

130 years VU UNIVERSITY AMSTERDAM

Remote sensing and optical modelling of dynamic coastal waters

Marieke Eleveld

In collaboration with HJ van der Woerd, SWM Peters, R Pasterkamp, A Hommersom, P Groetsch
Deltares & TU Delft, NIOZ (Yerseke & Texel), Water Insight & European partners, ..

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Contents

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- Dynamics (in IOPs & concentrations) and optical modelling
- Dynamics and processes, and sampling by remote sensing

Why?

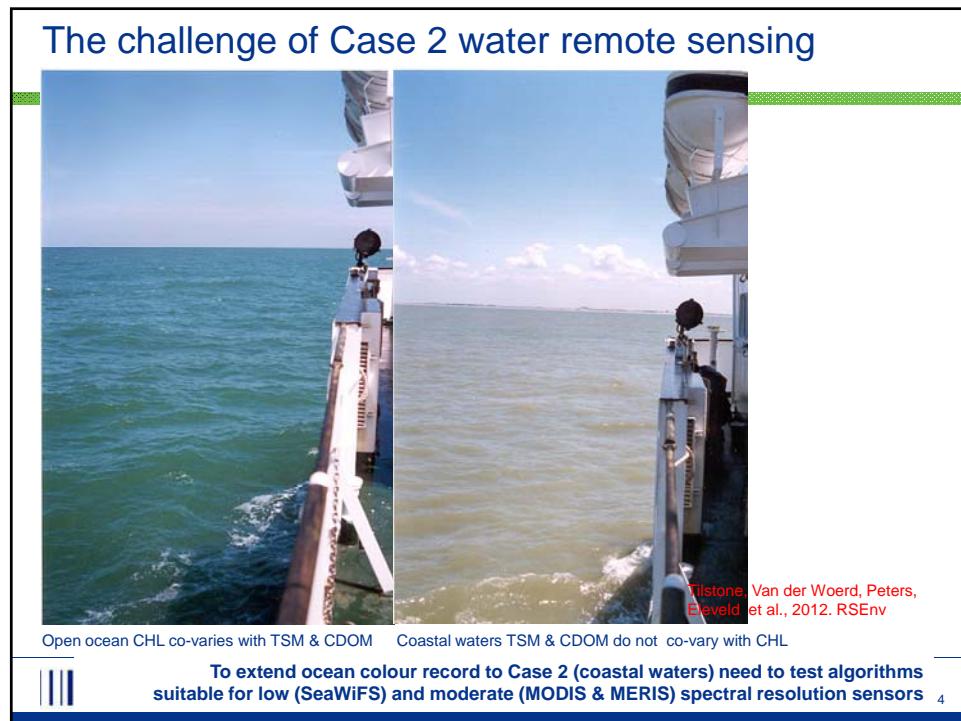
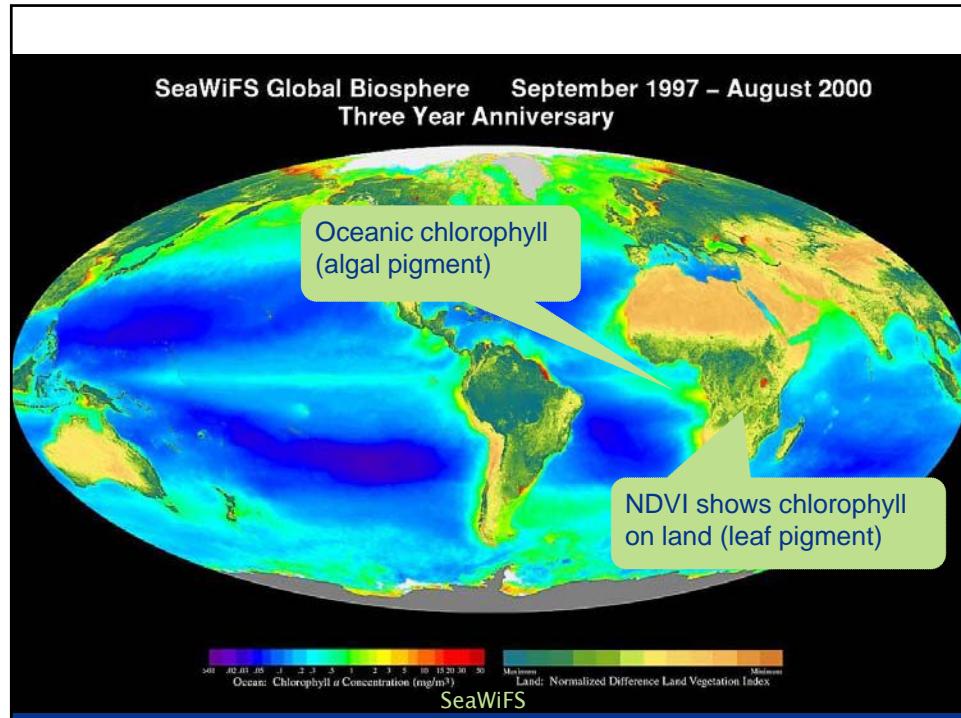
- Understanding aquatic systems: exposing mechanisms
- Some are highly dynamic, sometimes periodic

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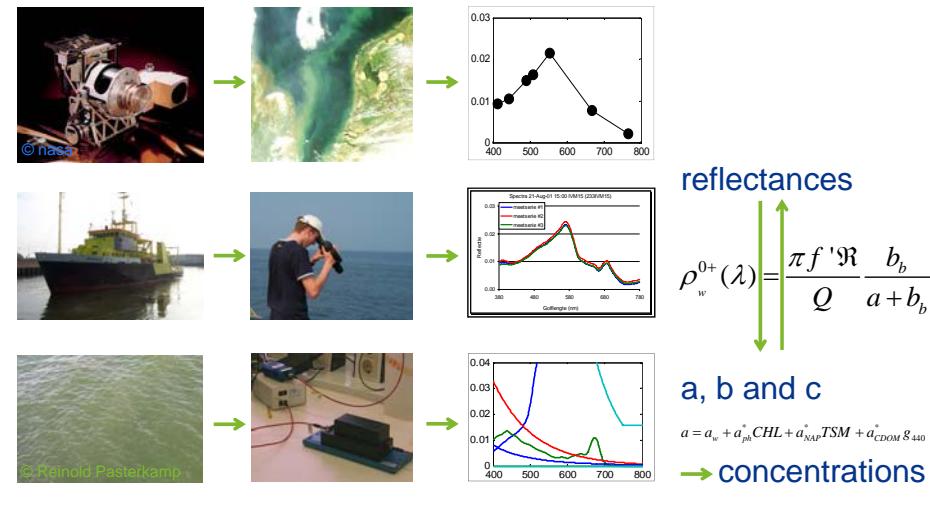
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 - > primary production, aquatic ecosystem

