

## DISTRIBUTION AND ISOTOPIC SIGNATURE OF Pb IN THE ENVIRONMENT OF ARCTIC NORWAY

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**Keywords:** Pb isotopes; atmospheric contamination; snow; soil; lichens

### Introduction

The environment at the Barents region, near Norwegian-Finnish-Russian border, is influenced by several smelters and metal processing industries. According to Reimann et al. (2001), the local Russian smelters (e.g. Nikel or Zapoljarnij) belong to the world's largest point-source emitters of SO<sub>2</sub> and especially metals. High metal (mainly Ni, Cu) concentration has been recognized in different environmental samples (e.g. snowpacks, rainwater, moss, topsoil etc.) in the region (Reimann et al., 2001; Äyräs et al., 1997). In this study we focus on Pb contamination in three different samples: snowpacks, lichens and soil profiles. The objective is to evaluate the Pb distribution in the region and identify the origin of Pb in the environment using the isotope fingerprinting technique.

### Methods

The study area was divided into three different transect according to the distance from the Nikel smelter and prevailing wind direction with a total number of 13 sampling points. The snowpack and lichens were sampled in March 2015 and soil profiles in August 2015. The snow was collected in duplicates at each sampling point. The two most abundant epiphytic species of lichens were collected, *Hypogymnia Physodes* and *Melanohalea Olivacea*. Soil profiles were collected in 7 sampling points. The samples were homogenized and decomposed in a mixture of acids (HNO<sub>3</sub>, HCl and HF). Concentration and isotope composition (<sup>206</sup>Pb, <sup>207</sup>Pb, <sup>208</sup>Pb) was determined by ICP-MS (iCAPQ, Thermo Scientific, Germany). Correction for mass bias was performed using analyses of SRM 981 (Common lead NIST, USA) after every two samples.

### Results

The Pb concentration ranges between 0.02 and 65 mg/kg (Tab.1). The snowpacks, reflecting a short-term deposition, contain the lowest amount of Pb in contrast to the lichens and topsoil. The distance and direction from Nikel smelter don't correlate with the Pb distribution in the area. The Pb isotopic composition in snow samples is summarized in Table 1. The values between 1.201 and 1.214 (<sup>206</sup>Pb/<sup>207</sup>Pb ratio) were determined in the samples from southern and western transects (from Nikel smelter) while values between 1.156 and 1.190 were determined in the northern-eastern transect.

**Table 1.** Pb concentration in snow, lichens and topsoil samples and Pb isotopic composition in snowpacks

Sampling site	Pb (mg/kg)			Snowpacks	
	snow	lichens	topsoil	<sup>206</sup> Pb/ <sup>207</sup> P b	<sup>208</sup> Pb/ <sup>206</sup> P b
1	1.94	2.47	27.9	1.206	2.042
2	0.82	4.07	-	1.207	2.046
3	0.38	19.9	-	1.201	2.050
4	0.38	18.7	65.7	1.206	2.048
5	0.97	6.33	39.9	1.207	2.039
6	0.20	16.4	10.0	1.214	2.051
7	0.27	13.7	25.6	1.202	2.043
8	0.99	25.1	44.8	1.206	2.033
9	0.26	34.9	-	1.203	2.043
10	0.04	19.2	-	1.175	2.068
11	0.03	25.9	-	1.157	2.088
12	0.03	5.90	-	1.156	2.101
13	0.02	10.9	7.70	1.190	2.067

### Acknowledgments

The research leading to these results has received funding from the Norwegian Financial Mechanism 2009-2014 under Project Contract no 7F14330.

### References

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