



30 Years of Soil Monitoring by the Bavarian Environment Agency

Results and Experiences



Structure

- 1) Soil monitoring in Bavaria: structure and basis data**

- 2) Soil monitoring by the Bavarian Environment Agency (LfU):**
 - a) Basis data**
 - b) Results: lead, nickel and PFOA**
 - c) Conclusions inclusive experiences**

Soil Monitoring in Bavaria: Structure



Soil Monitoring in Bavaria – basic data



Bavarian State Institute of Forestry

77 plots under forestry



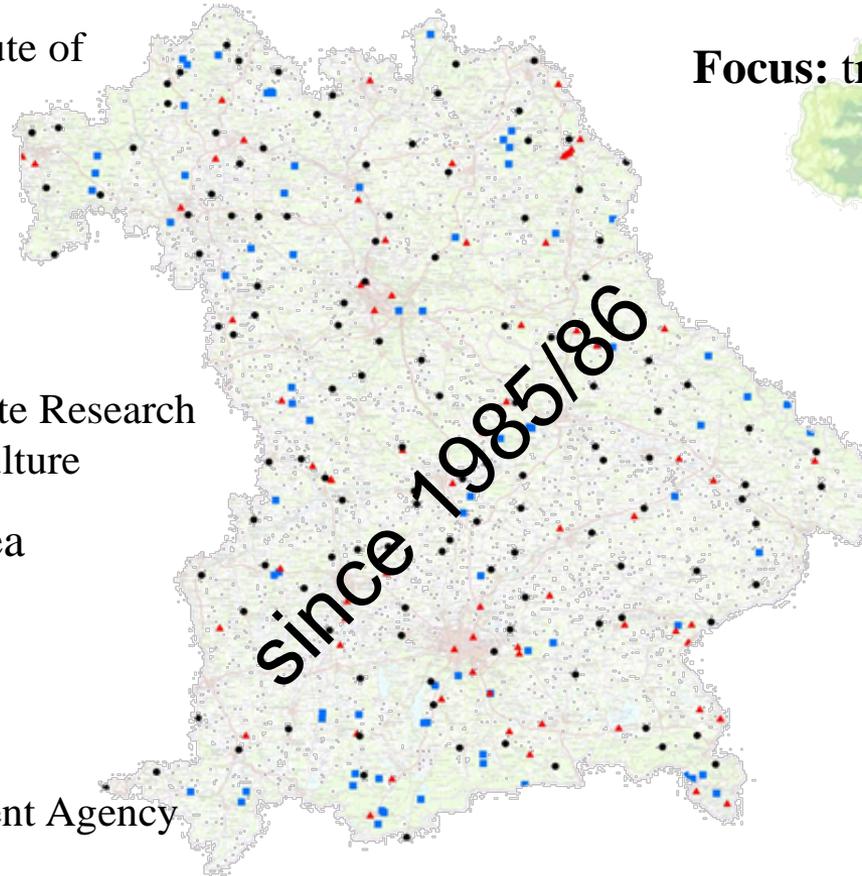
The Bavarian State Research Center for Agriculture

121 sites on agricultural area



Bavarian Environment Agency

60 plots on special sites, e.g. nature reserve, 8 plots for observation of radioactivity

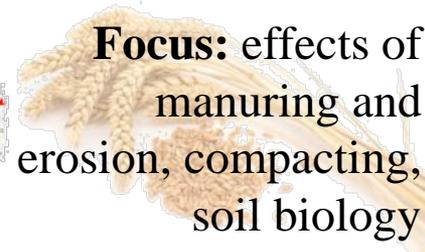


- The Bavarian State Research Center for Agriculture (LfL)
- Bavarian Environment Agency (LfU)
- Bavarian State Institute of Forestry (LWF)

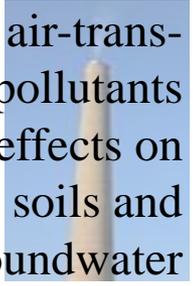
Focus: tree growth and health, forest decline