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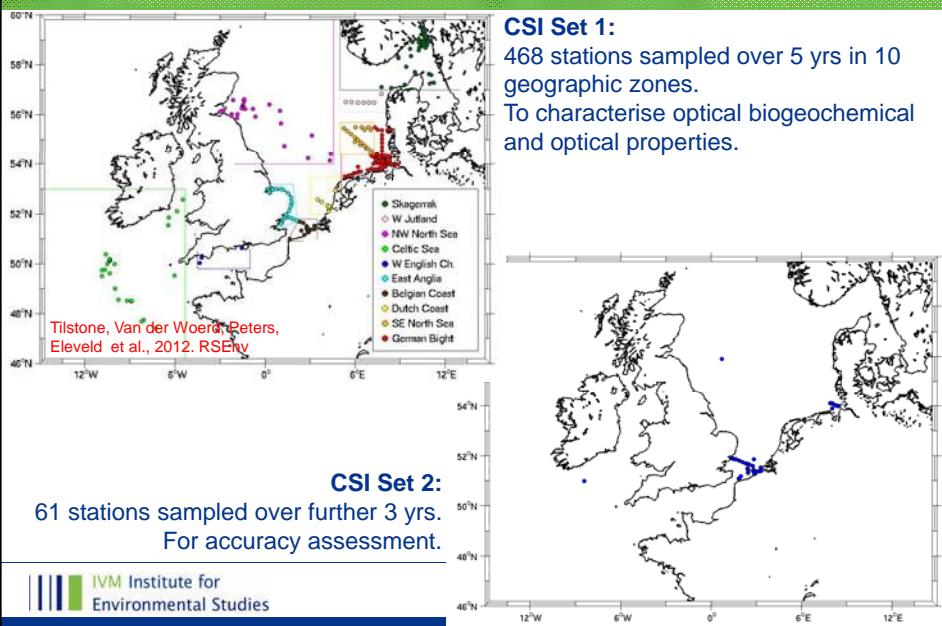
Optical modelling and remote sensing

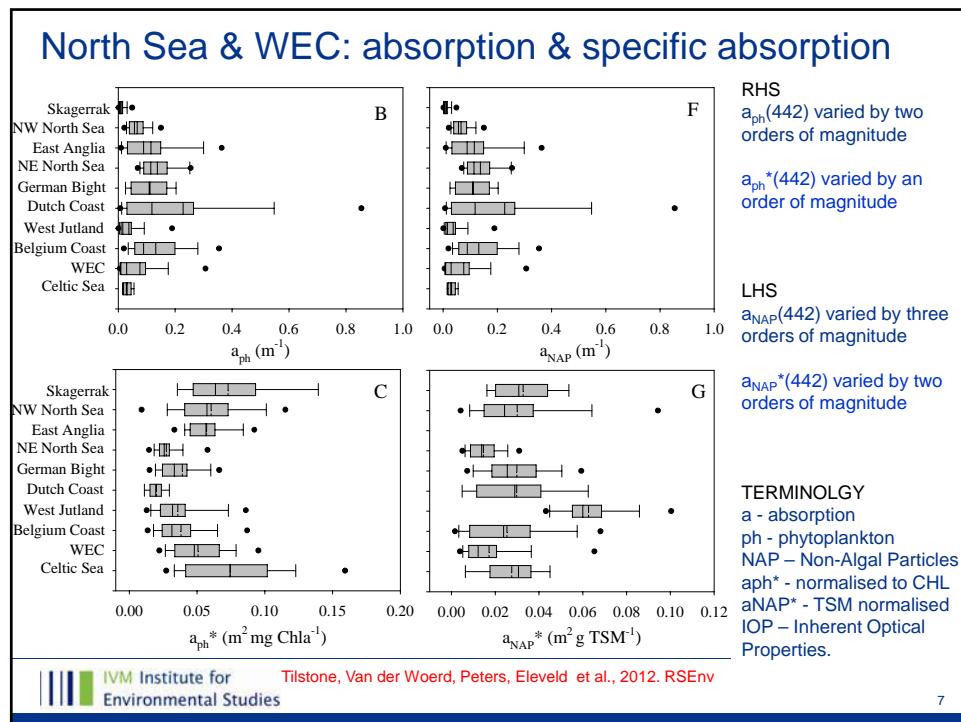


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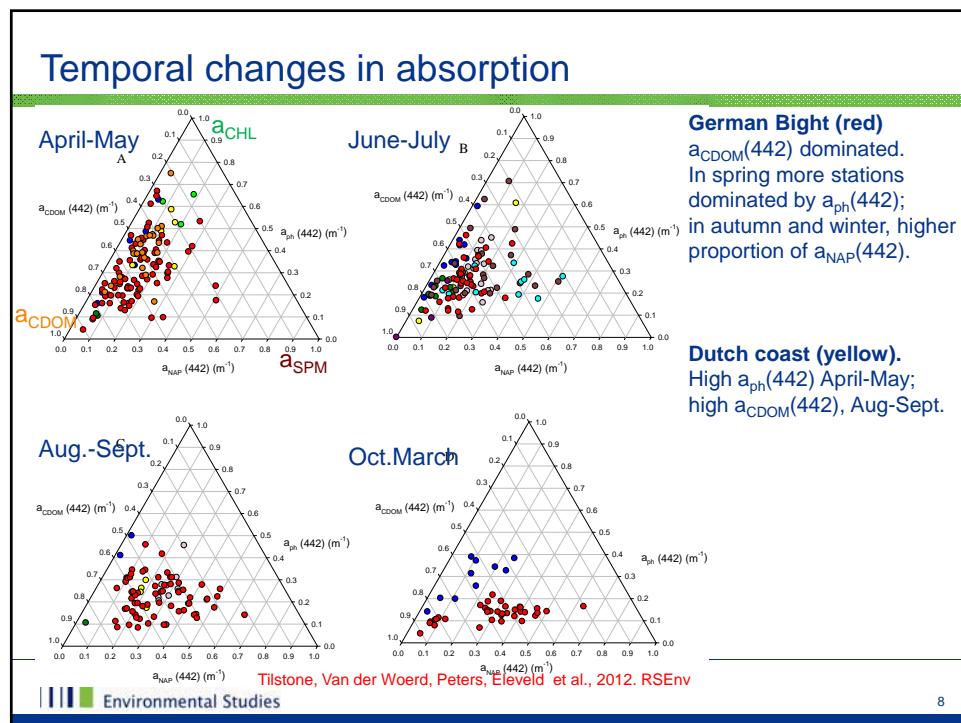
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In situ sampling: two independent data sets





7



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Optical water quality parameters

