transformed measurement series. Mathematical methods are limited only by linear trends and averaging. For example, the article [Wang, 2017] shows the dynamics of air temperature on the surface of the world since 1880, the so-called «linear objective assessment». From the standpoint of quantum entanglement [Mazurkin, 2019] in the article [Wang, 2017] "a new analysis of the average annual global air temperature on The earth's surface since 1880, which has a greater coverage and less uncertainty than previous distributions, was carried out." However, we believe that the global indicators are also grouped data should therefore be taken only at the beginning point of the measurement, we adopted the initial measurement of the greatest series for Central England (ssn_HadCET_max.txt). Another methodological drawback, for example, of the article [Alvarez-Castro, 1851], is the inclusion of primitive linear models in more complex models of atmospheric circulation. Moreover, the atmospheric dynamics leading to Western European hot summer temperatures since 1851, as stated in the same article, the models of atmospheric circulation, leading to the most intense thermal events, have changed over the last century. Another disadvantage of this article is that temperatures are reduced by removing the linear trend calculated from the time series of summer seasonal means. The purpose of detrending is to eliminate the effect of a well-documented rise in temperature in Europe, which does not depend on weather conditions.

Then it turns out that the true picture of the dynamics of a well-known indicator is hidden behind the mathematical tricks of variance analysis. A similar technique "after removal of all global average signals" with the help of various filters is used in the article [Santer, 2013]. The advantage of the article is that the understanding of quantum entanglement in the most dynamic series begins: "Here we study the influence of model and observational uncertainties on our ability to identify an anthropogenic imprint in satellite measurements of stratospheric and tropospheric temperature changes" [Santer, 2013]. The comparison of surface air temperature variability in three coupled integrations of the ocean-atmosphere model over 1000 years was performed according to linear trends. At the same time, changes in surface temperature are the longest and most reliable observational indicator. The record of observations contains both "signals", i.e. forced changes in the climate system, and noise, which is the undisturbed internal variability of the ocean–atmosphere–land surface system. To calculate the evolution of time, subtracting the linear trend would distort the variability of the pattern. For comparison, unchanged observations were used [Stouffer, 1999]. Thus, gradually comes the understanding of the immutability of time series. Time series of global or regional surface air temperature are fundamental for climate change studies [Li, 2016]. The new time series also show a slowdown in China's warming trend over the past 18 years (1998-2015). High-quality climate data sets are the basis for detecting and attributing climate change [Li, 2016]. Therefore, these series should be considered without any changes. Averaging and other types of grouping, of course, are necessary, but they must be performed after the wavelet analysis of constant time series. For example, the average temperature in New Zealand [http://archive.stats.govt.nz] increased at a rate of 0.95 ^{0}C per century, which means that the average temperature in 2016 was 1,0 ^{0}C warmer than in 1909. The average global land temperature increased by 0.9-1.1 ^{0}C over the same period of time. These trends were estimated using linear regression at 95%. Since 1909, New Zealand's warmest year has been 2016. During this period, the average annual temperature was 12.3 ^{0}C. Over the past 20 years, there have been five warmest years: 1998, 1999, 2005, 2013 and 2016. In these years, the average annual temperature exceeded 13.1 ^{0}C [http://archive.stats.govt.nz]. This heuristic description is acceptable, but does not give a pattern. The reasons for the adoption of linear trends is clear. The main thing is the simplicity of identifying linear formulas. For example, according to [https://journals.ametsoc.org/doi/10.1175/JCLI-D-17-0470.1.], the globally averaged feedback on the dynamics of the atmosphere is positive and enhances the reaction to the temperature near the surface on climate change, on average, 8% in the simulation with related models. The limitation associated with the budget of atmospheric mass leads to the fact that the feedback of dynamics on large scales is small in relation to the feedbacks associated with thermodynamic processes. Idealized impact models show that changes in circulation at high latitudes are potentially more effective in influencing global temperature than changes in circulation at low latitudes, and they discuss the implications for past and future climate change [https://journals.ametsoc.org/doi/10.1175/JCLI-D-17-0470.1.]. Monthly and annual temperature differences and their changes were considered [Ding, 1963-2015] on the Tibetan plateau and its surroundings in 1963-2015. Extreme weather and climate events, of which extreme temperatures are one of the most frequently studied because of the length of a number of temperatures and forecasts of temperature, usually more sustainable. The observed daily temperature peaks and lows at weather stations were obtained from the China climate data center (http://cdc.cma.gov.cn/home.do). Annual values are calculated in the same way as monthly values. Also, only linear trends are used [Ding, 2015]. The main methodological error in the selection of extreme values of the indicator is the absence of the date of measurement with the indication of hours. As a result, it is not possible to model periods of fluctuations of highs and lows. It turns out that the extreme values apply to the whole year, which is clearly wrong. The same flaw you have and the ranks of HadCET.

The article [https://journals.ametsoc.org/topic/w2w.] concludes that the main topic of W2W is predictability and weather forecast. Currently, research topics W2W are «growth errors», «uncertainty of cloud scale and predictability of local weather».It includes theoretical studies, numerical simulations and process studies based in part on advanced statistical methods. The goal of W2W is to determine the limits of weather predictability and prepare the best forecasts that are physically possible. W2W focuses on the most important reasons for the remaining uncertainties (read – quantum [Mazurkin, 2019]) in weather forecasting [https://journals.ametsoc.org/topic/w2w.]. A complex model is given in the article [Sinokrot, ?]. According to it, the energy balance takes into account the influence of air temperature, solar radiation, relative humidity, cloudiness and wind speed on the net rate of heat transfer through the water surface, as well as the thermal conductivity between the water and the river bed. It is shown that the effect of flux on solar radiation varies from 30 to 100%, and the effect of wind from 10 to 30% depending on the nature of the flux. Values are associated with the width of the stream and season because of the changing

Table 1. Maximum annual temperature (according to Headset)

No. p / n	Year	Time τ , years	t , °C	Tailings ε_{57}	Relative error Δ , %
1	1879	1	10.52	0.0175031	0.17
2	1880	2	12.54	-0.023438	-0.19
3	1881	3	12.12	-0.051185	-0.42
4	1882	4	12.99	-0.0020348	-0.02
5	1883	5	12.70	-0.0258254	-0.20
…		…	…	…	…
135	2013	135	13.29	0.0351728	0.26
136	2014	136	14.75	-0.0131567	-0.09
137	2015	137	14.17	-0.00795836	-0.06
138	2016	138	14.18	-0.00402374	-0.03
139	2017	139	14.30	-0.00292021	-0.02

