

Nye metoder til analyse for PAH forbindelser i jord og sediment

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GANDALF

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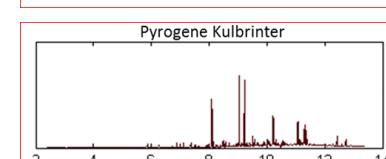
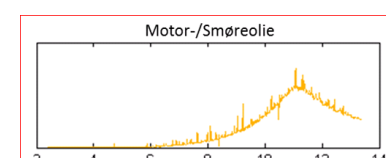
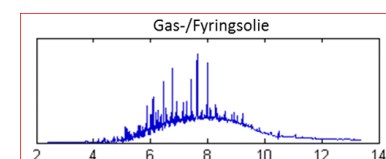
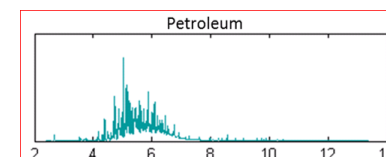
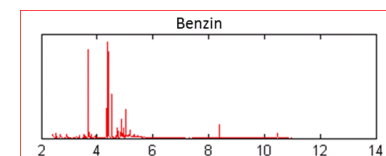
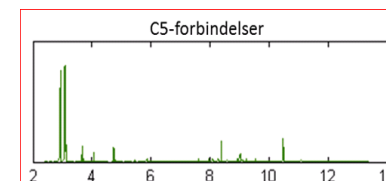
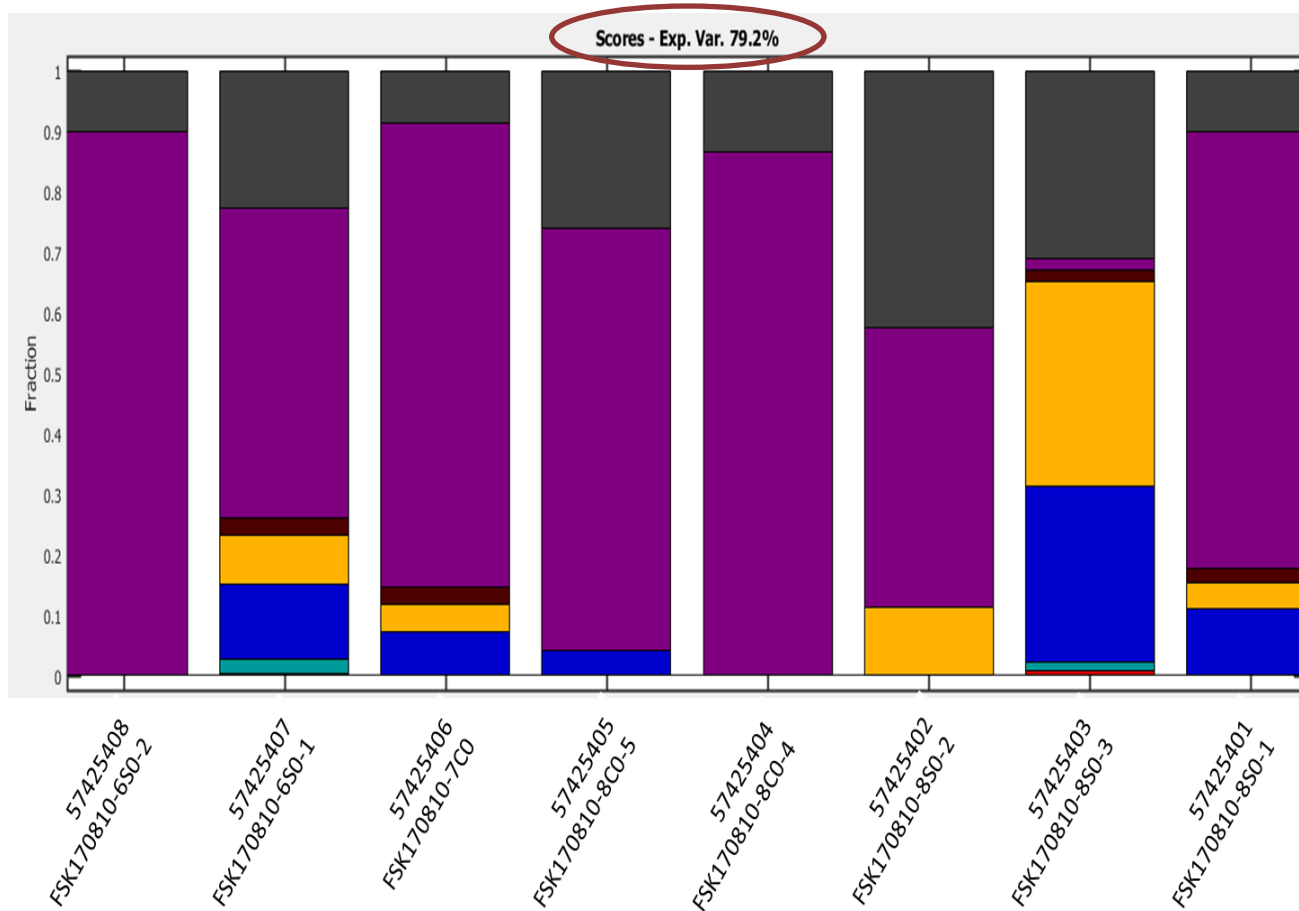
- Udvikling af metoder til Chemical Fingerprinting på jord- og sedimentprøver
- GIS Visualisering

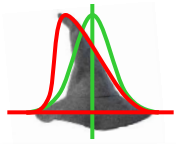
4 års projekt støttet af Innovationsfonden