Focus: effects of manuring and erosion, compacting, soil biology



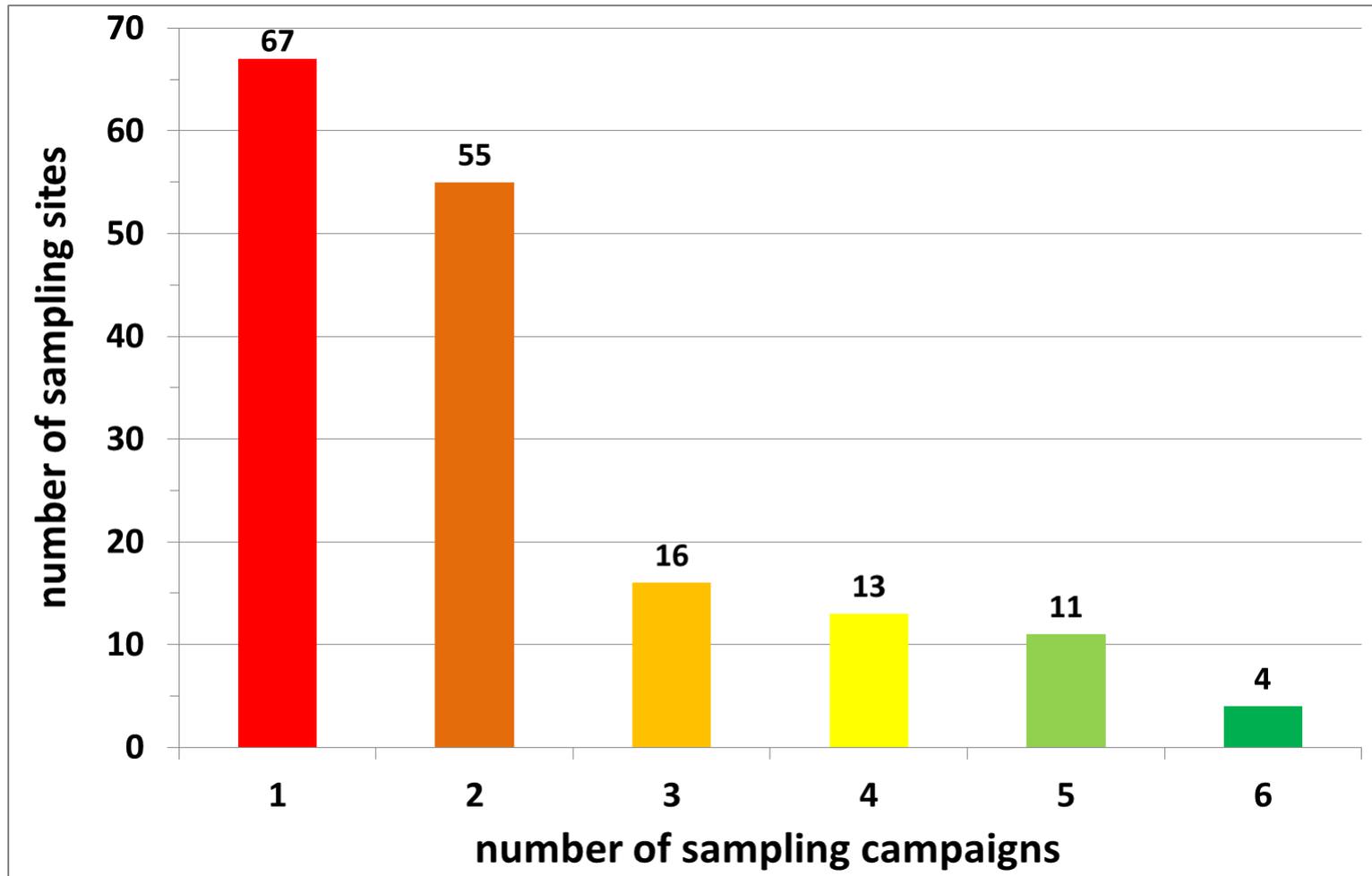
Focus: air-trans-ported pollutants and effects on natural soils and groundwater



