Simulation of a nutrient reduction scenario using ERGOM

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Matrix of simulations

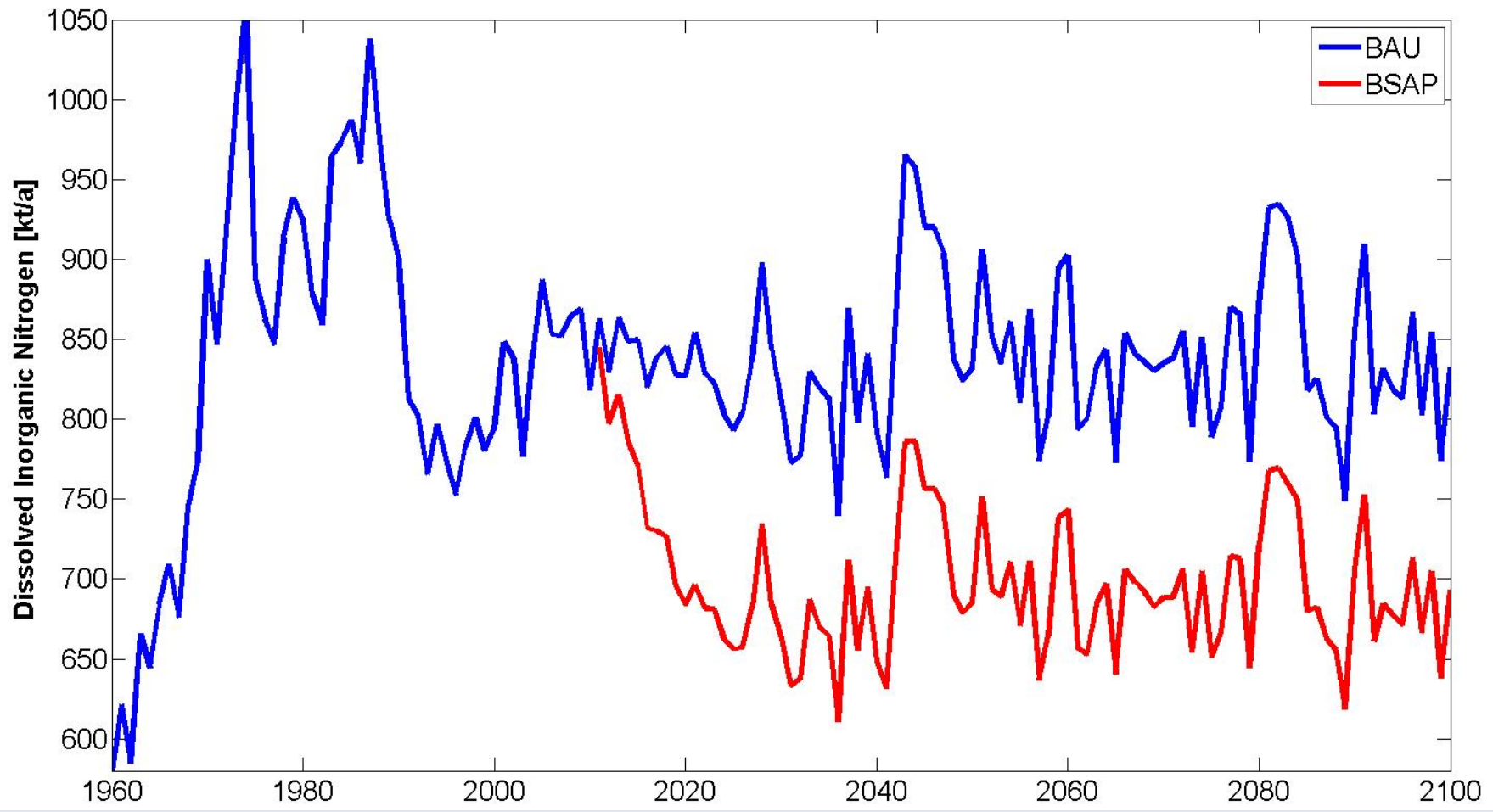
- Climate Change (IPCC-Szenarios):
  - A1B & B1

    regional climate model provided by CLM-community (1960-2100)