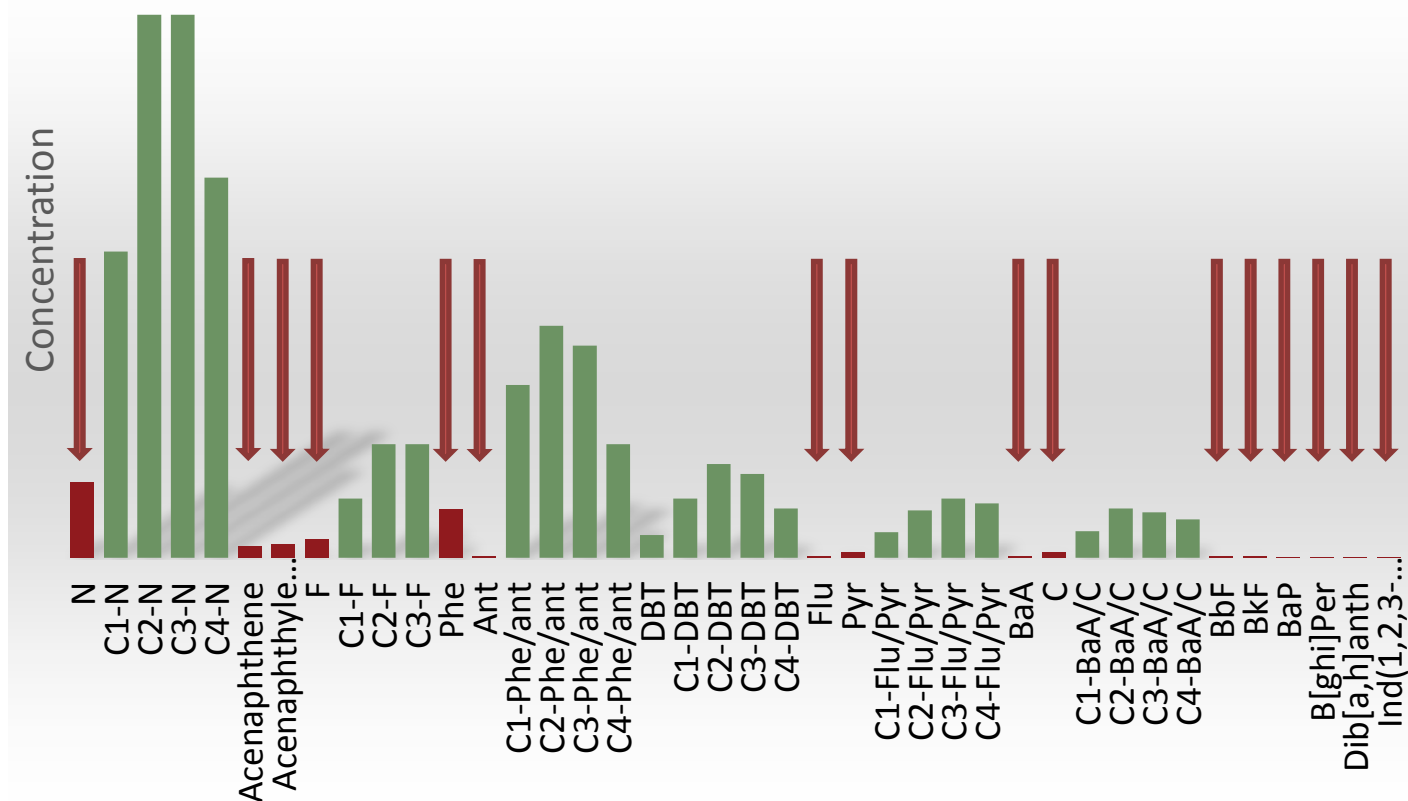
Sidste år: ChemfingSoil kildeopsplitning af kulbrinte-forureninger

ChemfingSoil, arketyper

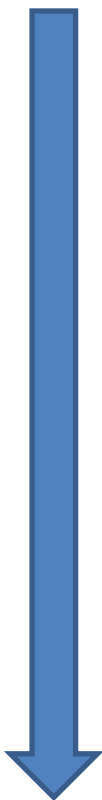




ChemFingSoil+ Metode til udvidelse af analyseomfanget for PAH'er



Historik for PAH kriterier:



1990: MST: Total forurening > 50 mg/kg: behov for vurdering af risici

1992: MST: Kriterium for "Total PAH" for rensat kulbrinteforurenet jord på 5 mg/kg

1993: MST: Jordkvalitetskriterium for kultjære: "Total PAH" 5 mg/kg og BaP 0,1 mg/kg

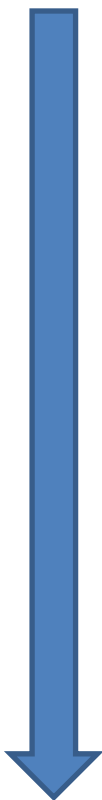
1995: MST: Toxikologiske jordkvalitetskriterier: "Total PAH" 5 mg/kg, BaP 0,1 mg/kg

1998: MST: Jordkvalitetskriterium; sum af 7 PAH'er + separat værdi for BaP og DBA

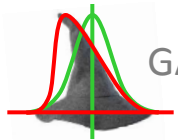


Fluoranthen,
Benzo(b)fluoranthen,
Benzo(j)fluoranthen,
Benzo(k)fluoranthen,
Benzo(a)pyren,*
Dibenz(a,h)anthracen* og
Indeno(1,2,3-cd)pyren

Analysemetoder for PAH:

