Levels and source regions of polychlorinated biphenyls (PCBs) measured in background air in Leova, Moldova.

Mats Nordum[1,2], Knut Breivik[1,2], Wenche Aas[1], Sabine Eckhardt[1], Martin Schlabach[1], Violeta Balan[3]

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Introduction

● Efforts have been undertaken to safely manage and dispose stock-piles of polychlorinated biphe-nyls (PCBs) in Moldova [1], but data on atmospheric levels of PCBs in this region remain limited [2].

● Such data are important to support monitoring ef-forts under the European Monitoring and Evalua-tion Program (EMEP) and the Stockholm Conven-tion on persistent organic pollutants (POPs).

● Objectives: (i) Determine ambient concentrations of PCBs in air at a background site in Leova, Moldo-va, (ii) compare and contrast measured levels of PCBs with data from other countries and regions, as well as (iii) evaluate possible source regions using the Lagrangian particle dispersion model FLEXPART [3,4].

Methods

● Weekly 24-hour measurements were done at Leova ($46^\circ 29'18''$N, $28^\circ 17'0''$E) from September 2009 to October 2010, using an active high volume air sampler.

● 52 samples plus 3 laboratory blanks were analyzed using GC/MS.

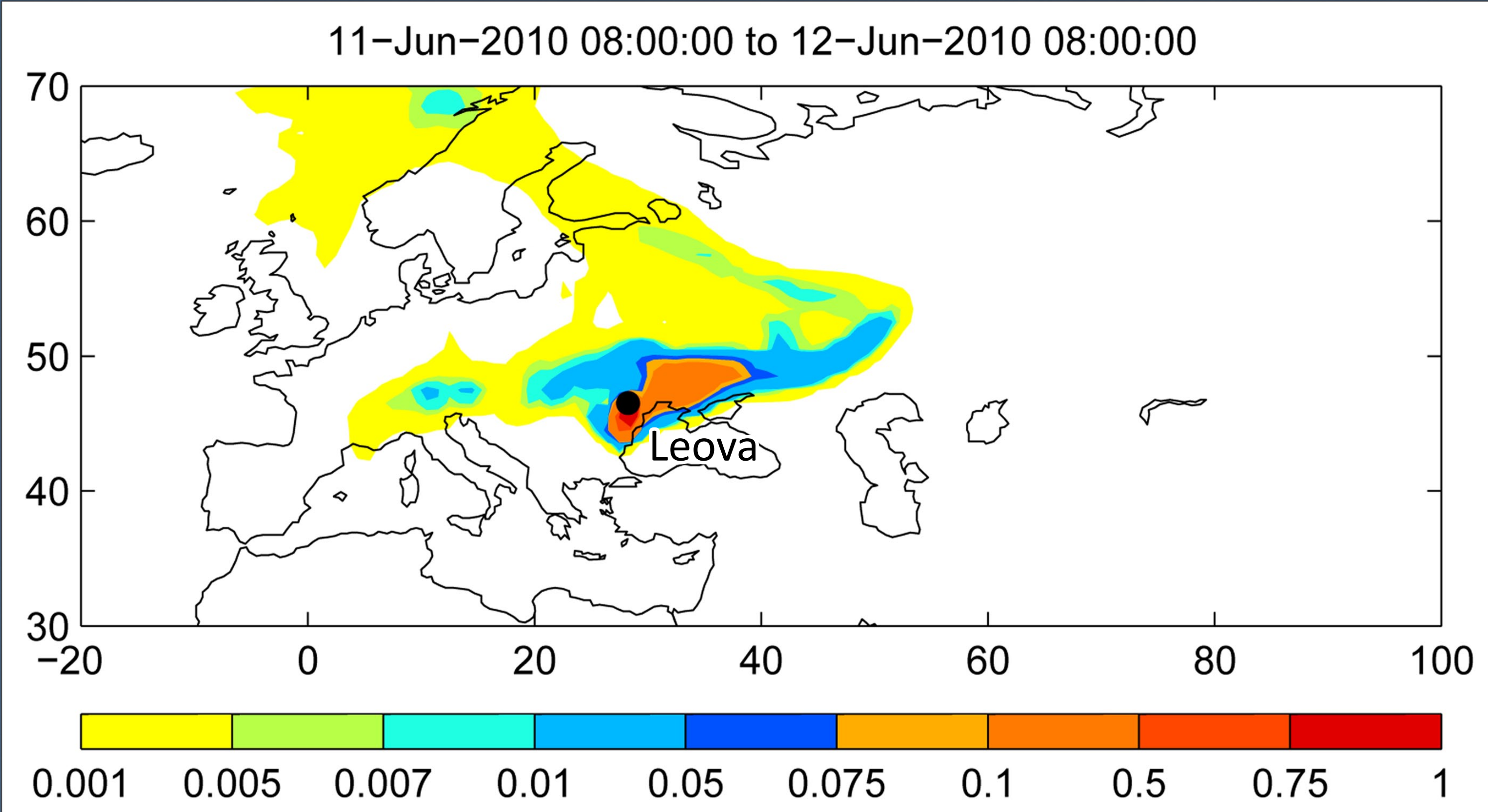● The FLEXPART model was used to identify the source regions of PCBs.

Figure 2: Footprint ES (emission sensitivity) map [ns/m³] from the FLEXPART model [3,4] for the air sample with the highest measured values of Σ_7PCBs. The map illustrates where the air mass had the ability to collect pollutants from sources 0-100 m above ground.

Table 1: Median, range and mean concentrations (±SD) of selected PCBs in air from Leova [pg m⁻³]. Measured concentrations in blanks (range), method detection limits (MDL) [both in pg m⁻³] and percentage of samples above MDL are also included. MDL was determined as the mean concentration of laboratory blanks plus three SDs.

