

The Place of Meteorology and Prophetism in Sustainable Development

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Abstract

Meteorology and Prophetism are universal phenomena which as a result of their significance and relevance had from time immemorial engaged the interest of scholars. Discourses on meteorology and prophetism had however revealed an undeniable fact that they are stabilizing agents and effective tools for arresting the tide of misfortune and misery. They are also being used to enhance creativity and increase productivity for the common good. Unfortunately, as important and interesting as discourses on meteorology and prophetism are, they are often been studied in isolation development which has consequently made it impossible to examine the benefits they have in common and how they have contributed to sustainable development. This paper therefore aims at doing comparative study of meteorology and prophetism with the purpose of exploring their common benefits to humanity by paying special attention to their points of convergence and divergence. Being an historical study, historical method of analysis is employed. The study reveals that meteorology is a branch of science that is concerned with the process and phenomena of atmosphere especially as a means of forecasting the weather while prophetism is a spiritual method or act of foreseeing and foretelling events. While a meteorologist employs scientific principles to observe, explain and forecast weather, a prophet or prophetess relies on inspiration to predict events. Meteorology and prophetism help people to plan what to wear, when to travel or which products to stock in supermarkets. An accurate forecast and prediction may mean the difference between life and death. Hence, their role in sustainable development and how they can enhance national interaction with the dynamic of globalization cannot be overemphasized. The paper however recommends that persistent comparative studies of both science and religion should be done since this will entrench progressive human development.

Keywords: *Meteorology, Prophetism, Scientific principles, Prediction, Forecasting.*

INTRODUCTION

Meteorology and prophetism are technically synonymous with forecasting, foretelling, prediction and prognostication. All these terms have to do with having the knowledge of the past present and future. Man's life will be in complete shambles and total disarray without adequate knowledge of the workings of his environment. a predicted future

is well prepared for. It is in view of this that this paper examines the place of meteorology and prophetism in human development.

Meteorology is the study of atmosphere, atmospheric phenomena and atmospheric effects on our weather. (The atmosphere is the gaseous layer of the physical environment that surrounds a planet). This means that anything that happens with the weather: wind, rain, snow, sun, dew, frost, fog, e.t.c is opened for study in meteorology. Meteorologists often focus on atmospheric research or operational weather forecasting. Research shows that meteorology includes: climate modeling, remote sensing, air quality, atmospheric physics and climate change. It also covers the relationship between the atmosphere and Earth's climate, oceans and biological life.

Weather forecast provides critical information about the expected weather conditions for a certain period of time and at a particular location. Forecasts may be prepared also for a particular area or route between two locations. There are many different techniques involved in weather forecasting from relatively simple observation of the sky to highly complex numerical models on powerful super computers such as the famous "Cray computer".

Most religions, if not all, have produced the phenomenon of prophecy either continuously or not at certain stage in their development. This observation according to Ugwueye (2002) holds true not only for the so-called primitive religions but also for highly sophisticated ones. By prophecy, we understand not specifically or even principally the foretelling of the future but the mediation and interpretation of the divine mind and will. It was in this sense that the term prophet was used from about the 5th century B.C to designate those who interpreted the divine mind as made known in various ways to themselves or to others.

Fischott (1993) defined a prophet as an individual bearer of charisma who by virtue of this mission proclaims a religious doctrine or divine commandment. Fonrer (1970) regard a prophet or prophetess as a person with charismatic gifts, conscious of having been singled out and called out, an individual who feels constrained to proclaim message and performs actions during a state of spiritual inspiration and possibly accompanied by mild or intense ecstasy. Just as a meteorologist uses scientific apparatus to predict the weather of a particular location and at a particular time, a prophet is charged with the responsibility of announcing God's will to the people in different situations. A prophet's major concerns are prophecy and prediction. That is, he is charged with the task of speaking about his contemporary situation and to predict what will happen in the future.

It is however very obvious that both Meteorology and prophetism deal with prediction, forecasting and foretelling as earlier stated in this work. The work therefore aims at examining the inter-relatedness between the two concepts. To this extent, the study shall focus on the conceptual clarification, history of Meteorology, the meaning of prophetism, origin and development of prophetism, common features between meteorology and prophetism, sustainable development and the place of meteorology and prophetism in sustainable development.

CONCEPTUAL CLARIFICATION

Atmosphere

Atmosphere is the gaseous layer of the physical environment that surrounds a planet. It is the layer of gases commonly known as air that surrounds the planet earth's and it is retained by earth's gravity. The atmosphere of Earth protects life on Earth by absorbing ultraviolet solar radiation, warming the surface through heat retention and reducing temperature between day and night (Gerrat, 1992).

