TARTU OBSERVATORY
space research centre

Eesti kaugseirepäev

Järvede veetüüpide määramise võimalused satelliidipiltidelt

Kristi Uudeberg, Elar Asuküll, Ilmar Ansko, Krista Alikas, Martin Ligi, Anu Reinart

Tõravere, 27.10.2016

Miks?





Allikas: http://www.glass-project.eu

Veetüüpide klassifikatsioon

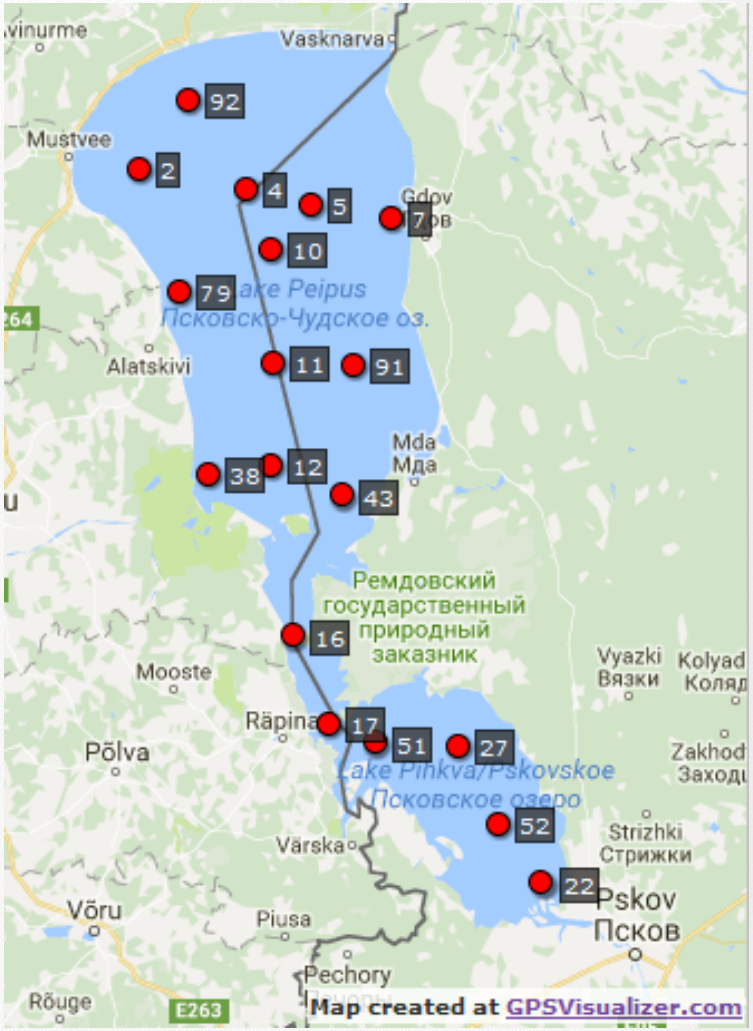
Selge (**C**), *Mõõdukas* (**M**), *Sogane* (**T**), *Väga sogane* (**V**) ja *Pruun* (**B**).

	C	M	T	V	B
C_{TSM} g m-3	0,6-3,1	1,0-10,3	13,4-20,1	31,5-37,5	3-12,0
C_{Chl} mg m-3	1,3-12,0	2,3-24,8	16,5-42,5	65,1-67,4	8,3-15,6
a_{CDOM} m-1	1,2-7,0	5,0-20,9	10,5-18,3	10,7-11,2	10-[~150]
Z_{Secchi} m	2,8-6,5	1,4-3,0	0,65-1	0,4-0,6	0,2-1,1

Klassifikatsiooni meetod: Reinart, A., Herlevi, A., Arst, H., Sipelgas, L., Preliminary optical classification of lakes and coastal waters in Estonia and south Finland, *Journal of Sea Research*, 49, 357-366, 2003.

