Monitoring at Norwegian-Russian cross-border territories (new data April 2010 - March 2011)

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The Norwegian-Russian seminar:

Interaction between governmental structures, business, academia and civil society – an instrument for improving environmental safety in the region
26.-27. October 2011

Outline

- Norwegian monitoring program; Svanvik, Karpdalen, Viksjøfjell, Karpbukt
- Results from April 2010 – March 2011
- Model development
- Emissions

Photo: Hildur Eikås, Sør-Varanger library

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Norwegian monitoring program

KLIMA- OG FORURENSNINGS-DIREKTORATET

MILJØVERNDEPARTEMENTET

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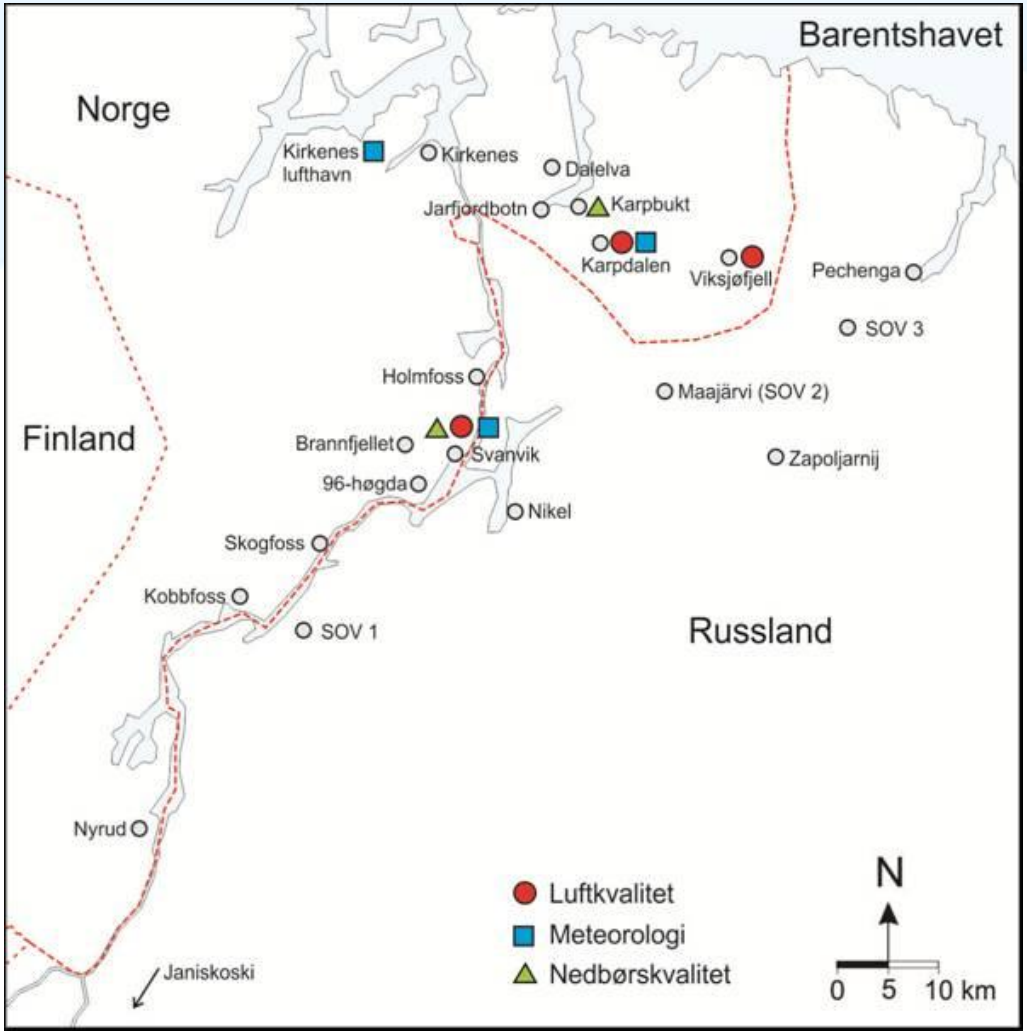

Svanvik (Сванвик)

- SO_2 monitor
- Heavy metals in air/particles
- Heavy metals in precipitation
- Meteorology
- Results on

- In collaboration with Bioforsk Soil and Environment

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Bioforsk

Karpdalen (Карпдален)

- SO_2 monitor
- Meteorology
- Heavy metals in air/particles from autumn 2011
- Results on

- In collaboration with Leif Vonka

Norwegian threshold values

- SO_2 hourly mean: 350 µg/m^3 (24 exceedances per year)
- SO_2 daily mean: 125 µg/m^3 (3 exceedances per year)
- SO_2 seasonal mean/annual mean: 20 µg/m^3

