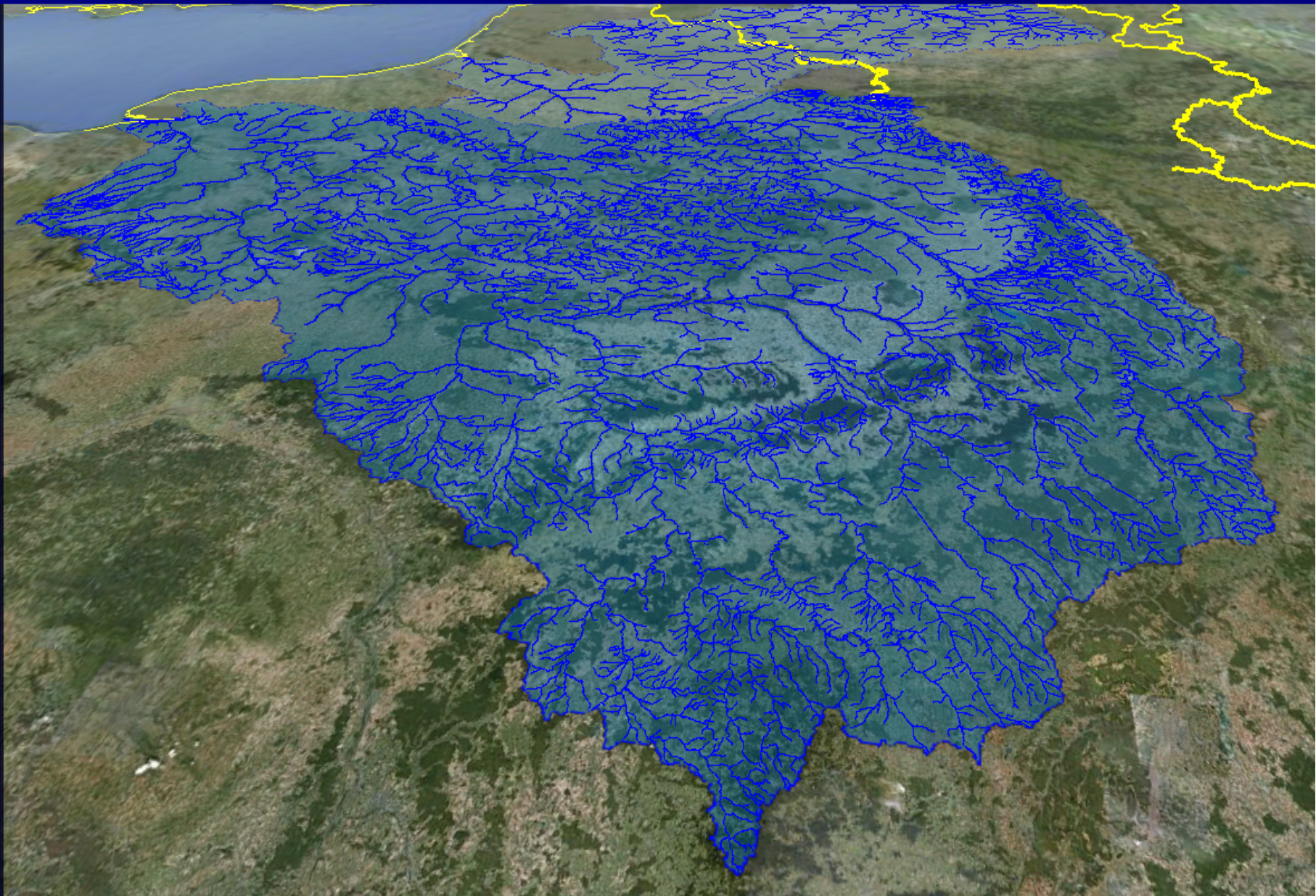


Riverine nutrients fluxes to the North Sea and harmful algal blooms, what changed since 1984?

Passy P., Gypens N., Billen G., Garnier J., Thieu V.,
Rousseau V., Callens J., Parent J-Y., Lancelot C.

EGU 2013 BG 3.2
12/04/2013 - Vienna





**COMMISSION
OSPAR**

« *Protecting and conserving the North-East Atlantic* »

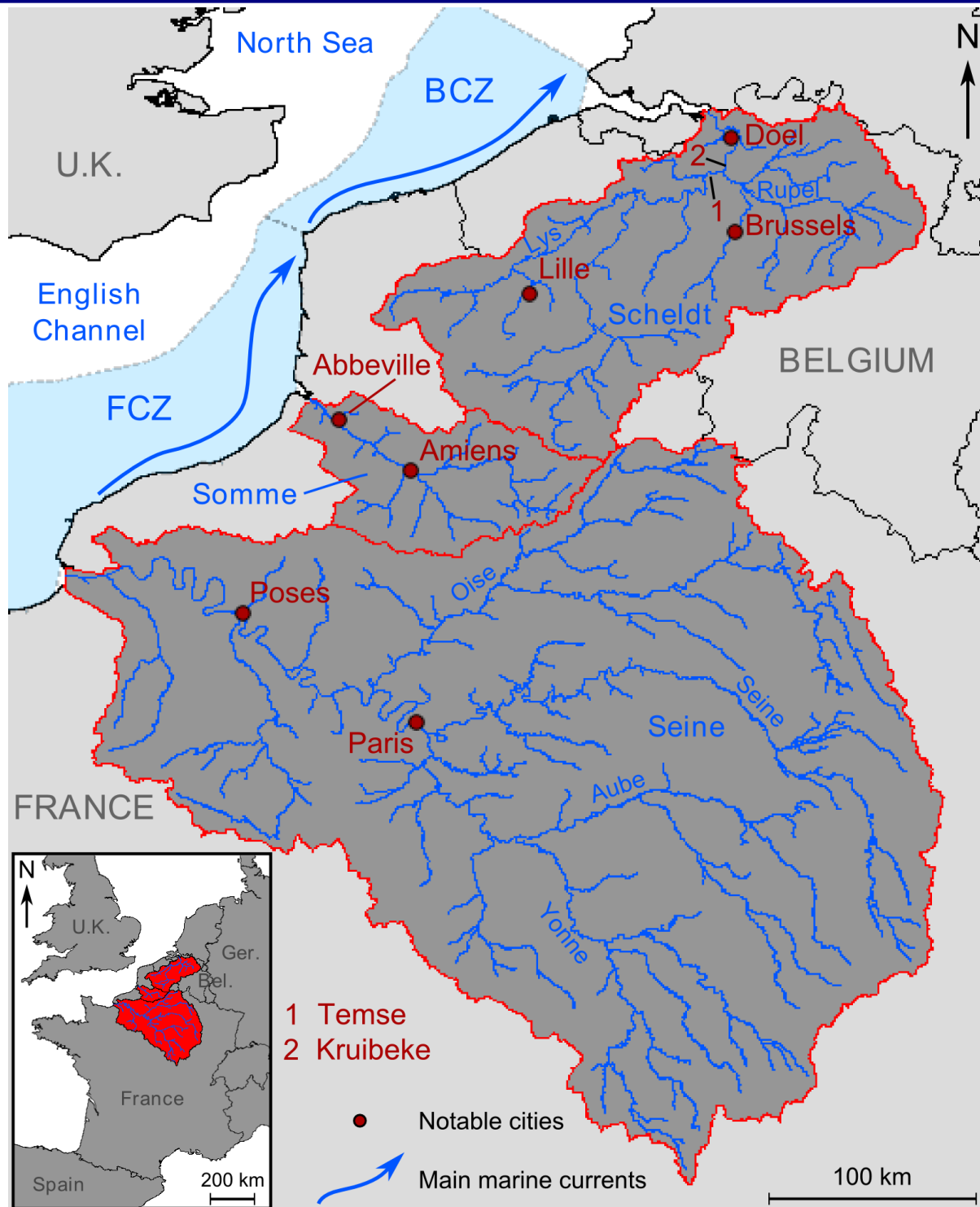


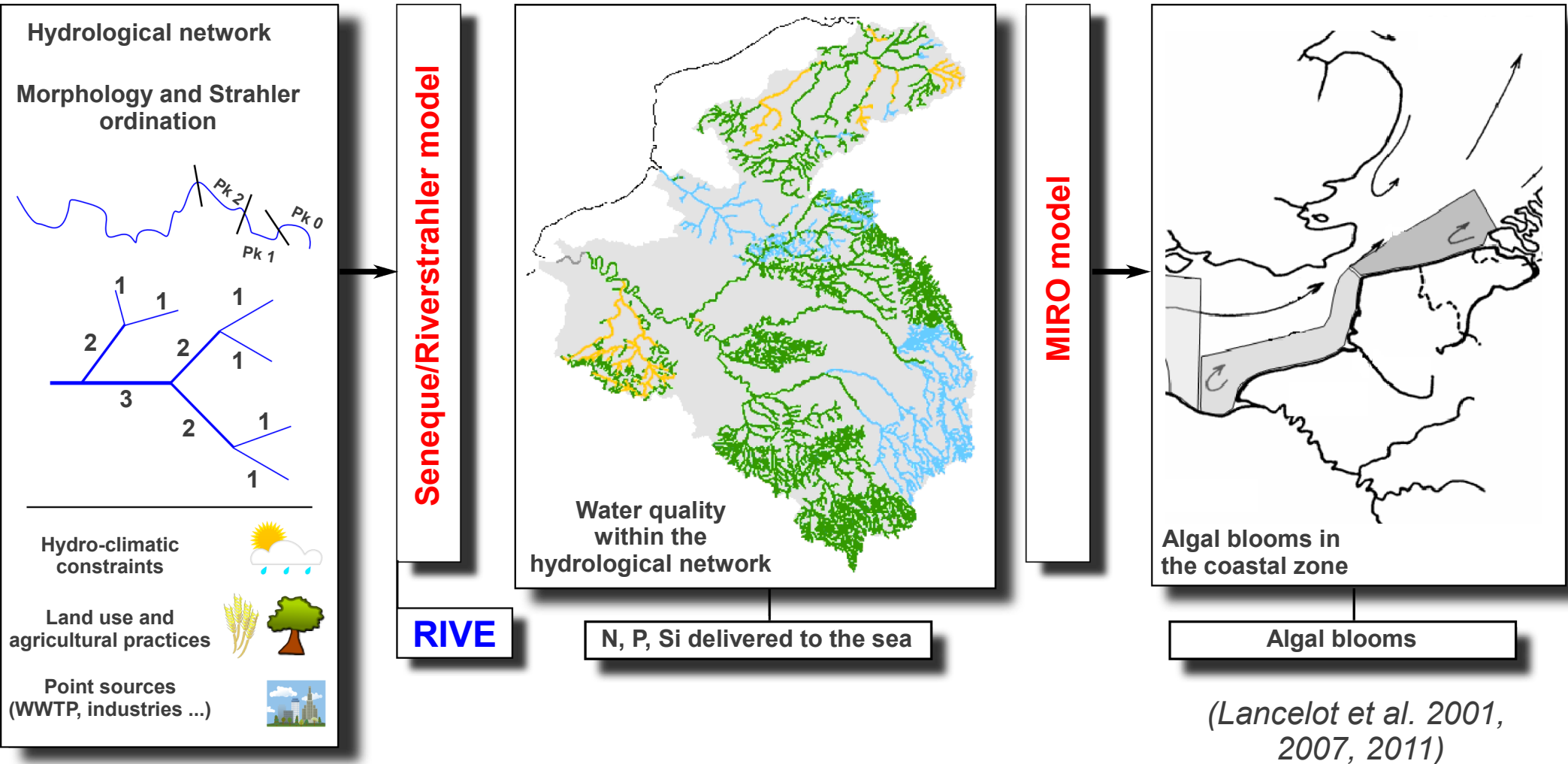
The 5 sectors designated by the OSPAR Commission

