

THE IMPACT OF GEOGRAPHICAL TECHNOLOGIES ON THE DEVELOPMENT OF CLIMATE SCIENCE (A STUDY IN GEOGRAPHICAL THOUGHT

Prof. Raed Rakan Al-Jawari, Safaa Ahmed khdemohamed

Ministry of Higher Education and Scientific Research, University of Al Mosul

Abstract

The research dealt with ((the impact of geographical technologies on the development of climate science (a study in geographical thought)), which is considered one of the important topics. The rapid developments in the fields of information and communication contributed to tremendous developments in various fields of life. It was natural for these advanced technologies to break into the fields of geography. To contribute to its development through the preparation of field studies in the developments that have been interested in modern geography. Technological scientific developments that the world witnesses today, making global societies in general in the Arab world in particular, facing great preparations to confront these modern technology developments in the science of geography. All scientific knowledge, and perhaps the most advanced and available technologies and means: Reconstruction technology by radioactive emission (OSL), advanced and calibrated carbon-14 technology (14), x-ray technology (x-ray) and magnetic sensitivity (ms) technology, as well as remote sensing system technology (SR) as well as GIS technology and system technology or GPS global positioning).

Modern technologies and the development of the manufacture of aerial cameras, satellites, and computers opened a wide field for geographers to use them in the branches of natural geography, as well as in climatology, as the results that are now appearing clearly and with great accuracy on their outputs from aerial photographs and satellite visuals, and computers also helped to make a quantum leap. In scientific research methods for various sciences, including geography, as well as in data collection and storage methods

The Introduction

The rapid developments in the fields of information and communications contributed to the developments. It was natural for these advanced technologies to penetrate the fields of geography to contribute to their development through the numbers of programs and field studies on all topics dealt with by branches of geography. Modern.

The scientific and technological developments that the world is witnessing today make the global societies in general, the Arabs in particular, face great challenges to confront these modern technical developments in the field of geographic sciences, harnessing them for the benefit of the educational process at all levels of scientific knowledge. Perhaps highlighted techniques and means cutting edge and available as a technique remote sensing system (SR) as well as systems technology the information geo Gis and global positioning system technology (GPS)).

I opened techniques modern and twist industry Machines Photography air and moons synthetic and calculators mechanism field Hello And wide for geographers Use them in the natural geographic branches as in

climatology as the results that It has become Appear clearly and accuracy super on its outputs from photo aerial and visuals satellite. This topic deals with the general framework of the study, which is represented by the geographical research steps, which include the following:-

First: the problem of the study:

The research problem revolves around what role modern technologies play in developing the science of geography, and the extent of their use by geographical researchers in the branches of natural and human geography and cartography. From this fact, the following questions arise:

- ❖ The role of modern means and technologies on the development of science the climate From the inception of geography to the modern era?
- ❖ Technologies served Geoclimatology?

Secondly, the hypothesis of the study:

The study hypothesis for the aforementioned problem can be formulated as follows:

- ❖ Methods and techniques have a major role in the development of science the climate From ancient times to modern times, it contributed to the interpretation, analysis and presentation of all manifestation the climate)
- ❖ Technologies of all kinds served climatology By drawing results and research methods.

Third - the importance of the study and its justification:

researcher's desire Knowledge of the most important geographical techniques in climate studies and the role of Modern technologies of all kinds in the development of climate studies and their importance in drawing accurate results and showing climate elements in different graphic forms .

Fourth - Study Objective:

The objectives of the study can be identified by the following points:

1. Careful scientific care in tracking climatology Definitions of climate and the historical evolution of climate through the ages
2. Knowledge of the most important geographical techniques used in the study of climatology, as well as giving samples of letters, treatises and research in which modern geographical techniques were used.

Fifth - Data sources:

The data and information on which the study relied are characterized by library sources represented in the scientific books that dealt with climatology and the historical development of climatology and the geographic techniques used in climate studies As well as research and theses related to the subject of the research directly or indirectly, which enable us to produce this study in an acceptable scientific manner.

Sixth - study methodology:

The study relied on the comparative approach as a basic approach, in order to achieve its objectives and in line with the problem and hypothesis, as well as the use of the descriptive and historical approach in presenting the most important Theses, treatises and research using modern geographical techniques We use the analytical method by analyzing these opinions in a precise scientific manner with evidence and evidence, and then comparing them with modern studies at the present time as much as possible..

Seventh, study limits:

period starts Antiquity in ancient civilizations to the present era.

Eighth - Previous Studies:

First: Theses and university dissertations:

1-study (Mohammed2022) ⁽¹⁾ The study dealt with the climate, planning and sustainability of cities in Egypt (a study in the urban climate) using geographic information systems and remote sensing.

2 - A study by Riyadh Abdullah Ahmed Al-Samarrai (2007) entitled - "The Role of Al-Masoudi in Arab Geography during the (fourth Hijri - tenth AD) century". Which dealt with scientific research methods and research methods in Al-Masoudi's writings, represented by (Baltanbih and Al-Ashraf) (The Meadows of Gold) and (Akhbar Al-Zaman)..

Second: Scientific Research:

- 1- Study - Hamid Majeed Shehab, (2011) entitled - "The Traveler and Geographer Ibn Said Al-Maghribi" This study dealt with the trips he made in the Islamic countries, as well as studying the most important aspects of his scientific life. The researcher also touched on the two most important books
- 2- in his field of geographical knowledge..