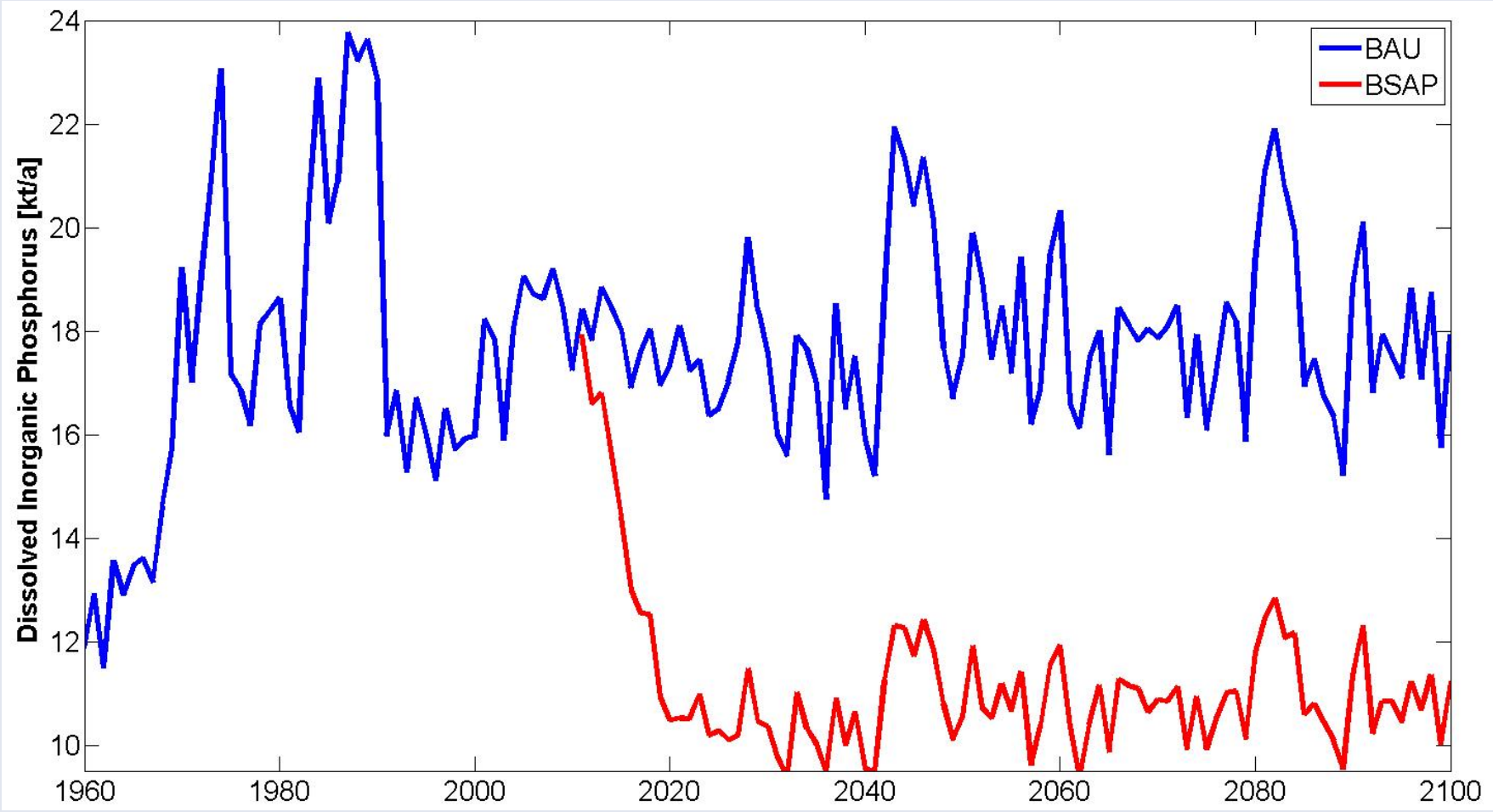
- Eutrophication
  - High nutrient inputs (BAU=Reference conditions)
  - Reduction according to the **Baltic Sea Action Plan**

    Regionalized reduction factors from BSAP (2007)

