As Earth’s climate is forced by human activities, it is vital to maintain an observing system capable of documenting global climate variability and change. Policymakers and the general public require climate observations to assess the present state of the ocean, cryosphere, atmosphere, and land, and place them in context with the past. To be of maximum value, these observations must be sustained over many decades. Climate observations are needed to evaluate and initialize climate models and to improve predictions of climate change. Such efforts are essential for guiding national and international policies that govern climate-related resources, and for building agreements aimed at mitigating long-term climate change.

Initiated in 2000, the Argo array of profiling floats has become a critical part of the global climate observing system. Heat and water are the fundamental elements of climate and the ocean is the dominant reservoir for both. For the first time in history, Argo provides observations of temperature, salinity and velocity in the upper oceans on a truly global scale. In 2007, Argo reached its initial goal of 3,000 floats spread over all of the oceans. The scientific community has made increasing use of these data. As of August 2010, Argo data was cited in more than 100 research papers, more than in the entirety of the previous year. The data are being used in a broad range of research into water mass properties and formation, air-sea interaction, ocean circulation and transport, mesoscale eddies, ocean dynamics, and seasonal-to-decadal variability. Argo’s open data policy has resulted in the global dataset being at the fingertips of researchers around the world. In addition to basic research, Argo data now are being used for initializing seasonal-to-decadal forecast models.

If Argo is sustained, its full value as a climate observing system will be realized in the decades to come. As anthropogenic greenhouse gases drive the planet out of radiative balance, 80 to 90 percent of the excess heat is stored in the oceans. Thus ocean heat storage provides a cumulative record of human influence on the climate, a record that is critical to predicting the speed and extent of change. Similarly, the record of ocean salinity is documenting a multi-decadal increase in global patterns of evaporation and rainfall. Argo data together with satellite measurements now provide a comprehensive record of global sea level rise and its causality due to thermal expansion and added mass. Argo is the only observing system capable of providing observations that are comprehensive and accurate enough to resolve these climatic signals over years to decades, and essential for improving forecasts of climate variability and change.

While sustaining its core measurements, Argo should also expand into new observational frontiers including the deep ocean and the ice-covered high latitudes and with new sensors for studying biogeochemical and eco-system impacts of climate change. The technology needed to successfully deploy the Argo array, and the planning required to maintain it, have now been demonstrated. The community consensus on the value of Argo and the need to sustain it in the future are clear.