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Is Sørkapp Land an Island? The Hornbreen–Hambergbreen Coast Formation in Svalbard in Light of the Cosmocentric Principle

Wojciech DOBIŃSKI

University of Silesia in Katowice, Institute of Earth Sciences, Sosnowiec, Poland
✉ wojciech.dobiński@us.edu.pl

One of the most interesting scientific issues in recent years related to the response of cryosphere elements to atmospheric warming is the issue of the separation of Sørkapp Land from the rest of Spitsbergen as a result of the retreat of the Hornbreen–Hambergbreen glacier system. Although the issue is not new in the study of the glacial cryosphere in Svalbard (Szupryczyński 1968; Ziaja and Ostafin 2015; Kavan et al. 2022), in recent years it has been given special attention on Spitsbergen due to the fact that the break of the ice bridge formed by the Hornbreen–Hambergbreen glaciers may occur relatively soon. All empirical studies devoted to this issue focus on predicting the approximate date of the separation of Sørkapp Land from the rest of Spitsbergen as a result of the retreat of the glaciers and to other natural consequences that may result from it. The years given here are between the end of the 20th century and 2065 (Saferna et al. 2023).

Empirical studies undertaken for years have been characterizing the process of retreat of these two glaciers more and more accurately, using geophysical methods and remote sensing on a large scale (Saferna et al. 2023). Unfortunately, the issue of importance for which this spectacular example can be an excellent illustration is still overlooked. So far, no one has taken a position on what basis we should claim that frozen water, such as glaciers, an extremely unstable and easily melting material, and therefore classified as part of the hydrosphere, would have a leading role to play here. If we are talking about the separation of two parts of the land, this means the separation of two parts of the lithosphere, not the hydrosphere. If there is an over-deepening under the Hornbreen–Hambergbreen glacier system, which has been clearly confirmed by radar studies (Grabiec et al. 2018), then the connection of Sørkapp Land with the rest of Spitsbergen relies solely on the existence of an ice bridge created by these two glaciers. If ice is classified as part of the hydrosphere, it cannot be land – lithosphere – at the same time. This classification is disjoint. This leads to a rather simple conclusion: Sørkapp Land, according to the definitions commonly accepted in science, is already an island at the present time. Therefore, there is no need to wait another few decades for the separation of ice from the land, which the authors write about when giving the approximate time of the island's formation.

The situation changes essentially when, in accordance with the tradition of the last 100 years (Dobrowolski 1923, 1931; Shumskiy 1964), ice is classified as a mineral and a rock. Then it should be consistently classified in the lithosphere, where it forms the lightest rock. This postulate was put forward quite a long time ago (Dobiński 2006). However, it is a necessary condition for the mentioned process to be described as the separation of two parts of the land. The spectacular example of the role of the Hornbreen–Hambergbreen glaciers in the evolution of the island of Spitsbergen allows us to return to this postulate with new force, presenting a very strong argument.

However, changing this paradigm still meets with resistance that cannot be justified by anything other than long-term habit resulting from the perception of ice in low latitudes, where it is indeed unstable. And although the duration of glaciation on Earth now and in the past can be counted in millions of years, the direct experience of ice on Earth for the vast majority of people is quite different.

At this point, unexpected help appears from a scientific field that seems to be completely separate from Earth sciences due to its subject of research. It is worth noting, however, that planetary science – because that is what we are talking about – is in its essence only a transfer of research methods and hypotheses characteristic of Earth, to a completely new, distant environment, on the basis of analogy. The amount of knowledge gathered about other celestial bodies in the field of planetary science is so large that it not only allows for learning about the geology, geomorphology or cryosphere of other planets, but also for unambiguous determination of what is common and what is exceptional in this respect.

But it is obvious and has been known for a long time that it is the Earth that constitutes a unique element among the planets of the Solar System. It is for this reason that it cannot be a point of reference in an analogous knowledge of the Cosmos, because this knowledge would be extremely geocentric, leading to the recognition of the exception as a general rule. It is therefore necessary to reverse the cognitive analogy, which applies particularly in relation to the Earth's cryosphere. The principle should be:

The Earth is not the reference point in analogous studies of the natural environment of the celestial bodies. It is the Cosmos and celestial bodies that constitute the reference area for the Earth, and for the study of its natural environment.

This is a cosmocentric principle, introduced into the global scientific circulation recently (Dobiński 2024), the essence of which is to break with the geocentrism still prevailing in the world of Earth sciences, by reversing the cognitive analogy. The example of ice, which is commonly found in space, best shows that it always constitutes an icy lithosphere there and is also treated as a mineral and rock. Although the Earth's icy lithosphere currently occupies a small part of it – it still remains so. Ice cannot be treated as an "additional body" (Dobrowolski 1931) or "fourth state of matter" (e.g. Hauck et al. 2011). It is in a completely literal sense a component of the lithosphere and only its treatment in Earth sciences allows for a correct and fully spectacular explanation of the process taking place on Spitsbergen, the main participants of which are the Hornbreen–Hambergbreen glaciers.

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