Table 2. The parameters of models of the dynamics of the maximum temperature(left wavelets affecting the future)

Number i	Wavelet $y_i = a_{1i}x^{a_{2i}} \exp(-a_{3i}x^{a_{4i}})\cos(\pi x/(a_{5i} + a_{6i}x^{a_{7i}}) - a_{8i})$								Coef. corr. r
	The amplitude (half) the fluctuations				The half-period of oscillations			Shift	
	a_{1i}	a_{2i}	a_{3i}	a_{4i}	a_{5i}	a_{6i}	a_{7i}	a_{8i}	
1	2.71559	0	0.035513	1.07413	0	0	0	0	0.7023
2	7.73307	0.12096	0	0	0	0	0	0	
3	0.54651	0	2.93024e-5	1.88045	316.24348	-2.01841	1.00254	-6.26821	
4	3.14912	0	0.85428	0.30062	7.30734	-0.0024517	1.33791	1.99219	
5	0.1427	0	0.0056849	1	22.53390	0.0085751	1	1.76368	0.1304
6	0.067941	0	-0.00011684	1.87805	1.97673	0.00029667	1.02498	-1.09258	0.1636
7	-0.098983	0	-0.38203	0.16316	2.63285	0.00082132	1.06945	3.45019	0.2811
8	0.012214	0	-0.027357	1	1.37362	-7.20491e-8	1	3.06997	0.2807
9	0.087155	0	-0.42135	0.19509	3.82333	0	0	5.88058	0.3314
10	0.20345	0	0.0051672	1	1.26504	0	0	-0.42364	0.2302
11	3.65673	0	2.76627	0.080315	5.27453	0.024985	0.55837	1.41723	0.1441
12	0.017614	0	-1.39363	0.10513	7.68937	-0.0089827	0.70595	-3.23896	0.2426
13	0.092843	0	-0.00014355	1.58645	10.09960	-0.00046679	1.38030	-0.67582	0.1780
14	0.021703	0	-0.44121	0.24259	16.38120	-0.0059755	0.95273	0.61785	0.1233
15	0.15599	0	-0.0010865	1	1.19750	0	0	4.75276	0.2873
19	-0.19304	0	7.84243e-5	1.73538	2.24833	0.0028409	0.47679	-0.71288	0.3468
20	0.00023519	1.76944	0.00047456	1.77878	1.93097	0	0	1.73348	0.2721
21	-0.16457	0	5.13749e-5	1	4.29378	-0.48912	0.15551	-2.56486	0.3741
24	0.019061	0	-0.00026095	1.82052	3.07419	-0.00045737	1.17054	-3.53395	0.1666
28	1.21833e-6	3.17284	0.0010763	1.68765	4.02374	-0.16265	0.23950	-1.32651	0.5300
30	-0.0074589	0.70510	0.014016	0.89769	6.67658	-6.85916e-5	1.48379	-2.33941	0.3090
31	1.80243e-12	7.05685	0.051488	1.07640	4.56778	-0.0027814	0.84711	-0.61617	0.4741
32	0.50210	0	1.44891	0.14612	4.34358	0.016344	0.74154	3.61052	0.2182
33	-0.00058830	1.31473	0.0017232	1.48901	1.08877	0	0	0.54959	0.2361
34	-0.023779	0	-0.00010111	1.82605	1.25852	0	0	1.11255	0.1806
35	0.00014918	1.52526	0.023419	0.90443	4.31441	-0.0027707	0.98033	-0.81863	0.1546
36	-3.59446e-6	2.12405	0	0	0.9991	0	0	0.015135	0.5160
37	-4.68120e-10	5.51445	0.026209	1.18711	1.12673	0	0	-2.90000	0.5259
38	0.0016216	0.91135	0.12600	0.49111	1.05701	0	0	0.43489	0.1930
39	0.00018919	1.77909	0.0024566	1.39676	1.17454	0	0	-2.64210	0.6413
41	0.023806	0.15897	0.00092346	1	1.48626	0.00085647	0.066247	5.70202	0.4600
43	0.00014199	1.31502	0.014584	0.98517	4.47329	0.0013085	0.98809	2.04179	0.0959
44	0.00063360	1.13988	0.011669	0.98677	2.50079	-0.00050544	1.08551	-5.92647	0.4293
45	-1.71864e-10	5.63726	0.049360	1.06973	0.78039	0	0	-1.17097	0.3872
46	0.027028	0	0.20591	0.18600	1.03393	0	0	-2.82348	0.2172
48	-9.31524e-5	0	-0.047268	0.99952	1.76326	0	0	2.13725	0.2861
50	-3.40533e-15	8.05438	0.024047	1.22572	1.57574	0	0	4.54592	0.5734
51	2.56573e-9	0	-0.11174	1.02360	27.58807	-0.037899	1.01501	2.78452	0.2895
52	-0.010216	0.14469	0.0043828	1.01453	1.64125	0	0	3.26225	0.3111
55	0.00078184	1.64327	0.43268	0.55510	8.85281	-0.023855	0.78186	1.05284	0.2314
56	1.68633e-7	3.18811	0.029409	1.02540	2.63137	-0.00034499	0.81116	-2.08942	0.3267
57	0.012448	0	-0.00028864	1.49543	3.42949	-0.0044776	0.80125	0.29614	0.4998

Note: italics predcitions, and bold critical wavelets.

leaf cover in the trees on the streams. After calibration, the accuracy of hourly and daily water temperature forecasts for several weeks is in the order of 0.2-1 °C. The article [Sinokrot, ?] also shows that solar (short-wave) radiation is the most important component of the heat flow over the water surface, but none of the other components, i.e. long-wave radiation, evaporation and convection into the atmosphere, are insignificant. Conducting heat exchange between the channel and water is an important component of the thermal balance in shallow water. Factor analysis we will show in a separate article between the maximum, minimum and average annual temperatures of Central England. In conclusion, the influence of temperature indicate that it is possible to consider the urban climate separately.

