



PCB-contamination in the sediments of the harbour basin of Zadar

(Croatia)

**as a consequence of war action and/or industrial contamination
APOPSBAL (5th EU-research framework)**



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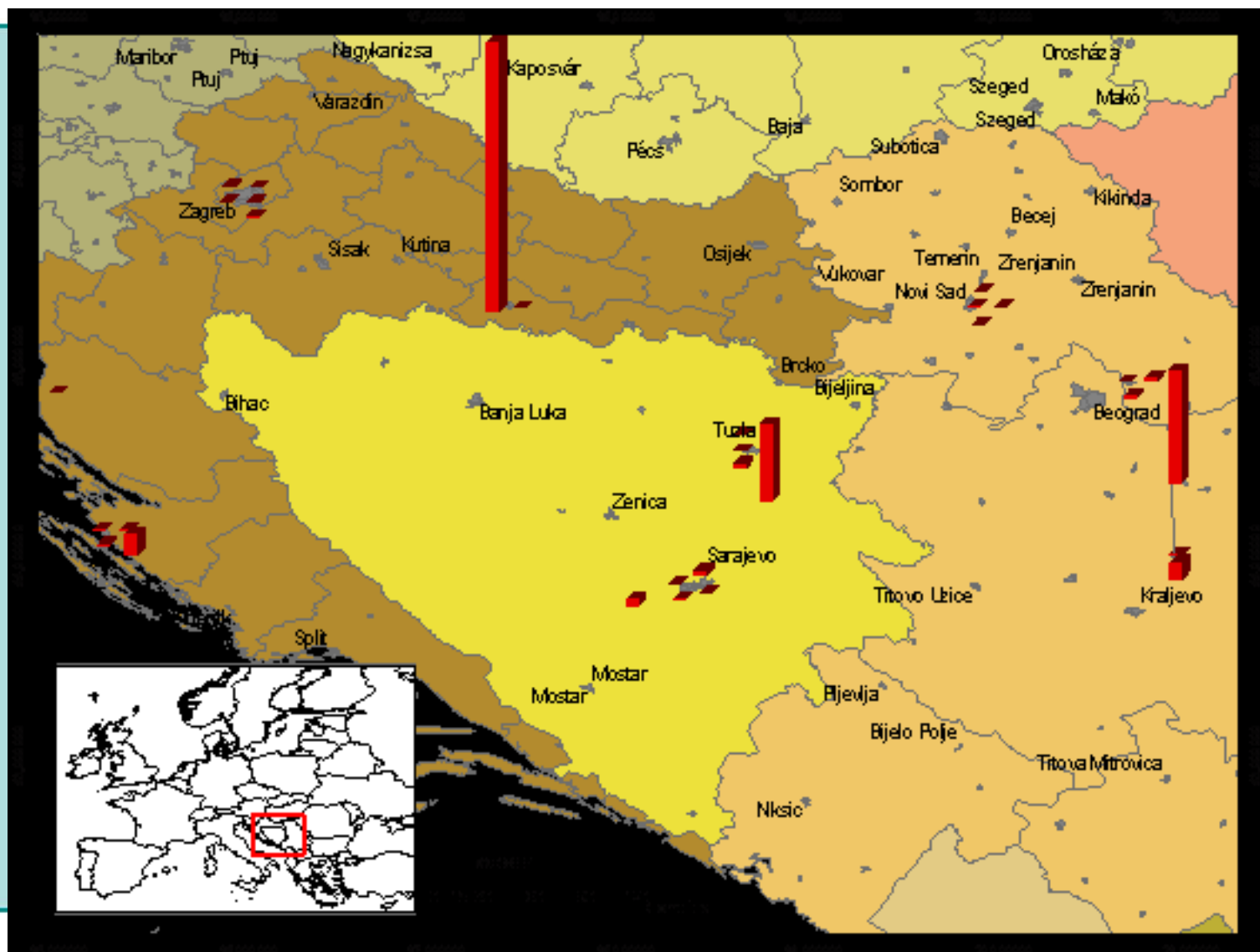


Zadar (HR) PCB in soil and marine sediment samples

- **Outline**
 - **PCB distribution in soil samples**
 - **PCB distribution in size fractions of soil samples**
 - **Marine sediment sampling in Zadar Harbour**
 - **Interpretation of PCB distribution in sediment samples**
- **Conclusions**



Situation of investigation area





Aerial photo of investigation area



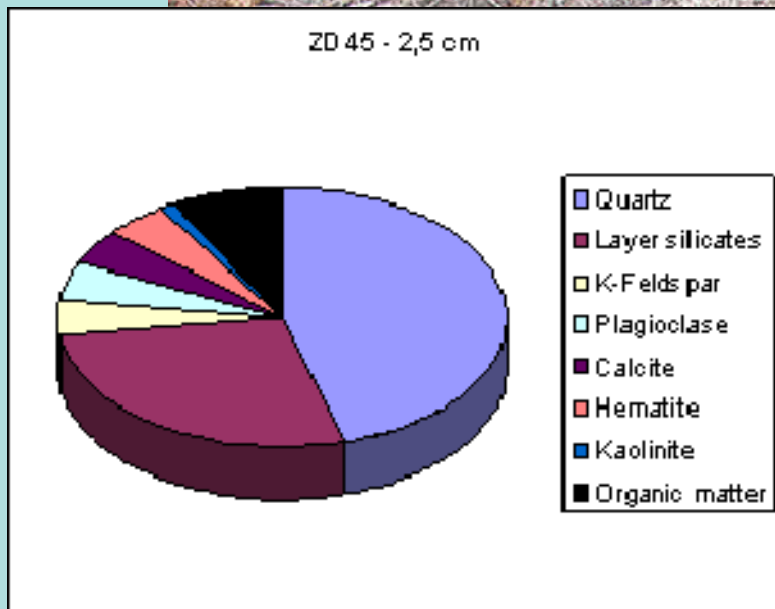
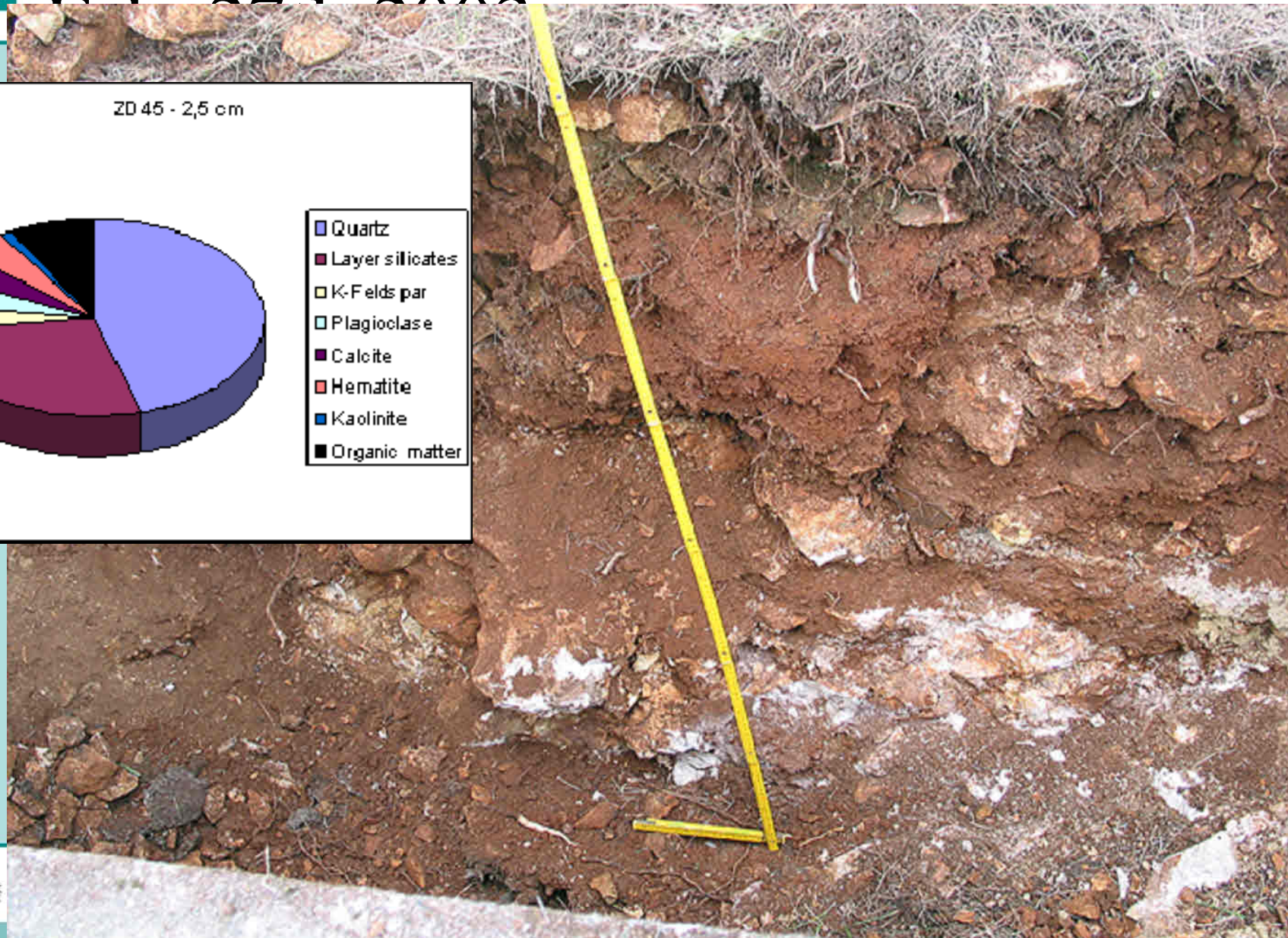
transformer station, Zadar, Feb.