The atmosphere has a mass of about 5.15×10^{21} kg: three quarters of which is written about 11 km of the earth surface. Earth's atmosphere can be divided into five main layers which include the Exosphere, troposphere, stratosphere, mesosphere and thermosphere. The exosphere is the outermost layer of Earth's atmosphere (i.e. the upper limit of the atmosphere). It extends from the exobase which is located at about 70 km above the sea level to about 10,000 km where it merges into the solar wind. The exosphere is located too far above Earth surface (Deikman, 1982).

The thermosphere is the second-highest layer of Earth's atmosphere. It extends from the meso-pause (which separates it from the mesosphere) at an altitude of about 80 km. The height of the thermopause varies considerably due to change in solar activity.

The mesosphere is the third highest layer of Earth's atmosphere occupying the region above the stratosphere and below the thermosphere. The stratosphere is the second-lowest layer of Earth's atmosphere. It lies above the troposphere and is separated from it by the tropopause. The stratosphere is so conditioned to the troposphere to an extent that it lacks the weather producing air turbulence that is so prevalent in the troposphere.

The troposphere is the lowest layer of Earth atmosphere. It extends from Earth's surface to an average height of about 12 km. Nearly all atmospheric water vapour of moisture is found in the troposphere, so it is the layer where most of Earth's weather takes place.

Weather forecasting

Weather forecasting is the application of science and technology to predict the condition of the atmosphere for a given location and time. Human beings have attempted to predict the weather informally for millennia and formally since the 19th century. Weather forecasts are made collecting quantitative data about the current state of the atmosphere at a given place and using scientific understanding of atmosphere processes to project how the atmosphere will change. Human input is required to pick the best possible forecast model to base the forecast upon that which involves pattern recognition skills, telecommunications, knowledge of model performance and knowledge of model biases.

The inaccuracy of forecasting is due to the chaotic nature of the atmosphere, the massive computational power required to solve the equations that describe the atmosphere, the error involved in measuring the initial conditions and an incomplete understanding of atmospheric processes. Hence, forecasts become less accurate as the difference between current time and the time for which the forecast is being made (the range of the forecast) increases. The use of ensembles and model consensus help narrow the error and pick the most likely outcome. There are varieties of end use to weather forecasts. Weather warnings are important forecasts because they are used to protect life and property. Forecasts based on temperature and precipitation are important to agriculture and therefore to traders within commodity markets.

Temperature forecasts are used by utility companies to estimate demand over coming days. On a daily basis people use weather forecasts to determine what to wear on a given day. Since outdoor activities are severely curtailed by heavy rain, snow and wind chill, forecasts can be used to plan activities around these events and to plan ahead and survive them. It is in view of this that meteorology has been defined as the study of weather and its changes especially with the aim of predicting it accurately.

Meteorology

The word “meteorology” is a derivative of a Greek word ‘meteros’ which means “lofty, high (in the sky). The word was coined from three Greek words meta (above), airo (I lift up), and logia i.e. the study of things in the air” (Holton, 2016).

Meteorology is a branch of the atmospheric science which includes atmospheric physics with a major focus on weather forecasting. (Holton:2016) The study of Meteorology dates back to millennia though significant progress in meteorology did not occur until 18th century. The field after weather observation networks were formed across broad regions. Prior attempts at prediction of weather depended on historical data. It wasn't until after the elucidation of the laws of physics and more particularly the development of the computer, allowing for the automated solution of a great many equations that model the weather in the later half of the 20th century that significant breakthroughs in weather forecasting were achieved. (Jacobson, 2005)

Meteorology phenomena are observable weather events that are explained by the science of meteorology. Meteorology phenomena are described and quantified by the variables of Earth's atmosphere temperature at pressure, water vapour, mass flow, and the variations and interactions of those variables and how they change over time.

Meteorology, climatology, atmospheric physics and atmospheric chemistry are sub-disciplines of the atmospheric science. Meteorology and hydrology comprise the interdisciplinary field of hydrometeorology. The interactions between Earth's atmosphere and its oceans are part of a coupled ocean-atmospheric system. Meteorology has application in many diverse fields such as the military, Energy producing company, transport, agriculture and construction.

History and origin of Meteorology

The beginning of meteorology can be traced back to ancient India (<https://www.science.dailymail.com/terms/meteorology.htm>) where serious discussion about the seasonal cycles caused by the movement of Earth around the sun emanated. (<https://www.nationalgeographic.org/encyclopedia/meteorology/>) Varahamihira's classical work *Britatsamnita* written about 500 A.D provides clear evidence of the knowledge of atmospheric processes existed even at that time (<https://www.at a deep kscience daily.com/terms/meteorology.htm>).

