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SOILS AND CLIMATE, V. R. Volobuyev, ~~"Iz. Ak. Nauk SSSR, Ser. Geograf. i Geo-fiz", Vol. XIII, No 5, Sept/Oct 1949, pp. 455-472~~

The soil map ~~of the~~ world ~~compiled~~ drawn up by Academician L. I. Prasolov (in Volume I of the Great Soviet World Atlas), ~~which objectively~~ synthesizes ~~the factual~~ data on the soils of the world obtained by Soviet and foreign pedologists and ~~soil scientists, made it possible to study~~ permit soil-climate ~~relationships~~ studies on the basis of the newest and most accurate data of world soil and climatic cartography.

The climatic characteristics of all ~~the~~ soil types ~~represented~~ on this world soil map ~~were~~ are obtained by superimposing on the soil map ~~the~~ maps ~~of~~ isohyets and (yearly) isothermals. ~~The~~ transference of these climatic characteristics to a rectangular graph with ~~the~~ average yearly temperature and the yearly ~~amount of~~ precipitation as coordinates (Figure 1) showed that

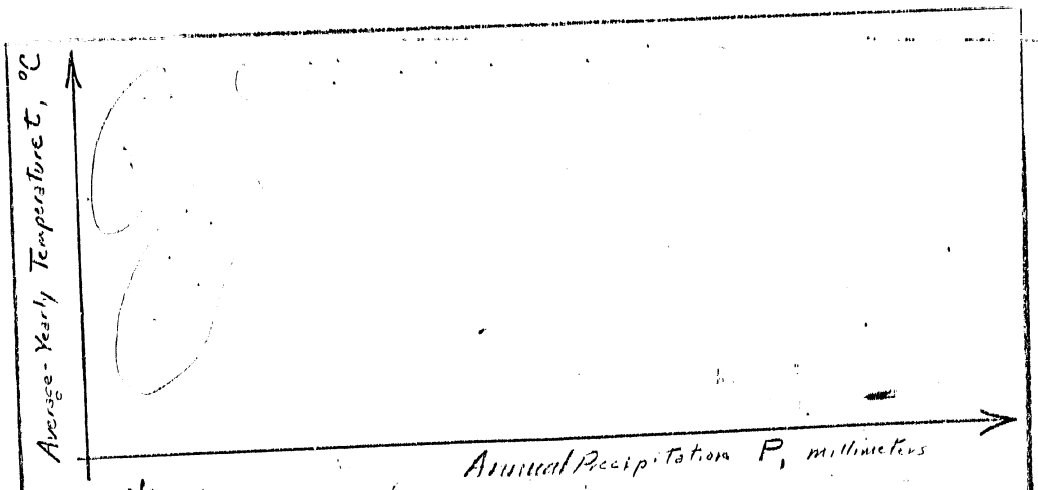

Fig. 1. ~~Soil~~ Pedo-Climatic Indices of Certain Basic Soil Types

1 - Chestnut Soils, 2 - ~~Podzolic~~ Podsolic Soils, Mainly of Coniferous Forests, 3- Red Soils, Mainly ~~Opodzolized~~ Podsolized (Having Acquired Podsolic Properties), 4- ~~Desert~~ Desert Soils (Sahara)

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the climatic ~~criteria~~ indices for each soil type are ~~arranged in~~ grouped within definite boundaries ~~of~~ climatic ~~conditions~~. This ~~that permits~~ isolation, on the climatic graph, ~~of~~ certain ~~fields~~ regions with a predominance of climatic indices with respect to ~~this~~ one or another soil type. These ~~fields~~ regions on the map characterize the climatic conditions governing the spread of ~~the~~ individual soils, and are called "pedo ~~soil~~-climatic areals ~~arcoles~~" (Figure 2). The form of the

