Atmospheric Heavy Metal Concentrations at Norwegian Background Sites: Temporal Trends

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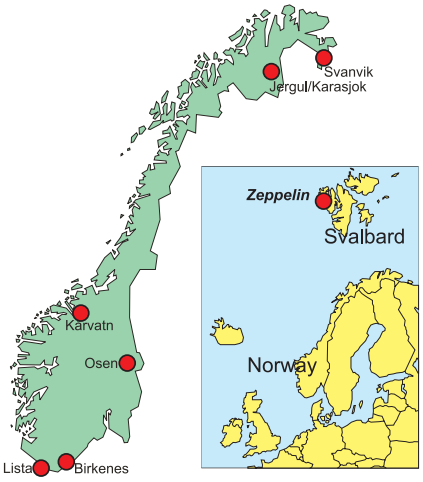
Introduction

As a part of the national Norwegian monitoring programme, long time surveys of heavy metals (HMs) in precipitation have been carried out since the late 1970's and since the beginning of 1990's for air .

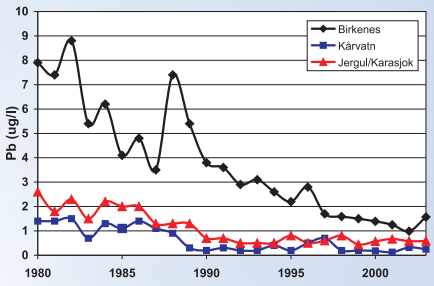


The sampling sites.

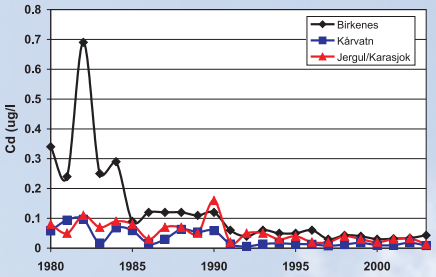
Experimental

Weekly precipitation samples were collected using bulk samplers at all stations. The air samples were collected on weekly basis at Lista and on 48 hours basis at the Zeppelin station. Determinations of the elements were performed by the use of an ICP-MS.

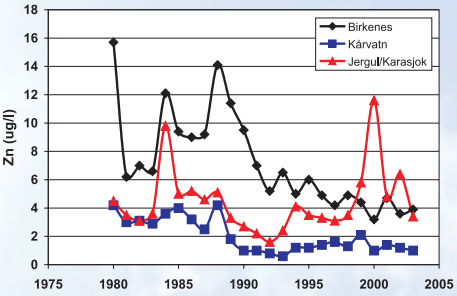
Bulk sampler.



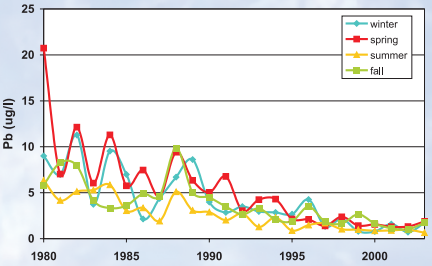
Lead in precipitation (ug/l) at three Norwegian background stations.



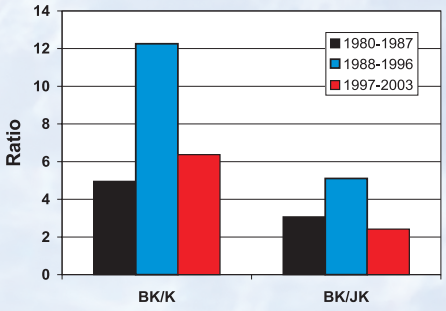
Cadmium in precipitation (ug/l) at three Norwegian background stations.



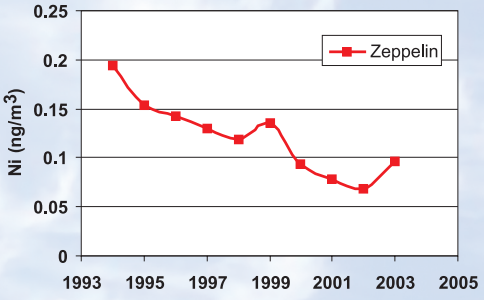
Zn in precipitation (ug/l) at three Norwegian background stations.



Seasonal weighted means for Pb in precipitation (ug/l) at Birkenes. % reduction: Spring –95%, Summer -95%, Autumn –85%, Winter –99%



Ratio between lead in precipitation (ug/l) at Birkenes and Kårvatn (BK/K) and Birkens and Jergul/Karasjok (BK/JK) during three time periods



Ni in aerosol (ng/m^3) at Zeppelin.

For those HMs showing a significant trend, the % reduction is written in bracelets

Station	Year	HMs precipitation
Birkenes	1980-2003	Cd (-99.9%), Pb (-99.3%), Zn (-70%)
Kårvatn	1980-2003	Cd (-92%), Pb (-95%), Zn (-78%)
Jergul	1980-2003	Cd (-80%), Pb (-92%)
Svanvik	1987-2003	As, Co, Cr (-46%), Cu, Ni, Pb, Cd, Zn
Osen	1988-2003	Cd (-77), Pb (-82%), Zn
Lista	1994-2003	As, Co, Cr, Cu (30%), Ni, Pb, Cd, Zn

Station	Year	HMs air/aerosol
Lista	1994-2003	As, Co, Cr (-57%), Cu, Hg, Ni, V, Pb, Cd, Zn
Zeppelin	1994-2003	As, Co, Cr (-76 %), Cu, Hg, Mn (-33%), -Nl (65%), V, Pb, Cd, Zn (21%)

Acknowledment

This work has been founded by the Norwegian Pollution Control Authority (SFT).