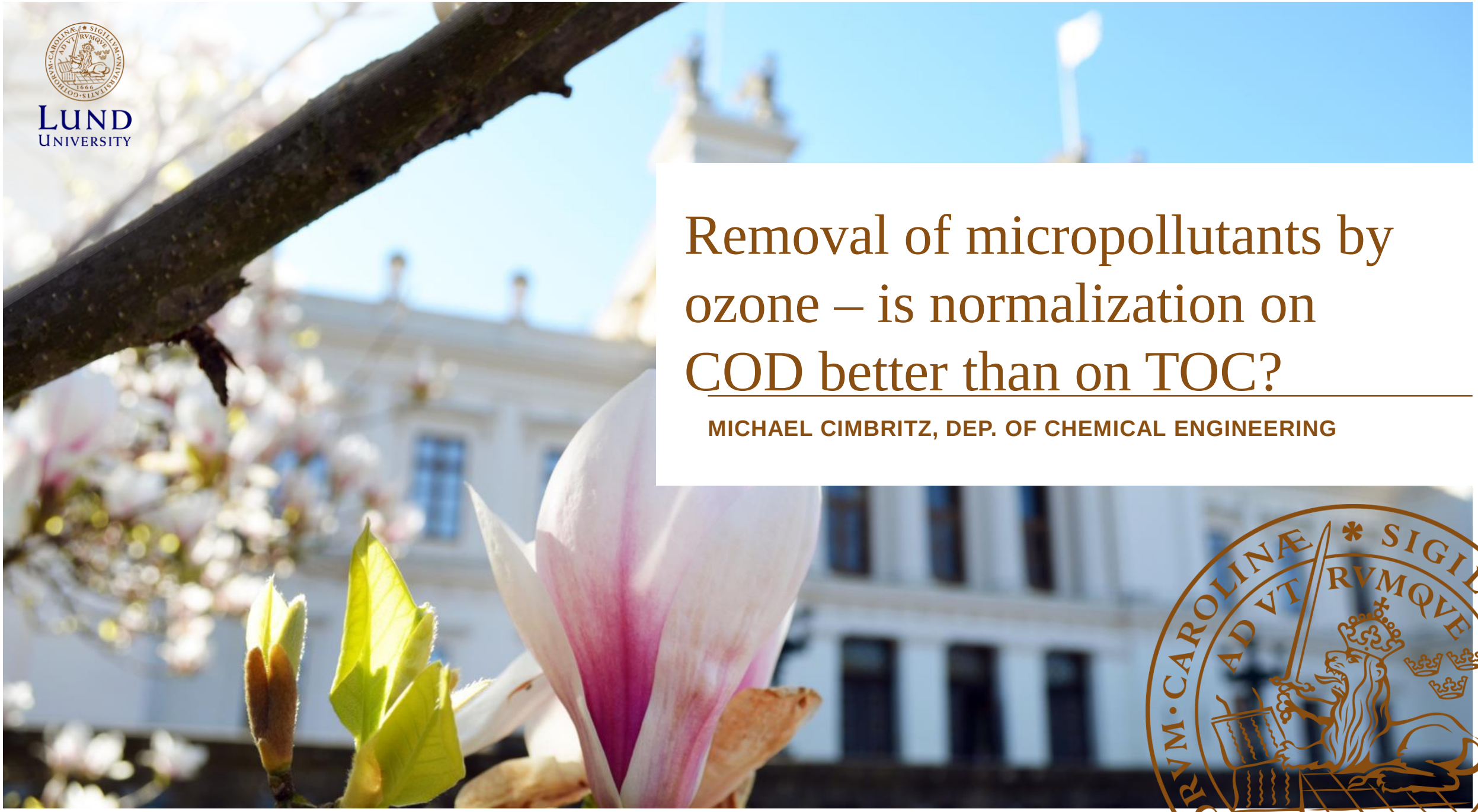


Removal of micropollutants by ozone – is normalization on COD better than on TOC?

MICHAEL CIMBRITZ, DEP. OF CHEMICAL ENGINEERING

Havs och Vatten myndigheten

Reningstekniker för läkemedel och mikroföroreningar i avloppsvatten

Redovisning av åtta projekt som fått medel från Havs- och vattenmiljöanslaget 2014-2017