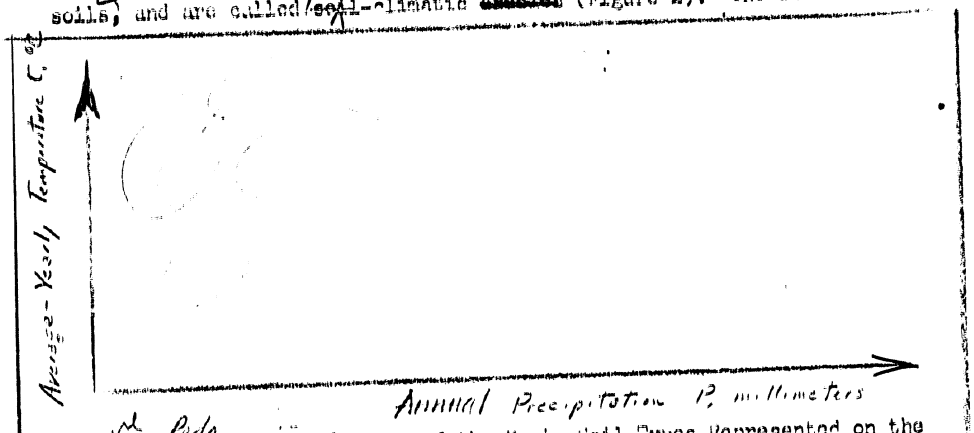

Fig. 2. Pedo ~~Soil~~-Climatic Areals of the Basic Soil Types Represented on the Soil Map ~~of the~~ World: 1 - Gray Desert Soils and Desert Soils, 2 - Chestnut Soils, 3 - Black Earths ~~Mars~~, 4 - Podzolic Soils, 5 - Tundra Soils, 6 - Brown Soils, 7 - Red Soils and Yellow Soils of the Subtropics, 8 - Laterites, 9 - Red Soils, Mainly Podzolized ~~Upodzolit~~, 10 -- Weakly lixiviated (leached) ~~Lixiviated~~ Soils of Dry Forests, 11 - Reddish Brown Soils of Savannas ~~Savanna~~

The form of ~~the~~ individual areals ~~arcoles~~ indicates ~~the existence of~~ ~~certain~~ several pedo ~~soil~~-climatic series. Consideration of the entire set of pedo ~~soil~~-climatic areals ~~arcoles~~ permits one to see isolation ~~of~~ curvilinear series that limit ~~the~~ the climatic conditions governing the spread of gray desert, chestnut ~~chestnut~~, black earth, and podzolic soils. Clearly evident is The series of ~~the arcoles of~~ podzolic areals ~~soil formations~~, including tundra soils, podzolic ~~podzolit~~, brown forest, yellow-earth subtropic and

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red earth, mainly podsolized soils of equatorial rain forests. The subdivision into series of the second-order of the first series of certain thermal variants is also definitely possible.

The regularity of the curves suggests a certain general dependence and hence is amenable to mathematical treatment. Filosofov's mathematical studies (1) showed that all the curves could be described by one general formula: $t = 43.2 \lg P - Hf$. This formula was found by graphing the relation $t = f(\lg P)$ for the line boundary between black earth (D) and forest-steppe (DE) hydroseries, which occupies a middle position in the system of hydrothermotypes and is at the same time most fully substantiated by present pedo-climatic areals. Logarithmic anamorphosis of this curve proved rectilinear with an angular coefficient of 43.2. The remaining hydroseries corresponds well with this formula when different values of Hf are used. Hf is called the hydrofactor.

The new series of curves (Figure 3), drawn from the above formula, corresponds almost exactly with the original series of curves. This in itself indicates that the original curves actually reflect a certain real and general regularity.

The question naturally arises: Why the differences as revealed by these curves? The order of variation of the soil series from gray desert soils through chestnut and black soils to podsolic indicates that individual series differ chiefly in moisture.

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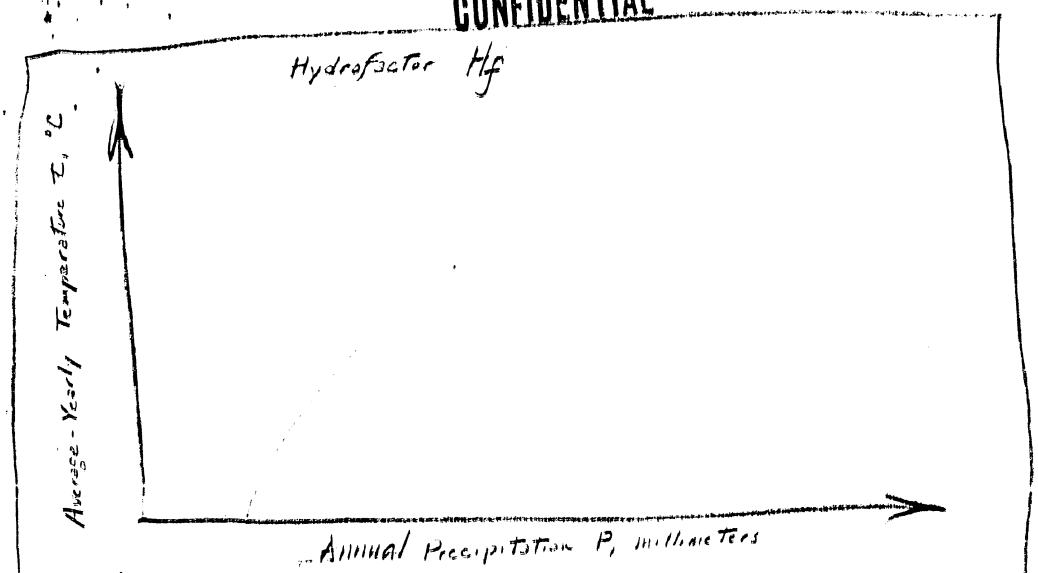

Fig. 3. The System of Soil Hydrothermotypes

Hydroseries: A - Desert, B - Gray Desert Soils, C - Chestnut, D - Black Earth, E - Podsolic, F - Gleyey-podsolic (conditional names adopted for the several most characteristic soil types).

