Kjell Henriksen

- Prof. Dr. 2
- Kjell Severin Henriksen was a driving force for optical atmospheric science in the northern polar region.

- Reminiscences by Charles Deehr on the 25th anniversary of Nordlysstasjonen I Adventdalen

Optical Atmospheric Prof. Dr. 2 Kjell Henriksen, Polar Bear on a Hot Tin Roof.
• Kjell’s heroes were early observers: Vegard and Stoffregen.
• He studied their results, used their instruments and applied new methods to understanding their observations.

Fig. 3. Vegard testing his double-prism spectrograph, which he used for more than 30 years. The exposure time for each plate could be several hours. By developing good observing techniques, Vegard was able to study the characteristic color changes of the aurora with this relatively insensitive instrument.
The Oxygen Green Line

- Kjell’s first PhD was in atomic physics and he applied it to the aurora.
- His second PhD thesis was a study of the [OI] 1D emission in the airglow and aurora.
- The brightest emission in the spectrum, there was some controversy over the production of 5577 Å [OI] emission in the aurora.
The Oxygen Green Line

• Kjell did not end the controversy over the green line, but he showed that indirect excitation from N\textsubscript{2}(A) molecules suggested by Vegard is important.

• He also commissioned a lovely cover for his thesis.
• Kjell was certain that the 6300 Å [OI] emission observed by photometers at the rf heating facility was induced in the electronics by the heater, so he set out to prove it using Willy’s SP-3 spectrometer.
Aurora and the Full Moon

- Willy Stoffregen found that there seemed to be less aurora during full moon.
- Kjell plotted auroral occurrence frequency as a function of lunar phase.
- The minimum in auroral occurrence frequency occurs 2 days before new moon.

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Aurora and the Full Moon

We proposed that the auroral occurrence frequency minimum was due to the hydromagnetic wake of the moon in the plasma sheet. The minimum turned out to be two days before new moon. The wake is shifted slightly because of the combination of the orbital and solar wind speed.

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Popular Articles

- Kjell and Alv Egeland wrote popular articles for *Tromsø* and *Aftenposten* on the aurora and auroral sound.

- The reprint cover was decorated with a watercolor of the old Nordlysobservatoriet.
Kjell first visited Alaska in 1975.
He used two Alaskan MSPs and spectrometers to measure changes in temperature with altitude in aurora.
They found no heating inside an auroral arc.
Kjell said to Sivjee and Deehr that Alaska should join with Norwegians to observe the dayside aurora from Svalbard.
Svalbard Before SAS

• Two days in a coal boat to the mining town of Longyearbyen.

Optical Atmospheric Prof. Dr.² Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Svalbard Before SAS

- The cable car system was operational and coal dust blew everywhere.

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Svalbard Before SAS

- There were no hotels and Funken housed the elite guests of The Great Norwegian Spitsbergen Coal Company (SNSK).
- No buses disturbed the mud in front of Funken.

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Svalbard Before SAS

• “You may install your observatory hut above Mine Seven, but remember, our first job here is to mine coal.”

A. Tiefental, October 1970.

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
• The University of Oslo – Physics Dept./ Norwegian Institute for Cosmic Physics Observatory (Omholt/Egeland) on Breinosa, October, 1970.

• Ny Ålesund 120 km mag. Meridian to the north.

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Svalbard Before SAS

- We didn’t even think about what the same view would contain today.
• The Canadians observed the afternoon dayside aurora from Cape Perry.

• Canadian-Norwegian Spitzbergen Auroral Expedition 1975.

• Among the members were Tom Berkey, Ove Harang and Kjell Henriksen.
• He called it Nordlysstasjonen to separate it from Nordlysobservatoriet, but not by too much.

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Flight from Alaska

- The National Science Foundation northern summer training program for the C130 Antarctic Supply airplane.
- Eielson AFB to Tromso July 1978.

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Flight from Alaska

- Two Navy flight crews, Sivjee, Deehr, Henriksen and “Haven Webb” a US state department representative stationed in Tromsø rumored to be from the CIA.

Optical Atmospheric Prof. Dr.² Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Flight from Alaska

- International Auroral Research to be carried out on Svalbard from the fall of 1978.
- Deehr, Henriksen and Sivjee pictured in “Tromsø” on the cargo.

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
A US Navy plane was not allowed to land on the demilitarized Svalbard.
Station was shipped by boat to Longyearbyen where it sat on the dock.
Kjell traded something for a “highway workers hut” to house the personnel.
Nordlysstasjonen – Sept 1978

- Kjell arbitrated a location and power on the road to Vinkelstasjonen in Adventdalen.
- Sivjee arrived in September to ready the station.
- He worked until January with sporadic help from Henriksen and Deehr (mostly at a distance) to get it going.
- Transportation was provided by SNSK via the miner’s shift bus to and from Mines #6 and #7.

Optical Atmospheric Prof. Dr.² Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Ulster Polytechnic

- Roger Smith’s Irish students worked hard to establish the FPI winds trailer as a part of the observatory grouping between Vinkelstasjonen and the airport.
- Kjell said Ulster was a Viking port and called it Ulstergård.

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
• Kjell commissioned Karen Lundberg to draw the station in Adventdalen, then made a stamp to issue to philatelists the world over, earning money for the new station.

