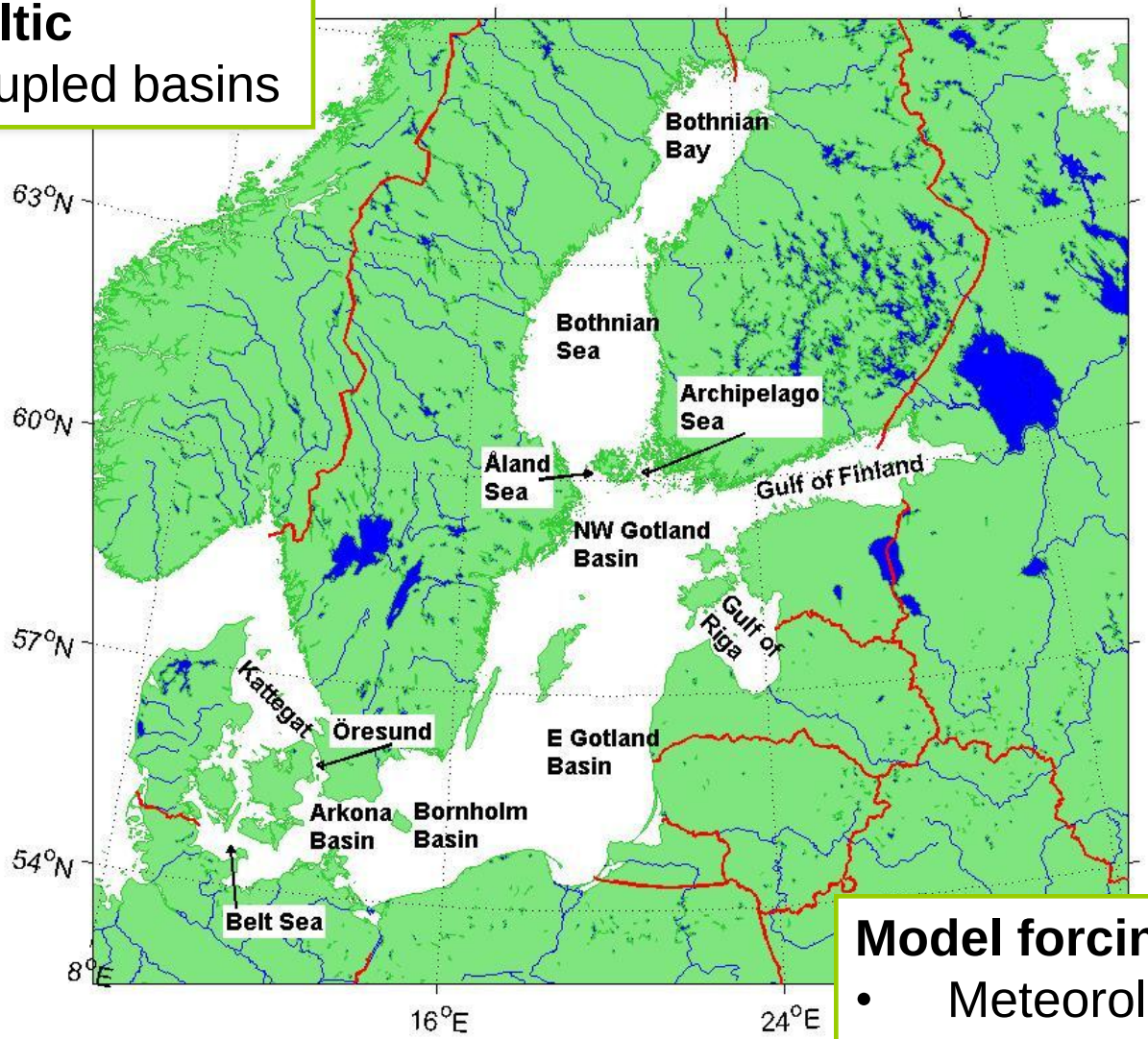
UNIVERSITY OF GOTHENBURG

Validation of the PROBE-Baltic model

Faculty of Science

PROBE Baltic
Thirteen coupled basins



Model forcing

- Meteorological data
- Runoff data
- Kattegat water level

Physical state variables

