

OSS19-2019-000008

Abstract for an Invited Paper
for the OSS19 Meeting of
the American Physical Society

Consider the Icicle

STEPHEN MORRIS, University of Toronto

Icicles are harmless and picturesque winter phenomena, familiar to anyone who lives in a cold climate. The shape of an icicle emerges from a subtle feedback between ice formation, which is controlled by the release of latent heat, and the flow of water over the evolving shape. Ideal icicles are predicted to have a universal "platonic" shape, independent of growing conditions. In addition, many natural icicles exhibit a ripply texture, which is the result of a morphological instability. The wavelength of the ripples is also remarkably independent of the growing conditions. Similar shape and ripple phenomena are also observed on stalactites, although certain details of their formation differ. We built a laboratory icicle growing machine to explore icicle physics. We learned what it takes to make a platonic icicle and the surprising origin of the ripples. The results of this study are available online in a giant open access database called the Icicle Atlas.

In collaboration with: Antony Szu-Han Chen (SAIT) and John Ladan (University of Toronto).