Havs- och vattenmyndighetens rapport 2018:7

VA-teknik Södra

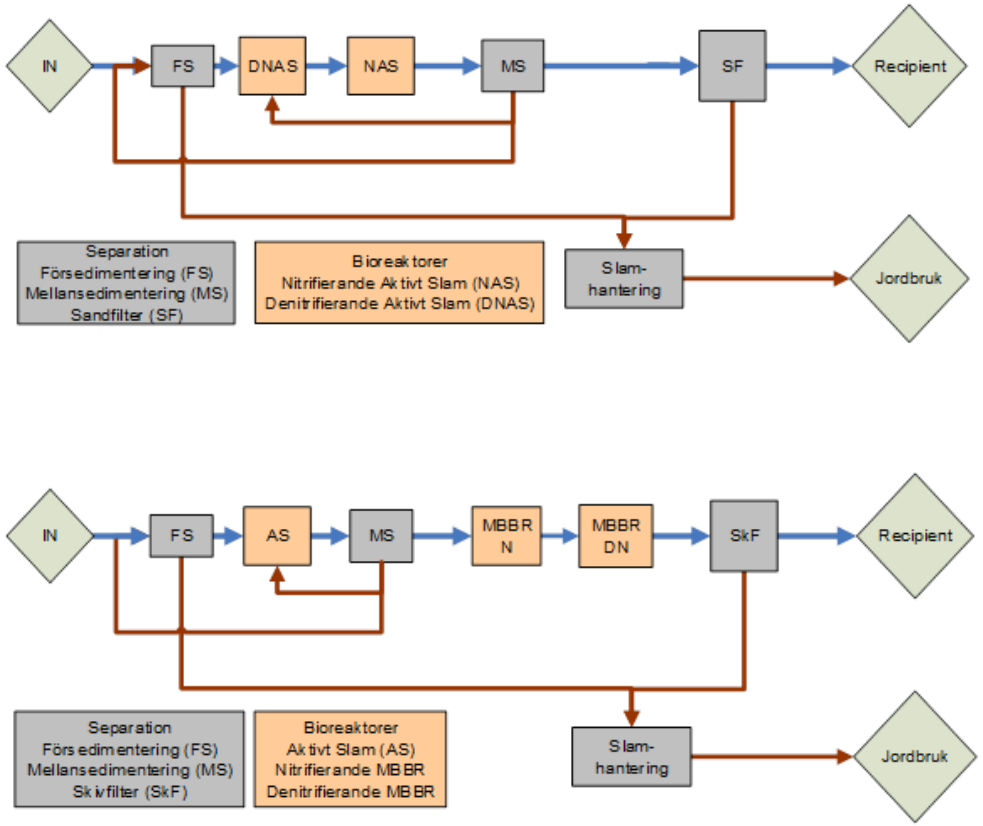
Rapport Nr. 11
2018

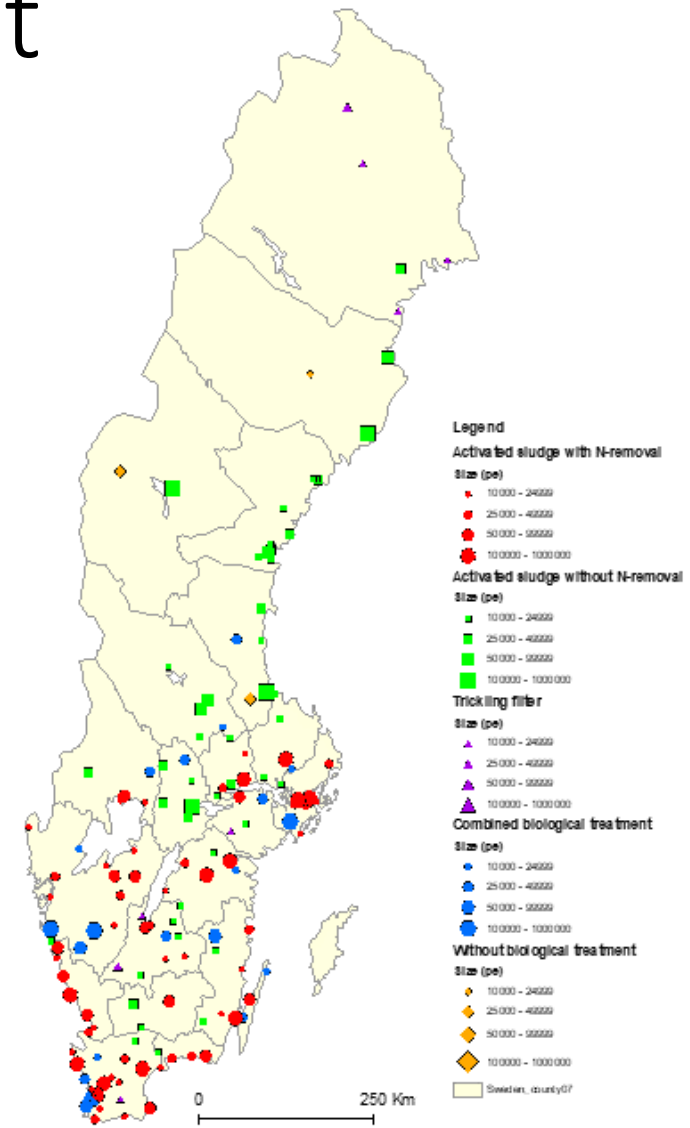
Reduktion av svårnedbrytbara föroreningar i avloppsvatten (RESVAV)

en projektsammanställning

Michael Cimbritz

Swedish wastewater treatment





Pilot studies in southern Sweden

Chemical Engineering Journal 325 (2017) 310–321

Contents lists available at ScienceDirect

Chemical Engineering Journal

journal homepage: www.elsevier.com/locate/cej

Ozonation efficiency in removing organic micro pollutants from wastewater with respect to hydraulic loading rates and different wastewaters

H. El-taliawy [a], M. Ekblad [b,c], F. Nilsson [d], M. J. la Cour Jansen [b], K. Bester [a,*]

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Water Practice & Technology Vol 12 No 4
doi: 10.2166/wpt.2017.087