OSPAR objectives → decreasing by

50 %

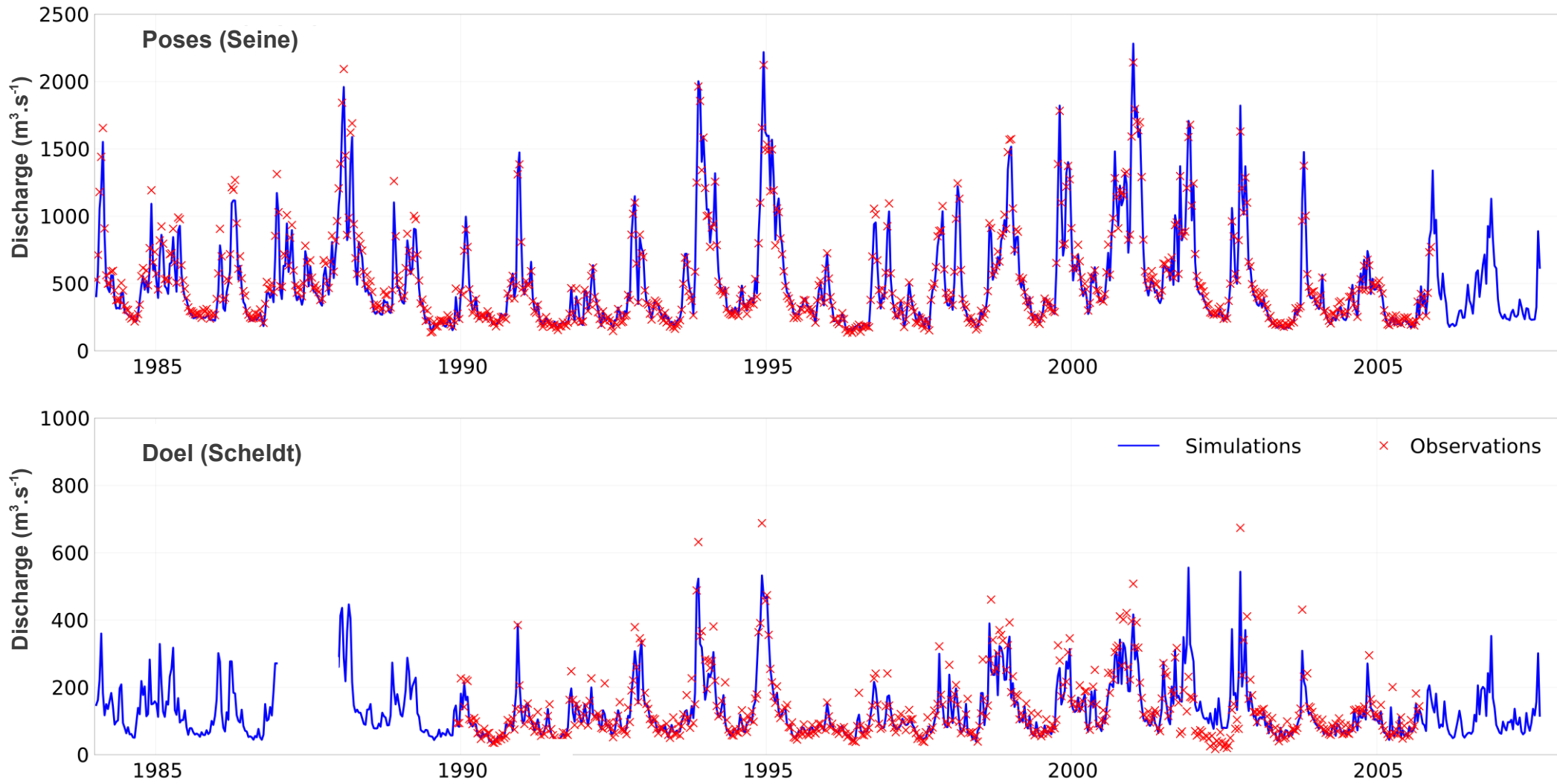
the N and P fluxes
from 1985 to 2007



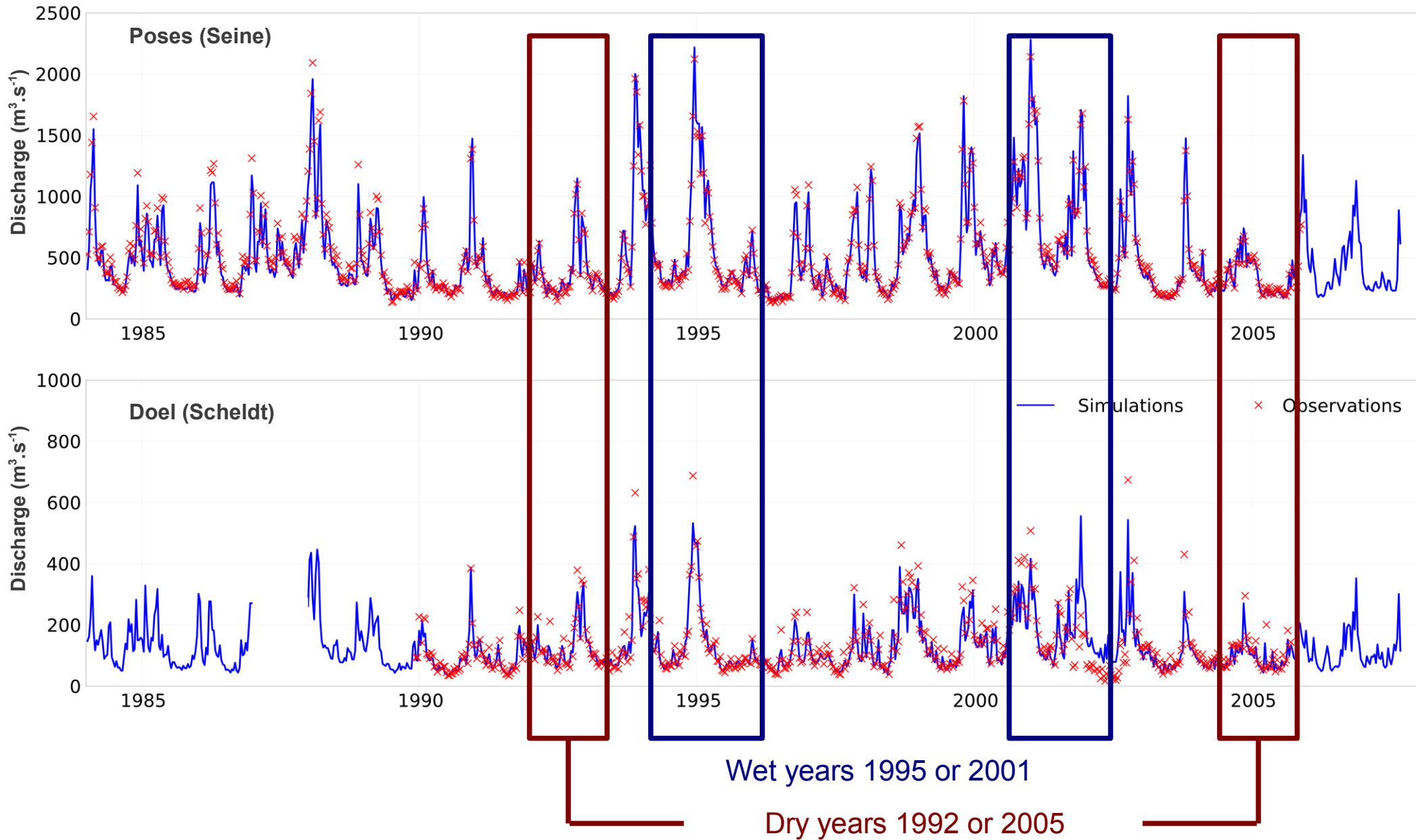


Modeling of the aquatic continuum

Similar hydrology

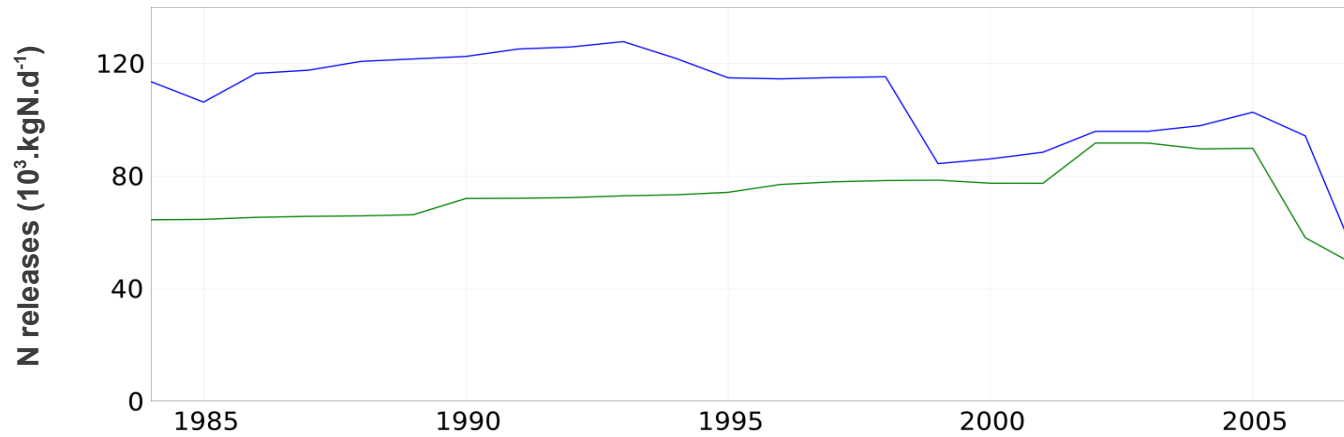


Similar hydrology

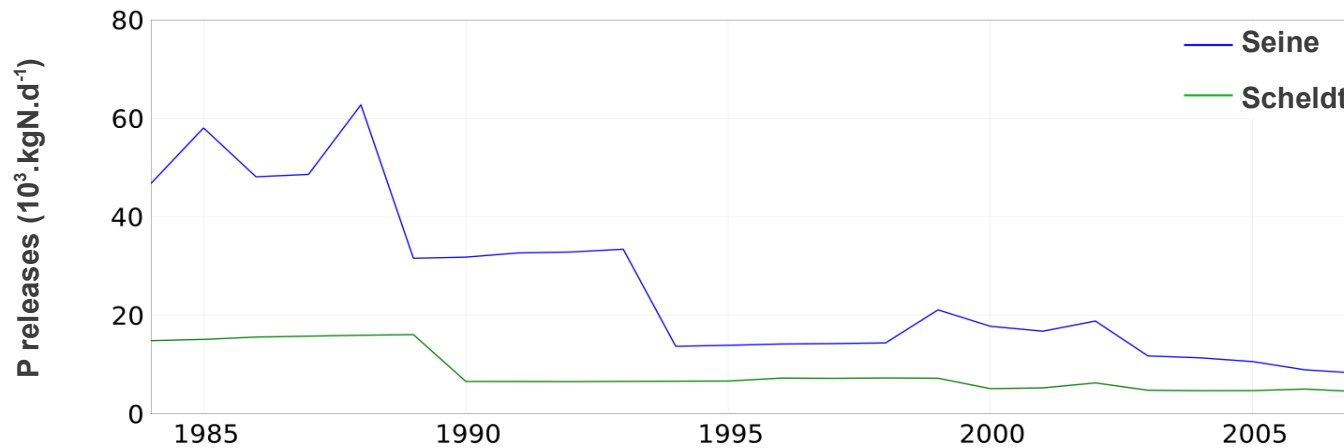


