

Sensors used to estimate particulate matter emissions

A. Hensen
E.P. Weijers
R. Rodink

Juni 2013
ECN-L--13-033



Sensors used to estimate particulate matter emissions.

A. Hensen, E.P. Weijers, R. Rodink

NEN/InfoMil infodag Luchtemissies
4 juni 2013

Waarom?

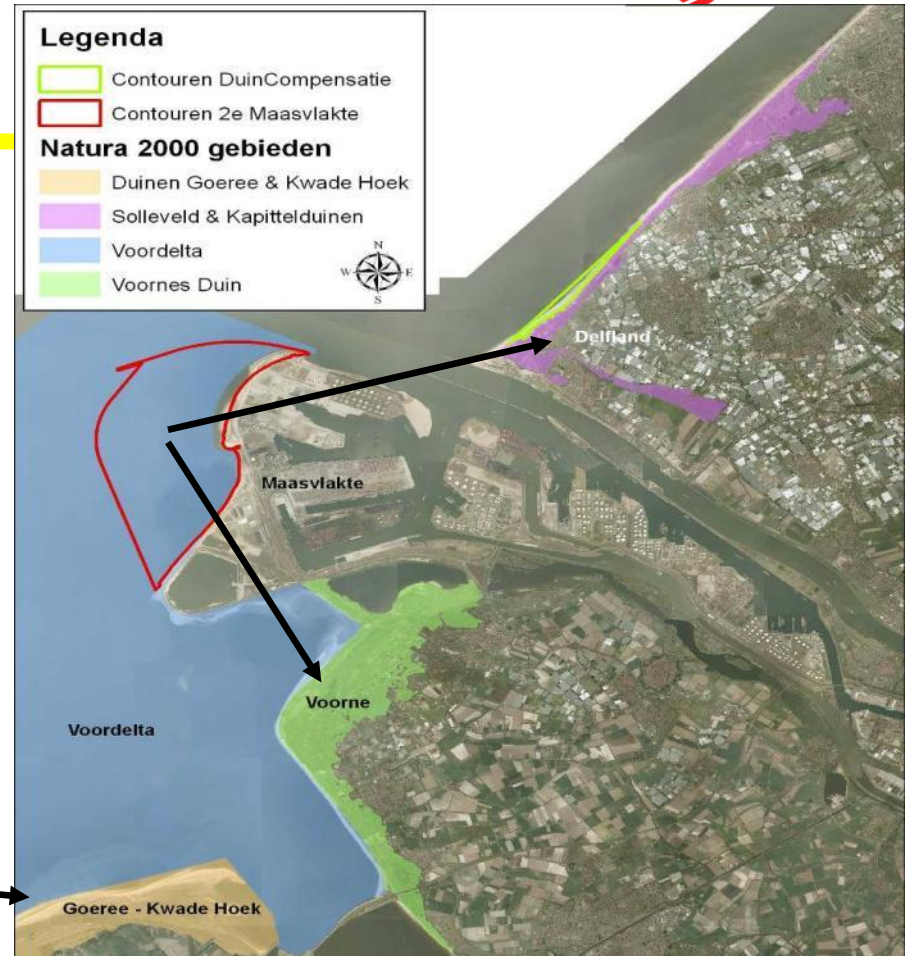
- ACTIE=MER



Voorbeeld MV2

Effect op N2000
Gebieden MV2

Referentie
gebied



Show stoppers in MER....



Show stoppers....



Habitat is te doen.....

Compensatie



- 35 hectare

Show stoppers....

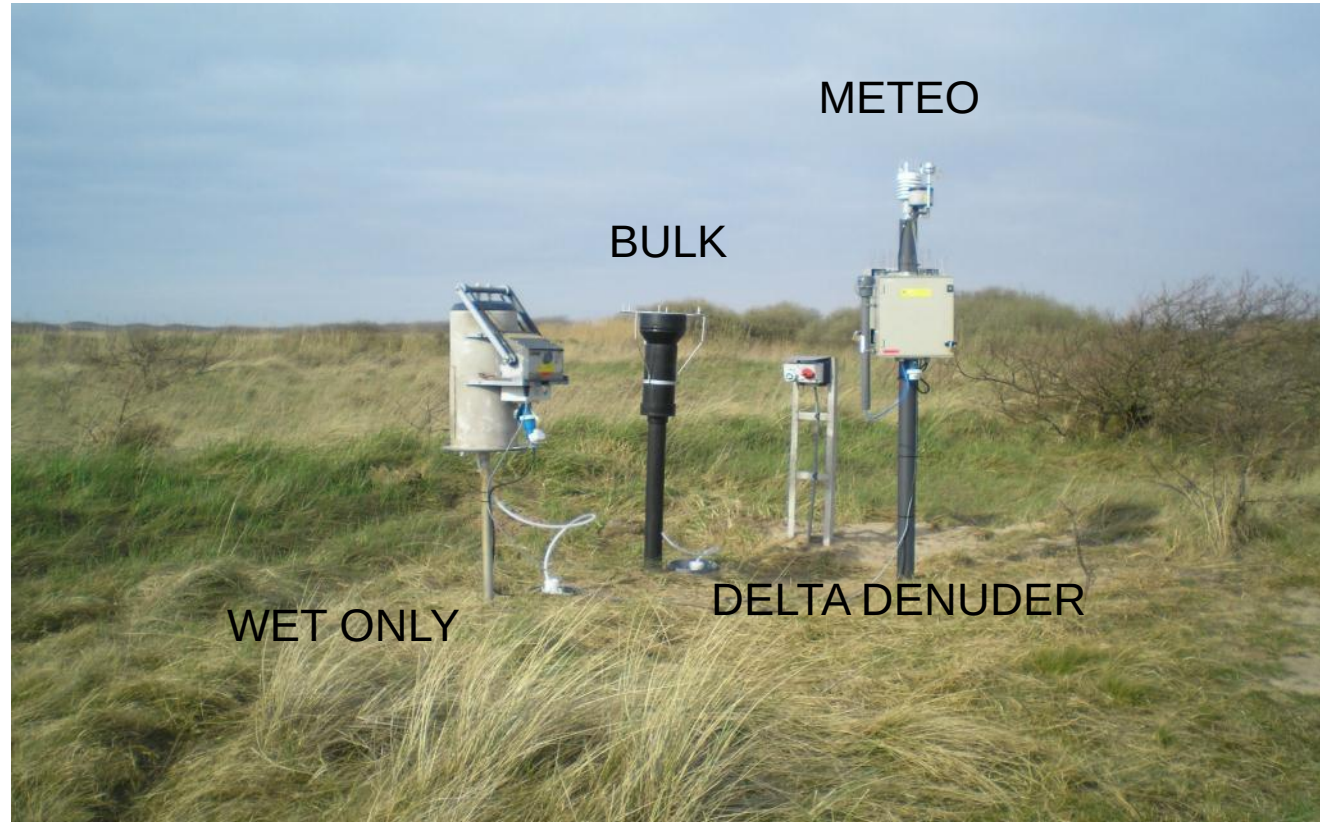


Habitat is te doen.....



Schone lucht niet

What's in the air.....



PM is een probleem

Vervuilde lucht mogelijk oorzaak van autisme

Door: Tonie Mudde – 27/11/12, 07:01



© ANP. Smogontwikkeling boven Los Angeles

MEER OVER

Wetenschap Gezondheid Autismen



Is een lik van de hond al smerig of ook ongezonder?



Elektriciteit opwekken kan



Hiv-besmetting baby via bloed



Wiskundigen komen me liefde: niet te snel gaan!

In wijken met de hoogste concentraties luchtvervuiling komt autisme drie keer zo vaak voor als in wijken met de schoonste lucht. Dit blijkt uit een studie van University of Southern California dat gisteravond is gepubliceerd in Archives of General Psychiatry.

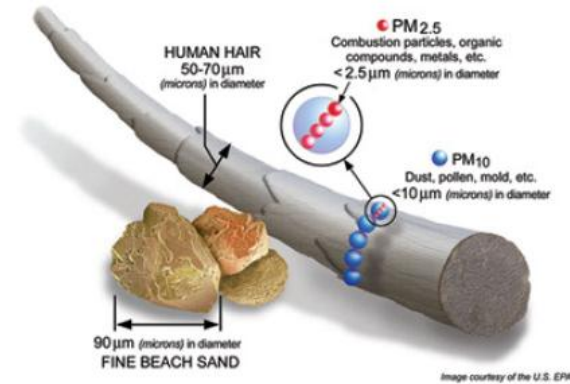
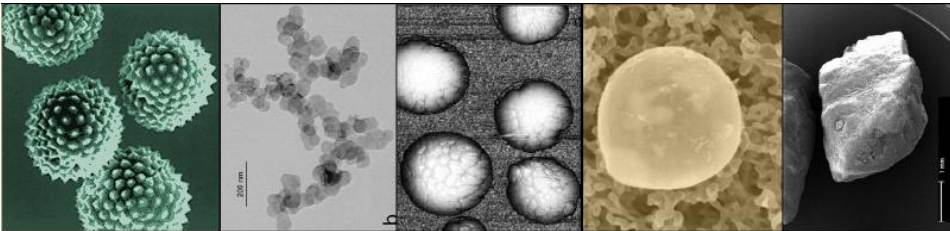
De onderzoekers vergeleken de blootstelling aan luchtvervuiling van moeders met en zonder kinderen met het voorkomen van autisme. Voor zowel fijnstof als stikstofdioxide bleek te gelden: hoe hoger de concentratie, hoe groter het risico dat een kind autisme ontwikkelt.

Volgens Bert Brunekreef, hoogleraar milieu-epidemiologie aan de Universiteit Utrecht, zit de Amerikaanse studie goed in elkaar. Hij vindt het van groot belang om de relatie tussen luchtvervuiling en aantasting van het zenuwstelsel verder uit



PM is niet eenvoudig....

- Diverse groottes
- Hygroscopisch & niet hygroscopisch
- Chemische and Physische verschillen



- Broeikas effect
- Gezondheids effects
- Depositie



ECN kan dit!

- Ontwikkeling



- Testen



JOAQUIN

- Veld campagne Antwerpen

Dus..... PM

IS LEUK !

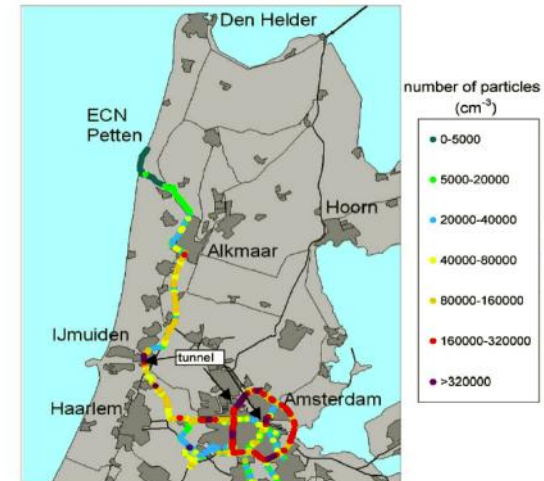


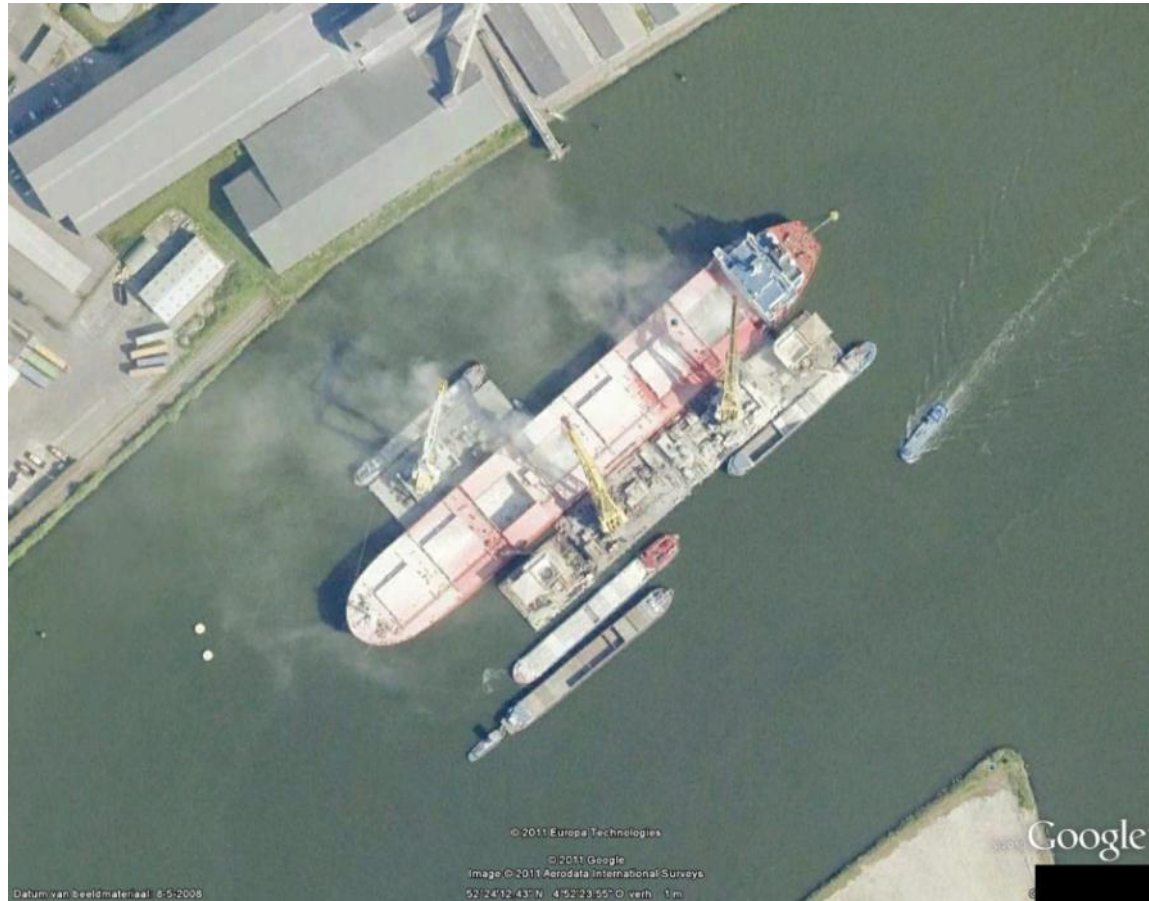
Fig. 2. Particle number concentrations along the way from the urban agglomeration of Amsterdam to the marine area near Petten (averages over 500 m; CPC-measurements).

Maar niet voor beleidsmakers

- Grootte, Massa or Chemie ?
- Moeilijk te meten = Moeilijk te controleren
- Visuele controle



Direct PM emissie check..



Discussie met I&M

- Discussie 2010
 - Nieuwe sensor optie: misschien meten in plaats van visuele controle
- Van: Lousy & Subjective  Lousy & Objective  Goed !

Vraag I&M 2011

- Kan een sensor gebruikt worden voor emissie bepaling?
- Kan een sensor systeem gebruikt worden om emissie factoren voor verschillende activiteiten : laden/graven etc. ?
- Kan een sensor helpen om problemen te voorkomen ?