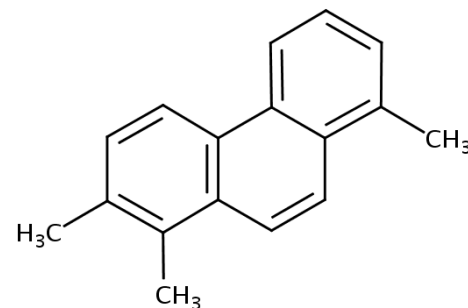
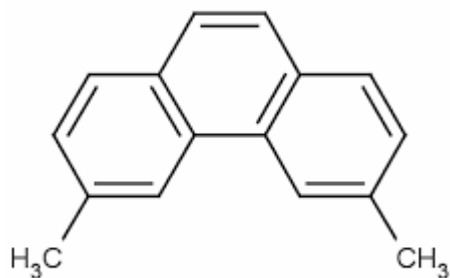
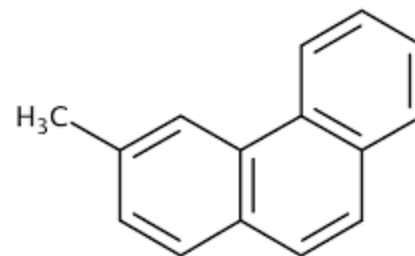
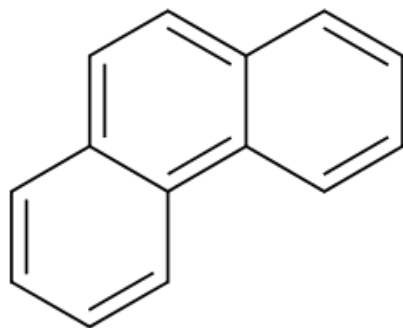


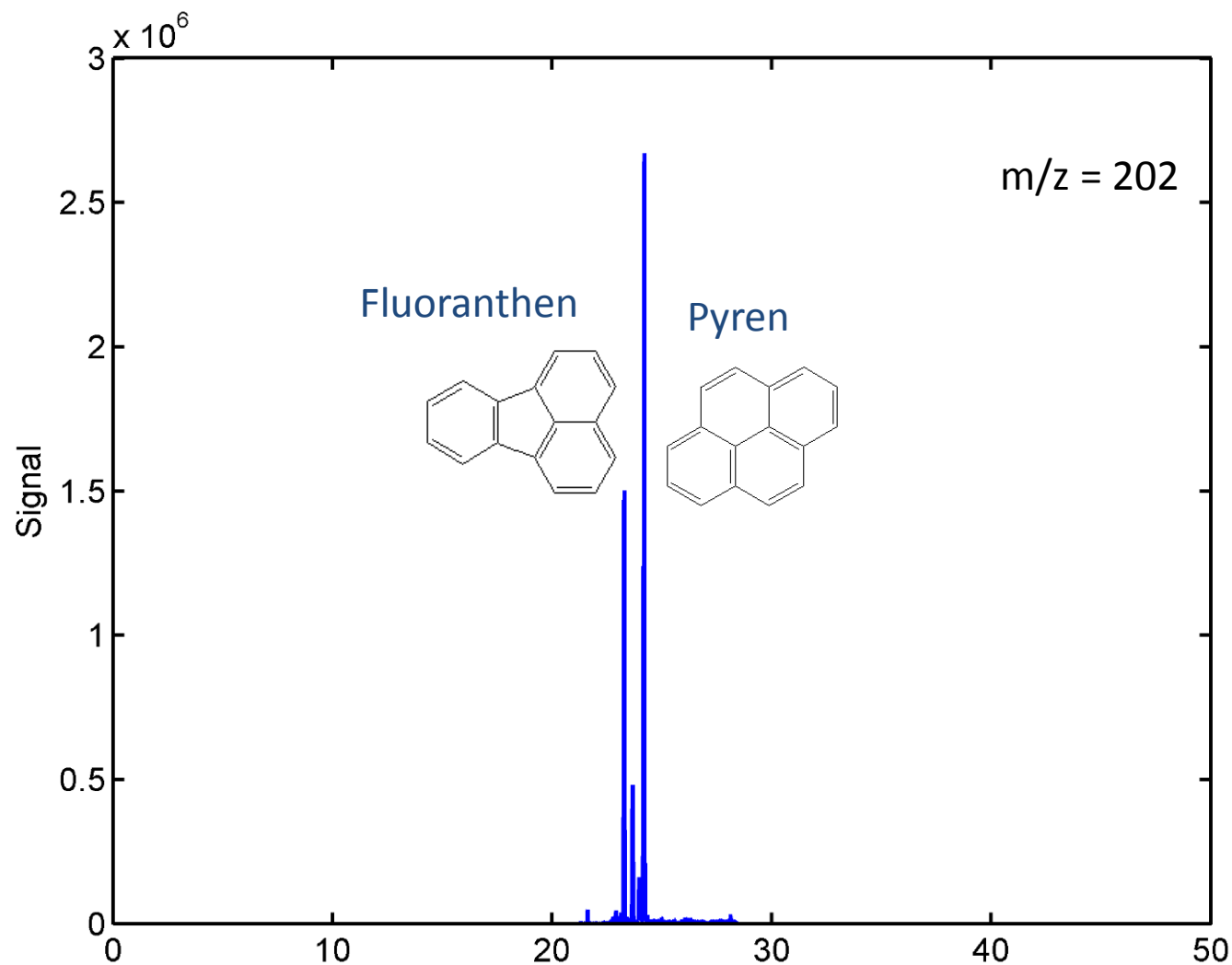
- 1980'erne: Flere metoder anvendt: GC-FID, Gravimetri, TLC og HPLC
Ofte analyse for udvalgte enkeltstoffer f.eks. 12 PAH herunder enkelte methylerede forbindelser
Kvantificering overfor tjærestandard eller modelstof
- Start 90'erne: Analyse for "Total tjære" + 6-7 PAH'er
- 1992: MST branchevejledning; Analyse for "Total tjære" + 8 PAH'er
- 1990'erne : 8-16 PAH'er ofte en del af analysepakkerne for tjære
- 1998: 7 PAH, sum + BaP og DBA