Thermoseries: I - Arctic, II - Subarctic, III - Moderate - Cold, IV - Moderate, V - Moderate-Warm, VI - Subtropic, VII - Tropic

This supposition is fully confirmed by comparison of values of Hf with coefficient wetting K, which is the ratio of precipitation to evaporation (Figure 4). The general nature of the clear curve obtained shows that coefficient wetting K characterizes the moisture or wetting formally and the quantity Hf expresses certain more important qualitative variations in wetting. For the known upper limit of atmospheric wetting corresponding to obtained maximum saturation of soil and excess of precipitation flowing above-ground and the hydrofactor Hf remains unchanged, characterizes maximum lixiviation, or leaching, of soils.

The demarcation point of the curve corresponds to equilibrium wetting when precipitation equals evaporation. This point corres-

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ponds to a hydrofactor lying in the black soil hydroseries. Thus, ~~it may be concluded that~~ the hydroseries must reflect the qualitative difference in ~~the~~ composition of the water balance of ~~a~~ soil stratum.

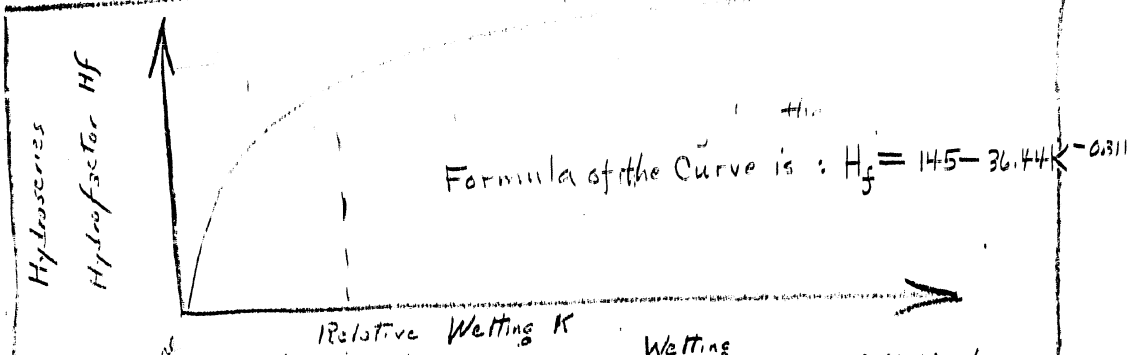

Fig. 4. The Dependence between the Relative ~~Moistening~~ Wetting K = precipitation/evaporation and the hydrofactor Hf, from ~~the~~ data of meteorological stations of the world (evaporation was calculated 1941 according to S. I. Ivanov's formula.)

~~of 1941~~

~~The~~ difference in ~~moistening~~ wetting, apparently, determines first of all ~~the conditions of~~ migration of weathering products along the soil profile. In this respect, there is ~~foundation~~ reason for using ~~for~~ Vysotskiy's ideas (2) in the subdivision of hydroseries ~~Vysotskiy's (7) ideas~~. Vysotskiy distinguishes hydroderies of insufficient ~~moistening~~ wetting as non-washed (impermacide) and hydroseries of high ~~moistening~~ wetting as washed (permacide). Consequently, having separated hydroseries according to certain, still not completely clear gradations of "unwashability" or "washability", ~~it it possible to transfer~~ one can shift from formal climatic characteristics to strictly genetic representations.

The nature of thermoseries should also be considered. Comparison of the average-yearly temperature and the average-yearly ~~daily radiation~~ diurnal insolation balance for ~~the~~ latitudes ~~of the~~ northern ~~hemisphere~~ shows that a direct ~~con-~~ relationships

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~~[illegible]~~ exists between these two climatic characteristics. Consequently, ~~it~~ ~~is also possible~~ may be in dealing with thermseries ~~to transfer~~ one may shift from formal characteristics dealing with ~~the~~ average-yearly temperature to ~~therm-~~ heat-balance representations.