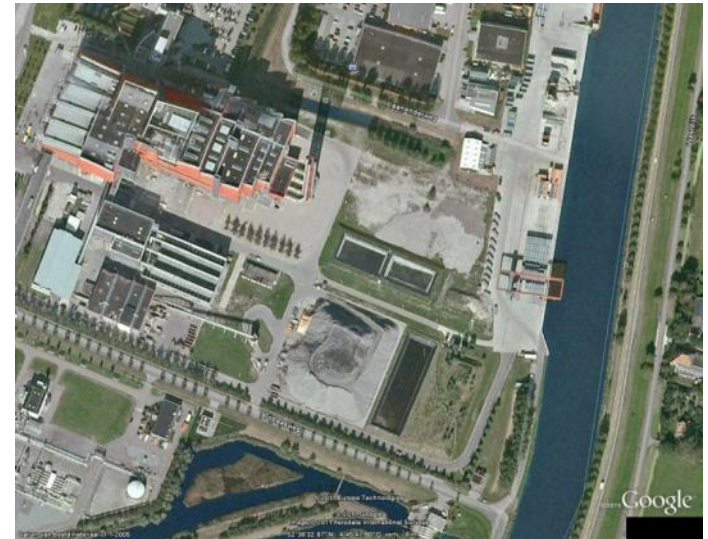
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I&M Project

- Zoek hoop !
- Contact Rietlanden
- Test metingen 1 site
- Meet Mei-Juni 2012

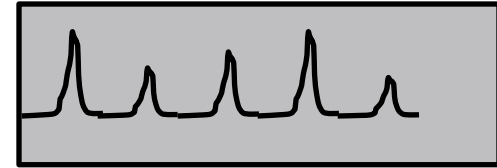
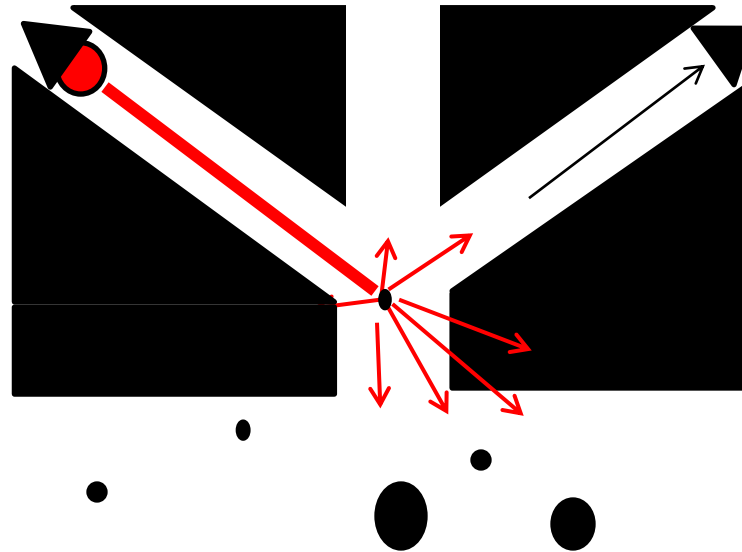


Rietlanden metingen

- Osiris opzet 5 locaties
- Activiteit gegevens beschikbaar
- Enthousiast !



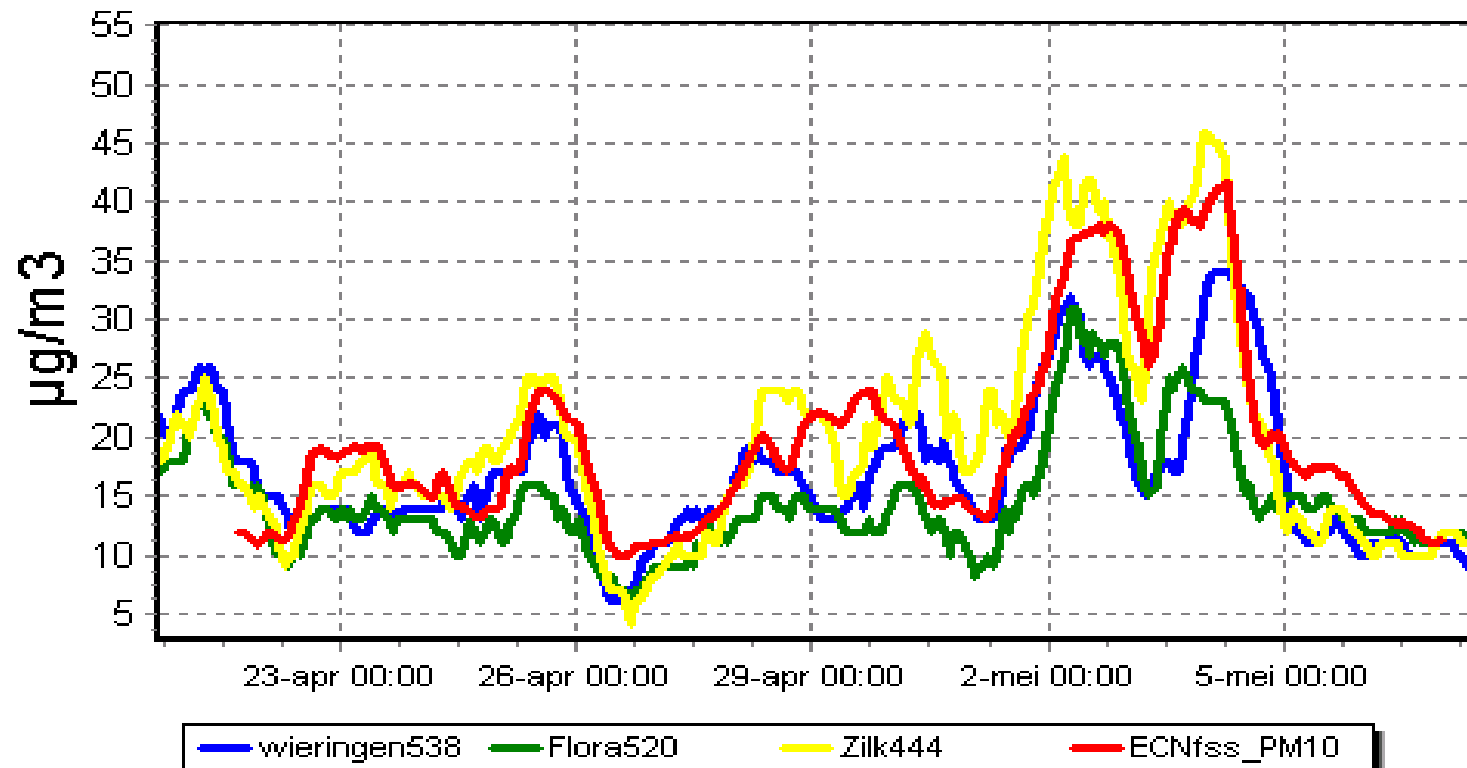
Sensor Concept



De raket....