Removal of pharmaceuticals with ozone at 10 Swedish wastewater treatment plants

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Lund 223 70, Sweden

Science of the Total Environment 658 (2019) 449–456

Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv

Is dissolved COD a suitable design parameter for ozone oxidation of organic micropollutants in wastewater?

M. Ekblad [a,b,*], P. Falås [a], H. El-taliawy [c], F. Nilsson [a,d], K. Bester [c], M. Hagman [b], M. Cimbritz [a]

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[b] Sweden Water Research AB, Ideon Science Park, Scheelevägen 15, 223 70 Lund, Sweden
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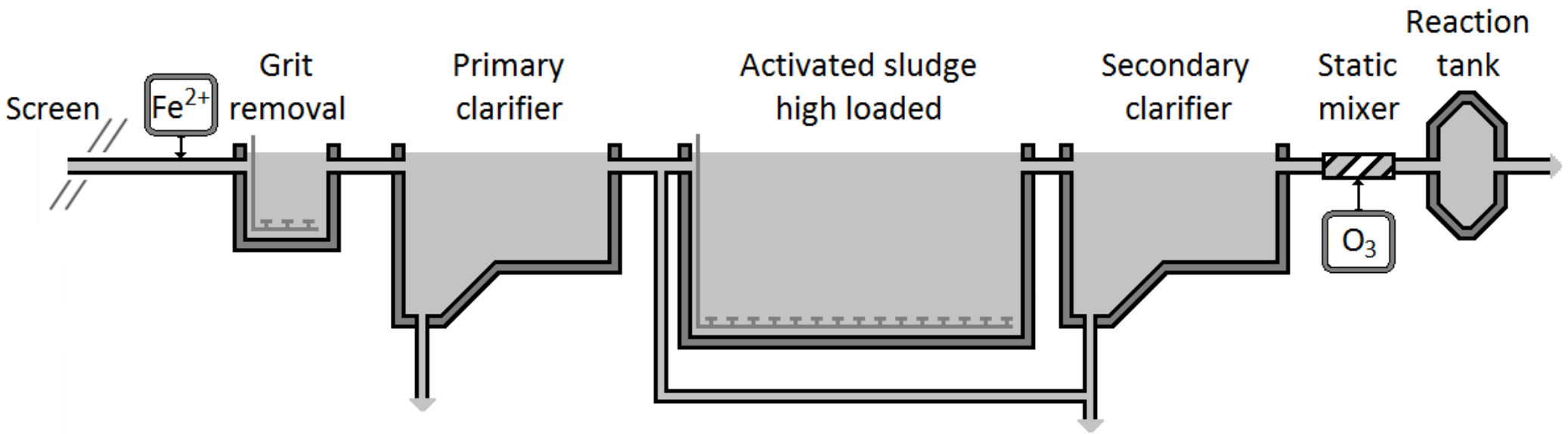
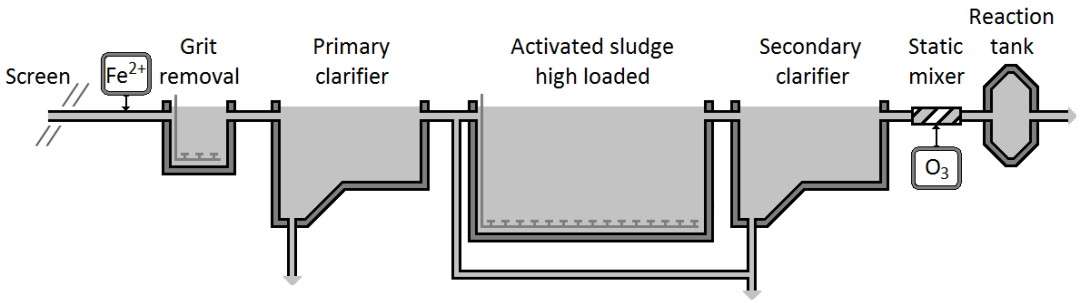
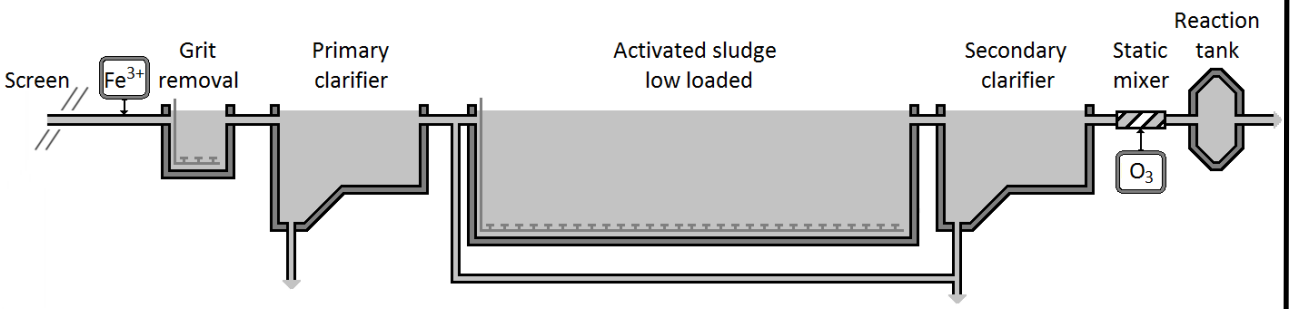
Ozone oxidation of micropollutants in wastewater with different degrees of biological treatment