$\rho_w^{0+}(\lambda) = \frac{\pi f' \Re}{Q} \frac{b_b}{a + b_b}$

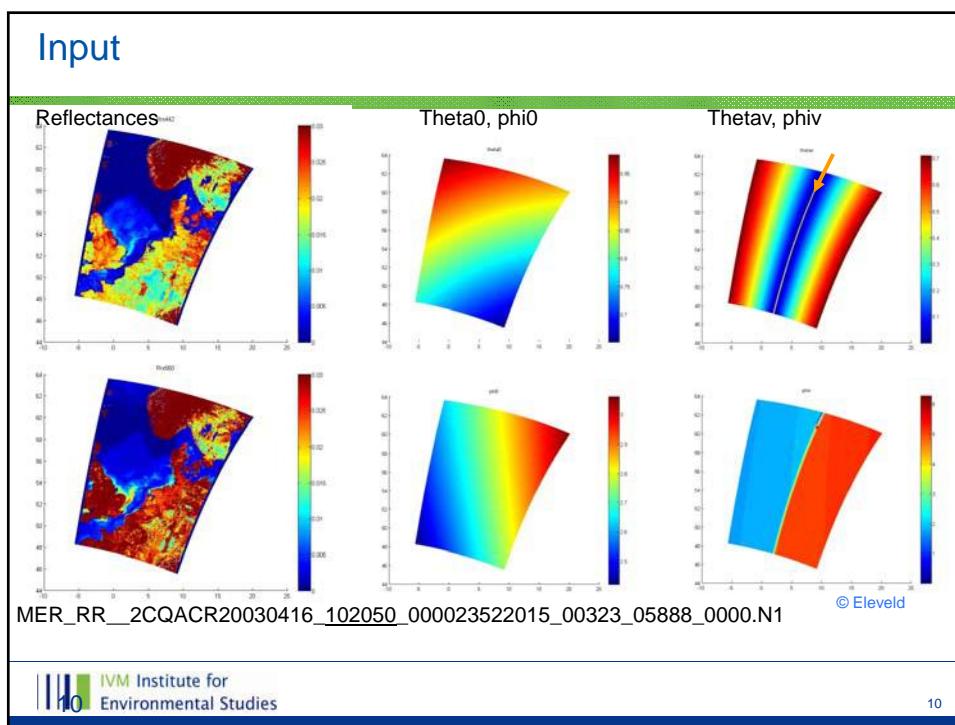
$b_b = b_{bw} + B b_{SPM}^* SPM$

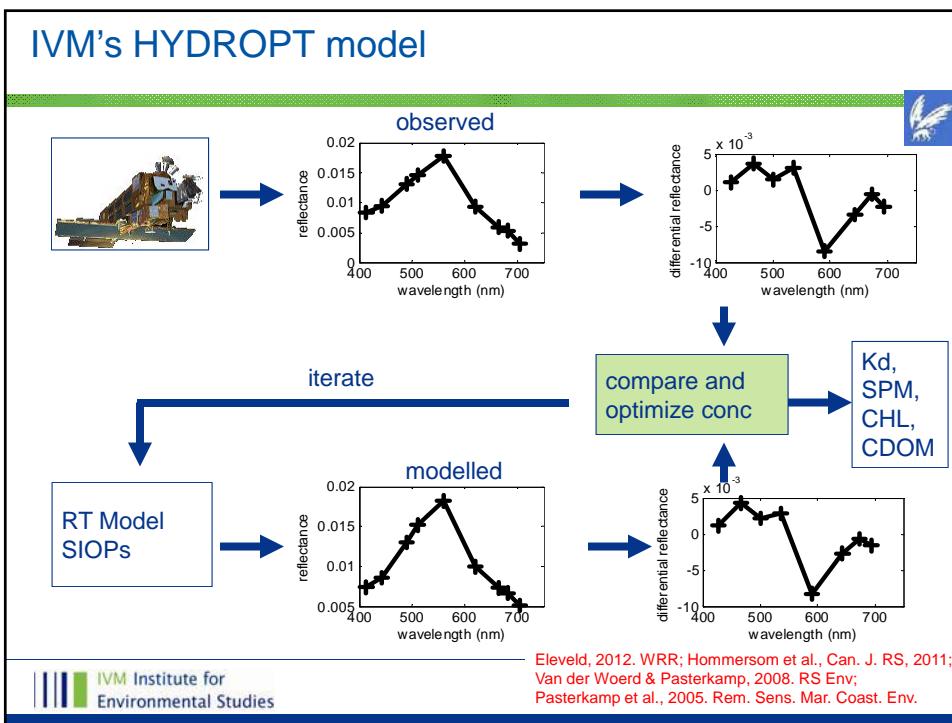
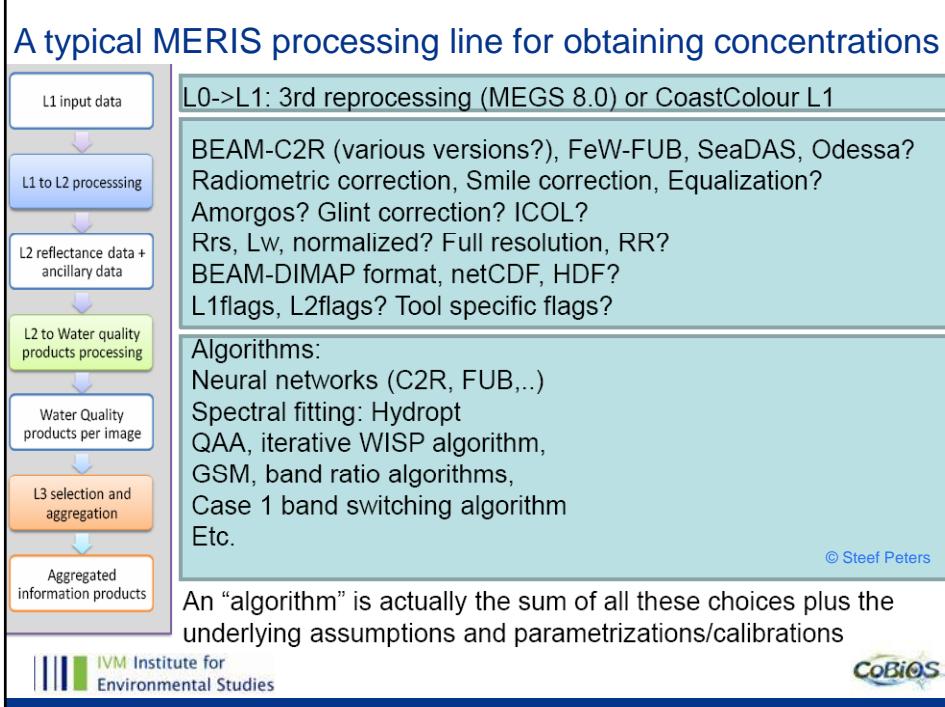
$a = a_w + a_{CHL}^* CHL + a_{SPM}^* SPM + a_{CDOM}^* g_{440}$