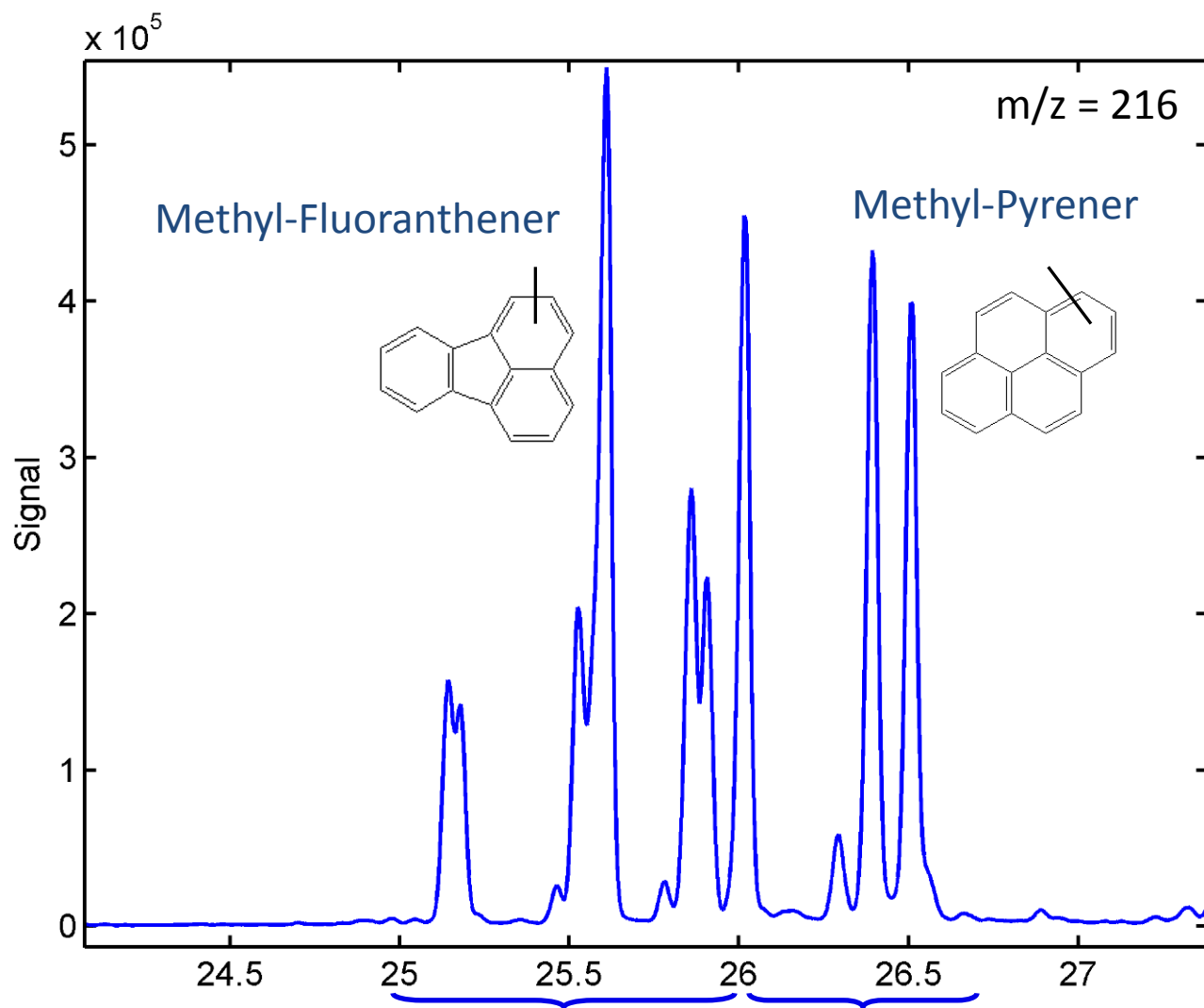


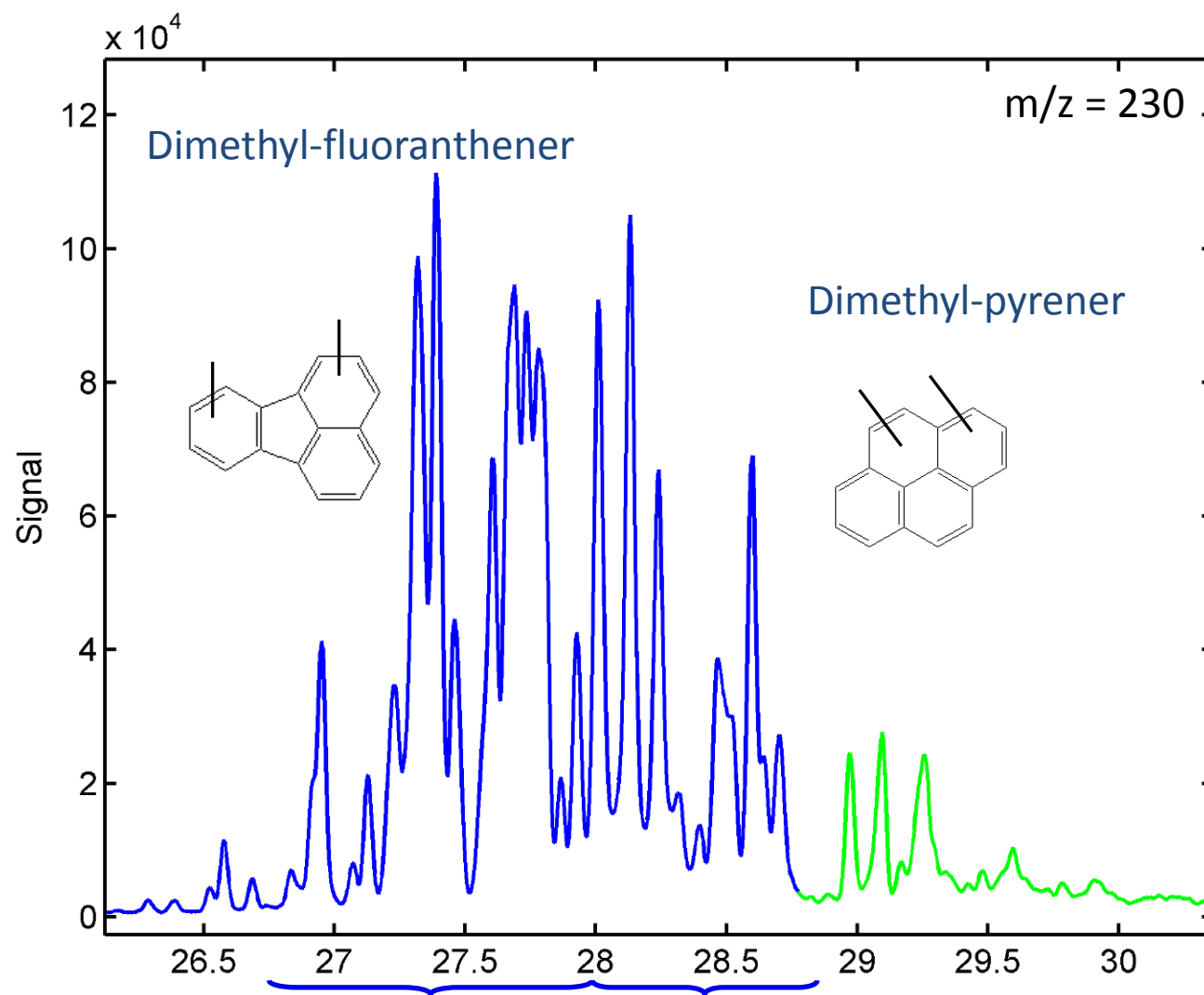
Methylerede PAH forbindelser

Phenantren + C1-, C2- og C3 methylerede-phenantrener