The first topic

First: the concept of climatology

The word climate is of Greek origin and means the angle of incidence of the sun's rays (Kilma), and interest in the climate began since the existence of man on earth, so his attempt to protect himself from the heat of the sun in the summer and the cold of the night in the winter is only the first thoughts in the climate, and the Arabs in the past called the climate the word Anwa, and its singular is a storm ⁽²⁾This term was used in the English language in the nineteenth century The climate as a system is associated with other systems of a component of the planet, such as the hydrosphere, the lithosphere, and the biosphere. These processes are called "internal factors". It is also subject to the influence of natural external factors such as the variation in the distribution and intensity of solar radiation, or human-induced factors such as air pollution and the increase in carbon dioxide. Koeppen & De Long Climatology as a complex summary of weather conditions over a long period, including details of changes, extremes, repetitions and sequence of weather elements from year to year, especially temperature and precipitation.

As for Thornthwaite Thornthwaite believes that the climatic characteristics of any region are determined based on the exchange of energy and moisture between the earth's surface and the atmosphere, and therefore the interpretation of the climate is based on the energy budget and the temperature in the region.

It is known as Triwartha Trwartha Climate as a component of the weather, and the condition of the climatic elements from one day to the next over a long period. To know the shapes of the Earth⁽³⁾, Well I knew

⁽¹⁾Islam Muhammad Jaber Muhammad, Climate, planning and sustainability of cities in Egypt (a study in urban climate) using geographic information systems and remote sensing, message Master's Unpublished, entirely Literature, university South Valley, Egypt, 2022.

²Salha Mustafa Issa, Climatic Geography, Arab Community Library for Publishing and Distribution, Ammaan Jordan 2009, , p. 7.

³Saeed Idris Al-Awami, Foundations of Climate Science, National Book House Libya. 2017, p. 14.

GeographyClimatology is a branch of physical geography, concerned with the study of climate as a component of the natural environment resulting from various natural factors.⁽⁴⁾

It can also be defined science the climate Climatologyit is Science that He studies and prescribe And he analyzes and connects items the climate Referred To her And for a while may be It goes on or fall short.He lost started Flag climate descriptively, then development to turn to analysis and tethering.As for with regards to Period temporal Lost He was the focus previously on that studies climate no correct unless if was period the study thirty year or more.Considering that the average He is closer to constancy And come closer to expression on condition the climate if He was for a while thirty year, and this is what Release on him session climatic climatic cycle.But I started Appear in the time Last studies Depends on a period shorter.Then after that satisfied Researchers that the climate far on constancy, and that a period thirtieth year that adopted previously vary their rates between all thirty year and another, appeared studies climatic I had a period shorter, like Month, or year, Promise him Years⁽⁵⁾.

that This is amazing developments that I entered on studies climatic He was she has what justified.the climate if he an average repetition phenomenon and distribute it geographer, while science the climate is The means that Studied This is amazing phenomenon And you analyze it any you try that You find she has an explanation Scientifically for its contrasts.And from this starting point we say that studies climatic she studies geography, and that geographical I can from jealousy on giving picture inclusivity climate region what.

The look inclusivity that own it geographical qualifies him that Analyse items the climate and connects between them, and finds she has interpretation associated in place that to speak in it.And so Prepare the climate from branches geo Geographythe task Walt Indispensable for any geographic about her.He is impact in many from phenomena geo the mission as well Affected out, As for the climate meaning the widest He is condition the system climatic With what in that Describe it description statistically , And it is considered the climate resource naturally Whatever if what done His employment in instructions development Social Economic and increases from its importance in the countries and regions that Depends on rains in its uses Miscellaneous Especially in Agriculture ⁽⁶⁾, That's why I cared organized foods and agriculture international(FAO)By studying it where increased Who its activity So I studied cover aerial telltale to risks the problem Globalism the most lethal And represented in pollution And who will affect in events changes climatic .

Second: the development of climate science

We can imagine that man, since he was found on this earth, has taken care of the weather phenomena surrounding him because of their direct impact on his life. Man's resort to wearing clothes and searching for a home for himself is one of the first human attempts to adapt to the climate of the region he inhabits. Then the process evolved into observing weather phenomenaWeather Phenomena Watch and the moments of comfort or discomfort it causes. The rain, the mild temperature, and the wind blowing in the form of a breeze made

⁴Ibrahim bin Suleiman Al-Ahedib,entranceTo weather, climate and geography, Imam Muhammad bin Saadoun University, Riyadh 2010, p. 22.

⁵Qusay Abdul-Majeed Al-Samarrai, Climate and Climatic Regions, Dar Al-Yazuri Scientific Publishing and Distribution, Amman 2008., p. 28.

⁶Salha Mustafa Issa, Climatic Geography, previous source, p. 8.

him happy, while the hurricanes, floods, and the extreme rise and fall in temperature disturbed him. And because the first man was unable to interpret it, he worked to worship it, believing that this would avoid its harms. Therefore, many climatic deities appeared. The Greeks worshiped Boreas, the god of winds, the Egyptians worshiped Ra, the sun god, Jupiter was considered the rain god among the Romans, and Thor was considered the god of thunder among the Scandinavians. While other peoples recorded the recurrence of these phenomena in an initial attempt to understand them and then predict them. The Chinese were the first to record the flood seasons since 2000 BC, and Chinese farmers monitored the weather.⁷⁾

Some ancient civilizations reported something that suggests a person's interest in the climate at that time, due to its direct impact on his life, so it appeared (the first systematic climate book by HippocratesHippocrates, who called it air, water, and places in 400 BC, followed by Aristotle's book entitled "Metrology," who designed the wind tower, which is the first hydrometeorological observatory in the world.⁸⁾The first climatic observations were just visual observations of the nature and causes of these phenomena. tangible, in one way or another, and it was done without tools, devices, or advanced technologies. The succession of the four seasons, as well as the flooding of the Nile River in ancient Egypt, are two clear examples of observations of natural weather phenomena in ancient times.⁹⁾