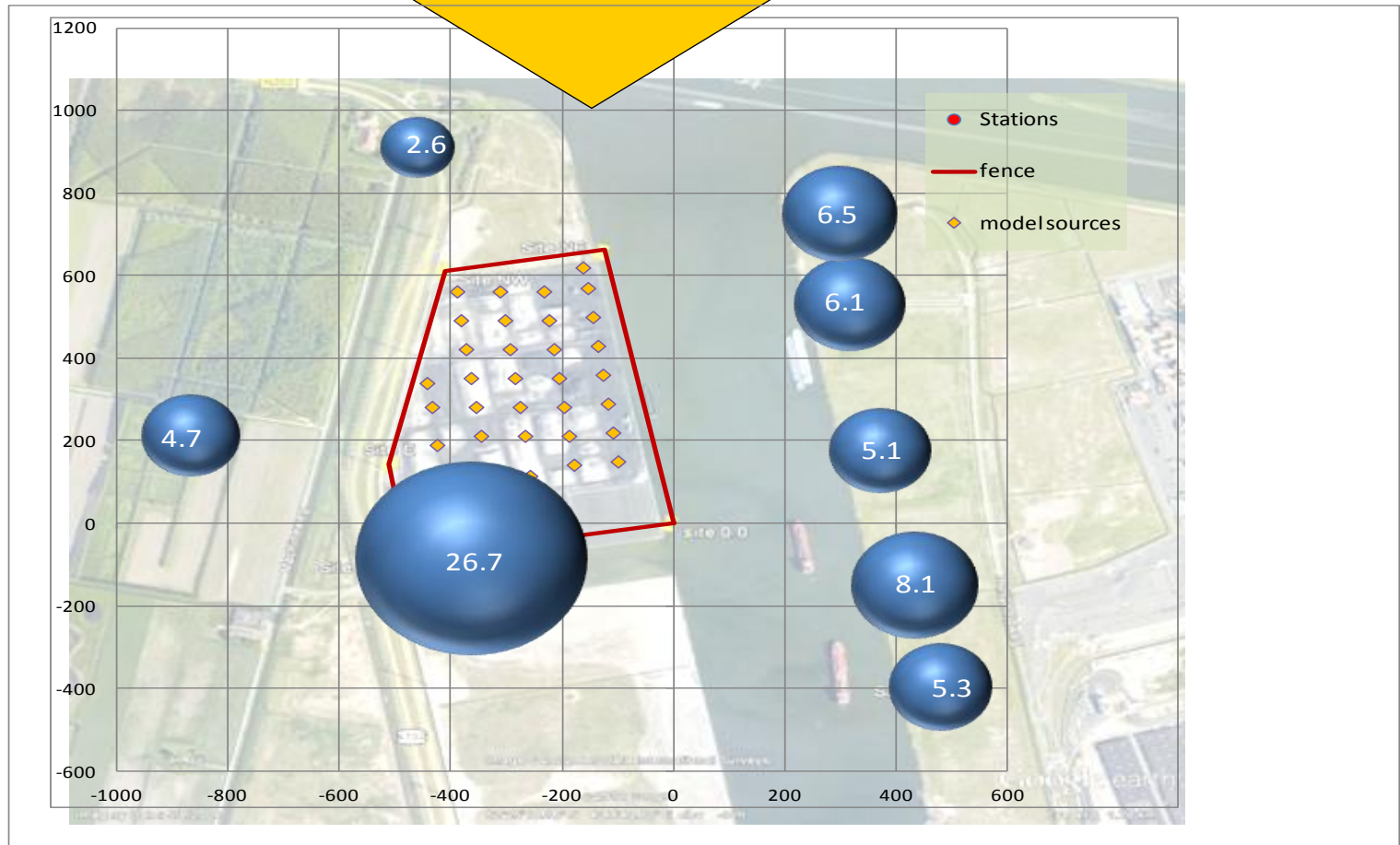
Vergelijk 24 data LML

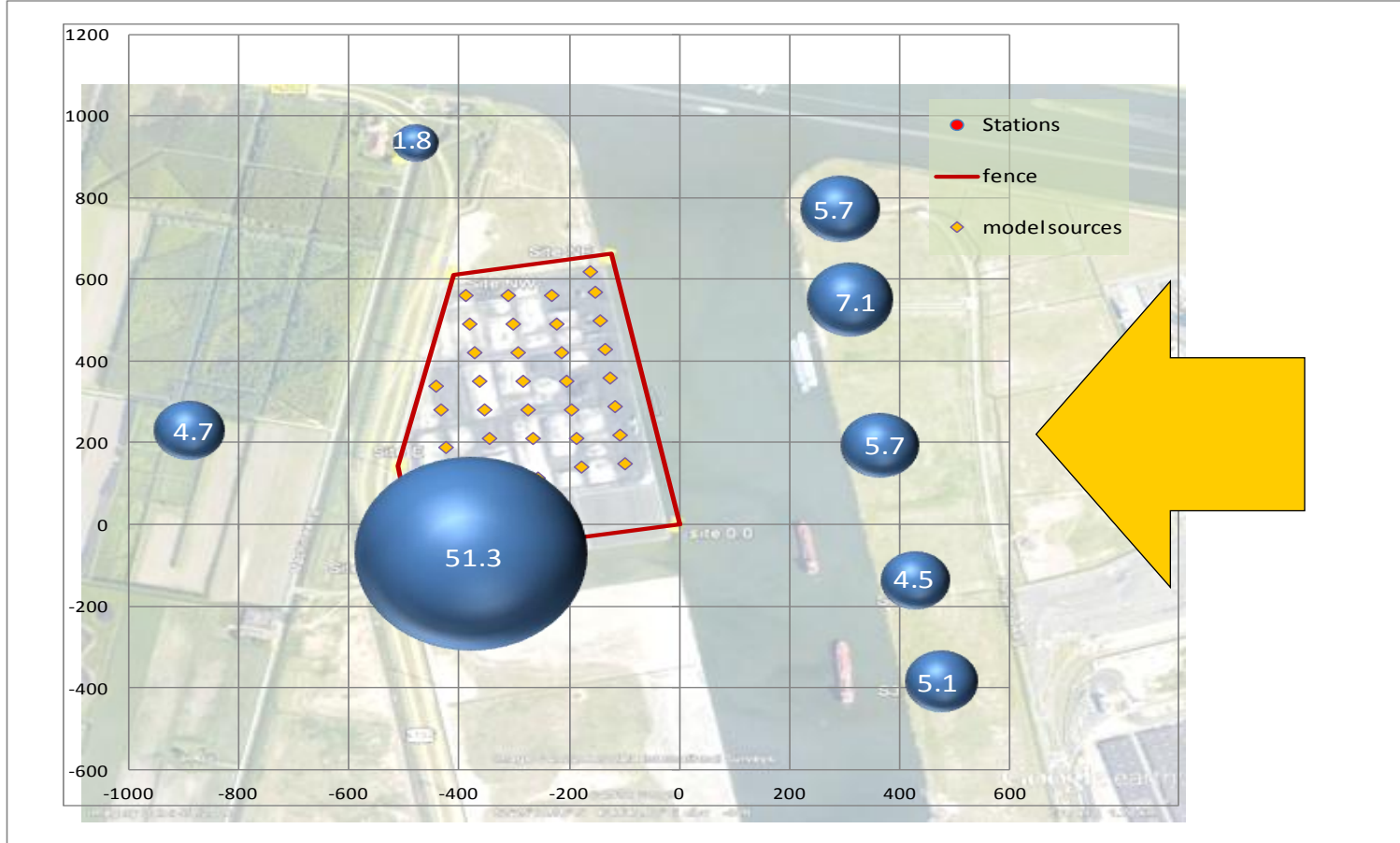


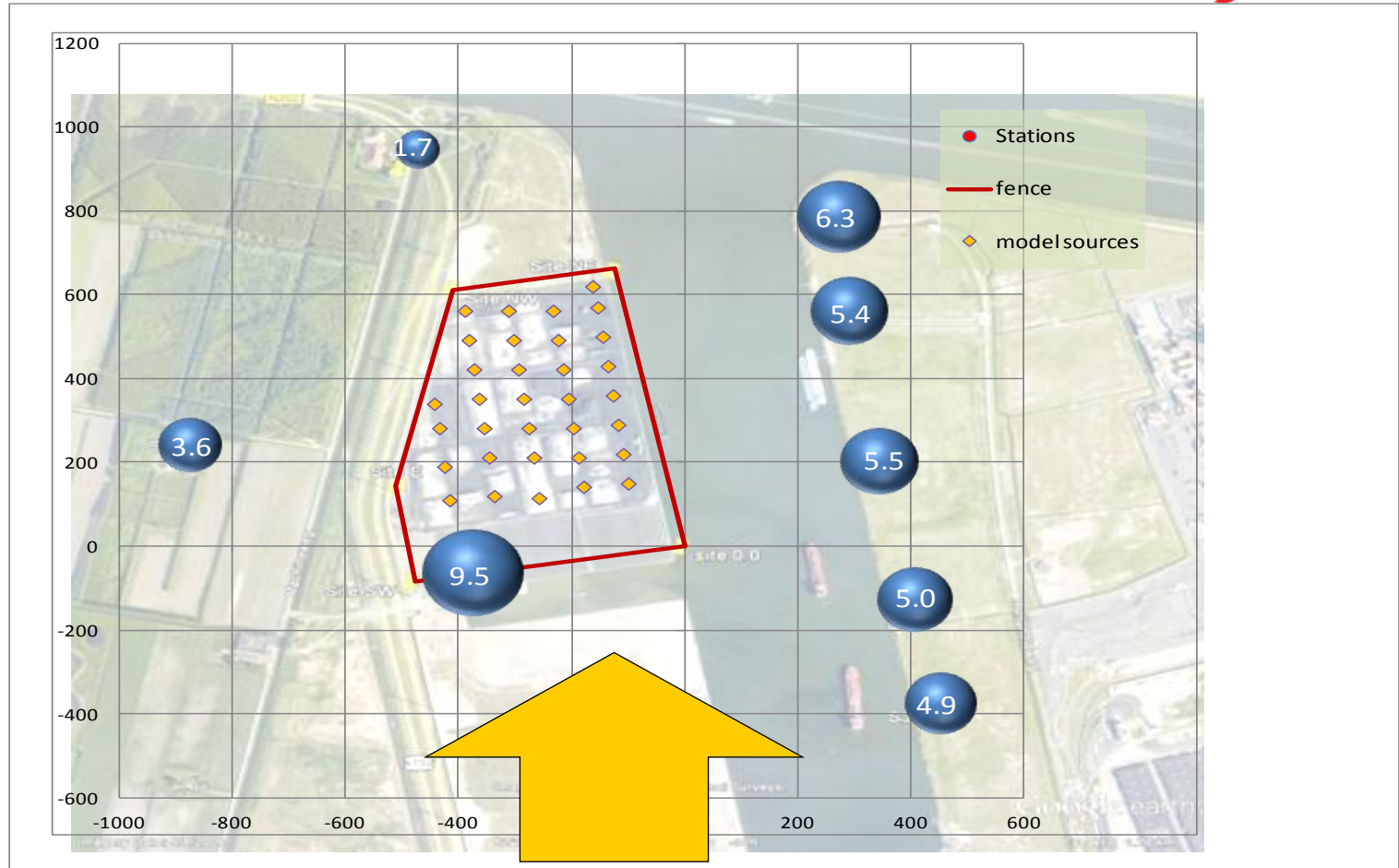
Emissie uitrekenen

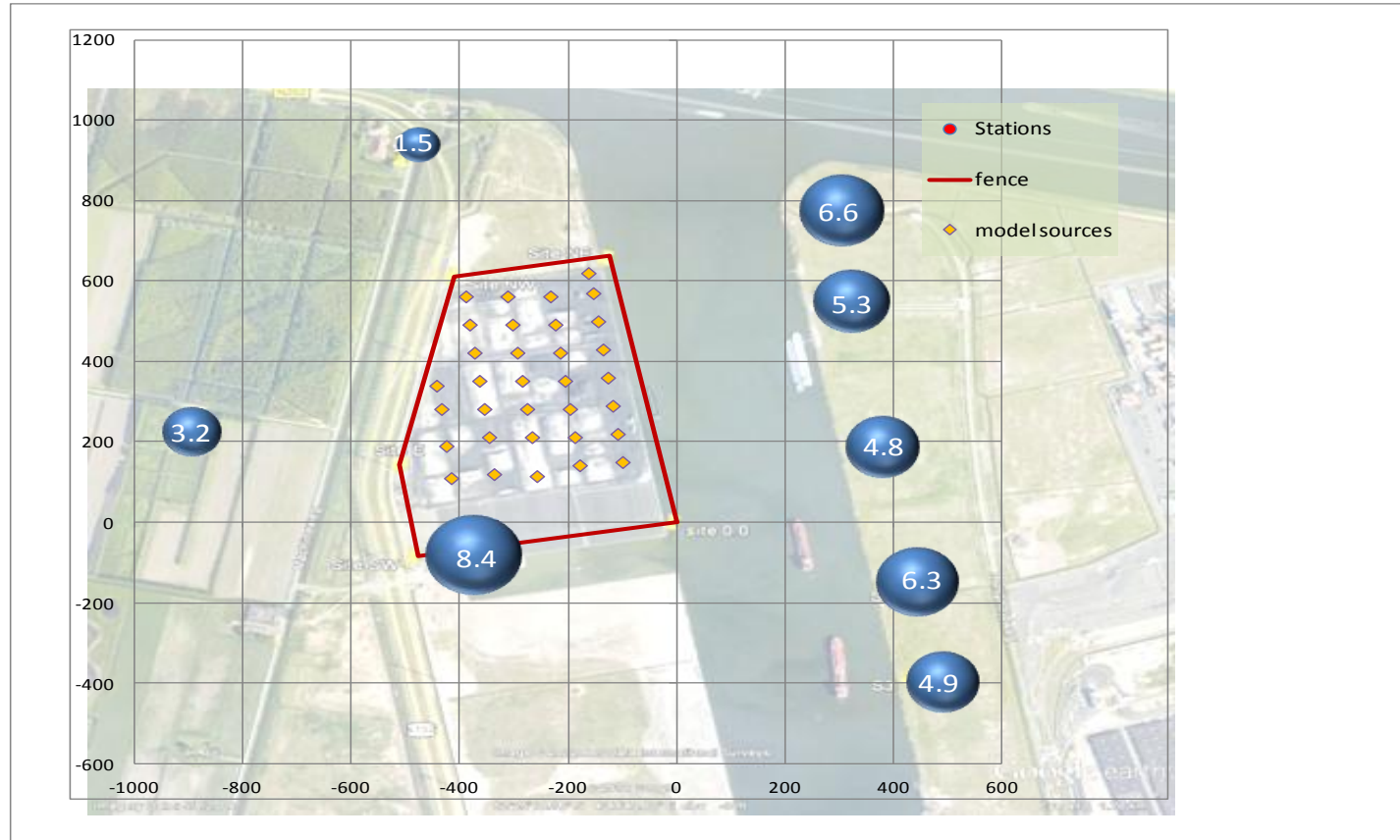
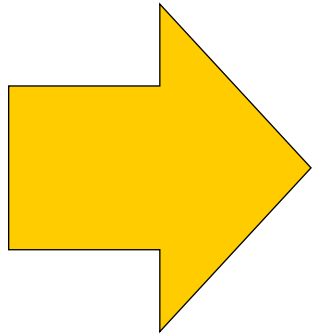


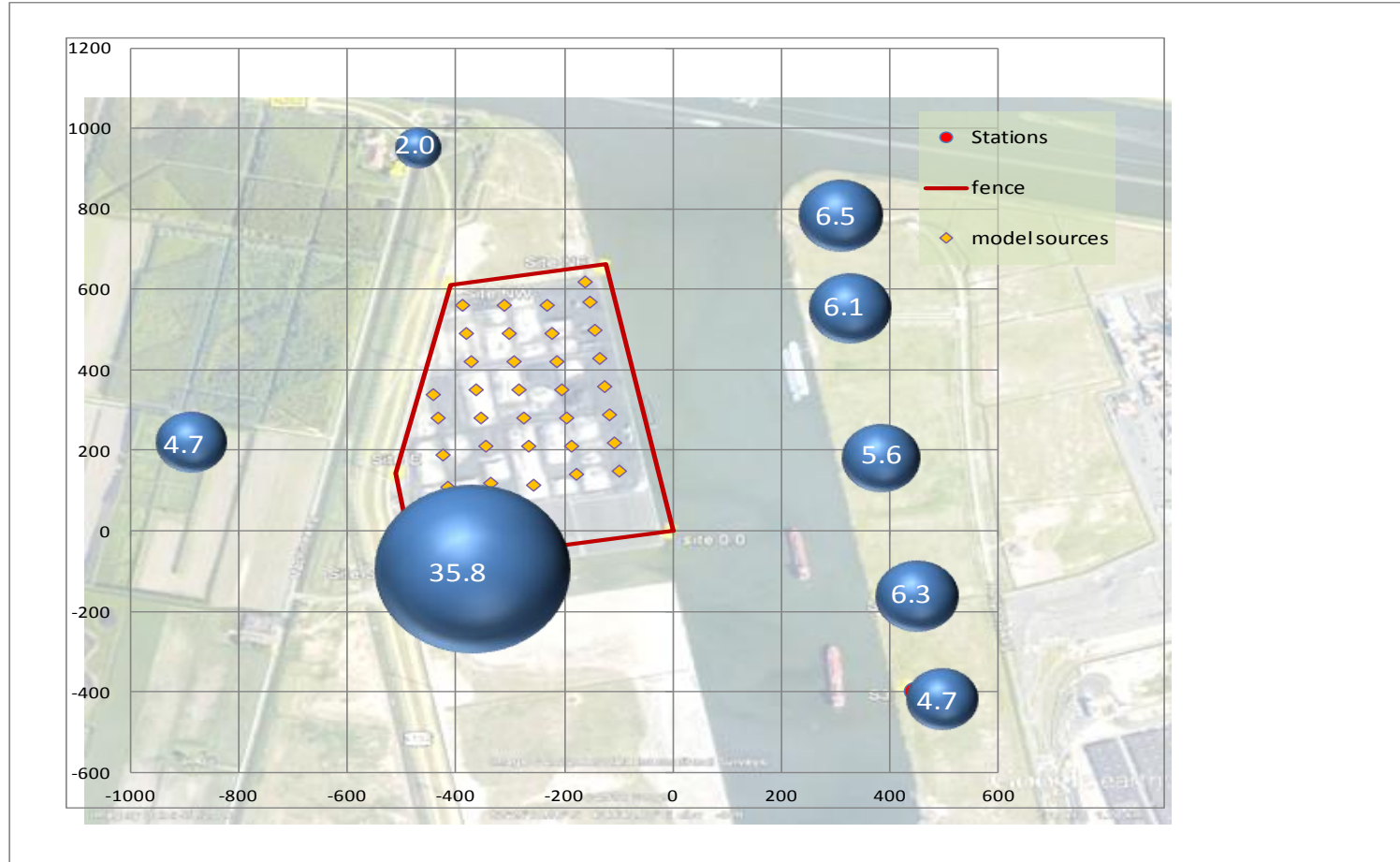
330-30



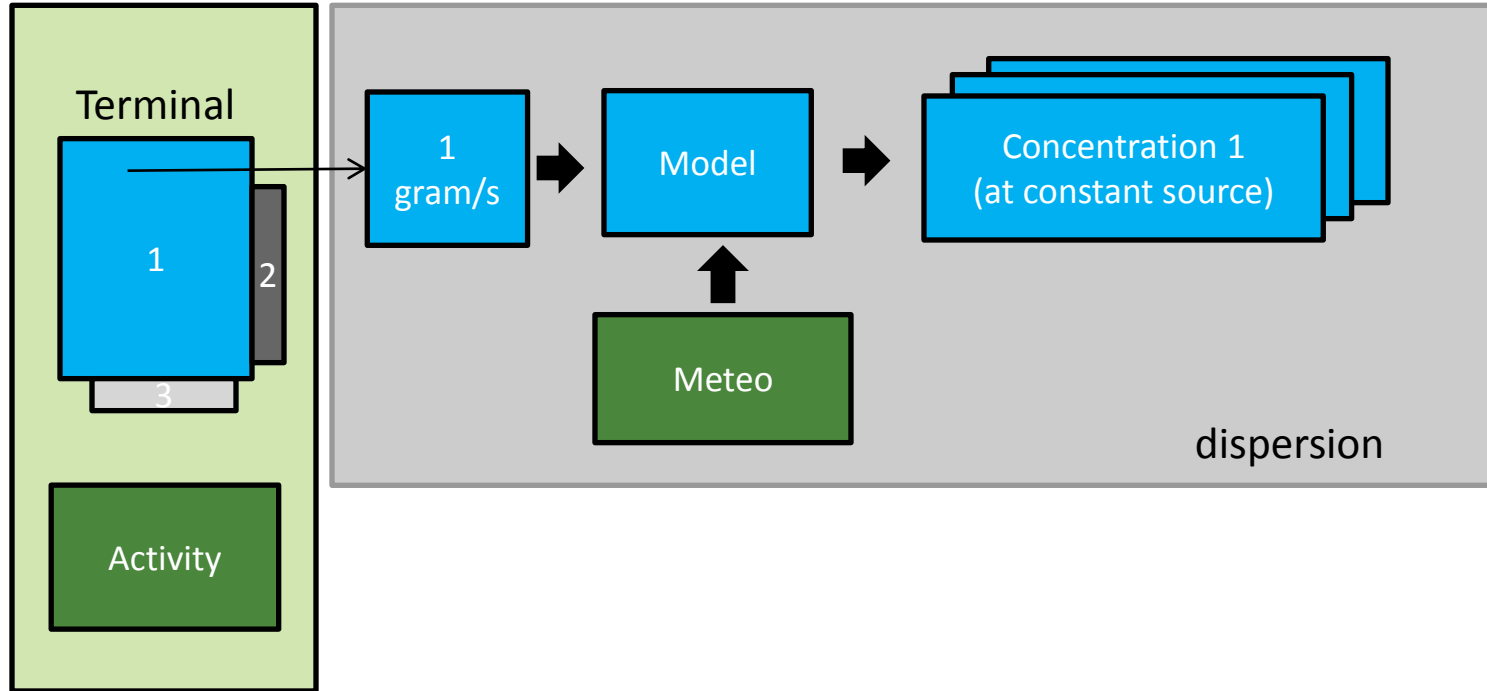




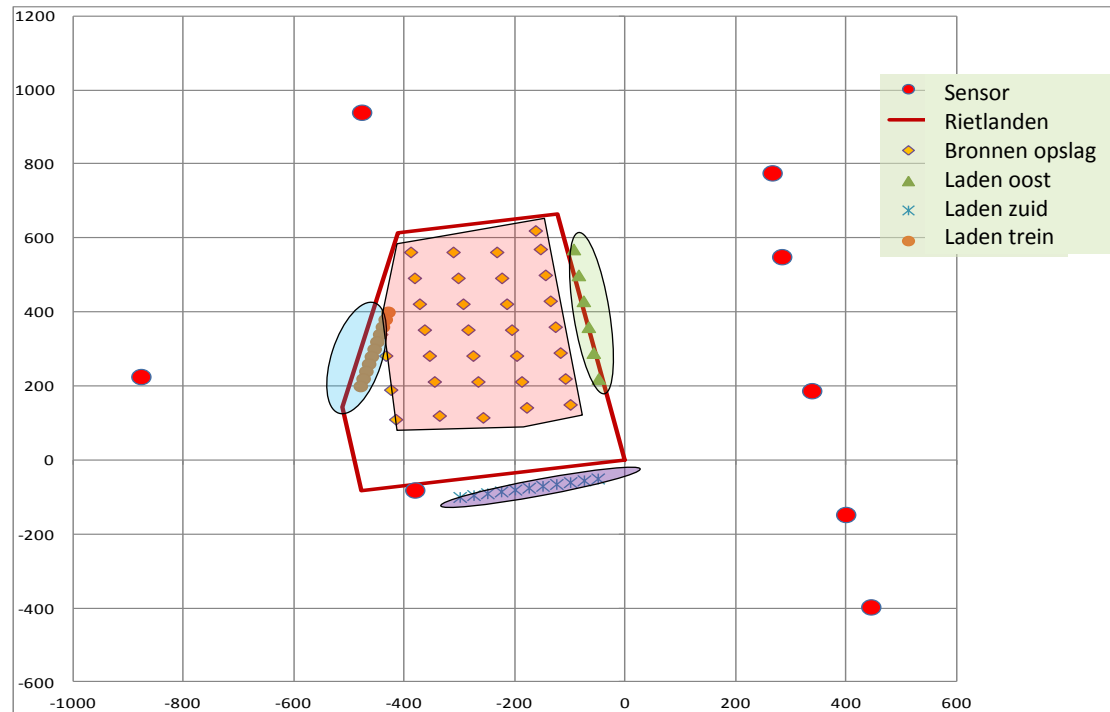




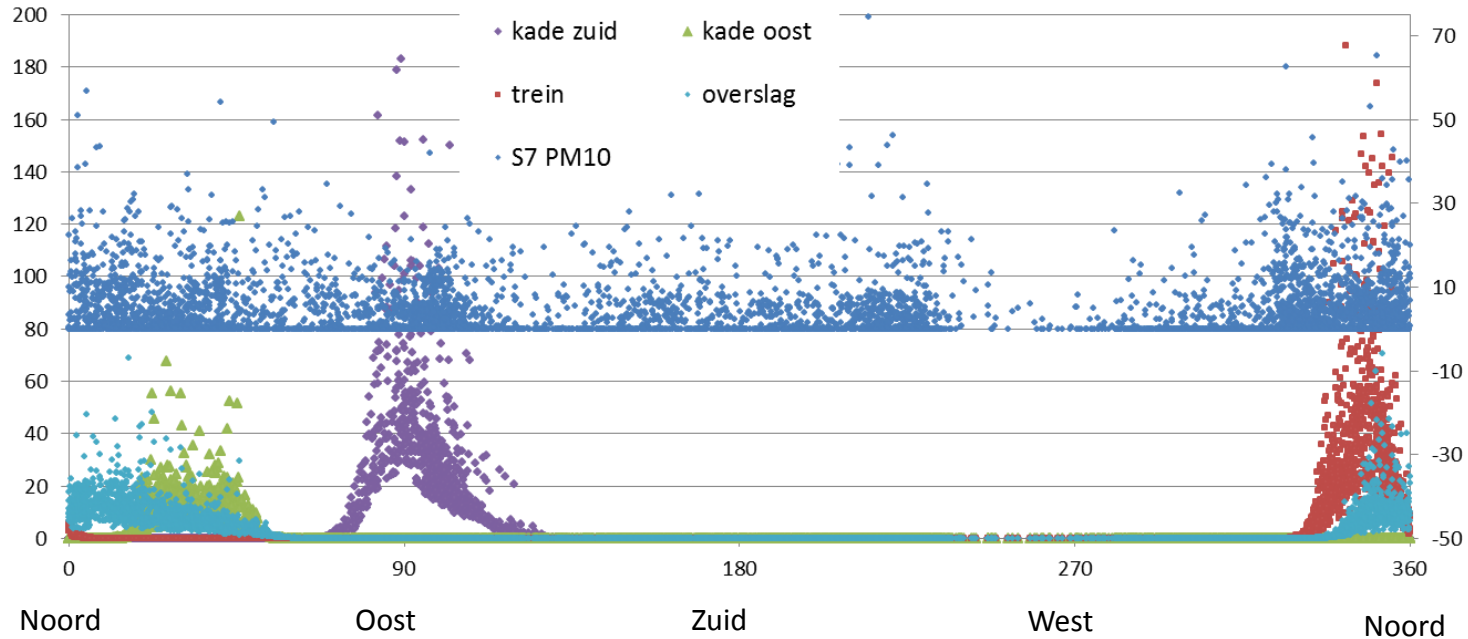
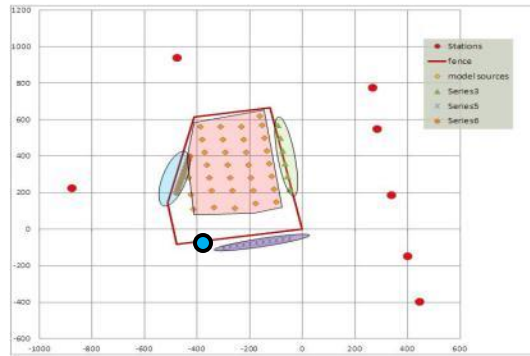
Dispersie berekenen