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Важные ключевые показатели SO_2 из измерений 1 апреля 2010 г.-31 марта 2011г

Параметр	Сванвик	Карпдален
Наивысший 10-минутный показатель µг/м^3	620	917
Наивысший среднечасовой показатель µг/м^3	433	854
Количество среднечасовых показателей >350 µг/м^3 летом	6	4
Количество среднечасовых показателей >350 µг/м^3 зимой	0	102
Наивысший среднесуточный показатель летом µг/м^3	156	94,9
Наивысший среднесуточный показатель зимой µг/м^3	96	507
Количество среднесуточных показателей > 125 µг/м^3	1	15
Количество среднесуточных показателей > 90 µг/м^3	6	20
Средний показатель лета µг/м^3	7,4	9,4
Средний показатель зимы µг/м^3	8,5	39,1

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Viksjøfjell (Викшёфьелл)

- SO_2 passive samplers (exposed 2 weeks)
- Average concentration winter 2010/2011 30 µg/m^3

View from Viksjøfjell southwards. One can see the flue gas from stack in Zapoljarnij. Photo: Christoffer Aalerud, County governor of Finnmark

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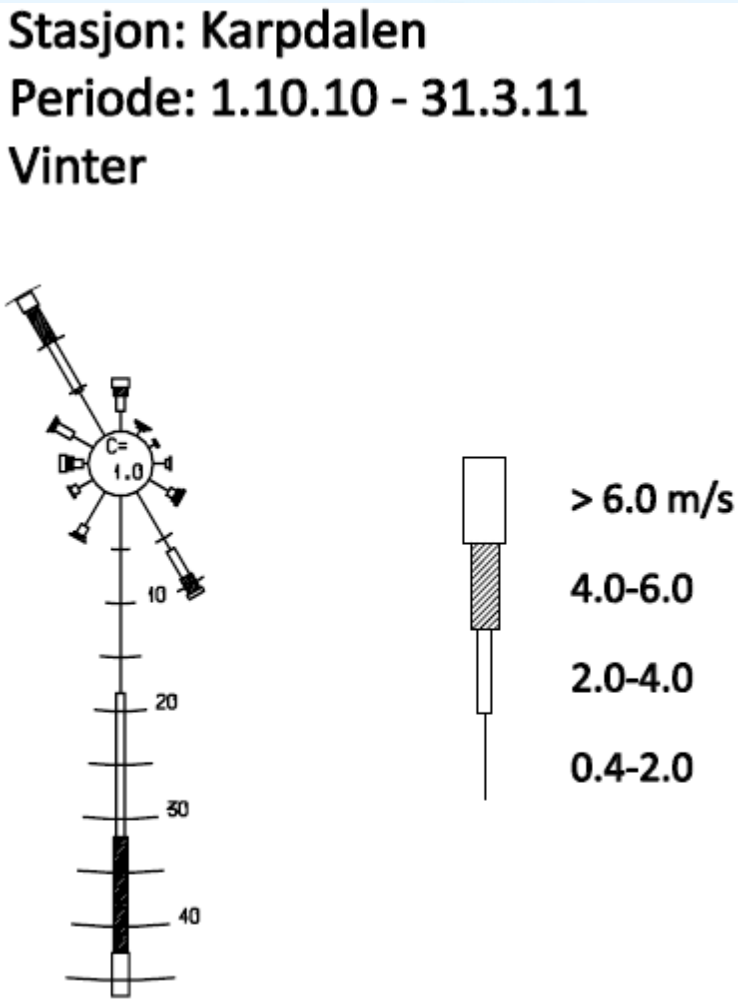
Meteorology

- Karpdalen (Карпдален)
- Prevailing wind direction from south during winter (2/3 of the time)



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Heavy metals

- Svanvik (Сванвик)
- Ni, As, Cu and Co trace metals from smelter activity
- Increased levels in precipitation from 2004

