Dynamic modelling of pesticide fluxes to surface waters using SWAT

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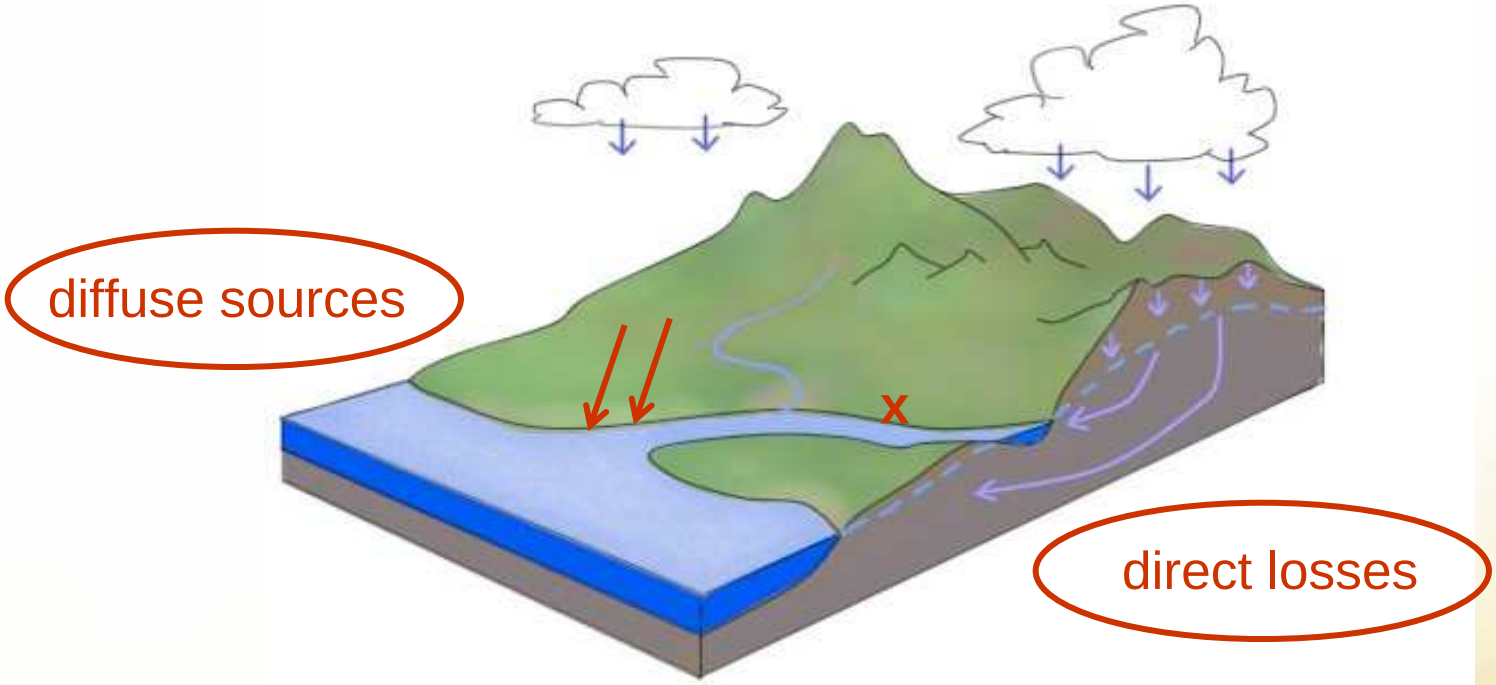
Problem statement



how important are direct losses

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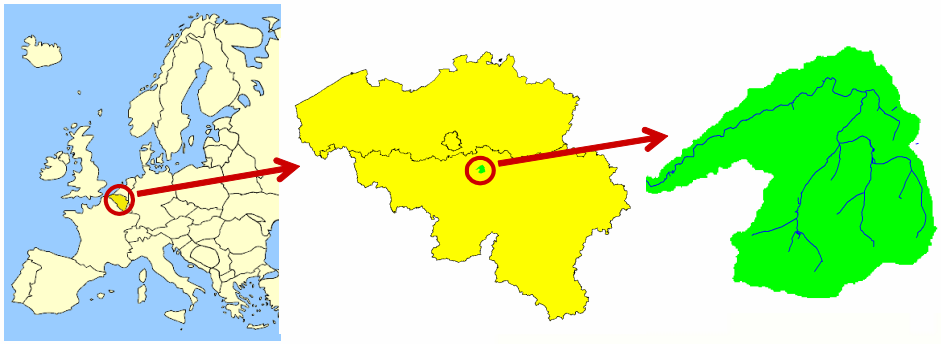
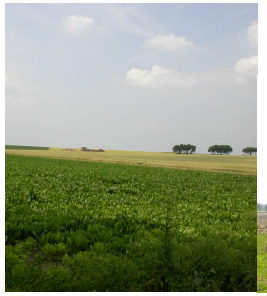
should we add them to SWAT?