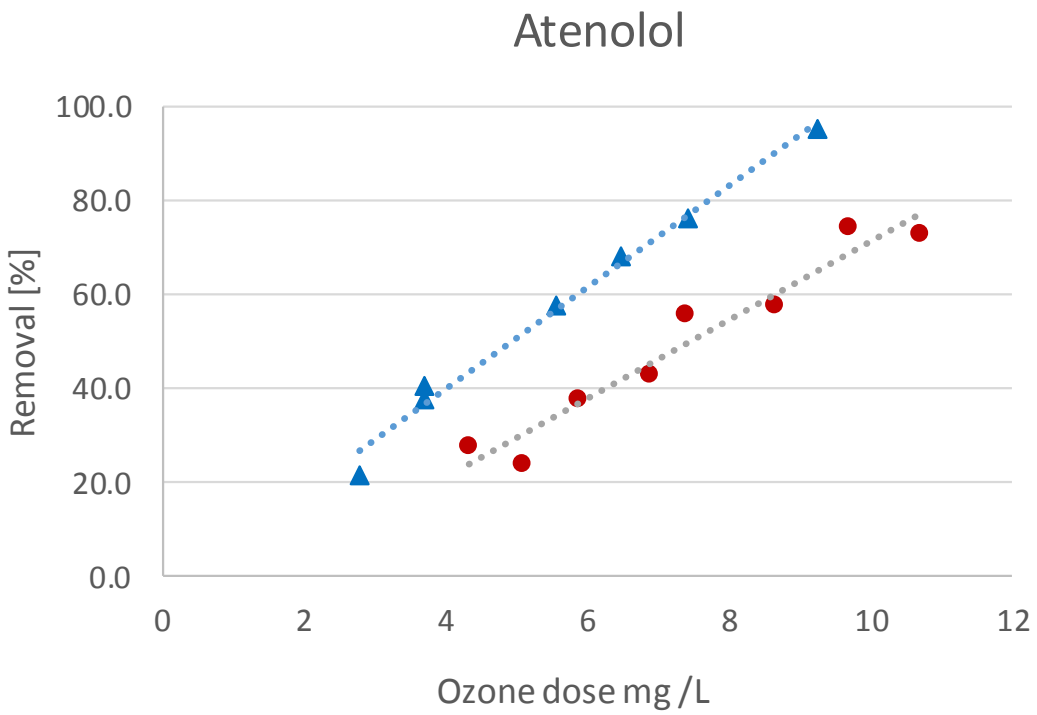


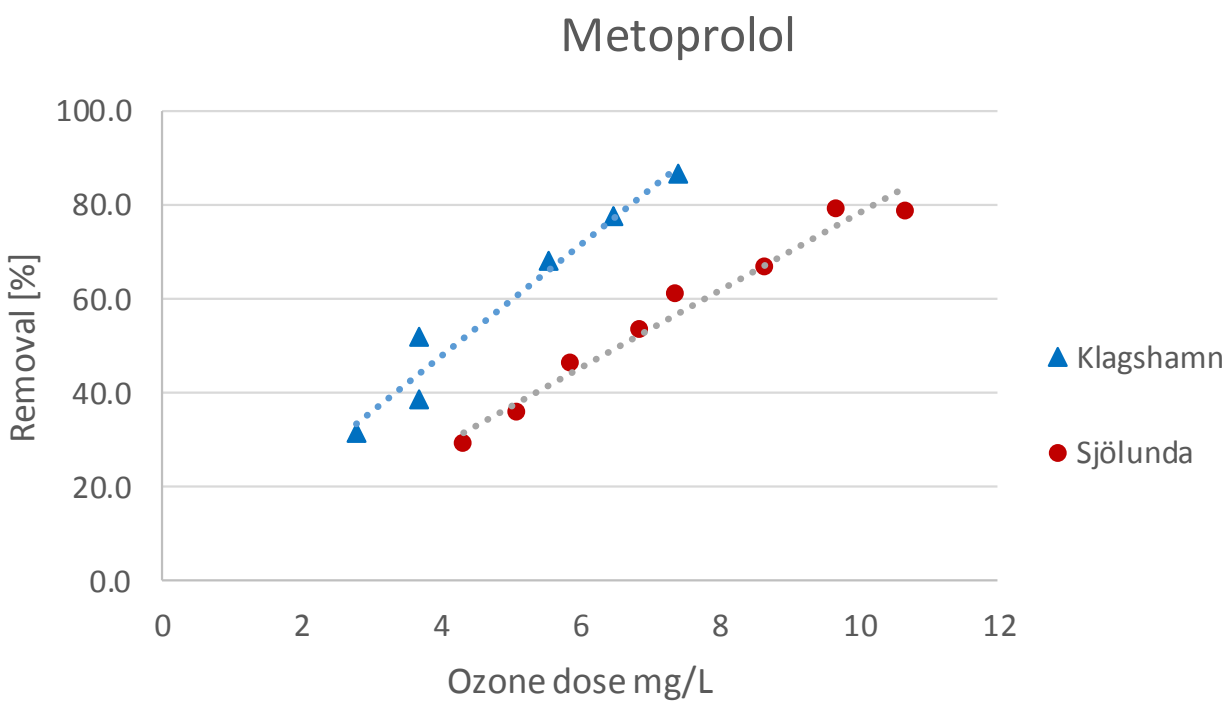
Ozone oxidation of micropollutants in wastewater with different degrees of biological treatment