The Arab civilization, like other civilizations, contributed to the growth of meteorological and climatic knowledge. The Arabs' contribution took place in two stages: before Islam and after Islam. The Arabs before Islam were nomads who were characterized by instability, roaming the Arabian Peninsula, which made them vulnerable to the weather phenomena around them such as extreme heat and cold, strong winds, heavy rains, lightning, thunder, and other weather phenomena that occur around them during the year. The Arab nomads noticed the spatial and temporal temperature variation on the daily, monthly and seasonal range. They also noticed the different wind directions and speed, the relationship between wind, temperature and rain, and the different colors and density of clouds and their relationship to rain and its abundance. And the Arabs linked lightning with the possibility of rain, as well as linking the weather phenomena that occur around them with the shapes of stars that appear in the sky. The Arabs gave different names to winds, clouds, and rain.¹⁰⁾

The writings received by Al-Masoudi, Ikhwan Al-Safa, Al-Qazwini, Al-Idrisi and others, dealt with weather and climatic conditions and the environmental factors affecting them. In the Arabian Gulf, the Arabian Sea, and the Indian Ocean, as in the well-known saying: "And among the winds are those that are blown by the star without what appears from the palace of the sea. This is a major breakthrough in the development of weather and climate (climate geography and the environment), and Al-Masoudi identified the climatic and environmental factors affecting man, as it was reported from him (the powers of the two earths and their action on the bodies may differ for three reasons: The amount of air in it, and the amount of trees, as well as the

⁷Qusai Abdul Majeed Al-Samarrai, previous source p.13.

⁸Adel Saeed Al-Rawi, Qusay Abdul-Majid Al-Samarrai, Applied Climate, Dar Al-Hikma, Baghdad, 1990, p. 30.

⁹Fathi Abdel Aziz Abu Radi, The Foundations of Climatic and Botanical Geography, Arab Renaissance House, Beirut, Lebanon 2004, p. 15.

¹⁰See Ibn Sayeda's book (Al-Mukhassos), Travel 6, Dar Al-Afaq, Beirut, pg. 62-s130.

amount of its height and low, so the land that has plenty of water moisturizes the bodies, and the land that is devoid of water dries it up. It's the other way around ⁽¹¹⁾.

The beginning of the European renaissance witnessed the translation of many Arabic books into different European languages, so the stage of European development of climatic ideas and theories and the addition of new ones to them began. Thermometer in the year 1592 AD, and its manufacture by Santorio Santorio in the year 1612 AD, and the manufacture of the barometer by Torricelli in 1643 AD, in addition to the discovery of a number of natural laws related to the gaseous envelope, such as Boyle's law in 1661 AD, which revealed the relationship between air volume and pressure. Then the monitoring stations appeared, and it was the beginning of the transition from descriptive observation to description based on facts and figures. The first monitoring station was in Paris in 1664 AD. In 1714 AD he adopted the Fahrenheit scale, and in 1736 AD he adopted the Celsius scale, and he discovered the Hygrometer in 1783 AD, and the rain gauge in 1987 AD. ⁽¹²⁾.

The development of climatology during the eighteenth and nineteenth centuries came through the availability of digital information from a large number of monitoring stations that were established during this period. This digital information provided the possibility of issuing distribution maps for important climatic elements such as temperature, pressure and precipitation. It also provided the possibility of comparison between different regions of the world. However, the development of climatology was slow due to the lack of climatic data on the upper atmosphere. Upper Atmosphere, and the theoretical foundations for the development of this science have not yet been integrated. Thus, climate writings continued to focus on the descriptive side, which is not devoid of analysis here or there. ⁽¹³⁾ During the recent past years, great developments took place in the study of the atmosphere, especially through the expansion witnessed by the world in the number of climatic stations in the fifties of the last century, which reached (10,000 meteorological stations) and (1,000 meteorological stations) to measure temperatures, atmospheric pressure and winds at different levels. In addition to the presence of (3000) ships equipped with the latest metrological devices, and advanced devices for measuring solar radiation were also available. ⁽¹⁴⁾.

The second topic

Firstly: Geographical techniques used in climatology

Technologies are of great importance in climate studies through what Produces mapping and modeling of weather and climate using GIS Remote sensing and statistical analysis softwares spss It is of great importance in the results Valuable maps for those who specialize in meteorology, while studying the processes in the atmosphere, so Scientists locate weather events and analyze how systems move over time And he is Identifying meaningful patterns and trends in weather data using Geotechnologies To more accurate predictions, remote

¹¹Ali Sahib Talib Al-Musawi, Climate and Environment, Dar Al-Kutub and Documents in Baghdad for the year 2017, p. 19.

¹²Salam Ahmed Al-Jubouri, Applied Climate Science, University of Baghdad, Ibn Rushd College of Education for Human Sciences, 1st edition, year 02014, p. 25.

¹³Qusai Abdul Majeed Al-Samarrai, previous source, p. 36.

¹⁴Bahaa Ahmed Al-Abd, Scientific Foundations in the Study of Climate and Weather, Al-Janadiri for Publishing and Distribution, 1st Edition. 2016, p. 24.

sensing by satellites in climate change studies can have the most important role, as the application of GIS in climate change research helps to pay attention to several phenomena such as: changes in vegetation cover within certain regions, diminishing sea ice and glaciers in Northern Hemisphere⁽¹⁵⁾The techniques used in climatology have included remote sensing programs, geographic information systems programs, and TechniqueAlgorithm designed organic functionsIt is clear as follows:

a.remote sensing system technologySR):

Meteorology is one of the civil applications that benefited early from satellites, as the satellite can be considered in this case as a very high observation tower that can reveal a very wide area of the Earth's surface and the atmosphere that covers it, and it can also give completely accurate information about Some weather phenomena such as cloud formations, their movement and temperature, and the movement and follow-up of hurricanes⁽¹⁶⁾.