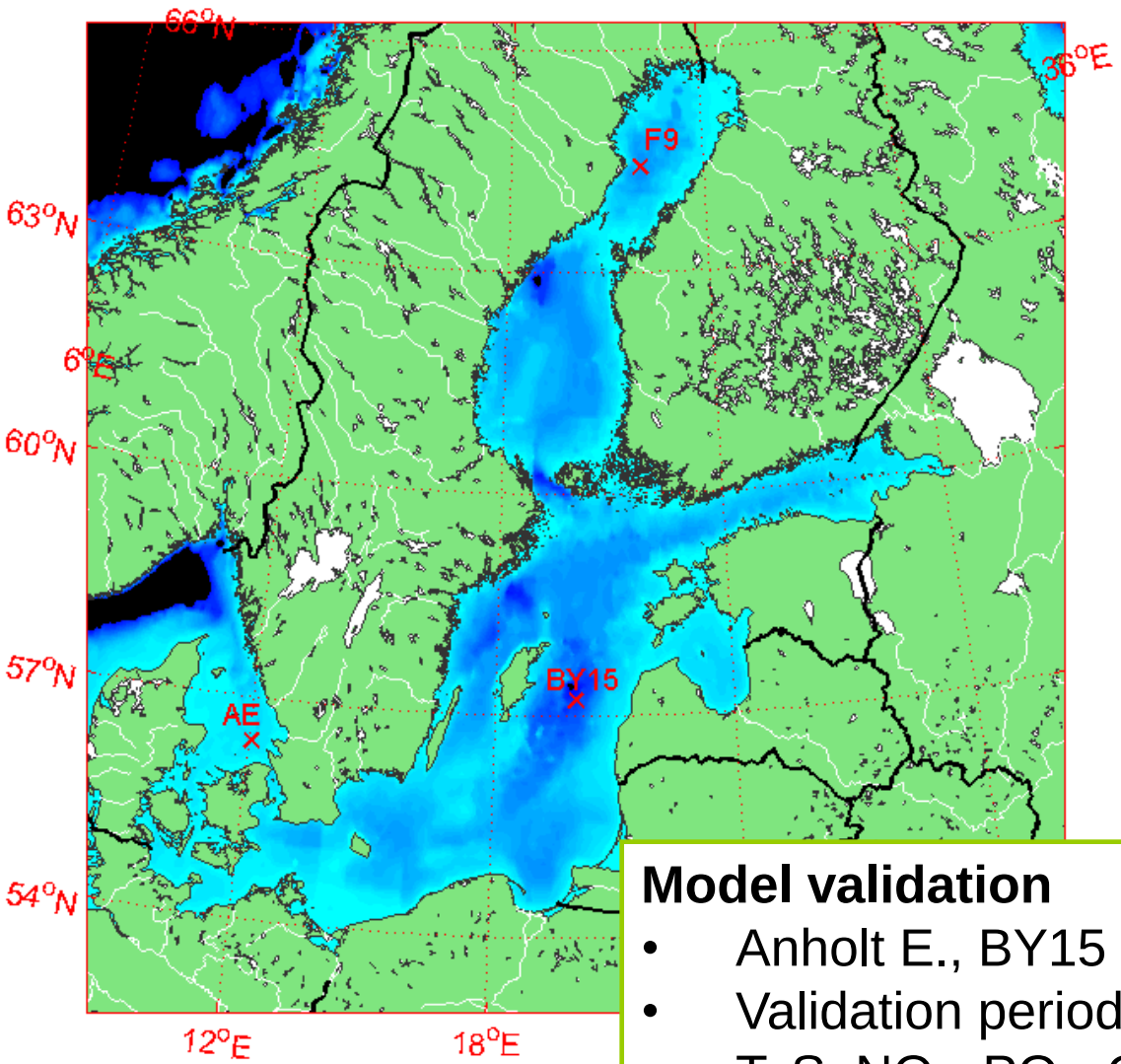
Notation	Description
ρU	momentum in x-direction (kg m^{-2} s^{-1})
ρV	momentum in y-direction (kg m^{-2} s^{-1})
H	heat (J m^{-3})
S	salinity
k	turbulent kinetic energy (J kg^{-1})
ε	dissipation of turbulent kinetic energy (W kg^{-1})