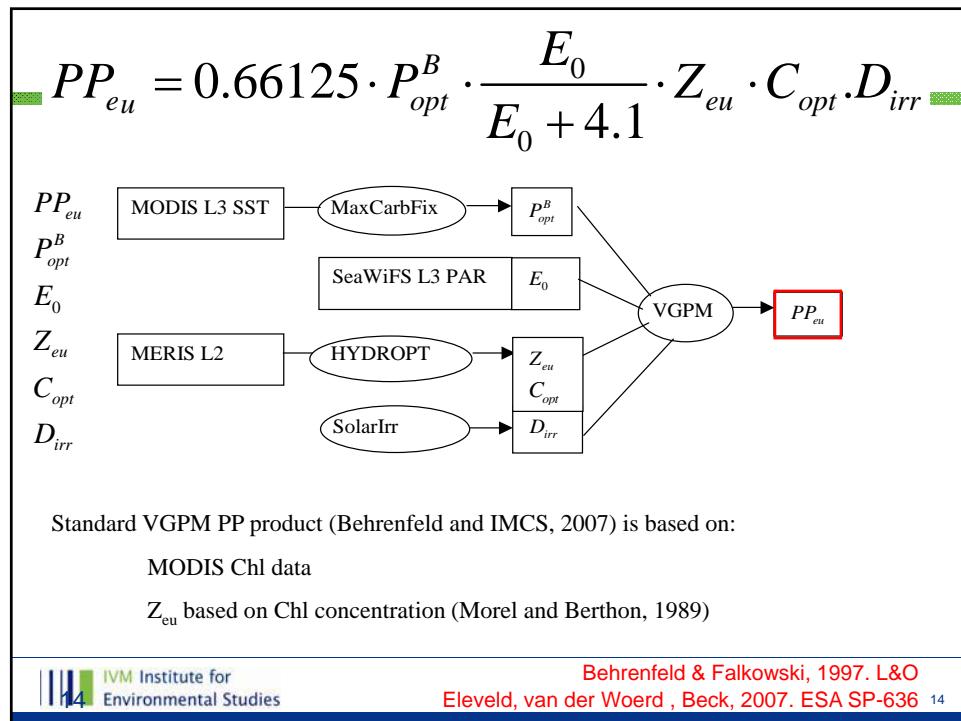
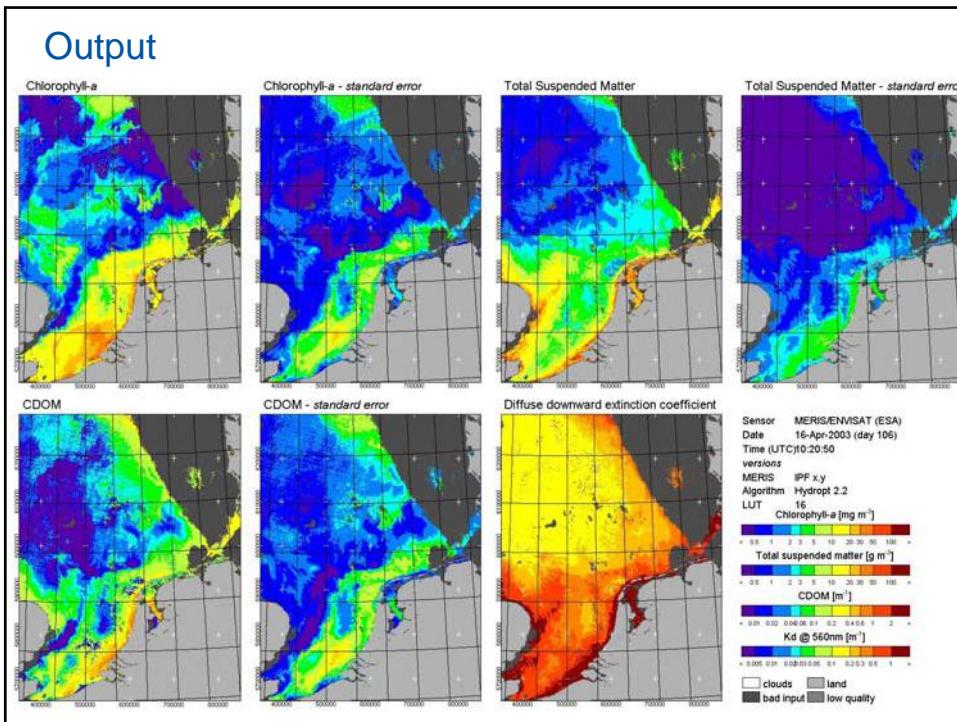
Implementation:
Numerical solution of the RT, spectral matching,
IOP-modelling, using power functions and derivatives

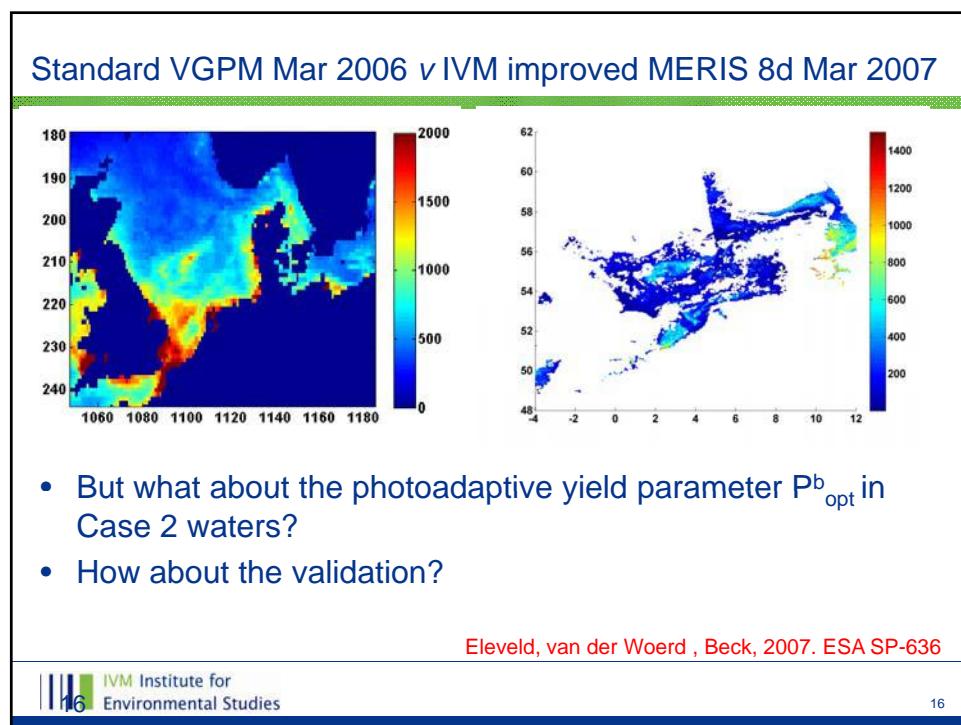
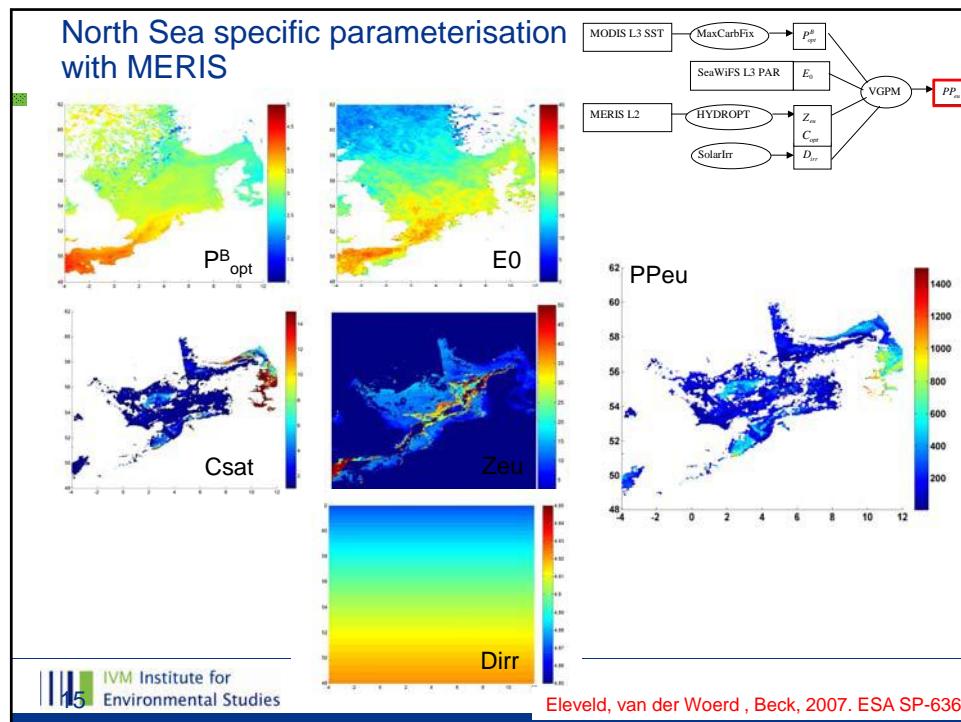
van der Woerd & Pasterkamp, 2008. RSEnv 112; Elefeld, 2012

