

BOOK REVIEW

Review of *The life of permafrost—a history of frozen earth in Russian and Soviet science*, by Pey-Yi Chu (2020). Toronto, Buffalo, and London: University of Toronto Press. 288 pp. ISBN-978-1-4875-0193-8.

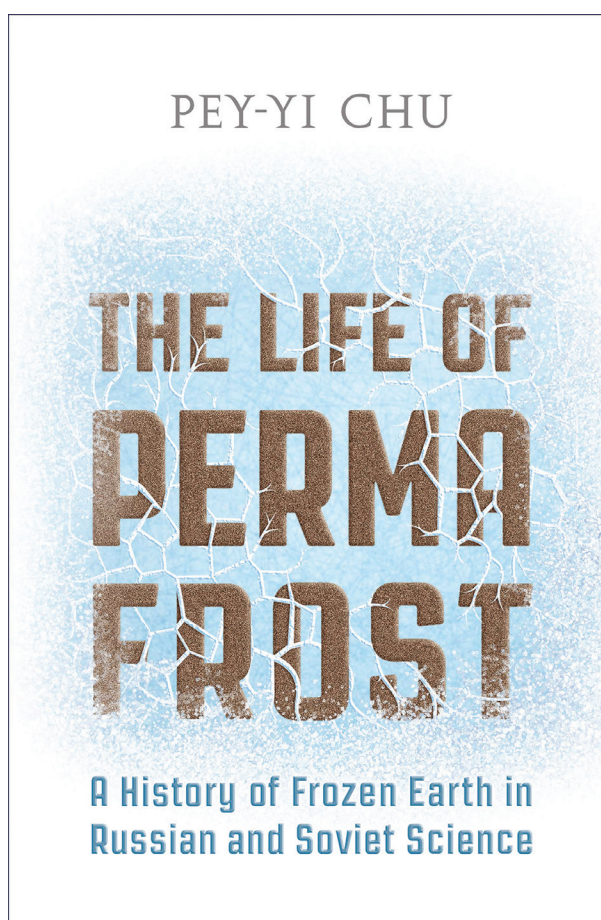
Permafrost is commonly defined as a condition where the ground frozen to a temperature of 0 °C or less for at least two consecutive years. But is permafrost a thing (a terrestrial substance defined by temperature) or a state of nature (a set of geochemical relations)? Thoroughly grounded in both archival sources and scientific knowledge, Pey-Yi Chu's admirable book provides a history dealing with this confusion. Chu shows that terms like *Eis-Boden*, *Boden-Eis* and *vechnaia merzlota* have reflected different attempts to grapple with the nature of this condition, and throughout the book she italicizes the terms to emphasize their status as conceptual artefacts.

Chu's is a distinctly Russian story. While permafrost is not unique to Russia, it first became a major concern for engineers and scientists during the eastward expansion of the Russian Empire across Siberia in the 17th and 18th centuries. In 1843, Karl Ernst von Baer, a German-speaking zoologist from the empire's Baltic fringe, coined the terms *Boden-Eis* (ground ice) and *Eis-Boden* (the spatial limits to the area in which *Boden-Eis* might be encountered, and an acknowledgement that the phenomenon covered more than strictly ice within the ground). Following Alexander von Humboldt, von Baer identified geographical parameters such as climate as the key variables. There were also clear practical dimensions to mapping *Eis-Boden*; engineers needed to build roads and sink wells. The term gained popularity without resolution of the underlying question of whether it referred to a thing or to a set of conditions.

As the story of *Eis-Boden* became the story of *vechnaia merzlota* in the 20th century, the Bolshevik Revolution left its mark. In the 1920s Mikhail Sumgin articulated a definition for an area with negative temperature over an extended period. This definition received wide approval despite an opposing definition by his rival Sergei Parkhomenko, one rooted in the ideas of Vladimir Vernadskii, characterizing *vechnaia merzlota* as a system that considered factors such as the geochemical properties of rocks without fixating on the presence of ice.

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Sumgin proved better at navigating the centralized structures of Soviet science in the 1930s, and his concept proved to be better suited to the practical work of developing Siberia in the headlong rush of crash industrialization. He thus managed to successfully link his thinking to the dialectical materialist ideology that dominated scientific thought in the USSR.

Sumgin's ideas ceased to remain popular after his death in 1942. Researchers such as Petr Shvetsov pushed the Vernadskii-inspired idea of the cryolithozone, arguing that it was a truer articulation of the dialectical materialism that underpinned official Soviet ideology. The ideological impetus behind Soviet science in this era has often been exemplified by the ultimately discredited genetics championed by Trofim Lysenko. However, Chu argues that in the case of *vechnaia merzlota*, ideological pressures stimulated rather than strangled scientific discussion. Materialist philosophy pushed Shvetsov to ask deep

questions about the relation between the process and object in *vechnaia merzlota*, inspiring re-evaluation without imposing flawed but politically convenient answers.

The difference with Lysenko's genetics became even clearer when *vechnaia merzlota* as a concept reached North America, where wartime construction in Alaska and northern Canada spurred research on what became known as "permafrost" in a 1943 US government report. Translated Soviet texts were fundamental to research and practices in North America. As US and Canadian permafrost research developed, so too did debates over whether the term represented a material substance or a system of relations—the same dialectic that originated in the USSR. The life of permafrost outside the USSR is sketched rather than analysed, a defensible choice given that Chu convincingly argues for the centrality of Russia as a source of experiences and ideas regarding permafrost and its predecessors. This includes some fine insights into the links between Soviet-era concerns for linear progress and the potentially "eternal" character of *vechnaia merzlota*.

The book contains little on the years from the 1960s to the present. The reader gets the impression that by this time the dialectic had been resolved, at least to the

satisfaction of those who worked with and thought about permafrost. Chu's epilogue gives prominent significance to her exchange at a conference in 2016 with the Polish glaciologist Wojciech Dobinski, whom she identifies as a rare advocate of a more systems-oriented approach to permafrost. The epilogue's subtitle, "Resurrection," implies the return of something lost—the reopening of something settled rather than the continuation of an unfinished debate. But might the dialectic be reopened? Chu ends by returning to an intriguing observation about conceptions of time. The life of permafrost to which she refers in the book's title is conceptual—the evolution of a set of terms—but also material, subject to directional change as the Earth's climatic parameters are pushed by anthropogenic warming. Is this sufficient reason to return to terms such as *Eis-Boden* that focus on conditions rather than the permanence of the substance? Permafrost researchers might balk at such a change. Nevertheless, they will surely appreciate her insights into the history of their discipline, just as historians will appreciate her thought-provoking examination of how the political and economic environment of Russia gave life to the conceptual ancestors of permafrost.