And now, in most countries, weather forecasting plays a major economic role in estimating crops and yields, and in following up hurricanes and hurricanes, which amount to natural disasters. Now, without a doubt, loss of life and property can be greatly reduced when the population can be migrated from areas that fall in the path of hurricanes, but This requires near-instantaneous satellite follow-up, as these hurricanes change their directions suddenly, quickly, and unpredictably, but fortunately, satellites can carry out this task of follow-up accurately..

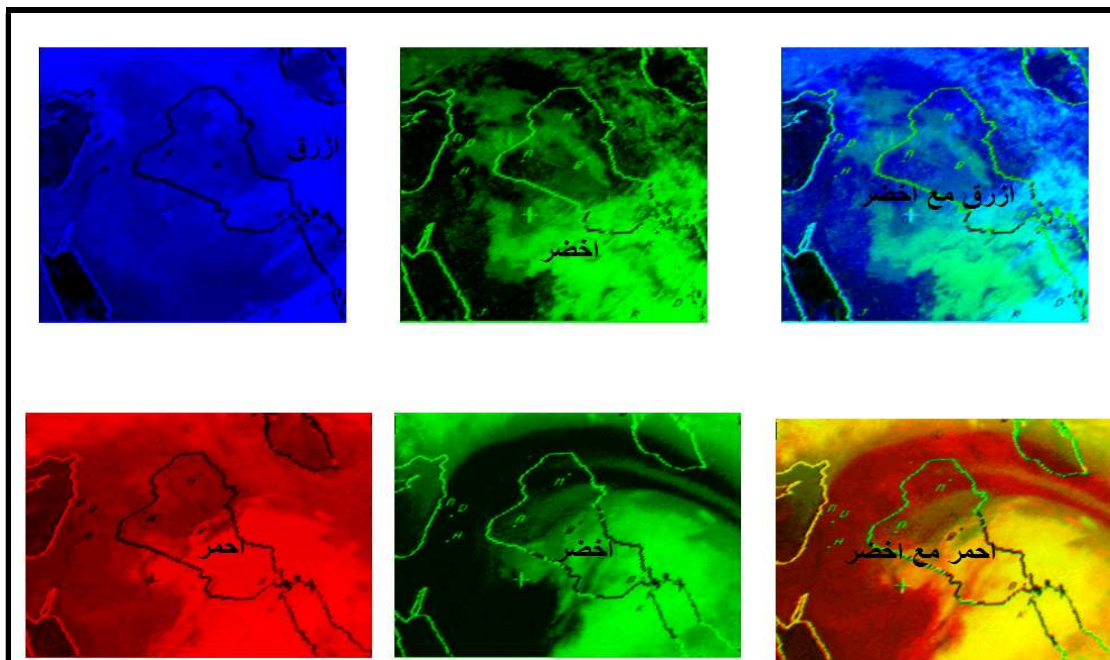
There are many applications for the use of remote sensing technologyIt is known that the visuals taken on board the satellite sensors are of flat, non-geographical projections, and are in black and white. So you need correction and improvement processes, and this is done through Information systems software and remote sensing techniques. Where the researcher was able to use the colors through the aerial photographs to determine the quality of the clouds through the following image ⁽¹⁷⁾, and is a studyAlaa Nabil Hamdoun Mahmoud Al-Abbadi, Applications of remote sensing in the study of geomorphological manifestations and changes in land uses of the city of Dohuk and its surroundings and its future expansion.One of the applied studies that dealt with the use of remote sensing technology in the study of climate, note Figure (1).

Figure 1: Enhanced images using the false color composite methodto the city of Dohuk

¹⁵Esraa Al-Tahat, The Relationship of Information Systems with Other Sciences 2022, an article published on the Internet on the website (<https://mawdoo3.com>).

¹⁶Mohamed Abdel-Wahhab Hassan Al-Asadi,ex Source,p. 62.

¹⁷Alaa Nabil Hamdoun Mahmoud Al-Abadi, Remote Sensing Applications in the Study of Geomorphological Aspects and Changes in Land Uses of the City of Dohuk and its Surroundings and Its Future Expansion, Master ThesisUnpublishedCollege of Science, University of Mosul, 2002, p. 76.