Changing point sources

N



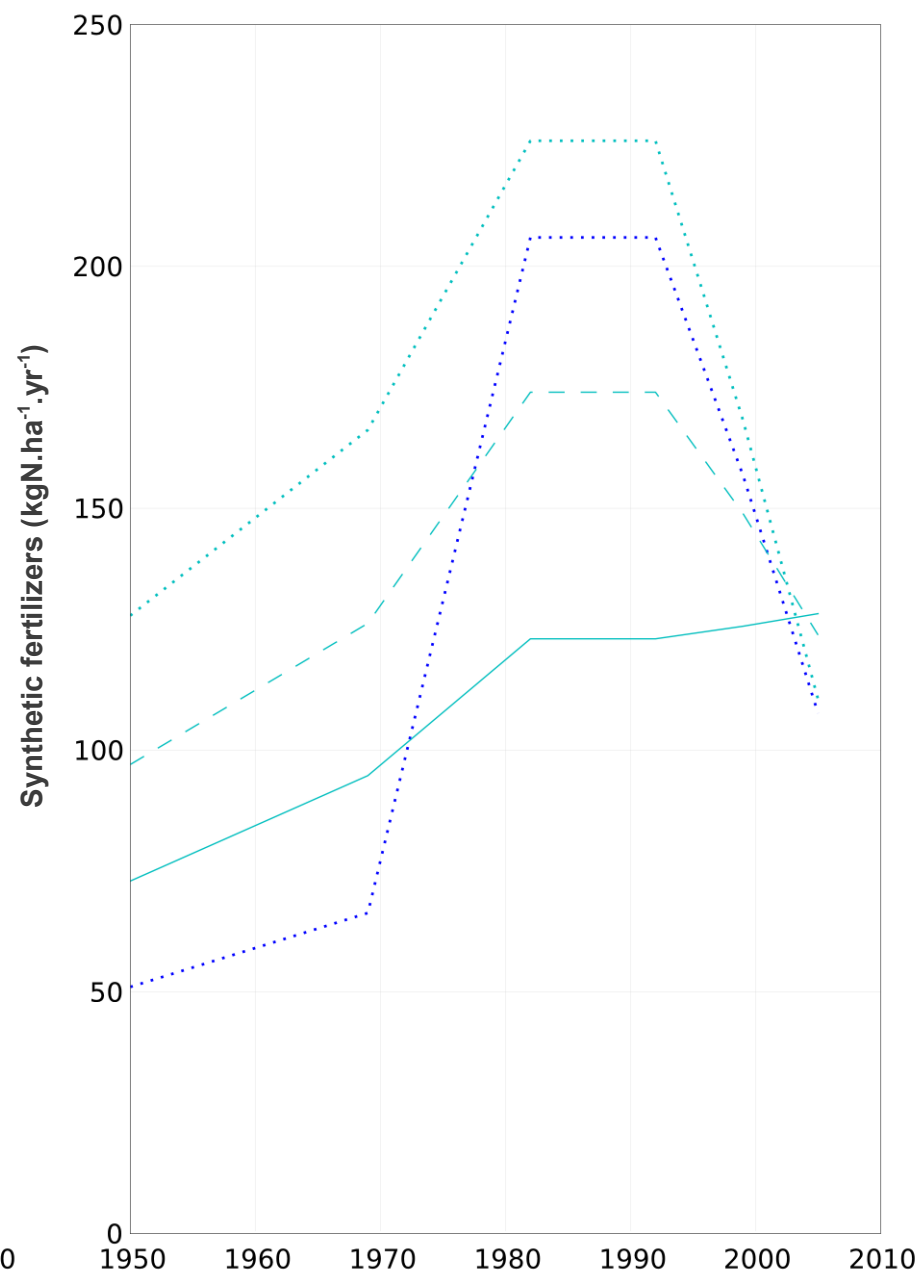
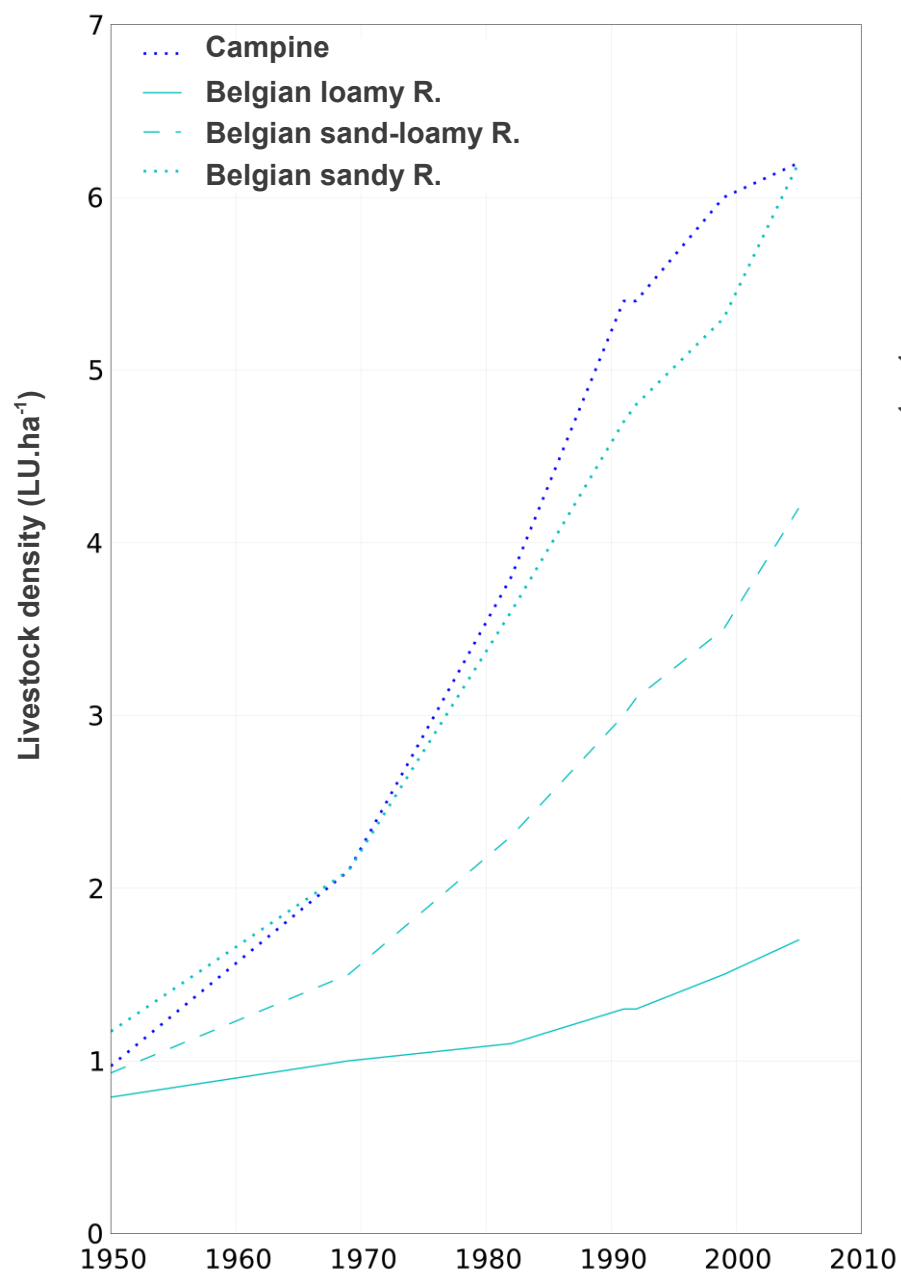
P



Better sewage connection rate and better treatment in WWTP

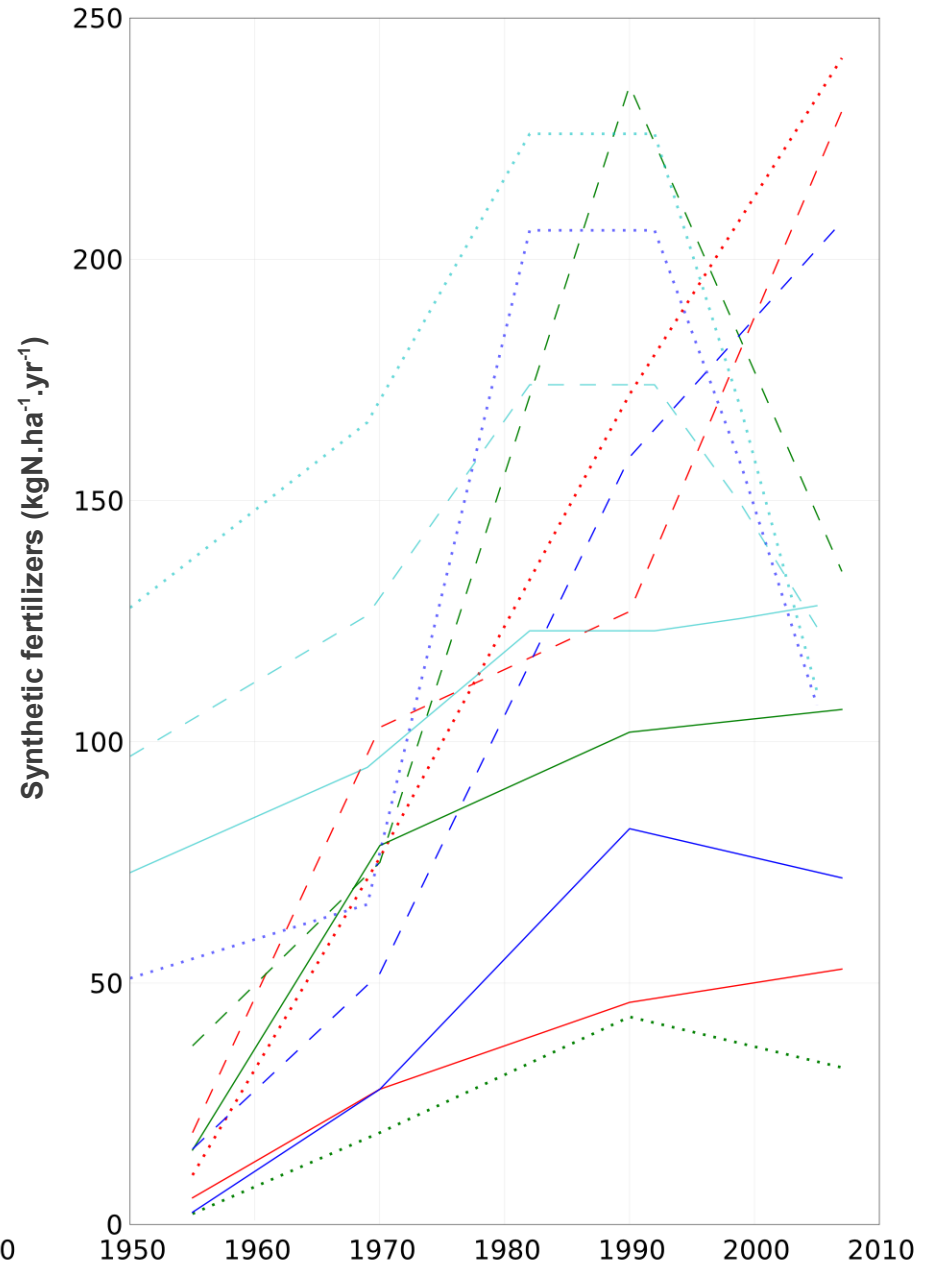
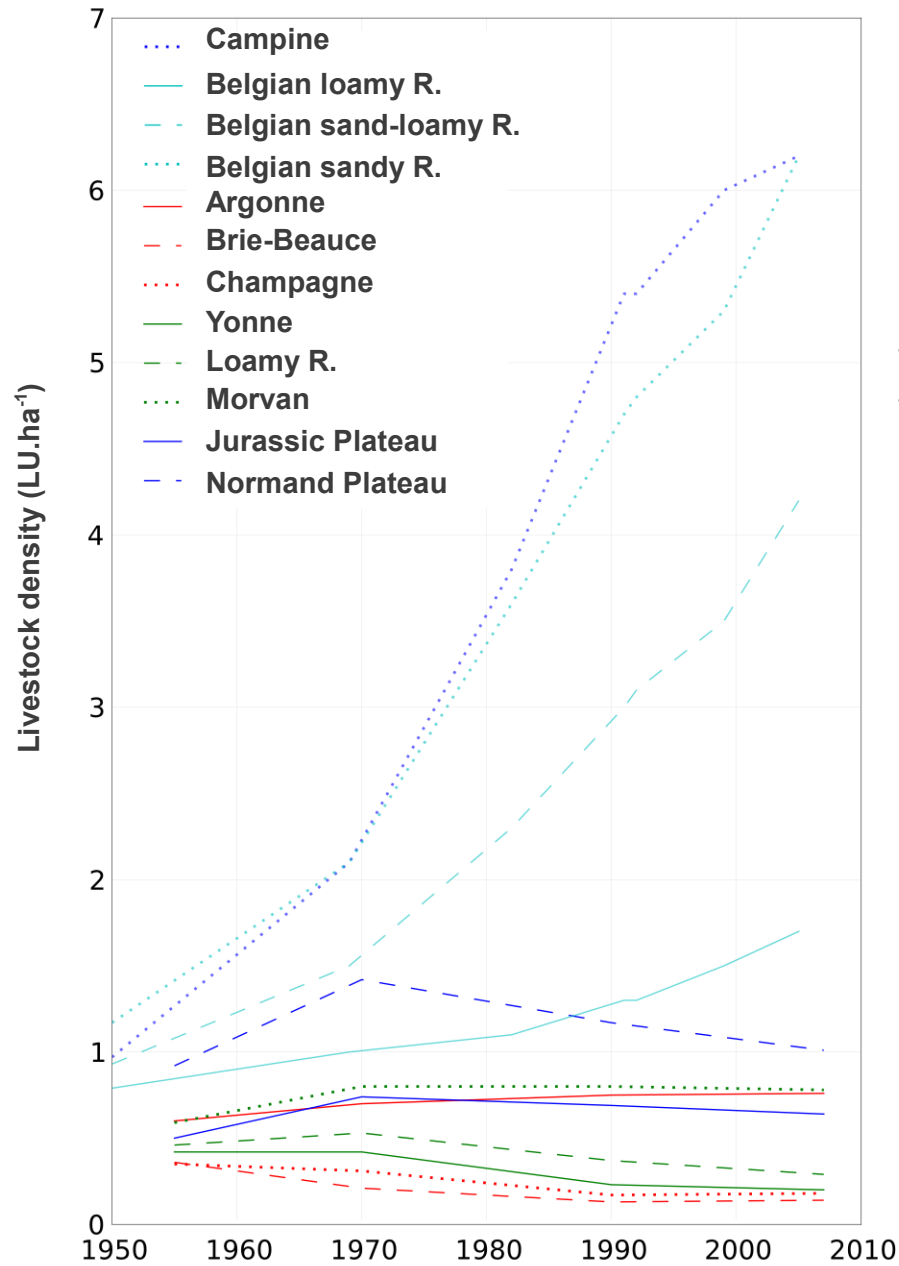
Toward a specialization of agricultural areas