Sjölunda WWTP	Klagshamn WWTP
	

	Activated sludge treatment	Activated sludge treatment
HRT (h)	3	5-6
SRT (d)	2	11
MLSS (g/L)	2-4	2-4
O_2 (mg/L)	2	2
Temperature (°C)	20	20

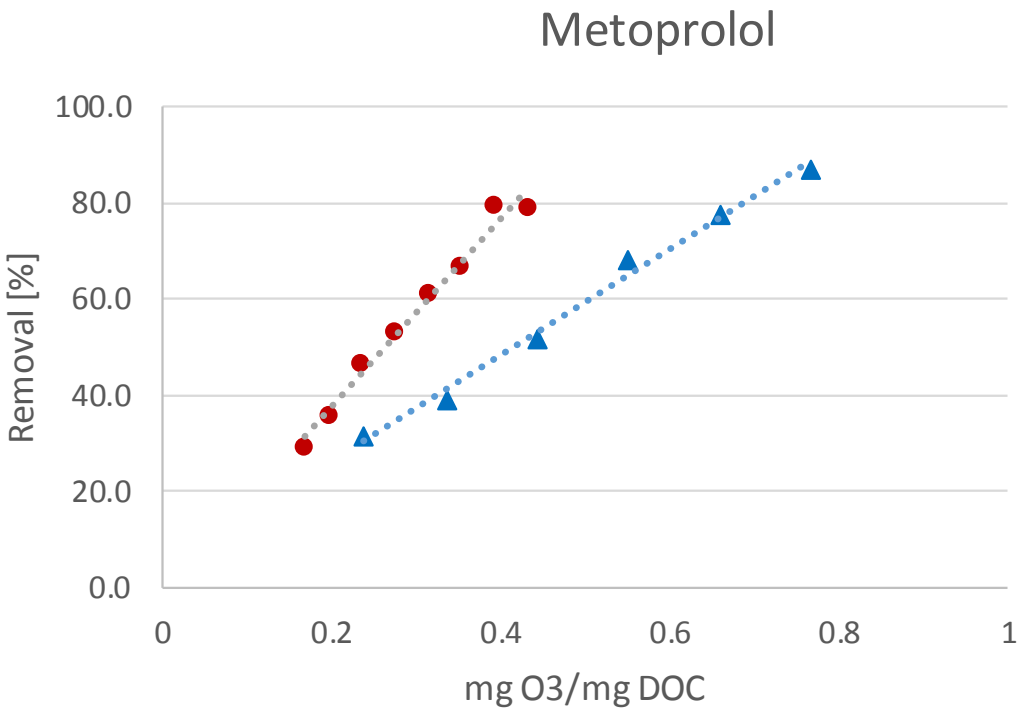
Removal at different ozone doses

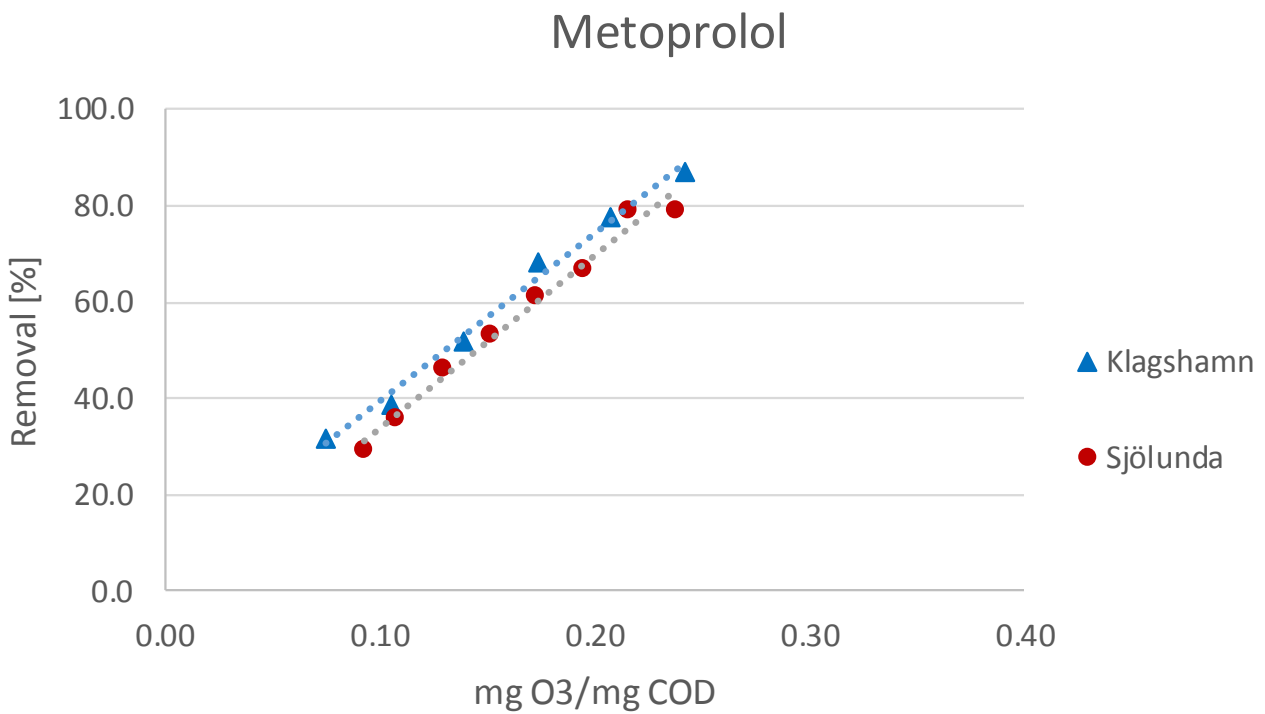




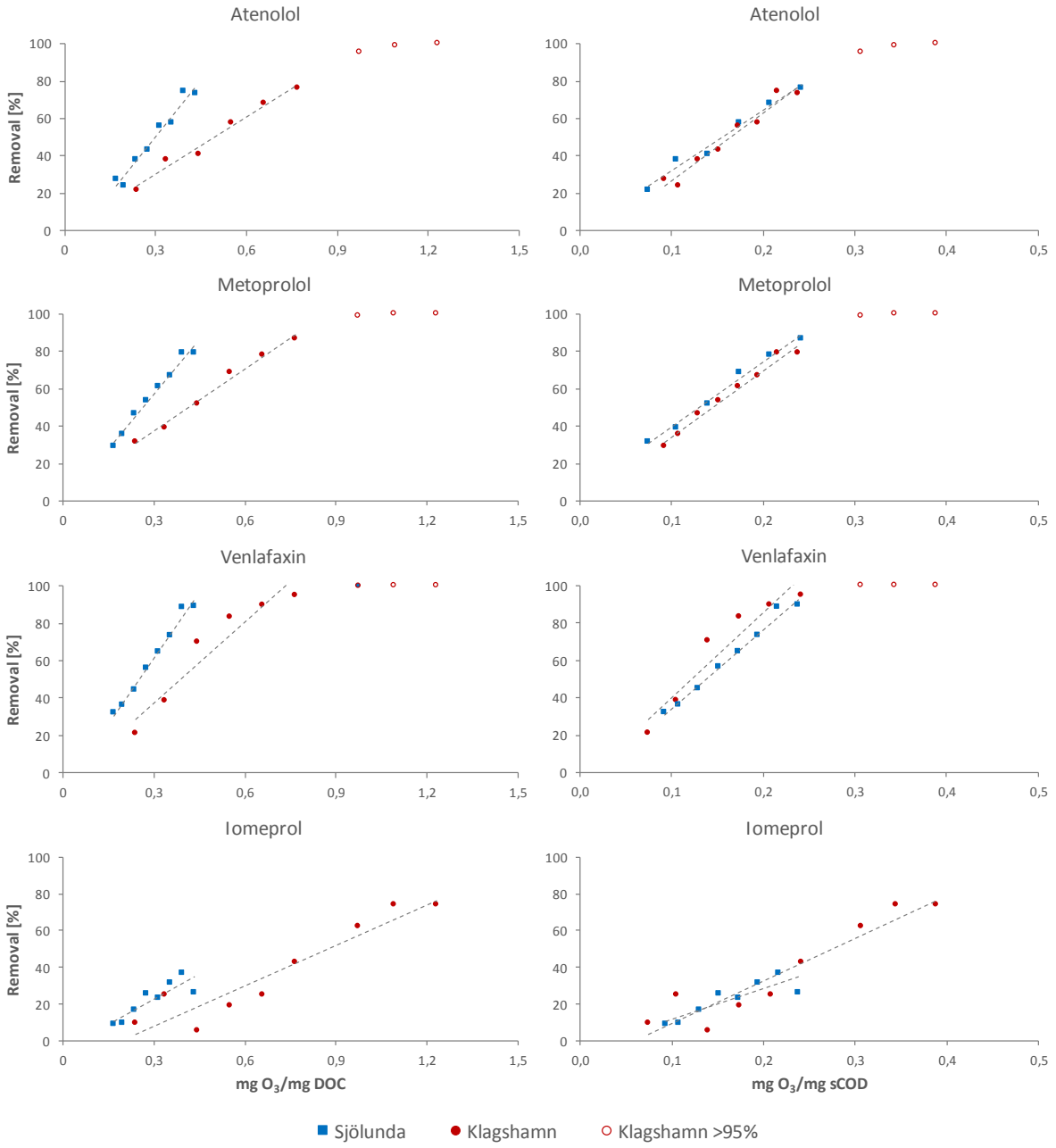
	DOC (mg/L)
Klagshamn	**9.3**
Sjölunda	**25.5**