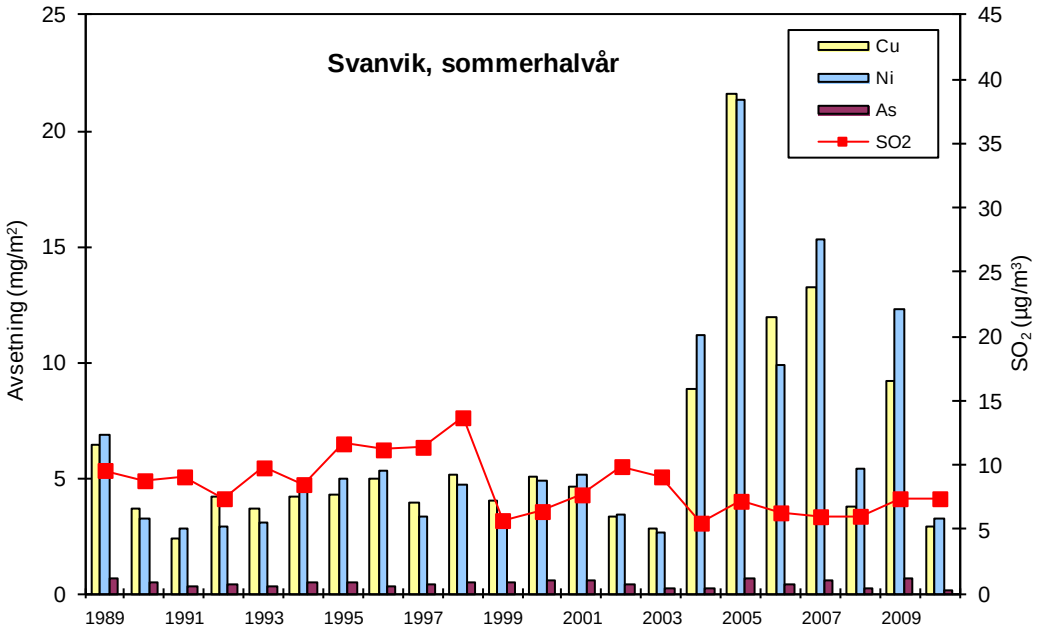
Max daily values in air 2010/2011:

