Ice structures, patterns, and processes: A view across the icefields

Julyan Cartwright

"The abrupt sides of vast mountains were before me; the icy wall of the glacier overhung me; a few shattered pines were scattered around; and the solemn silence of this glorious presence-chamber of imperial nature was broken only by the brawling waves or the fall of some vast fragment, the thunder sound of the avalanche or the cracking, reverber- ated along the mountains, of the accumulated ice, which, through the silent working of immutable laws, was ever and anon rent and torn, as if it had been but a plaything in their hands."
Mary Shelley, Frankenstein

"If you watch a glacier from a distance, and see the big rocks falling into the sea, and the way the ice moves, and so forth, it is not really essential to remember that it is made out of little hexagonal ice crystals. Yet if understood well-enough the motion of the glacier is in fact a consequence of the character of the hexagonal ice crystals. But it takes quite a while to understand all the behavior of the glacier (in fact nobody knows enough about ice yet, no matter how much they've studied the crystal). However the hope is that if we do understand the ice-crystal we shall ultimately understand the glacier."
Richard Feynman, The Character of Physical Law

From the frontiers of research on ice dynamics in its broadest sense, this talk surveys the structures of ice, the patterns or morphologies it may assume, and the physical and chemical processes in which it is involved. Open questions in the various fields of ice research in nature are highlighted, ranging from terrestrial and oceanic ice on Earth, to ice in the atmosphere, to ice on other Solar System bodies and in interstellar space.