Normalized ozone doses

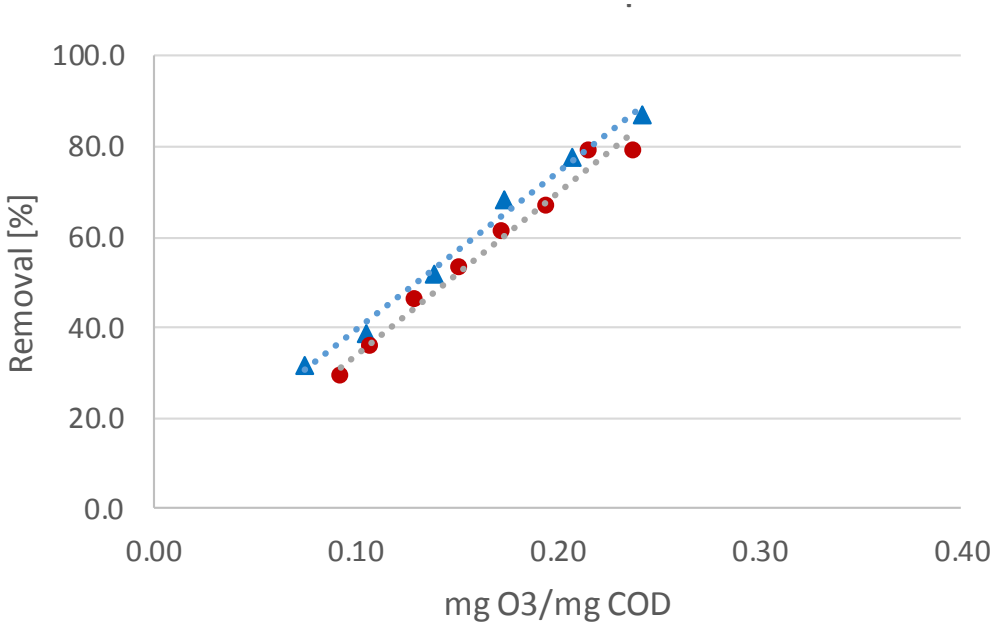


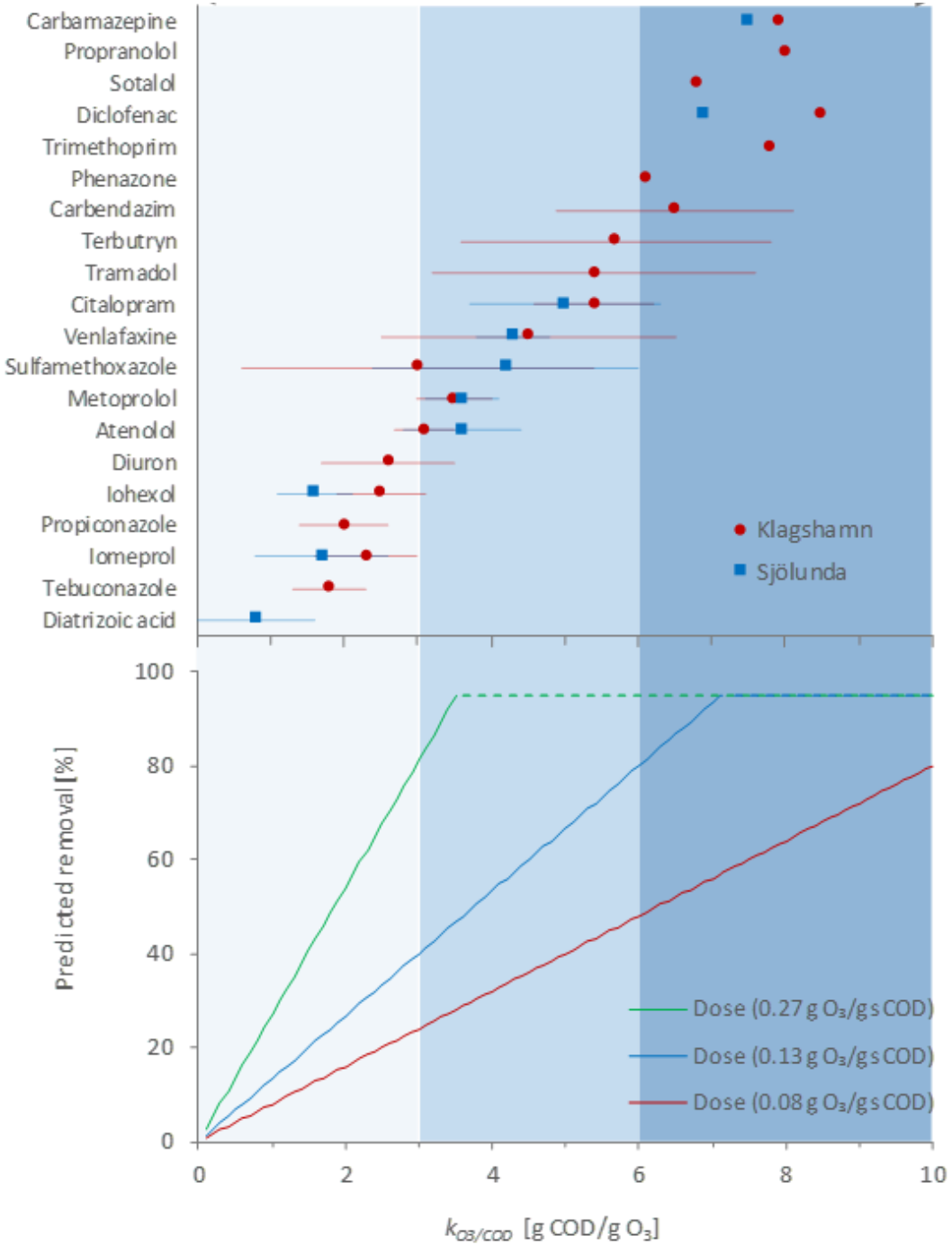


Normalized ozone doses



The slope - $k_{COD/O3}$





Predicted removal / Measured removal

Science of the Total Environment 461–462 (2013) 480–498

Contents lists available at SciVerse ScienceDirect

Science of the Total Environment

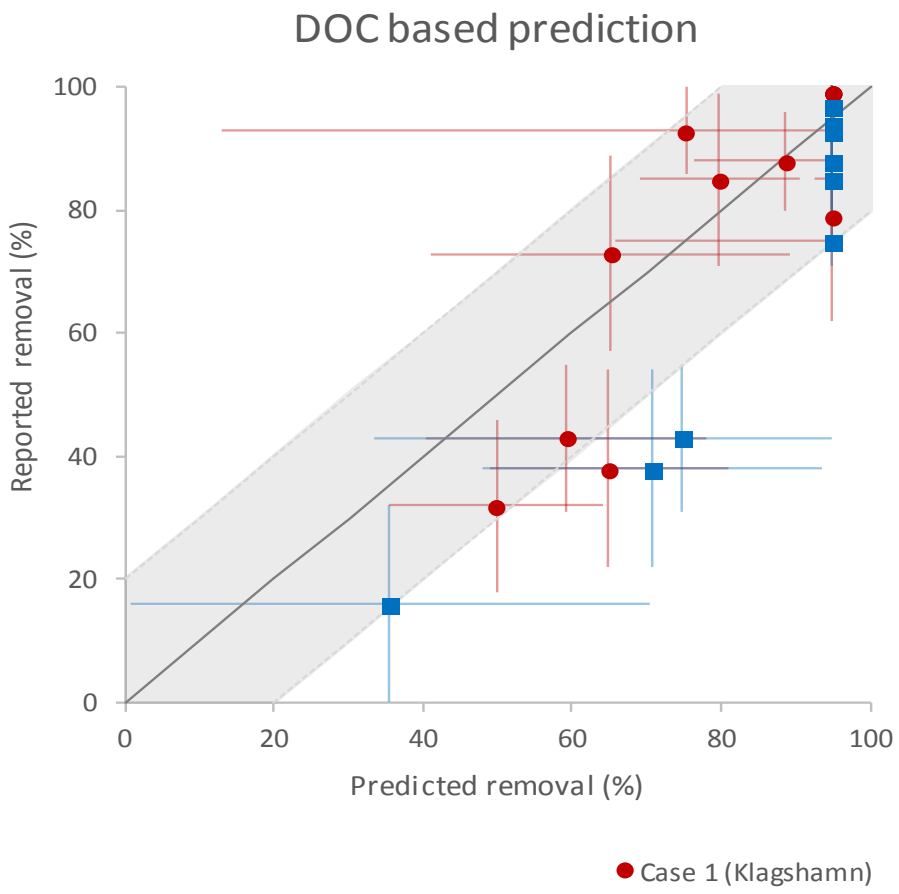
journal homepage: www.elsevier.com/locate/scitotenv

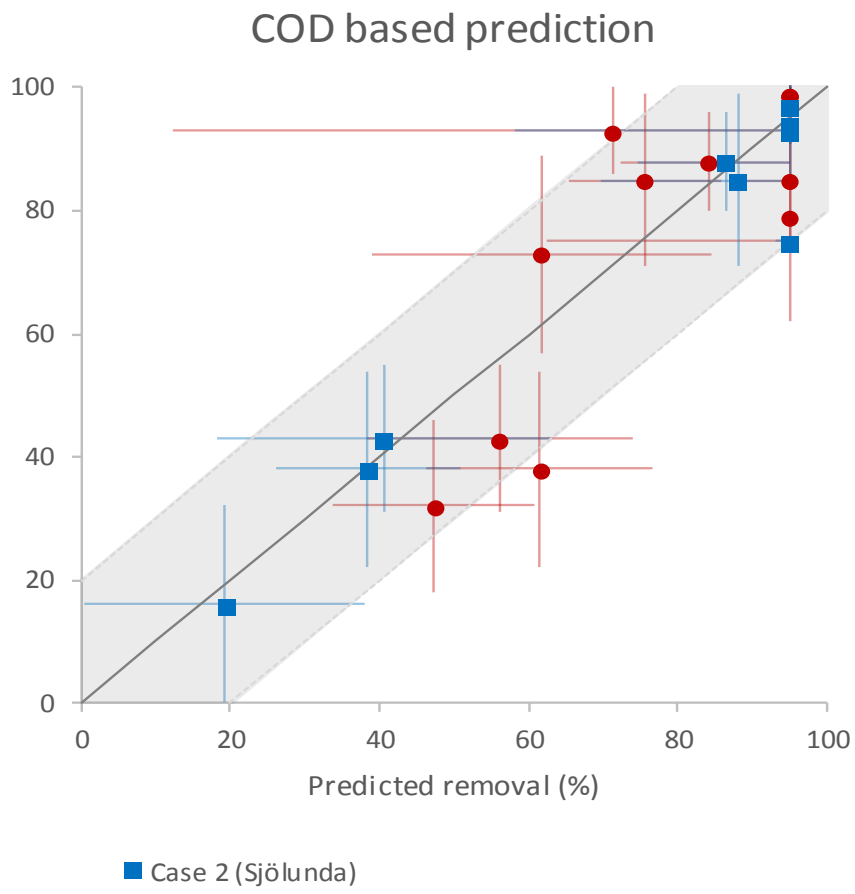
Treatment of micropollutants in municipal wastewater: Ozone or powdered activated carbon?

