

# Atmospheric transport and deposition of pesticides in Sweden

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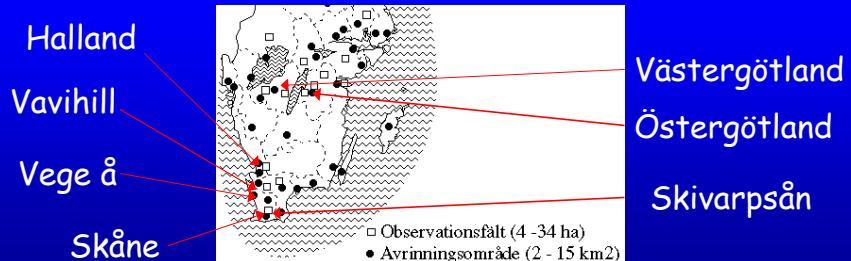


*Pesticide Behaviour in Soils, Water and Air*  
Warwick, UK 28 March 2006

## Pesticide Monitoring Programme

as part of the Swedish EPA's national monitoring  
programmes for agriculture and air (Started in 2002)

- 4 catchments (8-16 km<sup>2</sup>)
- 2 rivers (90-500 km<sup>2</sup>)
- Atmospheric deposition at Vävihill





## Methods

- Rain water collected
  - Event related sampling using a bulk sampler (a stainless steel funnel, area 0.5 m<sup>2</sup>, above a fridge)
  - 12 samples per year during May/Jun & Sep/Oct
  - Analysis including ca 85 different pesticides and some metabolites



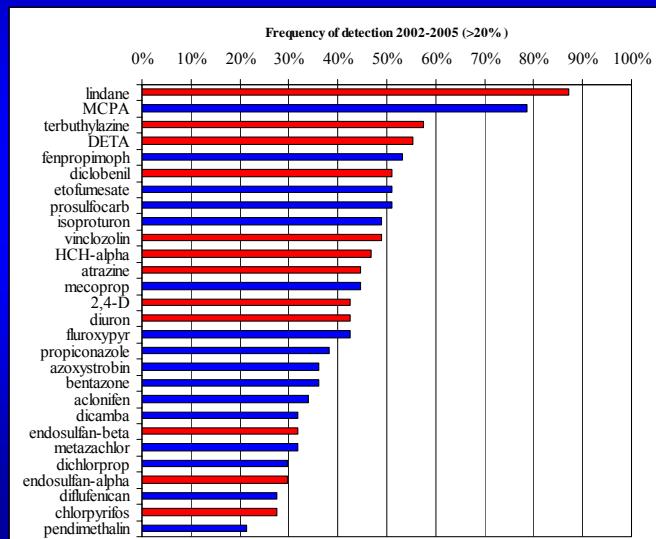
## Results 2002-2005

- 40 pesticides & 5 degradation products were detected in rainwater
  - 26 herbicides, 8 fungicides & 6 insecticides
- Most detects at the ng/l-level, though some were occasionally detected above 0.1 µg/l (prosulfocarb, isoproturon, MCPA & pendimethalin)
- Max conc. 0.8 µg/l (prosulfocarb)

## Results (ctd)

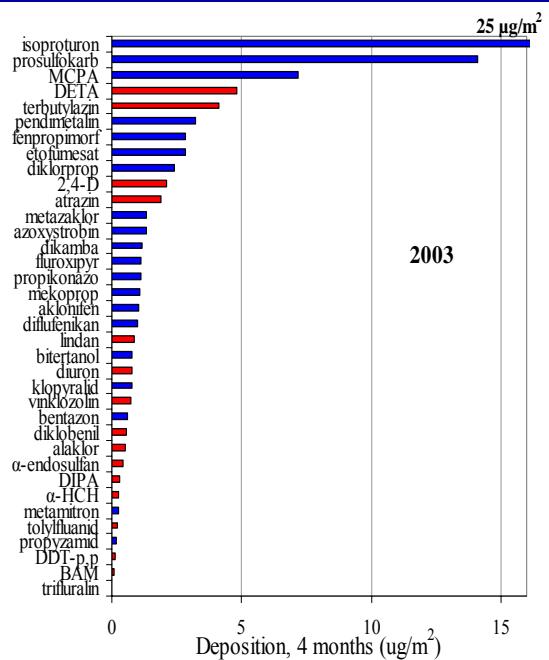
- 11 of the pesticides detected are no longer registered for use in Sweden (most of them since more than ca 10 y)
  - 2,4-D, atrazine, dichlobenil, diuron, endosulfan, lindane (incl.  $\alpha$ -HCH), terbutylazine (incl. DETA), vinclozolin

Frequency of detection in rainwater at  
Vavihill 2002-2005 (n=47)  
red bars = pesticides not used in Sweden