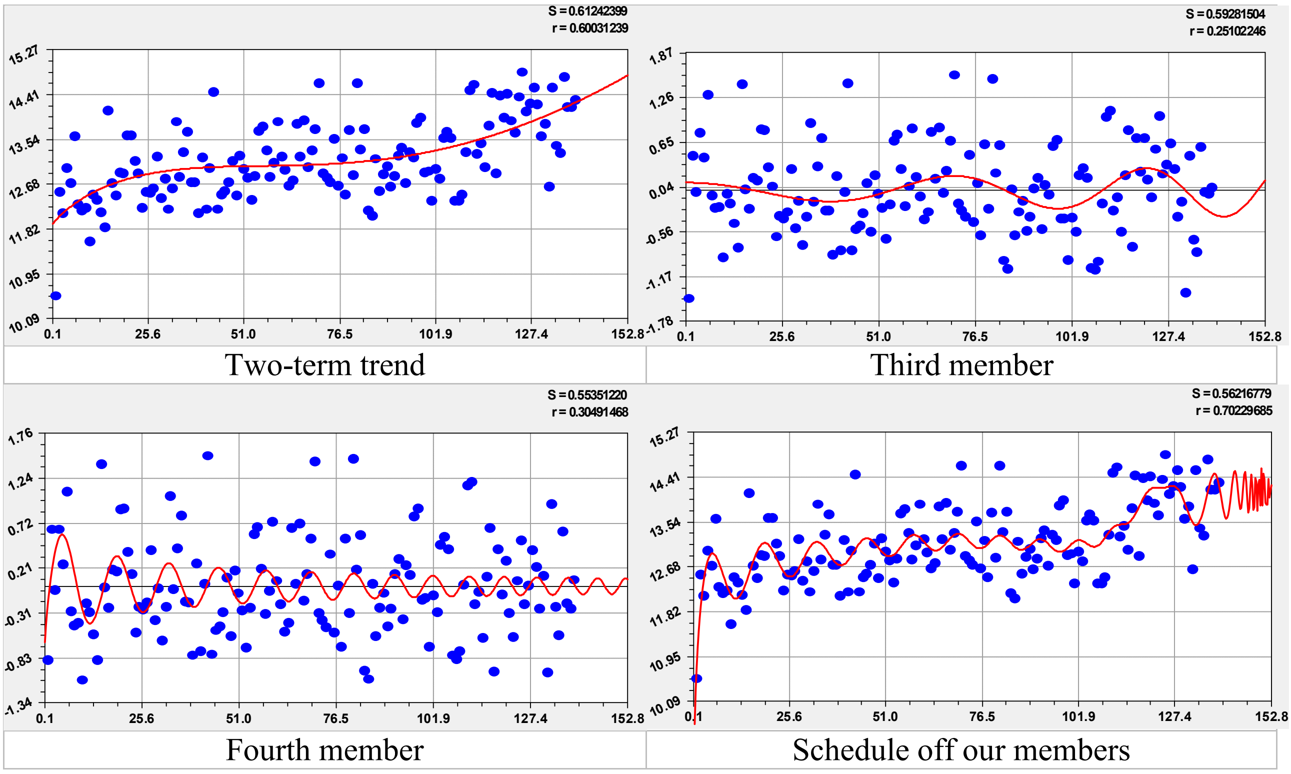


Figure 1. First, the members of model of dynamics of the maximum temperature: S - dispersion; r - correlation coefficient

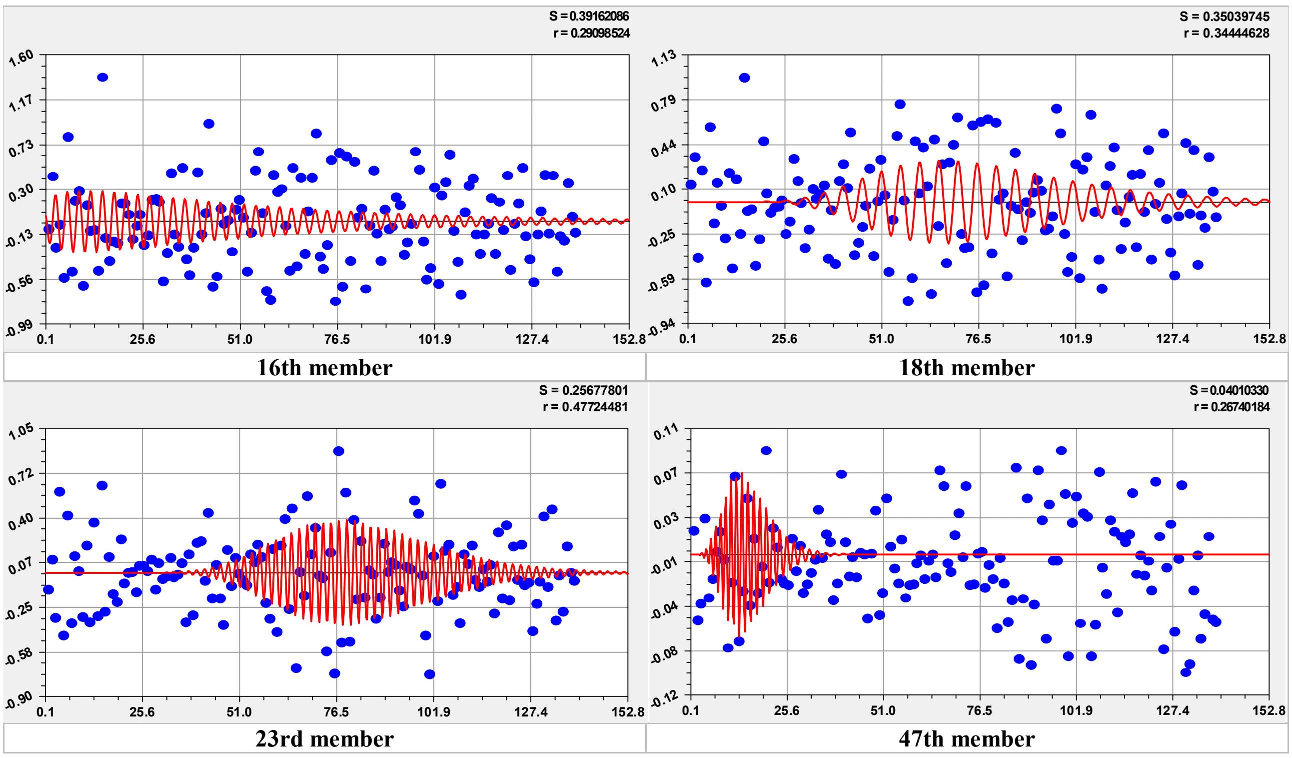


Figure 2. Wavelets from the past dynamics of the maximum temperature

For example, according to [Kislov, 2017], the intensity of the heat island of the city of Moscow, characterized by the data of surface observations, has increased in the last 15 years, and despite the pause in global warming. Discovered that vertical Islands can be traced to a height of 2 km. In summer, the lower part of the heat island is an island of dryness, while the upper part of the heat island corresponds to the island humidity. In winter, in the lower part of the island heat released island humidity [Kislov, 2017].

