MUSLIM INTERSCHOLASTIC TOURNAMENT

THE WEIGHT OF POWER:
RULING THE SELF TO SERVE OTHERS

MIST QUIZ BOWL TOPIC 1: THE WORLD, CHANGE AND THE FIGHT AGAINST THE CLIMATE CRISIS

MIST Quiz Bowl Topic 1: The World, Change and the Fight against the Climate Crisis

For MIST Quiz Bowl Topic 1: **The World, Change and the Fight against the Climate Crisis,** the questions will be asked from the compilation of scholarly journals below:

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Note:
The questions for this topic may include specifics regarding dates. These will be dates of significance.

For example:
Question: Experts state that by this year, climate change will truly be irreversible unless our carbon emissions are reduced significantly. What year has been stated by scientists in the IPCC?

Answer: 2030

Overview

Human activities are changing Earth's climate, causing increasingly disruptive societal and ecological impacts. Such impacts are creating hardships and suffering now, and they will continue to do so into the future - in ways expected as well as potentially unforeseen. To limit these impacts, the world's nations have agreed to hold the increase in global average temperature to well below 2°C (3.6°F) above pre-industrial levels.

To achieve this goal, global society must promptly reduce its greenhouse gas emissions. According to the Intergovernmental Panel on Climate Change (IPCC), global carbon dioxide (CO2) emissions must reach net-zero by around 2070 to have a good chance of limiting warming by about 2050. Either target will require a substantial near-term transition to carbon-neutral energy sources, adoption of more carbon-efficient food systems and land use practices, and enhanced removal of CO2 from the atmosphere through a combination of ecological and technological approaches.

Society must also prepare to cope with and adapt to the adverse impacts of climate change. Done strategically, efficiently, and equitably, the needed transformations provide a pathway toward greater prosperity and well-being, while inaction will prove very costly for humans and other life on the planet.

Background and History

Over the past century, as a result of burning fossil fuels and other human activities, atmospheric concentrations of greenhouse gases—including CO2, methane, nitrous oxide, and halocarbons—have risen to levels unprecedented in at least the last 800,000 years. The current decade is now the hottest in the history of modern civilization. Based on extensive scientific evidence, it is extremely likely that human activities, especially emissions of greenhouse gases, are the dominant cause of the observed warming since the mid-20th century. There is no alternative explanation supported by convincing evidence.

Many other changes related to heating have been documented: more frequent heat waves on land and in the ocean; reductions in Arctic sea ice, the Northern Hemisphere's snow cover, the Greenland and West Antarctic ice sheets, and mountain glaciers; changes in the global water cycle, including intensifying precipitation events; and rising sea levels. Greater CO2 concentrations in the atmosphere are also affecting the growth and nutritional value of land plants and are directly acidifying ocean waters.

International Policy and Conflict

The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at COP 21 in Paris, on 12 December 2015 and entered into force on 4 November 2016. Its goal is to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels.

To achieve this long-term temperature goal, countries aim to reach global peaking of greenhouse gas emissions as soon as possible to achieve a climate neutral world by mid-century. The Paris Agreement is a landmark in the multilateral climate change process because, for the first time, a binding agreement brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects.

Implementation of the Paris Agreement requires economic and social transformation, based on the best available science. The Paris Agreement works on a 5- year cycle of increasingly ambitious climate action carried out by countries.

In December 2015, 194 states and the European Union signed up to the Paris Agreement. This is the most important pact for international cooperation to tackle climate change. By signing the Agreement, the world's nations have committed to limit the increase in global warming to 'well below 2°C', with a goal to keep it to 1.5°C.

They also set an aim for global emissions to peak as soon as possible, and then achieve a balance between human emissions produced and the removal of greenhouse gases from the atmosphere in the second half of the century; resulting in what is called 'net zero emissions'. Developed countries have also committed to provide more financial support for developing countries to act on climate change.

By signing the Agreement, countries have committed to submitting and delivering on their own voluntary pledges that set out how they will lower their emissions and adapt to climate change. These are known as Nationally Determined Contributions (NDCs). The pledges are monitored through an international mechanism that reviews collective progress on the goals of the Agreement. This is the 'global stocktake' which will first happen in 2023, and then subsequently every five years.

Countries are legally bound to submit their pledges under the Paris Agreement. Delivering the pledges, however, must be ensured and enforced through national laws and policies. By publicizing the different national pledges transparently, the Agreement makes it possible to hold states accountable if they fail to deliver on their promises. The global stocktake mechanism also puts pressure on countries to increase their level of ambition over time, by regularly reviewing progress on the shared global goals.