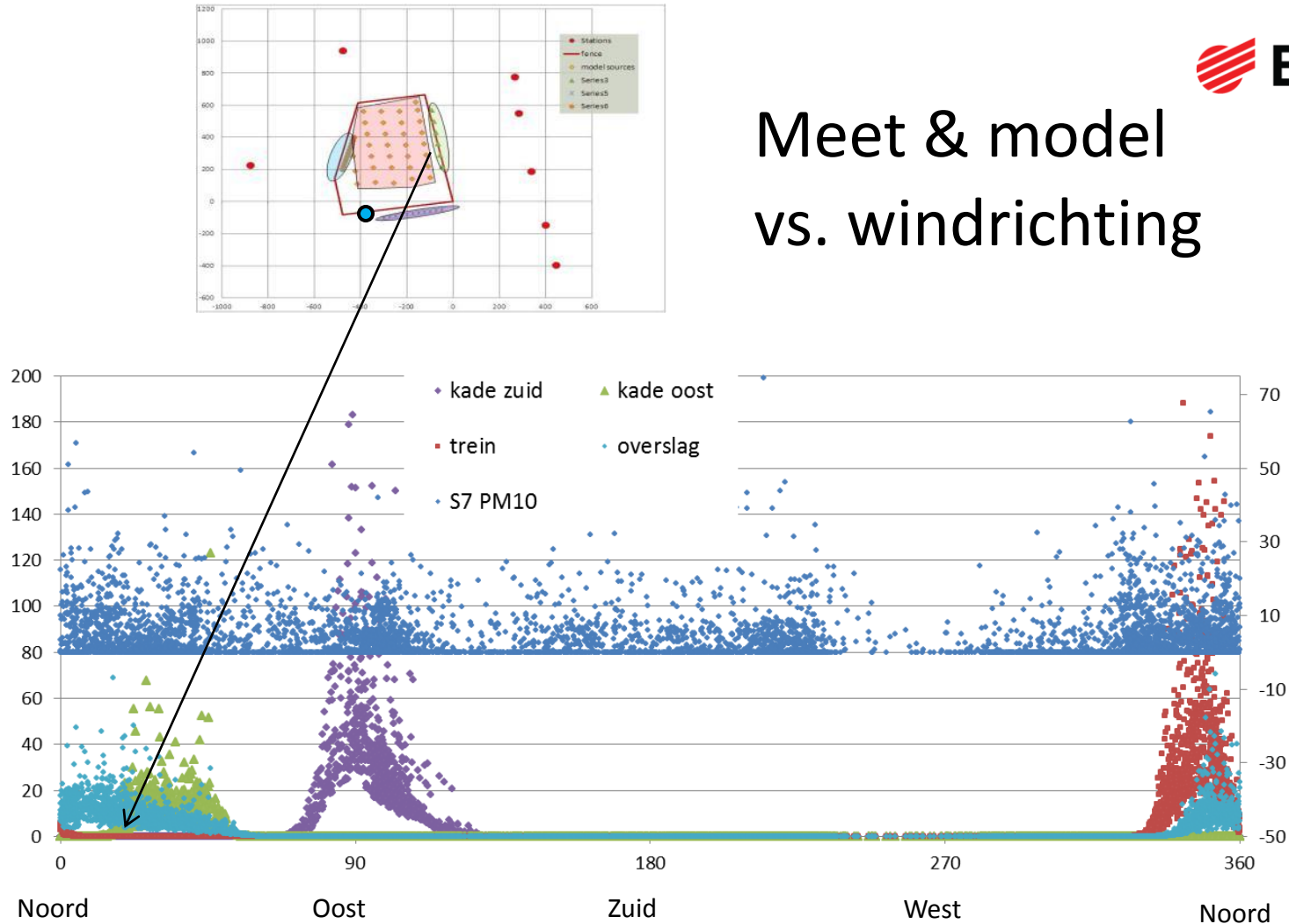
3 brongebieden in het model



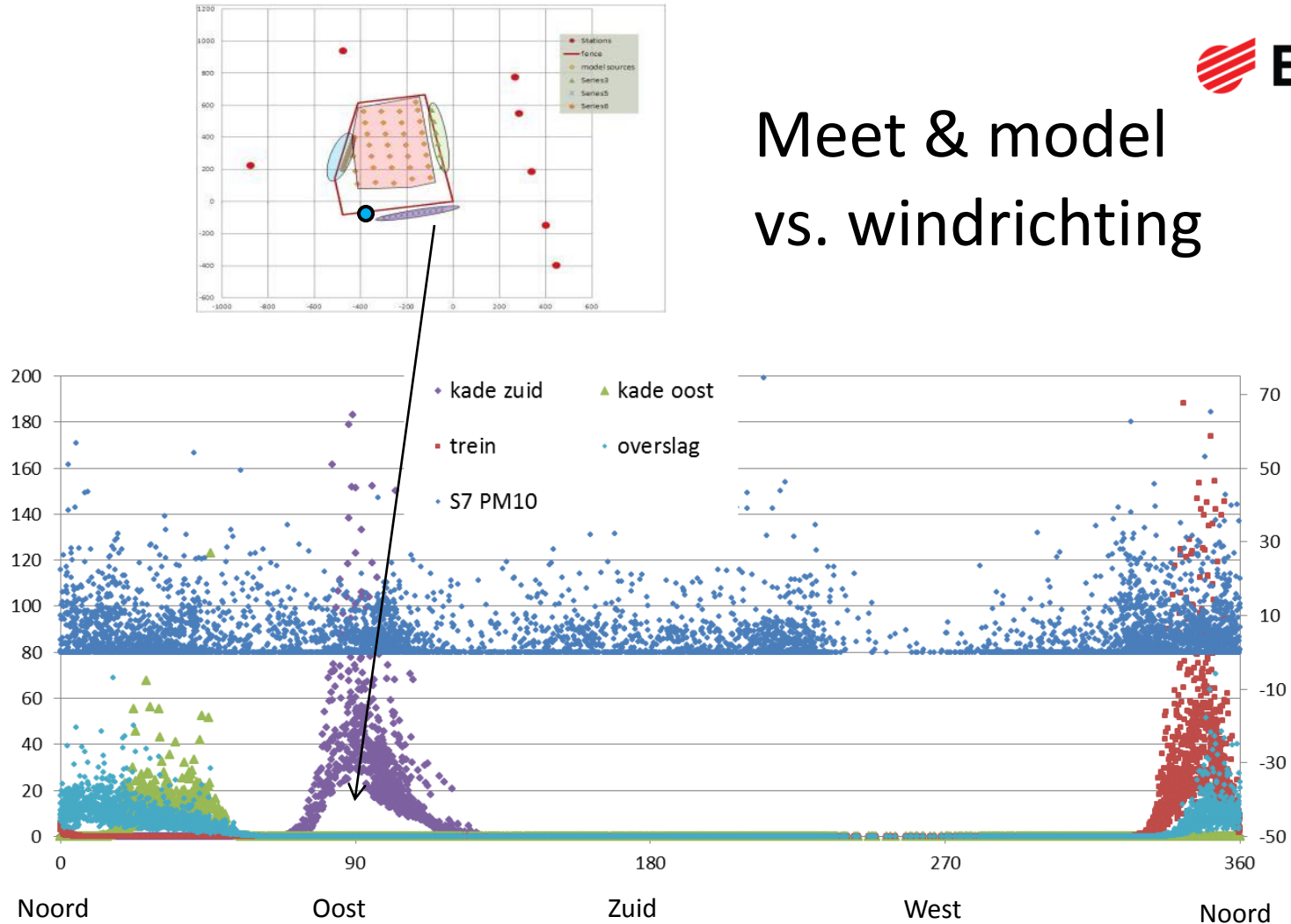
Meet & model vs. windrichting



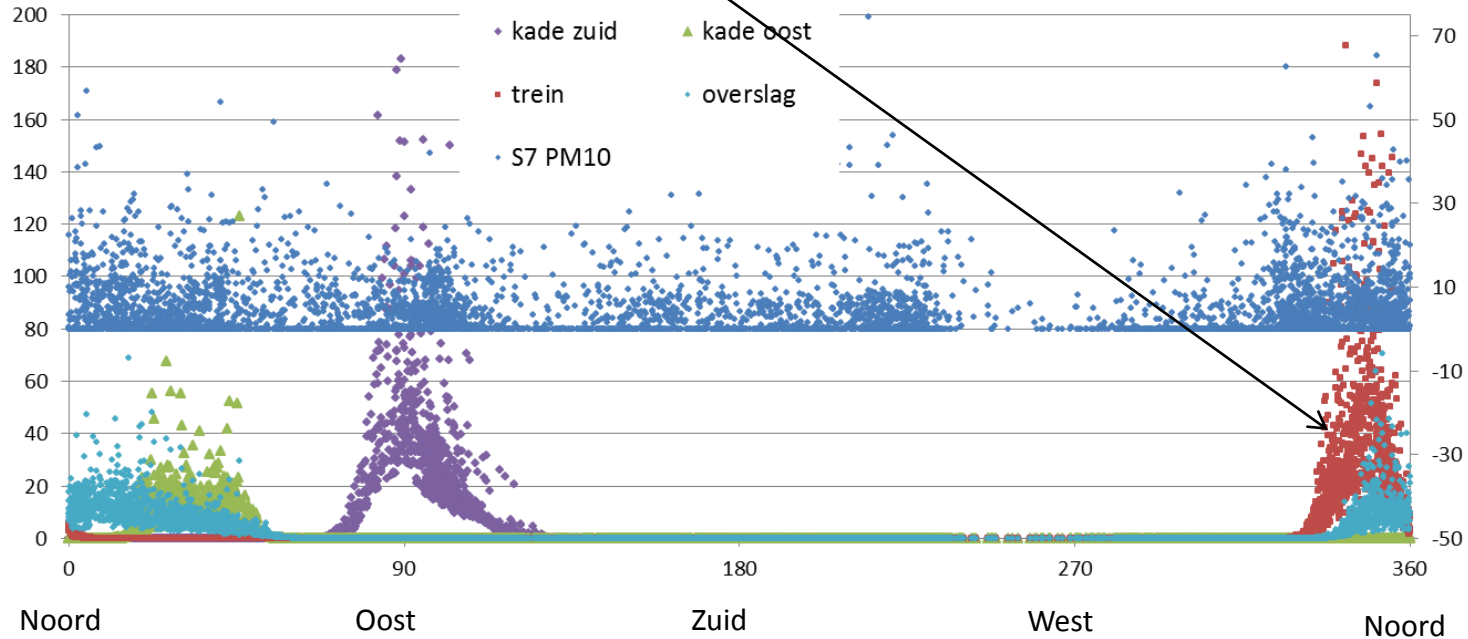
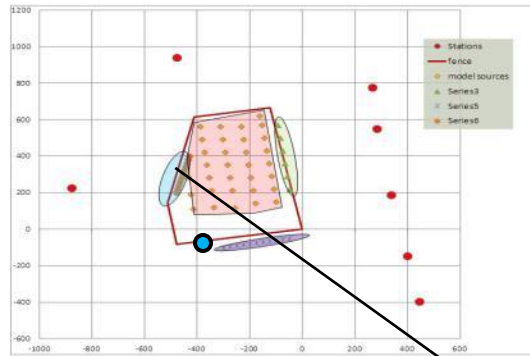
Meet & model vs. windrichting



