



Tellus A

Dynamic Meteorology and Oceanography

# In Memoriam Gösta Walin 1938–2022

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LETTER TO THE  
EDITOR



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## ABSTRACT

Gösta Walin passed away in September 2022 at an age of 84. He was a highly original thinker, who has been influential on oceanographic research in Sweden and abroad. The present article delineates Gösta Walin's scientific contributions and career.

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Gösta Walin, professor in physical oceanography at University of Gothenburg, passed away in September, 2022, in his summer house on the Swedish west coast at an age of 84. Gösta grew up in Stockholm and through an interest in outdoor activities, he became scientifically curious about the local coastal seas as well as the World Ocean. After graduating in physics from the Royal Institute of Technology, he became engaged in research at the Department of Meteorology at Stockholm University in the early sixties. At the time, Bert Bolin and Pierre Welander were active in department, which also received a large influx of prominent international visitors. Bolin, who was the head of the department and also influential in the Swedish Research Council, was supportive of research on fundamental geophysical fluid dynamics. This allowed Gösta to essentially alone select and define his research problems, even if an official thesis advisor was not assigned. In 1972, Gösta received a PhD in theoretical physics at Stockholm University, and the following year he began as professor in physical oceanography at University of Gothenburg.

Early in his career, Gösta worked on fundamental problems in geophysical fluid dynamics. In particular, his studies on the stability of water stratified by both salt and temperature, as well as on the interplay between Ekman boundary layers and density stratifications were highly influential, and have wide applications in oceanography and meteorology. His elegant analysis of spin-up of rotating stratified fluids is very highly cited and is still regarded as the definitive treatment of the problem (Walín, 1969). During the 1970s, Gösta continued pursuing theoretical and laboratory studies on

rotating-stratified flows together with collaborators and Ph. D. students.

Late in the 1960s, Gösta expanded his research activities to the dynamics of the Baltic Sea, both theoretically and observationally. During a family summer vacation in southeastern Sweden in 1968, he chartered a 33-foot fishing vessel, and conducted alone daily early-morning hydrographic surveys in the coastal zone. His observations document with textbook clarity coastal upwelling- and downwelling-events and their relation to wind variations. Gösta also developed an accompanying theoretical model for the hydrographic response in enclosed basins to transient meteorological forcing (Walín, 1972). Further, he realised that the high temporal and spatial variability in hydrographic observations are mainly due to adiabatic rearrangements, and that these obscure the diabatic processes that largely govern the mean state of the Baltic. To address this problem, Gösta conceived an original and fruitful idea: to describe the flow in a space spanned by salinity rather than by geographical coordinates (Walín, 1977).

In the early 1980s, he generalised this idea in a seminal study of the circulation in the World Ocean in temperature space, and showed how information on the sea-surface heat flux can be used to determine circulation and mixing processes in the ocean (Walín, 1982). Gösta's highly original work has spawned a rich and evolving body of oceanographic research known as the water-mass transformation framework, or the Walín framework, which is a powerful instrument for analysing observations as well as ocean-circulation models.

Gösta was one of the first oceanographers who seriously considered that the ocean circulation may have other equilibrium states than the present one, characterised by northern-hemisphere deepwater formation in the Atlantic but not in the Pacific. Based on a simplified model of thermohaline flows, he proposed in 1985 that salt-advection feedbacks may shift the deepwater formation between the ocean basins, and speculated if freshwater transports between the Atlantic and Pacific basins can pace or even drive glacial cycles (Walín, 1985). These ideas have stimulated a wide range of research in ocean dynamics, paleoceanography, and climate science. In the 1990s and 2000s, Gösta continued to work on problems in ocean circulation, and together with Ph. D. students, he gave innovative contributions on flow-topography interactions and how the features of small-scale mixing affect the dynamics of the meridional overturning circulation.

Gösta was also interested in the interplay between climate and the biosphere, and he did research on biogeochemical cycling of carbon and oxygen. Also in these geochemical studies, he invented novel approaches to analyse and extract information from complex systems.

Gösta had a unique talent for asking the right scientific questions: the ones that reveal some of nature's secrets and also are possible to answer. Usually, he was quick to find the answers but sometimes less quick to write the papers. Gösta jokingly commented that it was a torment to have to read and cite a whole string of papers, which were all obviously mistaken, just in order to publish the one paper that was correct.

Gösta was also interested in societal questions and politics, and often provided ideas and analyses that added unexpected perspectives. Friends and colleagues enjoyed discussing science, life and politics with Gösta, whose fresh ideas were intriguing and thought-provoking. He was engaged in the societal debate on the energy crisis and question of Swedish nuclear power in the 1970s, measures to mitigate the eutrophication of the Baltic Sea in the 1990s, and the Swedish university education and research sector in the 2010s. In this activity, Gösta authored several books, and during the Swedish EU referendum in 1994 he wrote a series of editorials in the newspaper *Bohuslänningen*, highlighting potential risks of joining the EU.

Gösta was a good friend, a committed mentor, and an esteemed and inspiring colleague, who will be much missed in the oceanographic community.

## COMPETING INTERESTS

The authors have no competing interests to declare.

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