Any phenomenon or process can be estimated by the level of adequacy (correlation coefficient) of the decomposition of the functional connectivity of the climate into quantum promiscuity (certainty), and the relationship between the climate parameters will give quantum entanglement. Moreover, when forecasting on the forecast horizon, equal to a third of the forecast basis [Mazurkin, 2019], oscillations appear from the set of wavelets, which, due to the sharply increasing amplitude, give quantum entanglement. In this article, the quanta of behavior of the first type differ: in dynamics, each

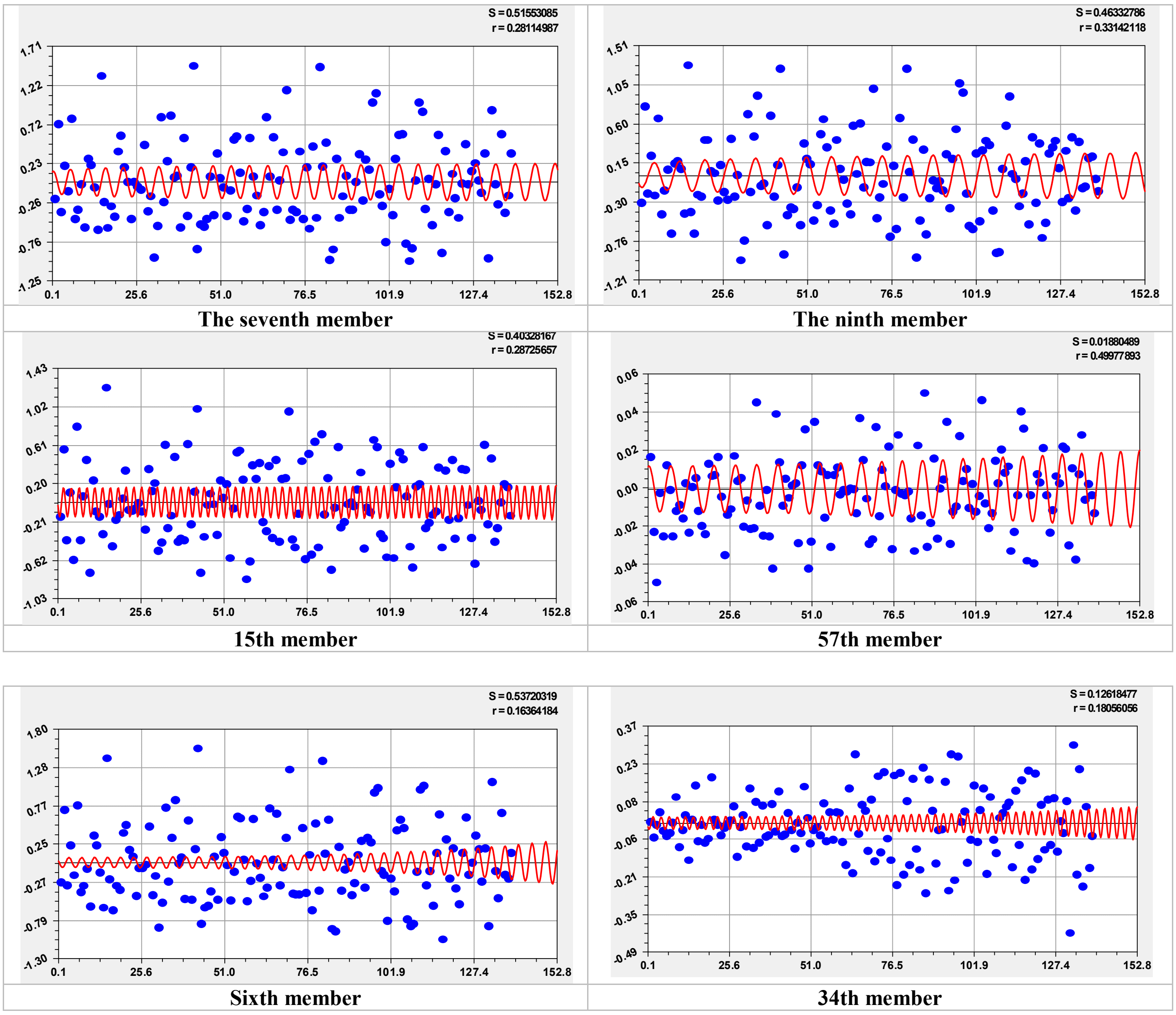
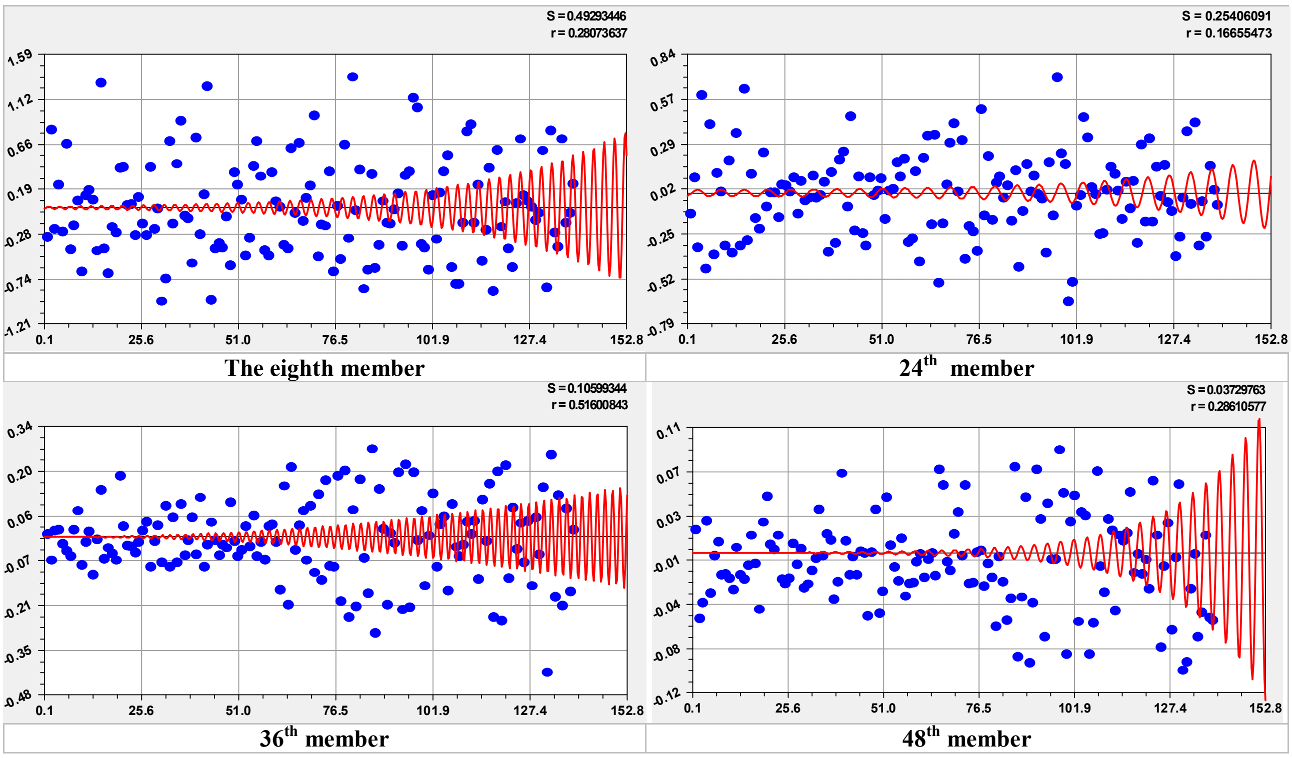


