

Introduction

The study of weather and climate is increasingly becoming important in national economic planning, social and political development. Climate studies have played an integral role in policy formulation and development in the West and have also become vital in Africa as has been seen from the establishment of departments of environment studies at African universities and the appointment of Ministers of Environment in recent years. In this chapter, we study the atmosphere and the processes which occur mainly in the troposphere which is about 12 to 13 km thick above the earth's surface. We also seek to understand climatology which describes the study of meteorological variables such as pressure, temperature, wind, humidity, precipitation and cloud cover and how these vary from time to time and from place to place. The increasing human interference on the natural environment, with serious consequences in both developed and developing countries, will also form a special object of analysis in this chapter.

The atmosphere

The atmosphere has four significant layers or spheres namely the troposphere, the stratosphere, the mesosphere and the thermosphere. These four spheres are distinguishable largely in terms of their variations in temperature, altitude (height above sea level) and pressure. The top of each layer is characterised by an isothermal zone identified as the tropopause, stratopause and the mesopause for the first three spheres respectively. Fig 1.0 illustrates the stratification and temperature of the atmosphere.

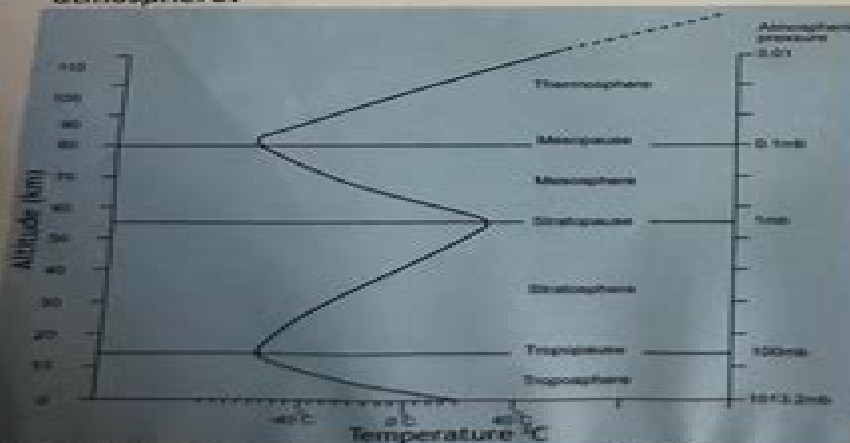


Fig 1.0 The atmosphere: temperature - height diagram

Troposphere

This is the atmospheric layer extending from the earth surface up to about 13 000m in height. It is the thinnest of all the spheres but it contains over 75% of the total gaseous mass of the atmosphere. Atmospheric gases include nitrogen which composes 78.8%, oxygen (20.9%), argon (0.95%) and carbon dioxide (0.033%) which are the major components, adding up to 99.9%. Other trace constituents include neon, helium, xenon, hydrogen and methane which constitute 0.003% altogether. According to Colin Buckle (1996), the term "troposphere" is derived from a Greek word "tropos", which means a situation where air is constantly in motion, arranging and rearranging itself in an attempt to achieve equilibrium.

We need to understand the various processes taking place in this layer since it is the weather-making sphere with a direct importance to humankind. Meteorologists have divided it into two layers of distinct aerodynamic characteristics. These are the upper air and the boundary layer which is synonymously known as the friction layer. Because the latter is in direct contact with the earth surface, it is constantly affected by the earth-atmospheric processes. As a result, it forms the major study area for meteorological analysis.

The Boundary Layers

The friction layer is about 1 000m in height and it can further be divided into two distinct layers. The lowest layer stretching from the earth surface up to about 100m is described as the surface boundary layer. It is a zone of highest pressure, moisture and temperature. Sometimes the phrase 'earth-atmosphere intersurface' is used to identify this layer. The second layer is the planetary boundary layer which stretches from about 100m to 600m in the atmosphere. Meteorological variables in this layer are not directly influenced by the earth surface. Fig 1.1 illustrates the two layers in the lower atmosphere.