It is also possible to speak of thermal types of weathering. ~~There is~~ Zemyatchenskiy, for example, definitely confirmed ~~of~~ the presence of ~~the~~ a northern type of weathering ~~(Zemyatchenskiy [illegible])~~ (3). The concepts of Reifenberg ~~([illegible])~~ (4), Fageler ~~(23)~~ (5) and others, emphasizing the uniqueness of weathering ~~in~~ tropical ~~conditions~~, are widely known. Several researchers (6, 7, etc) ~~concerned with the study of~~ on colloids ~~have~~ also concluded that ~~[illegible]~~ mineral colloids of ~~[illegible]~~ different thermal zones are different (~~Antipov-Karataev [illegible], Sedletskiy [illegible], and others~~). Finally, the recent works of Academician B. B. Polynov ~~([illegible])~~ (8) on the soils of Western Georgia also brought out the uniqueness of weathering ~~in~~ under subtropical ~~al conditions.~~

The system above discussed of soil hydro- and thermoseries is called ~~the system of~~ soil hydrothermotypes. Hydrothermotypes are understood to mean units of soil formation which reflect qualitative differences in soil-climatic ~~aspects~~ relationships. Hydrothermotypes are represented in the form of spatially repeating soil aggregates, ~~which are~~ i.e. stages in the process of soil formation, ~~dev~~ which developing under the ~~joint~~ combined influence and interaction of hydrothermal, lithogenous, ~~and biogenous~~ and biogenous soil ~~formans~~ forming agents. ~~but takes place uniquely~~ This development is unique in each hydrothermotype, ~~in dependence~~ depending upon the hydrothermal conditions ("primary climatic belts"). ~~The change of~~ soil~~s~~ variation within the limits of hydrothermotypes is ~~connected~~ due mainly ~~with~~ to the evolution of ~~the~~ topography and vegetation and also with cultivation ~~effects~~, i.e., is connected with ~~the~~ evolutionary changes ~~of~~ in soil formation ~~types~~.

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Thus, starting from pedo-climatic regularities, we arrive at the concept of genetic series of soil formation, i.e. an system essentially climatic.

The question of which soil aggregates correspond to which individual hydrothermotypes is partially answered by consideration of the distribution of pedo-climatic areals in the system of hydrothermotypes (Figure 2), but this presentation is schematic in nature. (Needed is) stricter clarification of the composition of all soil formations corresponding to the individual hydrothermotypes. The following method can be used to solve this problem.

The proposed system of soil hydrothermotypes reflects the most essential climatic differences. The family of intersecting curves of hydroseries and thermoseries subdivides the climatic conditions within the limits of the characteristics shown on the graph into a series of climatic regions called climatypes.

Inasmuch as the curves hydroseries correspond to essential qualitative differences in wetting, it seems possible to draw up a map of hydrozones (Figure 5). This map shows the land distribution of the zones with average-yearly temperature and yearly precipitation lying in boundaries characteristic of the individual hydroseries. A map of thermozones similar to the map of hydrozones (from the same material) was also drawn up corresponding to average-yearly temperature and yearly precipitation lying within the boundaries of individual thermoseries.

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Fig. 5. Map of Hydrozones (Zones of ~~moistening~~ wetting) ~~of the~~

1 - Extremely Dry Zone, 2 - Dry Zone, 3 - Zone of Insufficient ~~moistening~~ wetting,

4 - Zone of Equilibrium ~~moistening~~ wetting, 5 - Moderately Moist Zone, 6 - Moist Zone

(Washing Water Regime)

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Figure 5. Map of Thermozones ~~of the~~ World:

1 - Arctic Zone, 2 - Subarctic Zone With an Extremely Cold Active Period; 3 - Subarctic Zone, 4 - Moderately-Cold Zone, 6 - Moderate Zone, 7 - Moderately-Warm Zone, 7 - Subtropic Zone, 8 - Equatorial-Tropic Zone

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The maps of hydrozones and thermozones divide the land surface into characteristic wetting zones and thermal zones. Although the thermal zones in certain cases are in need of additional indices, the hydrozones agree completely with existing ideas on the land surface of continents.

A map of most prevalent climatypes was drawn up by combining hydrozone and thermozone maps. The climatype map was superposed on the world soil map (BS.M.) and the composition of the soil types within the limits of individual combinations of hydro- and thermozones was found by planimetry. The data obtained was grouped separately according to hydrozones and thermozones; relative distribution of soil types is shown in Figure 7. The arrangement of the main soil types of the world according to hydrozones and thermozones shows the close dependence of soil distribution upon climatic conditions. In a number of cases, this dependence is astonishingly close. For most world soil types, better than 75% correlation with climatic conditions can be assumed.