Figure 4. Pre-critical wavelets of maximum temperature dynamics



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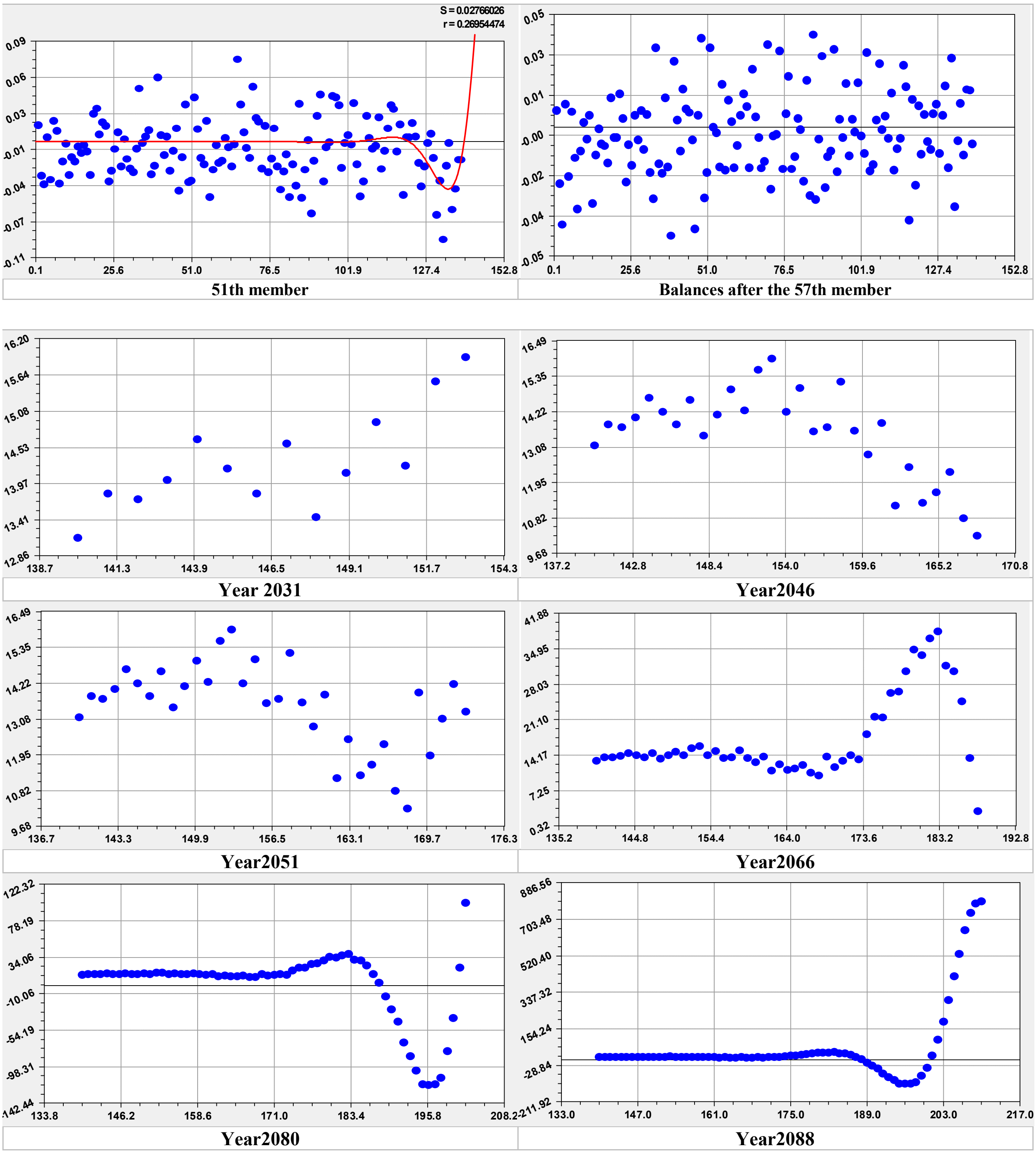