Case study

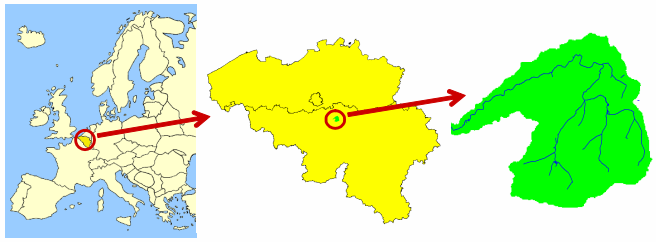
- location

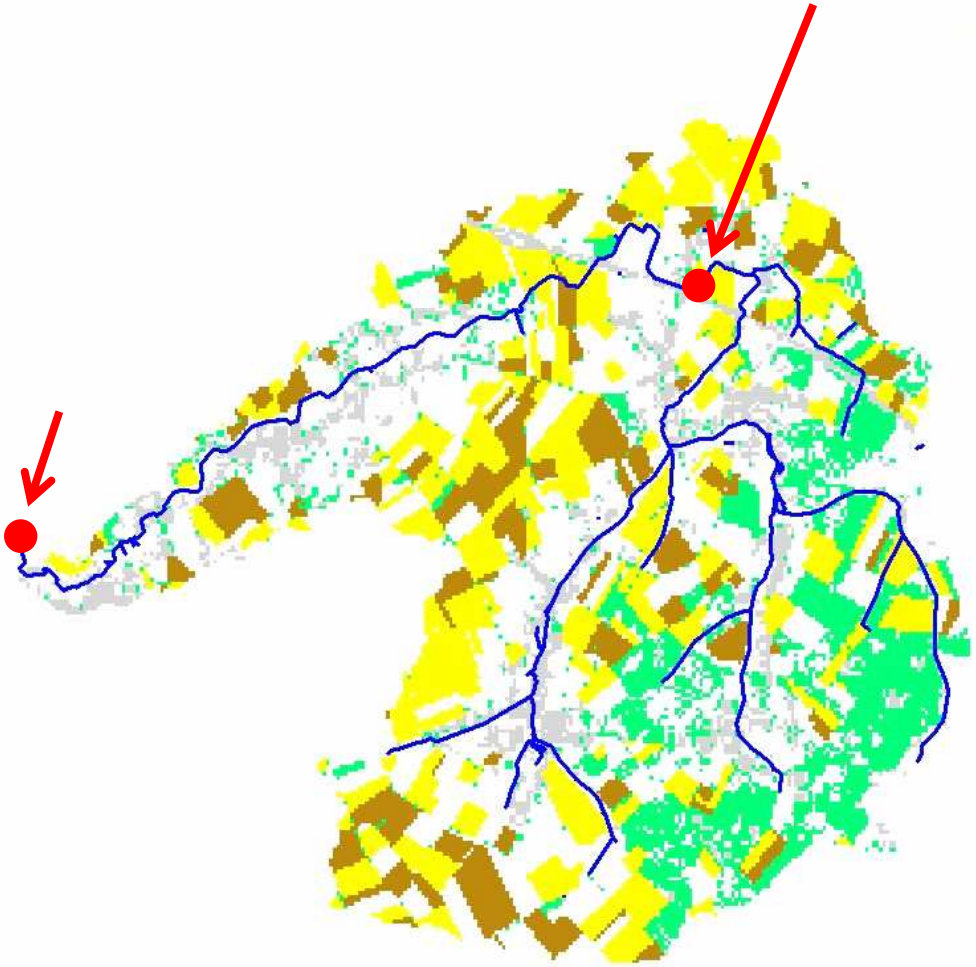


- small basin: 34 km², 16 km long, *t* = 1 day
- well documented
- studied in detail for pesticide application: 1998-2002