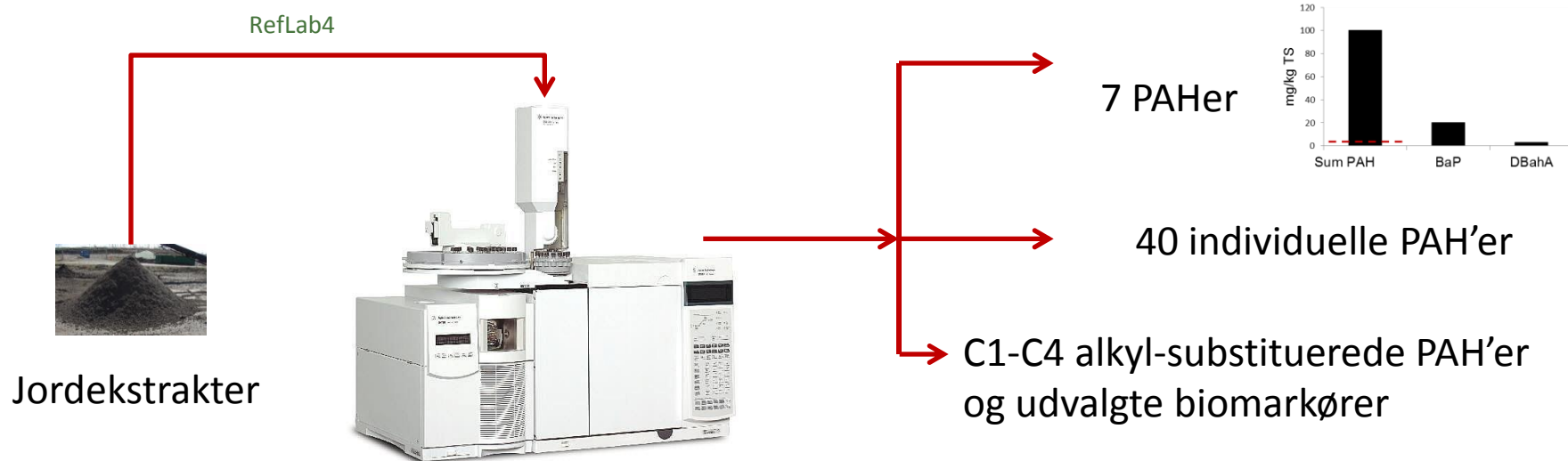






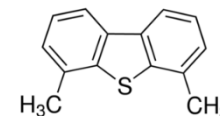


ChemFingSOIL+: metode, instrumentering og parametre



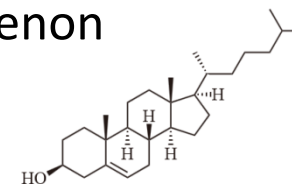
Alkylerede PAH'er:

- C1-C3(4) alkylerede naphtalener, fluorener, phenantrener, chrysener, pyrener og dibenzothiophener

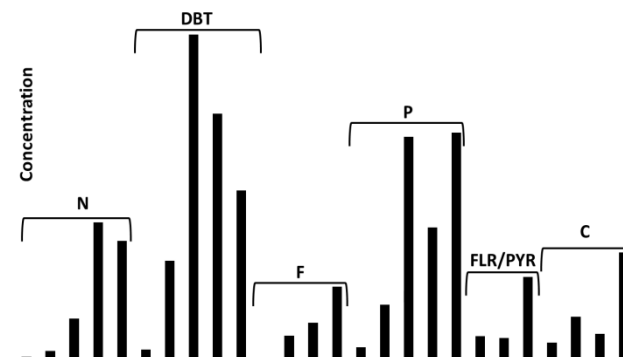
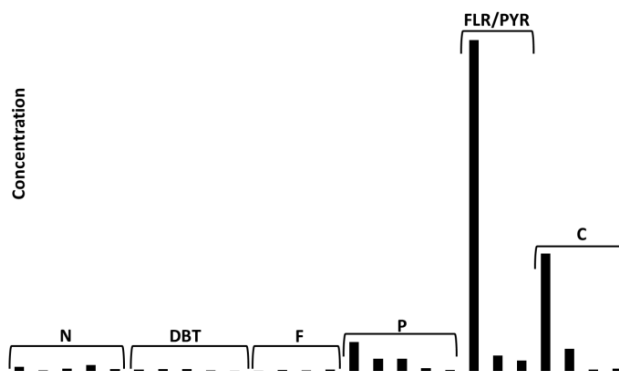
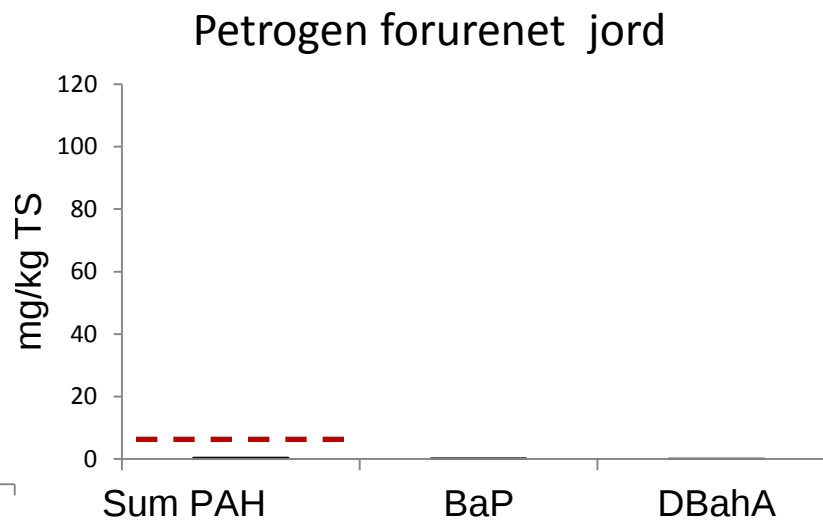
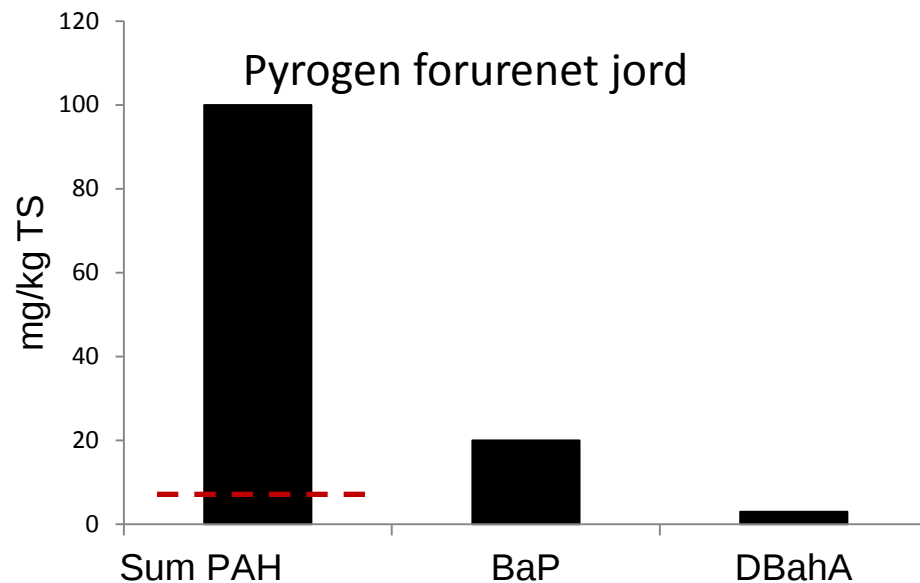


Biomarkører:

- Phytosteroler: Sitosterol, campesterol, stigmasterol, sitostenon
- Langkædede ulige n-alkaner



Pyrogene og petrogene kulbrinte kilder



Udvidelse fra 7 til 16 EPA PAH'er:

Naphthalen	mg/kg ts.	1,2
Acenaphthylen	mg/kg ts.	0,55
Acenaphthen	mg/kg ts.	3,5
Fluoren	mg/kg ts.	4,4
Phenanthren	mg/kg ts.	12
Anthracen	mg/kg ts.	3,2
Fluoranthen	mg/kg ts.	8,6
Pyren	mg/kg ts.	8,6
Benzo(a)anthracen	mg/kg ts.	1,4
Chrysen/ Triphenylen	mg/kg ts.	1,5
Benzo(b+j+k)fluoranthen	mg/kg ts.	3,9
Benzo(a)pyren	mg/kg ts.	2,1
Indeno(1,2,3-cd)pyren	mg/kg ts.	2,3
Dibenzo(a,h)anthracen	mg/kg ts.	0,61
Benzo(g,h,i)perylene	mg/kg ts.	2,7
Sum PAH (16 EPA)	mg/kg ts.	57
Sum PAH (st pakke)	mg/kg ts.	17

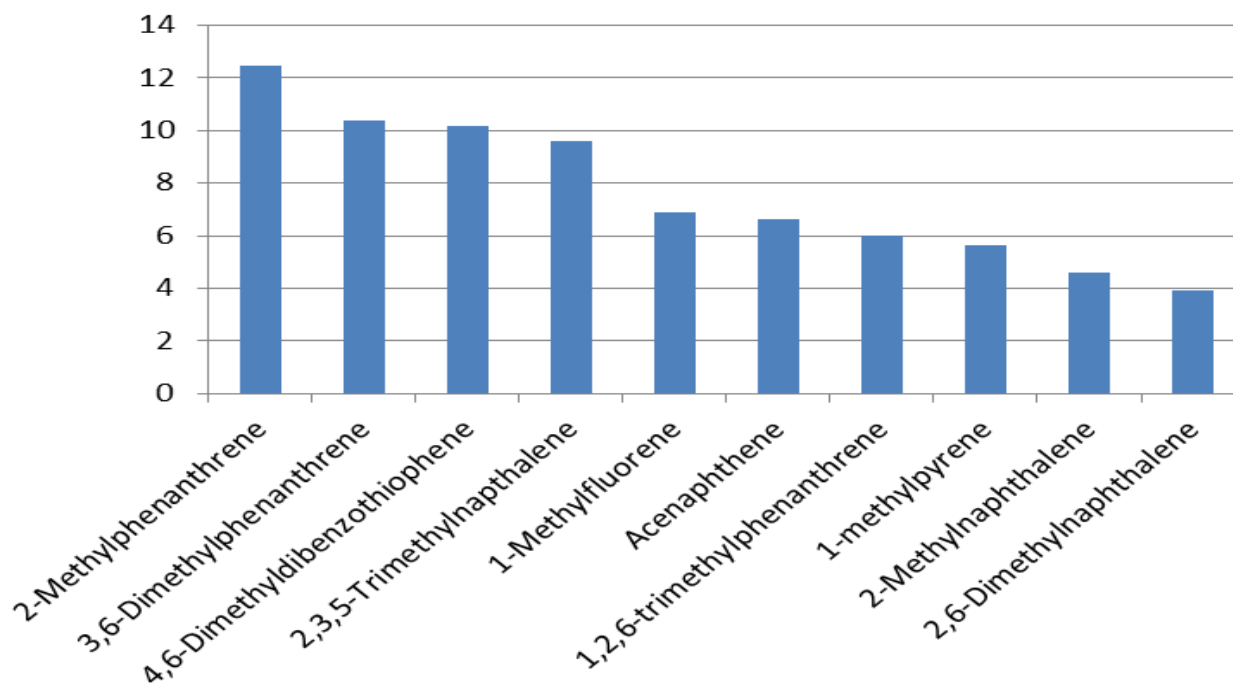
Tabel: PAH'er i prøve med størst Σ PAH

Udvalgte eksempler; PAH resultater (mg/kgTS)