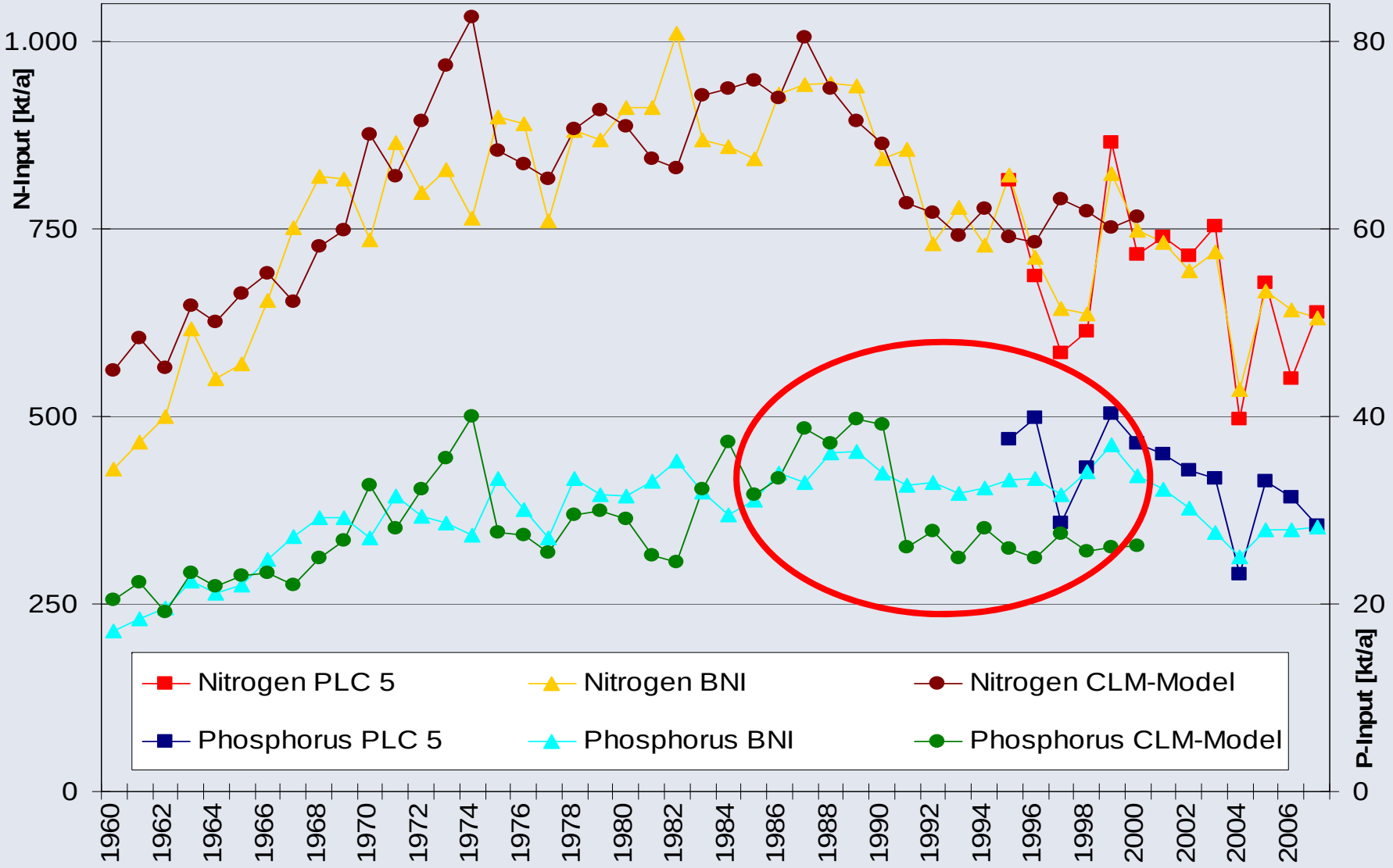
Reduction of the DIN input to 82%



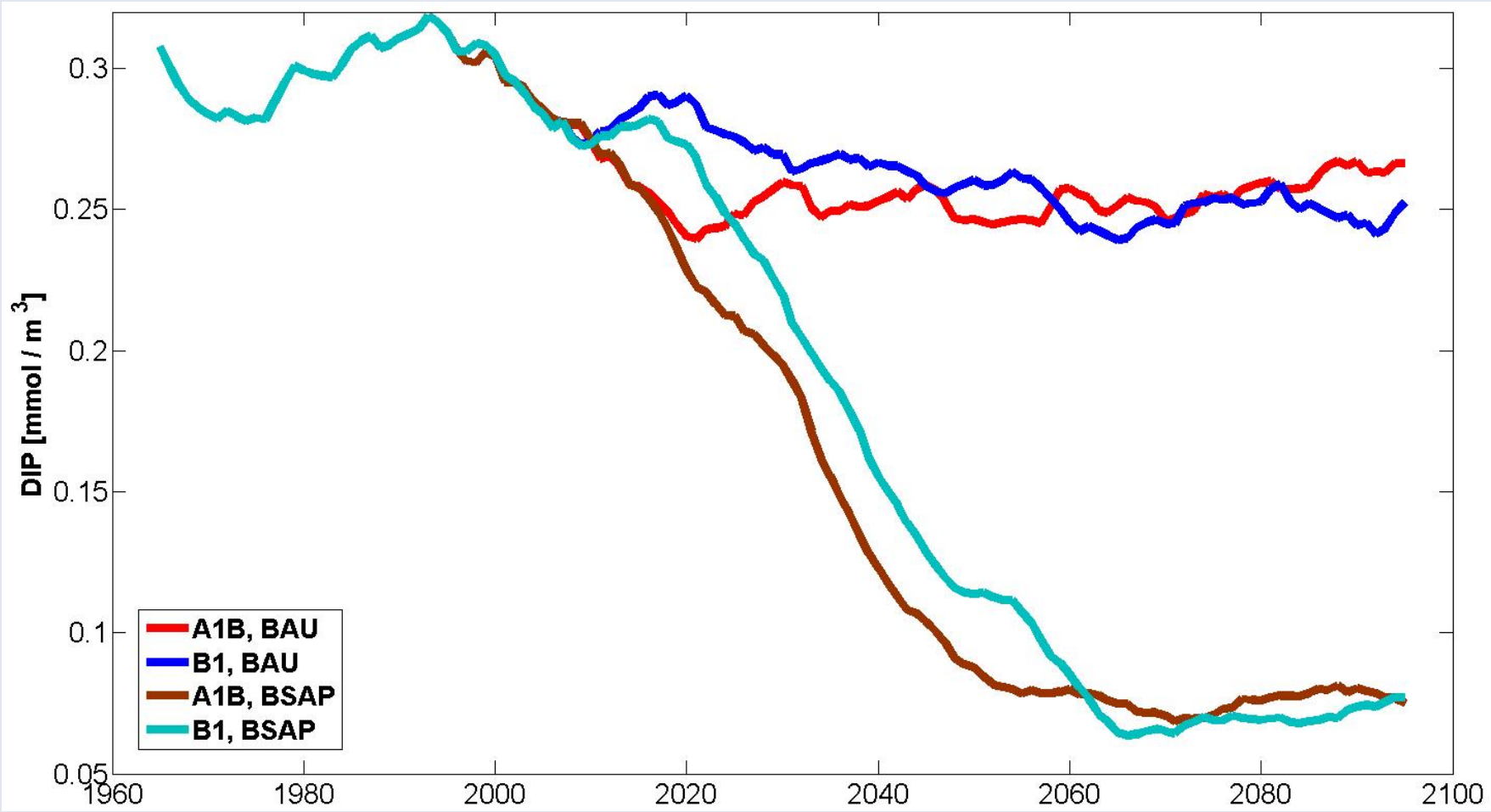