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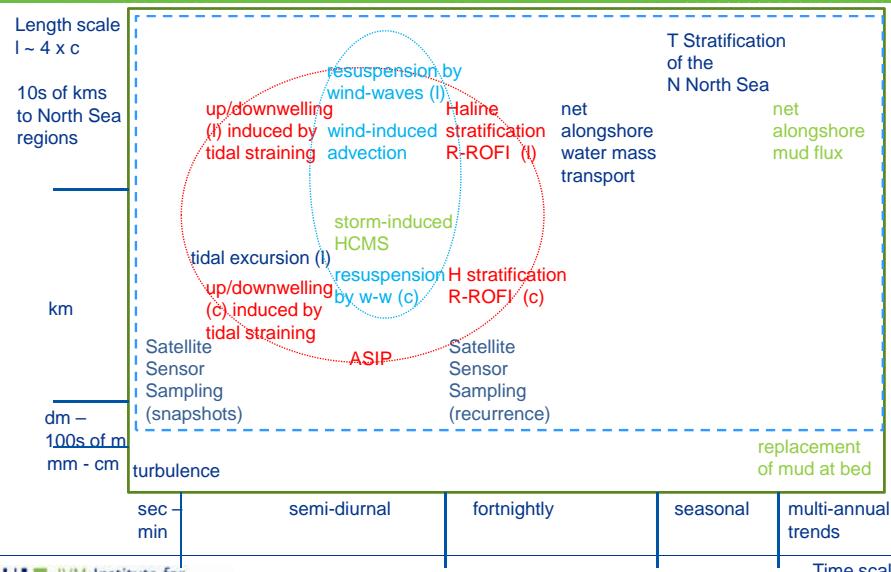
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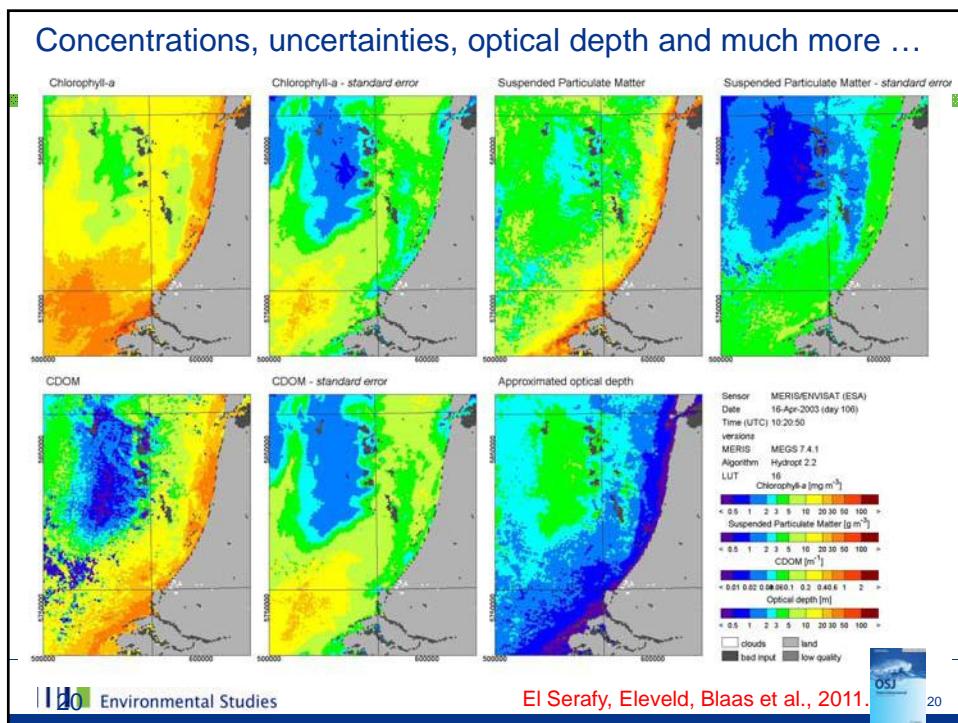
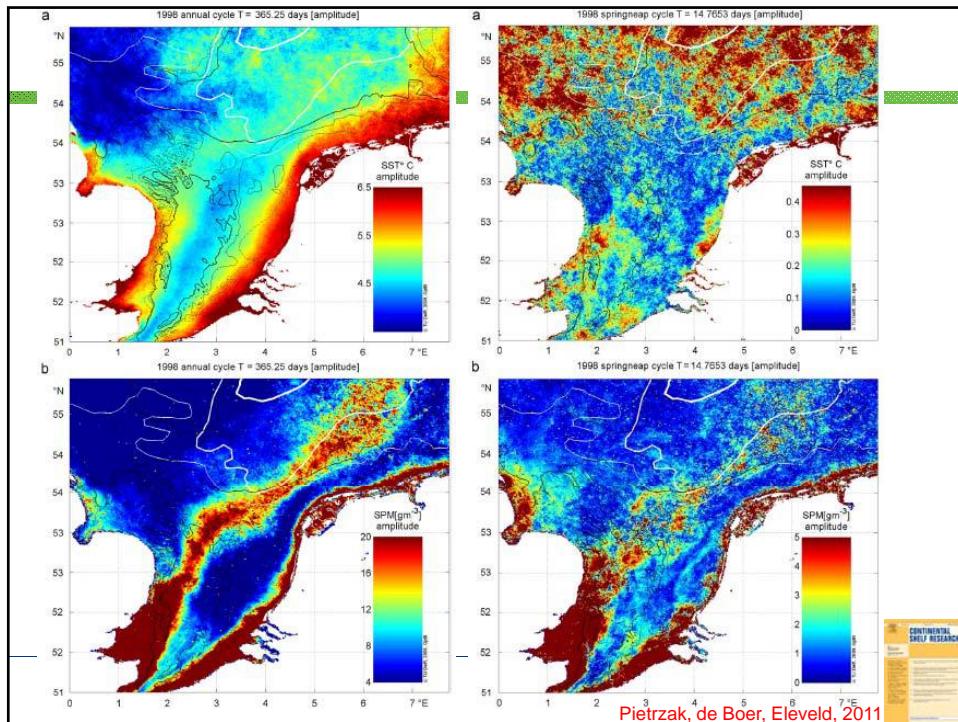
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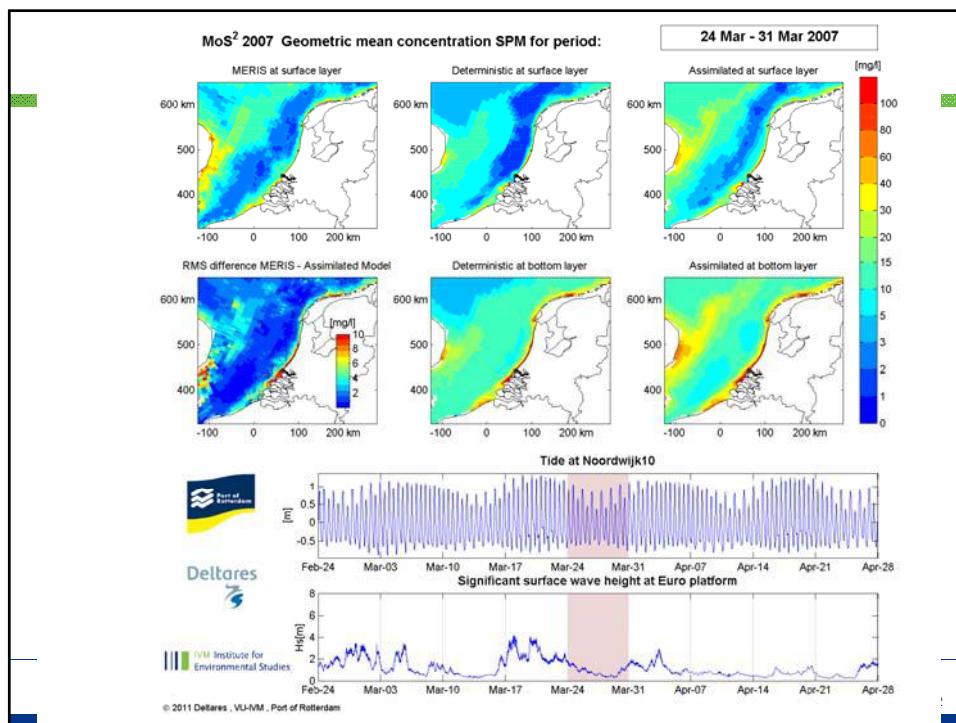