## Deposition

- Total deposition  
0.3-0.9 g/ha  
(4 months)
- Deposition  
0.01-0.0004%  
of appl. dose



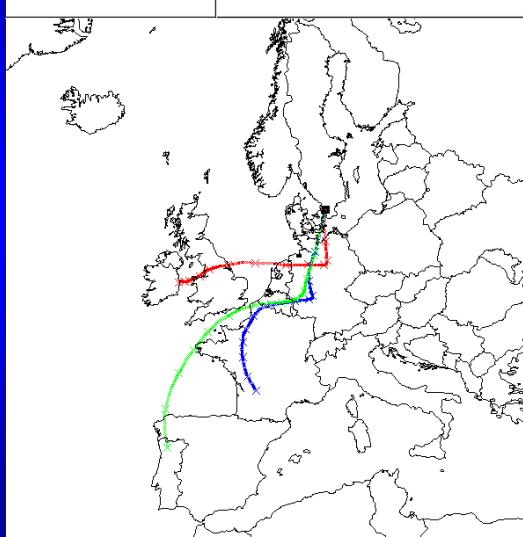
## Question 1

- Is there a correlation between composition of detected pesticides and origin of air-masses

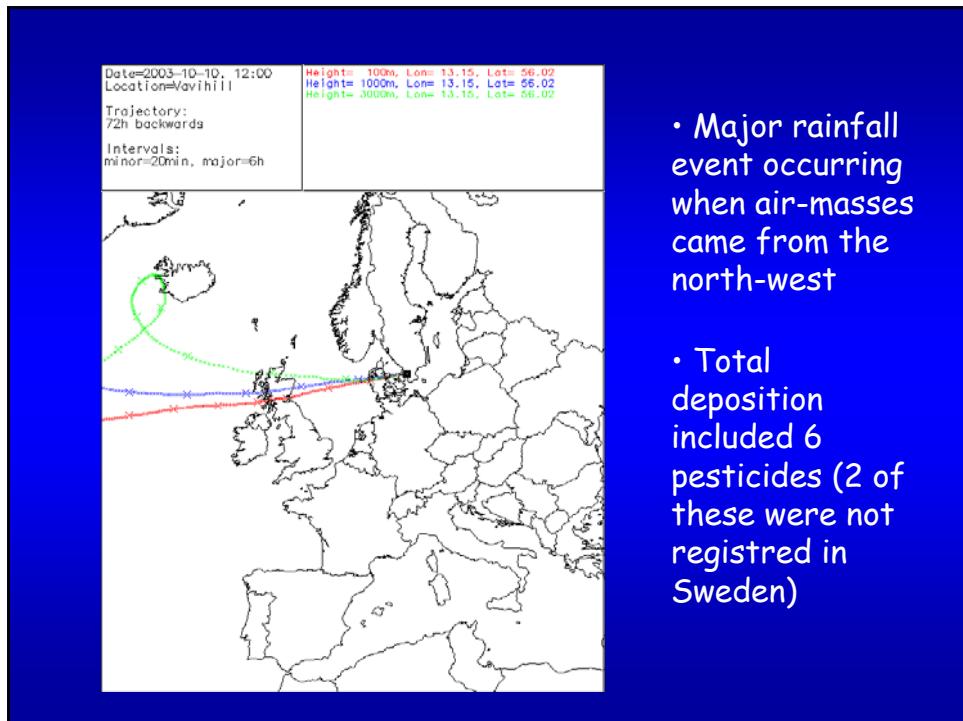
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Location=vavihill  
Height= 100m, Lon= 13.15, Lat= 56.02  
Height= 1000m, Lon= 13.15, Lat= 56.02  
Height= 3000m, Lon= 13.15, Lat= 56.02