The distribution of the main soil types of the world in the system of hydrothermotypes is shown in Figure 8. Thermozone I must be regarded as a zone of tundra soils. Hydrothermotypes E and EF of thermozone II can have both tundra and podsolic soils depending upon temperature in the active period. Tundra forms in thermozone II when the average temperature of the period, with average-monthly temperatures above 6° C, lies below 8.5° C. A higher temperature for this period is characteristic of podsolic soils and coniferous forests. This type of variation

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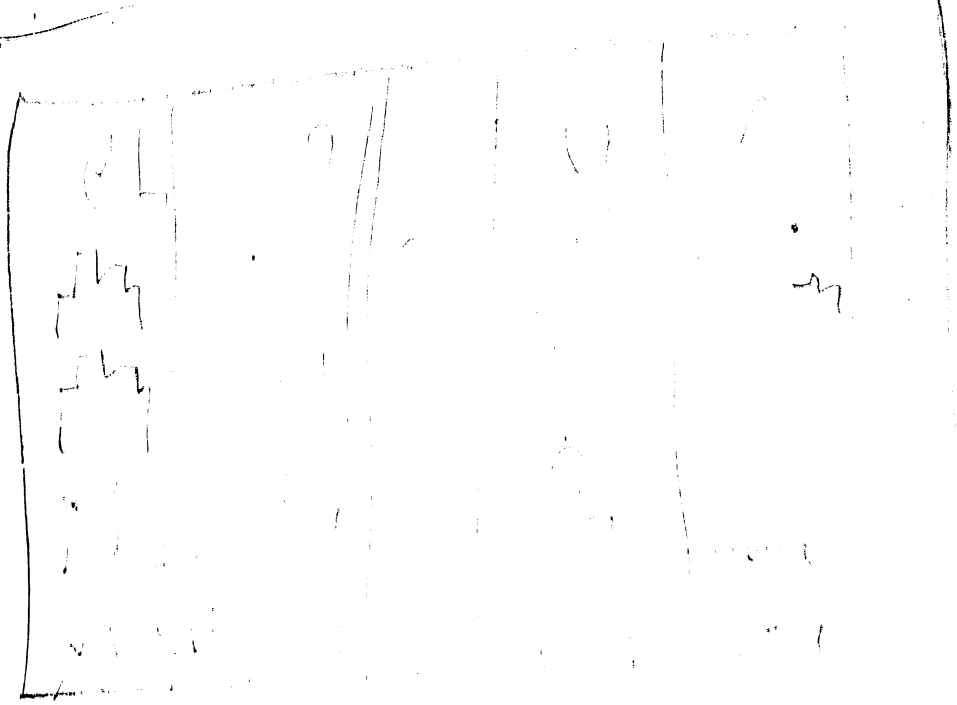

Fig. 7. World Distribution of the Main Soil Types ~~of the world~~ according to Hydrozones (a) and Thermozones (b) (in percentages ~~ratios~~ for each individual type ~~on~~ the world soil map):

1-tundra soils, 2-podzolic soils of coniferous forests, 3-podsolized soils of the forest-steppe, 4-brown soils of deciduous forests, 5-weakly lixiviated (leached) soils of dry evergreen forests, 6-red earths and yellow earths of the subtropics, 7-reddish brown soils of savannas, 8-red earths, mainly podsolized, 9-laterites, 10-black earths, 11-prairie soils resembling black earths, 12-black soils of savannas, 13-chestnut soils, 14-gray desert earths, light brown, and reddish brown soils of desert-steppe regions, 15-rocky and sandy desert soils

is also peculiar to hydrozone D1 within the limits of thermozones II and III; in these zones, tundra exists for low temperatures in the active period

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(below 8-9° C); while the unique "taiga (Siberian Forest) forest-steppe" exists for higher temperatures in this period.

Hydrozones E and F have podsolic soils under the conditions of thermozones III and IV. Brown forest soils are almost exclusively peculiar to hydrothermotype E-F-V. Subtropic yellow earths and red earths exhibit the same strict adaptation to a definite hydrothermotype (E-F-VI), as do soils of equatorial forests, i.e., red earths, for the most part podsolized (E-F-VII).