Ni: 66,90 ng/m^3

As: 25,25 ng/m^3

Cu: 37,31 ng/m^3

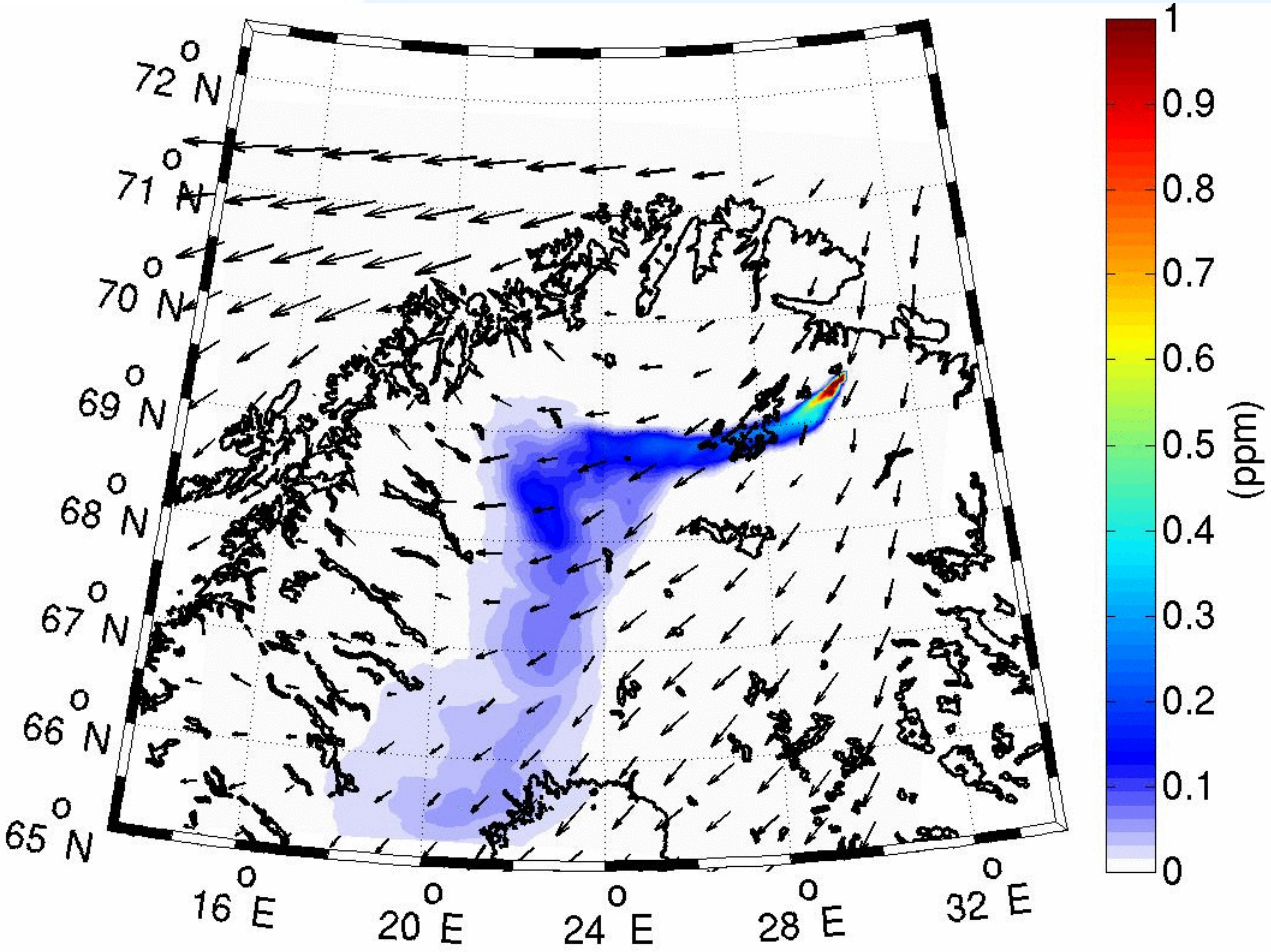
Co: 2,16 ng/m^3



Deposition of heavy metals at Svanvik, summer season

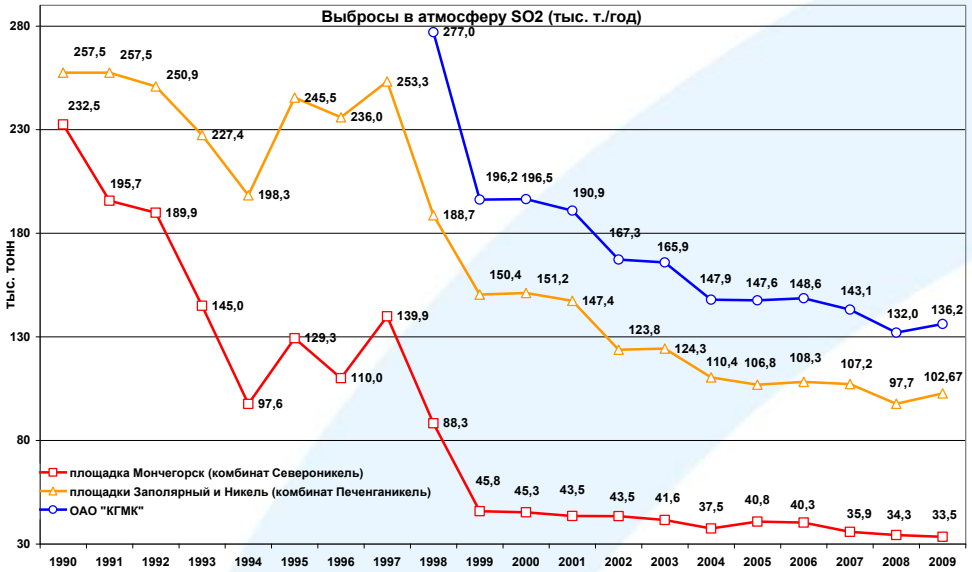
Model development

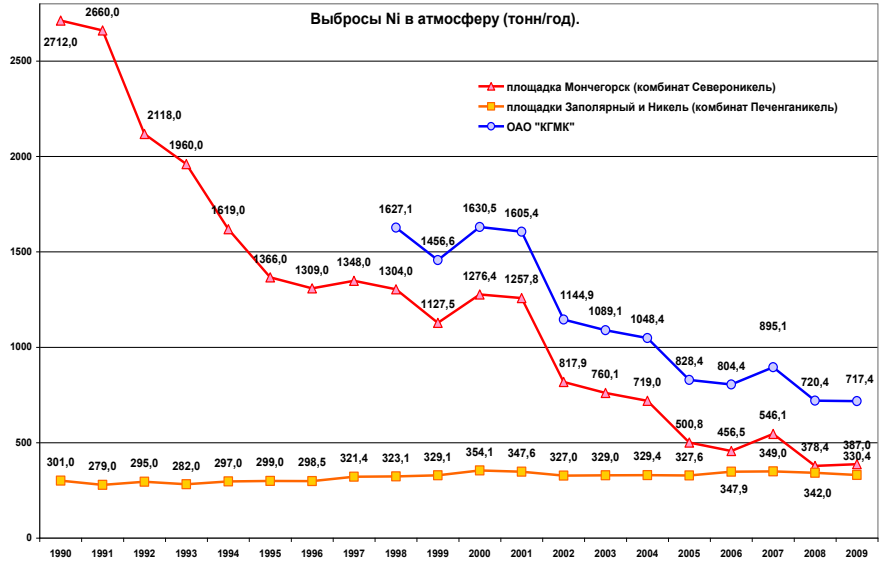
- WRF-Chem (NILU and University of Oslo)