Reduction of the DIP input to 60%



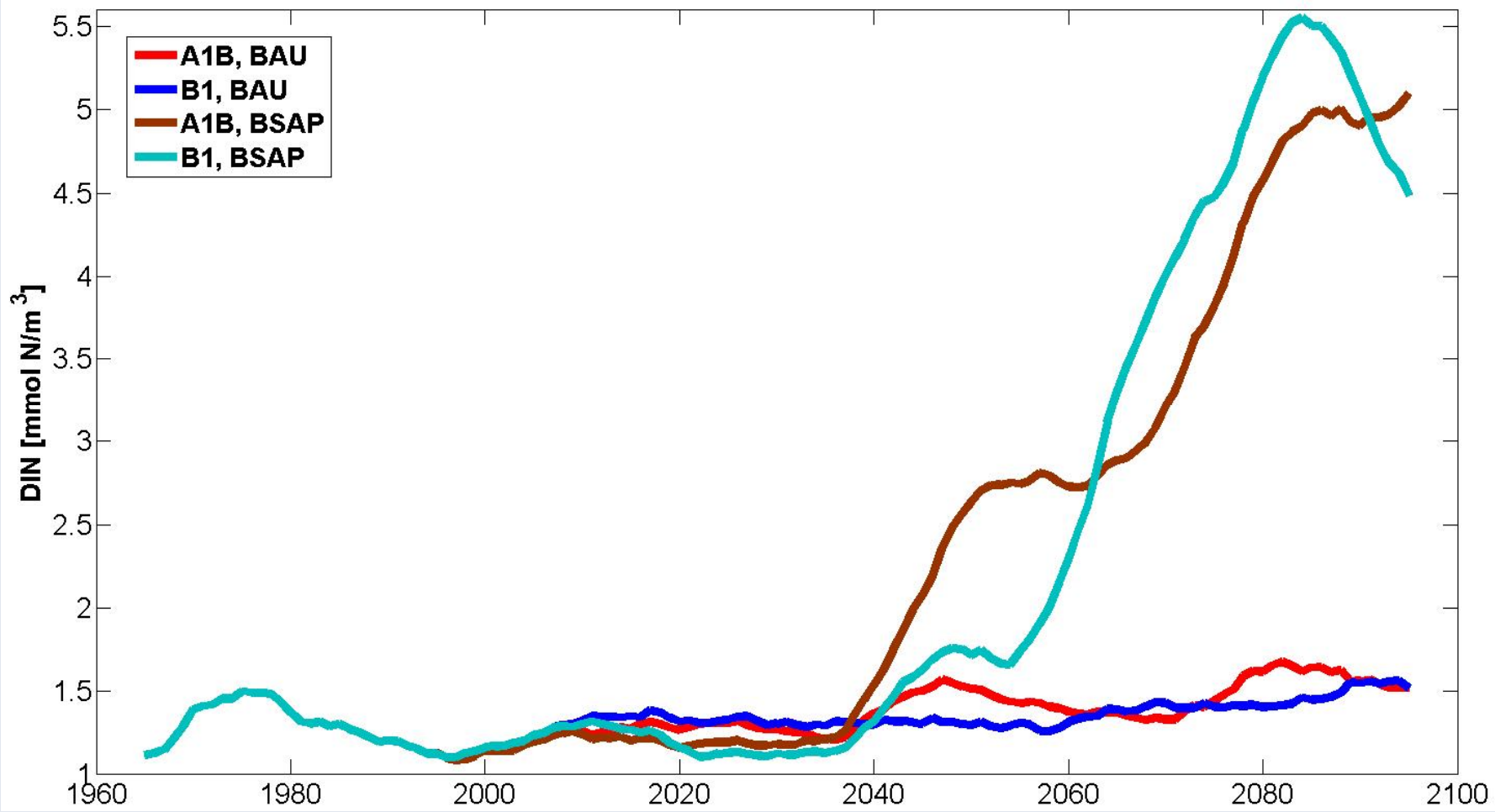
Decrease of riverine P-load after 1990 too strong?