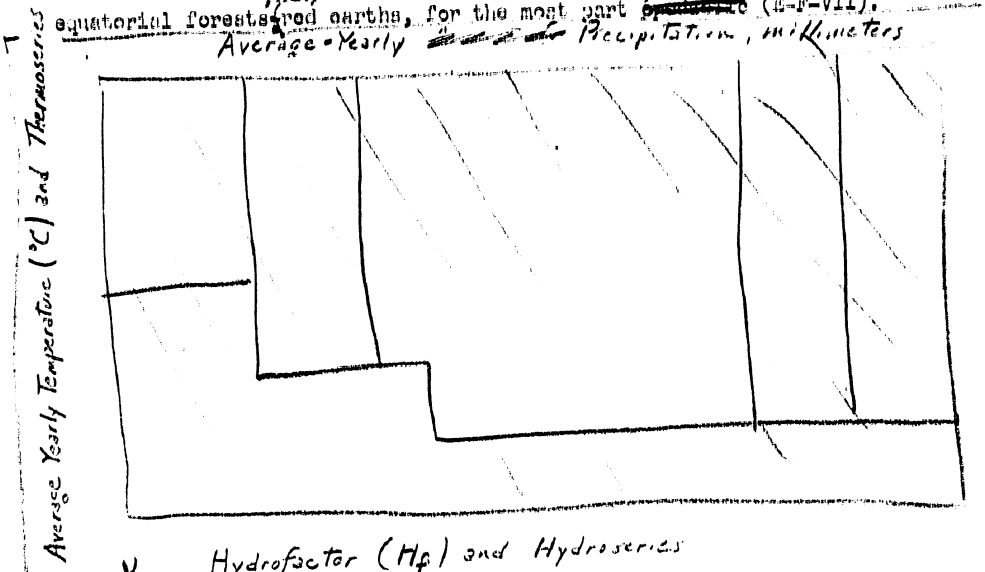

Fig. 8. Distribution of Main Soil Types of the World in a System of Hydrothermotypes.

1-sandy and rocky desert soils, 2-gray desert soils, light brown and reddish brown soils of desert-steppe regions, 3-chestnut soils, 4-chestnut (tropic) and black earths of savannas, 5-black earths, 6-podsolized soils of the forest-steppe, 7-weakly lixiated soils of evergreen forests and soils of subtropic prapies, 8-reddish brown soils of savannas, 9-red earths, mainly podsolized (and also laterites), 10-yellow earths and red earths of subtropics, 11-brown soils of deciduous forests, 12-podsolic soils of coniferous forests, 13-Arctic tundra soils, 14-podsolic and tundra soils (the latter under conditions of a cold active period), 15-"taiga forest-steppe" soils and tundra soils, (the latter under conditions of a cold active period), 16-climatic conditions seldom or never encountered on earth's surface

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Laterites do not have their own specific hydrothermotype but have developed under the same climatic ~~conditions~~ as red earths of equatorial forests. This observation agrees completely with the supposition advanced long ago by B. B. Polynov, who regarded laterites as a weathering crust.

Hydrothermotypes D-III, IV, and V should be considered as black earths. The intermediate hydrothermotype DE-IV, V is also a transitional type with podsolized soils of the forest-steppe. an evolutionary replacement by close soil types, black earths and podzolic soils, is also possible here. Similar replacements also occur in the hydrothermotypes D and DE-VI, in which weakly leached subtropic soils form under dry evergreen forests while soils of subtropic prairies form under grassy vegetation.

The presence of different types soil within the limits of one hydrothermotype does not lessen the merit of the proposed system. As Vil'yams stated, "The deep interconnection and interdependence of stages and periods in soil formation with development climatic (within the limits of one climatic latitudinal belt) had long been expressed in the static concept of soil-climatic zones which is now clearly insufficient". Consequently, soils representing individual stages of soil formation can be found in each hydrothermotype.

The reddish brown soils of savannas are very strictly adapted to hydrothermotype D and DE-VII.

Most chesnut soiils have developed under conditions of hydrothermotypes C, CD-IV, V, VI. Chestnut soils have also developed partly in hydrothermotypes C and CD-VII, apparently in some sort of tropical variations. The black (?) sic earths of savannas also exist under the conditions of the latter hydrothermotypes.

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Gray desert soils, light brown and reddish brown soils have developed within the limits of the semi-desert hydrozone (G, BD) and chiefly under the conditions of subtropic and tropic thermozones (VI, VII). Hydrothermotypes G, BD; V, VI, VII describe the regions where rocky and sandy desert soils prevail.

The main soil types known at the time of compilation of the World Soil Map are easily placed in the general system (see Table 1).

It is convenient to depict this system with its obvious climatic relationship on a graph of hydrothermotypes which gives it a slightly different form. In the new form of the graph of hydrothermotypes, also shown in rectangular coordinates with the same ordinate (average-yearly temperature, °C) and hydrofactor as abscissa, the lines of equal precipitation are arranged in the form of a series of parallel lines with a logarithmic ratio for the intervals between them. This representation of the system of hydrothermotypes is advantageous in that the hydroseries in it also lie in a parallel series.

In accordance with the concept of composition of soil within individual hydrothermotypes, as expressed in the table and in Figure 8, a new "idealized" soil map (Fig. 9) was drawn up on the basis of maps of combined hydrozones and thermozones. The latter is very similar to the soil map (Fig. 10), thereby clearly showing the correctness of the proposed pedo-climatic system.