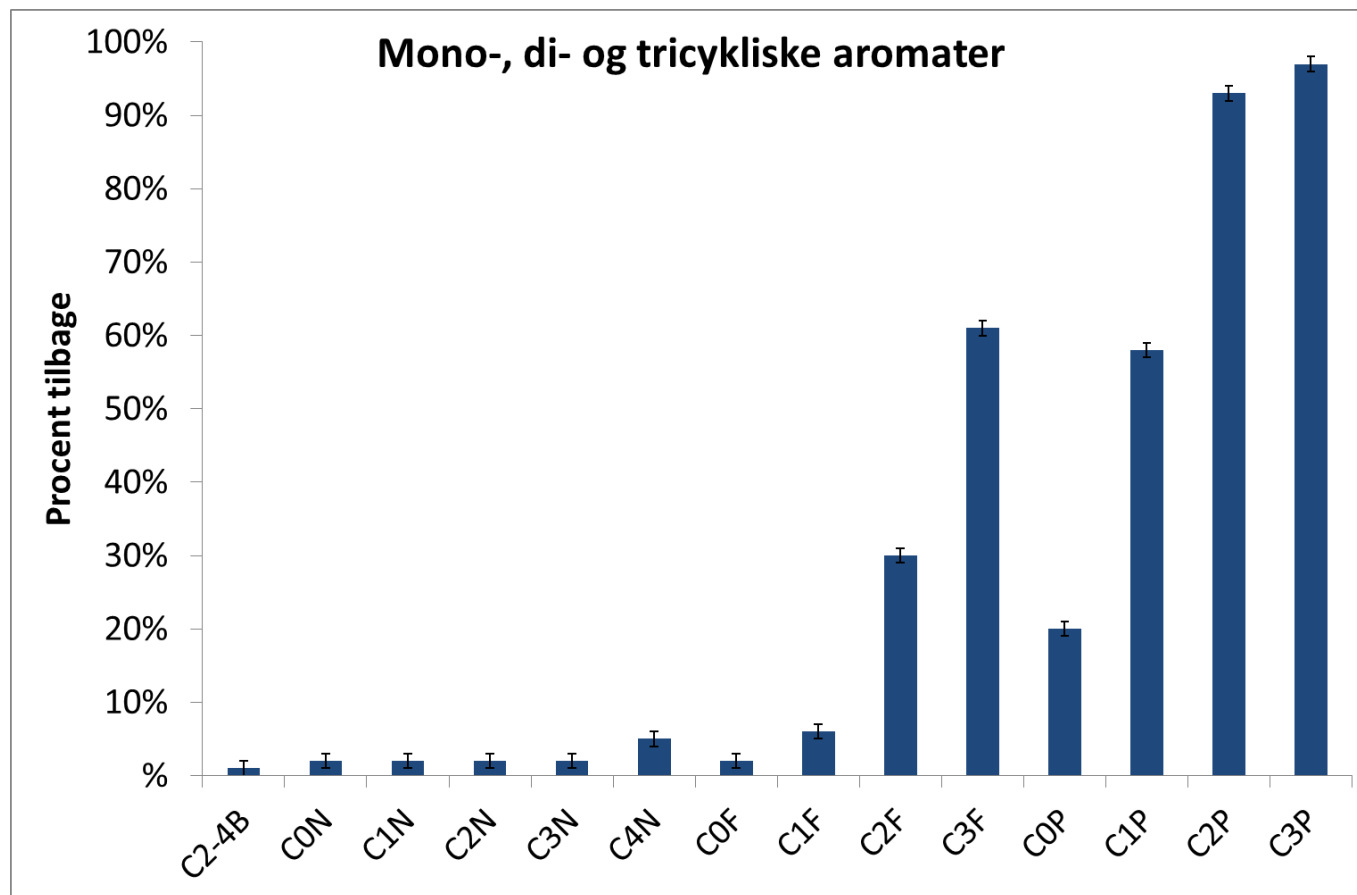
	Fæstningskanalen (fersk sediment)	Utterslev Mose (fersk sediment)	Ældre industri- grund
SUM PAH Chemfing,	120	8,1	5,4
SUM 16 PAH	31	2,8	1,8
SUM 7 PAH	18	2,7	1,2

Fæstningskanalen

Dominerende PAH forbindelser udenfor PAH 7

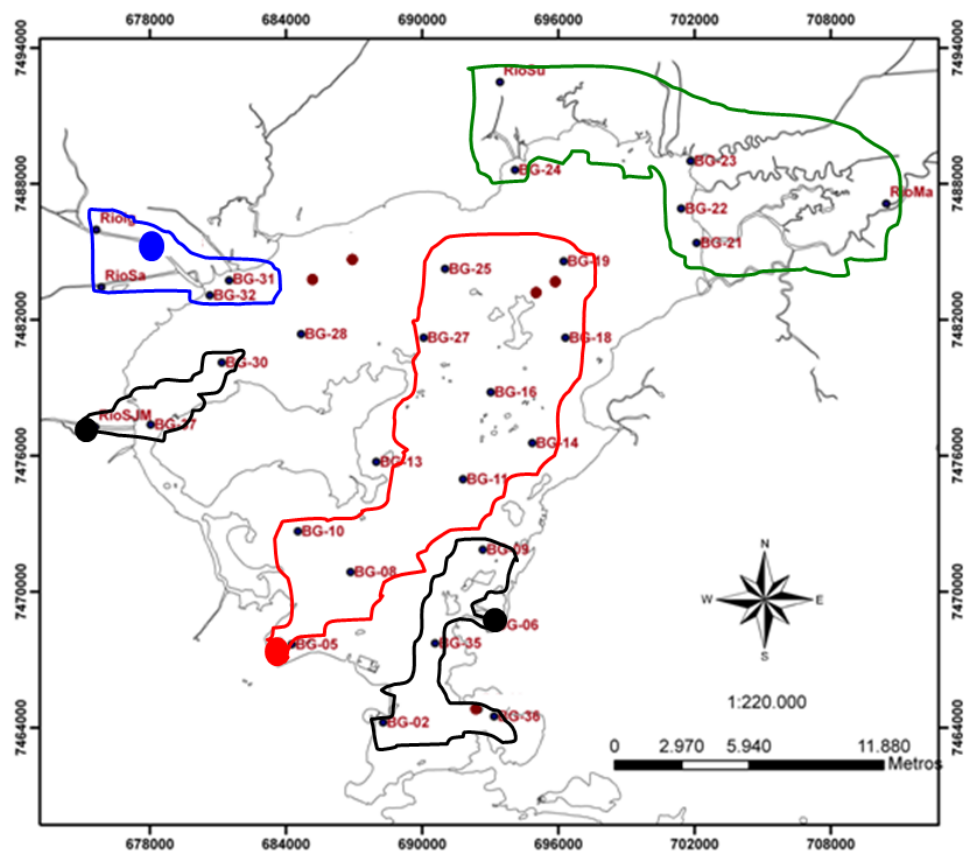


Case: Landfarming



Ref: Proff Jan Christensen KU PLEN

Case: Kildeidentifikation



Ref: Proff Jan Christensen
KU PLEN

Hvad kan vi bruge de nye metoder til:

- Risikovurdering
- Kildesporing
- Kontrol og opfølgning på remedieringstiltag
- Forbedret informationsniveau herunder indhold af ”naturlige kulbrinter”

Metoderne er der nu. Nu skal vi lære at bruge dem

**Måske tiden også er inde til at kigge på
PAH'erne og dermed analyseprogrammerne
påny??**