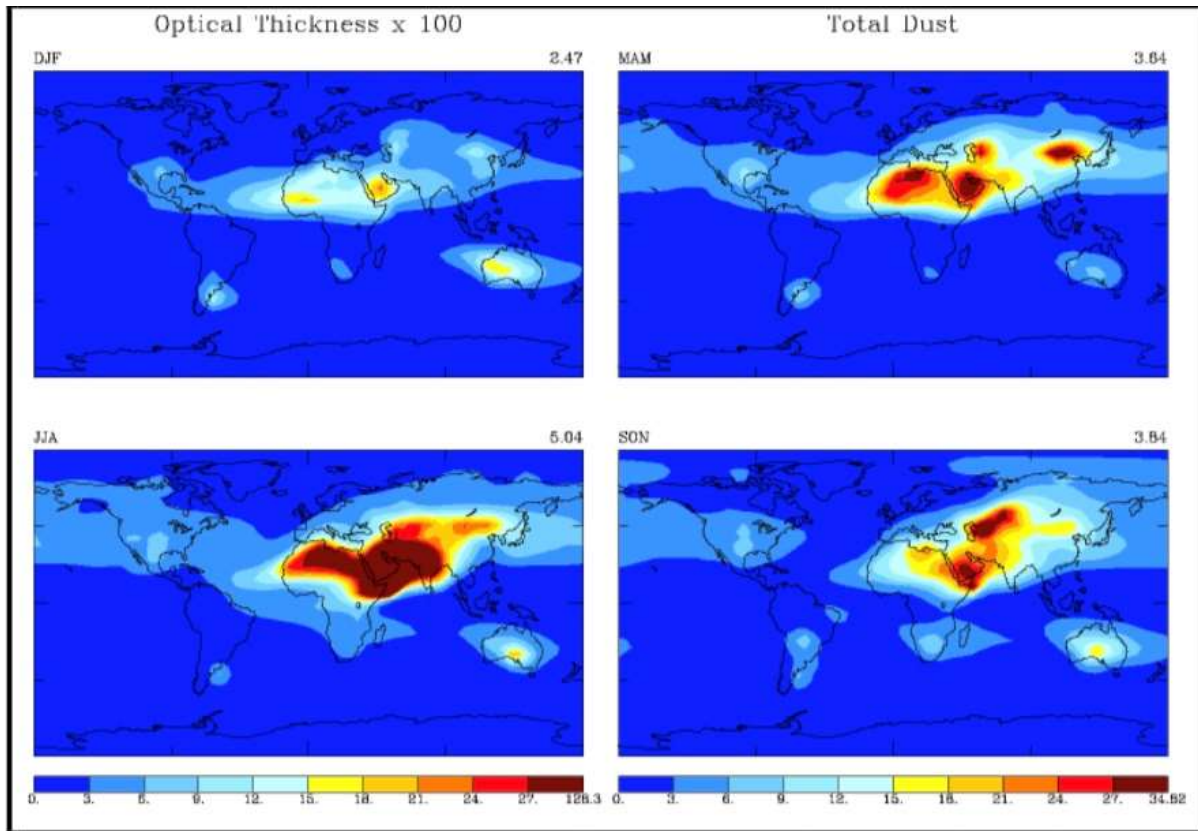


Source: On the authority of Alaa Nabil Hamdoun Mahmoud Al-Abadi, applications of remote sensing in the study of geomorphological manifestations and changes in land uses of the city of Dohuk and its surroundings and its future expansion, master's thesis Unpublished College of Science, University of Mosul, 2002, p. 76.

Remote sensing technology has also been used the study on that increases big in continent Asian on most likely She was a result for increments big in Industry and activities Humanity, And it showed like that that increases I accelerated on Bezel Contract the past and that the increase Globalism quick during This is amazing Period Working on reduction radiation solar linker to Surface the earth on road reflection and absorb ⁽¹⁸⁾. As shown in Figure (2)

Figure (2) Geographical distribution of the atmospheric concentration of Baha around the world and Iraq

¹⁸Ammar Majeed Mutlaq Al-Azzawi, Analysis of the Effect of Seasonal Changes in Climate Elements on the Severity of Droughts in Iraq, unpublished doctoral thesis, College of Education for Human Sciences, University of Tikrit, 2019, p. 68.

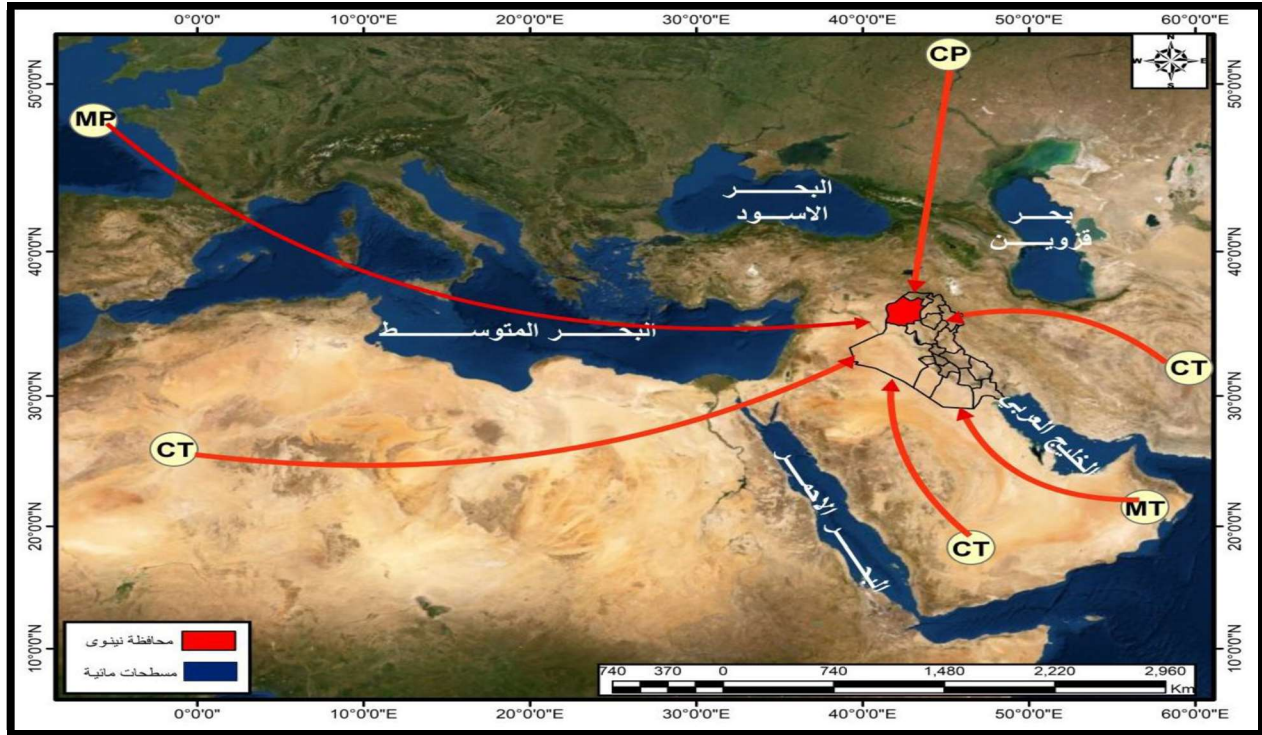


Source: Ammar Majeed Mutlaq Al-Azzawi, Previous source, p. 69.

In studying the projection of air masses using the remote sensing technique of the region, the researcher was able to know the air masses affecting the region and the directions of the winds coming to the study region.¹⁹), note Figure (3).