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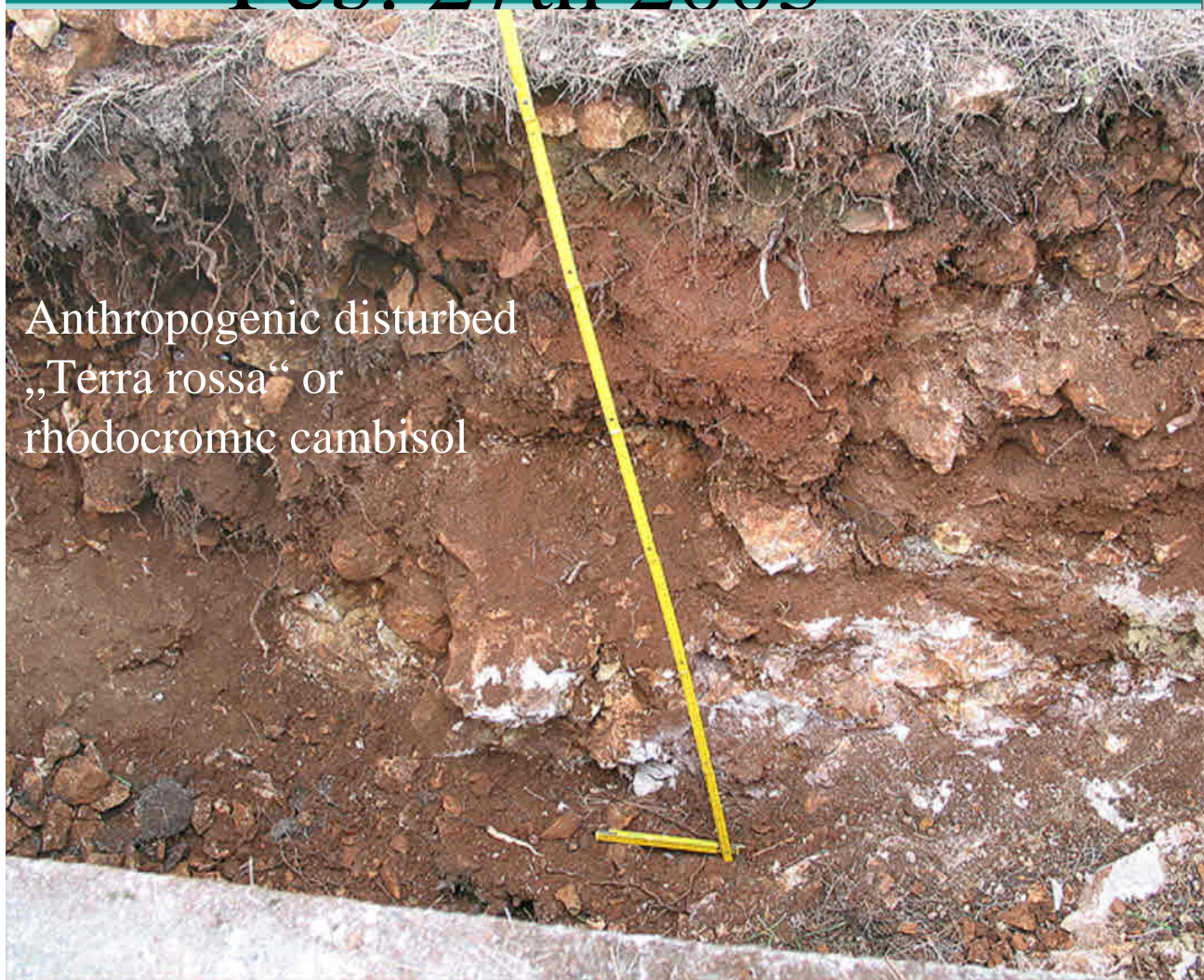


transformer station Zadar, 2nd pit,

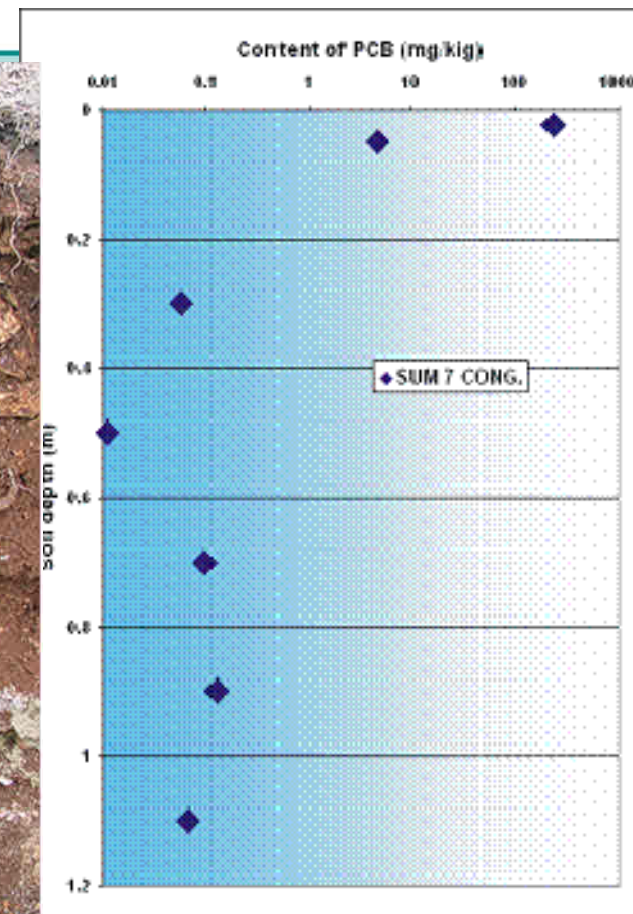
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transformer station Zadar, 2nd pit, Feb. 27th 2003