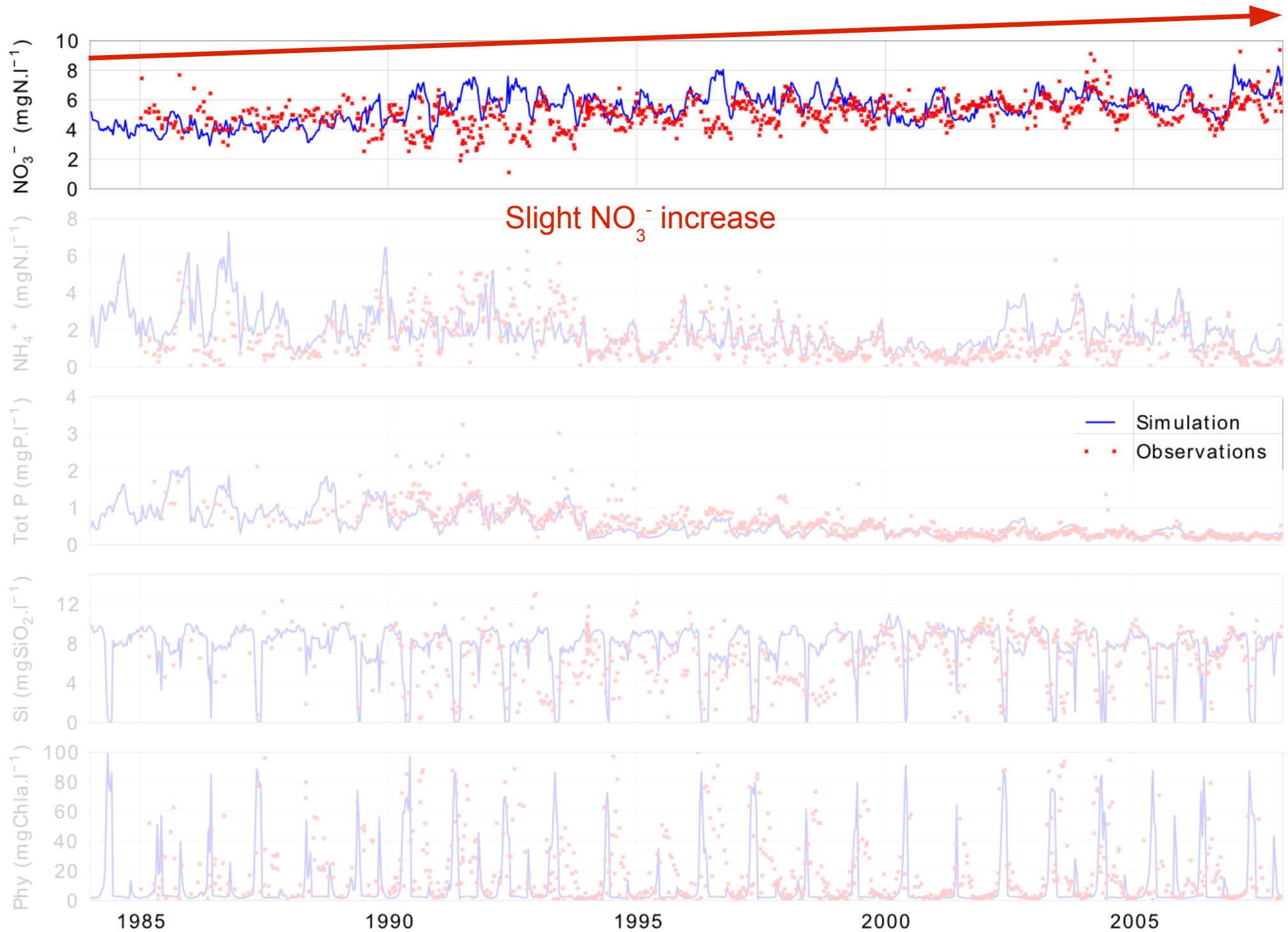
Areas dedicated to breeding

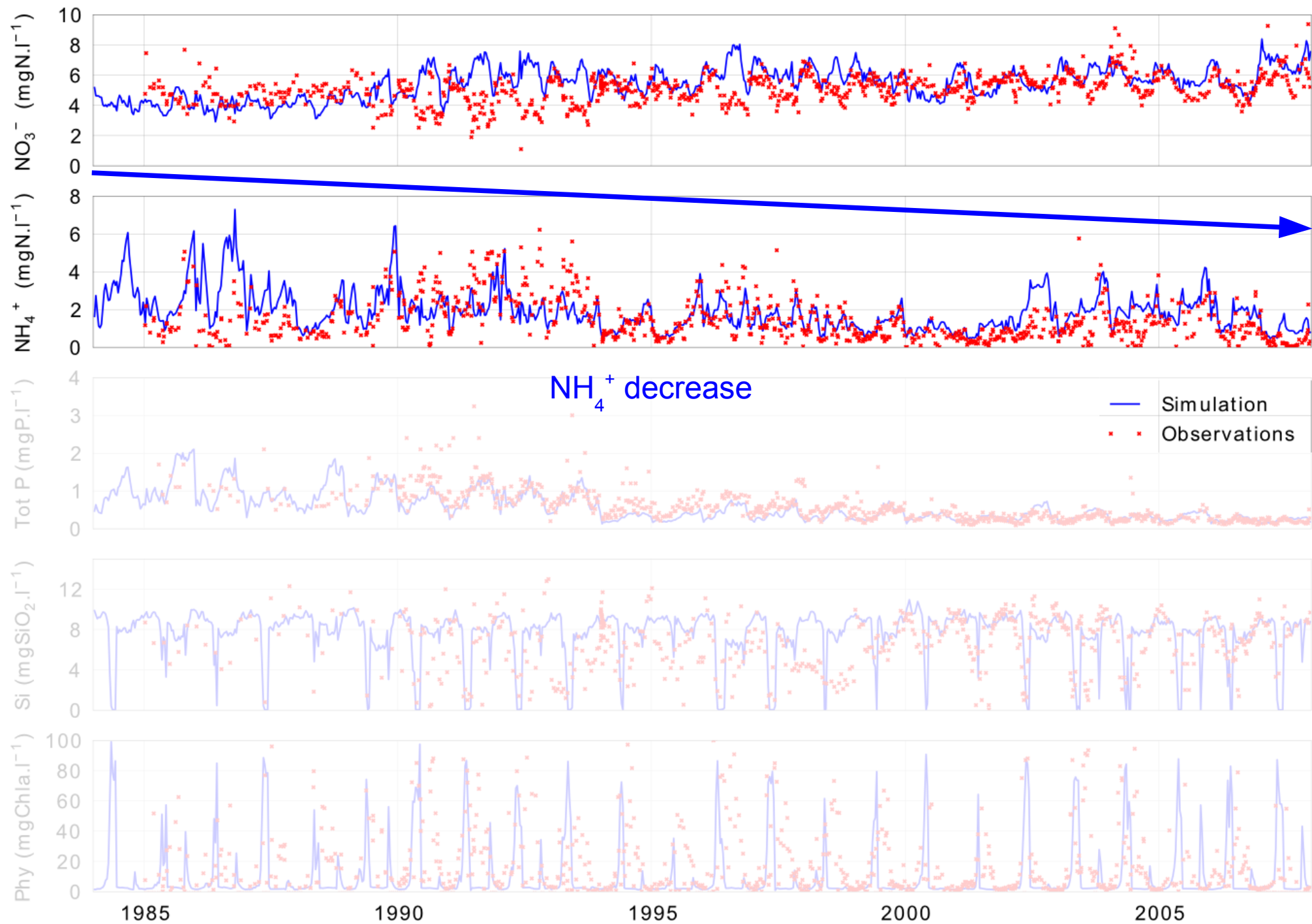


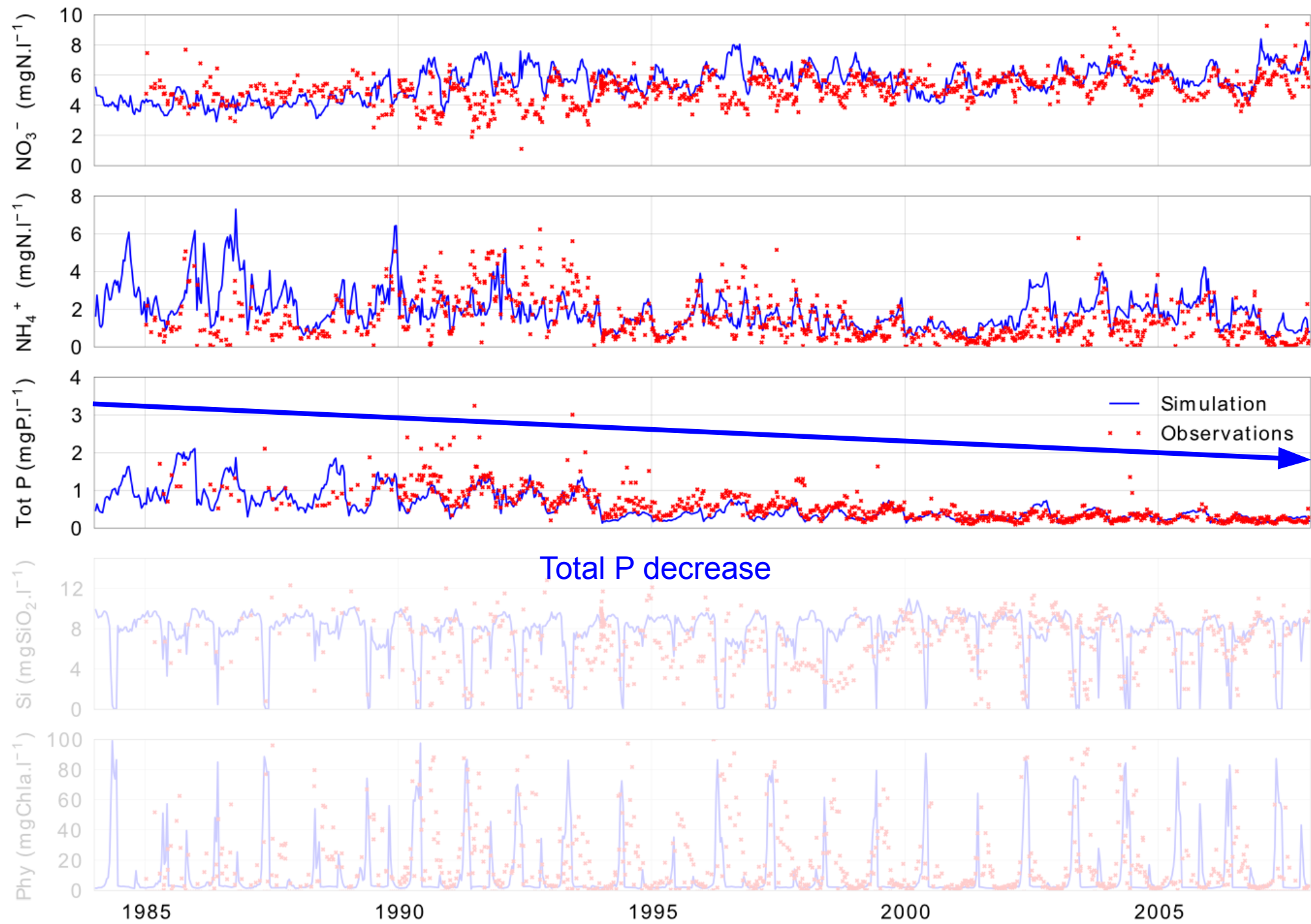
Toward a specialization of agricultural areas

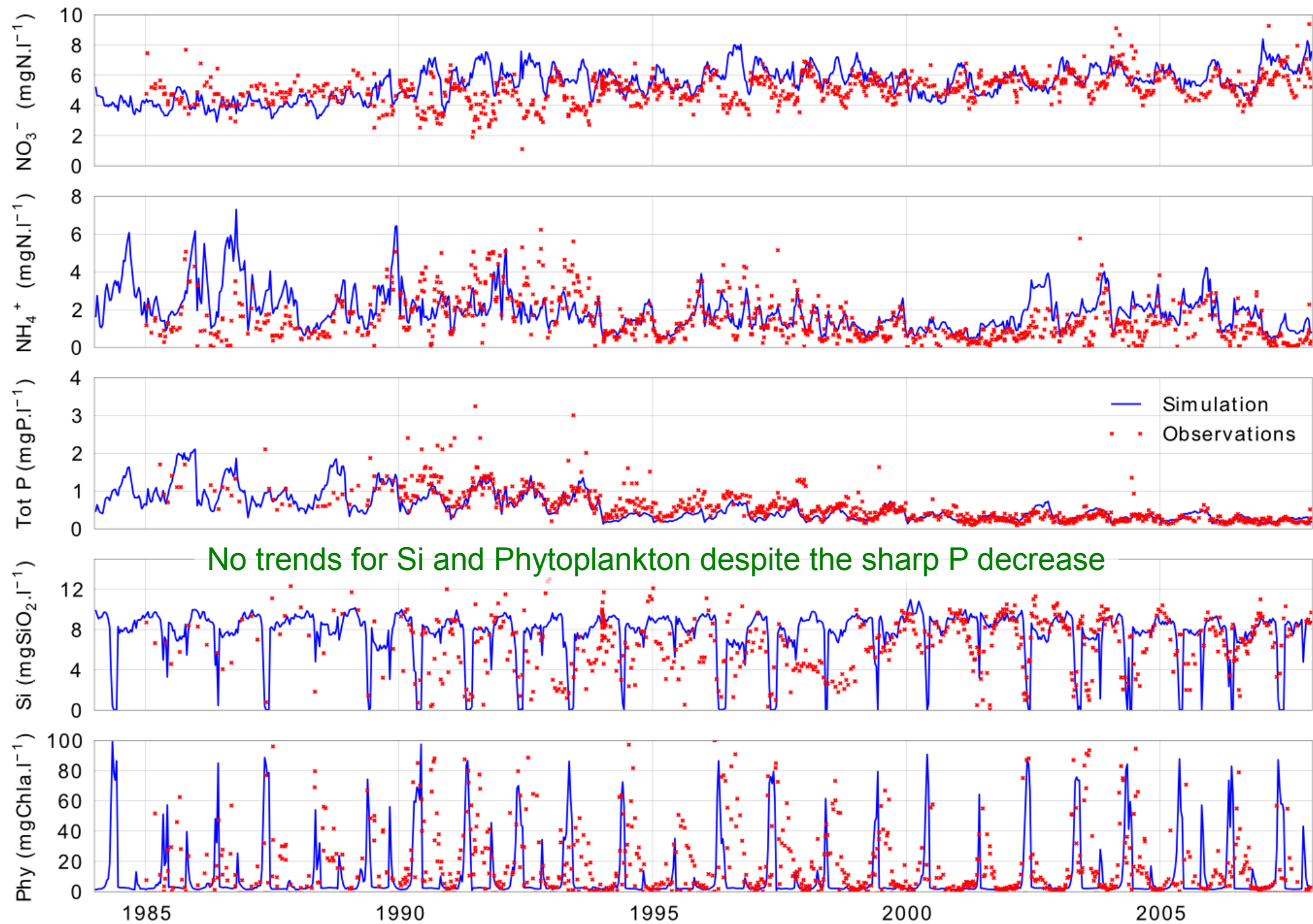
Areas dedicated to industrial crops production

