

Obituary

Erkki Palosuo 1912 – 2007



Erkki Palosuo in the Nordaustlandet expedition in 1957–1958 [Palosuo family archives, photographer not known].

Erkki Palosuo (until 1933 Brander) was born in Kitee, Karelia, eastern Finland on June 28th, 1912 and passed away in the same town on August 11th, 2007. He graduated from the high school *Joensuu lyceum* in 1931. Then he commenced his studies in the University of Helsinki but moved to Military Academy in 1937 graduating in 1939. He became a pilot in the Finnish Air Force and took part in three wars during the World War II in 1939–1945: The Winter War, the Continuation War, and the Lapland War. At the end of the war he was a captain, head of a squadron.

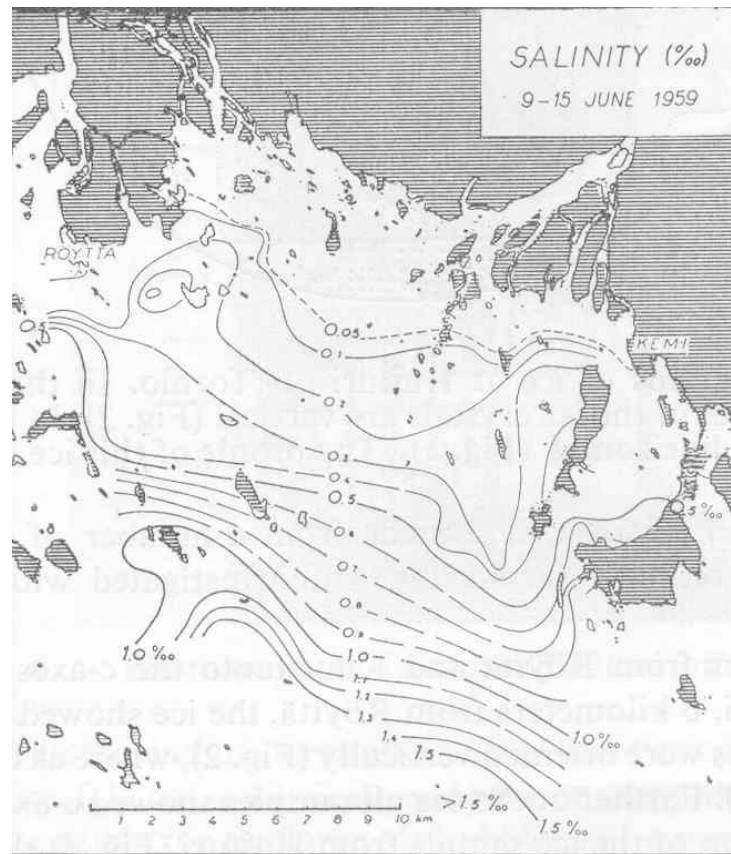
The Baltic Sea was a very important strategic seaway in the World War II years. In this period two winters were exceptionally cold (1940 and 1942), and the whole Baltic Sea became ice-covered. Erkki Palosuo was given the task to perform the ice reconnaissance flights over the Baltic Sea, in particular the Central and Southern Baltic

Sea between Finland and Germany. This method was then quite new in ice charting, introduced only in the 1930s in the Baltic Sea. In the ice reconnaissance Erkki Palosuo was guided by the leading scientist in ice charting in Finland, professor Risto Jurva, the head of the Ice Service of the Finnish Institute of Marine Research.

After the war Erkki Palosuo returned to his studies in the University of Helsinki. In 1947 he obtained the master degree in meteorology, and in the following year he withdrew from the Finnish Military Forces and started to work in the Ice Service. Parallel to the Ice Service work, he went on with his doctoral studies under the supervision of Risto Jurva and defended his doctoral thesis in 1953. The dissertation was titled *A treatise on severe ice conditions in the Central Baltic*. It focused on the drift ice in the Central and Southern Baltic Sea and was largely based on the material he had collected in his wartime ice reconnaissance flights. It was a very significant work, and still is the only publication with a deep going analysis of the morphology and drift of the ice fields in Gotland Sea. Also an analysis of the Baltic Sea ice climatology was included. As a whole the thesis was a new step from cartographic work to the geophysics of sea ice in the Baltic Sea.

