A Comprehensive Study of Ice

Source: *University of Granada*

Origin & Evolution of Life
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Summary: Scientists have published the most comprehensive study every performed on ice. Ice plays an important role in Earth's habitability, affecting everything from life's origins to our planet's global climate.

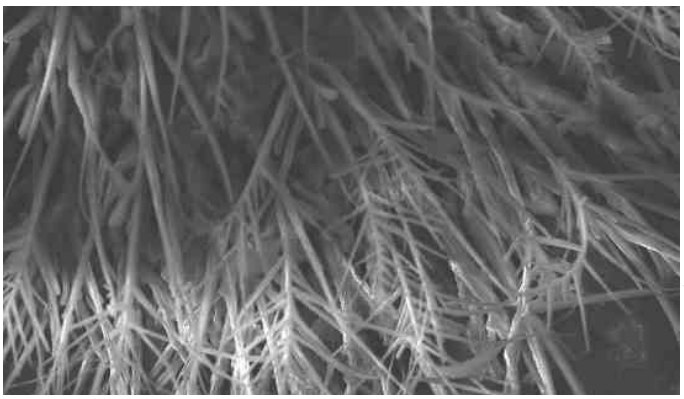
A group composed of 17 scientists from 11 different countries has published the most comprehensive study ever done on ice in the world. The study addresses the most important contemporary issues in a field of research that is "red hot", in authors' words.

This study, which was recently published in the prestigious journal *Reviews of Modern Physics* reviews recent international research studies on ice in terms of ice types and the structures and chemical and physical processes where ice is involved. This is the most comprehensive study ever done on all ice types and their properties.

The scientists Julyan Cartwright and Ignacio Sainz Díaz at the Instituto Andaluz de Ciencias de la Tierra (a joint center of the University of Granada and the Spanish Consejo Superior de Investigaciones Científicas, CSIC) are some of the participants in this study. According to Pfr. Sainz: "Ice can adopt a wide variety of forms when it is formed at extremely low temperatures an pressures, or when it forms in comets, planets or dust particles in the interstellar space".

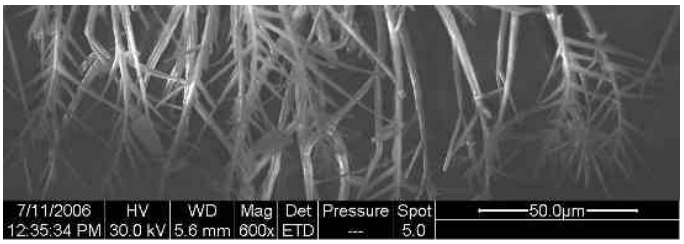
Ice mosaic in the Weddell Sea in the Antarctic. Credit: *Bartels-Rausch et. al., 2012*

Origin of life



The same researchers affirm that "ice can affect the chemical and physical properties of the atmosphere –as it can form clouds– and large ice sheets". Ice can also play "a major role" in climate change and even in the origin of life, as some theories place the origin of the first living things on Earth in oceanic ice sheets. Finally, the article also analyses the presence of ice on Mars or in comets.

If ice was better known, "it would contribute to understand a wide range of scientific phenomena"–Dr. Sainz explains. The article also analyses why avalanches cannot be predicted yet. "Snowslides are caused by a change in the inner structure of ice particles in the bonds of layers that are physically different.



Electron microscopy image of plant morphology in ice formed at low temperatures and pressure. Credit: *Bartels-Rausch et. al., 2012*

Such changes cause top layers to slide off the bottom layers. However, at present, the stability of top layers cannot be determined yet"–the Instituto Andaluz de Ciencias de la Tierra researcher states.

Researchers from different CSIC research centers as the IACT, the Instituto de Estructura de la Materia (IEM) o el Instituto de Astrofísica de Andalucía (IAA) have participated in this study.CSIC's Proyecto Intramural de Frontera -coordinated in Granada- gave the authors the idea to conduct a comprehensive study on ice. This study brought together several CSIC research groups and subsequently received funds from the EU European Science Foundation to held a work meeting celebrated at the University of Granada. Most of the attendees to this meeting subsequently collaborated in this study.

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