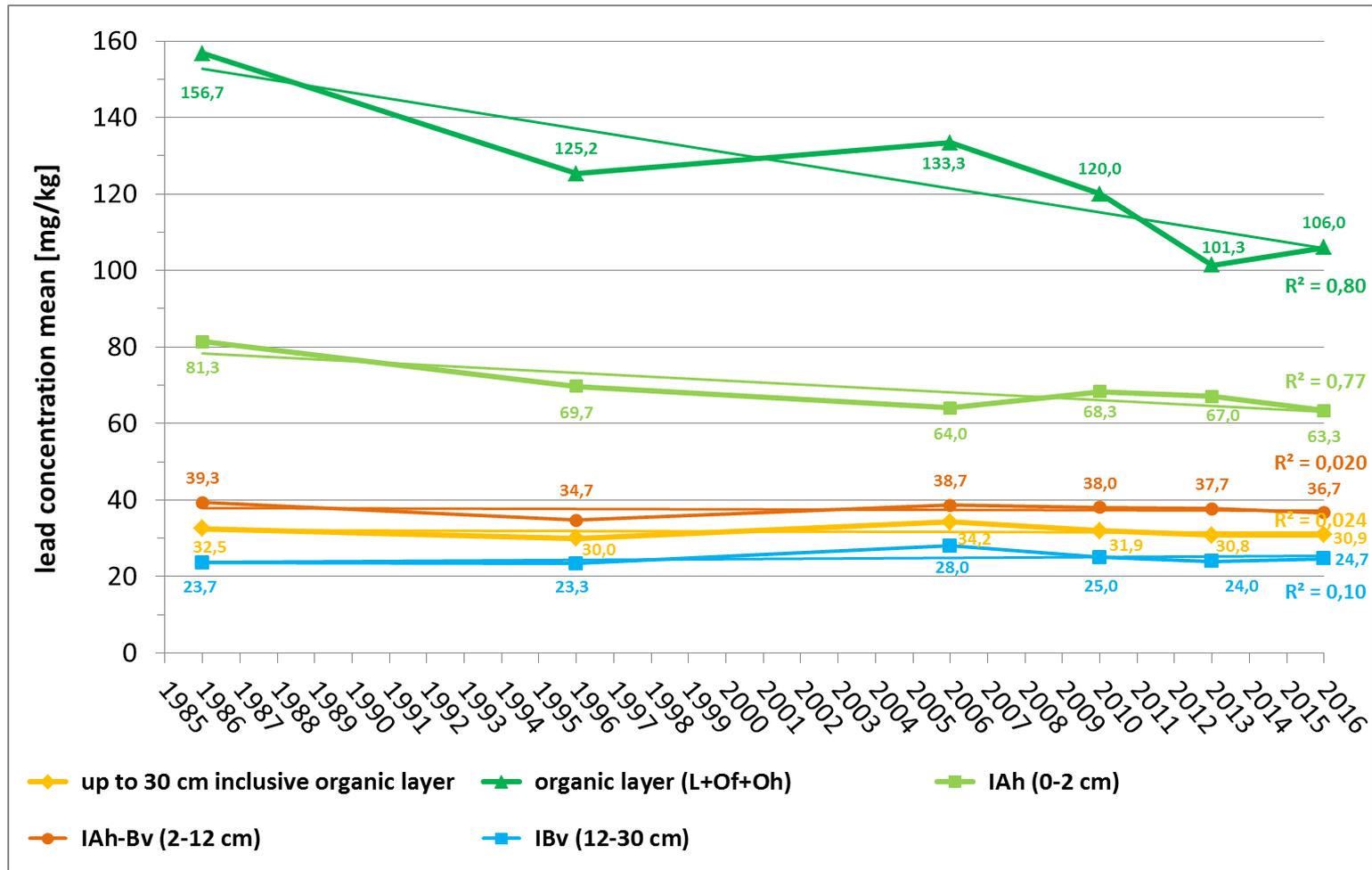
Soil monitoring by the Bavarian Environment Agency: Basic data

- **two rotating sampling axes (3 mixed samples per horizon) on an area of 50 x 50 m**
- **since 1986 sampling decennial → most sites being sampled twice after 25 years**
- **since 2010 13 focus-sites:**
 - **sampling every three years with a driving core tube (80 mm diameter)**
 - **up to 1 m depth**
- **chemical analysis methods corresponding to the german federal soil protection ordinance: organic carbon, nitrogen, pH, heavy metals, organic pollutants, ...**
- **sample-storage air dried and field fresh at -18° C**
- **3 facilities for monitoring climate change in the Alps since 2012**