As the learned ice scientist with the doctor degree and soon (1956) the chief of the Ice Service in Finland, he became the leading scientist in the Baltic Sea ice community developing the ice charting methodology and opening new lines in the sea ice basic research. In the 1950s he was able to join the international sea ice science network and was there a well-recognised character.

In the basic science the productivity of Erkki Palosuo was excellent. He performed investigations of the stability of landfast ice in the Baltic Sea with case studies and statistical analyses, which have been widely used since then. He then commenced ice structure analyses, and a particular, basin-invariant finding was the transition of ice structure from sea ice type to fresh water ice type in 1961. Based on ice samples from the estuary of Tornionjoki, Bay of Bothnia, Baltic Sea he was able to show that the transition takes place at the water salinity of about one per mille. This result was also confirmed in laboratory and later reconfirmed in the Baltic Sea. In the 1960s Erkki Palosuo started to work on sea ice ridges in the Baltic Sea and collected a database of large ridges, 15 individuals altogether. The observations still constitute the main data set of large ridges in the Baltic Sea. This work was connected to winter shipping, as ridges are the most difficult ice obstacles in the Baltic Sea, but also in the same decade ridge structure investigations commenced in arctic seas.



Salinity of the water in the estuary of Tornionjoki river on the northern coast of the Bay of Bothnia. The salinity front in this region was examined for the transition between fresh water ice type and sea ice type (Palosuo, E., 1961. Crystal structure of brackish ice and fresh-water ice. Snow and Ice Commission 54, pp. 9–14, IAHS, Gentbrugge, Belgium). With the permission of International Association of Hydrological Sciences.

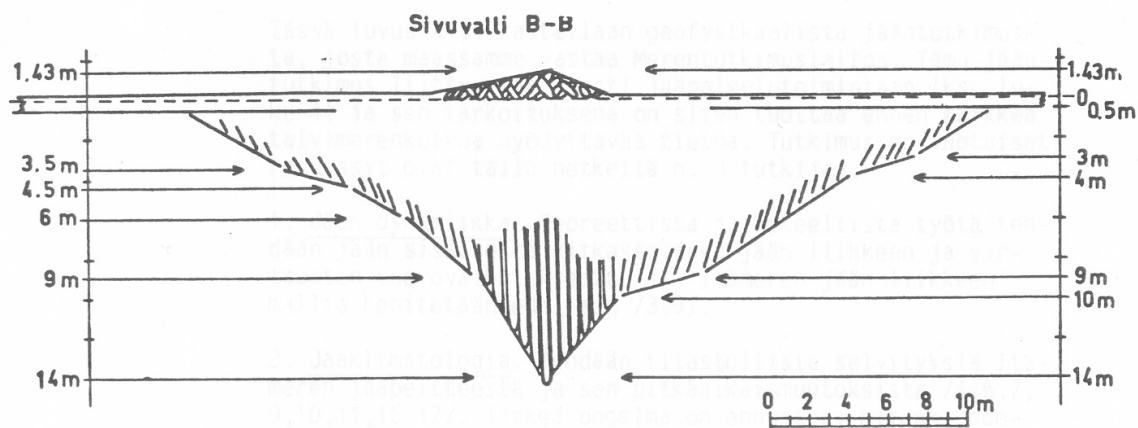
The winter navigation expanded to more and more difficult ice conditions, and finally in 1970 the all-year sea traffic had been opened to all the main harbours in Finland. The role of Erkki Palosuo in the development of ice mapping methods and ice risk evaluation was remarkable. Aerial reconnaissance became a routine tool, flights performed at times by Palosuo himself, and they remained so until the operational use of high resolution remote sensing satellite imaging in the 1980s.