Figure (3) Trends of air masses over Nineveh Governorate

¹⁹Abd al-Wahhab Atallah Mahmoud, Modeling the fluctuation of rainfall and its impact on soil moisture and its reflection on the vegetation cover in Nineveh Governorate, master's thesis. Unpublished College of Education for Human Sciences, Tikrit University, 2020, p. 35.



Source On the authority of Abd al-Wahhab Atallah Mahmoud, A previous source, pg. 35.

Geographic Information Systems (GIS) technology

Geographic information systems technology GIS is one of the most important modern methods used to represent appearances climatic. In general, whether it is natural or human, and what this research aims to do is give part of that use to technology GIS in the field of mapping climate elements through the preparation of a special atlas in which the isosceles are represented for each climate element.⁽²⁰⁾ like that Contains a geographic system on the tool appear Elevation data and temperature data in specific climatic stations, and to estimate or predict temperatures for locations far from climatic stations, it is necessary to use elevation data to predict and estimate temperatures in these locations that are located between existing climatic stations, and as it is known, there is a definite and well-known relationship between Elevations and average temperatures. Elevation data allows for knowledge and conclusions slopes The face of the slopes overlooking the sun and with the help of the available climatic data, on the movement of clouds and winds, it will be possible to conclude the expected temperatures in the selected locations (for example, the slopes that I directed towards the equator are hotter than the slopes that I directed towards the poles), and so on, with relative knowledge of Temperatures and merging them with GIS data, you will be able to estimate or predict temperatures for locations between climatic stations and compare them with climatic data for different periods of time to know the climatic changes that occurred and predict⁽²¹⁾

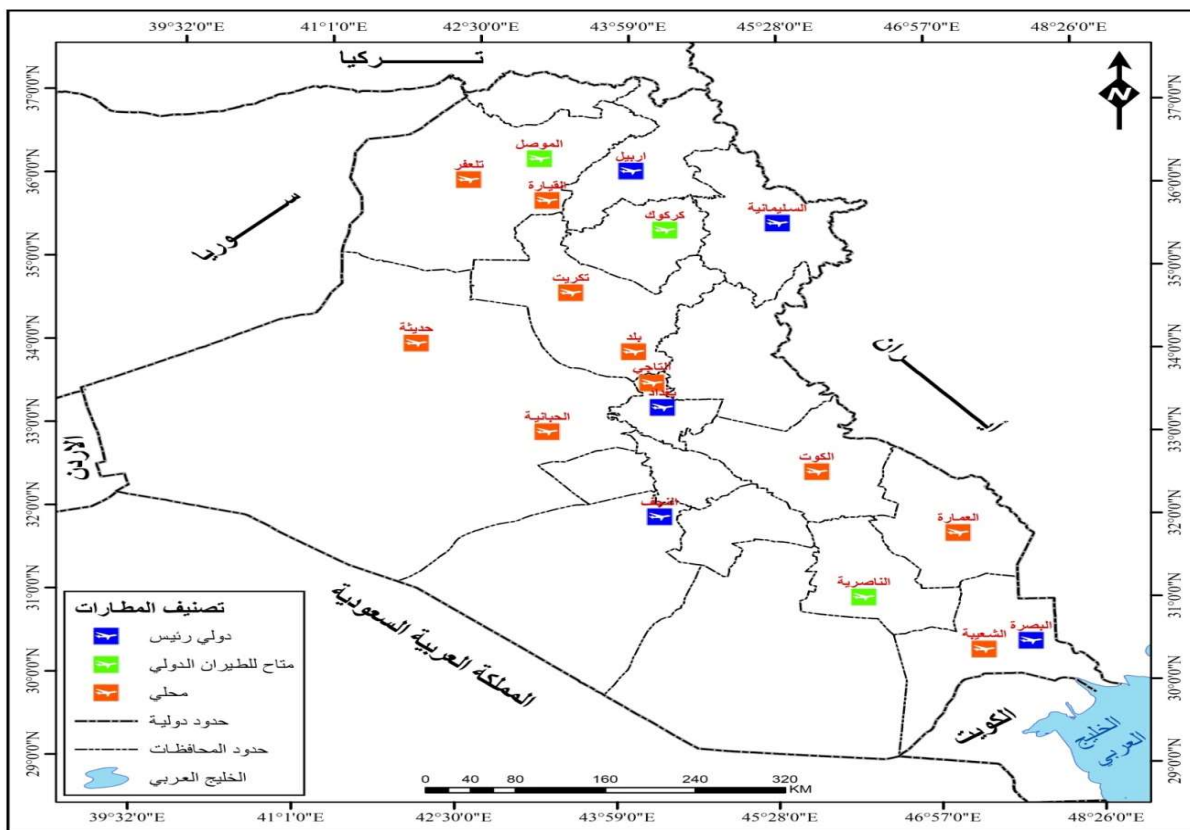
Among the applied studies that dealt with the use of geographic information systems technology is the study

²⁰Dia Saeed Awwad, student Abbas Karim, cartographic representation of climate elements in Maysan using information systems, International Journal of Human Sciences, 2022, Issue 30, pg. 94.