Meet & model vs. windrichting



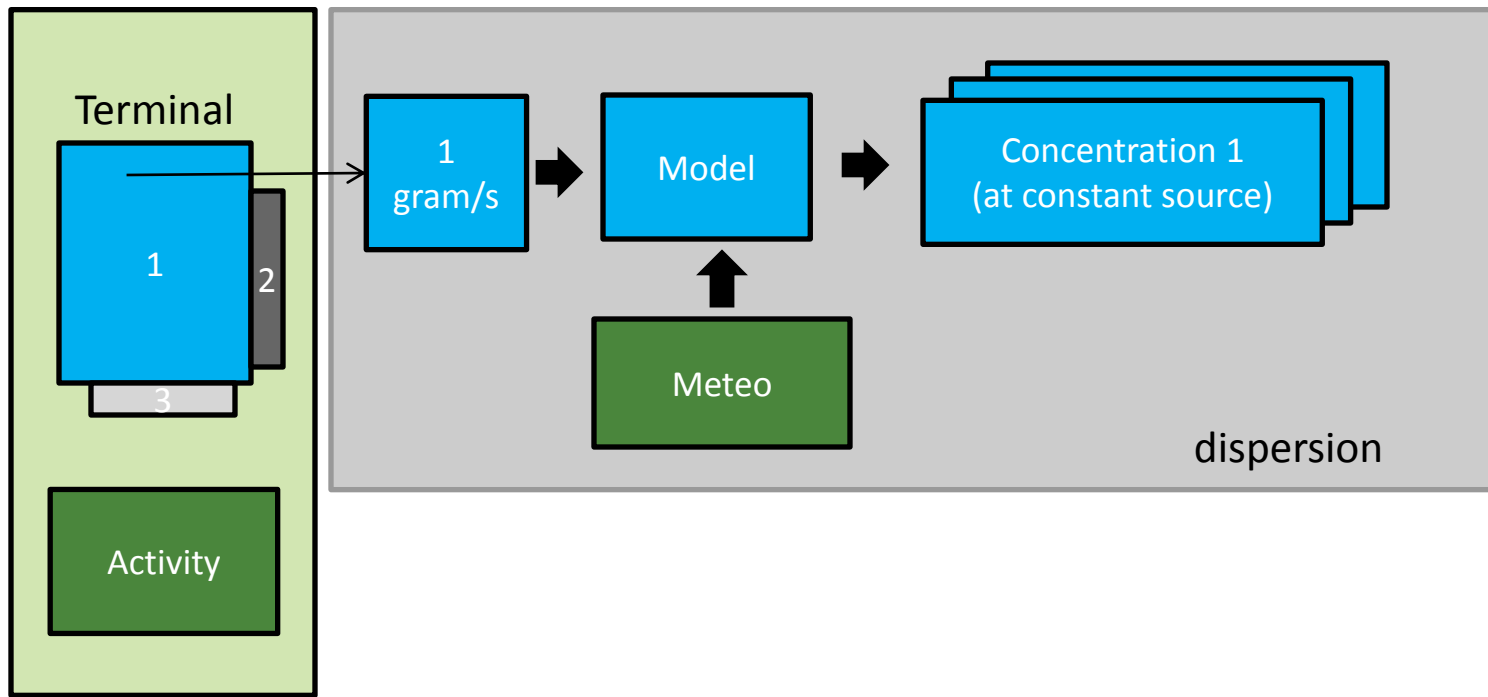
Meet & model vs. windrichting

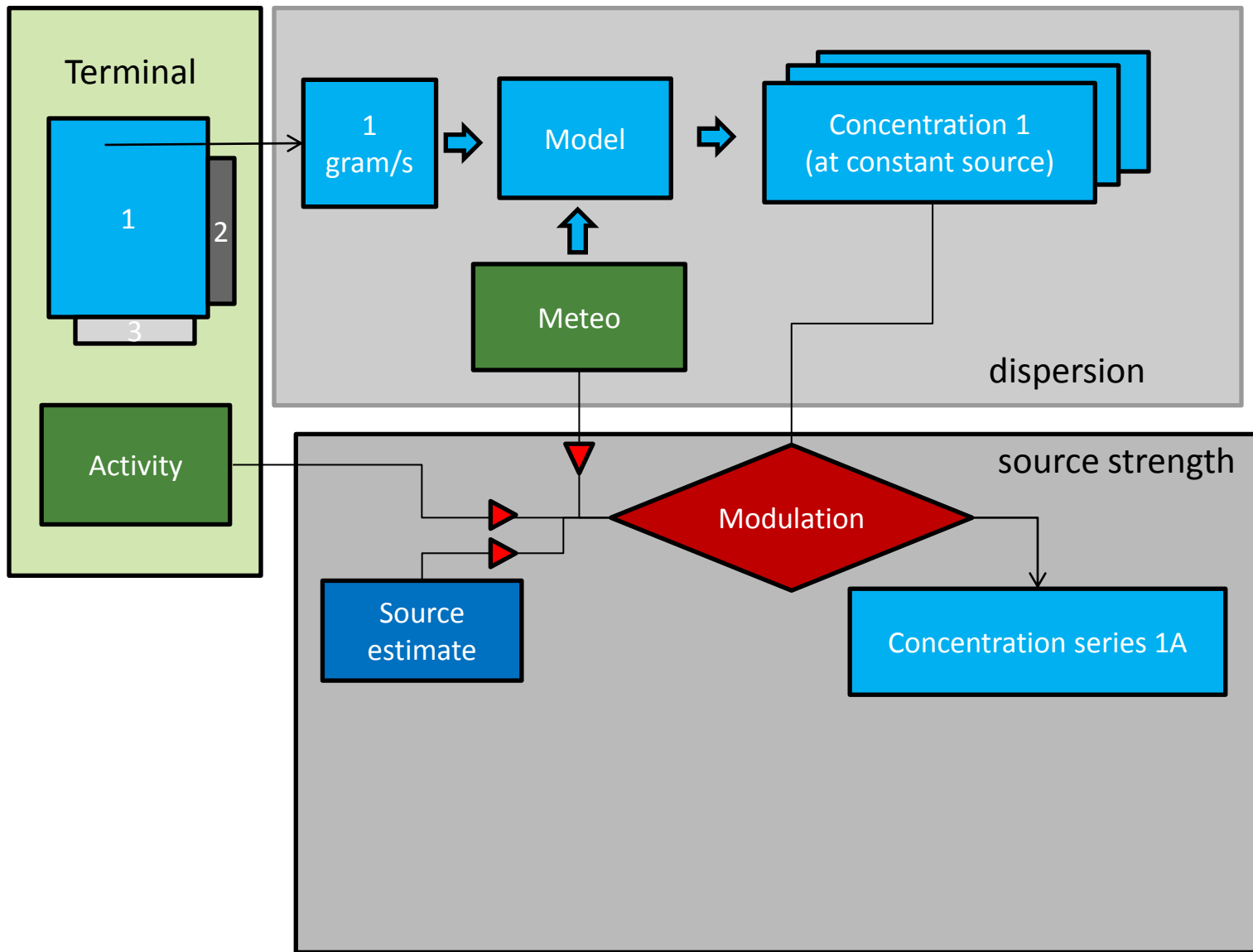


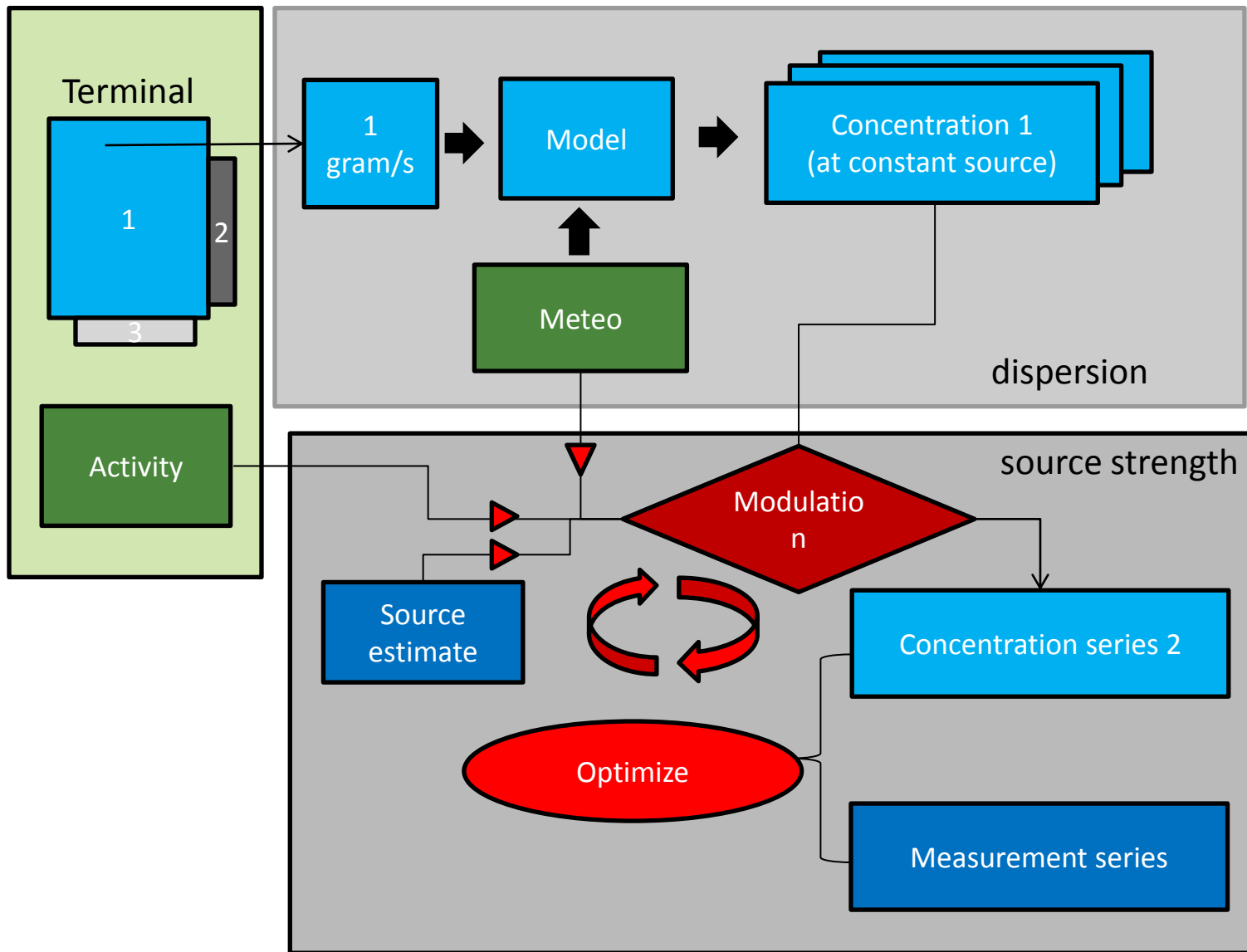
Optimaliseer: zoek de emissie

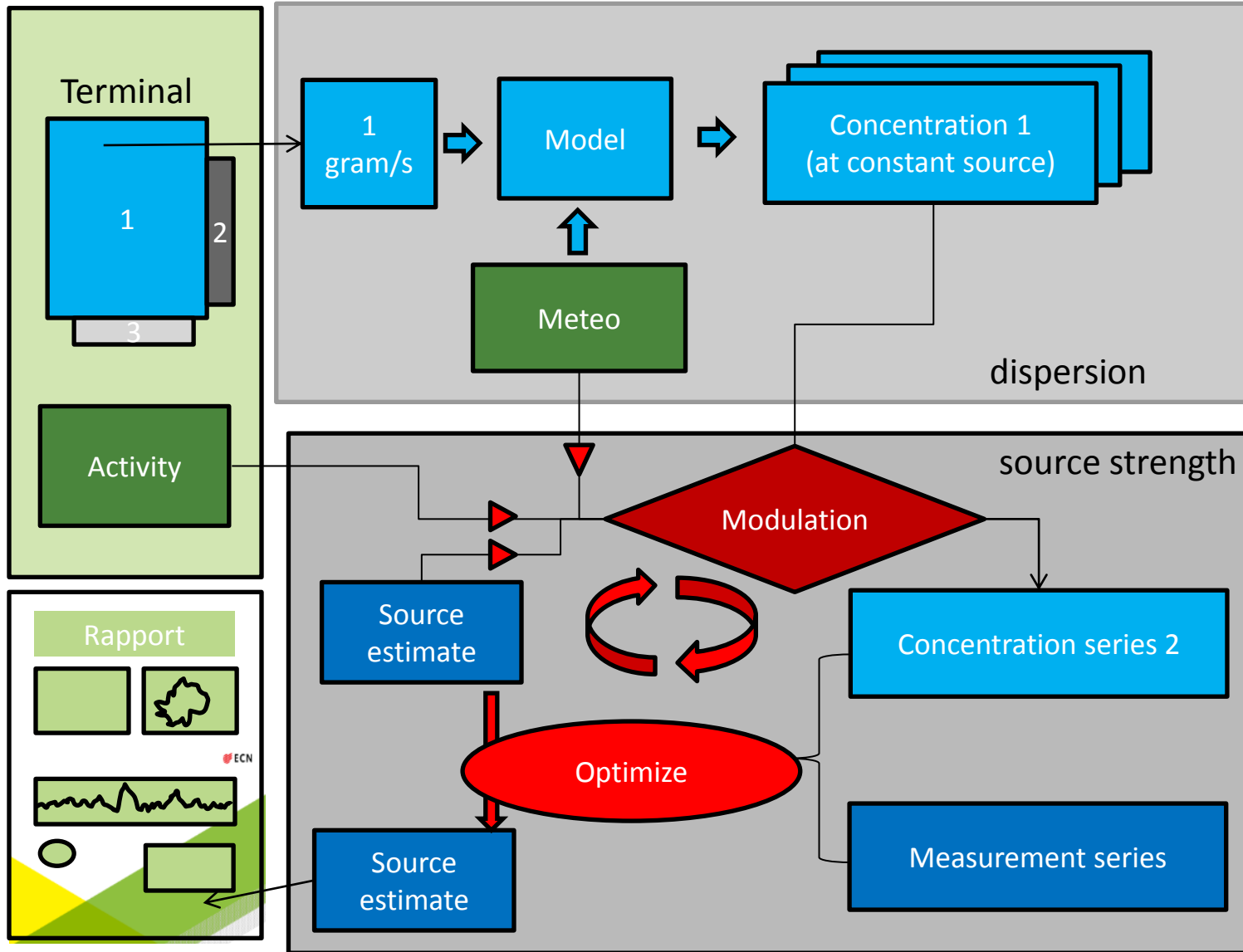
Optimaliseer

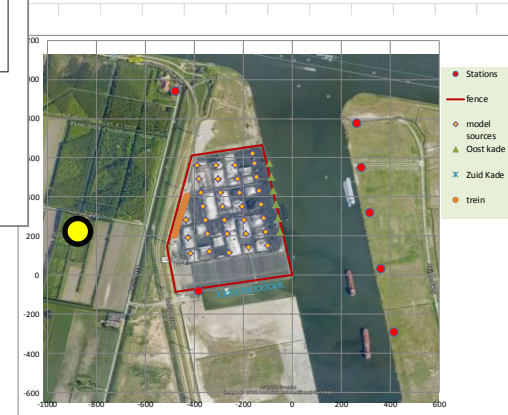
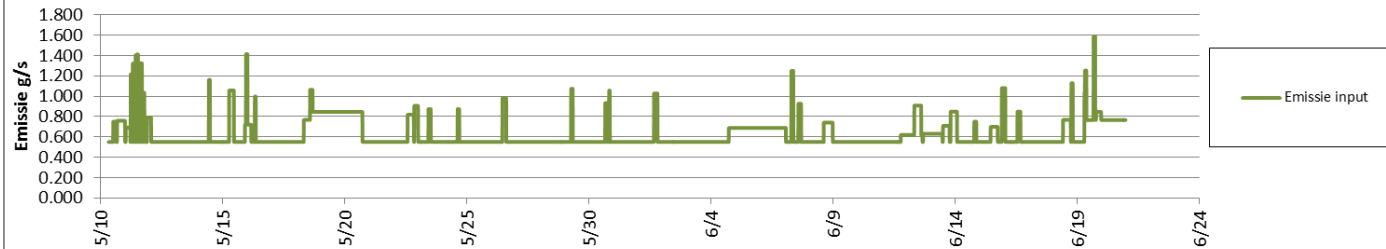
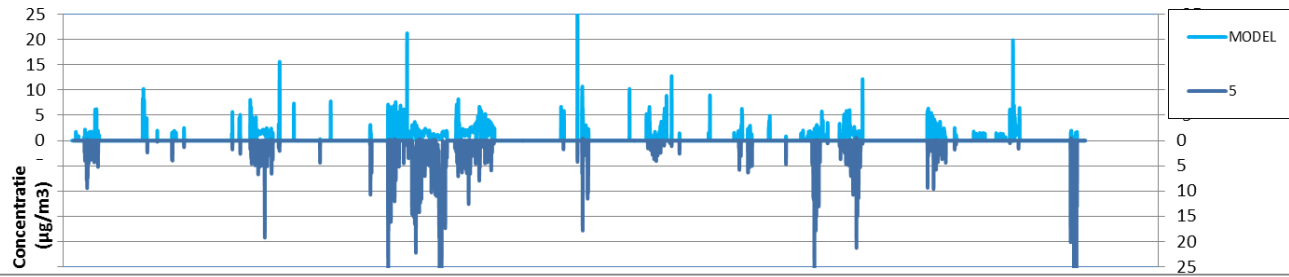
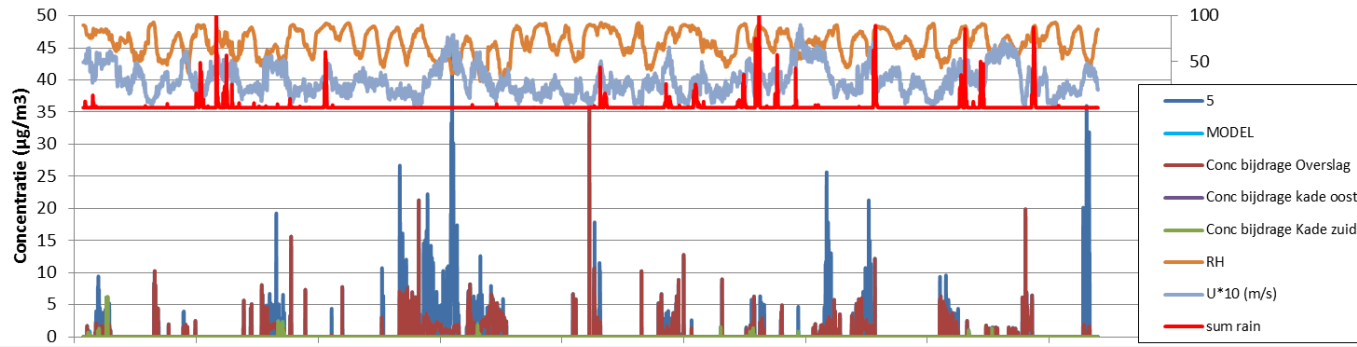
- Zoek combi van bronnen die meet en model kloppend maakt
- Wel geen effect van wind, regen, vocht (op EMISSIE !)

