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





- Kjell's heroes were early observers: Vegard and Stoffregen.
- He studied their results, used their instruments and applied new methods to understanding their observations.

Lars Vegard



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 N₂(A) molecules suggested by Vegard is important.
- He also commissioned a lovely cover for his thesis.





Willy Stoffregen

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.

LUNAR PERIOD IN AURORAL ACTIVITY



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.



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.





N2+ Temperature

- 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.







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





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





- 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.² Kjell Henriksen, Polar Bear on a Hot Tin Roof.



- "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.² 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.² Kjell Henriksen, Polar Bear on a Hot Tin Roof.





 We didn't even think about what the same view would contain today.



Jet Air Service - 1975

- 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.



Kjell's Dream



 He called it Nordlysstasjonen to separate it from Nordlysobservatoriet, but not by too much.
 Optical Atmospheric Prof. Dr.² 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.

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.



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.



Det store amerikanske «Hercules»-flyet med spesialutstyr for et internasjonalt forskningsprosjekt i nordlyssektoren landet på flyplassen i Tromsø i går formiddag, — etter en gód del om og men. Opprinnelig var det pla-

Foruten den 11 mann store flybesetningen fulgte professorene Dechrs og Sivjee fra Alaska-universitetet med flyet. Sammen med forsteamanuensis Kjell Henriksen overvåket de lossingen av det vitenskapelige utstyret. Dette går fra Tromso videre til Longyearbyen med forste hurtigrute. Forsteamanuensis Henriksen drar så 9. august fra Tromsø til Longyearbyen for å overvåke monteringen av dette spesialutstyret.

Det dreier seg om det vi kan kalle Norge-Alaskaprosjektet for nordlysforskning, sier professor Deehr til «Tromsø». Amerikanske ekspedisjoner har nokså lenge drevet nordlysforskning fra bl.a. leiren på selve Sydpolen. Sydpolen ligger imidlertid i 3.000 meters hoyde over havet, - mens stasjonen vi skal sette opp på Svalbard ligger helt nede ved kysten. Det betyr en hel del forskningsmessig. En fordel er det jo også at mens det blir overvintring i Antarktis, kan man jo lettvint komme frem og tilbake til Longyearbyen, - slik at man kan bytte på forskerjobben.

Både professor Deehr og professor Sivjee regner med å tilbringe hver sin del av kommende vinter i Longycarbyen, — antakelig også neste vinter. Professor Sivjee er for ovrig inder, — som i forholdsvis god tid slapp ut fra Idi nen at flyet skulle komme direkte til Tromsø fra Falrbanks i Alaska. Så ble det omdirlgert til Bodø. En tid så det ut til at de vitenskapelige instrumentene skulle losses der: Men det ble altså gitt grønt lys for videre ferd til Tromsø.



Nordlysstajonen – August 1978



- 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.



Nordlysstajonen – 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.



Ulstergård 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.



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.

Kjell's Dream 1978

Multi-Nation 20201012702222 Magnetospheric Svalbard Nordlysstasjonen i Adventdalen Scudy 1978-83 noitibre Expedition



Winter 1978 - 1979



 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





Spectrograph Alignment

 Spectrograph calibration and alignment was carried out in the cold by Sivjee and Henriksen. I found a way around the problem.





7th AM – July 1979

 Ove Harang and Kjell Henriksen organized the 7 th 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.



7th AM – July 1979



The Svalbard Expeditions 1980s

Svalbardposten nr. 19 - 1980/81

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

Nordlysforskere i Adventdalen for tredje år på rad

fullpakket med avanserte instrumenter. vinkelstasjonen i Endalen, finner du nordlysforskerne. I løpet av de to månedene nordlysundersøkelsene pågår. skal 12 forskere fra Norge, Alaska og Nord-Irland forsøke å fravriste nordlyset noen nye hemmeligheter. Svalbardposten spurte Kjell Henriksen, 1. amanuensis en ring rundt polene. ved Nordlysobservatoriet Tromsø, hvorfor de driver og undersøker nordlyset år etter år.

- Vi gjør det av ren vitenskapelig nysgjerrighet. Vi har ikke noe bestemt mål for vårt vi kan ikke arbeid. si at vi skal finne ut noe som kan være nyttig-Men det betyr ikke at ikke mye av det vi finner ut kan komme til nytte før eller senere. Hva egentlig

nordlys? Det er ikke mer

noe lys. Nordlyset en høvde på fra 100 til

tre små brakker, i Adventdalen fant sted 6. november 1978. Det like ved er nå tredje året stasjonen er i drift, normalt månedene desember og januar. Henriksen allerede klarsignal har for å fortsette observasionene her i tre vintre til, mens de amerikanske forskerne har fått støtte til to nye nordlyssesonger.