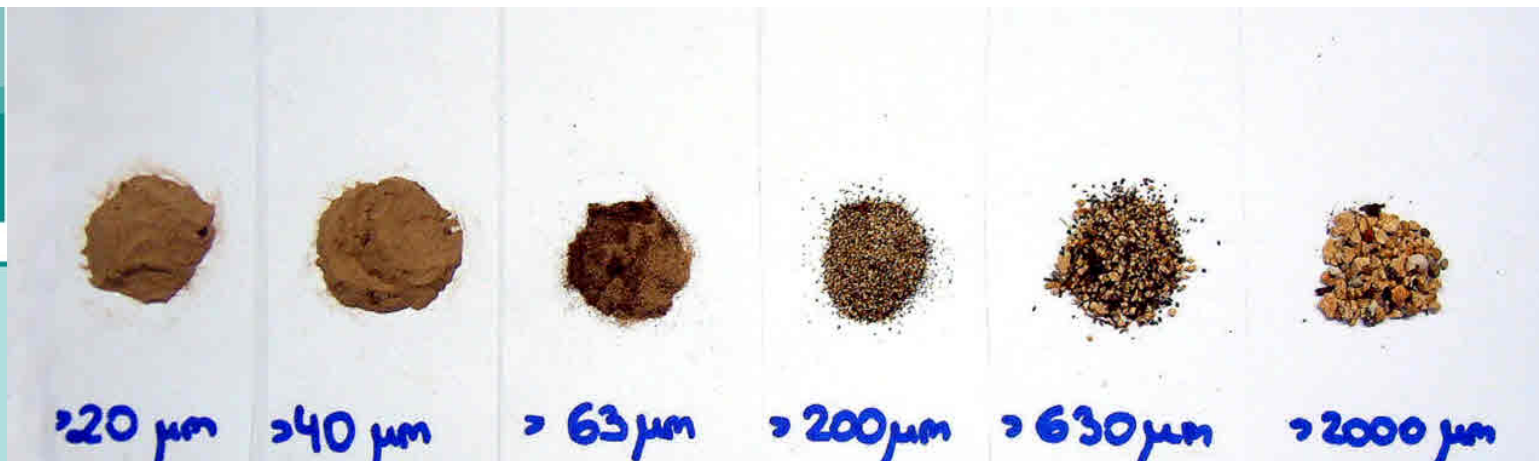
Anthropogenic disturbed
„Terra rossa“ or
rhodocromic cambisol



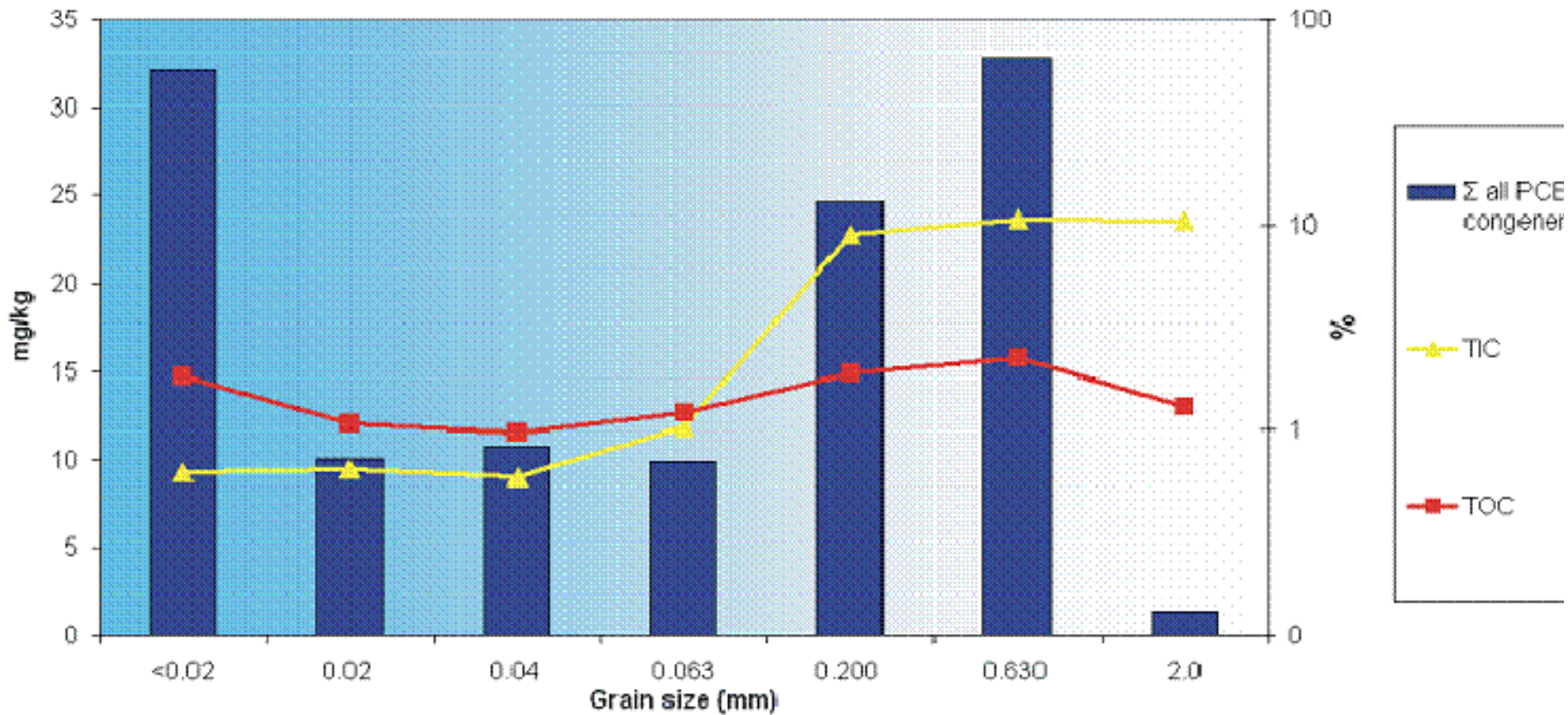
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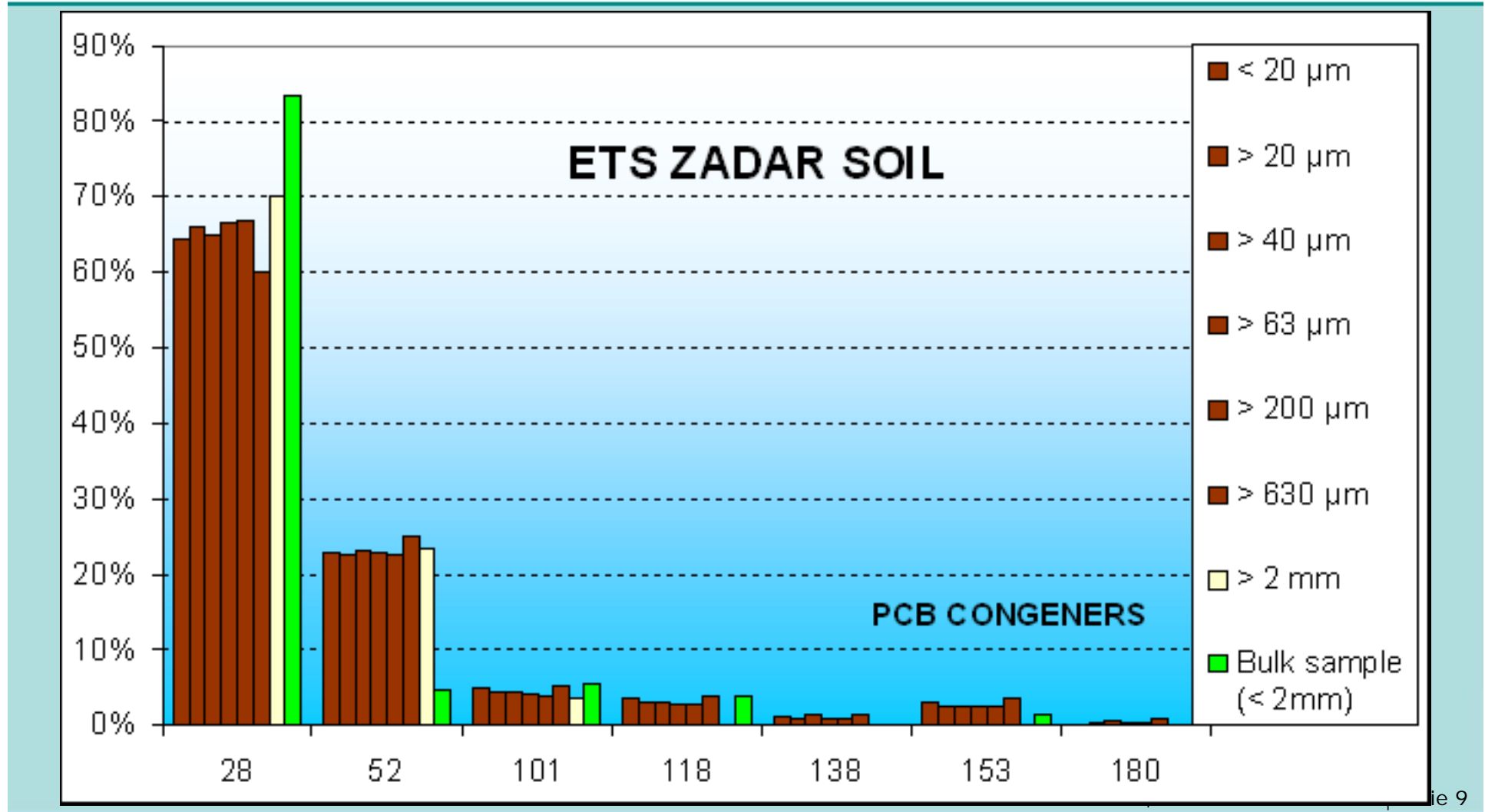