Most of his science career, 1948–1973, Erkki Palosuo worked in the Ice Service of the Finnish Institute of Marine Research. However, he expanded his research to other sections of the cryosphere science and even to physical oceanography. He took part in the Nordaustlandet expedition in International Geophysical Year 1957–1958 performing crystal structure analyses of the ice of the Austfonna glacier. He returned to the glacier once, in 1966. In Finland he went into lake ice investigations where professor Heikki Simojoki had been earlier the geophysics pioneer. Erkki Palosuo's work dealt with the snow ice formation and crystal structure of lake ice. By these expansions from sea ice research, he became the leading scientist in the cryospheric research in Finland. His most known achievements in physical oceanography are being the first one to map the wintertime hydrography in the frozen basins of the Baltic Sea and investigation of the

hydrography and circulation on the Gulf of Bothnia. The winter work was based on Finnish icebreakers, the only platform available that time for the oceanographic research of ice-covered waters.

In 1973 Erkki Palosuo was nominated as the professor in the Department of Geophysics in the University of Helsinki. This department had been established in 1966, and Heikki Simojoki had been its first professor (1966–1973). Before 1966 academic degrees in geophysics were given by the Department of Meteorology. Erkki Palosuo had acted as an adjunct professor since 1965 and taken part in the academic teaching. He continued now the work of professor Simojoki for further development of the Department of Geophysics and gave courses in snow and ice geophysics and physical oceanography.

The cryosphere – snow and ice – remained as the research topic of Erkki Palosuo after moving to the university. His main field was as before sea ice, and he played an active role in the development of the Finnish – Swedish collaboration in the Baltic Sea winter problems. In this time there was a rapid growth of sea ice research in Finland and Sweden due to the expanded winter shipping. He did more sea ice ridge structure studies, and started large scale mapping of Baltic Sea ice ridges with an airborne laser profilometer. He added the seasonal snow cover to his topics, also pioneering in Finland the study of friction between snow and ski.



Erkki Palosuo is highly recognised for his extensive investigations of the sea ice ridges in the Baltic Sea. Here a ridge profiled by him in the Bay of Bothnia is shown. The ridges have a key role in the dynamics of sea ice and also in the resistance of drift ice field to ship motion. (Palosuo, E., 1975. Formation and structure of ice ridges in the Baltic. Winter Navigation Research Board, Report 12, Helsinki)

Erkki Palosuo retired from the University of Helsinki at the end of 1977 but did not retire from science. Even more, he went back to the research of high Arctic, and took part in the Swedish expedition Ymer-80, summer 1980, to the Barents Sea and Svalbard – Franz Joseph Land sector of the Central Arctic Basin. His research there concerned sea ice structure and salinity, sea ice ridges, and occurrence of icebergs. In

the 1980s Erkki Palosuo completed the analysis of his Arctic data, from Austfonna glacier and Ymer-80 expedition, and continued with the physics of skiing in collaboration with the Department of Physics in the University of Helsinki. His last scientific publication was a historical review (with three co-authors) ‘Snow and ice geophysics in Finland during the 1900s’, in volume 37 of *Geophysica*, 2001.

In 1974 Erkki Palosuo became a member of Societas Scientiarum Fennica [Finnish Society of Sciences], the oldest science academy in Finland. He was a pioneering scientist in raising the profile of the research of cryosphere in Finland, a branch of geoscience most natural to Finland, the land of snow and ice. He served the Geophysical Society of Finland as the treasurer in 1950–1965 and as the chairman in 1968, and was prized by the Palmén medal of the Society in 1983. As the chairman of the Finnish Geographical Society he acted in 1972. Also he had very good relations with the winter navigation community in Finland. He was also internationally recognized cryosphere scientist, one of the great men of the 1950s club in this field. He was the member of the International Glaciological Society since 1950, Finnish correspondent in 1960–1979, and fellow of the Arctic Institute of North America. Two geographical polar sites bear his name: Palosuo Bay in Svalbard and Palosuo Islands in Antarctica.

Erkki Palosuo was impulsive, inspiring and sociable personality, and he had strong enthusiasm to science. His students remember him with warmth, an excellent professor and a supervisor as one should be.

*Matti Leppäranta, professor and Juhani Virta, professor emeritus
Division of Geophysics, Department of Physical Sciences, University of Helsinki*