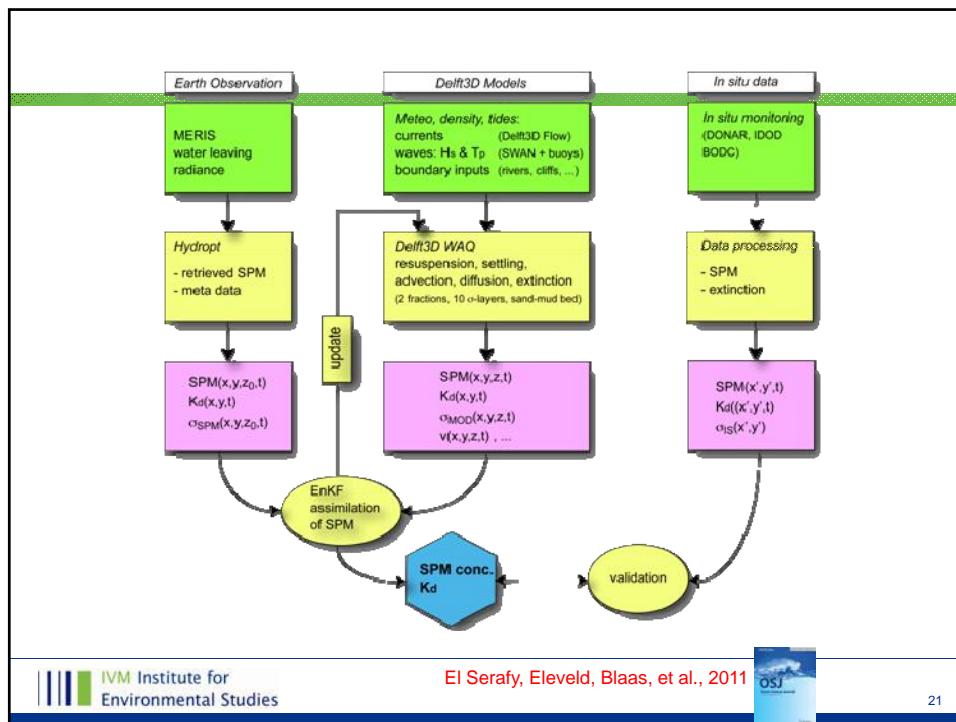
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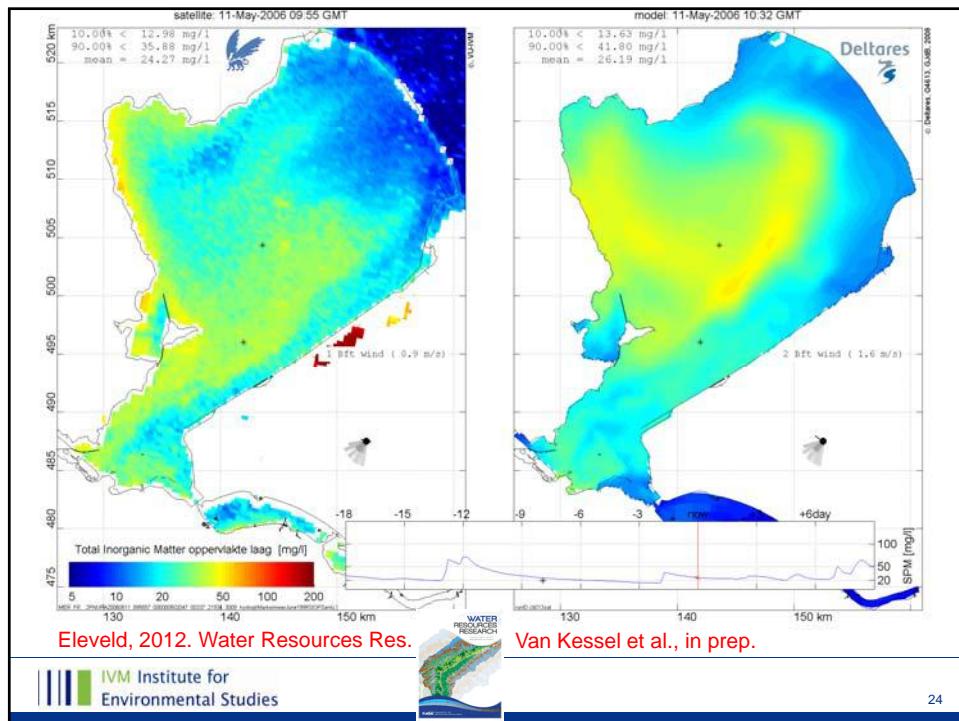
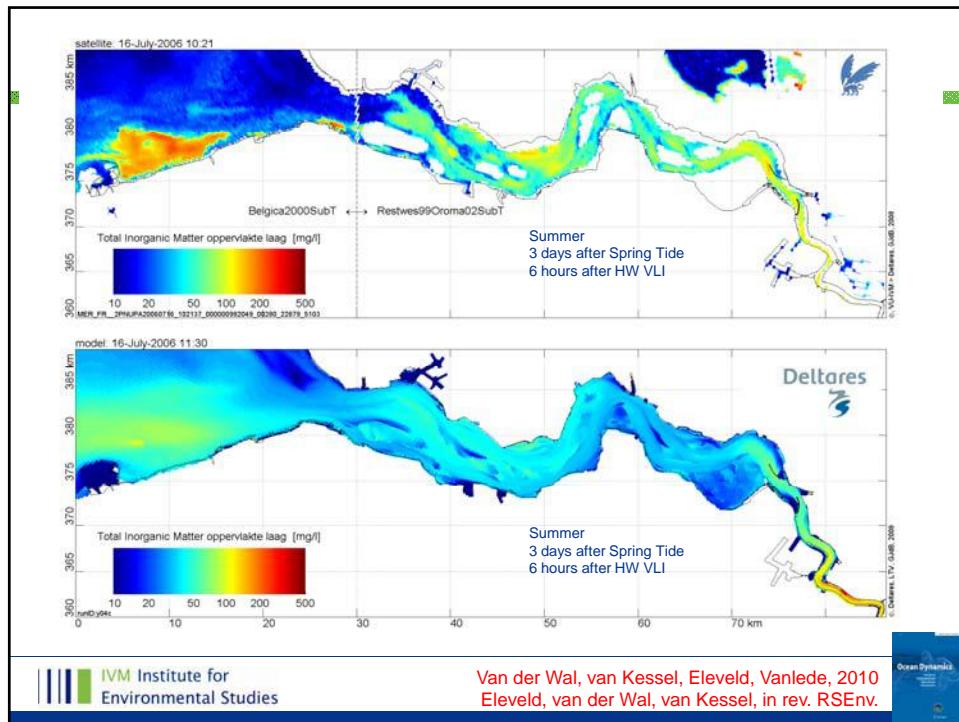
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-> primary production, aquatic ecosystem