²¹Iyad Ashour Al-Taie, Thaer Muzaffar Al-Azzawi, previous source, p. 334

of Uday Hussein Mustafa on the authority of the researcher through the map that was drawn in the programGisThe location of airports in Iraq and their classification between a local airport and an international airport through the color variable, where it is possible to distinguish phenomena through the color variable, as shown in Figure (4).

the shape(4) Indicating on it the locations of airports and their classification in Iraq

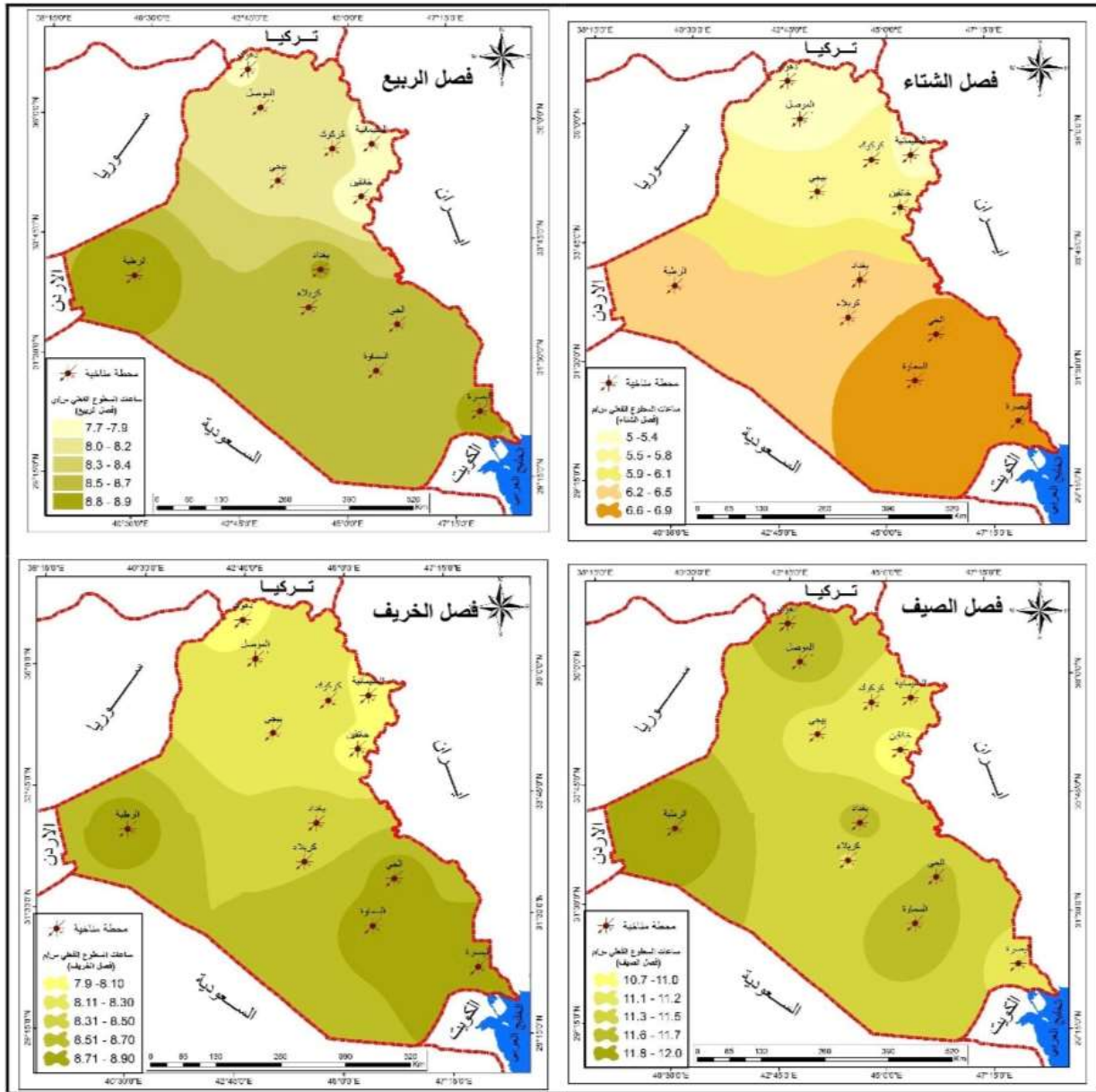


Source: On the authority of Aday Hussein Mustafa, Climatic Assessment of Airports in Iraq, an unpublished doctoral thesis, College of Education for Human Sciences, University of Tikrit, 2020, p. 7.

As shown by the study (Analysis of the effect of seasonal changes in climate elements on the severity of droughts in Iraq)By using geographic information systems technology in the process of reviewing the annual characteristics of the minimum, maximum and normal temperature of the study area.²²).Note the figure (5).

Figure (5) The seasonal mean of solar radiation in Iraq

²²Ammar Majeed Mutlaq Al-Azzawi,previous source, p. 34.



Source. Ammar Majeed Mutlaq Al-Azzawi, previous source, p. 34.

c. Technique Algorithm-designed organic functions (ANFIS).

It is one of the modern techniques used in climatology, and it is a system accident developed algorithm existing on techniques the artificial intelligence and means (ANFIS) Adaptive Network-based Fuzzy Inference Systems any Adaptive inference system using the Logic fuzzy or logic ambiguity⁽¹⁾. This system is of great importance in this field because it generates fuzzy organic functions for the input data, and it verifies the organic functions that were used in fuzzy logic and is expressed through the following::