The development of meteorology is deeply connected to development in science, math and technology. The Greek philosopher, Aristotle who has been described as the first major scholar of the atmosphere studied around 340 BCE. A growing belief in the scientific method profoundly changed the study of meteorology in the 17th and 18th centuries. Evangelista Torricelli, an Italian physicist observed that changes in air pressure were connected to changes in weather. (Jacobson, 2005) In 1643 Torricelli invented the Barometer to accurately measure the pressure of air. The barometer is still a key instrument in understanding and forecasting weather systems. In 1714, Daniel Fahrenheit a German physicist, developed the mercury thermometer. These instruments made it possible for meteorologists to accurately measure how important atmospheric variables are (Gerratt:1992).

There was no way to quickly transfer weather data until the invention of the telegraph by an American inventor, Samuel Morse in the mid-1800s. Using this new technology, meteorological offices were able to share information and produce the first modern weather maps. These maps combined and displayed more complex sets of information such as isobars (lines of equal air pressure) and isotherms (lines of equal temperature). With these large – scale weather maps, Meteorologists could examine a broader geographic picture of weather and make more accurate forecasts

(<https://www.metoffice.gov.uk/public/weather/forecast>).

In the 1920s, a group of Norwegian meteorologists developed the concepts of air masses and fronts that are the building blocks of modern weather forecasting. Using basic laws of physics, these Meteorologists discovered that huge cold and warm air masses that move and meet in patterns which are the root of many weather system (Richard:2015).

Military operations during World War II brought great advances to meteorology. The success of these operations was highly dependent on weather over vast regions of the globe. The military invested heavily in training, research and new technologies to improve their understanding of weather. The most important of these new technologies was radar, which was developed to detect the presence, direction and speed of aircraft and ships. Since the end of World War II radar has been used and improved to detect the presence, direction and speed of precipitation and wind patterns (<https://www.nationalgeographic.org/encyclopedia/meteorology>).

The technological developments of the 1950s and 1960s made it easier and faster for meteorologists to observe and predict weather systems on a massive scale. During the 1950s, computers created the first models of atmospheric conditions by running hundreds of data points through complex equations. These models were able to predict large scale weather such as the series of high and low pressure systems that circle our planet (<https://www.science daily.com/terms/meteorology.htm>).

TIROS 1, the first meteorological satellite provided the first accurate weather forecast from space in 1962. The success of TIROS 1 prompted the creation of more sophisticated satellites. Their ability to collect and transmit data with extreme accuracy and speed has made indispensable to meteorologists. Advanced satellites and the computers that process their data are the primary tools used in meteorology today. Modern meteorologists have a variety of tools that help them examine, describe, model, and predict weather systems. These technologies are being applied at different meteorological scales to improve forecast accuracy and efficiency.

Radar is an important remote sensing technology used in forecasting. A radar dish is an active sensor in that it sends out radio waves that bounce off particles in the atmosphere and return to the dish. A computer processes these pulses and determines the horizontal dimension of clouds and precipitation, the speed and direction in which these clouds are moving. A new technology known as dual-polarization radar transmits both horizontal and vertical radio wave pulses. With this additional pulse, dual-polarization radar is better able to estimate precipitation and differentiate types of precipitation, rain, snow, sleet or hail. Dual polarization radar will greatly improve flash flood and winter weather forecasts.

Tornado research is another important component of meteorology. Starting in 2009 the National Oceanic and Atmospheric Administration (NOAA) and the National Science Foundation conducted the largest tornado research project in history, known as VORTEX2. The VORTEX2 team consists of about 200 people and more than 80 weather instruments, they travelled more than 16,000 kilometers (10,000 miles) across the great plains of the United State to collect data on how, when, and why tornadoes form. The team made history by collecting extremely detailed data before, during, and after a specific tornado (<https://www.science daily.com/terms/meteorology.htm>). This tornado is the most intensively examined in history and will provide key insights into tornado dynamics (<https://www.science daily.com/terms/meteorology.htm>).

Satellites are extremely important to our understanding of global scale weather phenomena. The National Aeronautics and Space Administration (NASA) and NOAA operate three Geostationary Operational Environmental Satellite (GOES) that provide weather observations for more than 50 percent of the Earth's surface (<https://www.science daily.com/terms/meteorology.htm>).

GOES -15, launched in 2010 includes a solar X-ray, imager that monitors the sun's X-rays for the early detection of solar phenomena, such as solar flares. Solar flares can affect military and commercial satellite communications around the globe, A highly accurate imager of the Earth's surface, detects the movement and transfer of heat, it improves our understanding of the global energy balance and processes such as global warming, convection and severe weather.