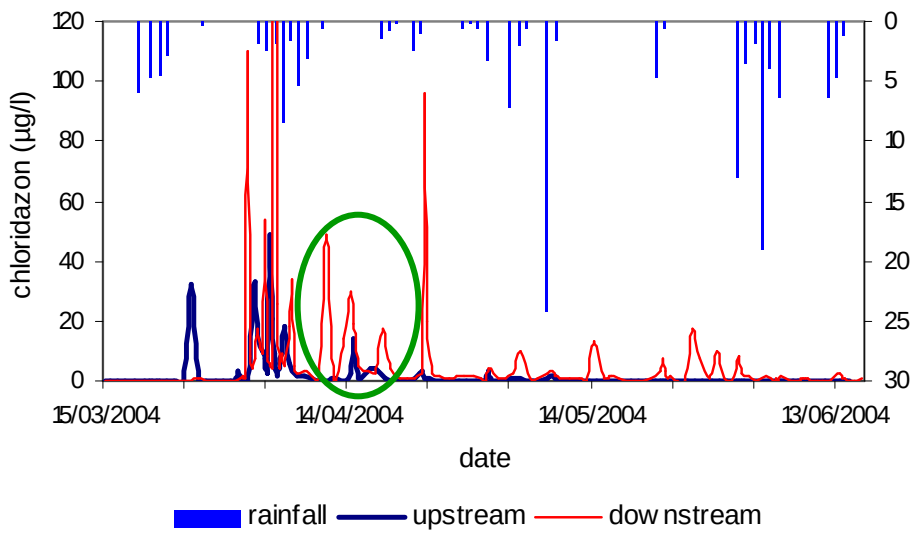


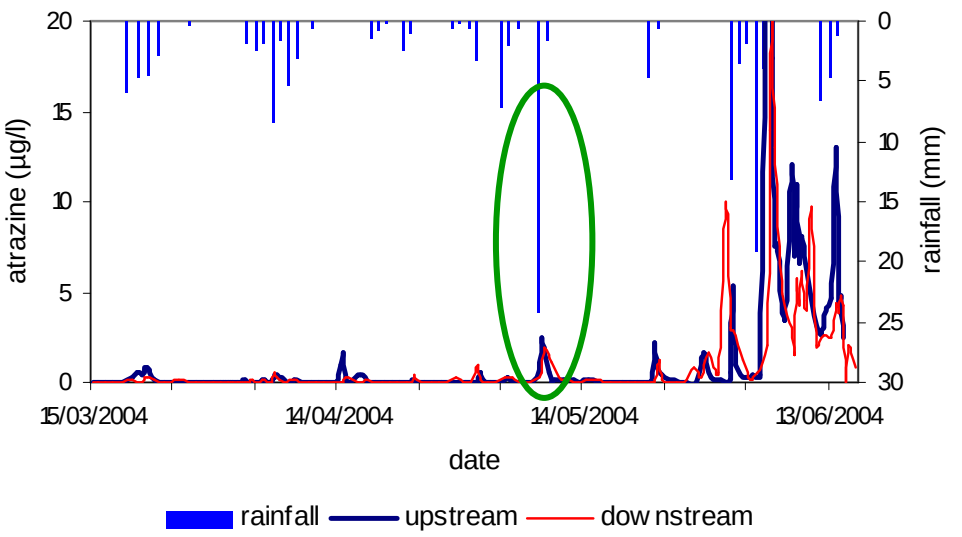
Case study





	teelt	% opp.	pesticide
	SGBT	10.34	→ chloridazon
	CORN	15.09	→ atrazine
	WATR	0.03	
	WWHT	21.53	→ isoproturon





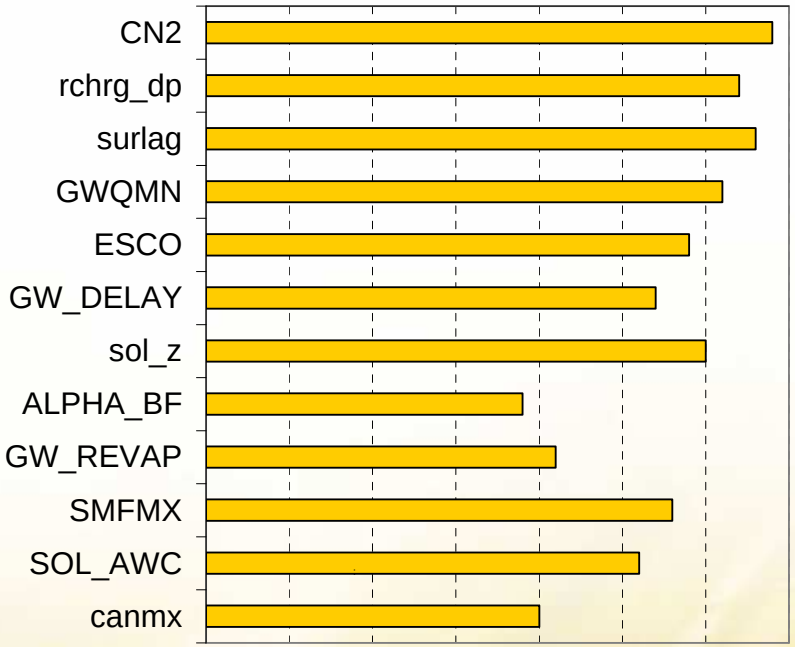
→ highly dynamic system with hourly variations