Σ all PCB congeners in different fractions





Effects of wet screening and freeze drying of soil fractions of ETS- Zadar?



Zadar PCB in air close to trafo station

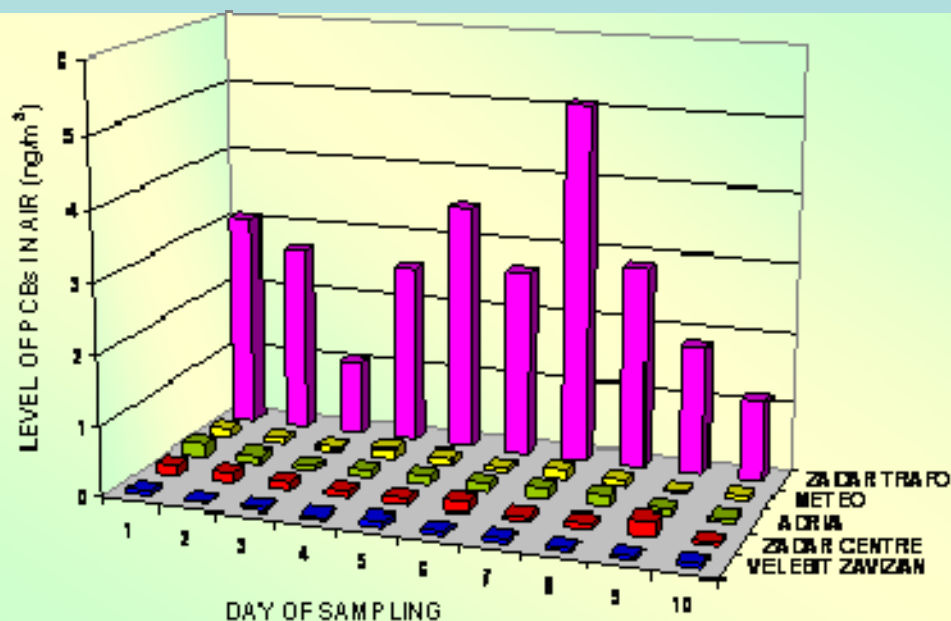


Figure 3. Levels of PCB in atmosphere of Zadar and Zavizan (Velebit Mt.), air sampling May 13 to 23, 2003