Prophetism

The term 'prophet', 'prophecy' and 'prophetism' are often used by religious leaders in the 21st century to encourage believers to take action in order to make the world a better place (Devillers, 2010).

A popular opinion according to Deviller (2010) is that prophecy foretells the future; however the meaning is rejected by the vast majority of biblical scholars. Yet even scholars are not unanimous in their attempt at providing a single definition of 'prophetism'. It is however necessary to look at the origins of the Greek '[prophets]' the word which the Septuagint (LXX) used for the translation of the Hebrew "nabi". In this sense, prophet is someone who acts as a "mouthpiece of god", a prophet is a human medium who is capable of receiving and transmitting a message from a deity (Nissinen, 2004).

De Jong (2007) as quoted by Devillier (2010) posits that all prophecy has bearing on a particular socio-historical circumstances so that the divine-human communication is interpreted as an event in the present or something that happened in the past. Prophecy is seen as the disclosure of a divine message which is important for the state of affairs in the present. Rather than straightforward descriptions of future events, the element of prediction is something that develops out of a present situation in which the divine plan relating to matters in the future is disclosed. Reading the signs in the present, the prophet is able to make calculated projections of what may not happen in the imminent future.

To sum up therefore, a prophet can be described as someone who delivers a divine message while prophecy or prophetism pertains to the interpretation of this message. Prophetism is in truth and reality an emanation sent forth by divine being through the medium of the active intellect in the first instance to man's rational faculty and then to his "imaginative faculty". Prophecy is not limited to a particular culture; it is a common property to all known ancient societies around the world.

Earlier scholars according to De Villier (2004) draw a distinction between divination and prophecy thereby aiming to distinguish between inductive and non-inductive measures that would separate the diviners from the prophets. Diviners make use of inductive measure and technical operations to evolve the message of a deity, while prophet received it spontaneously albeit an audible word, a dream or a vision. There are however two types of divination; Inductive and non-inductive divinations.

Inductive divination was common in the Ancient Near East but only vaguely attested to in the Hebrew Bible. This form of divination requires rather specialized knowledge and technical operations which range from astrology, good omens and bad omens to necromancy. Abnormal appearances in the phases of the heavenly bodies, abnormalities in the birth of animals or humans or in the intestine of ritually slaughtered animals, all served as media by which the gods disclosed some important message to earthly beings. Also the colour or motion of oil poured upon water could be a significant indication of events or otherwise the diviner could look out the direction of smoke from an incense burner. These forms of divination required special training skills and expert knowledge.

Non-inductive divination refers to the spontaneous revelation of divine messages to the recipients, that is the prophet which is more similar to the kind of prophecy of the Hebrew Bible (De Viller, 2004).

Common features between Meteorology and Prophetism

Meteorology and prophetism have unique and similar characteristics both should be studied together and not in isolation. While Meteorology is seen as the branch of science that deals with the processes and phenomena of the atmosphere especially a means of forecasting the weather, prophetism is considered as the disclosure of a divine message which is important for the state affairs of the present.

While meteorologists predict weather condition, prophets predict events.

Meteorologists forecast but prophets foretells

Prophetism is in truth and reality an emanation sent forth by divine being through the medium of the active intellect. Meteorology deals with a variety of tools that are used to examine and describe model and predict weather systems.

The act of prophesying may at times be innate. Meteorology absolutely involves learning processes so that after undergoing the process involved the person concerned becomes an expert.

While prophetism is deeply spiritual, meteorology is purely scientific.

While meteorologist uses scientific apparatus to forecast weather a prophet relies solely on inspiration.

It is however necessary at this juncture to look at the points of convergence between meteorology and prophetism: Both deals with prediction. While a Meteorologist predicts weather a prophet predicts future events.

A prophet needs to interpret his numerous events as divinely inspired before prophesying. A meteorologist also interprets the various data at his disposal before he can forecast.

Meteorologist through weather forecast help people to plan the kind of cloth to wear, when to travel and the kind of products to stock in supermarkets. Prophets also are able to warn people where to travel, what to eat and the kind of trade transactions to be involved in. Both need the knowledge of the present to forecast or foretell the future event

Sustainable Development

Development must involve two basic processes. The first has to do with improving and refining that which is already in existence and adapting it to contemporary requirement (Tunde, 2007). The second process involves finding solutions to new problems or new forms of solutions to old problems. Both imply creative responses for social political and economic affairs.