→ due to runoff but also to direct losses

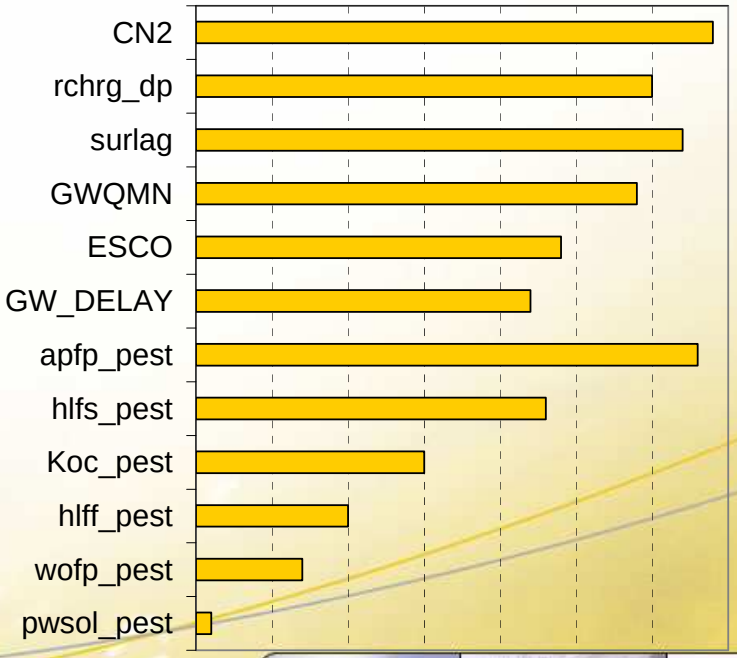
Modelling pesticide fluxes

Sensitivity analysis:

hydrology

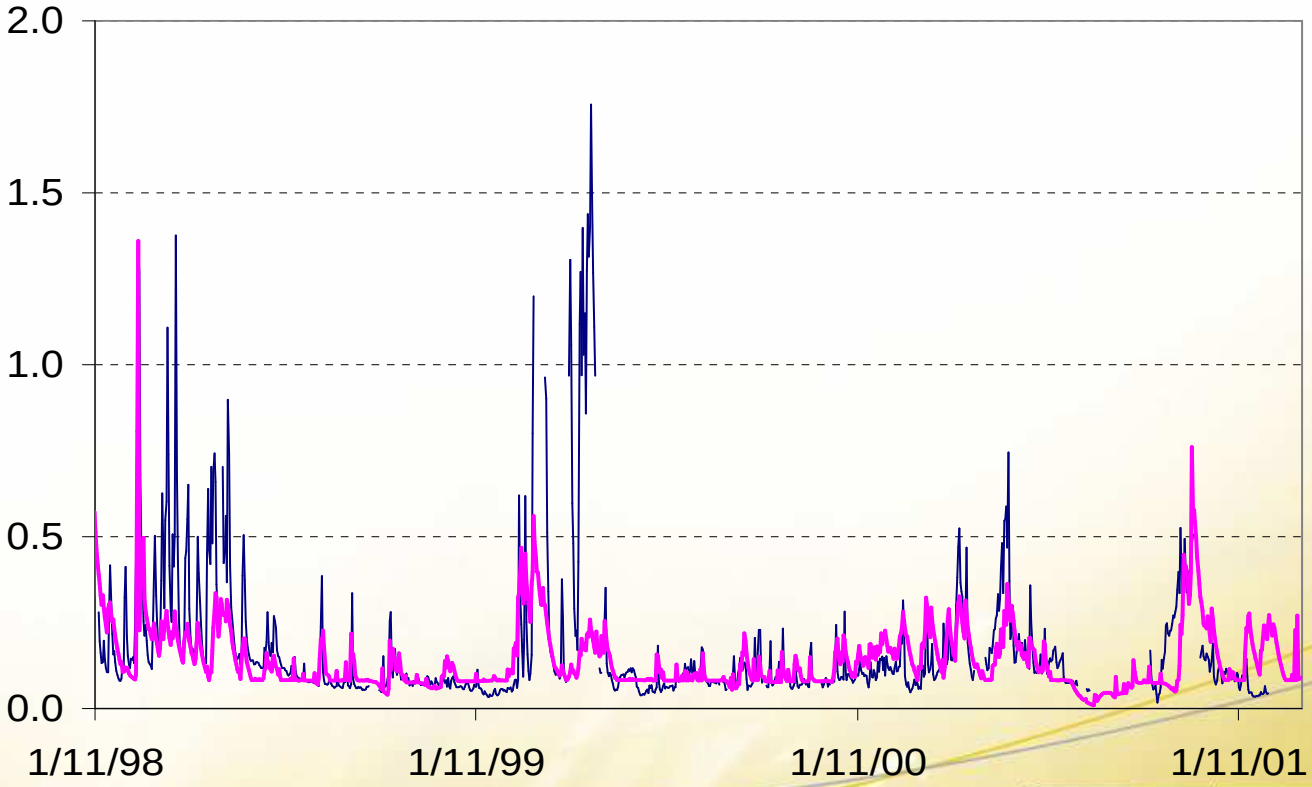


pesticide supply

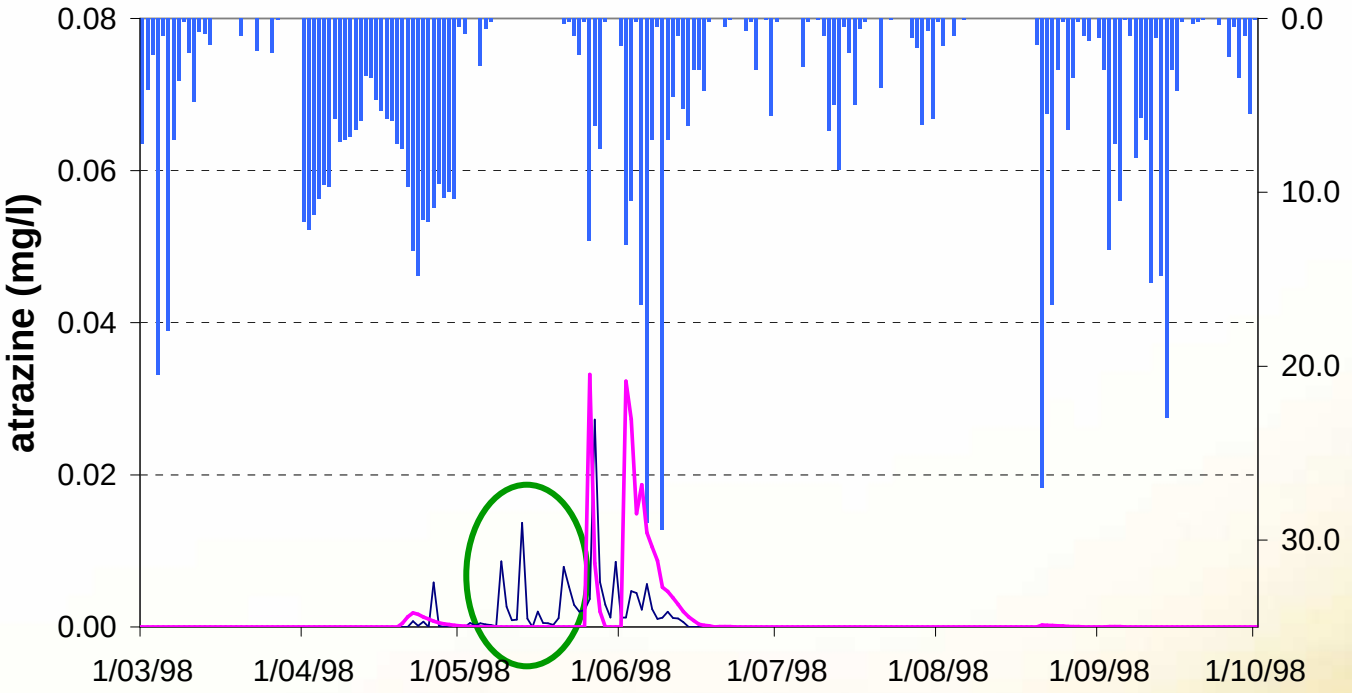


Modelling pesticide fluxes

hydrology



Modelling pesticide fluxes



→ acceptable agreement

→ direct losses are lacking


Adjustments to SWAT

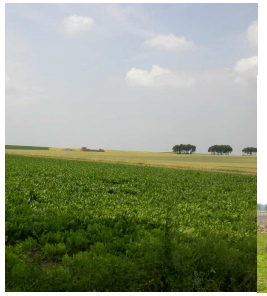
Insertion in the apply.f –file:

```
if (k == irtpest) then
drift(jj)= drift(jj) + xx * (1-ap_ef(kk))* hru_km(j) * 100. * 1.e6
end if
xx = xx * ap_ef(kk)
```

with: xx : amount of pesticide applied to HRU
ap_ef : application efficiency
hru_km : area of HRU