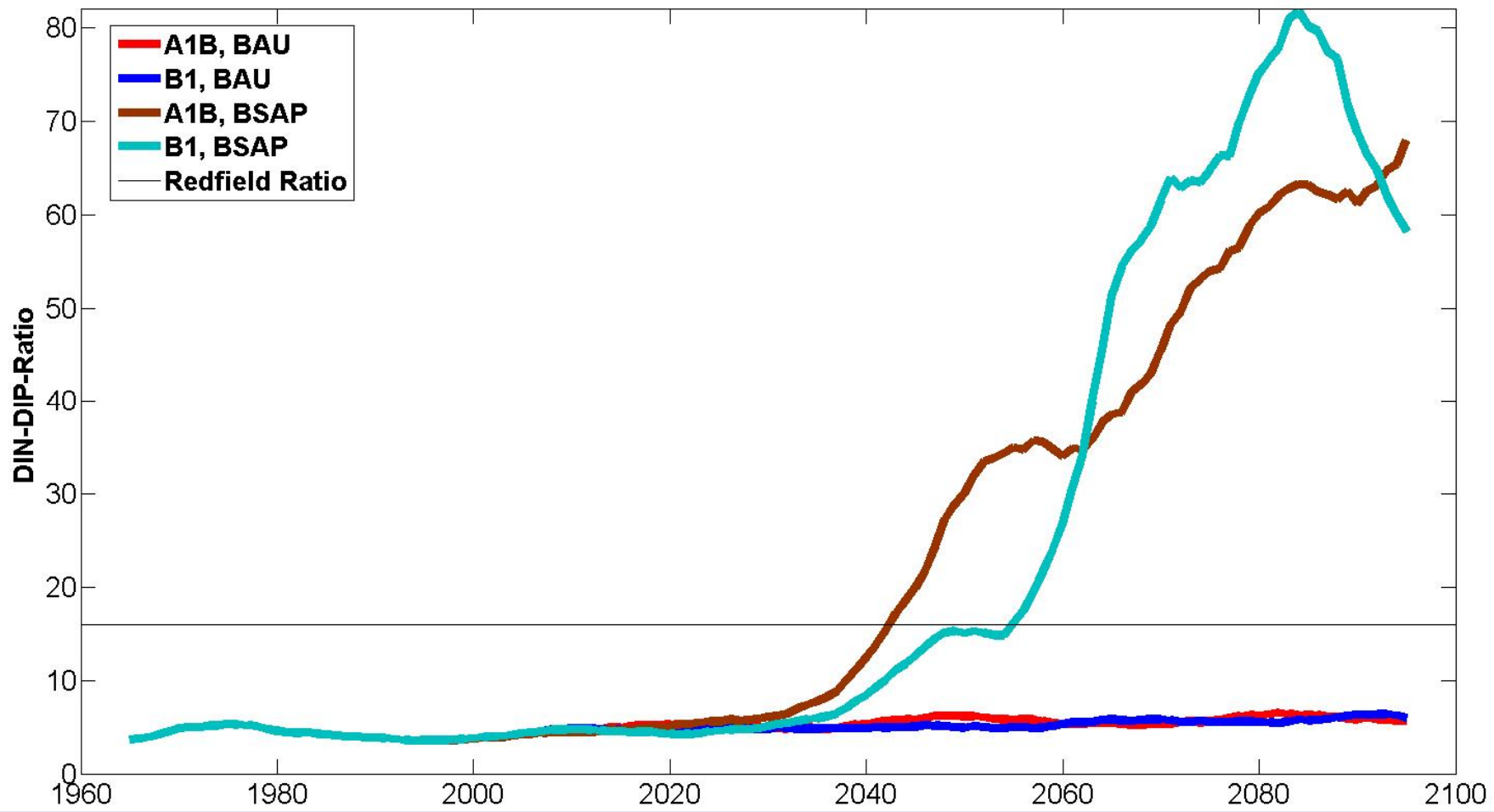
Strong decline of the available DIP (14-22˚E, 54-60˚N, 0-50m, summer)