Jonas Margot [a,*], Cornelia Kienle [b], Anoÿs Magnet [c], Mirco Weil [d], Luca Rossi [a], Luiz Felippe de Alencastro [a], Christian Abegglen [e,1], Denis Thonney [c,2], Nathalie Chèvre [f], Michael Schärer [g], D.A. Barry [a]

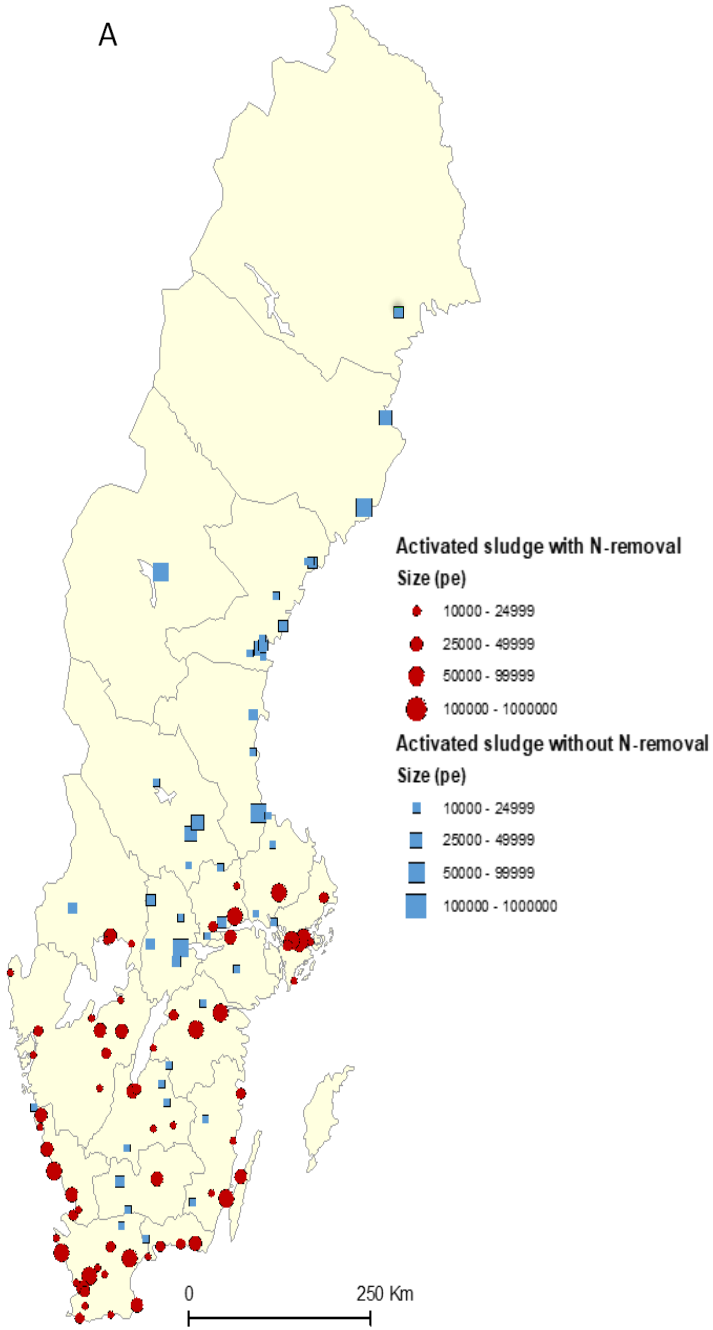
HIGHLIGHTS

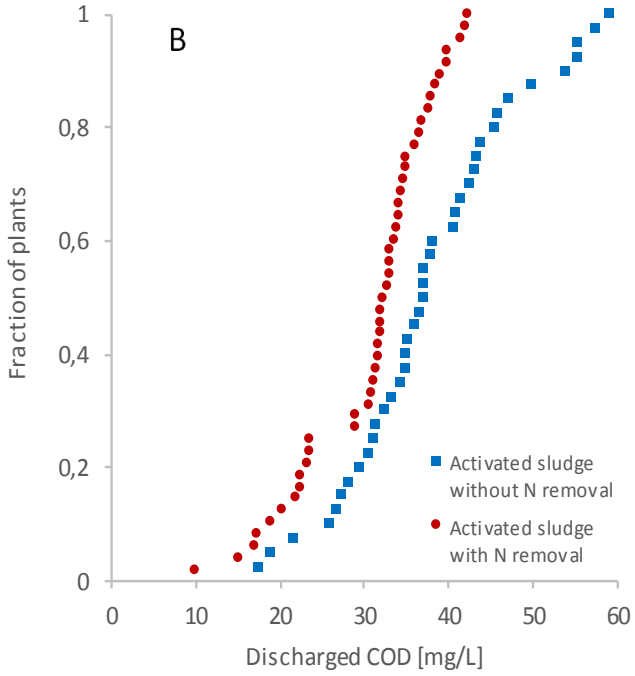
- Micropollutants are efficiently removed by both ozone and powdered activated carbon.
- Specific substances were removed more efficiently by ozone.
- Powdered activated carbon effectively removed a wider range of pollutants.
- Both treatments significantly reduced the toxicity of WWTP effluent.
- Both treatments are feasible for use in municipal WWTPs.

