Issues in Physics, Environment and Sustainable Development

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Abstract

The environmental problems cannot be addressed comprehensively by looking through the limited lens of only one of the traditional disciplines established in academia, such as, physics, chemistry, biology, engineering, or economics. It is hard to solve most global problems without the detailed information that those disciplines provide, but the study of Earth systems science suggests that we also need to find appropriate ways to integrate high-quality disciplinary work from several fields. To understand and assess the possible dangers to the Earth caused by the exploitation of its resources and the development of industry, a new branch of science, Environmental physics, has evaluated in the past 30 years, which is dedicated to study of 'Environmental Issues'

Keywords*: Physics, Environment, Sustainable development,Earth*

Introduction

Nature has amazing richness across the range of spatial and temporal scales at which Processes and their interactions occur. We know from our own experience that winds blow and oceans move. Our Earth is not solid, if we define solid to mean forever immovable in space. The drift of continents can have the major influence on both climate and life. Except for local phenomena such earthquakes, landslides, and mountain glaciers, the time frame for major continent-scale Earth motions is thousands to millions of years. How the "solid" Earth interacts with air, water, and life is essential for understanding the Earth as a system, as knowledge of how and why the Earth system changes over geologic time allows us to calibrate our tools needed to forecast global changes.

The Earth is a marvelous place and since its formation 4.6 billion years ago both living and non-living entities have developed. In a global environment that is structured within the relationship between the land, the air, the oceans and the biosphere. However, to appreciate our environment it is necessary to understand the basic physical science that regulates its development.

In the past few decades the possible detrimental impact humanity is having on the planet has caused increasing concern. As humanity has sought to improve its so called prosperity, it has often done so by exploiting the Earth's abundant natural resources. The discovery of the ozone hole, the first signs of industrially induced global warming, the widespread phenomenon of acid rain and the growing evidence of health problems caused by urban pollution, have attracted world-wide attention from both social and political commentators. Debates have taken place, in the Scientific and political communities, about the actual evidence for such phenomena and what actions should be taken to alleviate such impacts. The environmental problems cannot be addressed comprehensively by looking through the limited lens of only one of the traditional disciplines established in academia, such as, physics, chemistry, biology, engineering, or economics. It is hard to solve most global problems without the detailed information that those disciplines provide, but

the study of Earth systems science suggests that we also need to find appropriate ways to integrate high-quality disciplinary work from several fields. To understand and assess the possible dangers to the Earth caused by the exploitation of its resources and the development of industry, a new branch of science, Environmental physics, has evaluated in the past 30 years, which is dedicated to study of 'Environmental Issues'.

Environmental physics is an interdisciplinary subject that integrates the physics processes in the following disciplines: the atmosphere, the biosphere, the hydrosphere, and the geosphere. Environmental physics can be defined as the response of living organisms to their environment within the framework of the physics of environmental processes and issues. It is structures within the relationship between the atmosphere, the oceans (hydrosphere), land (lithosphere), soils and vegetation (biosphere). It embraces the following themes, Dželalija(2004) are; human environment and survival physics, built environment, urban environment, renewable energy, remote sensing, weather, climate and climate change, and environmental health.

To understand how any specific environmental process evolves, it is necessary to appreciate that all these processes are interdependent. The formation and mobility ofclouds, for example, illustrate just one aspect of a number of global environmental processes and require the study of: solar radiation transformations and the radiation balance, phase changes in the water cycle, monitoring physical phenomena, exchanges between the Earth, the oceans, the atmosphere and the biosphere, transport phenomena, especially mass and thermal energy transfer. However, it is important to appreciate that the principles and lows of physics are in evidence in many different environments and govern how all species live on the Earth.

The environment may be defined as the medium in which any entity finds itself. For example, for a cloud, its environment may be the region of the atmosphere in which it is formed, while for a plant, it is a field in which it lies, and for a whale it is the sea in which it swims. Thus, it is informative to discuss environmental issues within the context of the surroundings in which an object finds itself. In the following review the applications of the principles of physics to environmental processes and problems will be discussed and put in the context of current environmental issues.

Issues Arising in Our Environment

Global warming

Global warming; this is the rise in the average temperature of Earth's atmosphere and oceans since the late 19th century and its projected continuation. Since the early 20th century, Earth's mean surface temperature has increased by about 0.8 °C (1.4 °F), with about two-thirds of the increase occurring since 1980; Solomon et al (2007). Warming of the climate system is equivocal, and scientists are more than 90% certain that it is primarily caused by increasing concentrations of greenhouse gases produced by human activities such as the burning of fossil fuels and deforestation. These findings are recognized by the national science academies of all major industrialized nations, Houghton et al (2001).