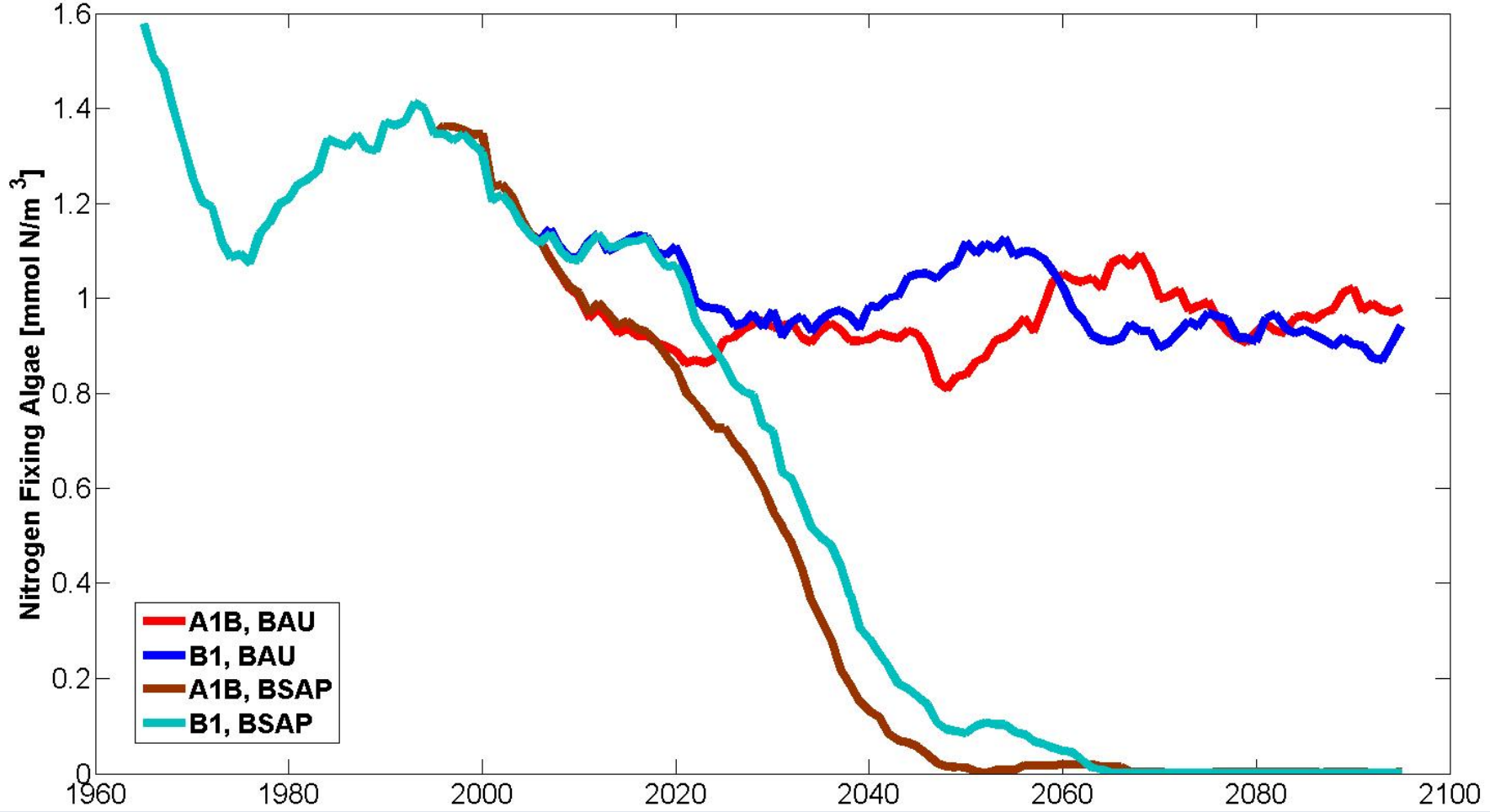
Accumulation of DIN (14-22˚E, 54-60˚N, 0-50m, summer)