It was deemed desirable to check the correctness of the above-mentioned regularities by an example of a more limited territory where the soil geography had been studied in more detail. With this purpose in mind, a map of hydrothermotypes of the Soviet Union was drawn up from the map of average-yearly temperature and the annual precipitation. Complete conformity was found when the map of hydrothermotypes and soil map

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World System of Main Soil Types ~~of the World~~ (Table)

Hydroseries / Thermoseries	Unwashed			Equilibrium	Washed	
	A, AB - Desert	B, BC - Gray Desert Soil	C, CD - Chestnut	D - Black Earth	DE - Forest-Steppe	E-F - Podsolic and Gleyey-Podsolic
VII - Tropic	A, AB - VII, VI, V - Sandy and Gravelly Desert Soils	B, BC - VII, VI, V, IV - Gray Desert Soils, Light Brown and Reddish Brown Soils of Desert-Steppe Regions	C, CD - VII - Chestnut (Tropic) and Black Earths of Savannas	D, DE - VII - Reddish-Brown Soils		E-F - VII - Red Earths, Mainly Podsolized, and Laterites
VI - Subtropic			C, CD - V, IV, VI - Chestnut Soils	D, DE - VI - Weakly-Leached Soils of Dry Forests and Soils of Subtropic Prairies		E-F - VI - Yellow Earths and Red Earths of the Subtropics
V - Moderate-Warm				D - V, IV, III - Black Earths	DE - V, IV - Podsolized Soils of the Forest-Steppe	EF - V - Brown Forest Soils
IV - Moderate						EF - IV, III - Podsolized Soils of Coniferous Forests
III - Moderate-Cold	Climatic Conditions Seldom or Ever Encountered on the Earth's Surface				DE - III, II - "Taiga" Forest-Steppe, and also Tundra Soils	
II - Subarctic						E-F - II - Podsolic and Tundra Soils
I - Arctic					DE, E-F - I - Soils of Arctic Tundras	

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Figure 9. "Idealized" Soil Map of the World:

1 - Sandy and Gravelly Desert Soils (Hydrothermotypes A, AB - V, VI, VII), 2 - Gray Desert Soils, Light Brown and Reddish-Brown Soils of Desert-Steppe Regions (B, BC - IV, V, VI, VII); 3 - Chestnut Soils (C, CD - IV, V, VI); 4 - Chestnut (Tropic) and Black Soils of Savannas (C, CD - VII); 5 - Black Earths (D - III, IV, V); 6 - Podsolic Soils of the Forest-Steppe (DE - IV, V); 7 - Weakly Lixiated Soils of Dry Evergreen Forests and Soils of Sub-Tropic Prairies (D, DE - VI); 8 - Reddish-Brown Soils of Savannas; 9 - Red Earths, Mainly Podsolized, and Laterites (E-F - VII); 10 - Yellow Earths and Red Earths of Subtropics (E-F - VI); 11 - Brown Soils of Deciduous Forests (E-F - V); 12 - Podsolic Soils of Coniferous Forests (E-F - VI, IV); 13 - Soils of the "Taiga Forest-Steppe" (DE - II, III); 14 - Tundra Soils (DE - II, III) with a Cold Active Period; 15 - Arctic Tundra Soils (DE, E-F - I); 16 - Arctic Regions of Which Little is Known With Regard to Climate

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Figure 10. World Soil Map:
1- Tundra Soils of Polar Regions, 2- Podsolic Soils, Mainly of Coniferous Forests, 3- Podsolized Soils of the Forest-Steppe of the Middle Latitudes, 4- Brown Soils of Deciduous Forests, 5- Weakly Lixiated Soils of Dry Evergreen Forests and Shrubs, 6- Red Earths and Yellow Earths of Damp Subtropics, 7- Reddish-Brown Soils of Savannas of Tropic Alternately Moist Regions, 8- Red Earths, Mainly Podsolized, of Equatorial Damp Forests, 9- Laterite Soils, 10- Black Earths of Steppe Regions, 11- Soils Resembling Black Earths of Prairies, 12- Black Soils of Dry Savannas, 13- Chestnut Soils of Dry Steppes, 14- Gray Desert Soils, Light Brown and Reddish-Brown Soils of Desert-Steppe Regions, 15- Sandy and Gravelly Desert Soils, 16- Mountain Soils, 17- Region of Present-Day Continental Icing

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Figure 11. a-Schematic Soil Map of the USSR (from map out of BSAM): 1-tundra soils, 2-podsolic soils, 3-gray forest and degraded black earths, 4-black earths, 5-chestnut soils, 6-brown and gray-earth soils, 7-desert soils, 8-mountain soils; b-Schematic Map of Hydrothermotypes of the USSR: 1-DE, E-F-1-Arctic tundras and DE-II, III-tundra soils (with a cold active period), 2-E-III, IV-podsolic soils, 3-ED-IV, V - podsolized soils of the forest-steppe, 4-DE-II, III-soils of the "taiga forest-steppe" (with a cold active period), 5-D-IV, V-black earths, 6-C, CD-IV, V-chestnut soils, 7-CB, B-V, VI-light chestnut and gray-earth soils, 8-BA, A-VI-light gray-earth soils and sandy desert soils, 9-mountain-regions

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are compared (Figure 11). The final purpose of the study made, however, was not just to establish this conformity, or to consider the world's geography ~~of the soils of the world in themselves~~; The drawing up of the "idealized" map and the proof of its conformity with the real world geography of soils are merely methods of checking and confirming the correctness of basic pedo-climatic dependences discovered, which is expressed in most general form in a graph of soil hydrothermotypes.