Processes & observations









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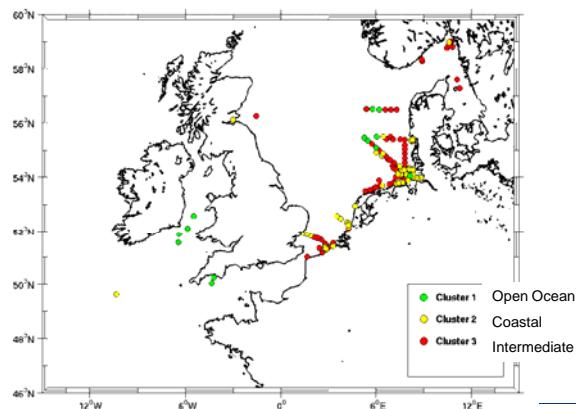
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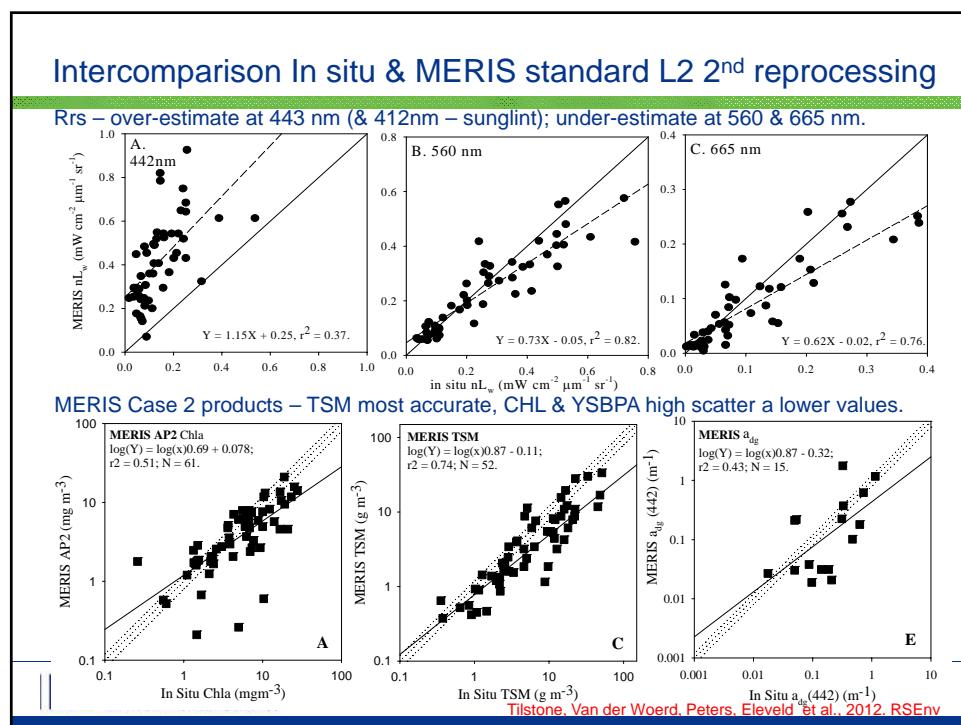
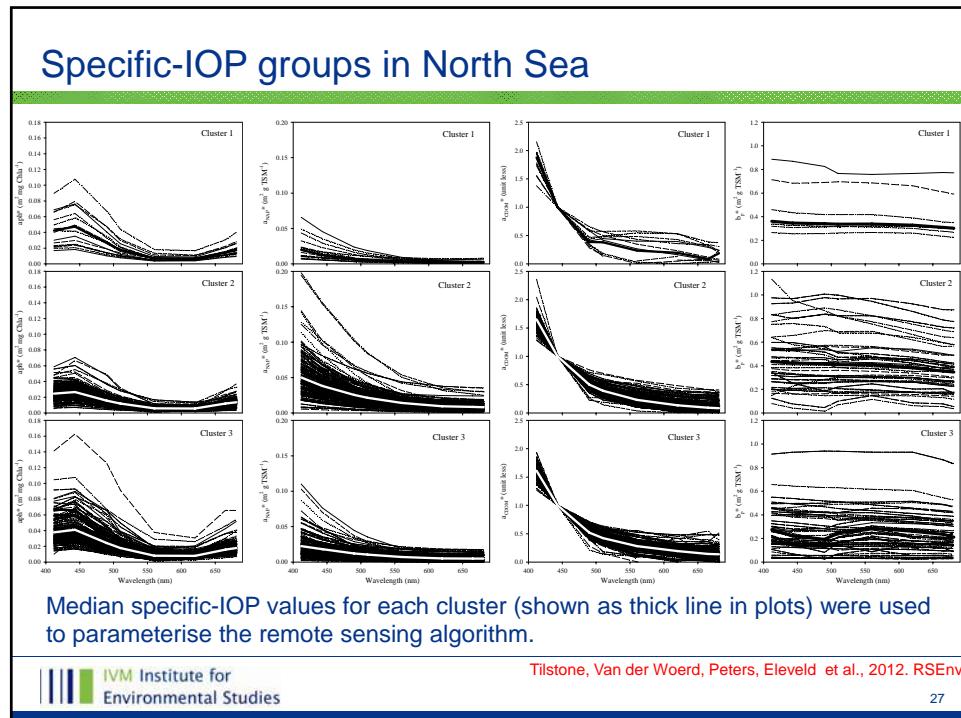
Variability in sIOPs