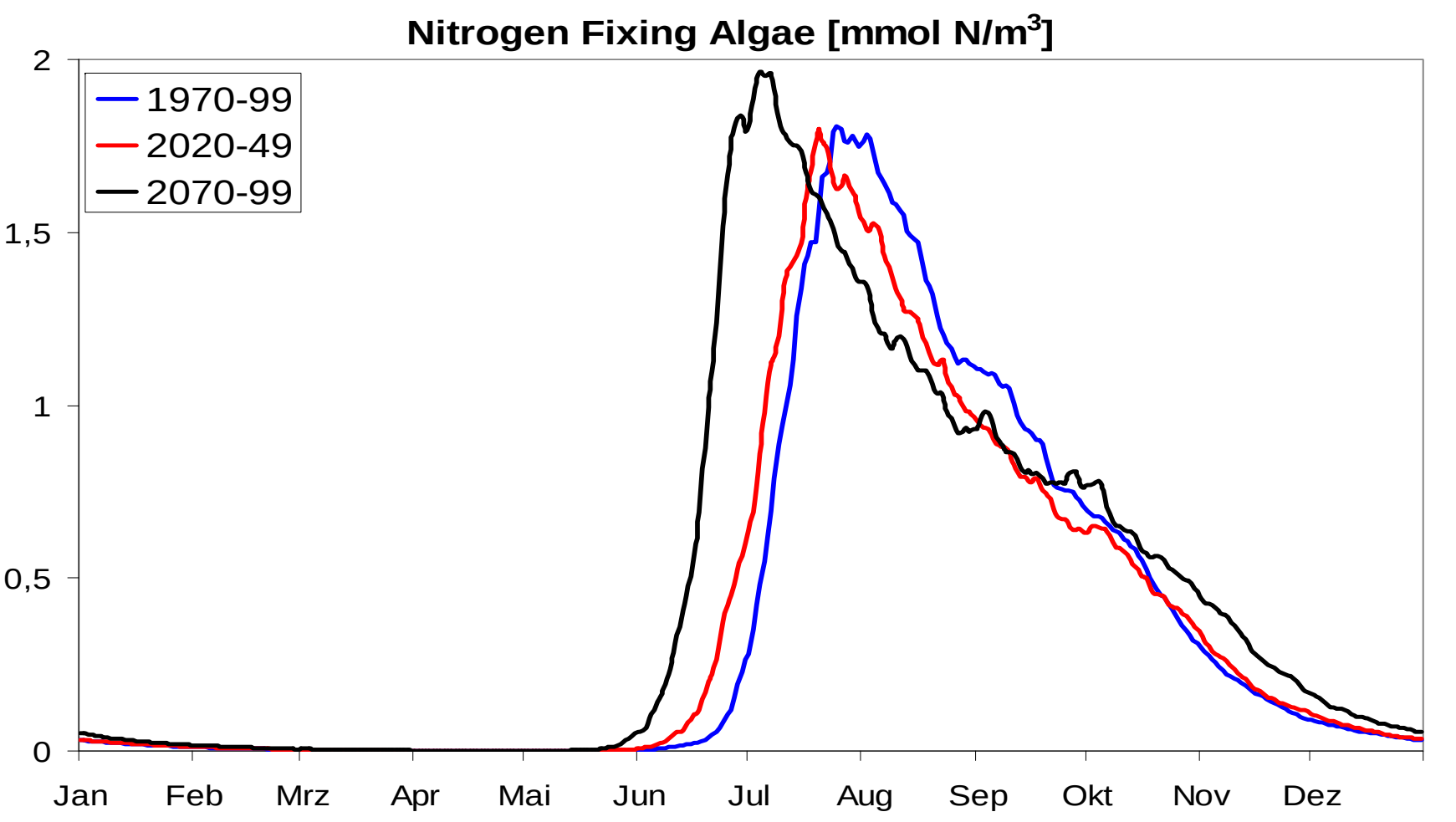
Shift from N to P limitation



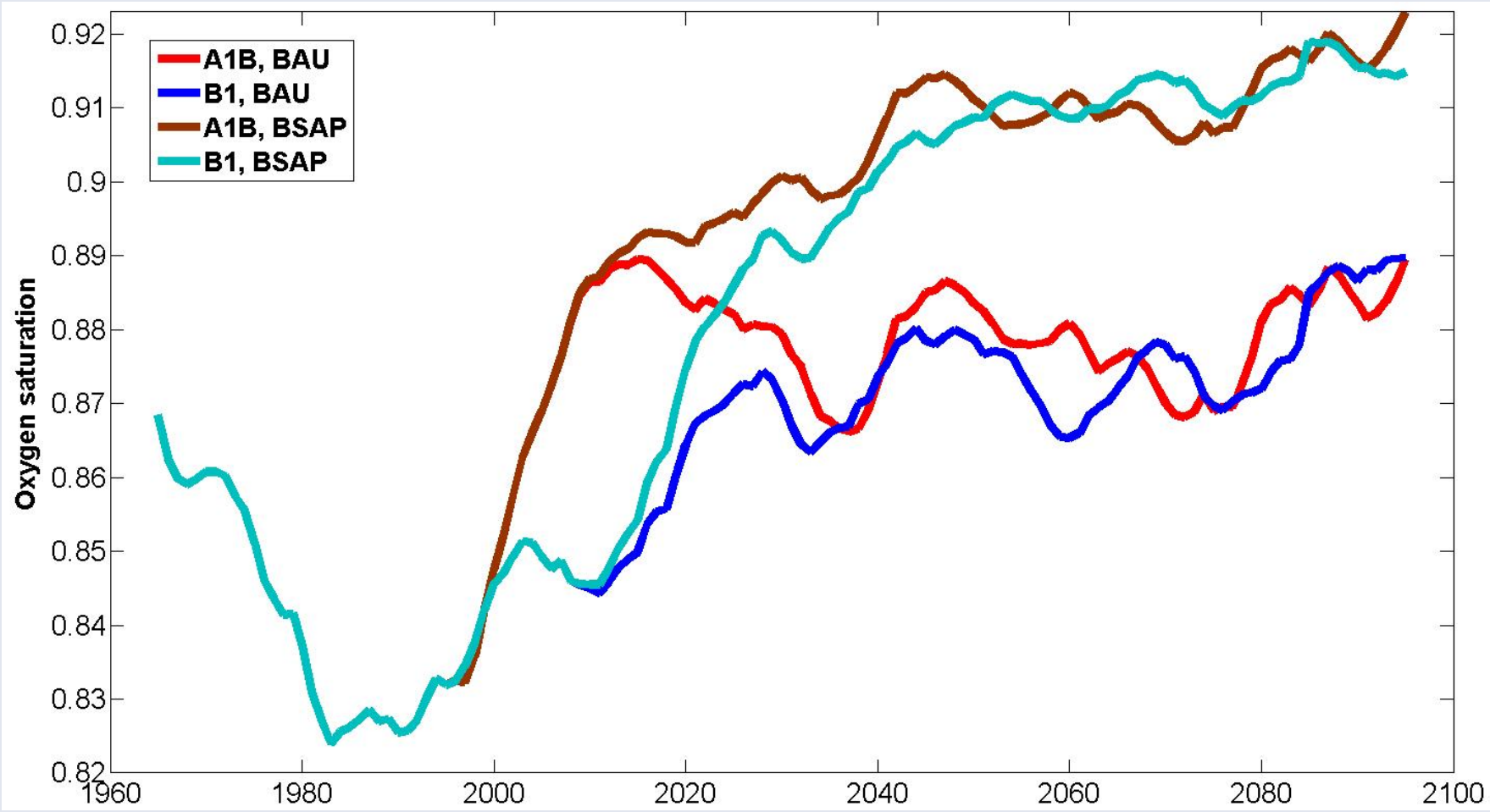
Strong decline of nitrogen fixing algae (14-22˚E, 54-60˚N, annual maximum)



