One only needs to watch the news to know that millions of humans across the globe are currently experiencing, with increasing frequency and severity, the impacts of climate change. The cost of weather-related disasters continues to rise each year as a result of changing climate. As of October 8 in 2021, the U.S. has experienced 18 weather/climate disaster events – including droughts, flooding, wildfires, hurricanes, and winter storms – each with losses exceeding $1 billion. The immediate impacts are clear: destruction of individual homes and entire communities, impaired access to healthcare, loss of life, and the financial costs of response and recovery. But there are also long-term impacts to consider, such as the changes in resiliency of terrestrial, oceanic, and freshwater ecosystems that impact their ability to recover after disruption from such events, threatening long-term impacts on ecological processes and services upon which humans rely.

Evidence for rapid climate change is compelling – and growing. Our planet’s average global temperature is rising. This change is directly linked to human activities that increase the amount of greenhouse gases (e.g., carbon dioxide and methane) in the atmosphere. According to the National Oceanic and Atmospheric Administration (NOAA), nine of the 10 warmest years on record have occurred since 2005, with 2019 being the second-warmest year on record. And changes are occurring in the ocean as well. The basic chemistry of the ocean is changing faster now than ever in the past. As the ocean continues to absorb much of the excess carbon dioxide and heat in the atmosphere, the water warms, expands, and becomes more acidic and less oxygenated. These thermal and chemical changes put stress on marine ecosystems and the life which inhabit them. They also melt terrestrial ice sheets and glaciers, which, unlike their aquatic counterparts ice shelves and sea ice, cause rising sea levels and put coastal communities at greater risk of erosion and storm surge. Simply put, the ocean, which covers more than 70 percent of Earth’s surface and transports heat from the equator to the poles, can’t continue to act as a huge buffering mechanism, regulating the global climate. Humans have introduced too much carbon dioxide into the system too quickly and we are now dealing with the consequences. Unfortunately, some consequences are still unknown as new and cumulating effects on our complex ocean and coastal ecosystems emerge.
It’s clear that climate change is one of the most complex issues we face. The United Nations’ Intergovernmental Panel on Climate Change (IPCC) has made that clear since their first climate assessment in 1990. They released their sixth report in August 2021, stating unequivocally that we must take urgent action to curb global heating if we are to prevent catastrophe. And while the IPCC assessment states that greenhouse gases are driving extreme weather, the more than 200 scientists involved in writing the report believe nations can still prevent the worst impacts.

The ocean, while negatively affected by climate change, can also serve as a source of solutions. Nature-based solutions are often overlooked, but blue carbon ecosystems including saltmarshes, seagrass beds, and mangroves, serve as valuable habitats for sequestering and storing carbon, at a rate of two- to four-times that of terrestrial forests. Protecting and conserving blue carbon ecosystems dually serve to bolster coasts and shorelines world-wide. Ocean-based renewable energy, such as offshore wind, tidal, and current technologies, are viable clean energy options, helping curb carbon emissions. These two example options not only serve as science-based solutions, but also help inspire innovation, support workforce development, and boost the economy, all of which positively supports goals of sustainable development and marine stewardship.

As the urgency for action grows, it is crucial that our future leaders understand the interconnected processes influencing Earth’s climate at global and regional scales, the impacts of climate change, and the opportunities and approaches to adaptation or mitigation. Researchers are constantly evaluating climate change’s role in extreme weather events, looking for trends and solutions. Investments in remote and in situ ocean observing and monitoring infrastructure are key to further understanding the ocean-climate system, predicting future negative impacts, and providing information that helps communities adapt and support development of new ocean-based solutions.

The NOSB’s ‘Climate Change: Ocean Science and Solutions’ theme is an opportunity for students to learn more about how we build scientific understanding around climate, particularly from an ocean perspective, including ocean processes, methods of observation, climate models, and user data needs that drive solutions from renewable energy and blue carbon capture capacity to building resiliency in our cities and infrastructure around the country.

2022 Regional Bowls (virtual or in-person):
February 5, 12, & March 5

2022 National Finals (virtual or in-person, to be confirmed):
April or May (to be confirmed)

Please visit www.NOSB.org for more information.