Biogeochemical state variables

Notation	Description
^{PC1}C	phytoplankton, group 1
^{PC2}C	phytoplankton, group 2
^{PC3}C	phytoplankton, group 3
^{ZOO}C	zooplankton
^{DETC}C	detritus, carbon
^{DETN}C	detritus, nitrogen
^{DETP}C	detritus, phosphorus
^{CT}C	total carbon (=$[CO_2]+[HCO_3^-]+[CO_3^{2-}]$)
^{AT}C	total alkalinity
^{NO3}C	nitrate
^{NH4}C	ammonium
^{PO4}C	phosphate
^{O2}C	dissolved oxygen gas

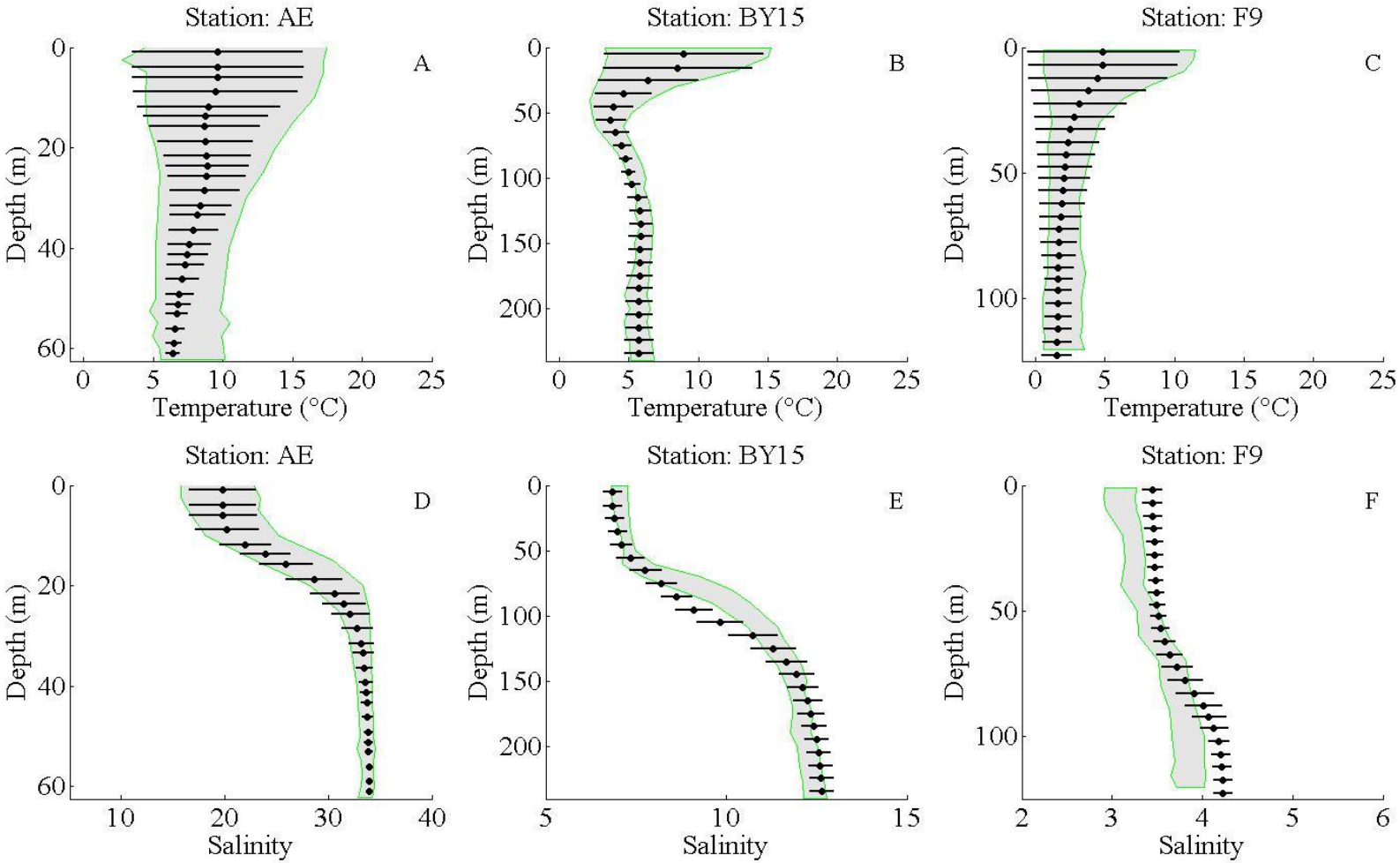
Sediment parameters

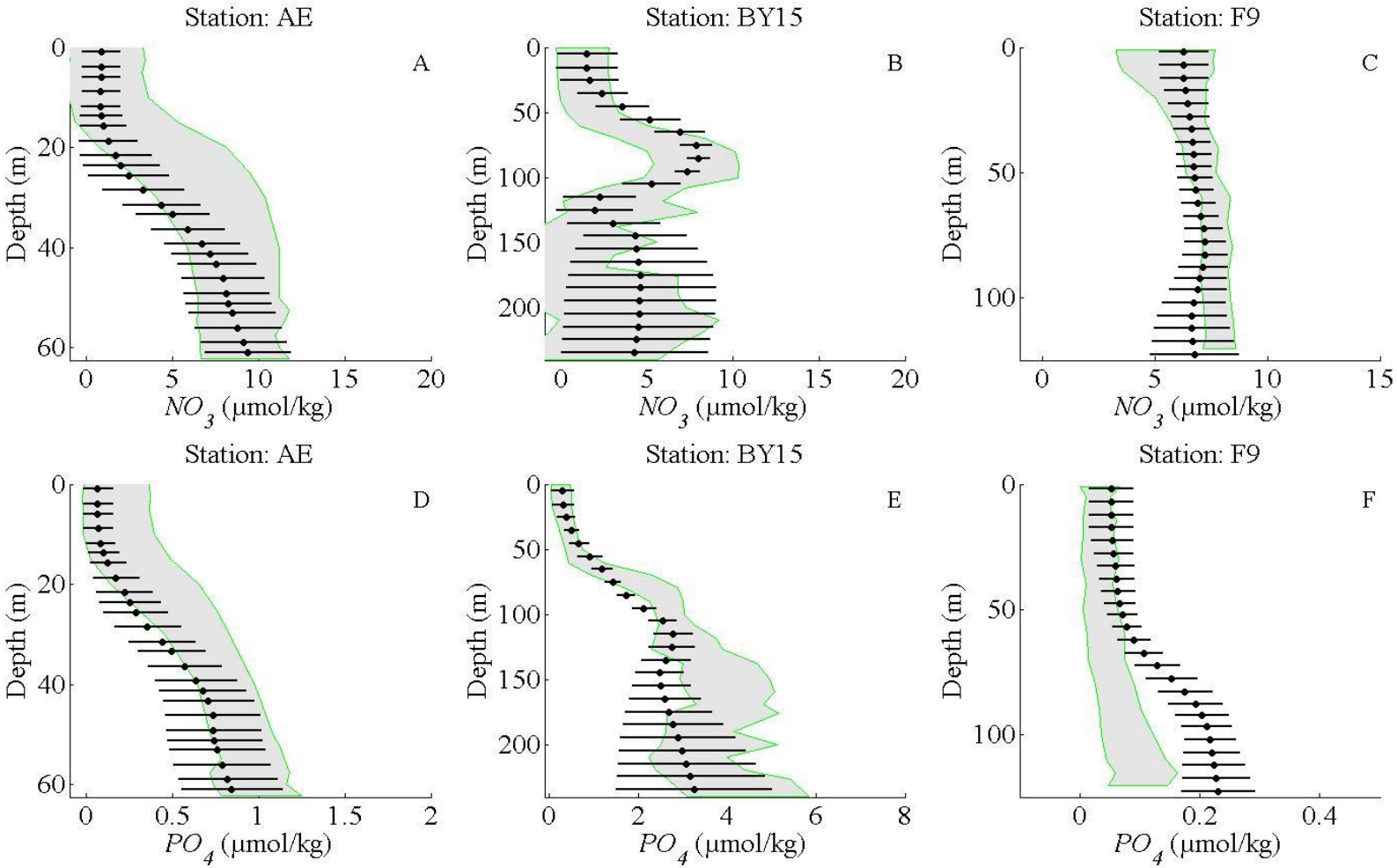
Notation	Description
SEDC	organic carbon
SEDN	organic nitrogen
SEDP	organic phosphorus
SPO4	inorganic phosphorus