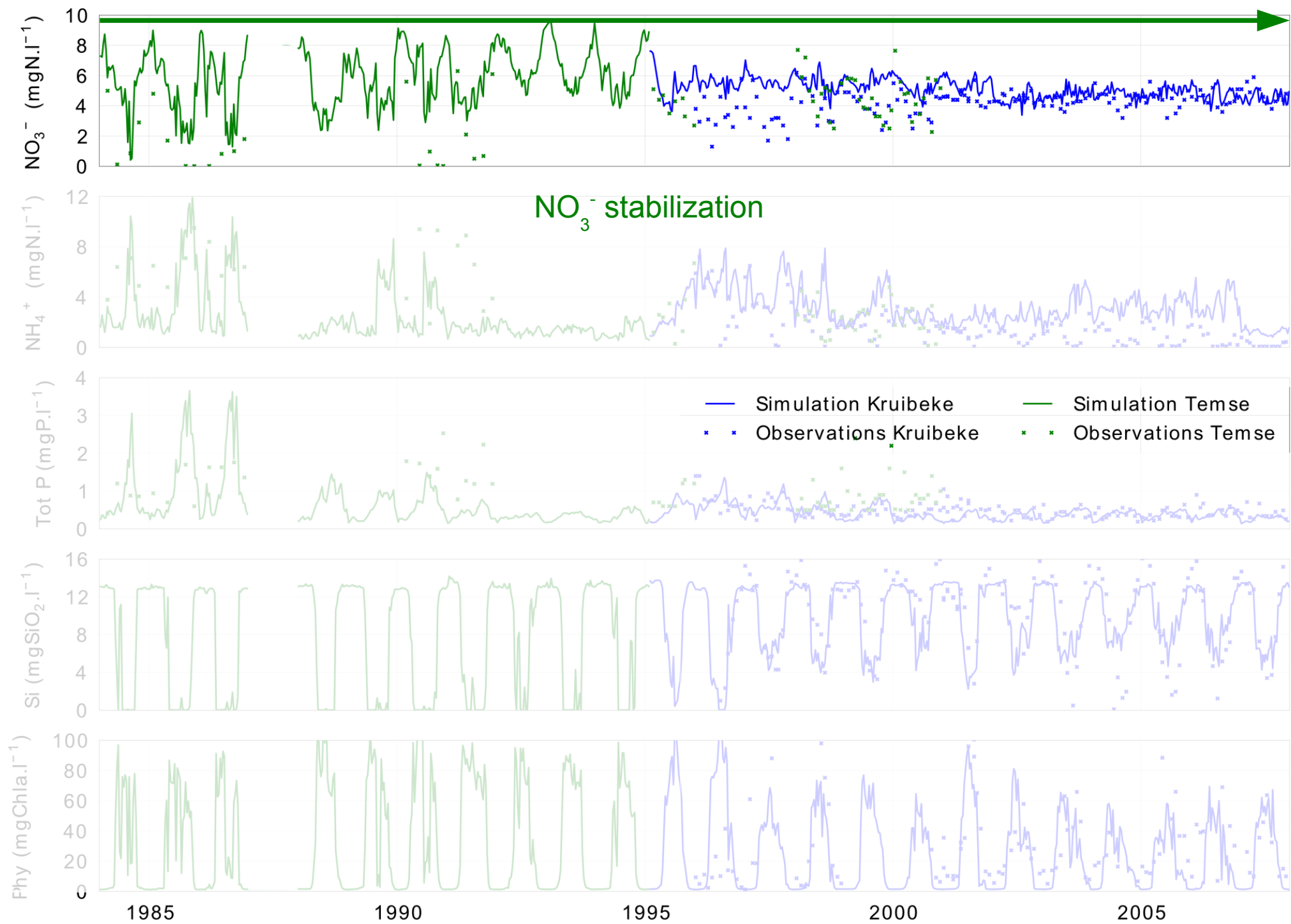


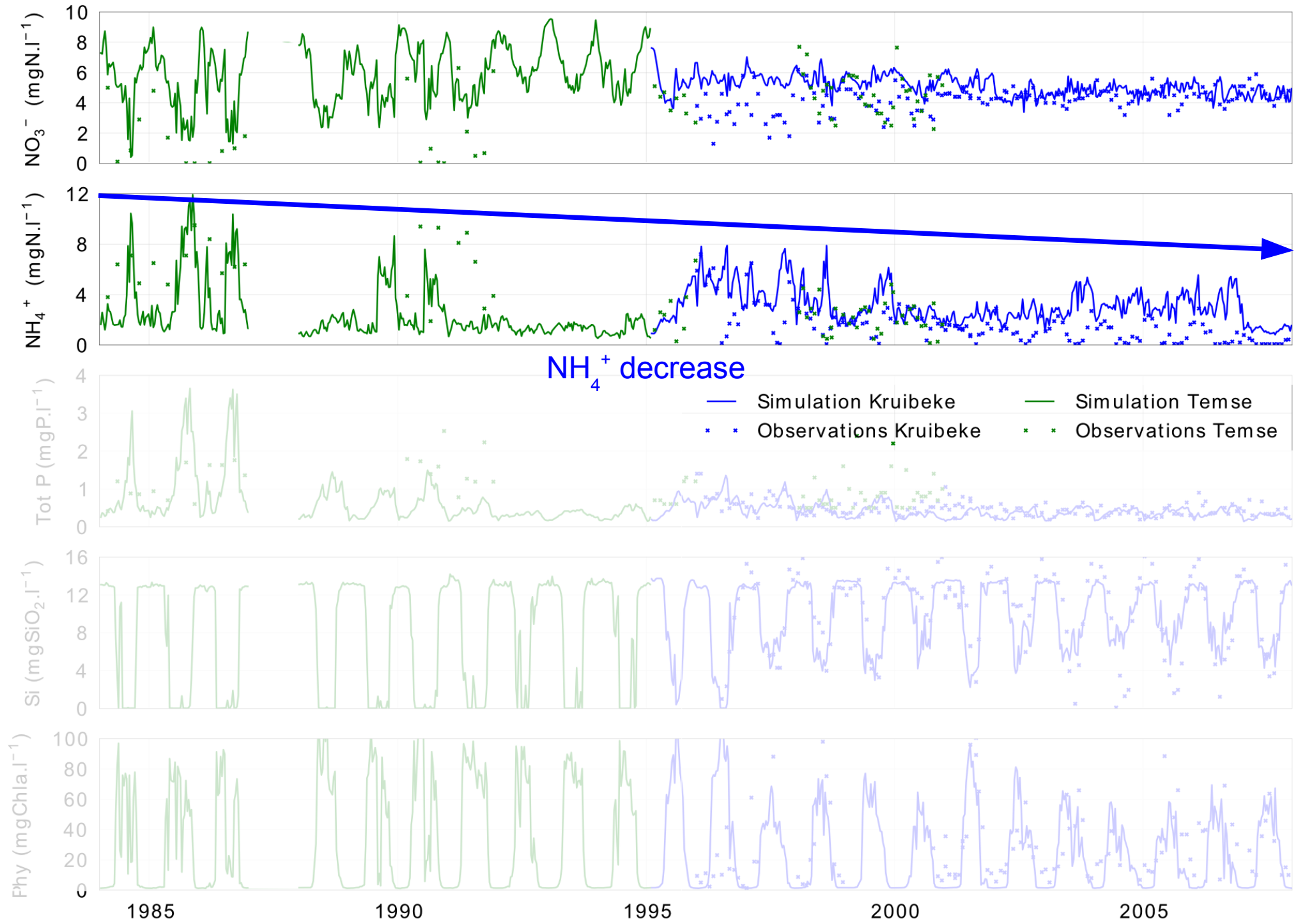


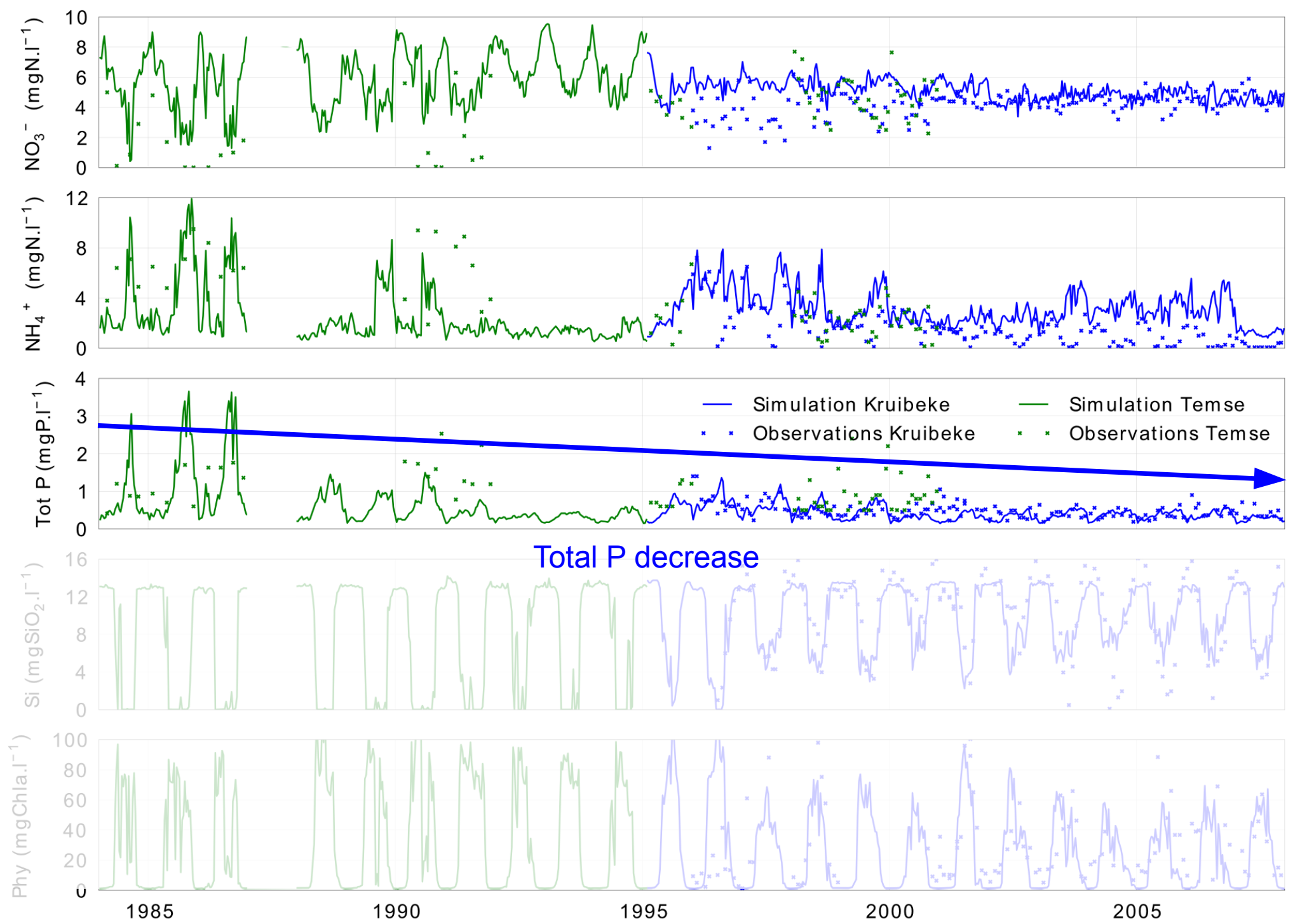


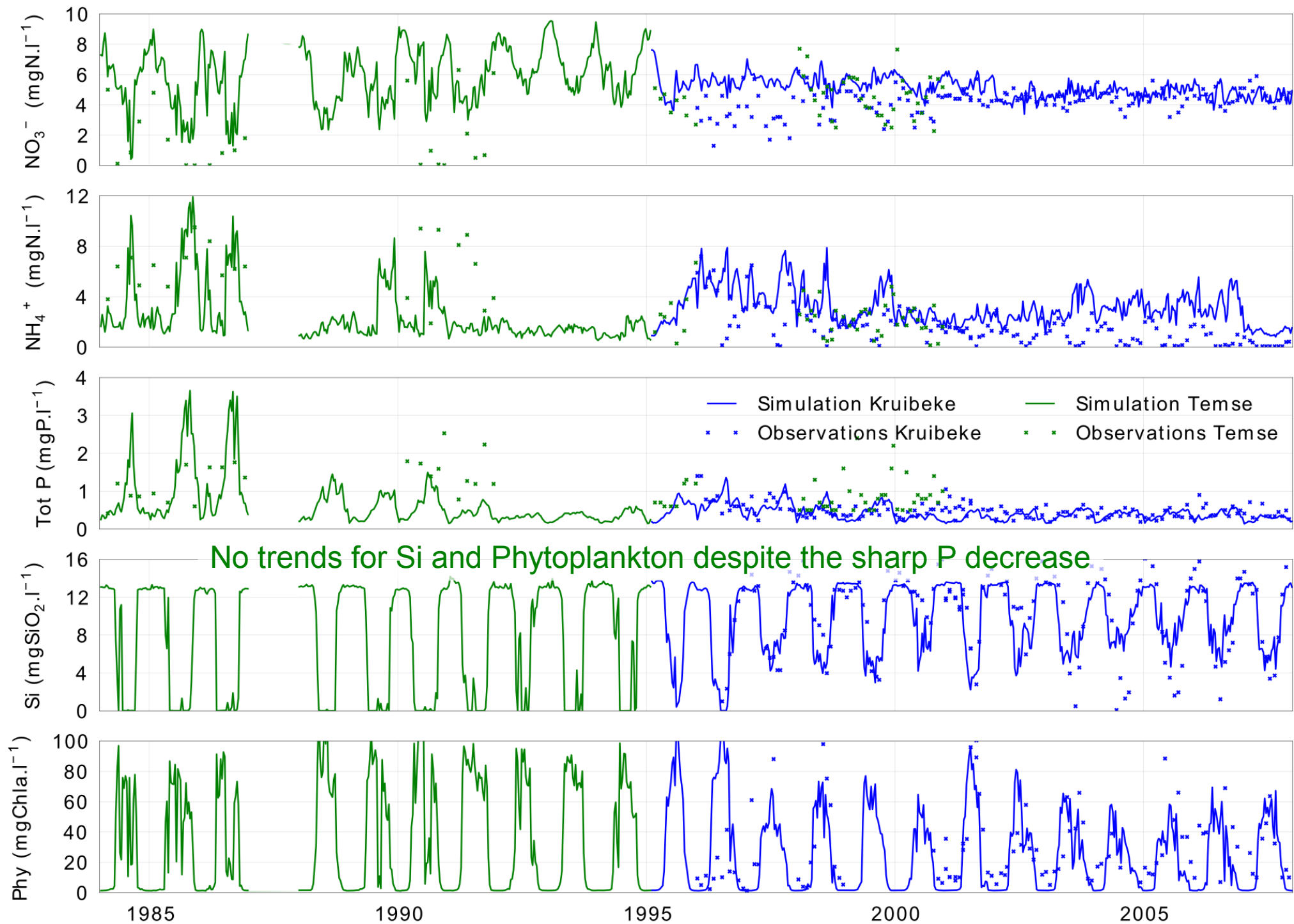






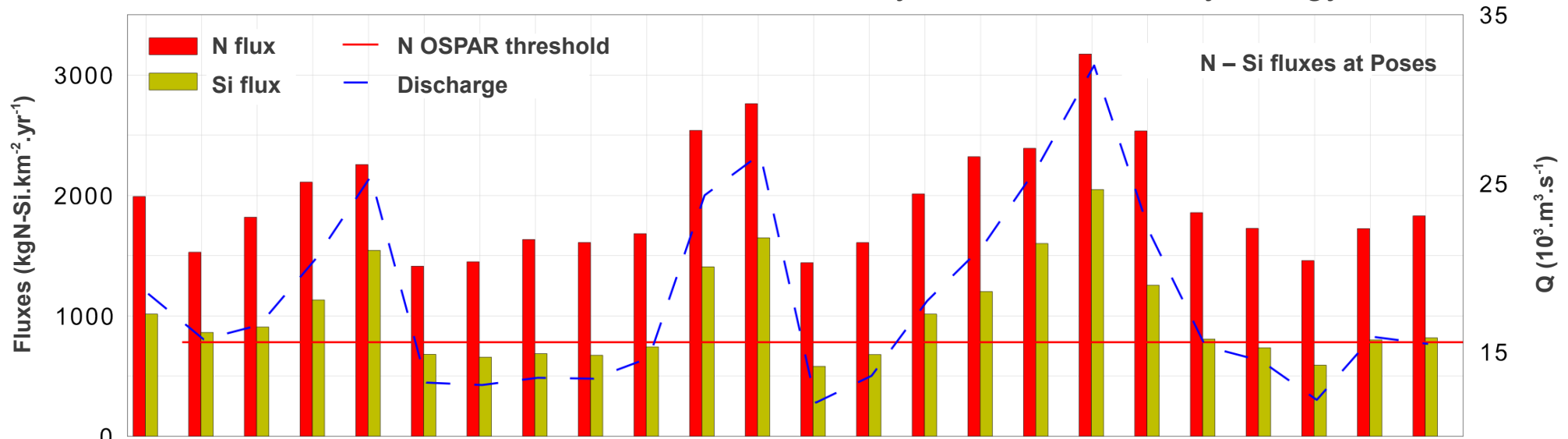




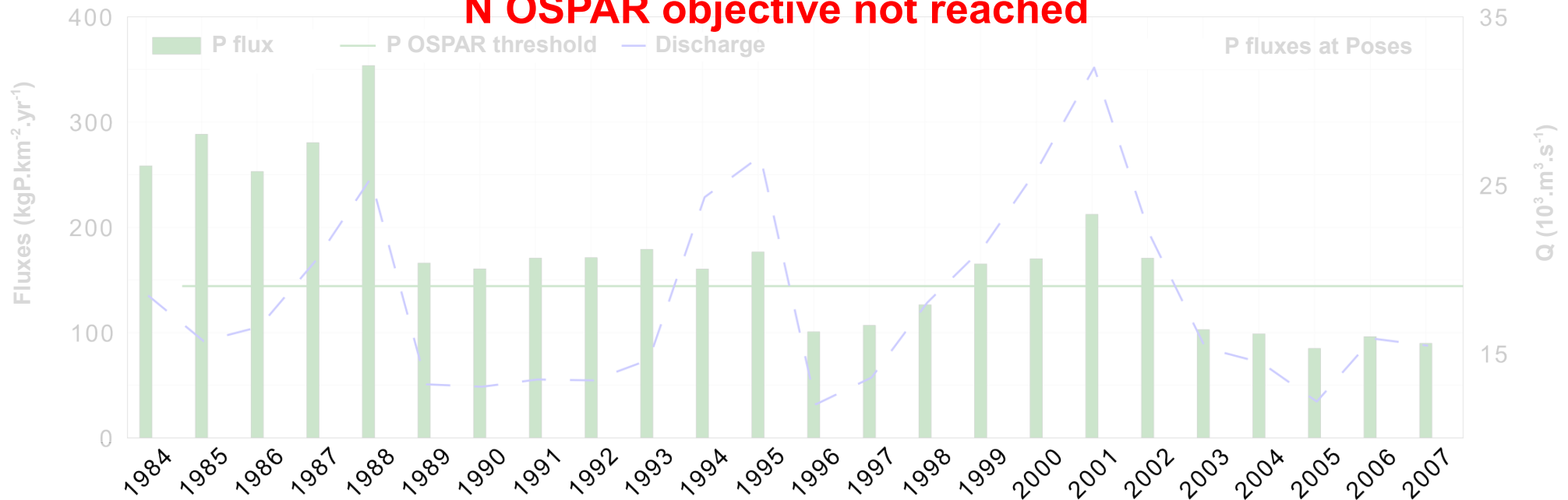


N, P, Si fluxes at Poses

N and Si come from **diffuse** sources = very sensitive to the hydrology