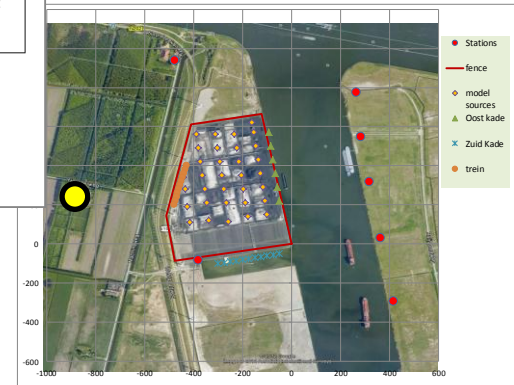
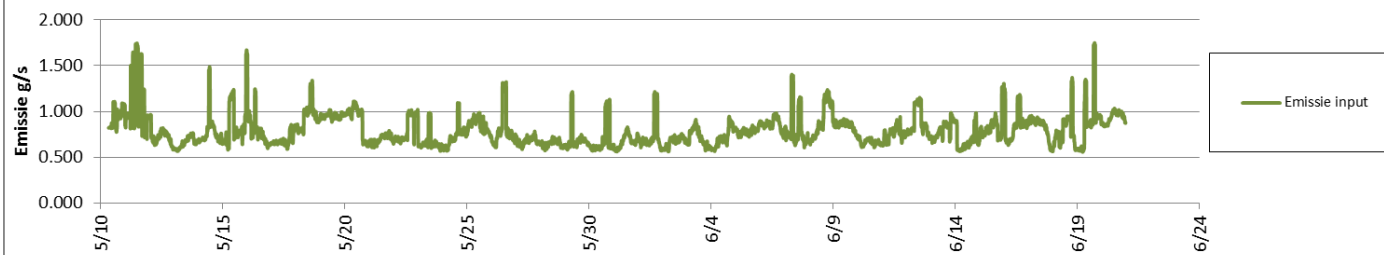
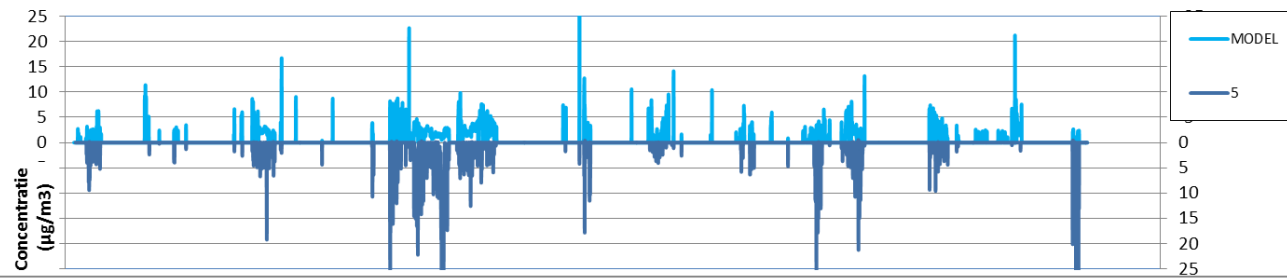
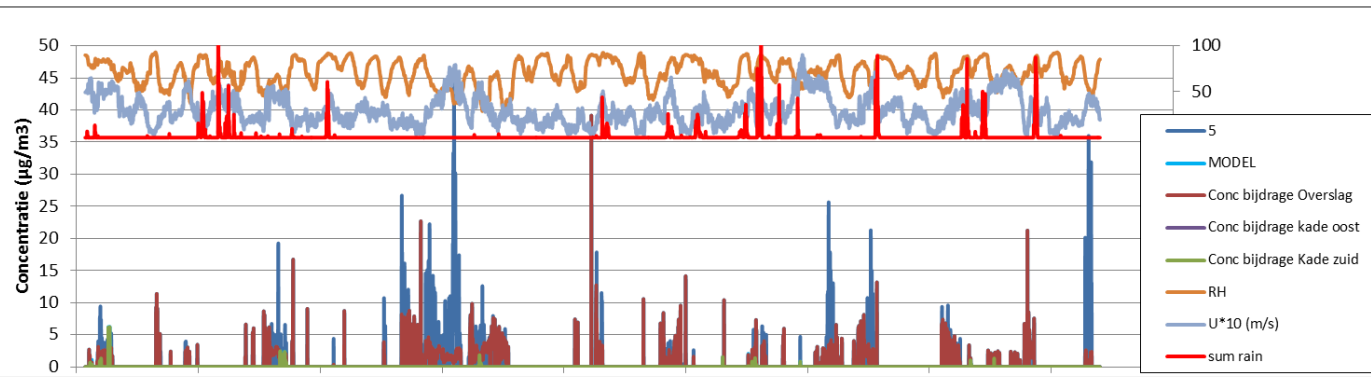




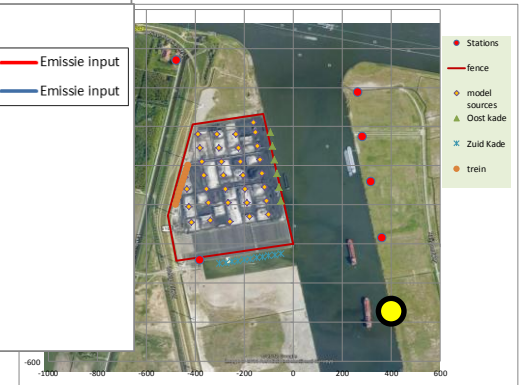
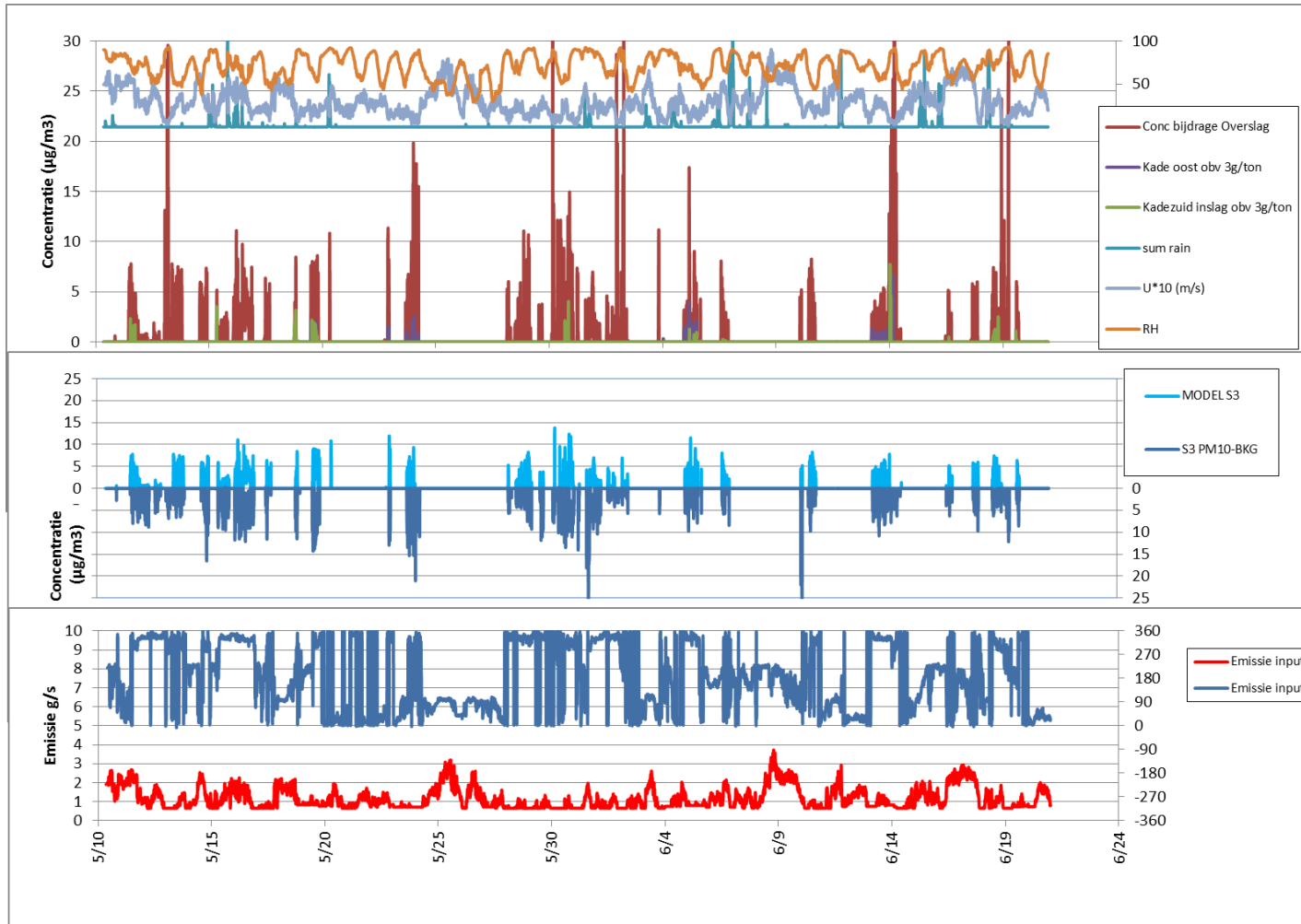


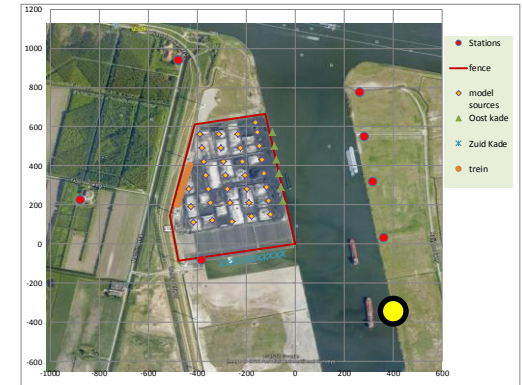
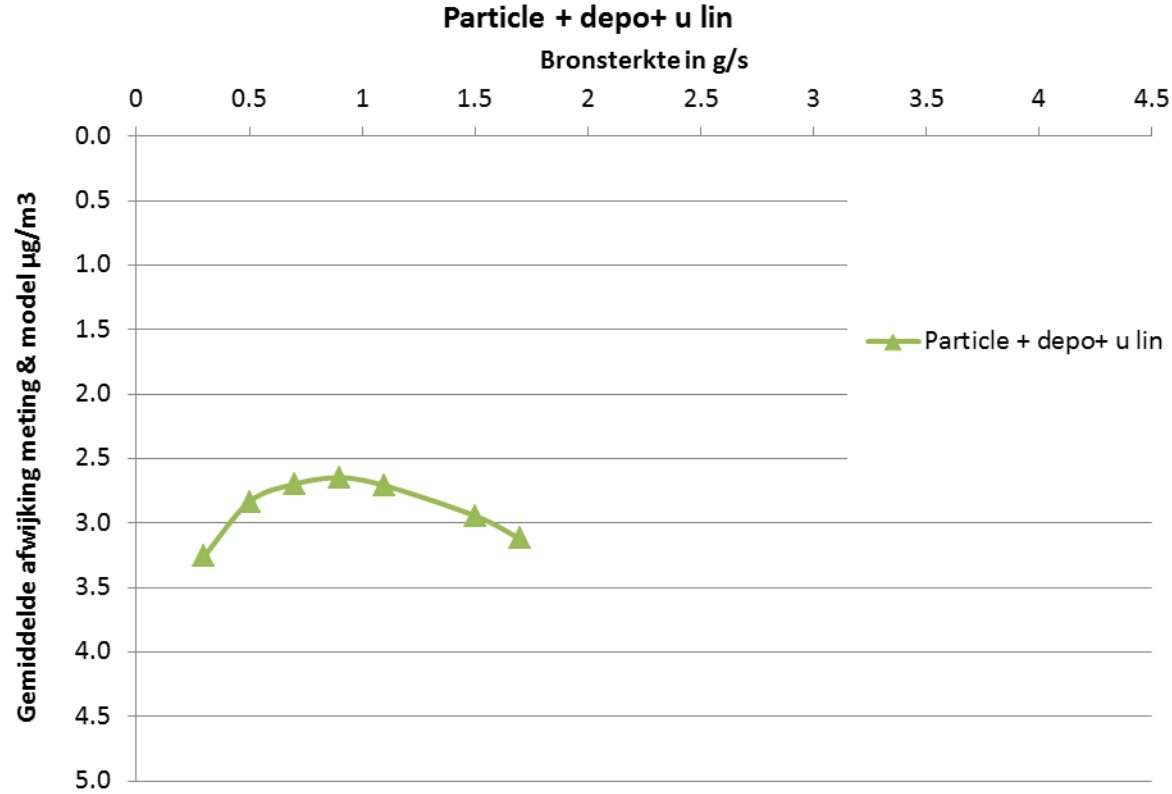


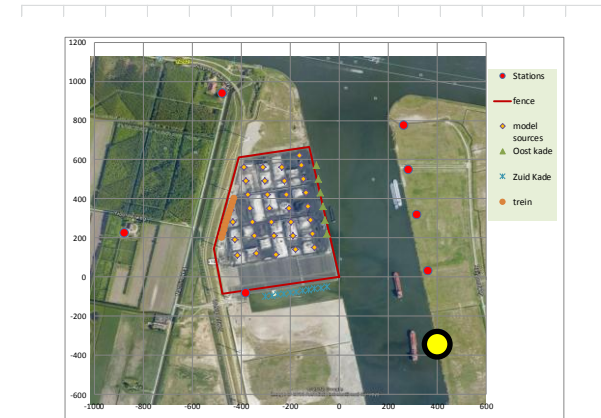
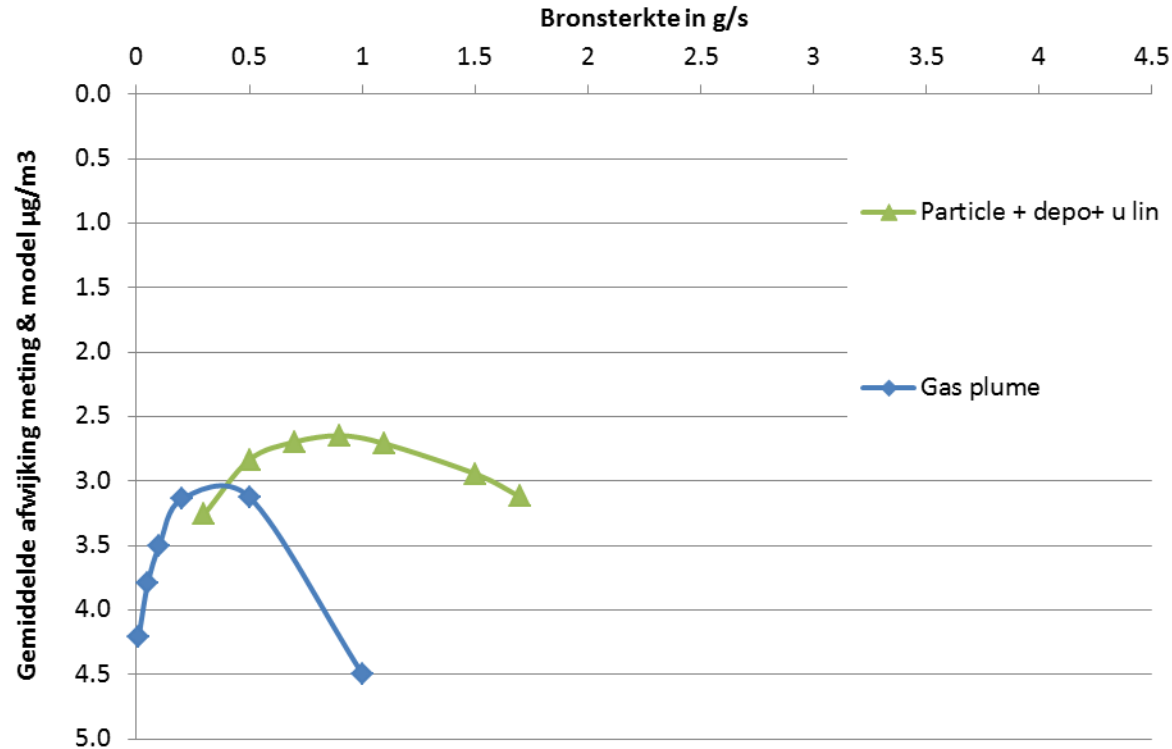