The depth of the troposphere is a function of vertical temperature and pressure variations which cause convective air currents. The high radiation intensity at the equatorial belt which influences vertical pressure variation causes the troposphere to be deepest at the equator, decreasing accordingly with increase in latitude. Similarly, the boundary layer also varies in depth with radiation intensity. In

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but can

Altitude (m)
1200
1000
800
600
400
200
0

Fi

10

1

Energy Mutodi Geography

R Bogdan



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The Geography of Energy, 1964 **Geographical Dimensions of Energy** F.J. Calzonetti, B. Solomon, 2011-10-03 This book is the first attempt to provide a comprehensive volume on the topic of energy geography. The book reviews research on energy geography, contains original refereed articles on energy, and provides a chapter on future research directions in this subfield of geography. The book provides an overview of the research activity underway and highlights the role of geographers and regional scientists in the study of energy topics. A diverse group of scholars contribute to the manuscript, and the chapters show how different research methodologies and approaches are employed in investigating a range of relevant energy problems. This book is intended for upper level undergraduate students and graduate students in geography, regional science, and related disciplines. It will also be useful to professional geographers who would like to know more about the energy geography subfield. Furthermore, the chapters will be interesting to applied geographers and energy policymakers who can see the value of the spatial perspective in addressing energy problems. Energy and the Environment Eleanor Rawling, 1983 *A Geography of Energy* H. Reid Wagstaff, 1974 **The Routledge Research Companion to Energy Geographies** Stefan Bouzarovski, Martin J Pasqualetti, Vanesa Castán Broto, 2017-07-06 Energy has become a central concern of many strands of geographical inquiry, from global climate change to the effects of energy decisions on our lives. However, many aspects of the black box of relationships at the energy society interface remain unopened, especially in terms of the spatial underpinnings of energy production and consumption within nations, cities, and regions. Debates focusing on the location and nature of energy flows frequently fail to consider the multiple geographical networks that illustrate and explain the distribution of fuels and services around the world. Providing an integrated perspective on the complex interdependencies between energy and geography, *The Routledge Research Companion to Energy Geographies* offers a timely conceptual framework to study the multiple facets of energy geography, including security, space, and place, planning, environmental science, economics, and political science. Illustrating how a geographic approach towards energy can aid decision-making pathways in the domains of social justice and environment, this book provides insights that will help move the international community toward greater cooperation, stability, and sustainability. *Energy Matters* Rosemary Hector, 1995 Part of a geography series which covers the main physical, human, and environmental themes with an emphasis on the interaction between people and their environment, this book examines the nature of energy and energy resources throughout the world and includes a decision-making exercise. **Geographical Dimensions of Energy** Calzanetti F. J., 1980 *Energy, the Ultimate Resource?* Earl Ferguson Cook, 1977 *The New Geographies of Energy* Karl Zimmerer, 2013-09-13 *The New Geographies of Energy: Assessment and Analysis of Critical Landscapes* is a pioneering collection of new geographic scholarship. It examines such vitally important research topics as energy dilemmas of the United States, large trends and patterns of energy consumption, including China's role, peak oil, energy poverty, and ethanol and other renewable energy.

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Table of Contents Energy Mutodi Geography

1. Understanding the eBook Energy Mutodi Geography
 - The Rise of Digital Reading Energy Mutodi Geography
 - Advantages of eBooks Over Traditional Books
2. Identifying Energy Mutodi Geography
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Energy Mutodi Geography
 - User-Friendly Interface
4. Exploring eBook Recommendations from Energy Mutodi Geography
 - Personalized Recommendations
 - Energy Mutodi Geography User Reviews and Ratings
 - Energy Mutodi Geography and Bestseller Lists
5. Accessing Energy Mutodi Geography Free and Paid eBooks
 - Energy Mutodi Geography Public Domain eBooks
 - Energy Mutodi Geography eBook Subscription Services
 - Energy Mutodi Geography Budget-Friendly Options

6. Navigating Energy Mutodi Geography eBook Formats
 - ePub, PDF, MOBI, and More
 - Energy Mutodi Geography Compatibility with Devices
 - Energy Mutodi Geography Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Energy Mutodi Geography
 - Highlighting and Note-Taking Energy Mutodi Geography
 - Interactive Elements Energy Mutodi Geography
8. Staying Engaged with Energy Mutodi Geography
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Energy Mutodi Geography
9. Balancing eBooks and Physical Books Energy Mutodi Geography
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Energy Mutodi Geography
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Energy Mutodi Geography
 - Setting Reading Goals Energy Mutodi Geography
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Energy Mutodi Geography
 - Fact-Checking eBook Content of Energy Mutodi Geography
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
 - Integration of Multimedia Elements

- Interactive and Gamified eBooks

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