Trajectory:  
72h backwards

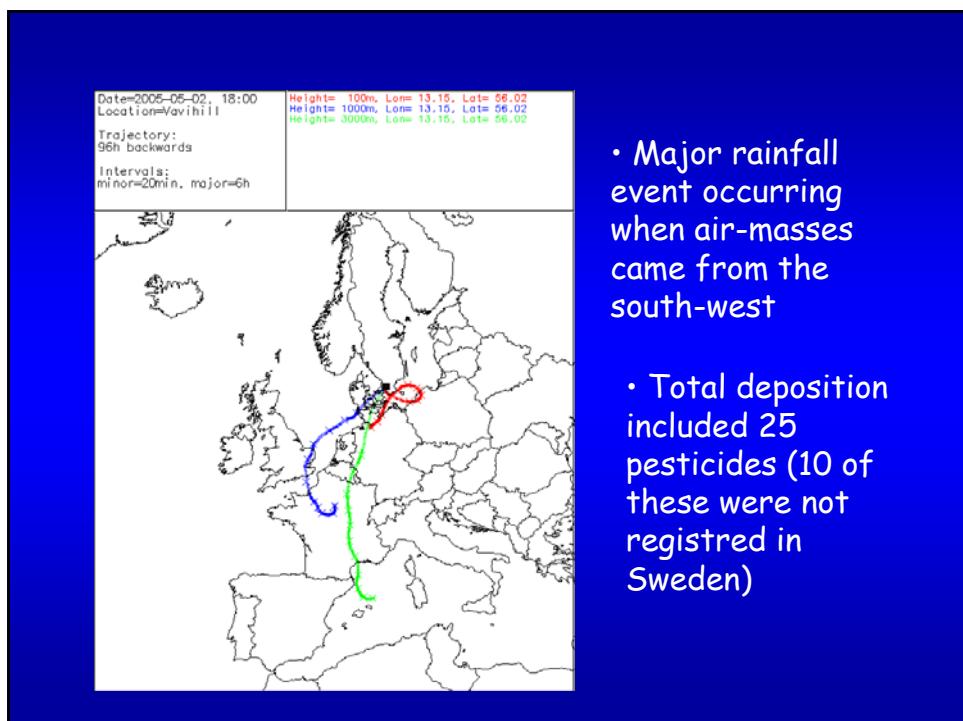
Intervals:  
minor=20min, major=6h



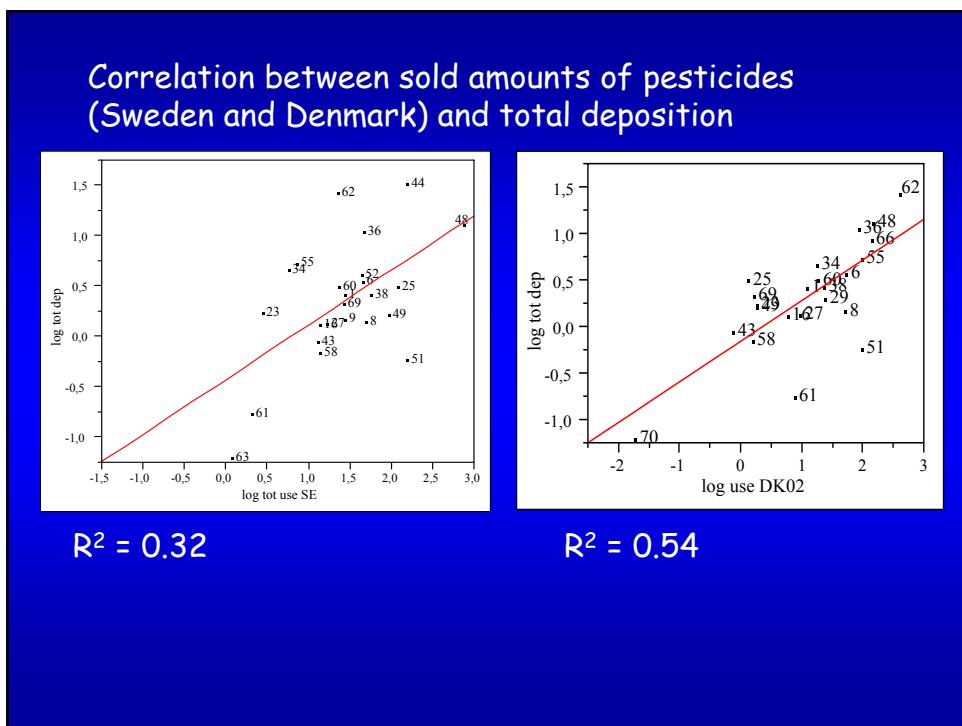
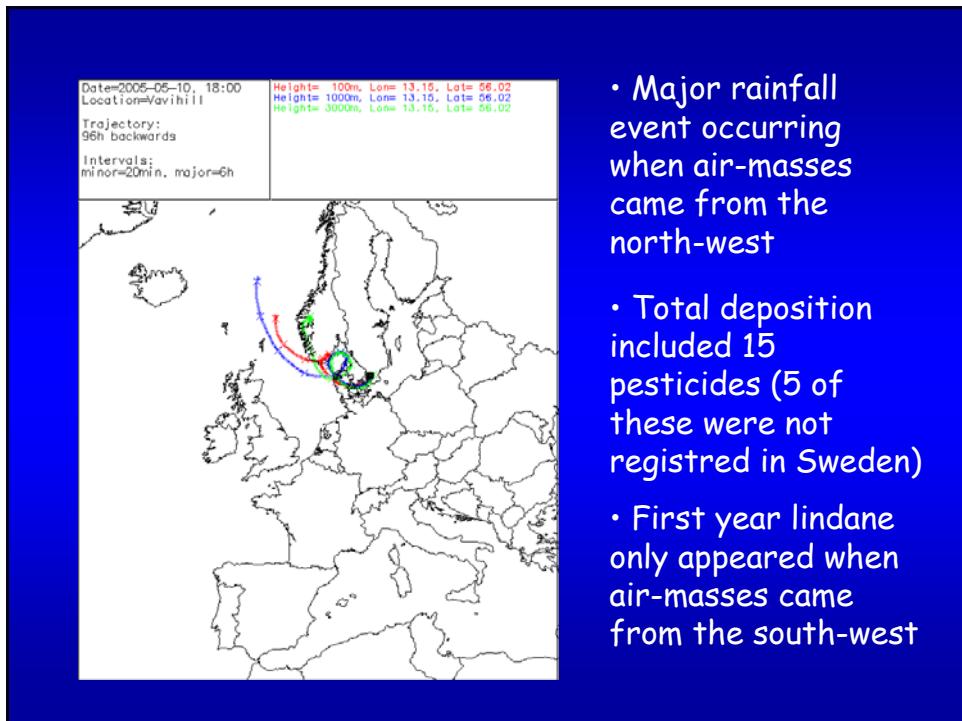
- Major rainfall event occurring when air-masses came from the south-west
- Total deposition included 12 pesticides (6 of these were not registered in Sweden)