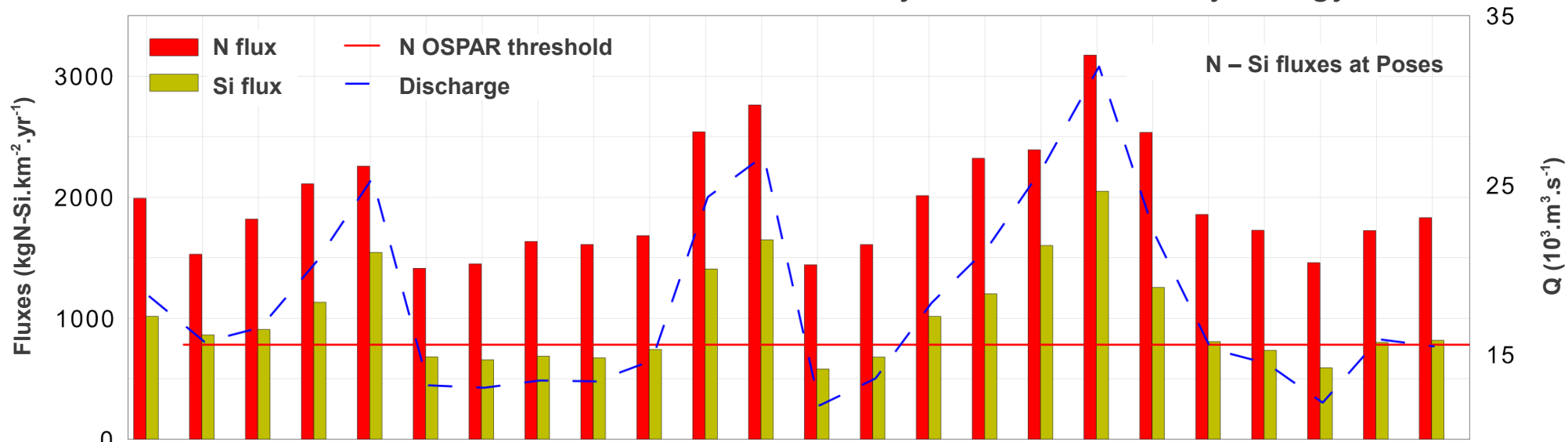


N OSPAR objective not reached

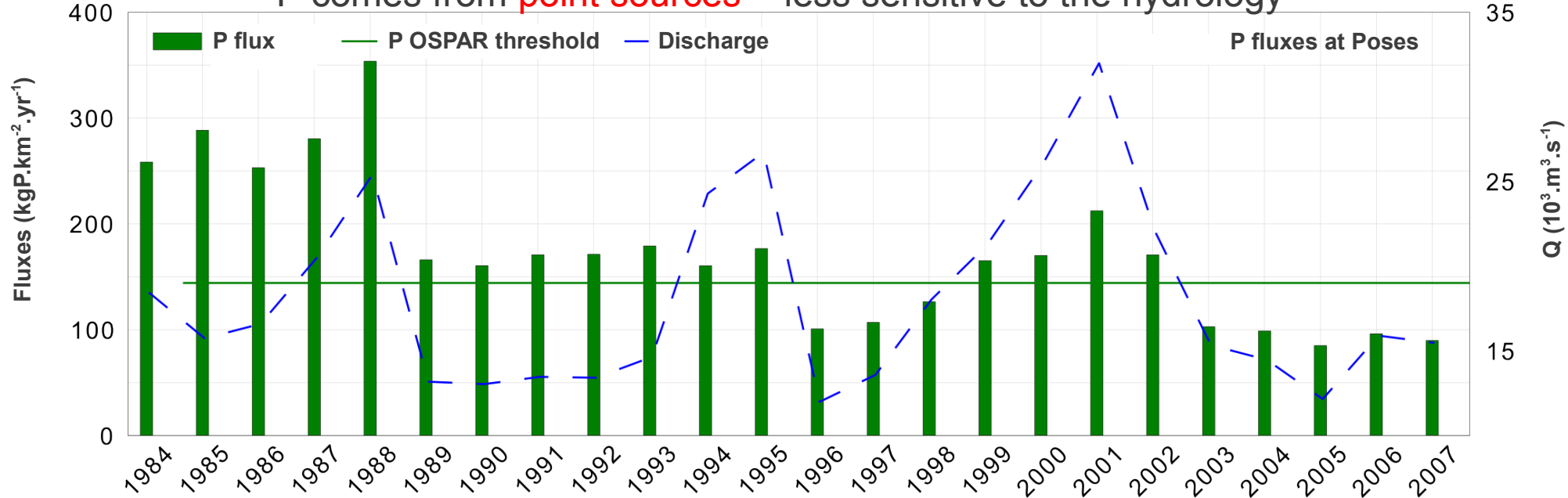


N, P, Si fluxes at Poses

N and Si come from **diffuse sources** = very sensitive to the hydrology



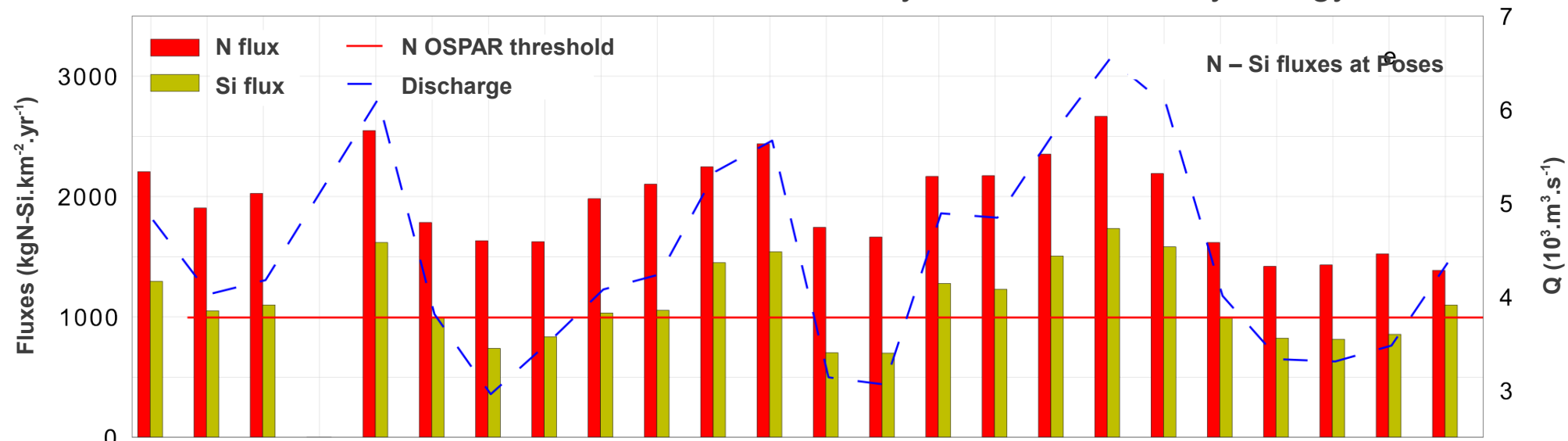
P comes from **point sources** = less sensitive to the hydrology