Sustainable development suggests an enduring, remarkable, non-terminal improvement in the quality of life, standard of living and life chances of the people. Such development must be capable of surviving generations over a prolonged period of time. It favours a progress curve in human development encompassing enhanced creativity, for increased productivity. Sustainable development is development that meets the needs of present without compromising the ability of future generations to meet their own needs.

Sustainable development is maintaining a delicate balance between the human needs to improve lifestyles and feeling of well-being on one hand, and preserving natural resources and ecosystems, on which we, and the future generations depends.

Sustainable development implies economic growth together with the protection of environmental quality, each reinforcing the other. The essence of this form of development is a stable relationship between human activities and the natural world which does not diminish the prospects for future generations to enjoy a quality of life at least as good as our own.

The term refers to achieving economic and social development in ways that do not exhausts a country's natural resources. It is a process of change in which the exploitation of

resources, the direction of investments the orientation of technological development and institutional change are made consistent with the future as well as present needs.

Sustainable development can therefore be defined as a deliberate and systematic policy of ensuring the survival of a state in such conditions that the social, economic and political necessities that are imperative for the enjoyment of the good life and ensuring the greatest good for the greatest numbers are available now without this constituting a denial of the capacity of being able to enjoy the same benefits to generations yet unborn in the foreseeable future.

Another way of understanding the concept of Sustainable development is to say that the society should be managed in an effective and efficient manner such that it benefits all and sundry, with enough resources still available for the continuation of the human race in future. This is achievable through the judicious and careful use of global resources. A necessary adjunct to this concern therefore is the imperative of poverty eradication, control of diseases, improvement of the standards of living of the people, good governance and the forgiveness of debts. Sustainable development refers to the definitive growth of the society in every sphere.

The Place of Meteorology and Prophetism in Sustainable Development

As earlier pointed out in this work, sustainable development entails how the society should be managed effectively and efficiently such that it benefits all and sundry with enough resources still available for the continuation of human race in the future, Meteorology and Prophetism make this achievable. Climate change is one of the greatest challenges of our time and its adverse impacts undermine the ability to achieve sustainable development. Climate change makes the survival of many societies and of the biological support systems of the planet impossible. It may have negative impact on: Food security; Agriculture; Rural development and Water management. It may also cause global health threats; Natural resources depletion; Environmental degradation and so on. A proper prediction of the conditions of the atmosphere for a given location and time helps to sustain development in the following ways:

- **It ensures healthy lives and promotes wellbeing for all ages:** With accurate predictions either from a Meteorologist or Prophet, adequate preparation is made to prevent any calamity that unfavourable weather might cause. Since weather condition determines attitudes at a given time evils and disaster are avoided with accurate predictions. When disasters are avoided, peaceful co-existence which leads to development becomes possible.
- **It promotes, sustains, inclusive economic growth and productive employment.** Proper prediction enhances economic growth if right transactions are made and needed goods are sold. Productive employment becomes necessary when profits are made. Employment will no doubt reduce the level of poverty which will in turn lead to economic sustainability.
- **It builds resilient infrastructure, promotes inclusive and sustainable industrialization and fosters innovation.** Through timely predictions, the building of dependable infrastructure and promotion of inclusive and sustainable industrialization will become an easy task. Persistent and reliable predictions also foster and contribute greatly to economic sustainability.
- **It makes cities and human settlements inclusive, safe, resilient and sustainable.** As no one is ready to settle in any region devoid of peace, proper prediction is necessary because settlement in any peaceful environment will enhance development.

- **It protects, restores and promotes sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halts and reverse land degradation and halts biodiversity loss**(<https://www.business-humanrights.org/>).(biodiversity loss is the variety of life on Earth in all its forms and interactions. It is the variability among living organisms from all sources, including terrestrial marine and other aquatic ecosystems). Biodiversity loss will no doubt affect the Gross Domestic Product(GDP) of any nation which in turn hamper its economic growth and development.
- **It revitalizes the global partnership for sustainable development:** Accurate meteorological or prophetic predictions enhance economic partnership among different countries. Apart from peaceful co-existence that global partnership brings, it contributes tremendously to economic development.
- **It promotes peaceful and inclusive societies for sustainable development.**

CONCLUSION

The role being played by meteorologists and prophets in the world cannot be overemphasized most especially when one considered the benefits of prophetism and meteorology to human development.

It is however not an exaggeration to opine that lives will remain inhabitable and of course miserable without these phenomena. Without weather forecast or prophetic prediction disasters of different degrees will be inevitable since sustainable development will remain unattainable grandiose and a mere illusion.

In view of the above analysis, it is however recommended that persistent comparative studies of science and religion should be done since this will pave way for expected sustainable development.

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