Figure 6. Maximum temperature forecasts

factor (in this article, the maximum annual temperature from 1878 to 2017) is divided into the sum of wavelets, that is, in time, the factor is represented as a bundle of solitary waves (solitons) and this process is characterized as *quantum promiscuity (certainty)*. And each wavelet is a separate quantum of behavior. In time, they belong to the infinite-dimensional or finite-dimensional wavelets (solitons, solitary waves). Forecasting with the increase of the forecast horizon (with the constancy of the forecast base) gives the transition from certainty to quantum entanglement. We will show this in the forecast of the maximum annual temperature in the future from 2018 to 2088 (70 years) from the base of the forecast in 2017 – 1878 = 140 years. As a wavelet, any quantum of behavior in time can be attributed to two groups: 1) occurred in the basis of the forecast up to the time of interruption of measurements that do not affect the projected future; 2) passing to the future time, and they affect the future behavior of the object of study. The second group of wavelets forms a set of predictive *model equations*. Calculations on them, as the forecast horizon grows, give a high *critical quantum entanglement* due to a sharp increase in the amplitude of some oscillations. By eliminating these critical wavelets, we obtain a predictive model *of moderate quantum entanglement*. Further, excluding from the list of wavelets the precritical equations that give a smooth slight increase in the future amplitude of oscillations, we obtain a normal predictive model with *low quantum entanglement*. With this approach, the table of parameters of the model can exclude those wavelets that are characteristic of the time at the base of the forecast and occurred from the beginning to the end of the base of the forecast. And the remaining equations will be further divided into three groups: *normal* (without taking into account pre-critical and critical wavelets), *pre-critical* (without taking into account critical wavelets) and *critical* (all passing to the future wavelets) *predictive models*.

Source data: The data are given in table 1 (ssn_HadCET_max.txt). A total of 57 components of the General model (1) were obtained by the method of identification [7]. The balances in table 1 are calculated as the difference between actual and calculated data. Then the relative error after the last 57th term is equal. The maximum relative error of the General model according to table 1 will be -0.42%. The maximum absolute error is less than $\pm$ 0.05 ^{0}C. The total number of 139 values without taking into account the sign from table 1 was distributed as follows: 0-0 by the intervals of relative error.1% – 63 pieces; 0.1 –0.2% – 37; 0.2 – 0.3% – 28; 0.3 – 0.4% – 10; more than 0.4% – 1 pieces. Thus, in the range from 0 to $\pm$ 0.5 % of the relative error located all 139 or 100% of the maximum annual temperatures.

Wavelet analysis: We understand any dynamic series as a series of signals. The time is $\tau = 0$ taken from the beginning of the reference time of the basis of the forecast since 1878. Then we obtain the positive x-axis. Wavelet signal, as a rule, of any nature (object of study) is mathematically recorded by the wave formula [7] of the form

$$y_i = A_i \cos(\pi x / p_i - a_{8i}),$$
$$A_i = a_{1i} x^{a_{2i}} \exp(-a_{3i} x^{a_{4i}}),\ p_i = a_{5i} + a_{6i} x^{a_{7i}}, (1)$$

where y – the index (dependent factor), i – the number part of the model (1), m – is the number of terms in the model (1), in our case equal to 57, x – is the explanatory variable (influencing factor), $a_1 ... a_8$ – the parameters of the model that accepts numeric values in the course of structural-parametric identification in the software environment CurveExpert-1.40 (URL: http://www.curveexpert.net/), A_i – – the amplitude (half) of wavelet (axis y), p_i – half-period fluctuations (axis x). According to the formula (1) with two *fundamental physical constants* e (the number of Neper or the number of time) and π (the number of Archimedes or the number of space), *a quantized wavelet signal* is formed from within the studied phenomenon and/or process. The concept of wavelet signal allows us to abstract from the physical meaning of many statistical series of measurements and consider their additive decomposition into components in the form of a sum of individual wavelets. A signal is a material carrier of information. And we understand information as *a measure of interaction*. The signal can be generated, but its reception is not required. A signal can be any physical process or part of it. It turns out that the change in the set of unknown signals has long been known, for example, through the series of meteorological measurements. However, there are still no statistical models as the dynamics of weather parameters at the weather station. At the information technology level, the 23rd Hilbert problem (development of methods of variational calculus) was solved by us [Mazurkin, 2014]. At the same time**,** *the variation of functions* is reduced to the conscious selection of stable laws and the construction of adequate stable laws on their basis.

We adhere to the concept of Descartes on the need to apply an algebraic equation of General form (1) directly as a finite mathematical solution of unknown differential or integral equations.

Regularities of the dynamics of maximum air temperature: Based on the forecast of 57 members of the General model (1), 15 members were placed, and 42 members or 73.68% affect the future (table. 2). Of the 42 wavelets taken into account in the forecasts up to 2088, 35 are normal (of which the first four terms are obtained from the capabilities of the program environment CurveExpert-1.40) laws. Predicate schema be two members, and critical fluctuations are the five wavelets. These seven terms can create quantum entanglement. After 2088, the predicted temperature values are abnormally high. Forecast [19] within the 2030-2040 that will reduce the temperature of the air confirmed. This period will begin in 2032 and will continue until 2046. The negative sign in front of the model component shows that it is critical to increase the maximum surface air temperature. A total of 12 such members (table. 2). The remaining 30 members have a positive sign and this indicates the desire to increase the maximum temperature at this point of the Earth.

The first term from table 2 of the two-term trend is modified by us [Mazurkin, 2014] Laplace's law (in mathematics), Mandelbrot (in physics), Tsipf-Pearl (in biology) and Pareto's law (in econometrics). Modernization involves the management of the third model parameter 1.07413 that in the known laws equal to 1. It shows the intensity of the exponential decline over time of the maximum air temperature in Central England. As a rule, the first member of the model is a natural component, and the second and subsequent members of the model (1) show biotechnical, in particular anthropogenic, influence. The second term of the exponential growth law gives a dynamic increase in the maximum air temperature. Then it turns out that the trend shows the influence of two forces: the first member is global cooling (the influence of space on the earth's atmosphere), and the second – global warming (the influence of the Earth and humanity).