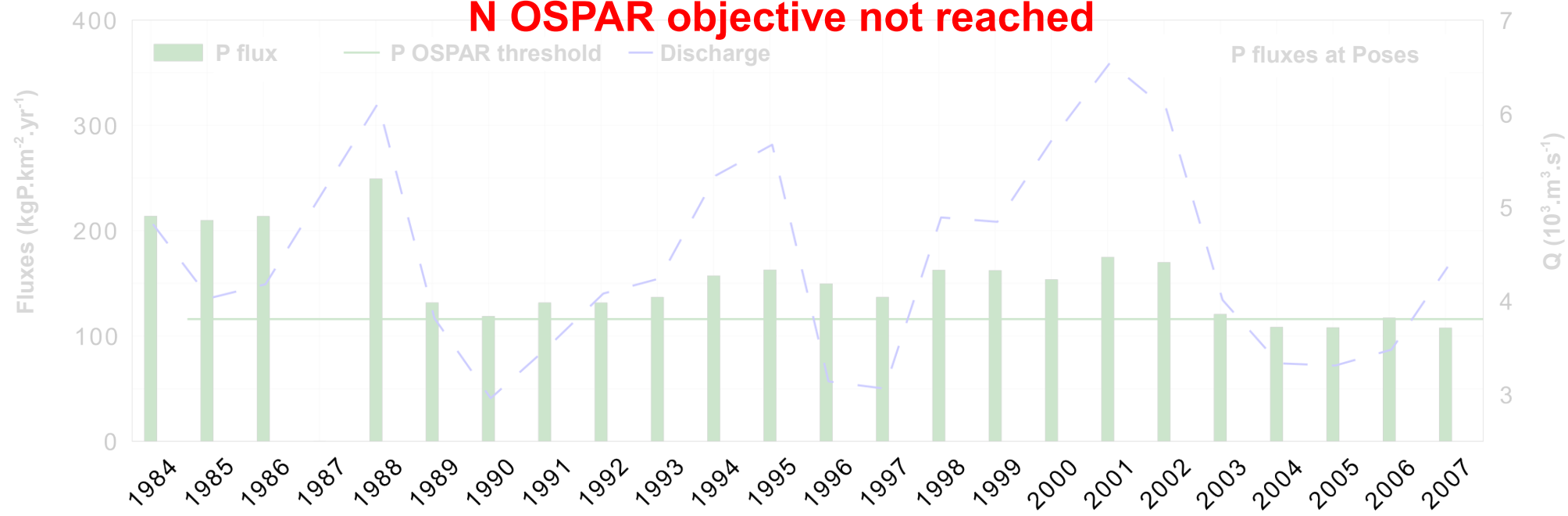
P OSPAR objective reached

N, P, Si fluxes at the Scheldt's outlet

N and Si come from **diffuse sources** = very sensitive to the hydrology

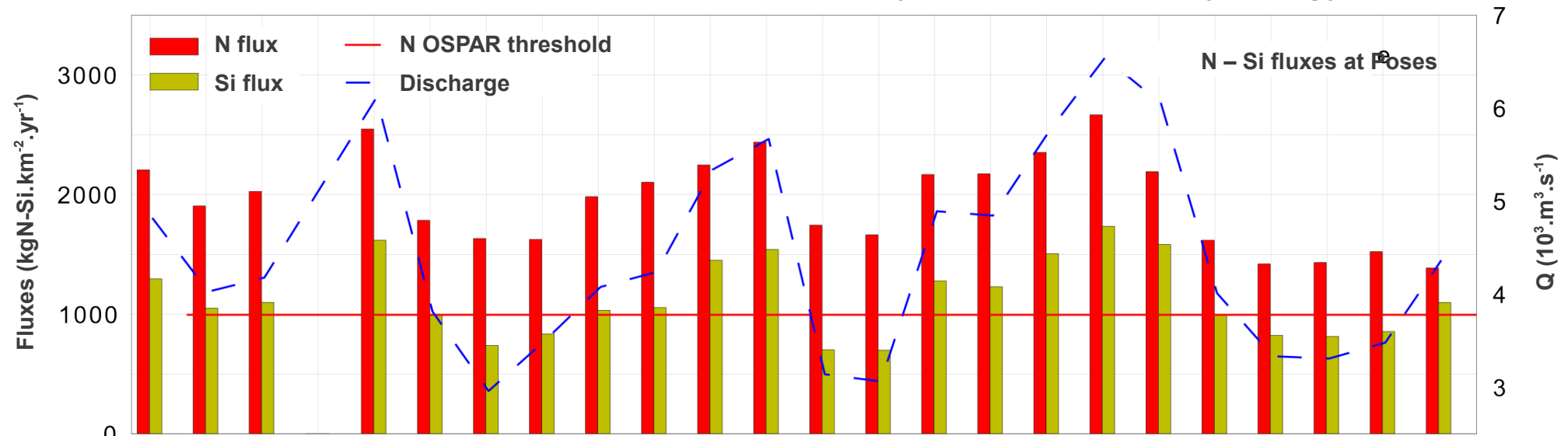


N OSPAR objective not reached

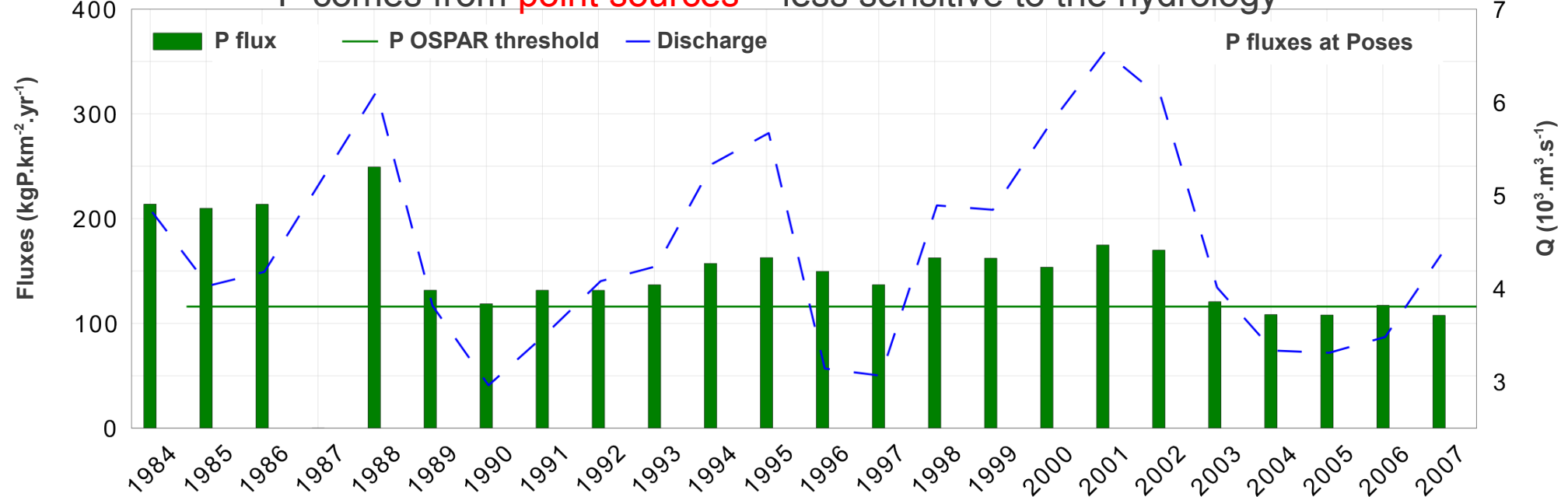


N, P, Si fluxes at the Scheldt's outlet

N and Si come from **diffuse sources** = very sensitive to the hydrology



P comes from **point sources** = less sensitive to the hydrology

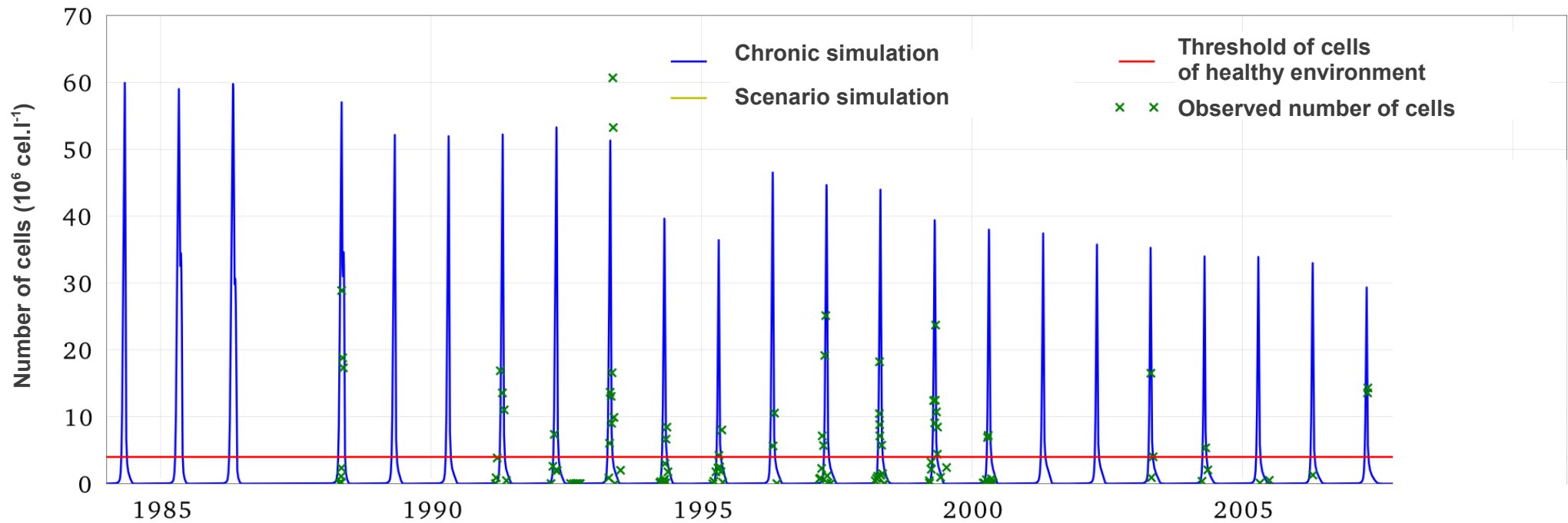


P OSPAR objective reached

Intensity of the *Phaeocystis* bloom in the North Sea

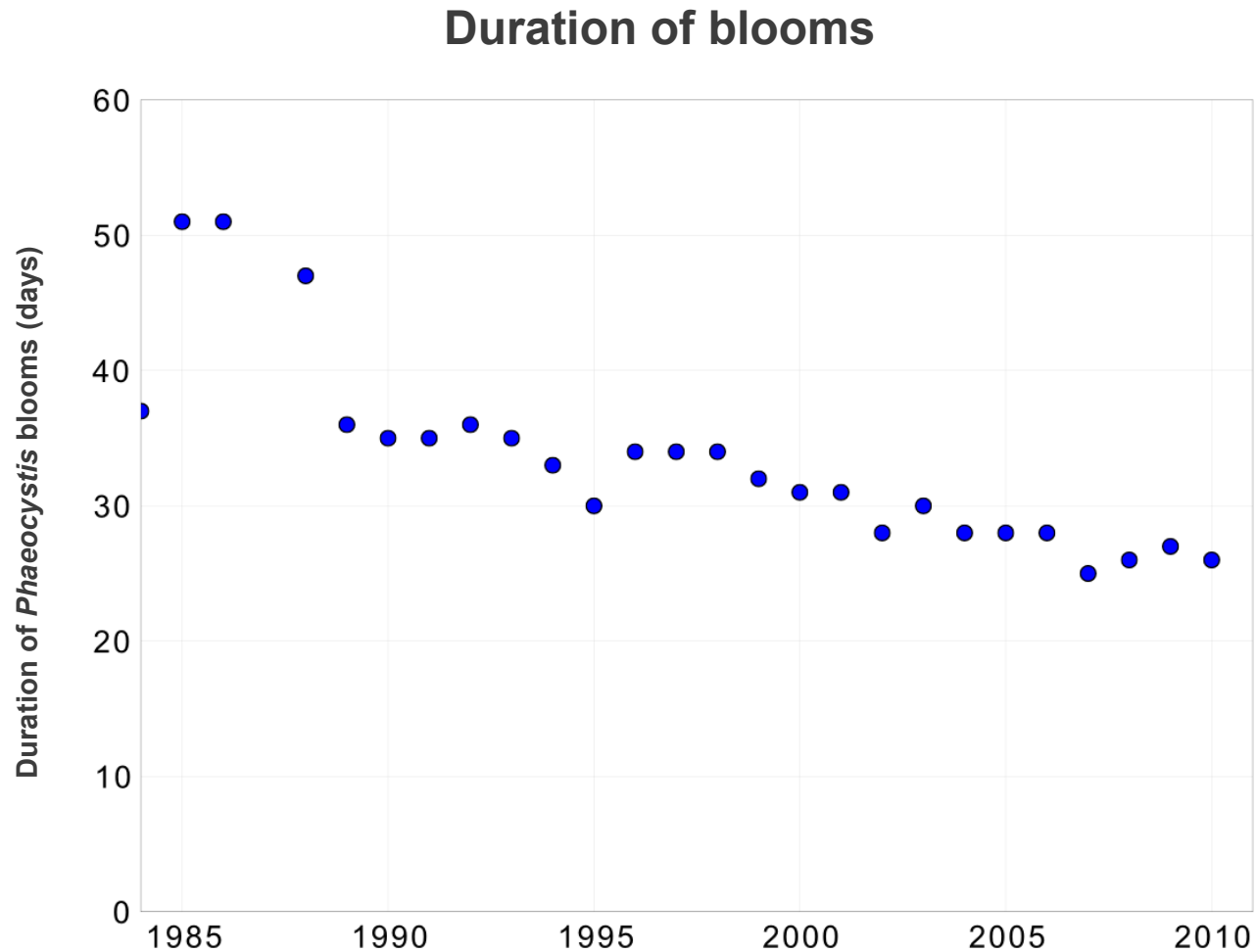
Changes from 1984

Decrease from 60 million to 30 million of cells



Still highly above the threshold of a healthy environment
(Lancelot et al 2009)