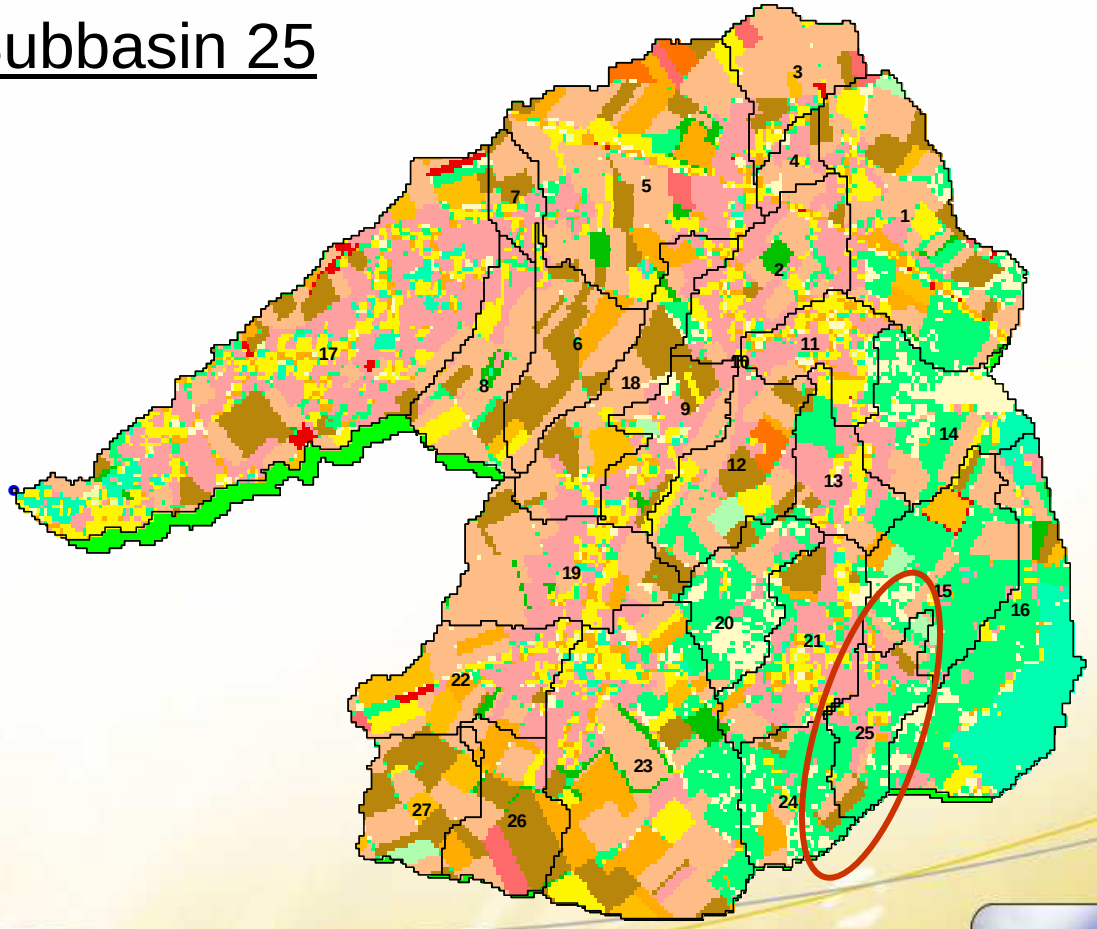
Insertion in the virtual.f-file:

```
varoute(11,ihout) = wsolp(sb) +drift(sb)
```