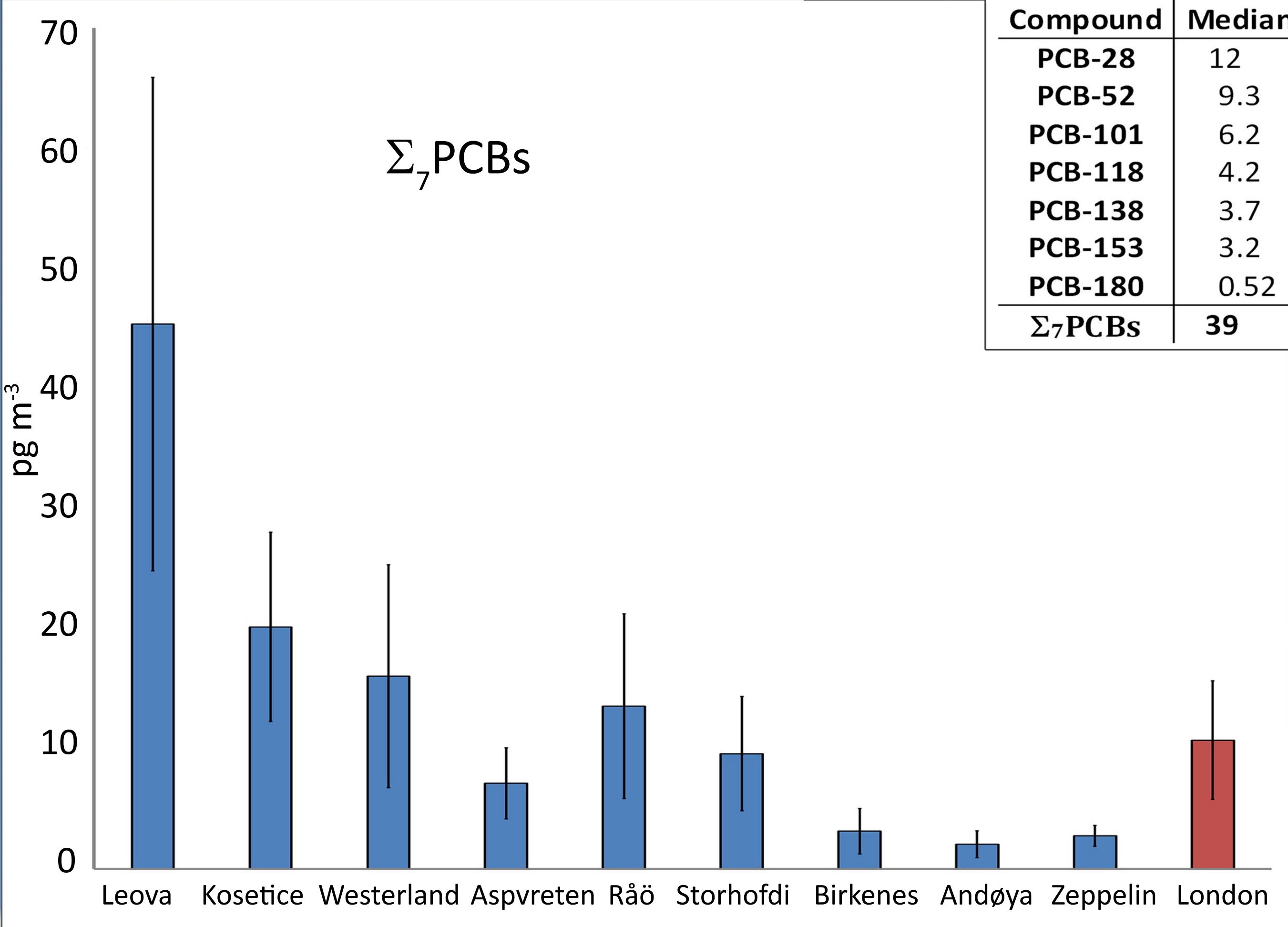| Compound	Median	Range	Mean (±SD)	Blanks (range)	MDL	% above MDL
PCB-28	12	2.6-45	14 (±7.6)	0.07-0.15	0.23	100
PCB-52	9.3	2.3-29	11 (±5.0)	0.10-0.13	0.18	100
PCB-101	6.2	1.9-15	7.2 (±3.3)	0.09-0.17	0.25	100
PCB-118	4.2	1.3-18	5.2 (±3.0)	0.05-0.12	0.21	100
PCB-138	3.7	1.0-23	4.3 (±3.1)	0.04-0.09	0.13	100
PCB-153	3.2	0.87-15	3.7 (±2.2)	0.06-0.10	0.14	100
PCB-180	0.52	0.14-2.7	0.63 (±0.44)	0.01-0.02	0.03	100
Σ_7PCBs	39	10-111	45 (±21)			

Figure 1: Mean concentrations of Σ_7PCBs in air at Leova [pg m⁻³] from September 2009 to October 2010 compared to other European background stations [5] and an urban sampling site in London [6]. Error bars show standard deviation.

Results

● Mean concentration of Σ_7PCBs (PCB-28, -52, -101, -118, -138, -153, -180) for the 52 air samples mea-sured at Leova was 45 (±21) pg m⁻³ (Table 1).

● Mean concentrations at Leova were 2-22 times higher than European background stations, and four times higher than the urban sampling station in London (Figure 1).

● Footprint ES (emission sensitivity) maps (exemplified in Figure 2) from the FLEXPART model indicate possible source regions for the measured PCBs at Leova.

References

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