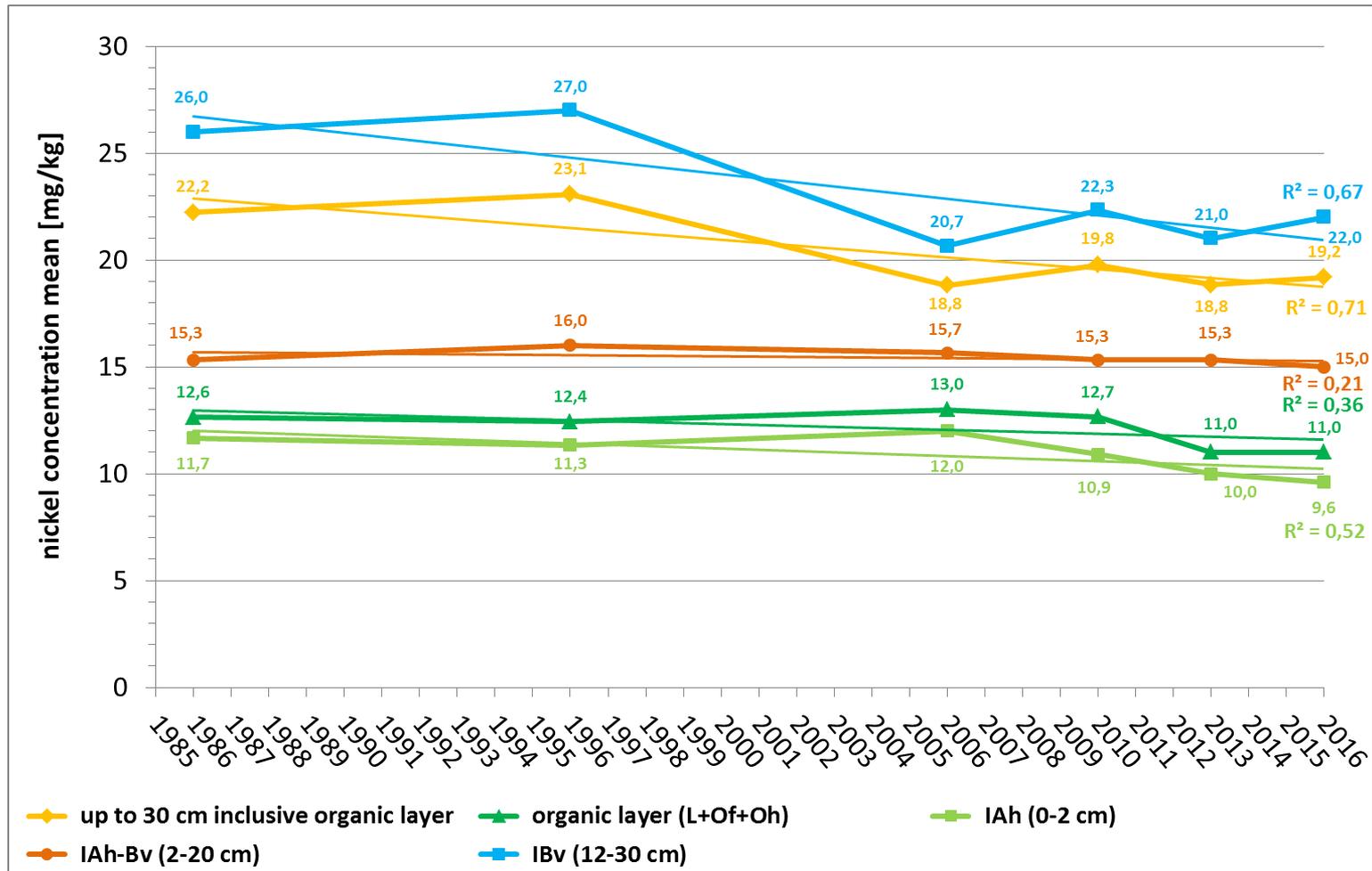
Evaluation: sampling of soils and their frequency problem