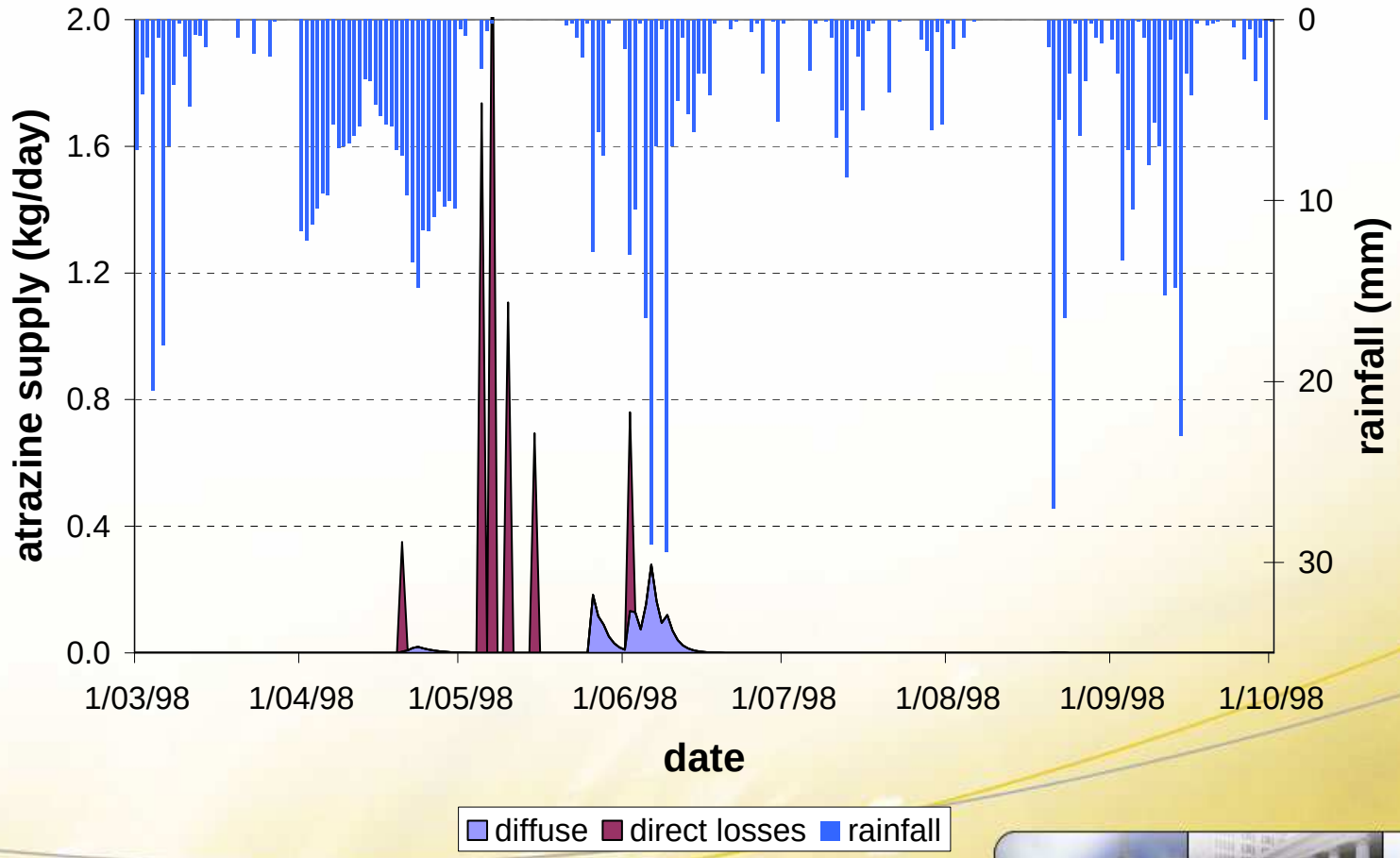


Modelling results: subbasin 25

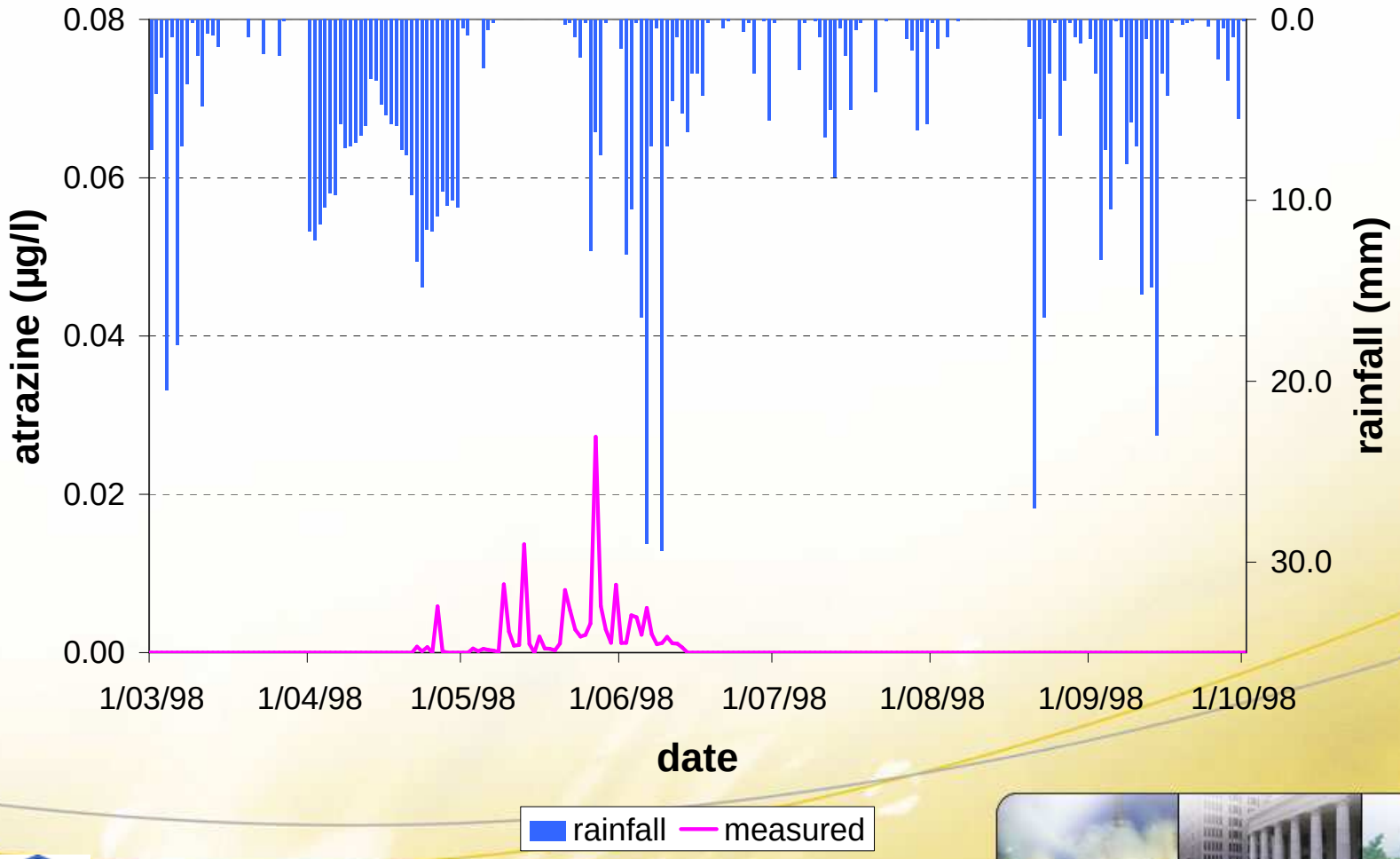
Subbasin 25



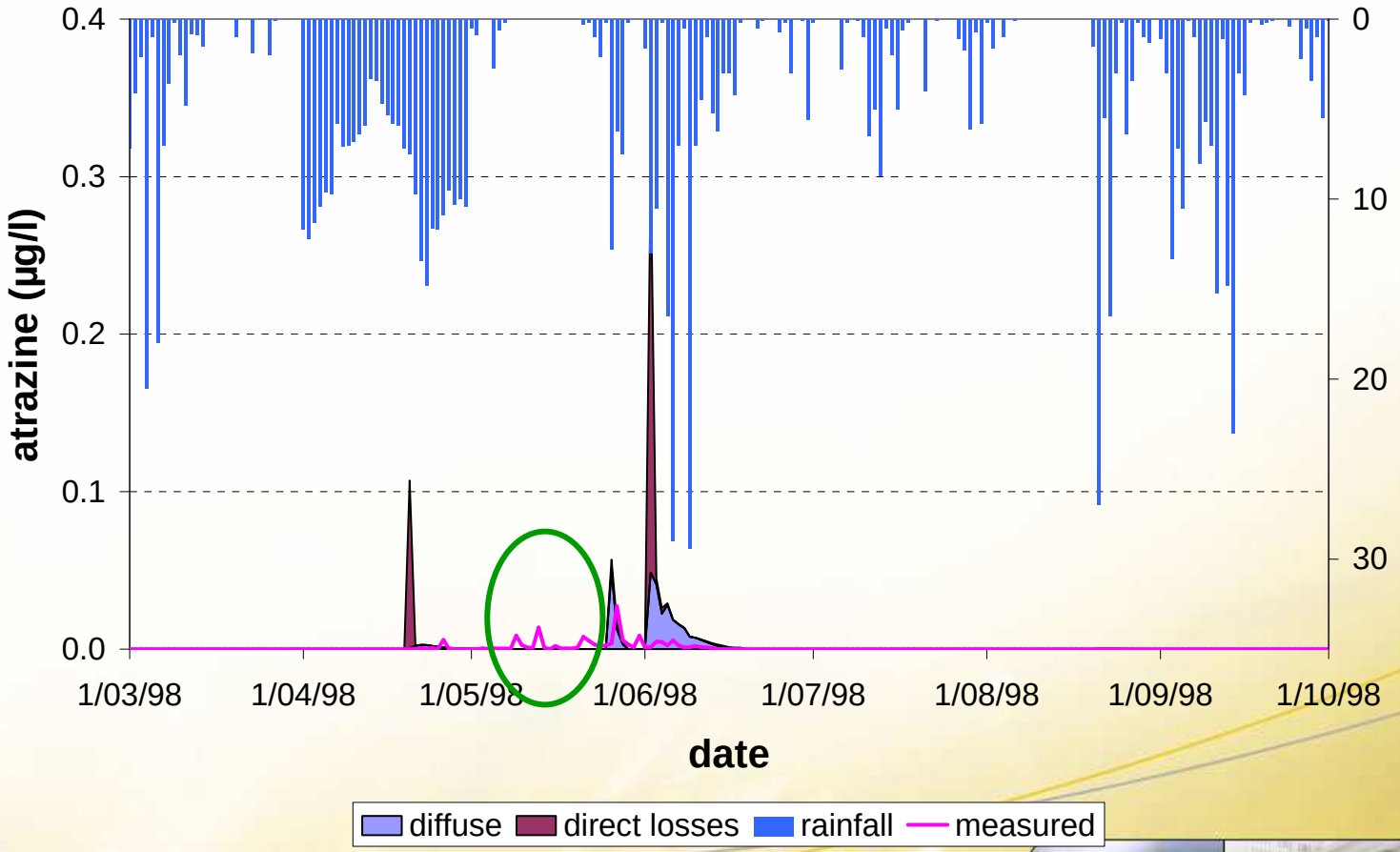
Modelling results: subbasin 25



Modelling results: subbasin 25



Modelling results: mouth of the river




Conclusions

- direct losses can contribute for 50 to 70% of pesticide load
- sensitivity analysis → sensitive parameters
- calibration of pesticide supply with SWAT2000 gives reliable predictions
- in dry periods: → extension of SWAT code

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better results

- what happens in routing towards the mouth?


questions ?