6th July 2007 at 00h

Emissions





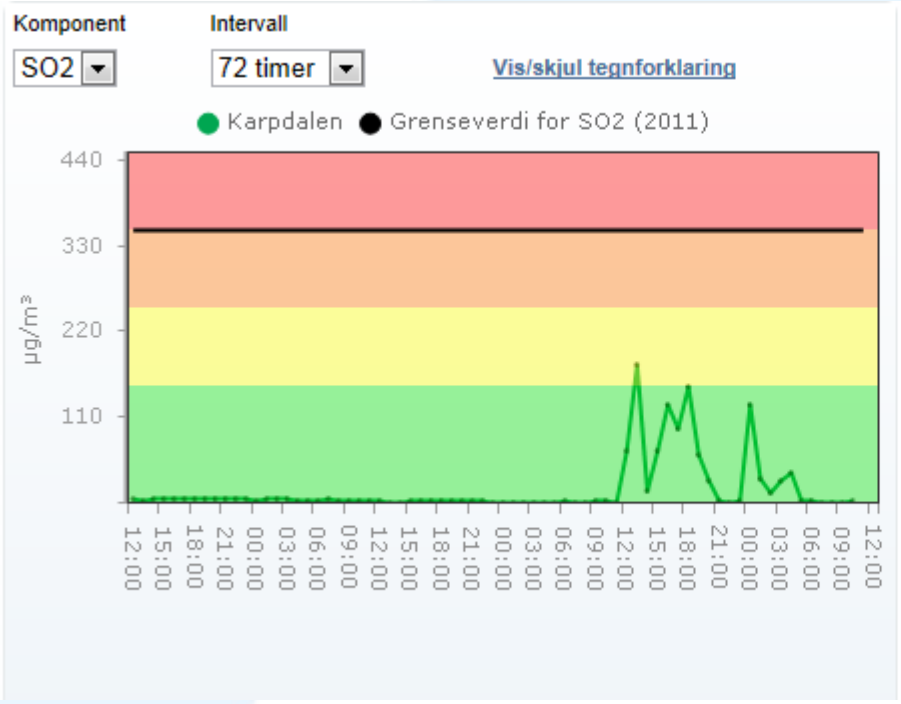
From Kola MMC. Thanks to Bellona for sending the numbers

Diffusive emissions: Smelter and city of Nikel 19. June 2008

Hourly mean concentrations in Nikel (NILU instrument):
1470 µg/m^3 (13h-14h) and 1527 µg/m^3 (14h-15h).

Photo: Christoffer Aalerud,
County governor of Finnmark

www.luftkvalitet.info



Karpdalen

Stasjonen ligger i Karpdalen, øst for Kirkenes og nord for smelteverket i Nikel, Russland. Dette er en "gammel" stasjon som ble nedlagt i 1999 og gjenåpnet høsten 2008. SO2 og meteorologi måles. Om vinteren er dominerende vindretning fra sør og sør-sørvest. Da bringes utslippene fra Nikel nordover mot Karpdalen og Jarfjordfjellet.

Status: Stasjonen er i normal drift.
Eiet av: NILU (målinger på oppdrag fra KLIF)

Detaljer

- Se kart
- Se luftkvalitets index (Tabell)
- Se luftkvalitets data (Tabell og graf)

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Summary (outline)

- Norwegian monitoring program; Svanvik, Karpdalen, Viksjøfjell, Karpbukt
- Results from April 2010 – March 2011
- Model development
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Photo: Hildur Eikås,
Sør-Varanger library

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Extra in case of any questions

Concentration and wind direction

The Breuer diagram shows very high concentrations when the wind is coming from the west. However the wind is coming from the west in less than 5% of the time, i.e. that there are very few episodes with high concentrations. Our hypothesis is that southerly, continental wind brings the emissions from Nikel northwards. Then the air masses meet westerly coastal wind and this brings the pollution westward. This is detected as pollution coming from the west at our monitoring station in Karpdalen (artificial wind direction)

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Concentration and wind direction 2

Here we have plotted concentration for each 10° wind sector multiplied by the percentage when the wind is coming from that specific wind direction. This give **total load** for each wind direction.

Max: direction 180° (south), the concentration is 36 µg/m^3 and the wind is coming from this direction 21,3% of the time

Smelter in Nikel and emissions seen from Brannfjellet, Pasvik valley 23. July 2007 (after the summer episode).