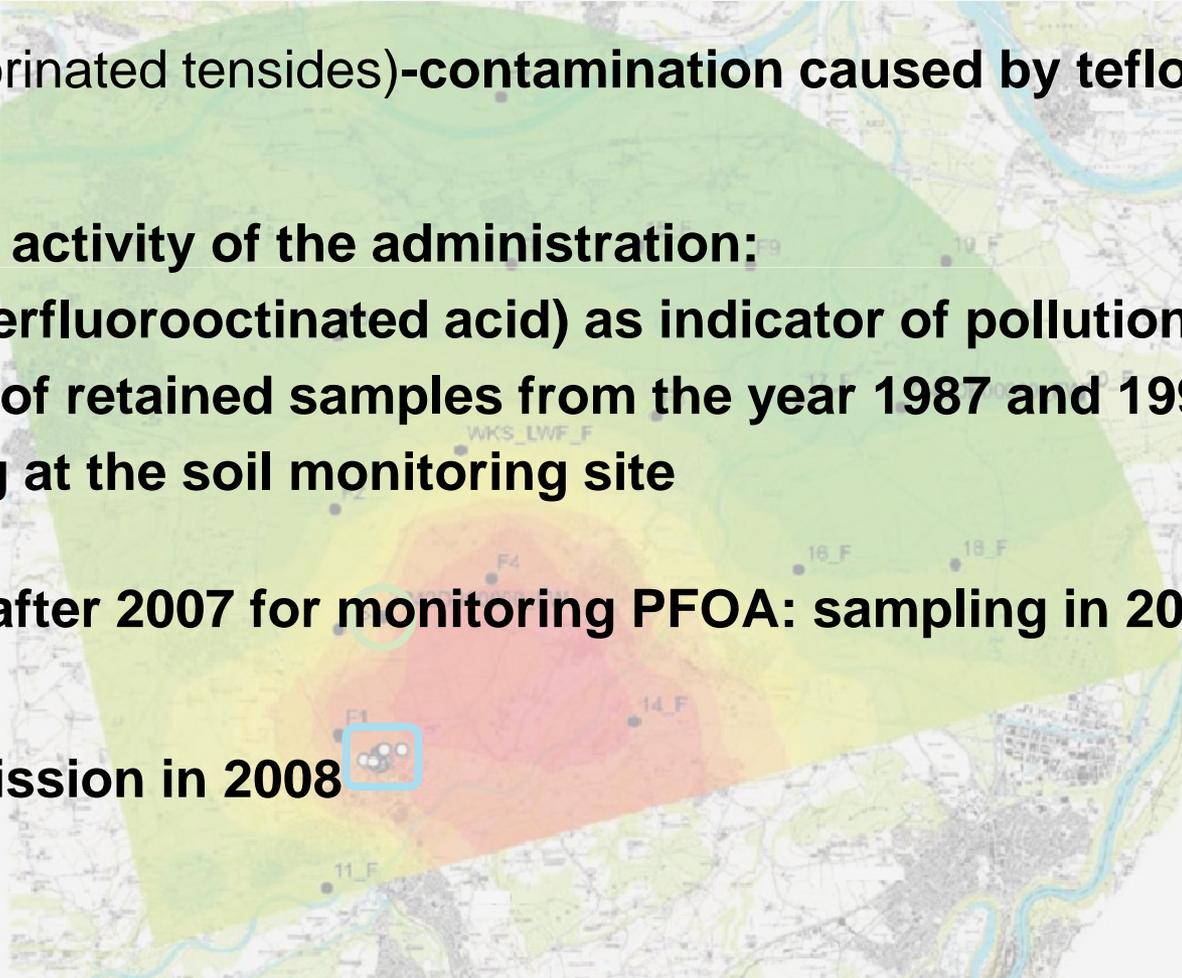
Results: Time series of lead on the site „Rehau“