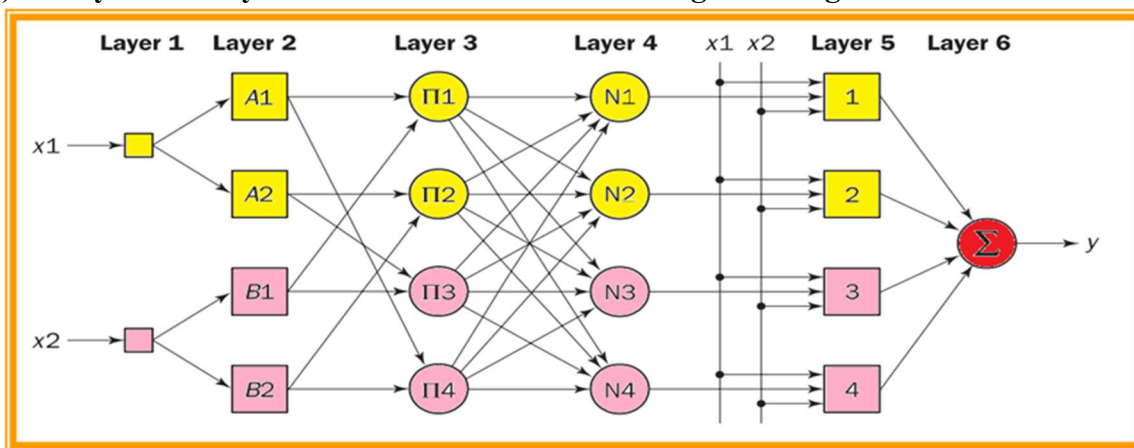
IF x_1 is A_1
 AND x_2 is A_2

 AND x_m is A_m
 THEN $y = f(x_1, x_2, \dots, x_m)$

whereas x_2, x_1 are the input variables and A_2, A_1 are fuzzy groups. A linear function of the variables, so when x be constant, we get zero in the fuzzy model that follows from the base prepared for the study, and when it is polynomials of the first order:

So you represent ANFIS usually by six layers of the fuzzy neural network, as diagram (8) shows the matrix architecture that is compatible with first-order fuzzy models.⁽²³⁾, note Figure (6).⁽⁷⁾

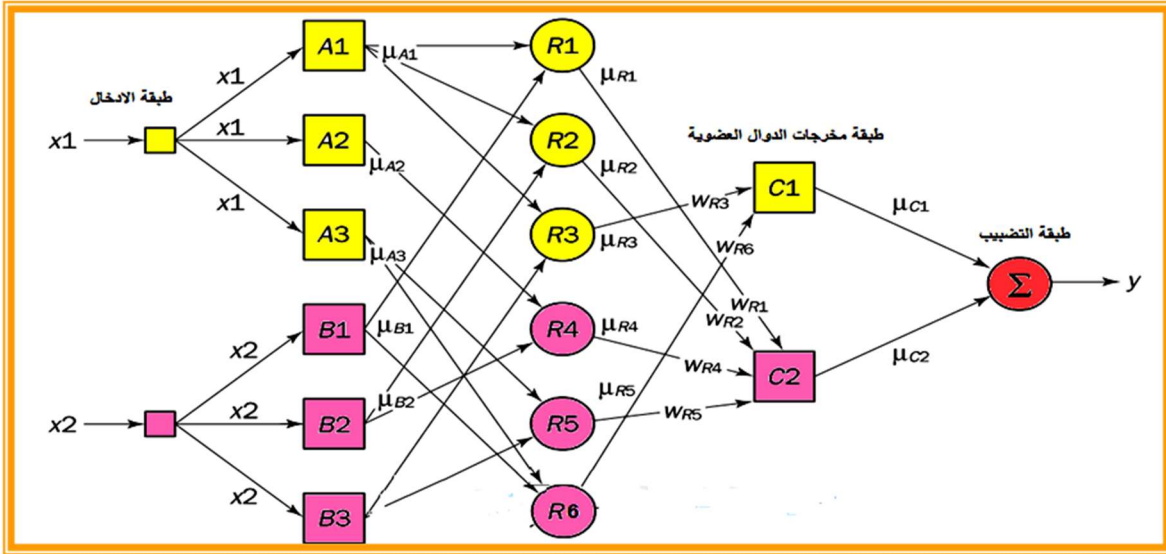
Figure (6) The system of layers of neural networks according to the algorithm ANFIS.



Source: quoted from Ahmed Abdul Ghafoor Khattab Al-Sumaidaie, previous source, p. 90.

Figure (17) fuzzy inference

²³Ahmed Abdel-Ghafoor Khattab Al-Sumaidaie, Modeling Rain Clouds to Estimate Falling Rain in the Mountainous Regions of Iraq Using Fuzzy Logic and Fuzzy Neural Networks, thesis Unpublished Ph.D College of Education for Human Sciences, Tikrit University, 2015, p. 89.



Source: quoted from Ahmed Abdul Ghafoor Khattab Al-Sumaidaie, previous source, p. 90.

secondly: Results of using geographical techniques in climatology

contributed techniques Recent studies in climate Much to overcome many climatic problems By taking advantage of the technological solutions it provides, such as providing accurate and timely information about climatic phenomena By collecting giant information Big Data from Systems Remote Sensing And GIS so the following results were reached from the use of techniques in climatology

- 1- The ancient climate studies relied on primitive methods to predict the elements of the climate, as they relied on to predict the rains, as they noticed that the sun had a red color the day before that fell in the rain. Air depressions and atmospheric depressions that cause rain.
- 2- Remote sensing technology is the main source of climate science by collecting precipitation data all over the world. Traditional rain gauges are distributed very rarely in every country. However, remote sensing satellites provided visualizations that allow defendants, researchers and concerned authorities to record data related to precipitation forecasts. It rains periodically, as well as predicting the heat of the wind and knowing its directions and speed.
- 3- that Technique Organized the information geo Same Importance Significant in climate studies through Preparation Maps And that for accuracy Maps stomach using it Climatology tools, in addition to Possibility to update or addition data and info for phenomena that Complete fee And prepare maps she has using This is amazing Technology. It is also possible construction a base data digital especially with elements the climate (radiation solar the heat, the pressure aerial, rains, evaporation, Humidity relativism, wind), and possibility Updated continuously with Possibility deletion and add to her. As well as the possibility of interpreting the results through the data and also climatic prediction for long periods of time by collecting and observing weather patterns,
- 4- that Technique Algorithm-designed organic functions (ANFIS It is considered one of the approved studies in climatology, based on an estimate of the accuracy of the climatic data programmed by the researcher, so that a link is made between the climatic data observed at the ground stations with the data collected through satellite visuals.

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