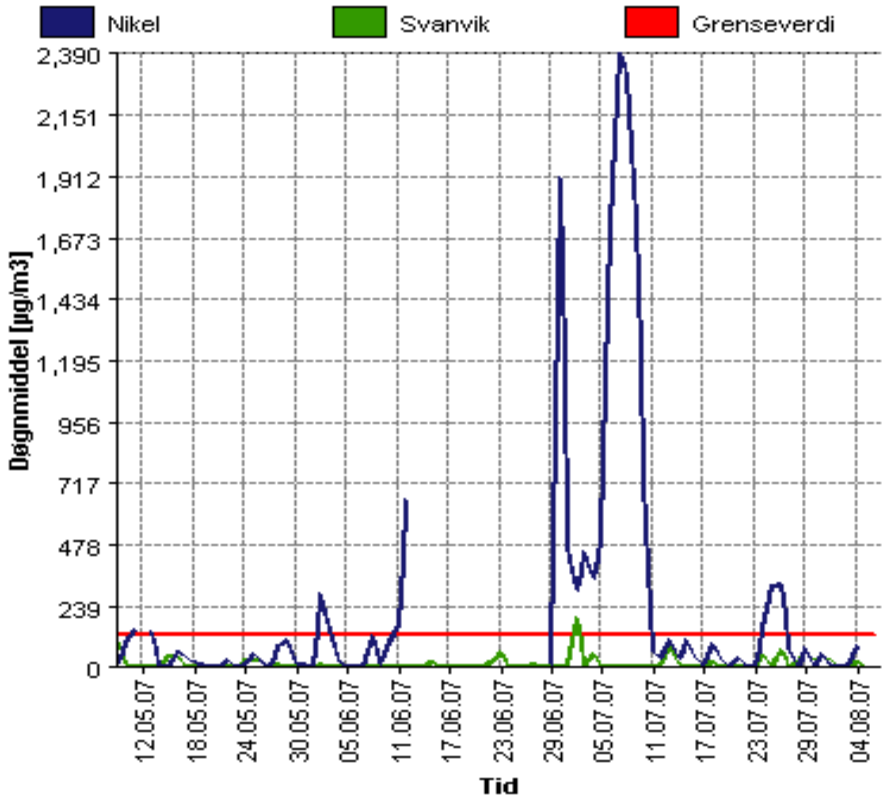
Photo: Espen Tangen Aarnes, Bioforsk Svanhovd

Summer episode 2007

Døgnmiddel for SO2 siste 90 dager i µg/m3

Om forurensingsnivåer
Om grenseverdier

Siste 90 dager (døgnmiddel) | Generèr graf



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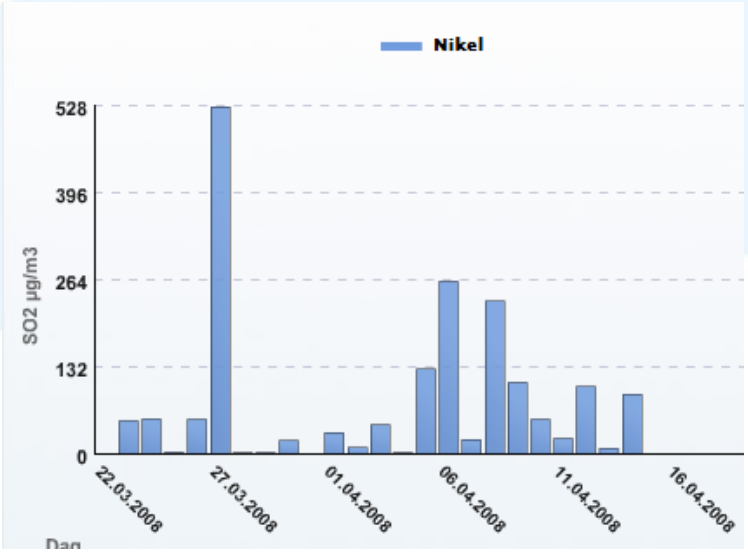
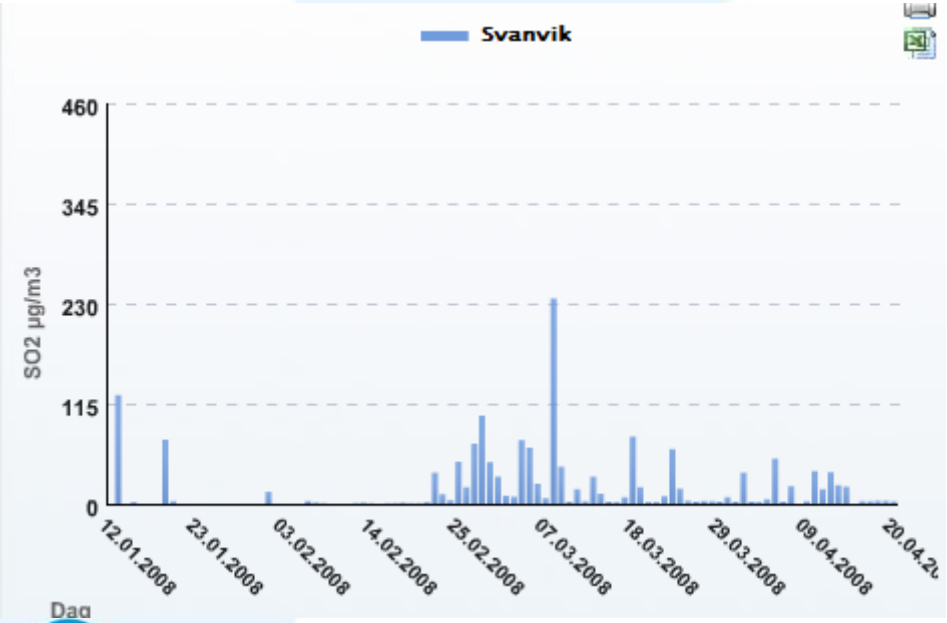
Model development