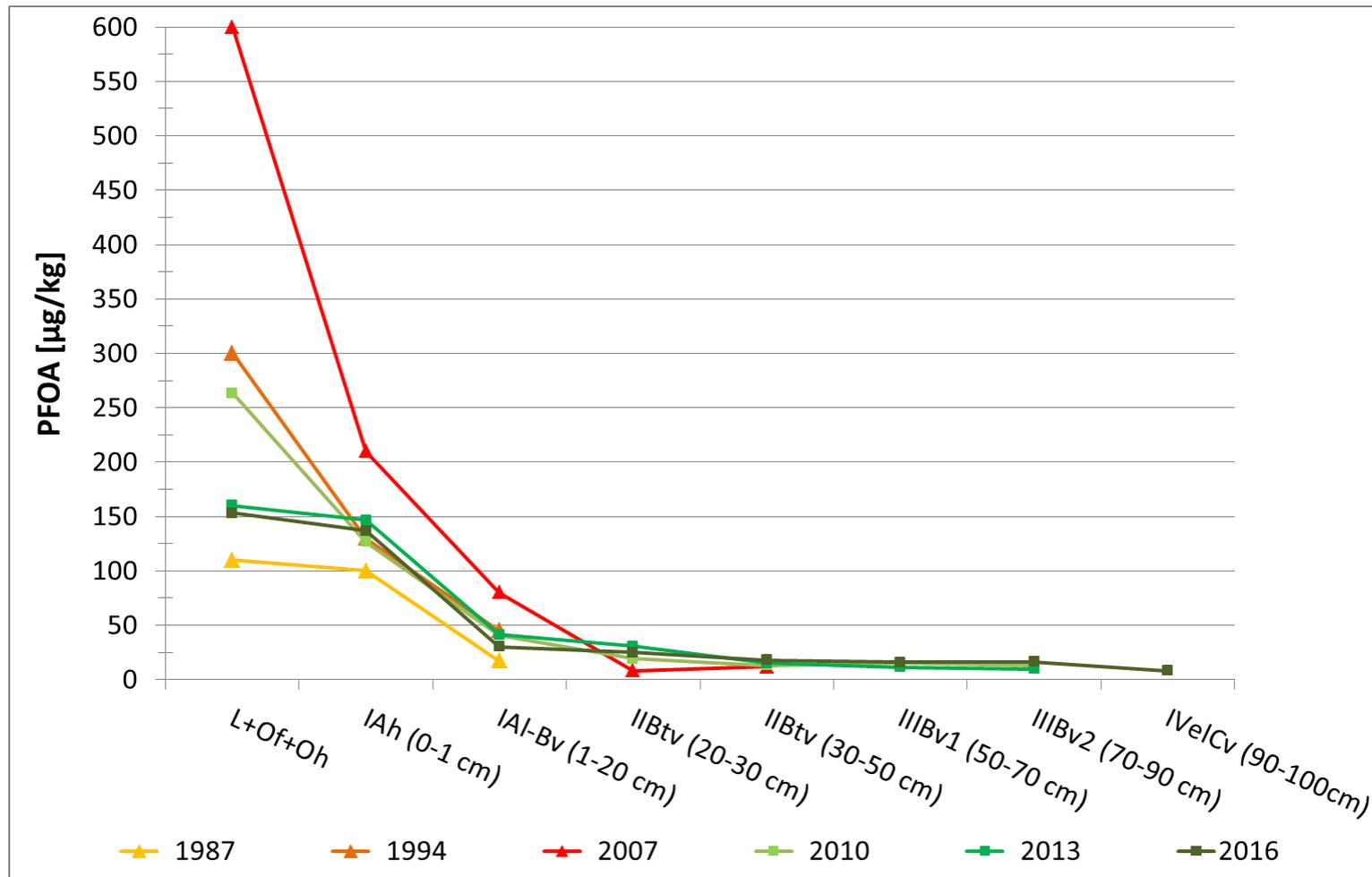
Results: Time series of nickel on the site „Rehau“



Results: evidence of PFT-contamination – basic conditions

- **PFT(perfluorinated tensides)-contamination caused by teflon production**
- **2007: main activity of the administration:**
 - **PFOA (perfluorooctinated acid) as indicator of pollution**
 - **analysis of retained samples from the year 1987 and 1994**
 - **sampling at the soil monitoring site**
- **focus site after 2007 for monitoring PFOA: sampling in 2010, 2013, 2016**
- **stop of emission in 2008** 

Results: evidence of PFT-contamination – time series



Conclusions and experiences

Soil monitoring is suitable for



effective operation of environmental legislation (lead decrease)

information about natural processes (nickel)

evidence of contamination (PFOA)

Provided:

time series are long enough, an often problem at the moment **yet**

for this purpose the alpha and omega is:
quality management and documentation

Conclusions

Haste makes waste!

There's still a lot of work to do.

Let's get started!

Thank you for your attention!