- Major rainfall event occurring when air-masses came from the north-west
- Total deposition included 6 pesticides (2 of these were not registered in Sweden)



- Major rainfall event occurring when air-masses came from the south-west
- Total deposition included 25 pesticides (10 of these were not registered in Sweden)

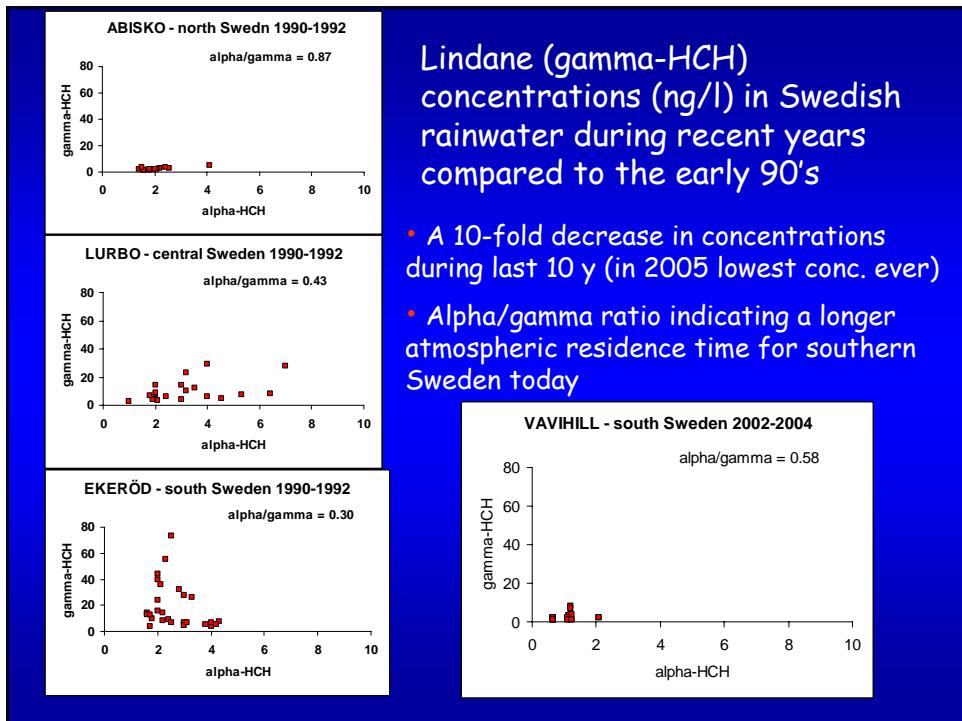


## Vapour pressure

Substance	log Vp (Pa)	
dichlobenil	-0,8	
trifluralin	-2,2	
<u>prosulfocarb</u>	-2,2	Prosulfocarb, fenpropimorph and pendimethalin used in Sweden
lindane	-2,4	
<u>fenpropimorph</u>	-2,5	
chlorpyrifos	-2,6	
alachlor	-2,7	
<u>pendimethalin</u>	-2,7	

## Question 2

- Lindane has now been taken off the market within the EU - are there any changes in the deposition of lindane in Sweden?



## Conclusions

- Currently used pesticides are regularly detected at ng/l-levels in rainwater
- Deposited amount corresponds to ca 0.01-0.0004% of applied dose
- A significant contribution to atmospheric deposition in southern Sweden from pesticides that are no longer used within Sweden
- There is a correlation between origin of air-masses and composition of detected pesticides
- Lindane, now banned within the EU, is detected at decreasing concentrations