Editorial

Sybil Seitzinger, Executive Director, IGBP

The record low in Arctic sea-ice extent this summer was probably this year's biggest global-change story. According to the National Snow and Ice Data Center, the area covered by sea ice last month represents a 45 percent reduction as compared with September conditions in the 1980s and 1990s.

Meanwhile, the past couple of years have witnessed a renewed focus on methane emissions from the region, and particularly the stability of methane hydrates. Clearly, Earth's northernmost regions are changing rapidly. It is fitting, then, that these regions form the focus of several articles in this issue of *Global Change*.

Matrai and Leck highlight the role of marine micro-organisms in supplying the particles that go on to form cloud condensation nuclei in the Arctic. They explore the intriguing possibility of a negative feedback that could counteract the melting of sea ice. This possibility opens up exciting opportunities for research at the intersection of physical and biological systems. But it also highlights the complexity of processes that need to be taken into account to understand Arctic change.

Bondre joins the continuing discussion about the possible dangers posed by Arctic methane. His assessment is similar to that of many others – that although an ever-warming Arctic will release more methane than it currently does, the evidence at hand does not indicate imminent catastrophe. But there are poorly quantified interconnections and interdependencies among a number of processes, and hence the possibility of abrupt change: this is why interdisciplinary approaches are so important.

These articles add to the picture of an environment in flux. Anthropogenic global warming is undoubtedly a dominant driver of change in the Arctic. But the complexity of interacting processes and the poorly understood role of some components – clouds, for example – makes projecting future change challenging. There can be little disagreement about the need for continuous monitoring using all tools available at our disposal. Downy discusses how the European Space Agency is collaborating with researchers from IGBP and other organisations to do just that.

All IGBP projects contribute in one way or another to enhancing our understanding of the fragile northern regions. In the past couple of years, the projects have mapped Arctic coastal erosion, explored the carbon budget of the Nordic Seas, tracked ocean acidification, measured methane emissions and assessed the impact of black carbon deposition. Activities have included assessments of the effects of current and anticipated change on human societies.

Next year, IGBP will expand its second synthesis to distil the overarching scientific insights from the programme's research during the past decade. We hope that some of these insights will provide a nuanced picture of the changing climate and environment in the Arctic.

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