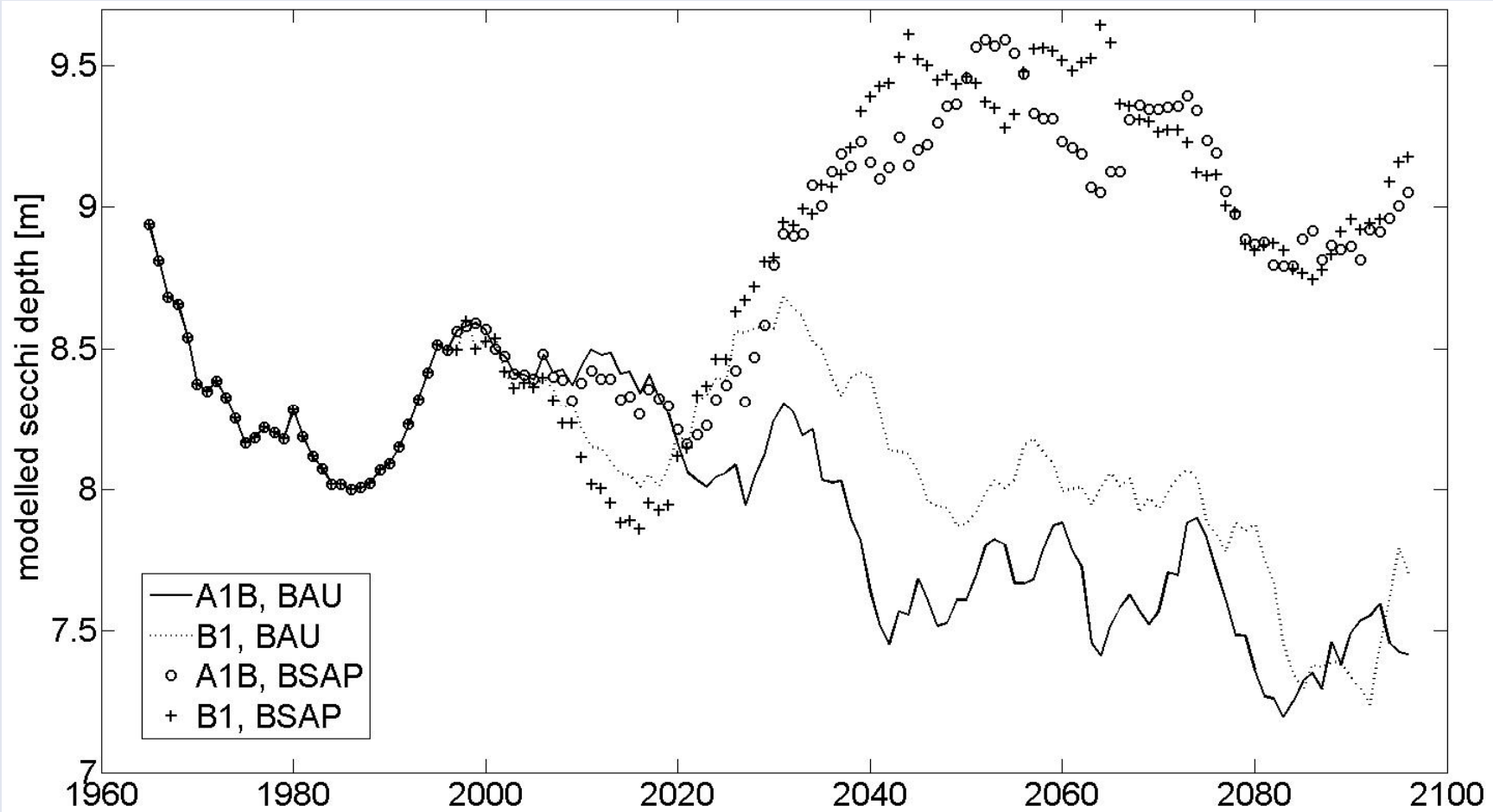
Increase of Nitrogen Fixers bloom at BAU-scenario (Arkona Sea, A1B-forcing)



Higher oxygen saturation at BSAP (14-22˚E, 54-60˚N, summer)



Secchi Depth (Mecklenburg Bight, averaged for June to September)



ERGOM: eutrophication scenarios

Baltic Earth, SMHI, 6.3.2014

Parameter	Climate Change	CC & BSAP
Water transparency	↓	↑
Oxygen	↓	↔
DIP	↔	↓↓
DIN	↔	↑↑
Nitrogen Fixing Algae	↑	↓↓
Chlorophyll a	↑	↓↓
Detritus	↑	↓↓
Zooplankton	↑	↓
Denitrification	↑	↓↓
N-Fixation	↑	↓↓

Friedland et al. (2012, JMS): „Climate change and the Baltic Sea action plan: Model simulations on the future of the western Baltic Sea“

TN/TP-ratio matters!

Overall nutrient loads BSAP (2013)	TN [t/a]	TP [t/a]	TN/TP
1997-2003	910.344	36.894	≈ 24,7
Maximum Allowable Inputs	792.209	21.716	≈ 36,5

Friedland et al. (2012)	TN [t/a]	TP [t/a]	TN/TP
Reference (2021-2100)	1.041.008	34.267	≈ 30,4
BSAP (2021-2100)	857.282	20.660	≈ 41,5

Proposal

- Table with integrated nutrient fluxes and TN/TP-ratio from all simulations
- Analysis compared to TARGREV (2013)

Summer Chl.a [µg/l]: Arkona Sea	**TARGREV (Tab. 4.6)**	**IOW**	…
Status/ Reference Simulation	1,35	3,46	…
Target/ BSAP Simulation	<1,22	1,59	…
Ratio (%)	<90	46	…