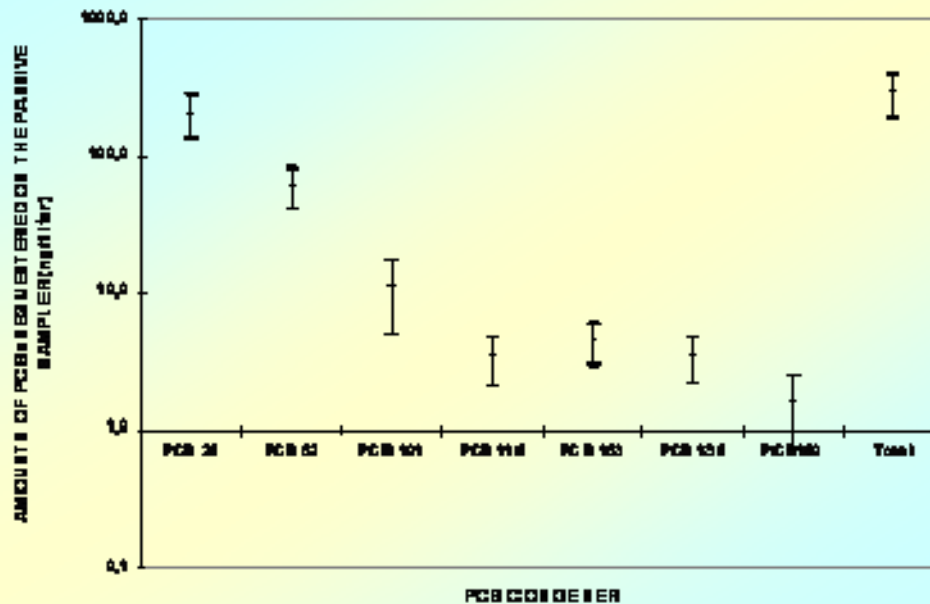
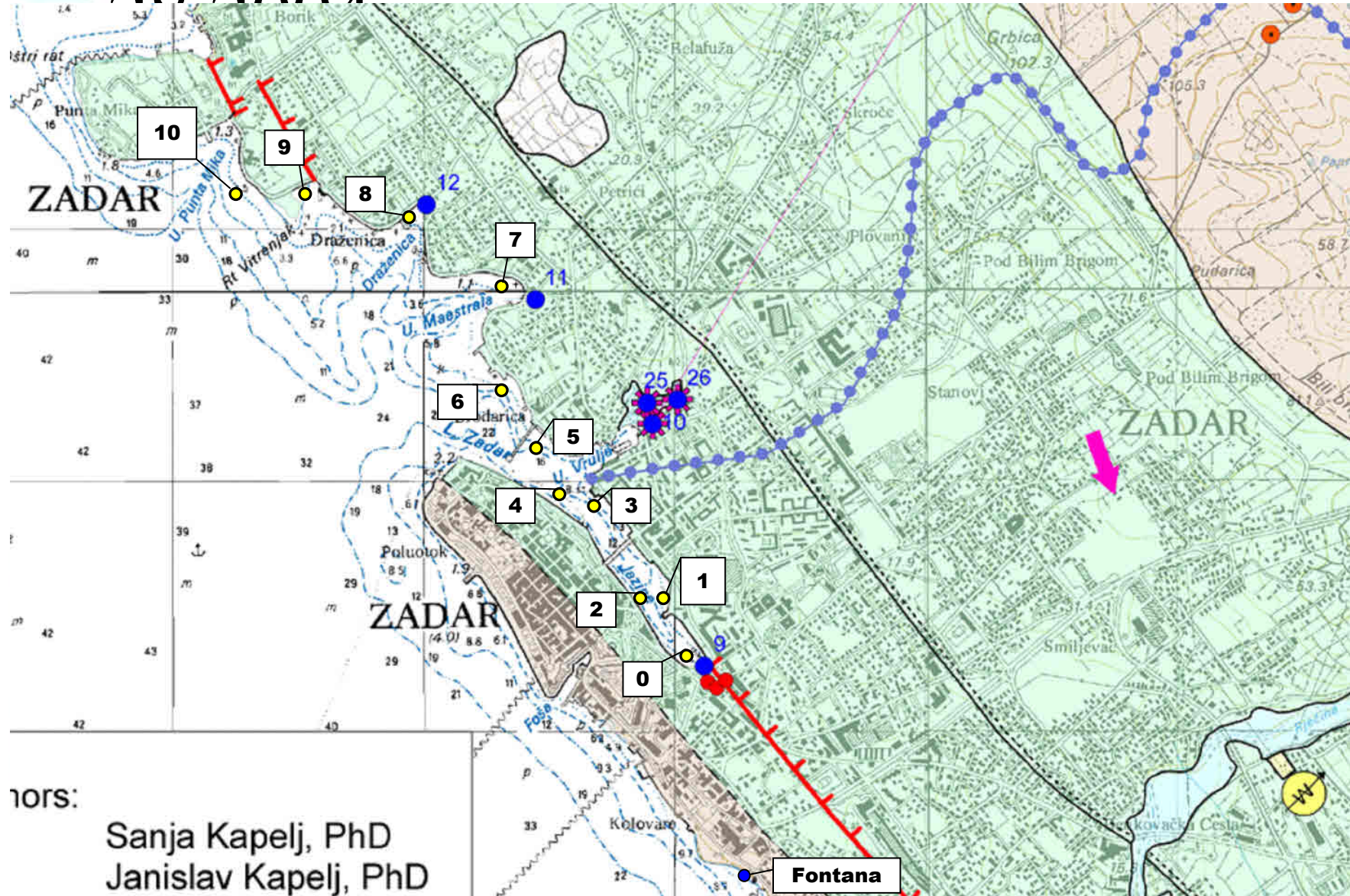


Figure 4. Levels of PCBs in passive air filters obtained after 5 consecutive passive air samplings around E.T.S. Zadar from July to November 2004

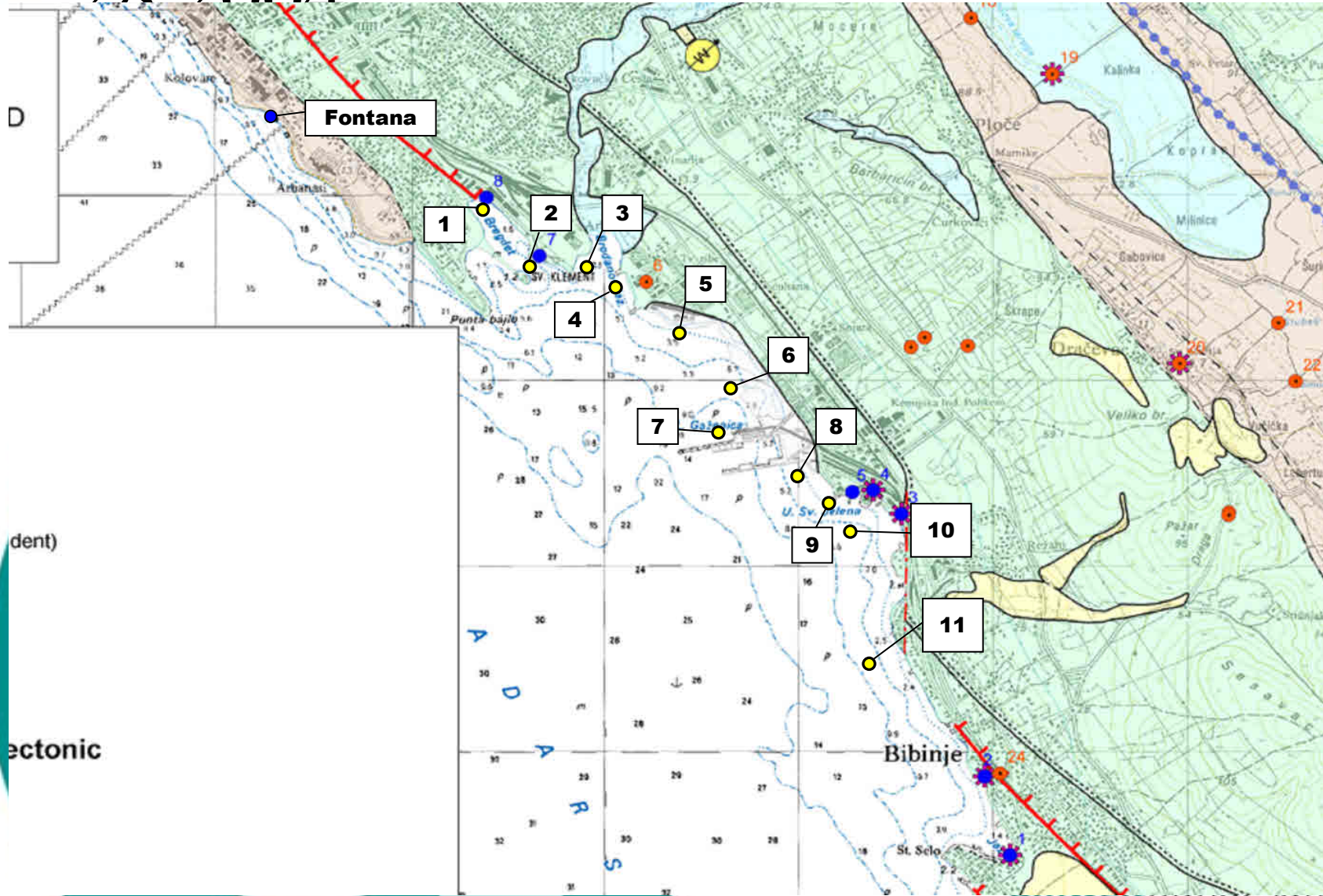
Zadar sediment sampling April 27-



10RS:

Sanja Kapelj, PhD
Janislav Kapelj, PhD

Zadar sediment sampling April 27-28 2004



Zadar sediment sampling

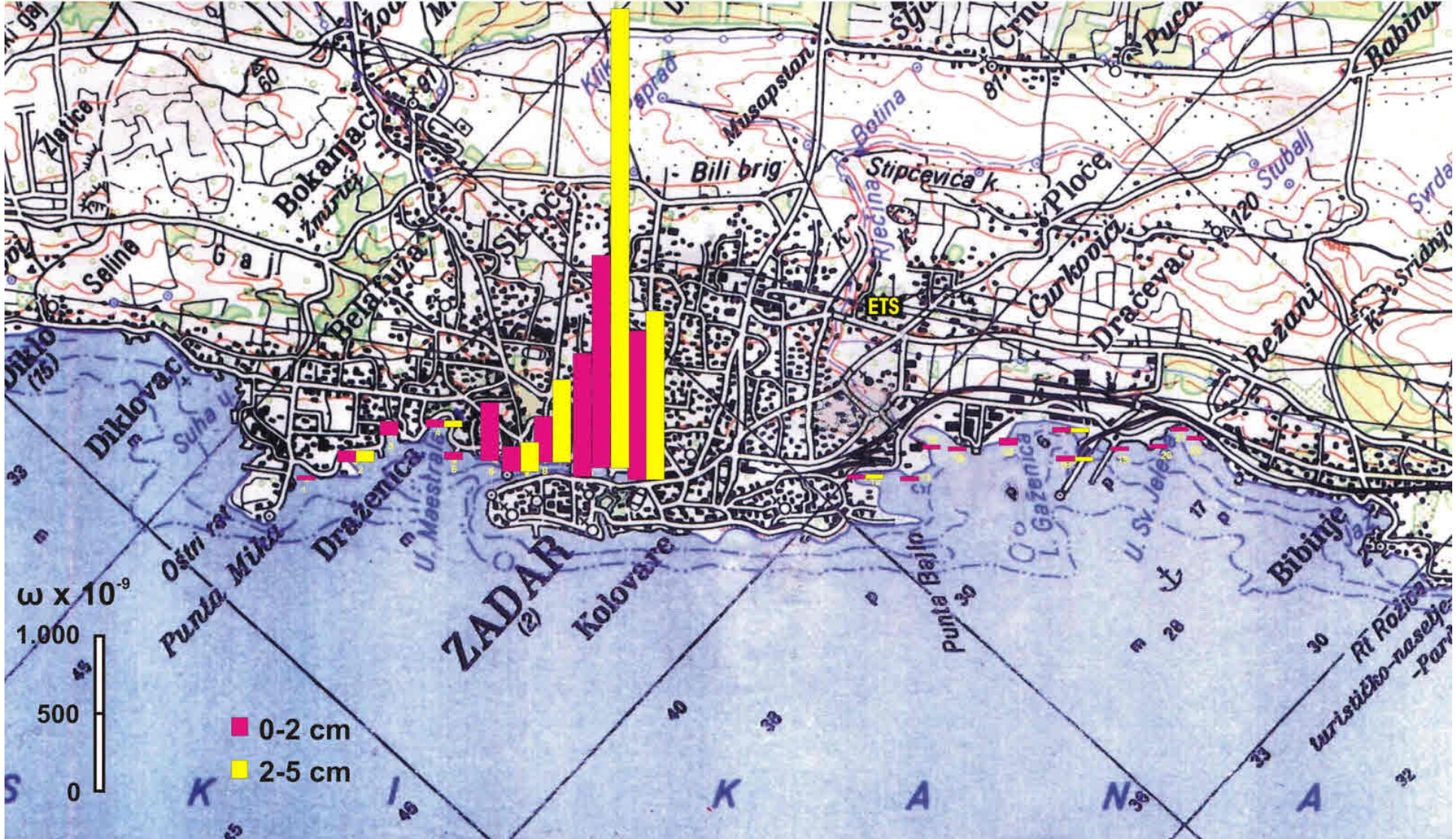


| Folie 13



Zadar harbour fishing





Zadar harbour sediment tractions, Jazine Veslacki Klub, Aug. 6th

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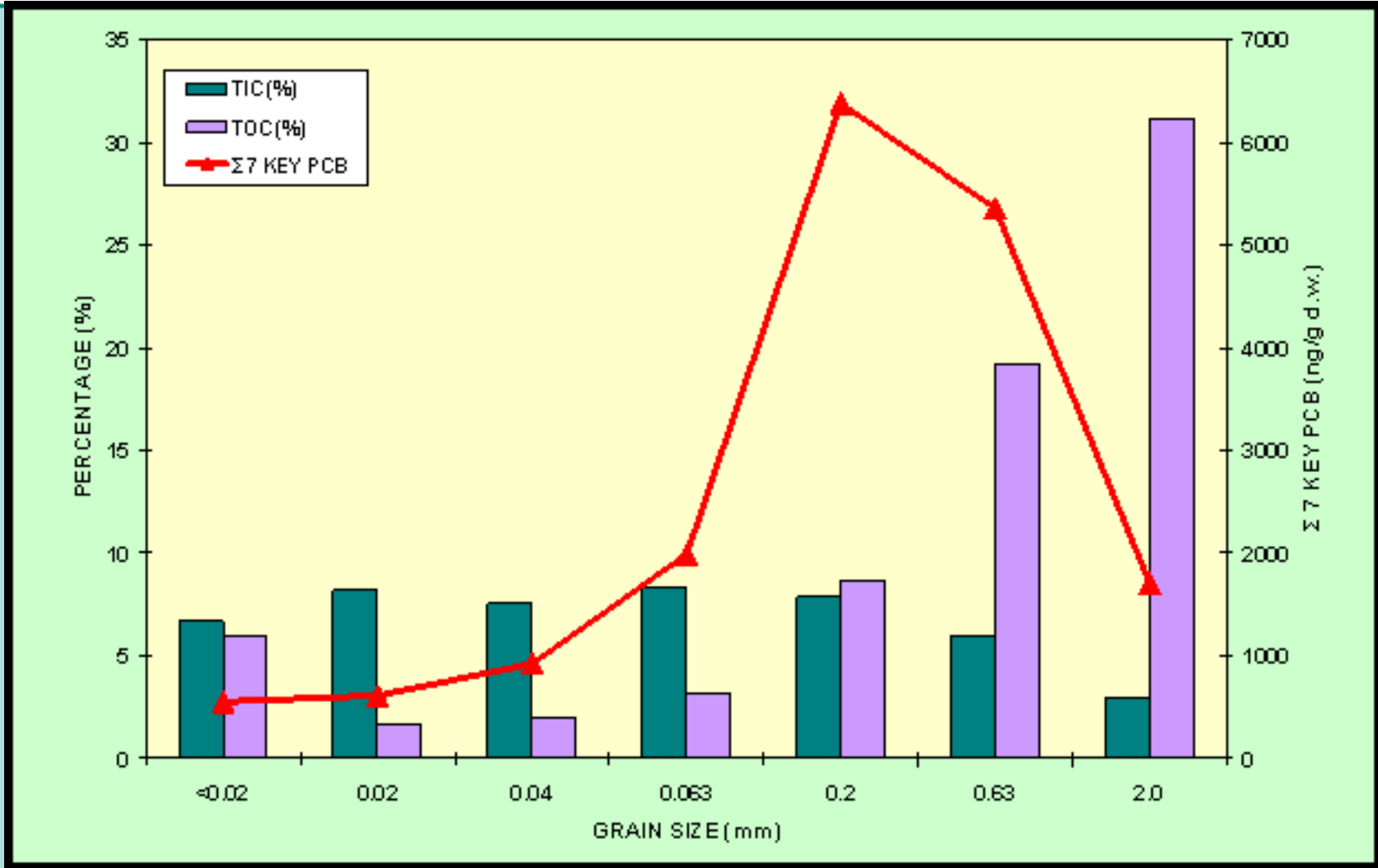