NILU and University of Oslo are working on development of WRF-Chem atmospheric-chemistry model to investigate dispersion and deposition from Nikel and Zapoljarnij

SO2-målinger

www.luftkvalitet.info





Nikel (2007/2008):

Max. 10-min.verdi >8000 µg/m^3

Max. timeverdi 5962 µg/m^3

Max. døgnmiddel: 2390 µg/m^3

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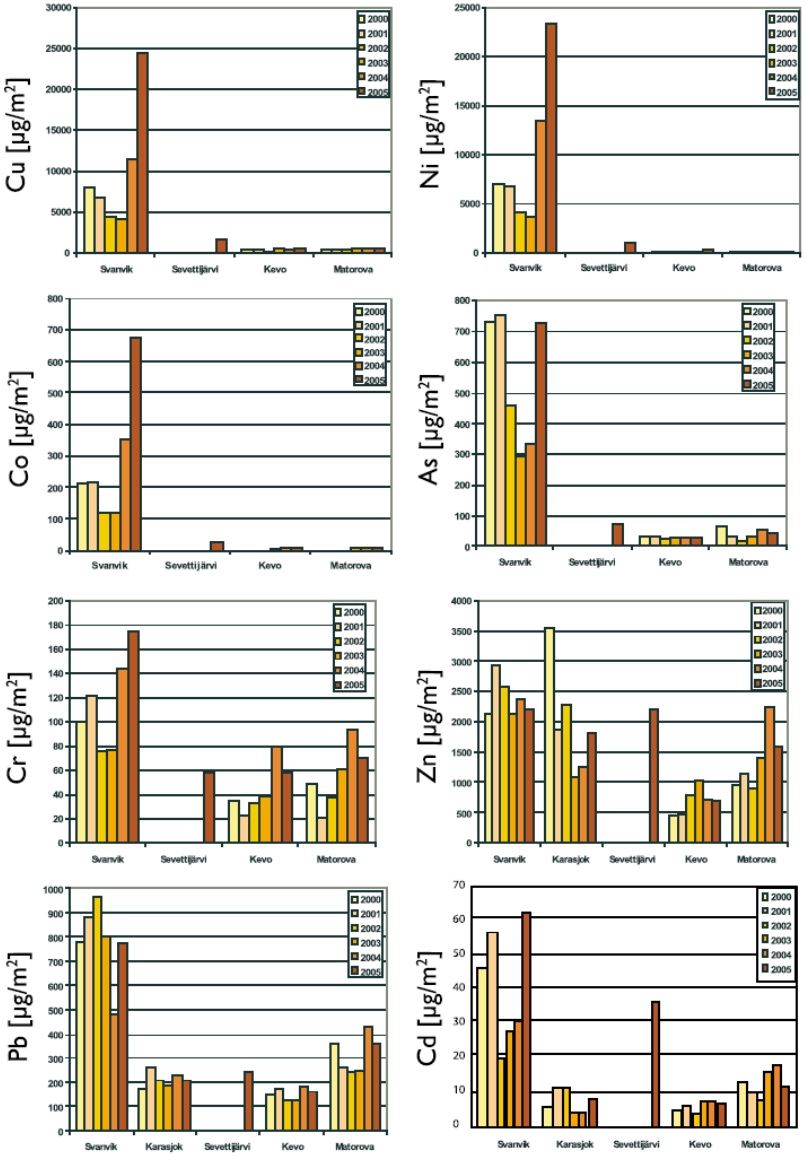