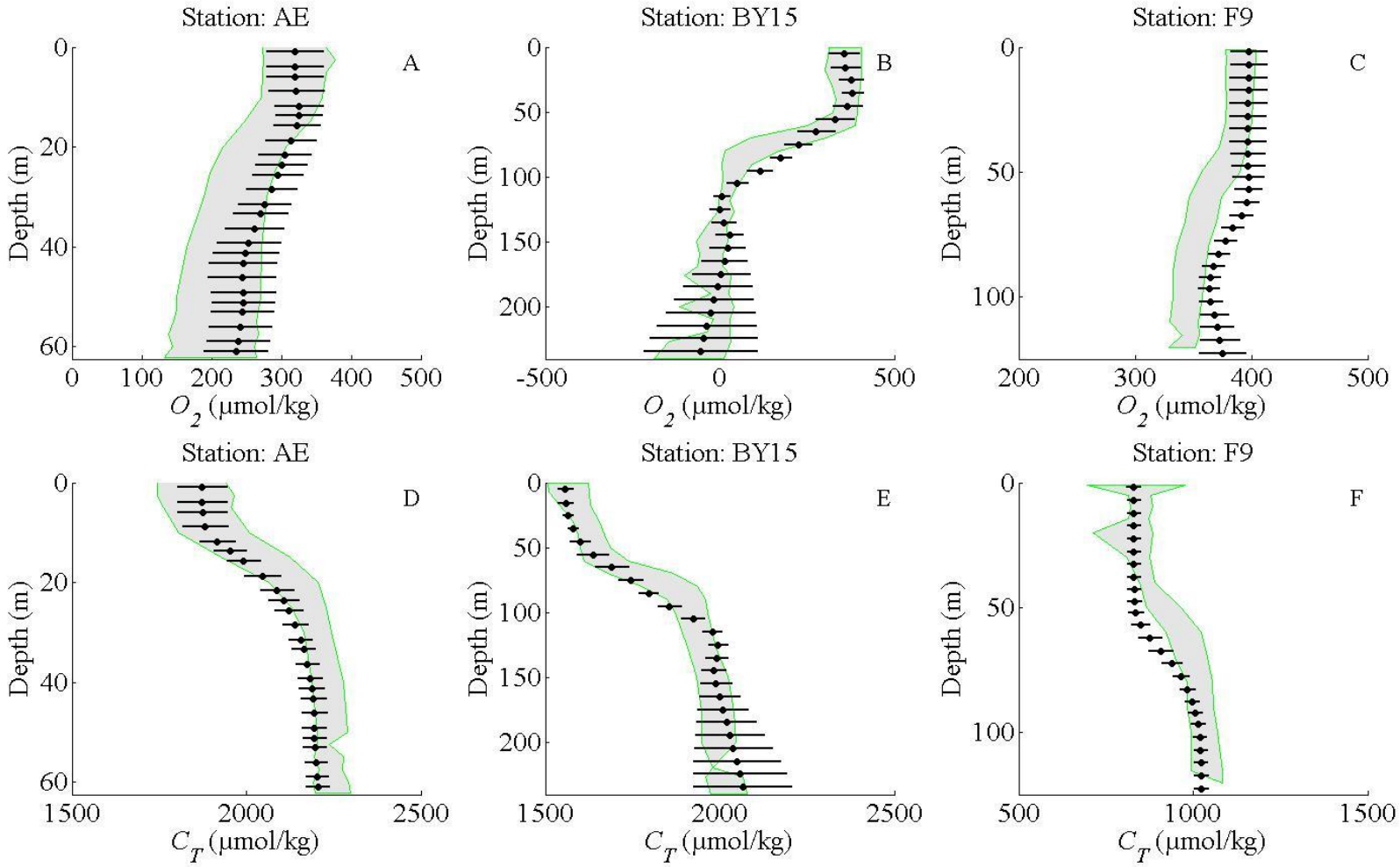


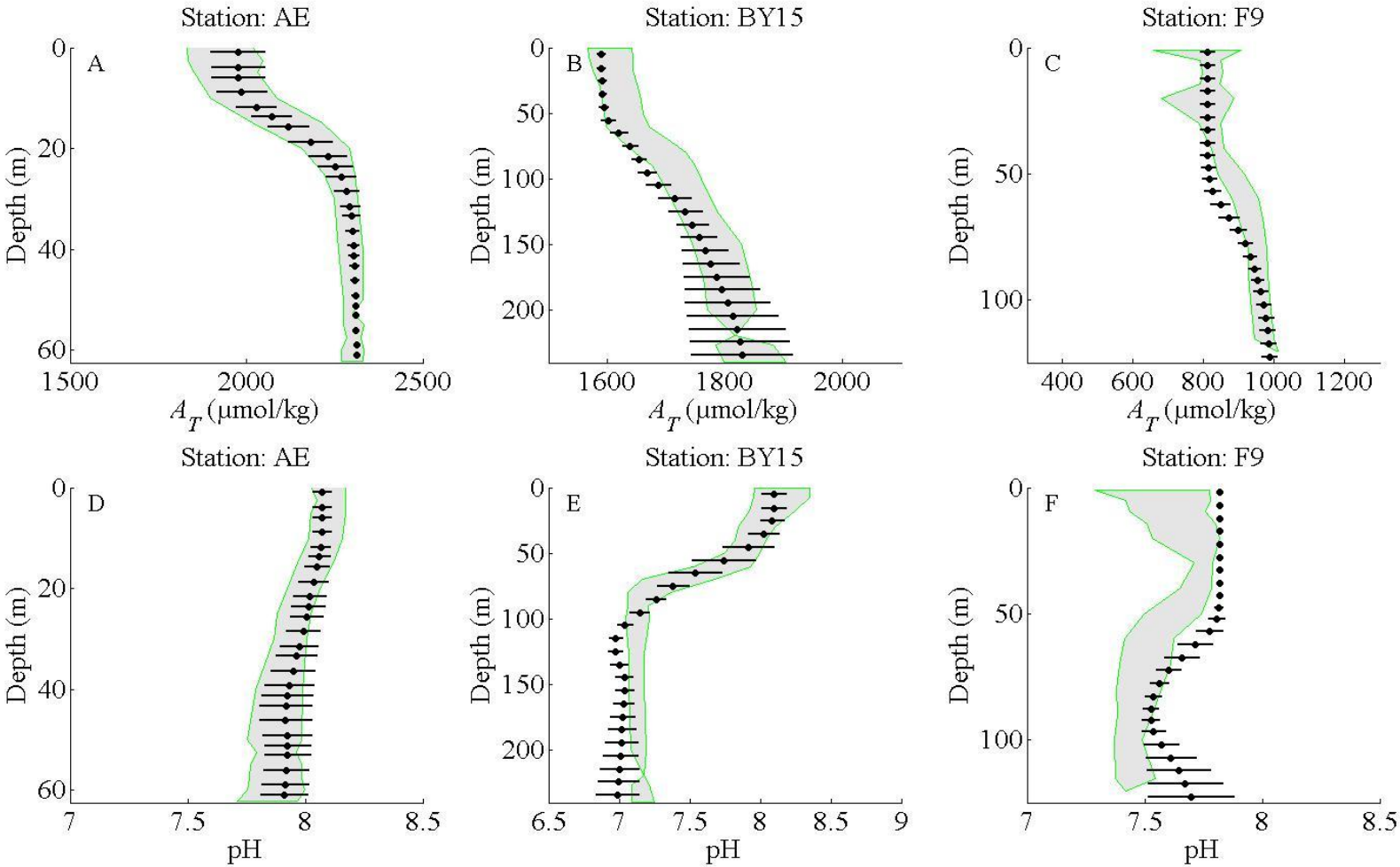
Model validation

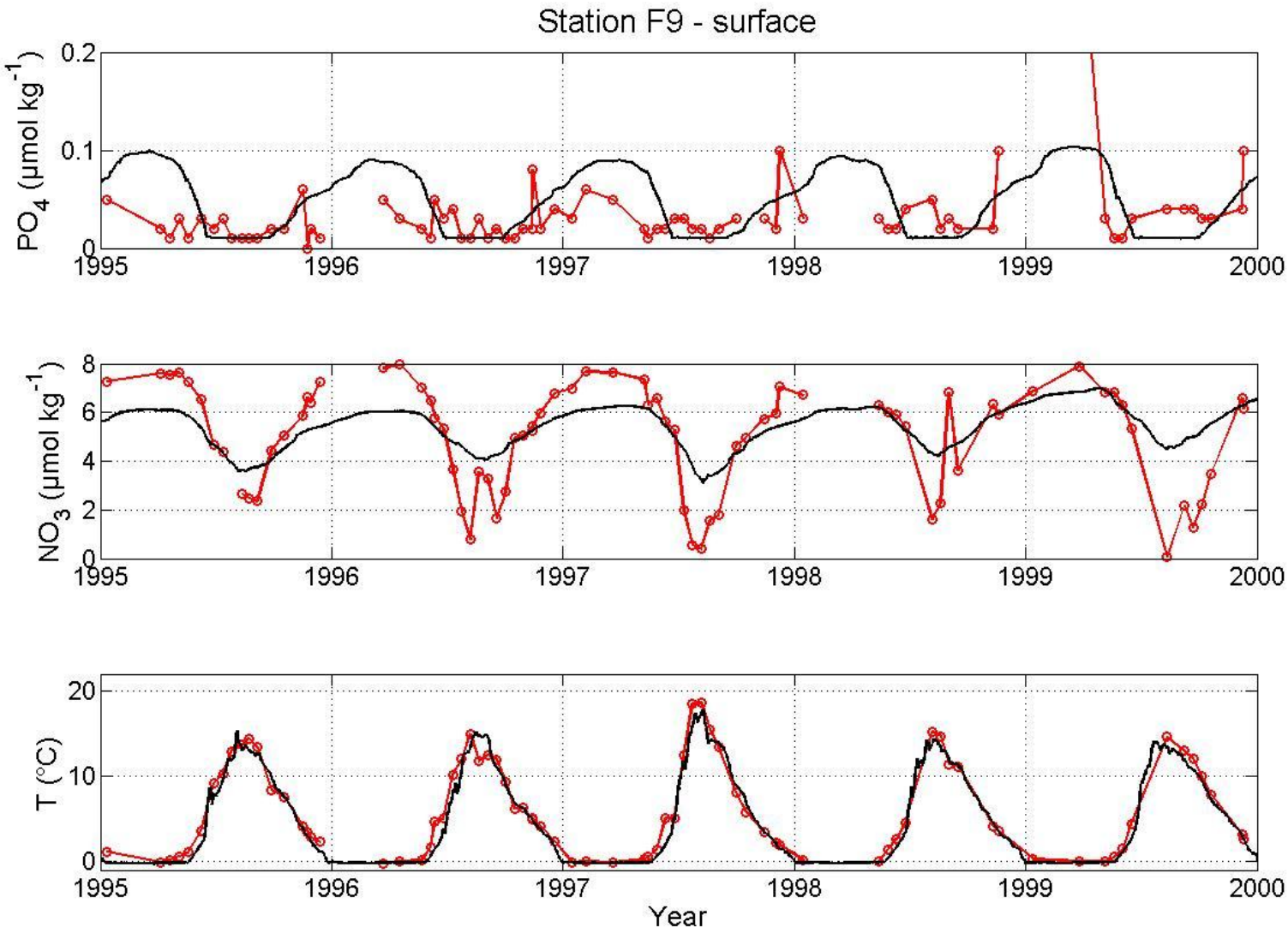
- Anholt E., BY15 and F9
- Validation period: 1995-2009
- T, S, NO_3, PO_4, O_2, C_T, A_T, pH
- SHARK data (SMHI)


Station: AE
A
Station: BY15
B
Station: F9
C
Depth (m)
Temperature (°C)
Station: AE
D
Station: BY15
E
Station: F9
F
Salinity


Station: AE
A
Station: BY15
B
Station: F9
C
Depth (m)
NO_3 (µmol/kg)
Station: AE
D
Station: BY15
E
Station: F9
F
PO_4 (µmol/kg)


Station: AE
A
Station: BY15
B
Station: F9
C
Depth (m)
O_2 (µmol/kg)
Station: AE
D
Station: BY15
E
Station: F9
F
C_T (µmol/kg)


Station: AE
A
Depth (m)
A_T (µmol/kg)
Station: BY15
B
Station: F9
C
Station: AE
D
pH
Station: BY15
E
Station: F9
F


Station F9 - surface
PO4 (µmol kg-1)
0.2
0.1
0
1995
1996
1997
1998
1999
2000
NO3 (µmol kg-1)
8
6
4
2
0
T (°C)
20
10
Year

Future model development

- Increased productivity in the Kattegat (→ increased oxygen consumption and nutrient release in the deep water)
- Additional phosphorus source in the Bothnian Bay? (→ increased oxygen consumption and nutrient release in the deep water)