The adaptation of individual soil types and subtypes to definite hydrothermotypes can also be convincingly proven by constructing soil spectra according to hydrothermotypes (Figure 12). Each hydrothermotype is characterized by a very definite composition of the soil cover. Although several soil types are found within the limits of individual hydrozones, somehow one of those hydrozones clearly predominates, being the most prevalent at the given stage of evolution of the landscape.

It should be noted in particular that Central Yakutiya, according to the map of hydrothermotypes, is in the forest-steppe zone and not in the forest zone with podsolic soils as is usually thought. This conclusion has been confirmed by the most recent studies of the soils and vegetation of this region.

The problem arose of the relation ~~measure of the connection~~ between hydrothermotypes and the actual distribution of soils ~~on the territory of~~ in the USSR ~~compared~~ in comparison with relations ~~the connections~~ ~~with respect~~ relative to other natural elements. A comparison of soil spectra according to hydrothermotypes with phytospectra according to equivalent soil zones shows that the relation ~~coupling~~ between hydrothermotypes and soils, on the one hand, and soils and vegetation, on the other, is exactly equal.

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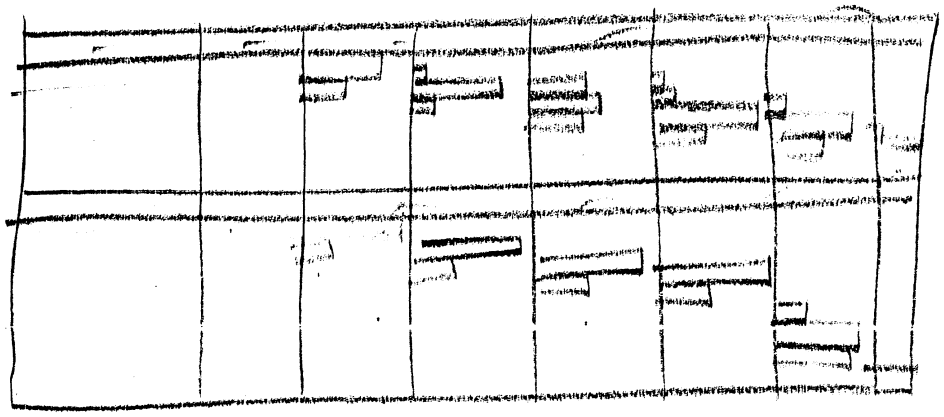

Figure 12. Soil Spectra According to Hydrothermotypes (percentage ~~ratio~~ of the area of soil types within the limits of each hydrothermotype) and phytospectra according to hydrothermotypes (percentage ratio of the area under various types of vegetation within the limits of the separate hydrothermotypes) in the Soviet Union West of the Yenisey River

~~The~~ study is ~~made~~ of ~~soil~~ pedo-climatic relationships demonstrates clearly the close dependence of soils upon such simple climatic characteristics as ~~the~~ yearly precipitation and ~~the~~ average-yearly temperature. At the same time, however, it would be incorrect to state that this dependence completely expresses the complexity and diversity of soil-climatic relationships. The climatic indices used characterize the climatic ~~conditions~~ only in the most general fashion. These climatic indices must be extended in future studies.

Thus, the thesis concerning the ~~existence of a~~ general dependence of ~~t~~ the geographical distribution of soils upon ~~the~~ climate obtained further development in the system ~~of~~ soil hydrothermotypes. This system ~~constitutes a foundation for transferring~~ passes from a ~~simple pointing to~~ acknowledgment of the existence of a

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dependence of soil formation upon ~~the~~ climate to the establishment of ~~setting forth~~ definite and strict laws of pedo-climatic relationships.

The system of soil hydrothermotypes discloses qualitative elements ~~unique and series~~ in pedo-climatic relationships throughout the climatic spectrum ~~of climatic conditions~~ of the earth's land surface and also reveals ~~exposes at the same time~~ the most general quantitative dependence ~~which lies~~ at the basis ~~heart~~ of these relationships.

~~Further clarification of~~ the characteristics of the evolution, composition, and character of ~~the~~ soils peculiar ~~indigenous~~ to various hydrothermotypes should be clarified ~~is conceivable~~ by the ~~method of~~ study of pedo ~~soil~~-climatic laws for ~~by the example of~~ individual regions (using here ~~for this the~~ more detailed soil and climatic maps) and ~~by the method of studying the~~ regular variations in ~~ups in the change~~ various properties of soils ~~in dependence upon the~~ for various climatic ~~conditions.~~

Submitted By Academician L. I. Prasolov 9 Nov 1948

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