This approach is part of the reason why international relations experts have suggested that the Paris Agreement was an important new step for global climate change action[3]. By relying on voluntary promises and transparent review processes, it sidesteps the thorny question of how to reach an international agreement on legally binding targets for lowering greenhouse gas emissions. It is hoped that this approach creates a more realistic path for international climate change action.

Why is Climate Changing?

Climate—the statistical description (both mean and variability) of the atmosphere–ocean–land–cryosphere system over a few decades—is characterized by the balance of incoming and outgoing energy, which strongly depends on the composition of the atmosphere. Consequently, climate can be affected by human-induced changes in atmospheric composition (greenhouse gases and aerosols) and land surface use/cover. Climate is also influenced by natural variability, which includes decadal to multi-decadal fluctuations of ocean circulation and temperature in the Atlantic and Pacific basins.

Other than water vapor, the most prevalent greenhouse gas is CO_2, whose concentration is rising mainly from fossil fuel combustion, cement production, and deforestation. About half the anthropogenic CO_2 input into the atmosphere has remained in the atmosphere, and the rest has been taken up by the oceans and terrestrial biosphere (i.e., soil and plants on land)—the two CO_2 reservoirs with which the atmosphere routinely exchanges large amounts of CO_2, seasonally. Once introduced, the CO_2 can reside in the atmosphere for 1000 years or more before it is removed by natural processes, with more than 50% of the introduced CO_2 remaining in the atmosphere for at least 50 years and roughly 30% remaining for at least 100 years.

Water vapor is another important greenhouse gas, but unlike CO_2, it responds quickly to temperature change. For this reason, it mostly acts as a feedback, amplifying the response of the climate system to changes in radiative forcing, for instance from long-lived greenhouse gases like CO_2.

A third important greenhouse gas is methane, which is produced both naturally, primarily by emissions from wetlands and wildlife, and from human activities such as agriculture, landfills, and fossil fuel extraction processes, with the human activities responsible for the majority of emissions today. For example, methane is a by-product of the hydraulic fracturing (fracking) process for extracting oil and natural gas from underground. Methane is shorter-lived and much less abundant than CO_2 but a much more effective greenhouse gas per molecule, with more than 30 times the warming potential of CO_2 by weight when compared over a 100-year period. The concentration of methane in the atmosphere was less than 800 parts per billion before the industrial revolution and is now measured at over 1,800 parts per billion. As the climate changes, the production of natural methane will likely increase, for example, due to thawing of previously frozen carbon-rich soils in the permafrost zones of the high-latitude continents and the possible mobilization of methane trapped in hydrate form in oceanic sediment.

Human activity also affects climate through changes in the number and physical properties of tiny (nano- to micrometer diameter) solid particles and liquid droplets suspended in the atmosphere, known collectively as atmospheric aerosols, e.g., dust and sulfates from air pollution. Aerosols modify both visible and infrared radiation and can influence the spatial distribution of clouds and precipitation. Most aerosols originating from human activity act to cool the planet, partly counteracting greenhouse warming. However, the time span in which aerosols remain suspended in the troposphere is much shorter than for greenhouse gases such as CO_2. Stratospheric aerosols generated by occasional large sulfur-rich volcanic eruptions can reduce the global surface temperature for a few years.

Changes in land surface use from agriculture, irrigation, deforestation, and urbanization also influence the surface exchange of water and energy with the atmosphere, generating regional climate change.

How is The Climate Projected to Change in the Future?

Based on understanding of past changes and projections of future human activities, it is projected that over the next 100 years Earth’s surface will warm at least as much as it did in the past 100 years, and perhaps 2–6 times more. Further, the proportion of global warming that is offset by cooling from human sources of aerosols may diminish in the future.

Global warming and sea level rise would continue during the next few decades even if atmospheric greenhouse gas concentrations could somehow be held constant at their present levels. This decades-long delay is because of the inherent slowness with which the oceans and polar ice sheets respond to surrounding temperature, the input of heat, and changes in the chemistry of the air and oceans.

Climate models project the global average sea level to be 0.3–1.2 m (1.0–4.0 ft) higher, and the global average surface temperature to be warmer by more than 1.5°C (and up to 4.0°C depending on future emission scenarios) at the end of the twenty-first century relative to the 1850–1900 period. A narrower range for the global surface temperature increase (2.6°–3.1°C) is obtained in scenarios where emissions are restricted to the level of current international agreements. Oceans are also projected to be significantly more acidic (an additional 0.3–0.4 pH decrease, or +150% more acidic) by the end of this century.