> Nordlyset opptrer som Forskerne i Adventdalen har kontakt med nordlysforskere i Alaska - tvers over Nordpolen. Det viser seg at når det skjer noe drastisk med nordlyset over Svalbard, kan man se at det samme skjer med nordlyset over Alaska - til samme tid.

> 1 en brakkene er to forskere fra Nord-Irland gang med måle vind og temperaturforhold i en høyde av 200-300 kilometer. skal ikke forsøke 055 noen vitenskapelig på holdbar forklaring på hvordan kan, finne de ut hvor kaldt det er



Professor Charles Deehr fra Fairbanks (sittende) og 1. amanuensis Kjell Henriksen teraner" i Nordlysstasjonen i Adventdalen.

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.



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.



"Our Excellent Car"



- 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.



Atomospheric Lithium

 Kjell led the study of lithium twilight emission in the northern polar cap.





Auroral Helium Emission

 Kjell wanted to find the He emission in the aurora that Willy Stoffregen tentatively identified earlier.





Auroral Helium Emission

 Strongly enhanced 3889 A in the twilight and in the aurora



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!"





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

Students and Visitors

Nordlys-professor har sett nordlys for første gang



- Dette må jeg se til det er slutt, selv om jeg skal fryse ihjel! Alex Korschunow beskriver sitt første møte med nordlys for Kjell Henriksen fra Nordlysobservatoriet i Tromsø og Roger Marshall fra Alaska.



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.





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.



"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".



UltraViolet Sunlight

- 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.



Fig. 2. Calibrated global spectrum at a solar elevation angle of 6°. The conspicuous decrease for wavelengths longer than 4500 Å is caused by off-axis attenuation by the teffon diffuser, and therefore the calibration is usable only below 4500 Å.



UltraViolet Sunlight

290 – 315 nm, UVB 400 200 0 195 200 200 200 205 210 Day number



Day number



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.² Kjell Henriksen, Polar Bear on a Hot Tin Roof.

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



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





- 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 Henriksen raser over Geir Braathens beskyldninger om at Nordlysøbservatoriets målinger ikke holder faglige mål.



– Vi var penest i fjor i Sveits for å foreta en grundig kalibreting av våre instrumenter. Vi fikk den tilbake med beskjed om at de var svært neysktige og ikke trengte å justeres. Norsk institutt for luftforskning har filtt store summer av miljøverndepartementet for å lede undersøkelserer om croenhget. De har ikkevel ikke kjennskap til hva vi driver med, sier han og peker på at Geir Beaathen ennå öke har vært i feltet og sett hvordan Nordlysobservatoriet foretar sine undersøkelser.

Feil

De faeste satellittandersøkelsene som ble foretatt var ikke riktige på grunn av feil på et av måkinstrumenterne. Denne feilen er der fortaalt, men man prøver å justere for feilen i beregnington. Måtes å justere på et bån forandret bele seks gauger såden føllen. ble oppdaget, Hvordan kan vi vite at de gastere på rett måte i dåg, undrer Kjell Henrikson.

Variasjoner

Nordlysobservatoriet er den forskrängsinstitusjonen som har drevet med consendlinger lengst ber i landet. De har plvist at oconlaget varierer kraftig fra är til år og änsidene i melkott.

- Det er flere årsaket til variagenen. En av årsakene er solflelekkalnivitet, som Geir Brachen viser til, men denne er av mindre betydning. Det er inidlertid ingen ting som tyder på at utilipp av de alkalte KFK-gassene fører til at orenlaget redusteret, mener Kjell

Henriksen. Får støttø

Tromso-forskerne har absil flit, statte av rassiske kolleger i sint vurderinger av ozonlaget.

Kjell Henriksen visor også til at de har film størte fra forskore i Sodankylt i Finland og Nordkjøping i Sverige.

Kjelf Hereiksen utelukket ikke at enkelte kan ha vikarierende motiv for å hevde at ozonlaget blir måndre.

 Miljøverndepartementet har bevilget millionötelog til Norsk institutt for luftforskning. Dene er petger vi som driver med millinger har sett lite til. Pengroverforingerte er umdlerfid avhengig av at frykten for et oronhall et til stede, mener Kjell Henrikstti.

PÅLITELIG: Väre o;onmålinger er pålitelige, sier Kjell Henriksen.





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.



Fig. 2. Monthly mean values for the period 1935–1969, \bar{M}_1 , continuous curve, and 1984–1989, \bar{M}_2 , dashed



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.





the

mist

osa.

Kjell Henriksen

 He was there in yesterday on **Brein-**8 15 2003



Kjell Henriksen



 I heard him say "Put the new observatory far enough up on Breinosa to look <u>down</u> on these antennas."



 Without Kjell, there would have been no optical auroral observatory in Adventdalen.

> Aurora over Mine #7 photo: K. Henriksen.

Kjell Henriksen