The third and fourth terms have the amplitude of oscillation according to the law of exponential death (the Laplace law modified by us). Therefore, both wavelets are infinite-dimensional, since due to Laplace's law, the amplitude change shows the continuation of values up to 1879 and after 2017. The negative is that the periods of these fluctuations decrease, ranging from $2 \times 316.24348 \approx 632.5$years and 14.6 years as of 1878. For 2017, these two wavelets had a period of oscillation of only 32 and 5.5 years. And by 2032, the third term reaches a half-period of 1.4 years, and then the parameter a_{5i} gets a negative value. Then the first wavelet (the third term) is already critical. In General, the four-membered model (1) provides adequacy for maximum air temperature dynamics with a correlation coefficient of 0.7023 (adequacy level – strong coupling). The other terms give different correlation coefficients, the maximum of which 0.6413 is obtained for the 39th term. In table 2, the minimum half-period of oscillation was 0.9991 years for the 36th critical member. Then it turns out that to identify the cyclicity of less than a year, it is necessary to take into account monthly (but it turned out that the influence of the moon on the air temperature is insignificant) and daily (the earth's revolution around itself) measurements. But, as you know, the change of day and night dramatically changes the temperature.

Therefore, in the future, extreme values of air temperature should be recorded every at least three hours [9-12]. Only then is it possible to take into account the actual maxima and minima of temperature in the surface layer of the atmosphere. In this case, the uniform abscissa scale according to HadCET will turn into an uneven scale.

The first pattern of the dynamics of the maximum temperature: Trend contains two members (Fig. 1) and obtained a correlation coefficient of 0.6003. Moreover, the pattern is clearly nonlinear, so we consider attempts to apply linear models in climatology to be an obvious simplification. Although the linear equation has a correlation coefficient of 0.5610, however, in the identification method [Mazurkin, 2014], we use the linear model only as the beginning of the modeling process. The reason for the «love» of scientists to approximate linear trends lies in only one thing – linear models are universal to the positive and negative halves of the abscissa. Linear models are valid only on short dynamic series, and on long ones, as in this example in 139 years, linear trends are very rough and primitive. The first wavelet as the third term of the General model (1) (Fig. 1) with a correlation coefficient of 0.2510 after the Union changed sign in amplitude and became the law of exponential death. This led to tremor (shaking after 2017). Second wavelet with адбекватностью 0.3049 has not changed in design. As can be seen from the General schedule for the four members, after 2017 there is a tremor (jitter) due to a significant decrease in the half-period of oscillations. It turned out that this jitter will change by other wavelets, but the forecast even at the heuristic level is disappointing: at this point the maximum temperature of the air on the surface of the earth's land will change randomly. As a result, the climate at this point, and hence on the whole Earth, will be predictable only for all 42 wavelets. This manifests the integrity of the climate. However, this statement requires checking for more reliable measurement data along the time axis, including, in addition to the maximum temperature, the exact coordinates of each value of the indicator (year, month, day, hour).

Wavelets that do not affect the forecast for the future: We show the graphs of the four most characteristic wavelets of the total number 15 (100 15 / 57 = 26.32%), which do not affect the future (Fig. 2). The maximum amplitude of the 16th member was observed around 1890, and then the amplitude of the oscillation gradually decreased, reaching almost zero in 2017. Then, from 2018, this fluctuation will no longer affect the dynamics of the maximum temperature of the surface air layer. But the 18th term has clear boundaries at the beginning and end of the oscillation, so this wavelet becomes finite-dimensional. It began around 1878 + 25 = 1913 and will continue until 2030. However, the transition to the future is insignificant, so this fluctuation can also be attributed to the group that does not affect the forecasts. Further, the 23rd member is also similar to the 18th member, but has boundaries of influence in the past from 1916 to 2017. Even further inretrospectis the 47th wavelet. Then it turns out that there are different wavelets on the time axis, and in the future new vibrational disturbances may appear, the beginning of which is earlier or further than the end of the forecast base. This uncertainty and does not allow you to fully trust the forecasts. The larger the forecast horizon, the less likely the adequacy of the forecast.

Normally affect the future of wavelets: Of the 42 wavelets, 34 are normal members (the third term we have attributed to the generators of quantum entanglement) of the 57 members (100 34 / 57 = 59.65%). The most characteristic of the acceptance of normality is the seventh term (Fig. 3). Here the amplitude of oscillation varies little (slow increases or decreases, or has constant amplitude). From the data of table 2 it can be seen that the amplitude of the oscillation slowly increases according to the law of exponential growth. In the ninth member, the amplitude of the oscillation also slowly increases. In this case, the half-period of oscillation is not important for selection in normal wavelets. Therefore, the third member can also be conditionally attributed to this group.

Wavelets 15 and 57 also have a slowly increasing oscillation amplitude. Of course, all the oscillations decreasing in amplitude, but continuing their influence on the future, quite obviously become normal. As can be seen from the graphs, all normal wavelets have a quiet continuation in time for the future, while the amplitude of the oscillations in the forecasts increases slightly. And this circumstance becomes important for forecasting on one third of the basis of the forecast (forecast) or on full length of the basis of the forecast (approximate forecast). The range of dynamics of the maximum annual temperature of Central England has almost 60% of normal wavelets.

Pre-critical wavelets for the future: Pre-critical and critical wavelets are conditional. Figure 4 shows graphs of only two pre-critical wavelets (3.51%). So we called fluctuations, which relative to the horizon of the forecast changes relatively little, but still in the direction of increasing amplitude. The result of such selection of wavelets will be known only after direct calculations on the forecast horizon in the Excel software environment. In this example, pre-critical and critical wavelets cancel each other out, so the prediction was only possible for all 42 members.

Critical dynamics wavelets for the future: Five future critical wavelets are shown in figure 5. They were enough in the dynamic series according to table 1 (8.77% of 57 members). The 51st member is especially interesting. It almost started in 1978 and therefore such a sharp increase in amplitude according to the law of exponential growth, apparently, did not go unnoticed for climatologists in England. It is this oscillation that determines the wave line of the forecast until 2088. Figure 5 at the end shows a scatter plot of the residuals after the 57th term. They have less standard error of measurements of temperature (0.1 ^{0}C for the price of division of the instrument, especially in the late 19th century) to $\pm$ 0.05 ^{0}C the remains after a 57-year member of the steel is less than that of the measurement error.