At regional scales, climate models project a general reduction of precipitation in the subtropics, which, together with warmer temperatures, will have the effect of intensifying drought. An increase of precipitation in the high latitudes is also projected, with associated increasing extreme precipitation events. The sea ice in the Arctic Ocean is projected to become seasonal or disappear entirely from some places, making the continental margins of the Arctic more prone to damaging storms and ocean waves. Warming in Alaska, which is faster than in other parts of the United States, will continue, with likely further thawing of permafrost.

Barring large increases in volcanic activity or decreases in solar energy output, reducing the amount of greenhouse gas emitted by human activity and/or accelerating the removal of these gases from the atmosphere is the only way to avoid much of the projected warming and its associated global-scale effects on sea level rise, precipitation and heat extremes, and ecosystem health. Adaptation could ameliorate at least some of the impacts of projected climate change on economies and human health.

Climate projections for decades into the future are made using computer programs that model the atmosphere–ocean–land surface–cryosphere system, based largely on fundamental physical laws and well-understood physical principles. These models explicitly simulate the large-scale [approximately 100 km (60 miles) or larger] motions of the atmosphere and ocean. By subjecting these models to time-dependent greenhouse gas concentrations and other forcings, with concentrations allowed to evolve in the future based on emission hypotheses (or “scenarios”), the simulated climate responds to such changes in atmospheric composition. Climate projections from such calculations focus on identifying the average (mean) state and extreme states of the atmosphere and ocean, summarized on the time scales of decades, rather than an instantaneous future state of the entire system. The projections depend on the evolution of the energy budget and its influence on the climate system's slowly varying system components—ocean, land surface, and the cryosphere—and their interactions.

Natural variability can obscure anthropogenic influences on climate at the multidecadal scale. Examples include a slower pace of atmospheric warming during the first decade of the twenty-first century and a more rapid pace during the mid-2010s. Such changes in the pace of warming are also seen in projections of future climate.

Climate models have both strengths and weaknesses. For example, they reliably represent many of the fundamental processes that govern weather and climate, including midlatitude storms, heat waves, droughts, and extreme seasonal precipitation. As a result, many models are able to simulate the broad features of the twentieth-century climate. However, some crucial processes like clouds and convection, ocean eddies, deep water formation, and carbon cycle remain crudely represented. These deficiencies are thought to underpin model errors in the representation of the present climate, its modes of natural variability, and its recent evolution. Climate simulations and projections are especially challenged on the regional scale—the scale of relevance in adaptation efforts. However, climate models successfully replicate the global warming of the twentieth century, and they agree that further warming and other global and regional changes can be expected this century. Furthermore, there are recent developments of higher-resolution climate models that can be used to project regional-scale changes.

The Needed Responses

Destructive consequences of global climate change can be moderated by taking prompt actions to use energy more efficiently, transition to energy sources and products and services that do not release greenhouse gases, implement existing and novel technologies and practices to remove and store CO_2 from the atmosphere, and adapt to unavoidable changes. These actions must involve individuals, communities, businesses, governments, acting at local, regional, national, and global scales. Done smartly, those actions can yield significant economic and social benefits, including better human health and well-being, employment opportunities, more sustainably used resources, and conserved biodiversity. Enhanced CO_2 removal from the atmosphere will be needed to achieve net-zero emissions. Other climate intervention approaches, such as solar radiation management, require cautious consideration of risks. Neither can substitute for deep cuts in emissions or the need for adaptation.

Effective climate policies will rely on innovative and responsive science and engineering to inform and weigh response options. Scientists and engineers must continue to engage with policy makers, communities, businesses, and the public to undertake solution-oriented research and analysis. Scientific institutions, including academia and governmental agencies, should expand and prioritize their support for research, application, and knowledge dissemination to address the climate crisis.

If all of this sounds expensive, it is – but the important thing to remember is that we already know a lot about how to adapt. More is being learned every day. Further, investing in adaptation makes a lot more sense than waiting and trying to catch up later, as many countries have learned during the COVID-19 pandemic. Protecting people now saves more lives and reduces risks moving forward. It makes financial sense too because the longer we wait, the more the costs will escalate.

Think about this. Globally, a $1.8 trillion investment in early warning systems, climate-resilient infrastructure, improved agriculture, global mangrove protection along coastlines and resilient water resources could generate $7.1 trillion through a combination of avoided costs and a variety of social and environmental benefits. Universal access to early warning systems can deliver benefits up to 10 times the initial cost. And if more farms installed solar-powered irrigation, used new crop varieties, had access to weather alert systems and took other adaptive measures, the world would avoid a drop-off in global agricultural yields of up to 30 per cent by 2050.

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