Climate model projections were summarized in the 2007 Fourth Assessment Report (AR4) by the Intergovernmental Panel on Climate Change (IPCC). They indicated that during the 21st century the global surface temperature is likely to rise a further 1.1 to 2.9 °C (2 to 5.2 °F) for their lowest emissions scenario and 2.4 to 6.4 °C (4.3 to 11.5 °F) for their highest. The ranges of these estimates arise from the use of models with differing sensitivity to greenhouse gas concentrations.

According to AR4, warming and related changes will vary from region to region around the globe. The effects of an increase in global temperature include a rise in sea levels and a change in

the amount and pattern of precipitation, as well a probable expansion of subtropical deserts. Warming is expected to be strongest in the Arctic and would be associated with the continuing retreat of glaciers, permafrost and sea ice. Other likely effects of the warming include a more frequent occurrence of extreme-weather events including heat waves, droughts and heavy rainfall, ocean acidification and species extinctions due to shifting temperature regimes. Effects significant to humans include the threat to food security from decreasing crop yields and the loss of habitat from inundation.

US National Research Council (US NRC 2012), Proposed policy responses to global warming include mitigation by emissions reduction, adaptation to its effects, and possible future reengineering. Most countries are parties to the United Nations Framework Convention on Climate Change (UNFCCC), whose ultimate objective is to prevent dangerous anthropogenic (i.e., human-induced) climate change. Parties to the UNFCCC have adopted a range of policies designed to reduce greenhouse gas emissions and to assist in adaptation to global warming. Parties to the UNFCCC have agreed that deep cuts in emissions are required, and that future global warming should be limited to below 2.0 °C (3.6 °F) relative to the pre-industrial level. Reports published in 2011 by the United Nations Environment Programme and the International Energy Agency suggest that efforts as of the early 21st century to reduce emissions may be inadequate to meet the UNFCCC's 2 °C target.

Climate Change

Climate change is a significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years. It may be a change in average weather conditions, or in the distribution of weather around the average conditions (i.e., more or fewer extreme weather events). Climate change is caused by factors that include oceanic processes (such as oceanic circulation), variations in solar radiation received by Earth, plate tectonics and volcanic eruptions, and human-induced alterations of the natural world; these latter effects are currently causing global warming, and "climate change" is often used to describe human-specific impacts.

Scientists actively work to understand past and future climate by using observations and theoretical models. Borehole temperature profiles, ice cores at the frequencies of visible light largely passes through the atmosphere to warm the planetary surface, which then emits this energy at the lower frequencies of infrared thermal radiation. Infrared radiation is absorbed by greenhouse gases, which in turn re-radiate much of the energy to the surface and lower atmosphere. The mechanism is named after the effect of solar radiation passing through glass and warming a greenhouse, but the way it retains heat is fundamentally different as a greenhouse works by reducing, floral and faunal records, glacial and per glacial processes, stable isotope and other sediment analyses, and sea level records serve to provide a climate record that spans the geologic past. More recent data are provided by the instrumental record. Physically based general circulation models are often used in theoretical approaches to match past climate data, make future projections, and link causes and effects in climate change.

Greenhouse Effect

The greenhouse effect is a process by which thermal radiation from a planetary surface is absorbed by atmospheric greenhouse gases, and is re-radiated in all directions. Since part of this re-radiation is back towards the surface and the lower atmosphere, it results in an elevation of the average surface temperature above what it would be in the absence of the gases.

Solar radiation airflow, isolating the warm air inside the structure so that heat is not lost by convection.

The existence of the greenhouse effect was argued for by Joseph Fourier in 1824. The argument and the evidence was further strengthened by Claude Pouillet in 1827 and 1838, and reasoned from experimental observations by John Tyndall in 1859, and more fully quantified by Svante Arrhenius in 1896, Stephen (2001) .

If an ideal thermally conductive blackbody However, since the Earth reflects about 30% of the incoming sunlight, the planet's effective temperature was the same distance from the Sun as the Earth is, it would have a temperature of about 5.3 °C. the temperature of a blackbody that would emit the same amount of radiation) is about −18 °C, about 33°C below the actual surface temperature of about 14 °C. The mechanism that produces this difference between the actual surface temperature and the effective temperature is due to the atmosphere and is known as the greenhouse effect; Vaclav (2003).

Earth's natural greenhouse effect makes life as we know it possible. However, human activities, primarily the burning of fossil fuels and clearing of forests, have intensified the natural greenhouse effect, causing global warming.

Conclusion

It has been well recognized that environment issues like global warming and climate change etc are not merely national issues but are global issues and hence must be tackled with international efforts and cooperation.

Our survival and sustenance depend. Resources withdraw, processing and use of the product have all to by synchronized with the ecological cycles in any plan of development our actions should be planned ecologically for the sustenance of the environment and development.

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