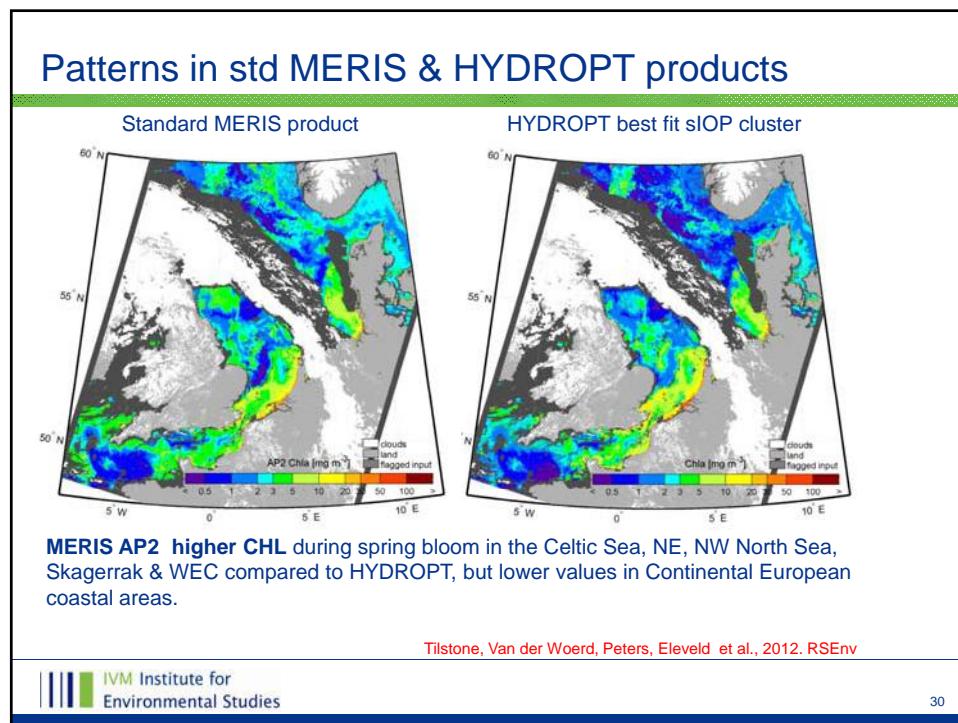
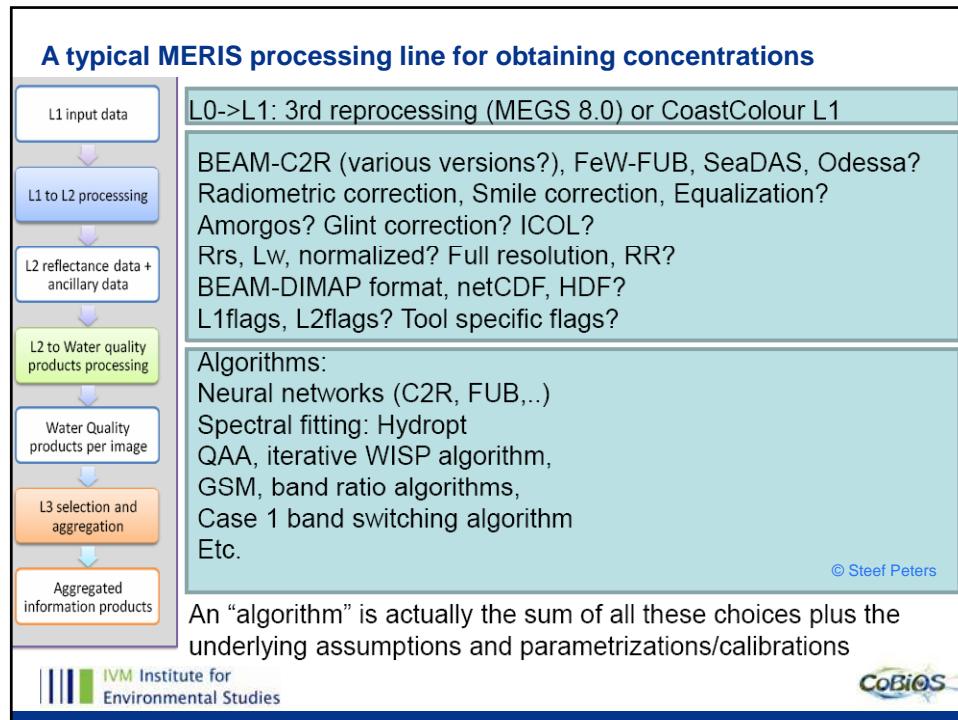
- Can trends in specific-absorption properties alone can be used to develop more accurate ocean colour regional algorithms?
- IOP have a large variation between geographical regions, but sIOP show less variation. For regional water-quality algorithms is it better to parameterize algorithms with sIOP?

Cluster analysis on
 a_{ph}^* , a_{NAP}^* , a_{CDOM}

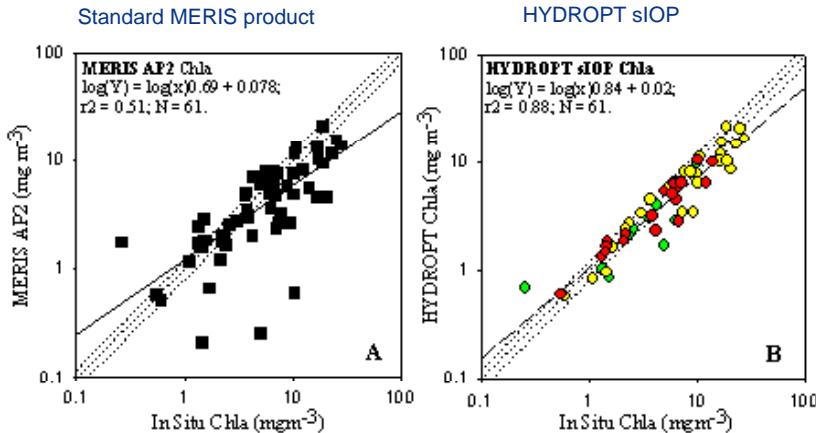


Tilstone, Van der Woerd, Peters, Elefeldt et al., 2012. RSEnv





Accuracy of std MERIS & HYDROPT products



HYDROPT, regionally parameterized with sIOP data derived from cluster analysis, gave more accurate CHL products than standard MERIS case 2 (2nd reprocessing)

Tilstone, Van der Woerd, Peters, Elefeldt et al., 2012. RSEnv

Conclusion

- Dynamics (in IOPs & concentrations) and optical modelling
Use Case-2 approach with regional sIOPs, and if possible also take temporal dynamics into account
- Dynamics and processes, and sampling by remote sensing
We need Geostationary satellites to capture diurnal tide
- Also use information about the basic optical parameters (such as a, b, Kd) to describe light climate and further our understanding of the aquatic ecosystem