Optical Atmospheric Prof. Dr.² Kjell Henriksen, Polar Bear on a Hot Tin Roof.
• Observers stayed in the batchelor miner’s quarters and ate in the Miner’s Mess for NOK 35 per day.
Multi-National Svalbard Auroral Expedition – Jan 1979

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Spectrograph Alignment

- Spectrograph calibration and alignment was carried out in the cold by Sivjee and Henriksen. I found a way around the problem.
Ove Harang and Kjell Henriksen organized the 7th annual meeting in Tromso.

It featured a ferry boat trip to catch a mess of cod typical of Havlandet, and a cook out in a nearby fishing camp on the outer fjord.
Here is Willy Stoffregen showing the products of our hard-won fishing efforts.

Optical Atmospheric Prof. Dr.² Kjell Henriksen, Polar Bear on a Hot Tin Roof.
The Svalbard Expeditions 1980s

- Local advertising gave a sense of permanence to the huts in Adventdalen.

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
The Local Community

• Kjell made certain that we met with local organizations to talk about our work at Nordlysstasjonen.
• Here the observers are taking tea at the church.

Optical Atmospheric Prof. Dr.² Kjell Henriksen, Polar Bear on a Hot Tin Roof.
1984 – A New Observatory

- One night around 1982, Kjell said “We need a new observatory!”
- We were distracted, but Kjell would not let it go.
- We later found out that SNSK wanted us out of the drainage to the drinking water lake.
1984 – A New Observatory

- Kjell convinced SNSK to extend the power line to the old airport on the river side of the Adventdalen road.
- Kjell convinced UiTø to design and build the observatory with matching funds from Deehr’s NSF grant.

Optical Atmospheric Prof. Dr.² Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Hydrogen -1985

- Kjell’s interest in hydrogen emission led to his description of the narrow, weak lines found in the dayside aurora.
Kjell managed to wrangle several cars for transportation to the observatory over the years.

Henriksen, Deehr and Lybekk are shown in the safety of the “excellent car” watching the polar bear whose skin now hangs in Huset Restaurant.

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Kjell led the study of lithium twilight emission in the northern polar cap.
Kjell wanted to find the He emission in the aurora that Willy Stoffregen tentatively identified earlier.
Auroral Helium Emission

- Strongly enhanced 3889 Å in the twilight and in the aurora

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Expansion - 1988

- "Chuck, we need to expand, because of all these new groups wanting to observe the dayside aurora.
- You should get NSF funds and split the cost of an expansion with funds I get from UiTø in the same way you did with the new construction!"

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Students and Visitors

- Kjell supported students, old timers, and anyone interested in the aurora.

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Visits to and from Barentsburg

• Students and faculty on both sides of the curtain appreciated the opportunity to visit and work together on this neutral ground.
Practical Experience for Students

- Experience in a difficult and exciting environment inspires graduate students to do original work.

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Alaska Student Trip Report

• When Kjell Henriksen arrived on 6 Dec he began to do several things. First, he insisted on a major cleanup of the station. So mops in hand, we cleared out several kilos of dirt. He also began throwing most things out that were not bolted down or taking data…
• Kjell had an improved set of stairs built and installed on the back porch to the roof…
• Kjell bought a television…
• Kjell also decided that we should have hot water at the station. Now all the faucets have hot water as well…

Don Hampton trip report excerpt 26 Nov 91-16 Jan 92.

Optical Atmospheric Prof. Dr.² Kjell Henriksen, Polar Bear on a Hot Tin Roof.
“The Boys on the Roof”

- Kjell had so many students that they were referred to as a group called “Guttene på Taket”, “The Boys on the Roof”.

Optical Atmospheric Prof. Dr.² Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Kjell developed an interest in the ultraviolet solar spectrum and its yearly variation on Svalbard. He modified a spectrograph to measure the scattered light and the direct sunlight.
UltraViolet Sunlight

• Kjell cooperated with reindeer research on the absorption of uv sunlight by the deer.

Fig. 5. Integrated UVB, UBA and visible blue irradiances obtained at Longyearbyen throughout the period from 7 to 30 July 1989, Julian day number 192–213. The cloudy days manifest themselves with variable and low irradiance during the day, but increased values during the night.

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
18 AM, June 1991

• Kjell helped organize the 18th Optical Meeting held at Tromsø in June 1991.
• He arranged and paid for a busload of the Russian participants to stay in Tromsø with his own funds.
• He is pictured here at 20 AM held in Apatity in September 1993.
• Photo: S. Chernouss

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Ozone in the Arctic

• With interest in the Antarctic Ozone Hole at a peak, pointed out that there was no corresponding tendency in the Arctic.

• He defended the veracity of the Tromsø ozone measurements with his usual forthrightness.
Ozone in the Arctic

- Kjell was “rasende” according to the local paper that anyone would presume to think that there was less ozone in the Arctic without consulting the long record at Nordlysobservatoriet.

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
Ozone in the Arctic

- He regarded it as a tragedy that the long record of ozone measurements at the Nordlysobservatoriet was cut because of a declining interest in optical measurements (1969-1982).
Hydrogen Again

- He directed Dag Lorentzen and Fred Sigernes to observe and model the dayside auroral hydrogen emission.
- He did not live to know that this was the key to our confirmation of magnetic merging in the day side aurora.
He was there in the mist yesterday on Breinosa.
• I heard him say “Put the new observatory far enough up on Breinosa to look down on these antennas.”

Optical Atmospheric Prof. Dr. Kjell Henriksen, Polar Bear on a Hot Tin Roof.
• Without Kjell, there would have been no optical auroral observatory in Adventdalen.

Aurora over Mine #7
photo: K. Henriksen.