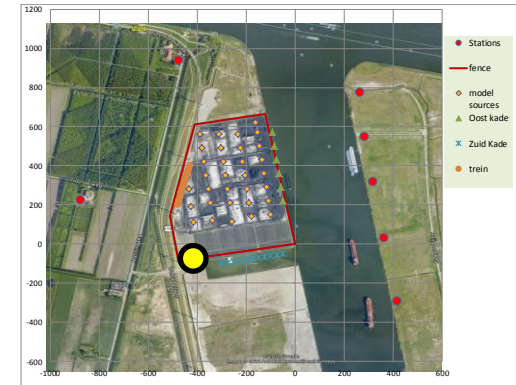
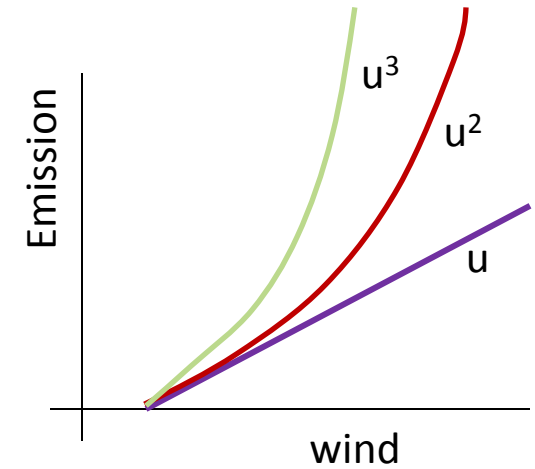
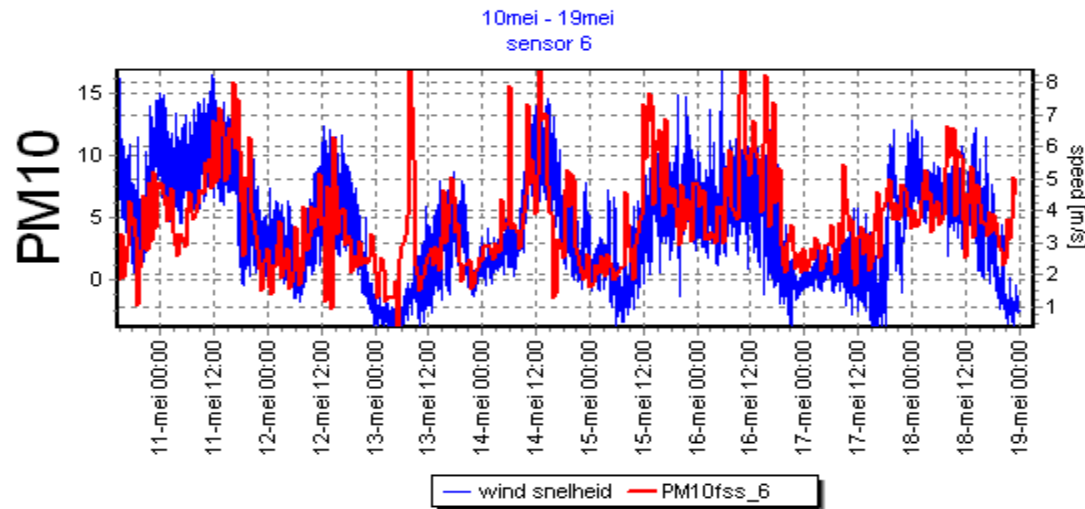
Dataset per locatie

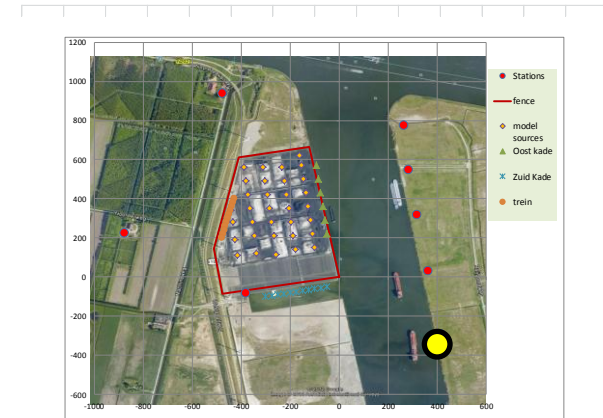
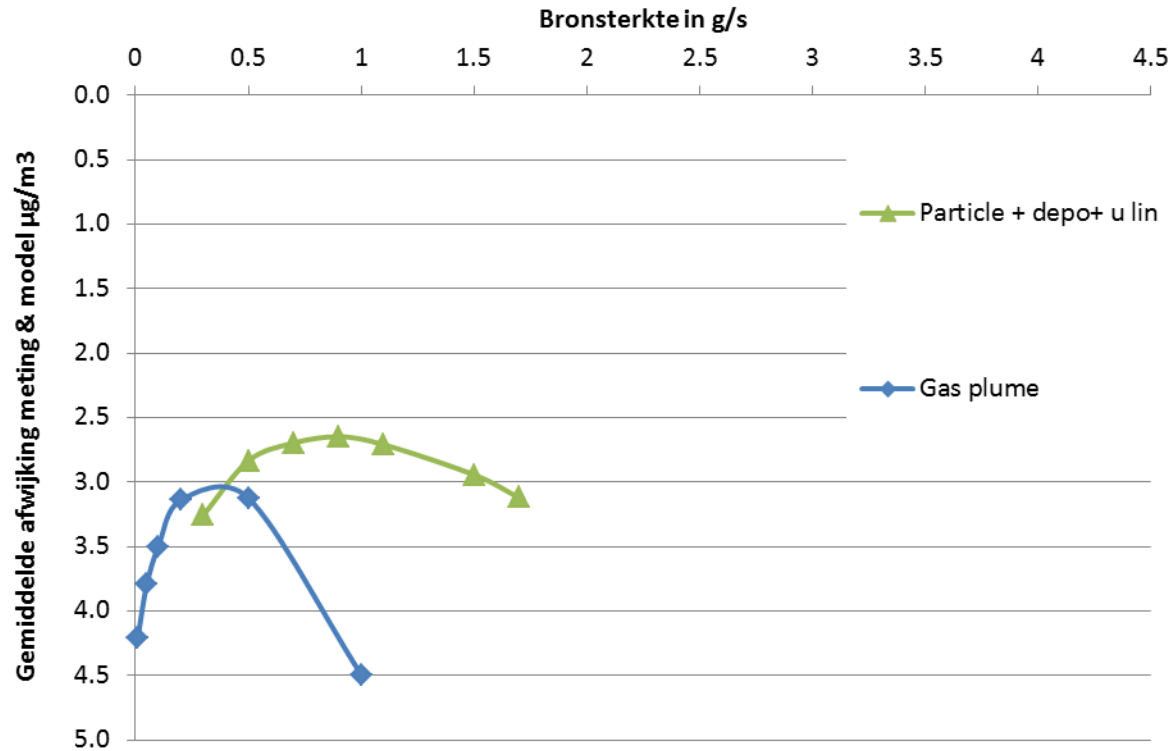


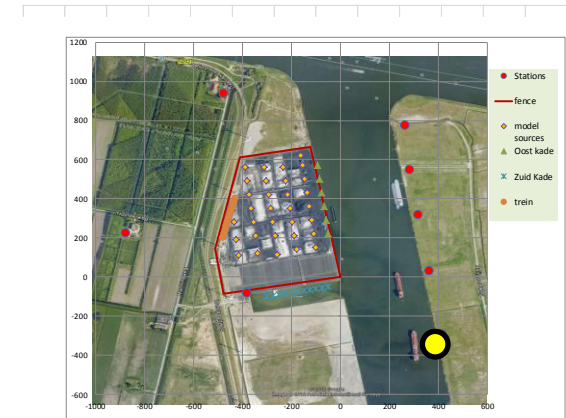
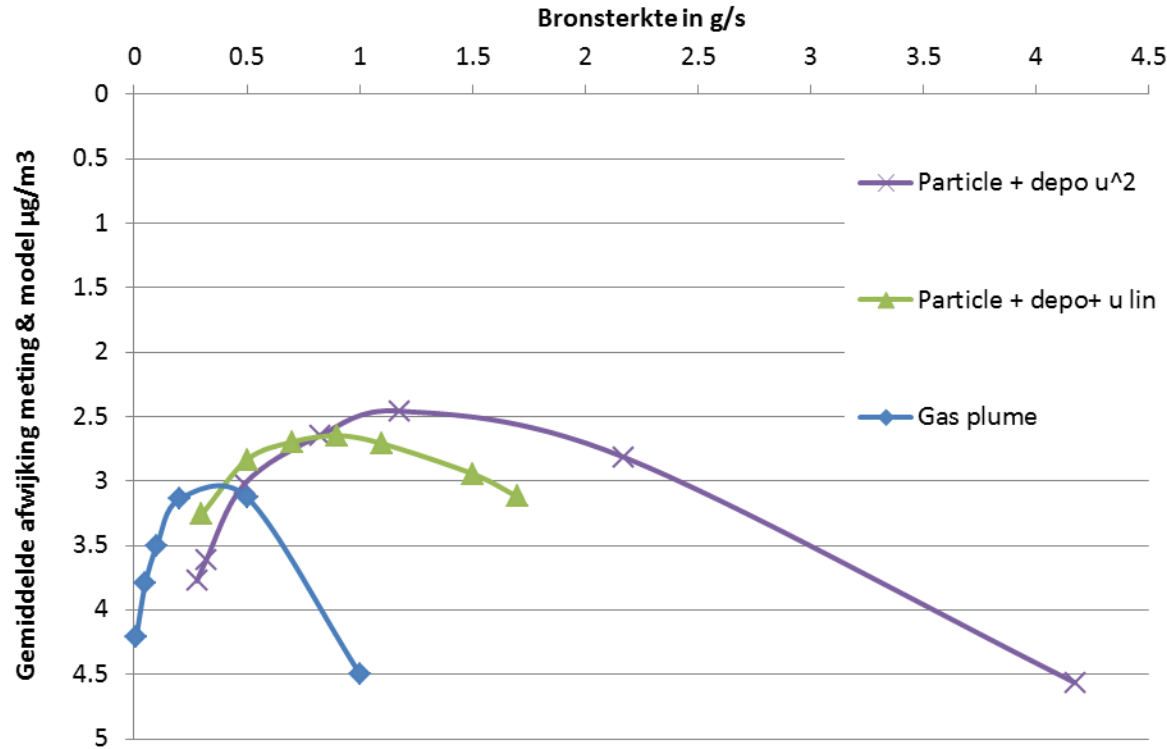


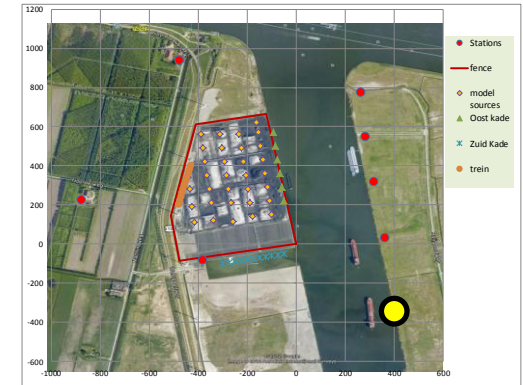
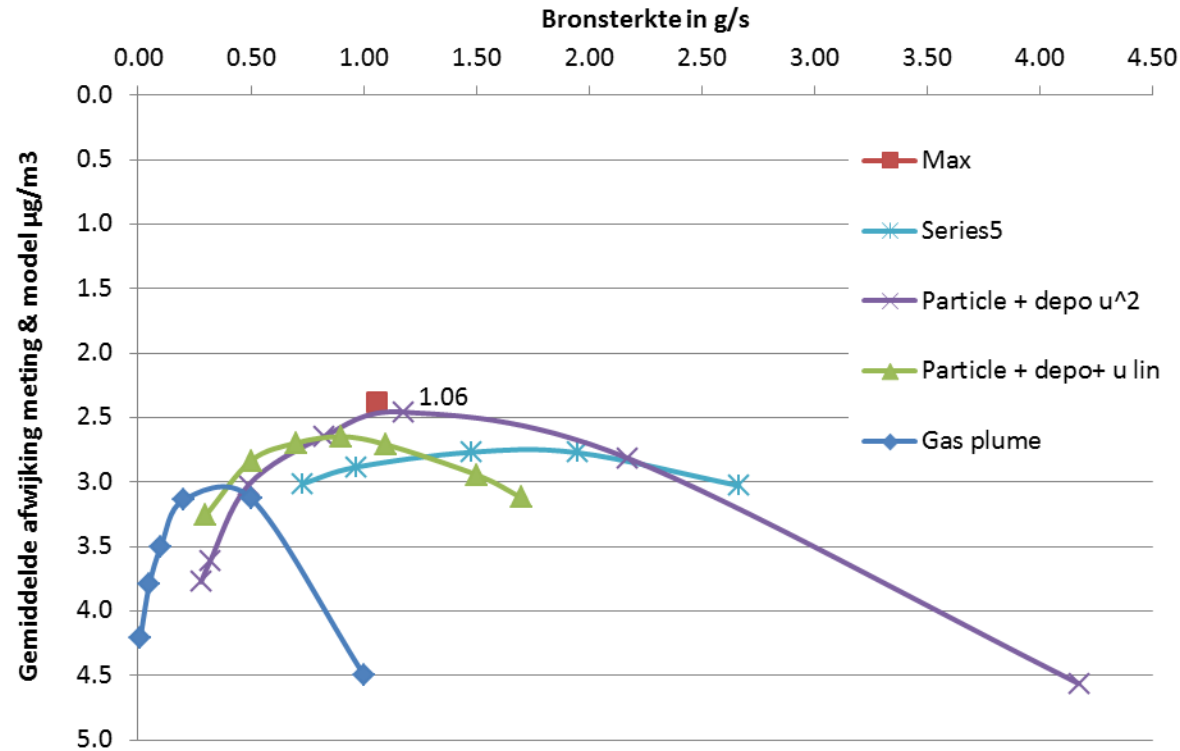