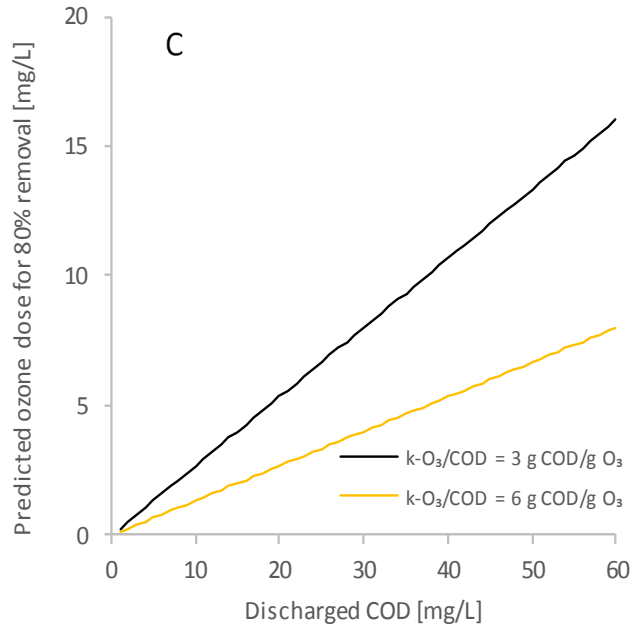




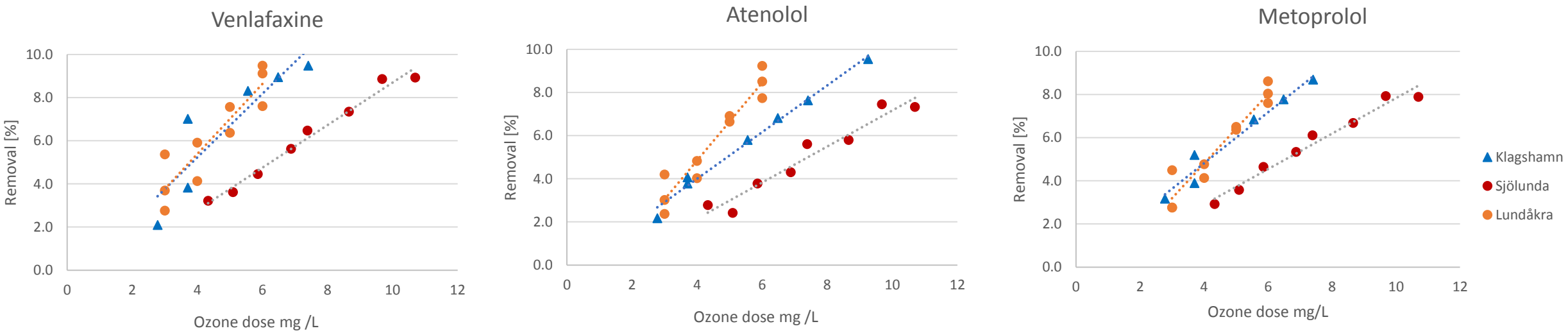
A national perspective



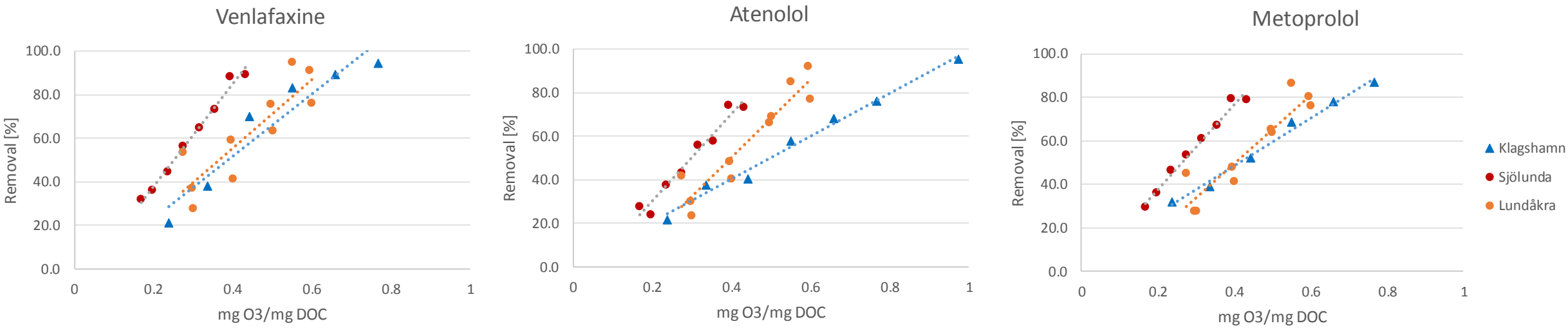




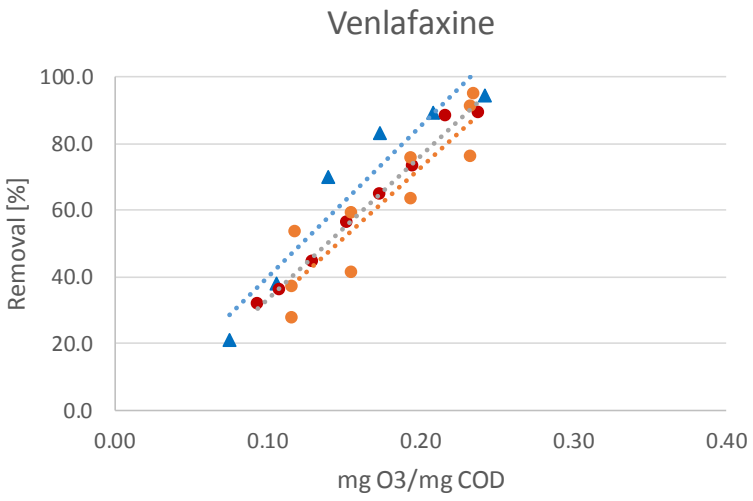
Comparison with Pilot in Bonus Cleanwater

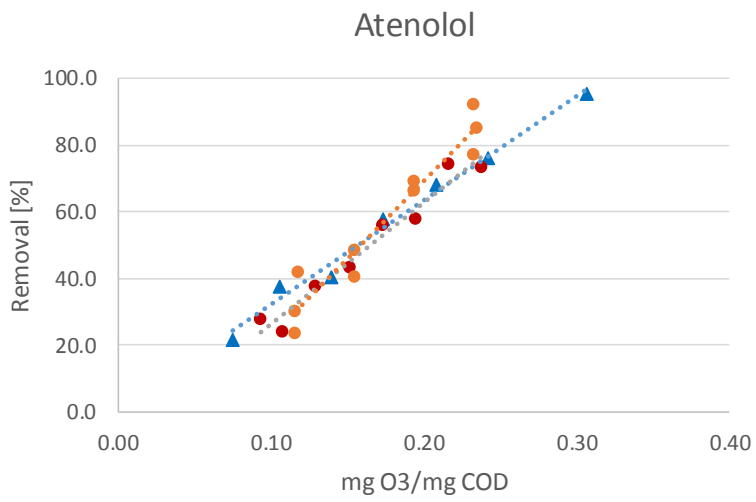


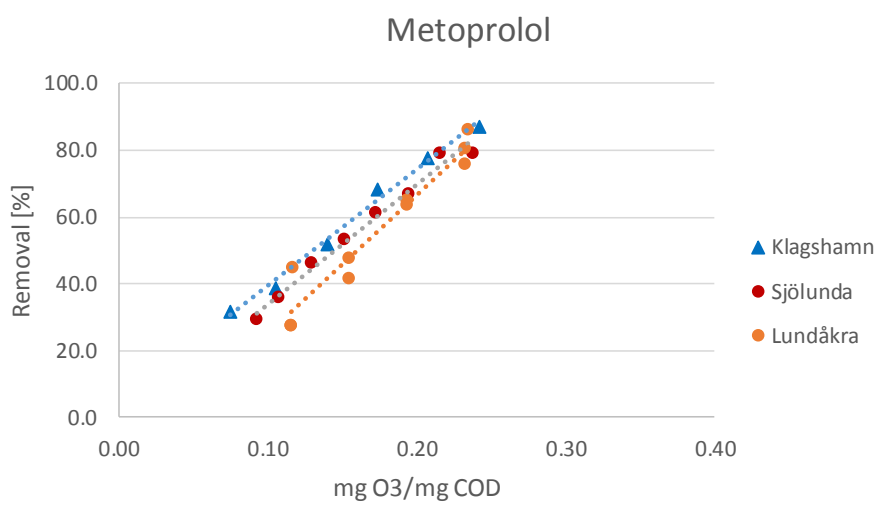
Comparison with Pilot in Bonus Cleanwater



Comparison with Pilot in Bonus Cleanwater







Thank you for listening!

BONUS CLEANWATER

BONUS
SCIENCE FOR A BETTER FUTURE OF THE BALTIC SEA REGION