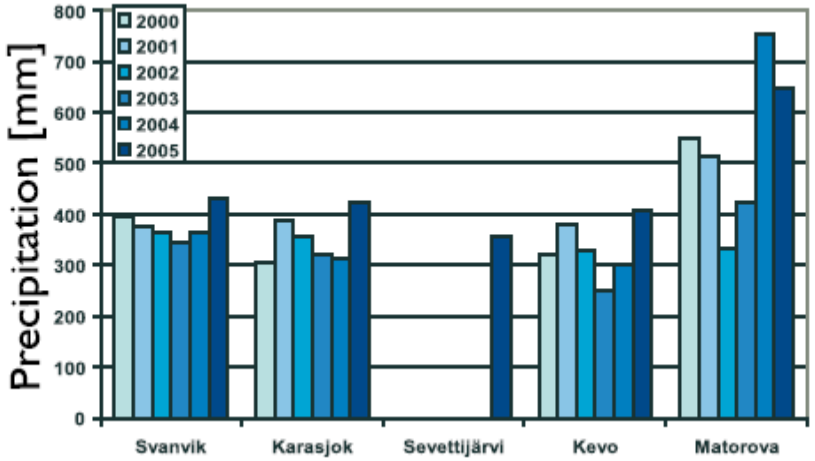

Økning i en rekke tungmetaller, både Svanvik og andre stasjoner (Kevo, Matorova) fra 2003 til 2005: Skyldes ikke endringer i nedbør i Svanvik og Kevo

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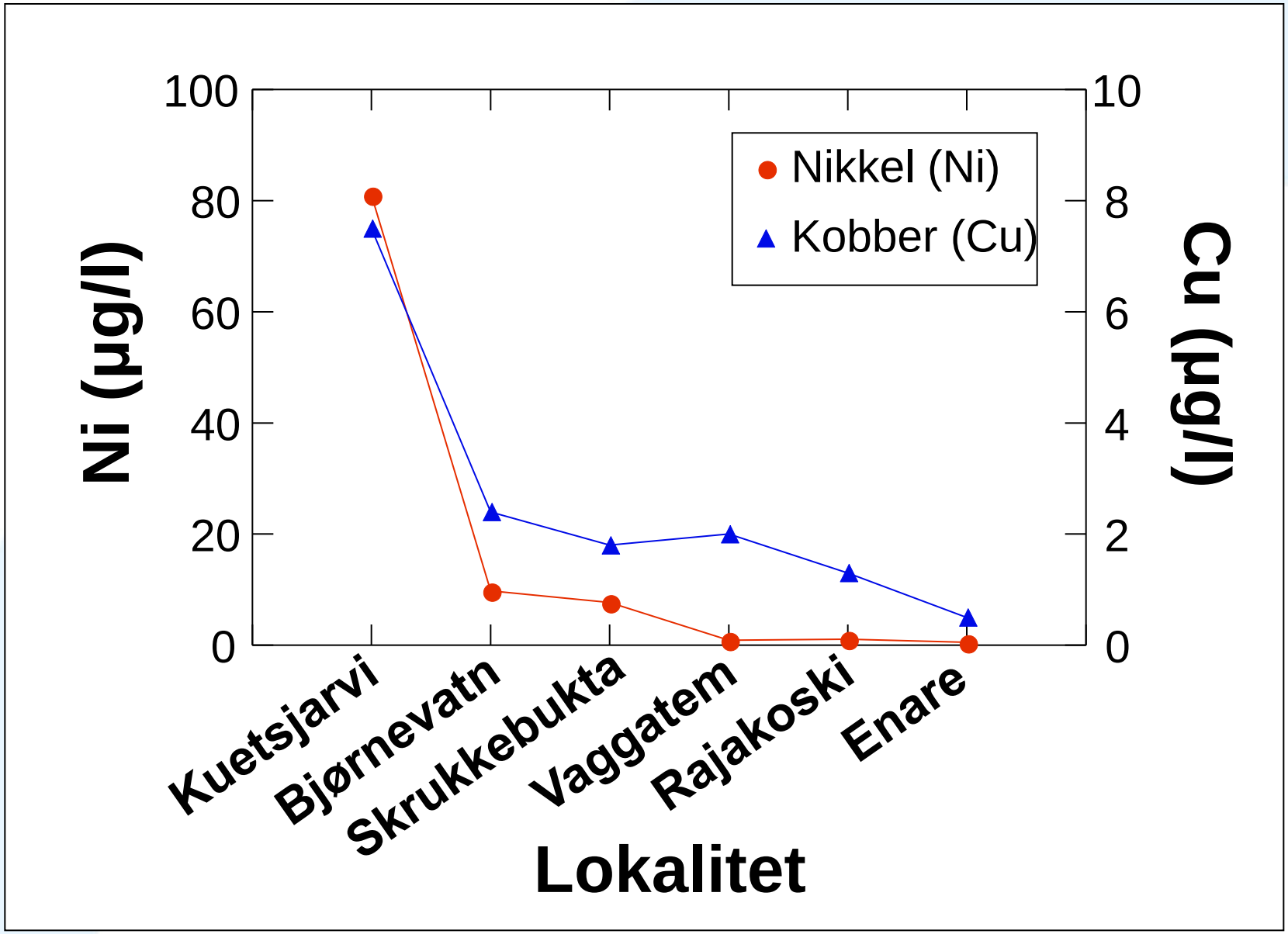
Water chemistry



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