Maximum temperature forecasts for the future: Direct calculations in Excel, figure 6 graphs the forecasts. The first stage from 2018 to 2031 is characterized by further warming from 13.13 0 C to 15.92 ^{0}C. In fact, the maximum temperature was registered for 2018 (https://www.metoffice.gov.uk/ hadobs/hadcet/data/download.html) in the surface air layer 14.72 ^{0}C. In comparison with 2017, the actual temperature increase was equal to 14.72 – 14.30 = 0.42 ^{0}C. The deviation of the calculated values in table 1 for 2017 was -0.02% and also equal to 14.30 ^{0}C. As a result, the calculated for all signs of numbers in the program environment CurveExpert-1.40 is more accurate compared to the record of five significant digits in the model parameters (1) in table 2. Therefore, the difference from the actual value of 14.72 ^{0}C for 2018 calculated by 42 equations from table 2 to 13.13 ^{0}C, equal to 1.59 ^{0}C or 100 (14.72 – 13.13) / 14.72 = 10.80%. Then all forecasts become somewhat understated, and the real picture of climate dynamics in Central England can be much more dramatic. Taking into account the underestimation in the models by 2031, the maximum air temperature can reach 10% more than the value of 15.92 ^{0}C and will be 17.51 ^{0}C. Then we can conclude that we need annual iterations of 57 wavelets, taking into account the maximum air temperatures. And every year it is necessary to consider the forecasts taking into account the full record of the model parameters (for example, take the first parameter of the first member instead of 2.71559 in the table the value 2.71558837237 E+000 on the printout of the software environment). At the second stage from 2031 to 2046 there is a cooling from 15.92 to 10.25 0C. The decrease in air temperature will occur at 100 (15.92 – 10.25) = 55.32%. This stage coincides with the forecast for 2030-2040 for solar activity [34] and it may be a small ice age.

However, from 2046 to 2051, warming is expected in Central England from 10.25 to 13.30 0C. This is a very short period of global warming relaxation. But then in the next stage from 2051 to 2066 there will be a heat stroke with an accelerated increase in the maximum air temperature to 38.36 ^{0}C in 2061 and then a sharp decline to 3.21 ^{0}C in 2066. The next stage from 2061 to 2074 is the probable global cooling from 38.36 to -120.38 ^{0}C. In figure 6, this global cooling to 2080 will be replaced by a rapid rise to 100.25 ^{0}C. Since then, the oceans will begin to boil and after 8 years by 2088 the temperature will be as on the planet Venus, reaching a maximum of 795 ^{0}C. From this point in time, an even more terrible global cooling may begin. Thus, the earth's atmosphere since 2051 will go to the dressing. Oscillatory adaptation is already broken, and before the destruction of the mechanism of adaptation of the atmosphere at the point of Central England long. For the adoption of effective measures to stabilize the oscillatory adaptation to climate change to 2051 remained for 32 years.

Conclusion

For each ground-based weather station it is necessary to study *the point distributions* of meteorological measurements, in this article the maximum annual temperature of Central England according to HadCET. The dynamic series was decomposed into 57 wavelets with a maximum relative error of 0.42%. Direct calculations in Excel for them with five significant figures in the parameters of the model (1) allowed us to give forecasts for the stages up to 2088. As a wavelet, any quantum of behavior in time can be attributed to two groups: 1) occurred in the basis of the forecast up to the time of interruption of measurements that do not affect the projected future; 2) passing to the future time, and they affect the future behavior of the object of study. Based on the forecast of 57 members of the General model (1), 15 members were placed, and 42 members or 73.68% affect the future. After 2088, the predicted temperature values are abnormally high. Therefore, since 2051, due to the anomalous behavior of the third member, quantum entanglement has already begun. Forecast Valentina Zharkova on small ice age in the 2030-2040 confirmed. This period will begin in 2032 and will continue until 2046. The nonlinear two-term trend shows the influence of two forces: the first term is global cooling (the influence of space on the earth's atmosphere), and the second – global warming (the influence of the Earth and humanity). The third and fourth members are the amplitude of the oscillations according to the law Expo-nentially death. Therefore, both wavelets are infinite-dimensional, since the amplitude change shows the continuation of the values before 1879 and after 2017. The negative is that the periods of these fluctuations decrease, ranging from $2 \times 316.24348 \approx 632.5$ years and 14.6 years as of 1878. For 2017, these two wavelets had a period of oscillation of only 32 and 5.5 years. And by 2032, the third member reaches a half-period of 1.4 years. As a result, since 1879 there has been a strong increase in the frequency of oscillations, when the periods of oscillations decreased by 19.8 and 10.4 times. An increase in the frequency of oscillations indicates a loss of climate stability.

For the first four members after 2017, tremor (shaking) is observed due to a significant decrease in the half-period of oscillations. It turned out that this jitter until 2088 will change other wavelets, the maximum temperature will change cycles of cooling and warming. The first phase from 2018 to 2031, the year was characterized by further warming from 13.13^{0}C 15.92 ^{0}C. Due to five significant digits in the parameters of the model calculations for the forecasts proved to be understated.
The real picture of climate dynamics in Central England can be much more dramatic. Taking into account the underestimation in the models by 2031, the maximum air temperature can reach 10% more than the value of 15.92 ^{0}C and will be 17.51 ^{0}C. At the second stage, from 2031 to 2046, cooling is expected from 15.92 to 10.25 0C. The decrease in air temperature will occur at 100 (15.92 – 10.25) = 55.32%. This stage coincides with the forecast for 2030-2040 for solar activity and it may be a small ice age. However, by 2046 2051 years expected warming in Central England with up to 10.25 13.30 ^{0}C. But then in the next stage from 2051 to 2066 there will be a heat stroke with an accelerated increase in the maximum air temperature to 38.36 ^{0}C in 2061 and then a sharp decline to 3.21 ^{0}C in 2066. The next step 2061 to 2074 year is likely global cooling from 38.36 to – 120.38 ^{0}C. Is global cooling until 2080 replaced by rapid temperature rise to 100.25 ^{0}C. From this point in time the oceans will begin to boil to the year 2088, the temperature will become like the planet Venus, reaching a maximum temperature at 795 ^{0}C. Apparently, this time the Earth will become lifeless.

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