Phaeocystis development in the North Sea

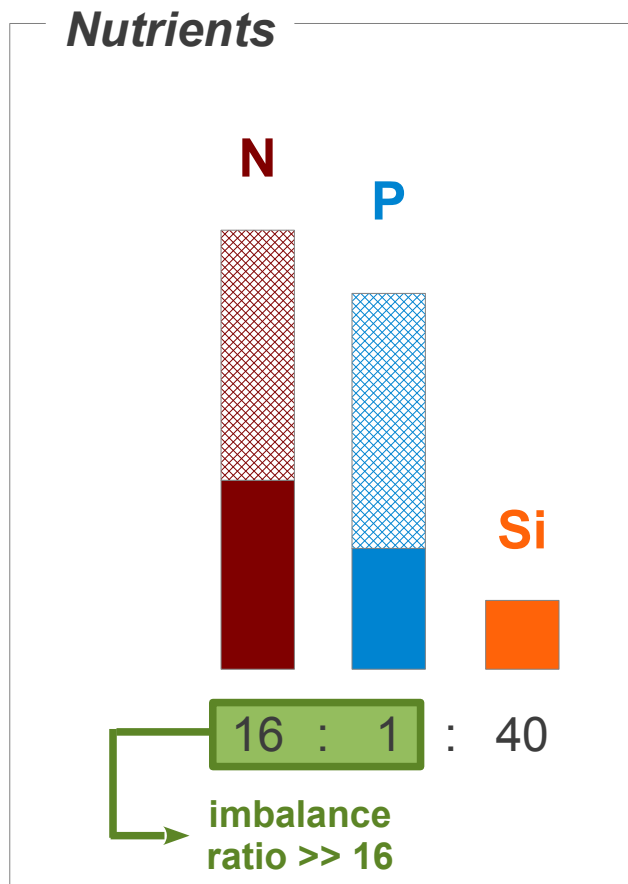


Decrease from 51 to 28 days

What changes in terms of fluxes delivered to the sea?

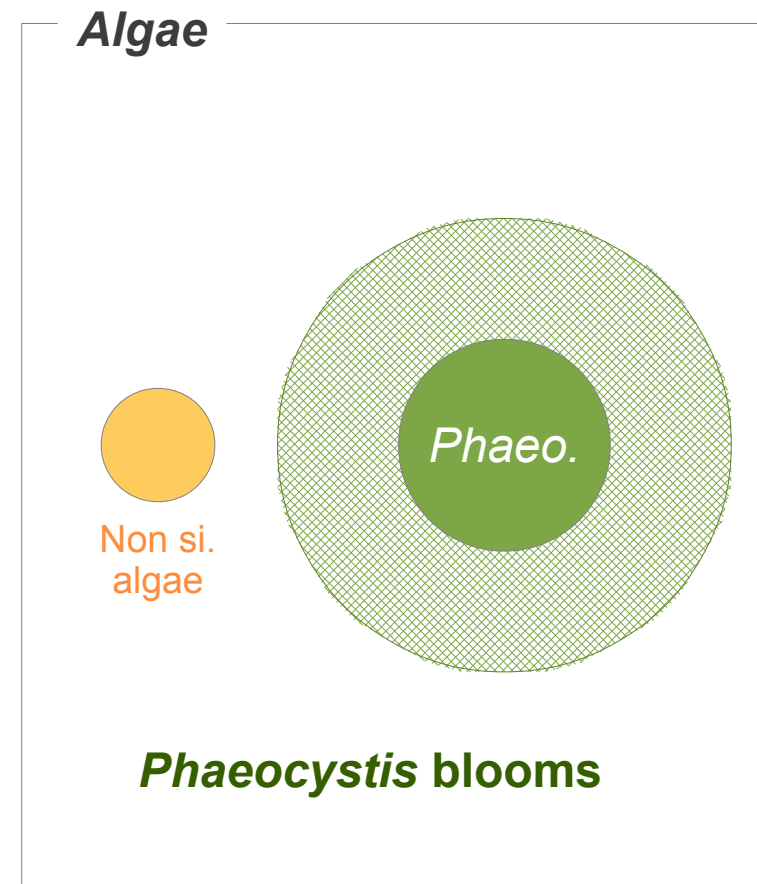
Which impacts at the coastal zone?

1984



uptake

ratio C:N:P:(Si)

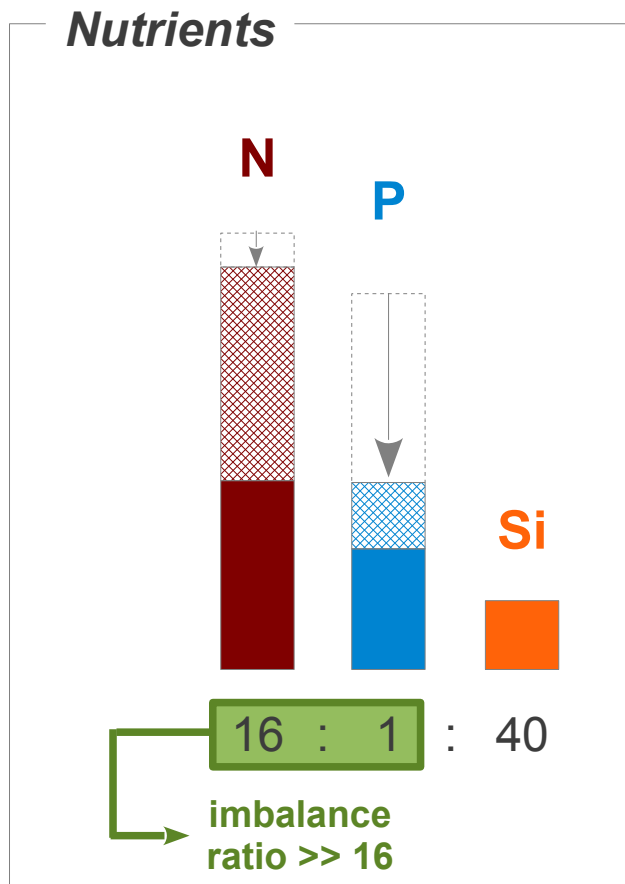


N limiting

What changes in terms of fluxes delivered to the sea?

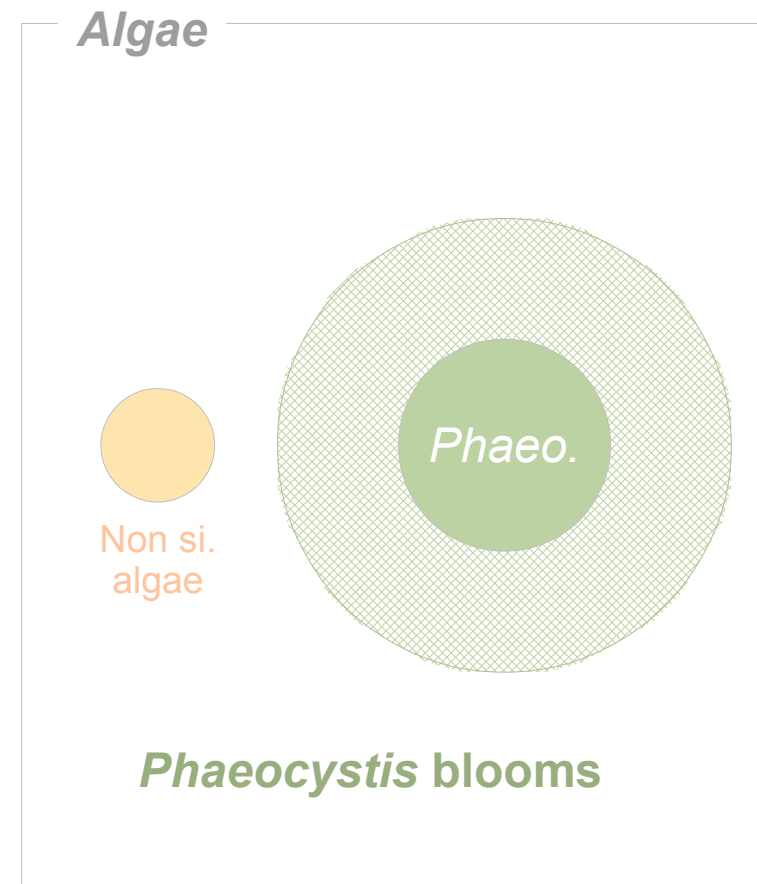
Which impacts at the coastal zone?

1984 → 2007



uptake

ratio C:N:P:(Si)

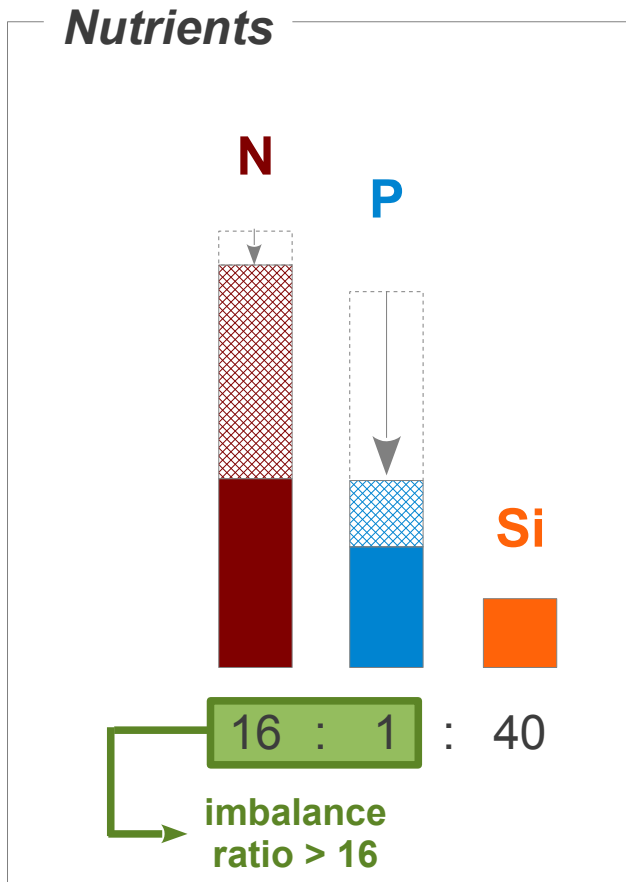


N limiting

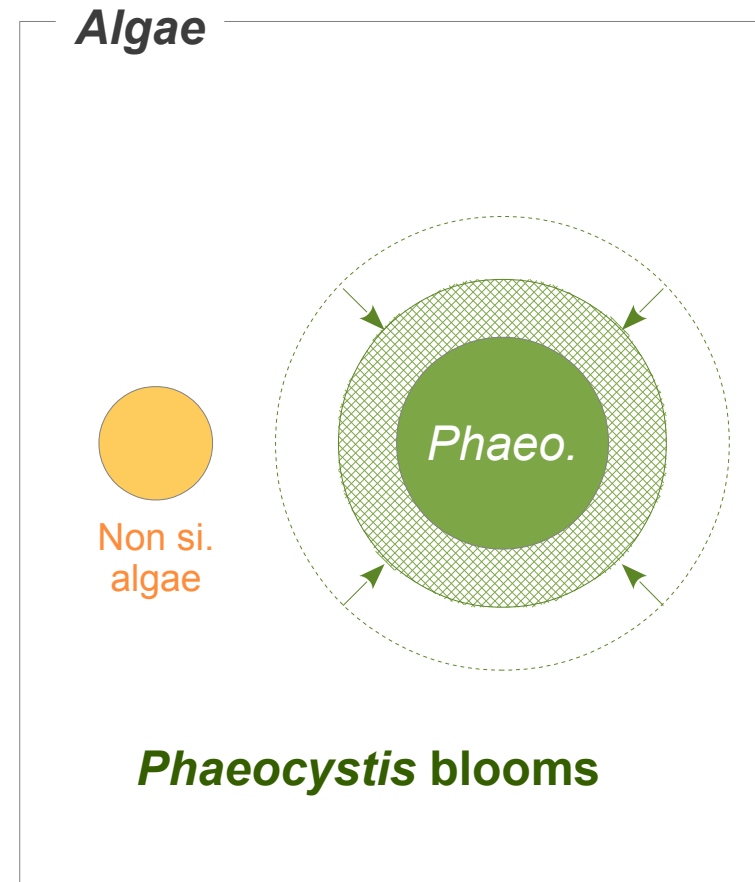
What changes in terms of fluxes delivered to the sea?

Which impacts at the coastal zone?

1984 → 2007



uptake
 →
 ratio C:N:P:(Si)



P limiting

Thank you for your attention