| Folie 16



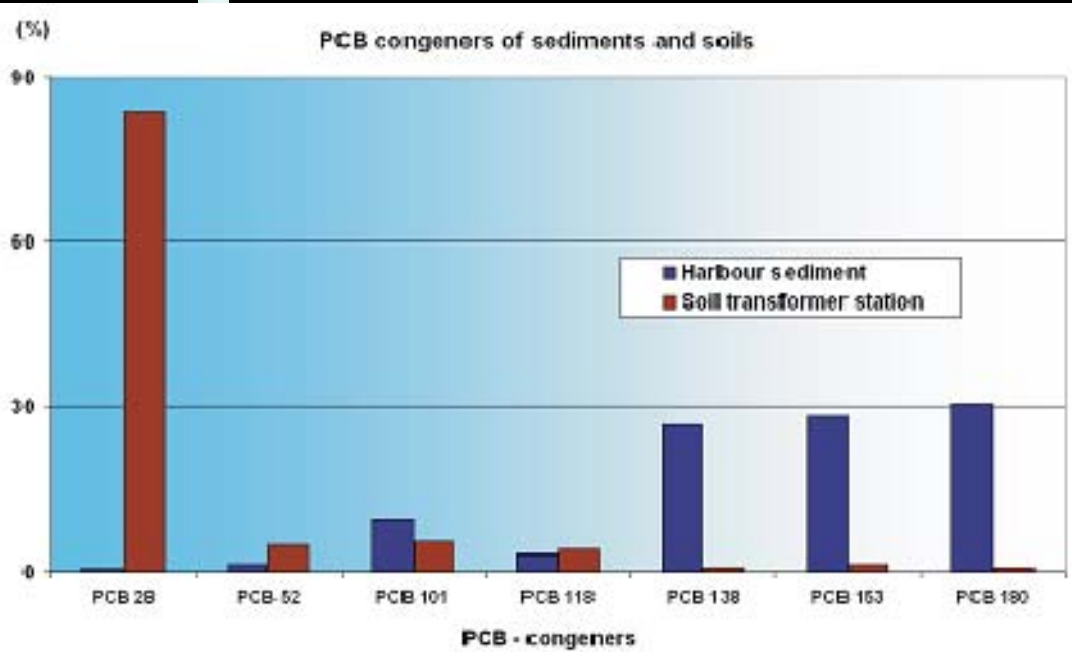
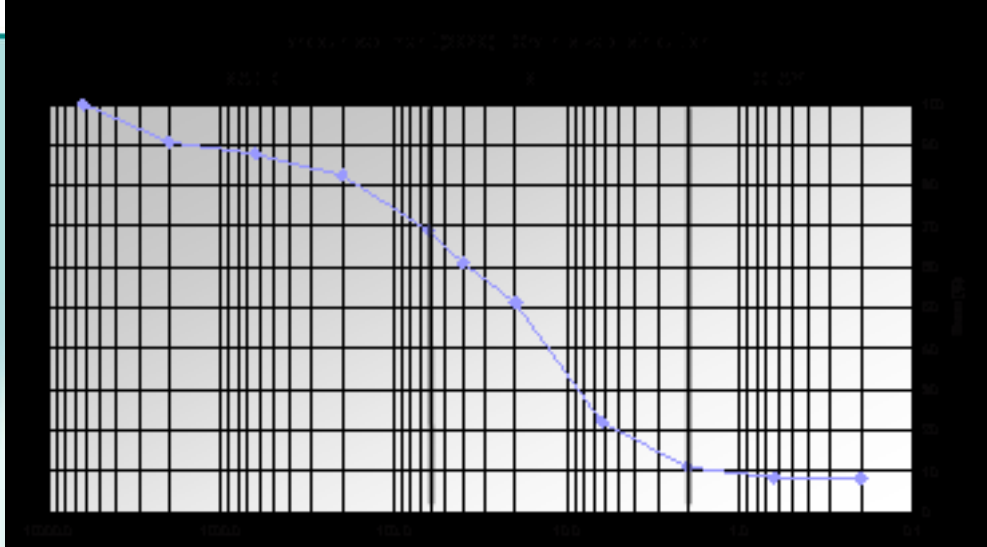
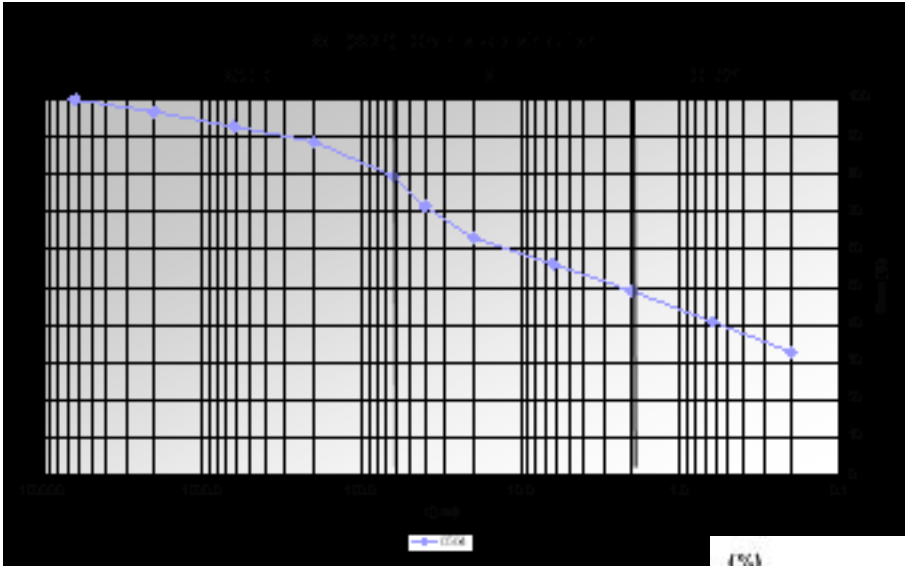
Zadar harbour sediment fractions, Jazine Veslacki Klub, Aug. 6th 2004







Comparison of grain-size and congener patterns of ETS soils and harbour sediments, Zadar