Windefect op emissie

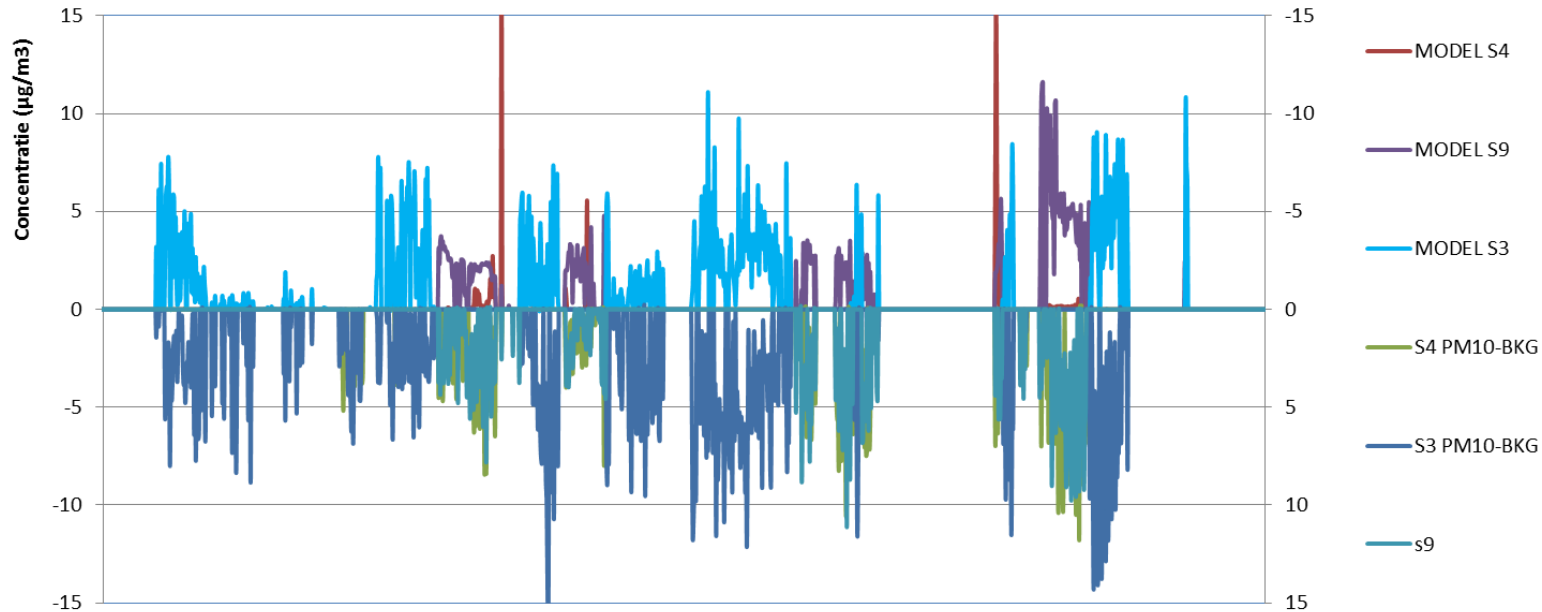








Combi van stations



Emissie factoren

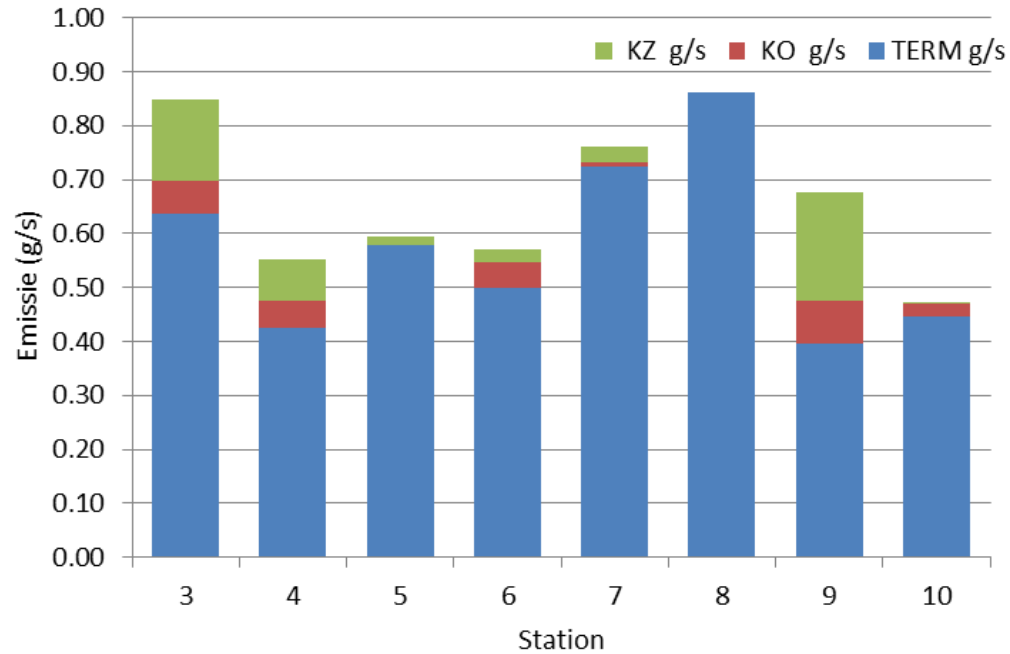


Restaat per station

Station + Meteo	Source g/s	TERM g/s	KO g/s	KZ g/s	EF KO g/ton	EF KZ g/ton	nr points	Gemiddelde concentratie boven achtergrond $\mu\text{g}/\text{m}^3$	Q index
3	0.85	0.64	0.06	0.15	0.18	0.45	884	5.1	56%
4	0.55	0.42	0.05	0.08	0.15	0.23	360	3.8	52%
5	0.60	0.58		0.02		0.05	607	4.5	45%
6	0.57	0.50	0.05	0.03	0.14	0.08	2800	8.7	51%
7	0.76	0.73	0.01	0.03	0.02	0.09	516	6.8	51%
8	0.88	0.86					760	9.1	65%
9	0.68	0.40	0.08	0.20	0.24	0.60	282	4.1	57%
10	0.47	0.45	0.02	0.00	0.07	0.00	326	5.0	43%
Gemiddeld	0.67	0.57	0.04	0.07	0.13	0.21	817	5.9	52%
rel std	22%	28%	57%	107%	57%	107%	101%	35%	13%
rel standard error	8%	10%	18%	28%	21%	39%	50%	19%	6%

$0.7 \pm 0.3 \text{ g/s}$

Emissie split over activiteit (per station)

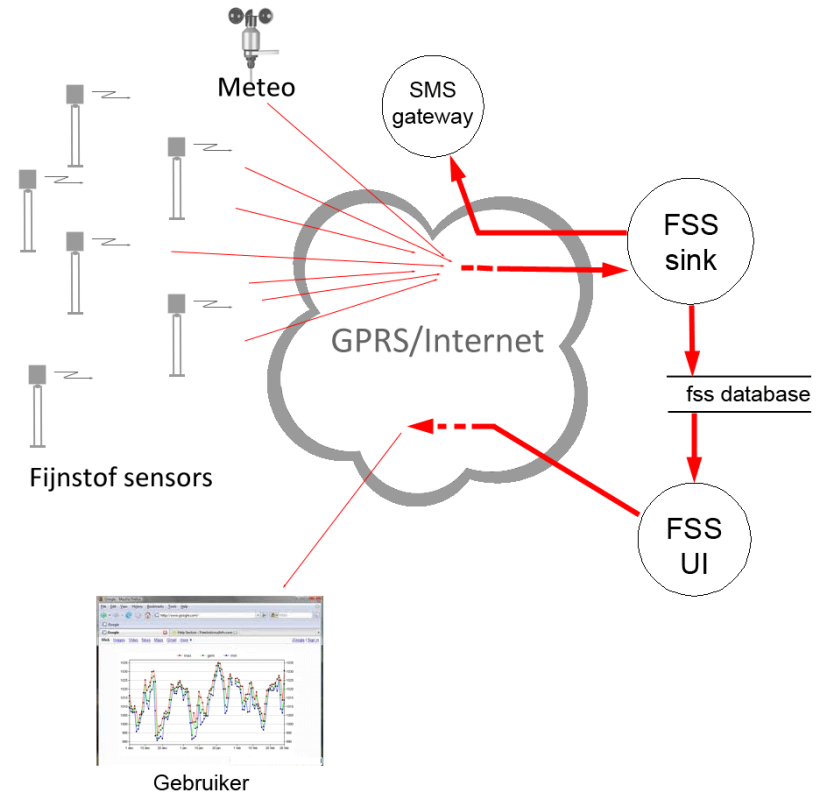


Emissie in context

Oppervlak	250000	m ²	Schatting voor de terminal
Doorzet	9000000	ton/jaar	g/s
Schattingen voor jaar emissies			
Vrins 1999	3	g/ton	0.86
	1	ton/ha/jaar	0.79
		Totaal:	1.65
TNO 1986	10-23	g/ton doorzet	2.9
	300	g/m ² /y	2.4
Novem 1991	1-5000	µg/m ² /s	0.25
Peutz 2005			
Onbehandeld (10%)	4.1	ton/ha/jaar opslag	0.62*
Behandeld (90%)	0.41		
Peutz 2005	3	gram/ton handling	0.86
Gemiddelde tijdens meetcampagne			0.7 ± 0.3

Opzet nu...

System setup



Rietlanden

Inloggen

Voordat u verder kunt, moet u inloggen met uw persoonlijke account.

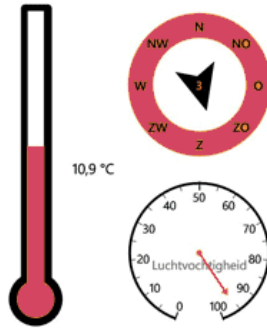
E-mailadres

Wachtwoord

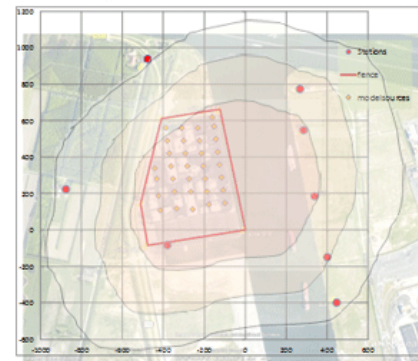
Inloggen

[Wachtwoord vergeten?](#)

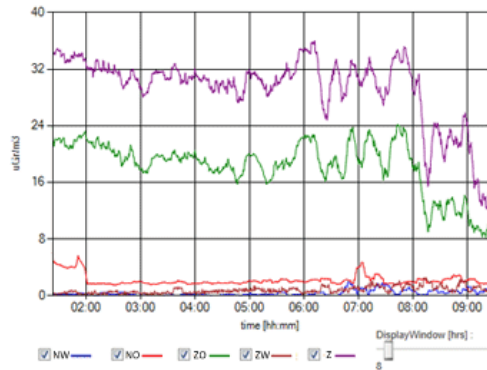
Meteo



Contourplot



Fijnstof



Meldingen

2012-10-22 13:48:01 Lorem ipsum dolor sit amet, conse...

2012-10-22 13:48:01 Lorem ipsum dolor sit amet, conse...

2012-10-22 13:48:01 Lorem ipsum dolor sit amet, conse...

2012-10-22 13:48:01 Lorem ipsum dolor sit amet, conse...

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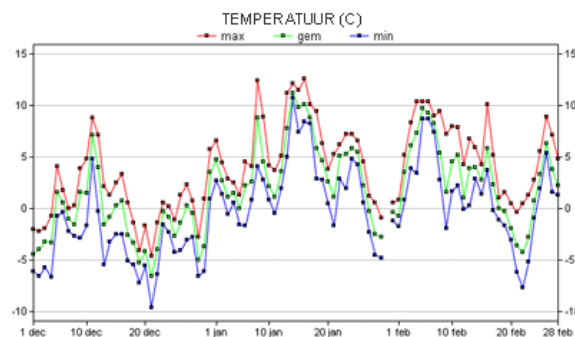
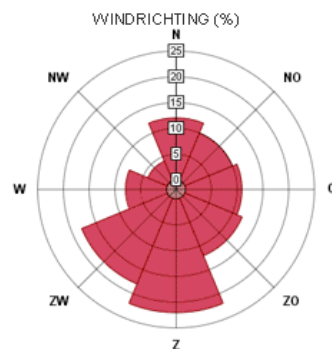
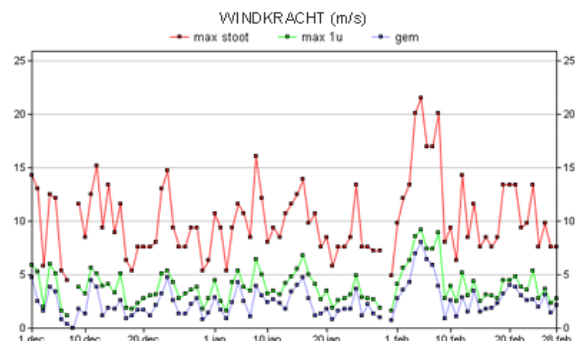
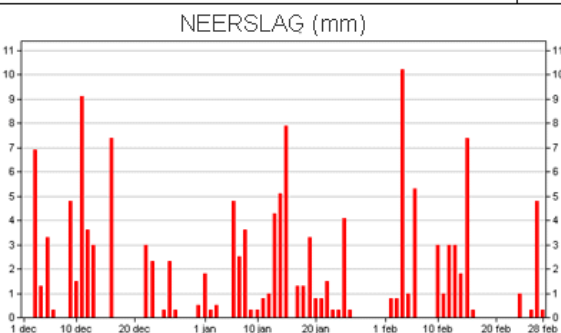
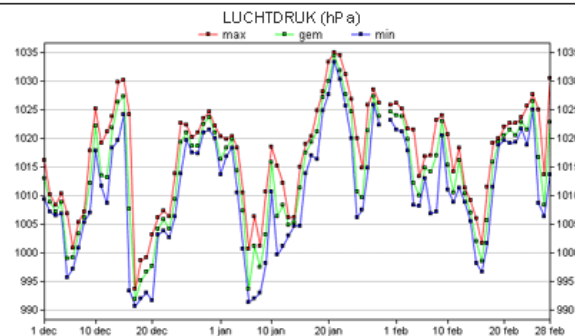
2012-10-22 13:48:01 Lorem ipsum dolor sit amet, conse...

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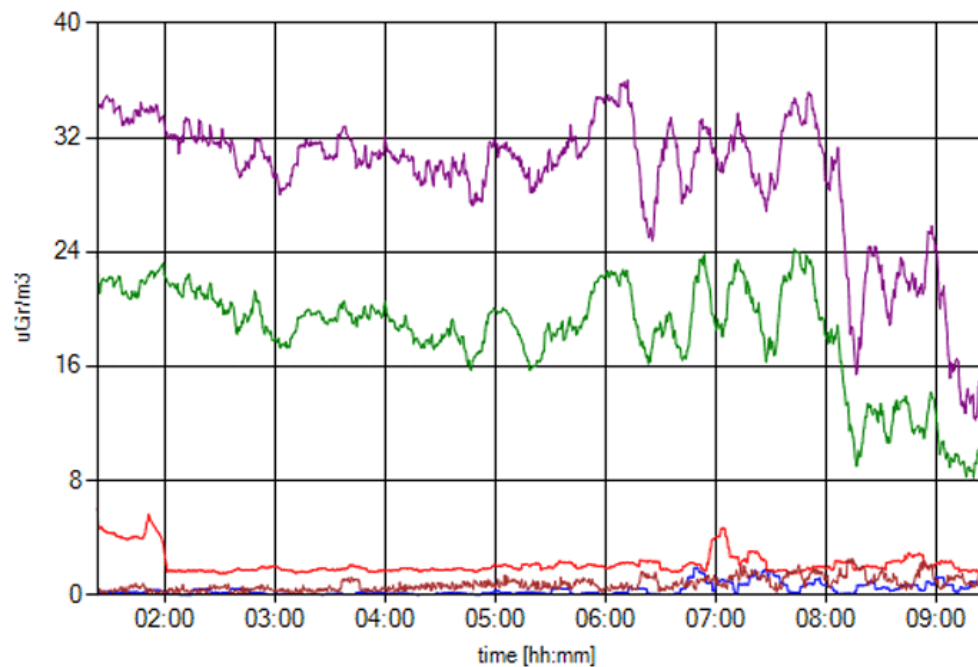
2012-10-22 13:48:01 Lorem ipsum dolor sit amet, conse...

2012-10-22 13:48:01 Lorem ipsum dolor sit amet, conse...



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☒ NW ☒ NO ☒ ZO ☒ ZW ☒ Z

Show:

☒ Average

☐ Min

☐ Max

Meldingen

22-10-2012 16:34:01

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WILT U ER OOK EEN ???

Conclusies

Waar zijn we nu & waar willen we heen :

- Het werkt



- Van Louzy & Subjectief  Louzy maar Objectief  Goed !

- Science ahead!
 - Als daar budget voor is



ECN: uw partner bij
diepgravend onderzoek

Bedankt voor de aandacht!

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