Zadar Marina and harbour (Jazine) sediment

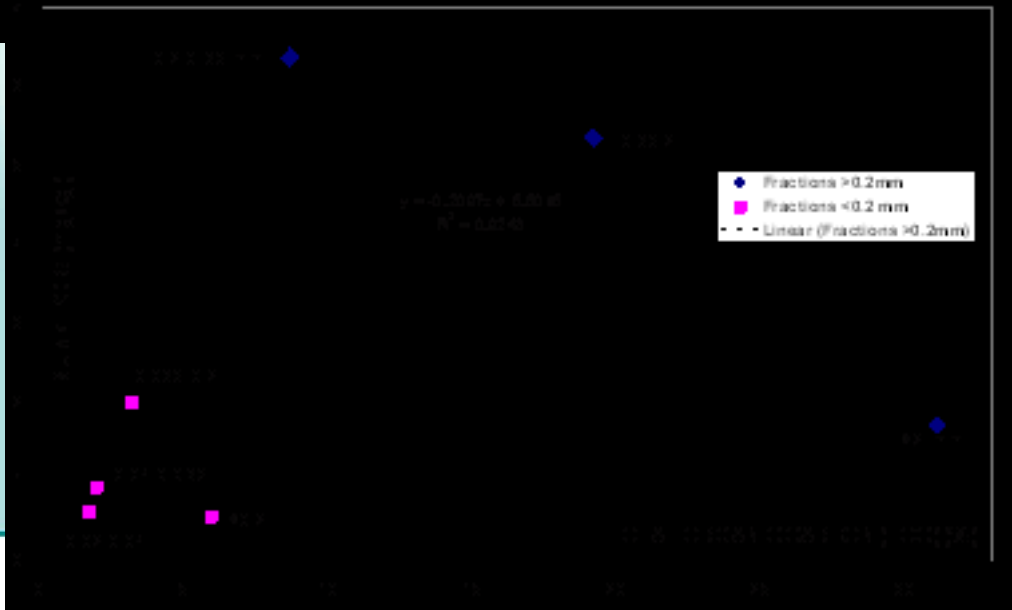
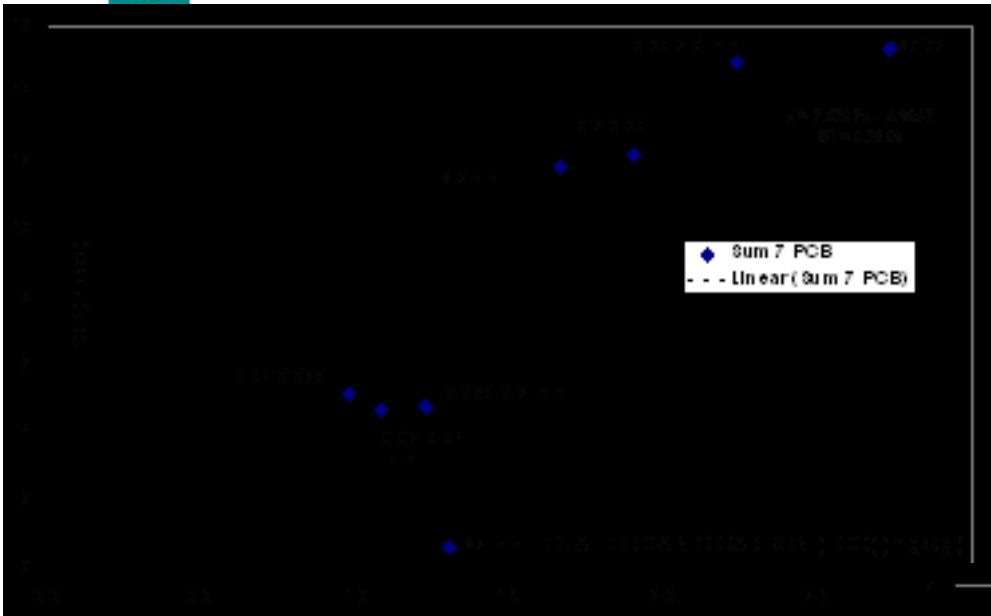
SUM 7 KEY-PCBs (mg/kg)

- ◆ Sediments, Jazine 04
- Sediments Marina 03
- Exponentiell (Sediments, Jazine 04)



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Zadar harbour , Jazine Veslacki Klub, Aug. 6th 2004, 14:00H



Zadar Old Textile factory TIZ



Figure 5. Parcel on which the factory

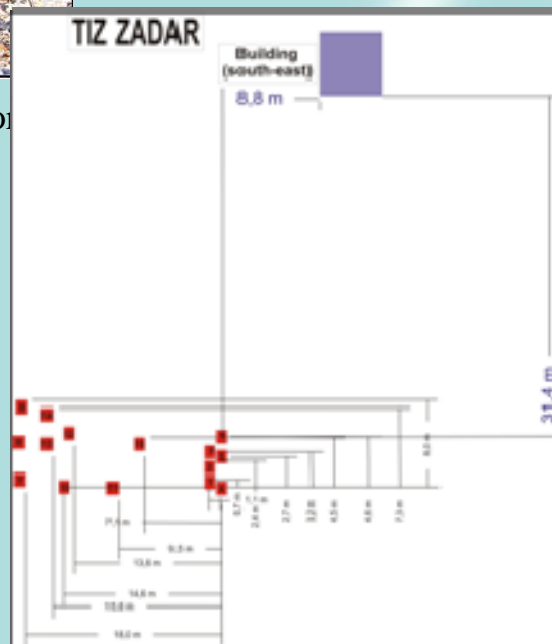


Figure 6. Position of sampling points inside TIZ building complex

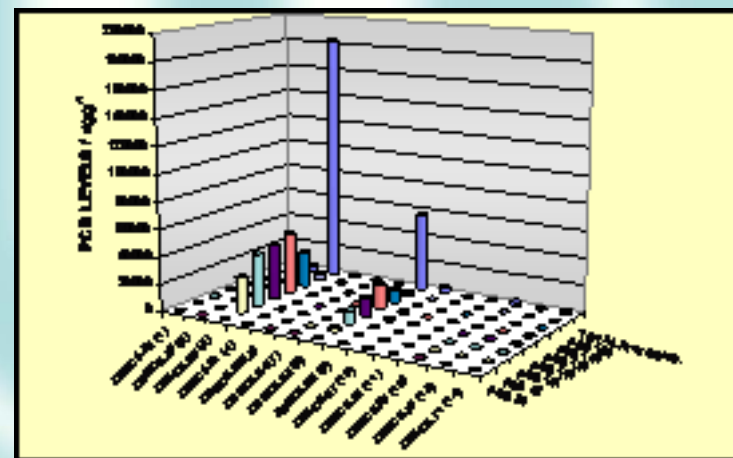


Figure 7. Levels of PCBs in soil samples collected at APOPSBATZ, M₂ Kralik 03.06.2005 | Folie 23 TIZ, 2005





Zadar (HR) PCB in soil and marine sediment samples

CONCLUSIONS

- **The correlation with the TOC is too weak to be the only explanation**
- **One possibility would be, that the PCBs are also adsorbed on clay minerals in the finer and on iron-oxide spherules or porous limestone fragments in the coarser fractions**
- **The light PCBs seem to have been enriched in the soil, whereas the marine sediments show an enrichment in the heavy PCBs suggesting different sources or different bio-degradation mechanisms.**

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Zadar (HR) PCB in soil and marine sediment samples

CONCLUSIONS

- **PCBs are enriched in fish caught in the harbour basin only**
- **PCBs are a common contamination in harbour basins and may also originate from old painting of ships**



Thank you for your attention!

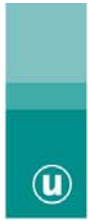


| Folie 26



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Publications

PICER, M.; PICER, N.; T. KOVAČ, V.; CENCIC KODBA, Z. & KRALIK, M. (2003): PCB-contamination in soils of the electrotransformer station in Zadar as consequence of oil spills during war action (Croatia). In: Kralik, M.; Häusler, H. & Kolesar, C. (eds.): Abstracts of the 1st conference of Applied Environmental Geology in Central and Eastern Europe. 7-10th Oct. 2003, Rep. 228, 190-191, Federal Environment Agency, Vienna.

HASLINGER, E.; KRALIK, M.; PICER, M.; PICER, N.; OTTNER, F. & CENCIE KODBA, Z. (2005): PCB-contamination in "Terra Rossa" soil samples of an electro transformer station in Zadar as consequence of oil spills during war action (Croatia). Abstr. Soil indicators – Annual Meeting Austrian Soil Sci. Soc., May 12 & 13th, Ljubljana, p. 34-35, Inst. f. Bodenforsch., Univ. f. Bodenkultur, Wien.

Planned publication:

- 1. PCB distribution in "Terra Rossa" type soil of ETS Zadar**
- 2. PCB distribution in marine harbour sediments of Zadar**
- 3. Together with S. Kapelj "PCB-groundwater vulnerability" in the Zadar area**

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