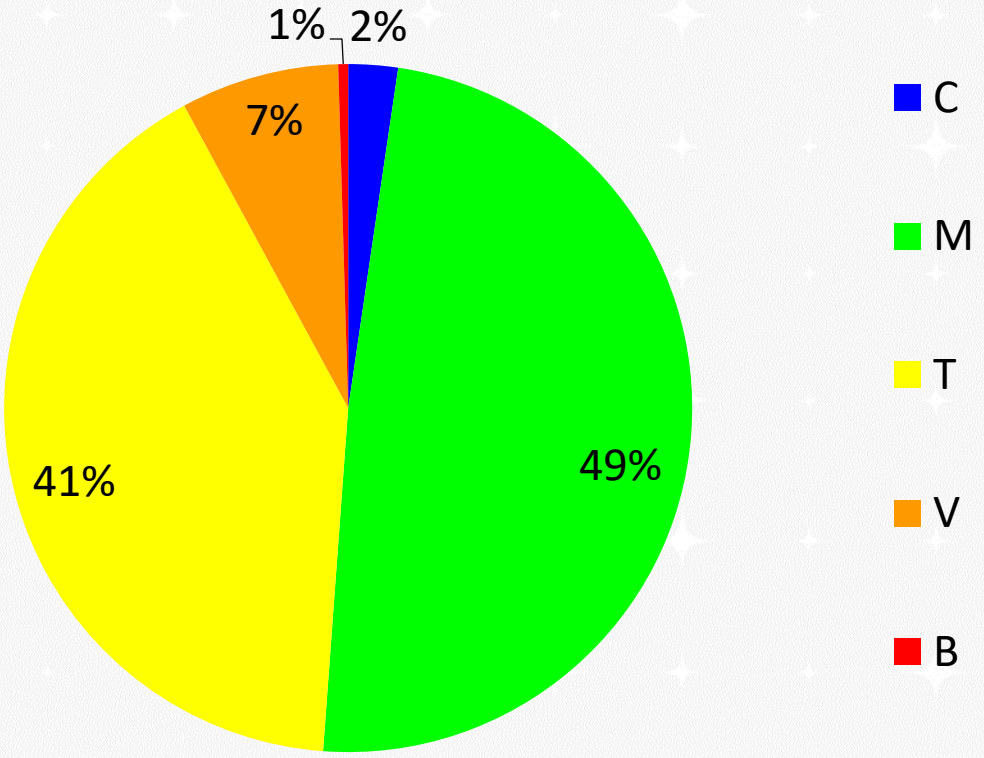
Peipsi järv

- Peipsi järv
  - Peipsi *s.s.*
  - Lämmijärv
  - Pihkva järv
- Pindala: 3555 km^2
- Sügavus
  - 7,1 m (keskmine)
  - 15,3 m (maksimaalne)
- *In situ* andmed
  - 2008.-2011. aastad
  - 216 punkti



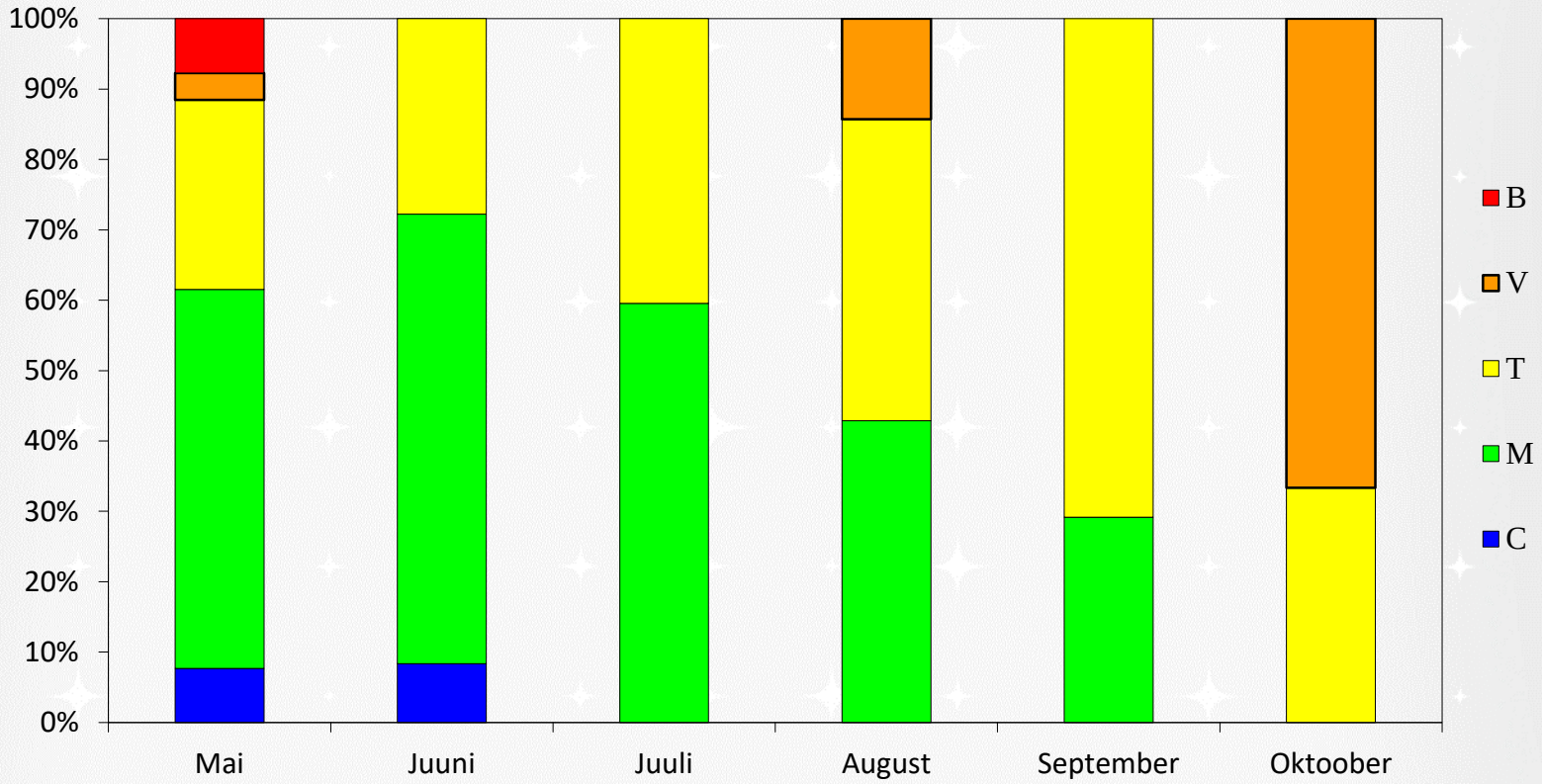
Peipsi järve veetüüpide jaotus

- Peipsi järve 2008. - 2011. aasta *in situ* andmete põhjal.



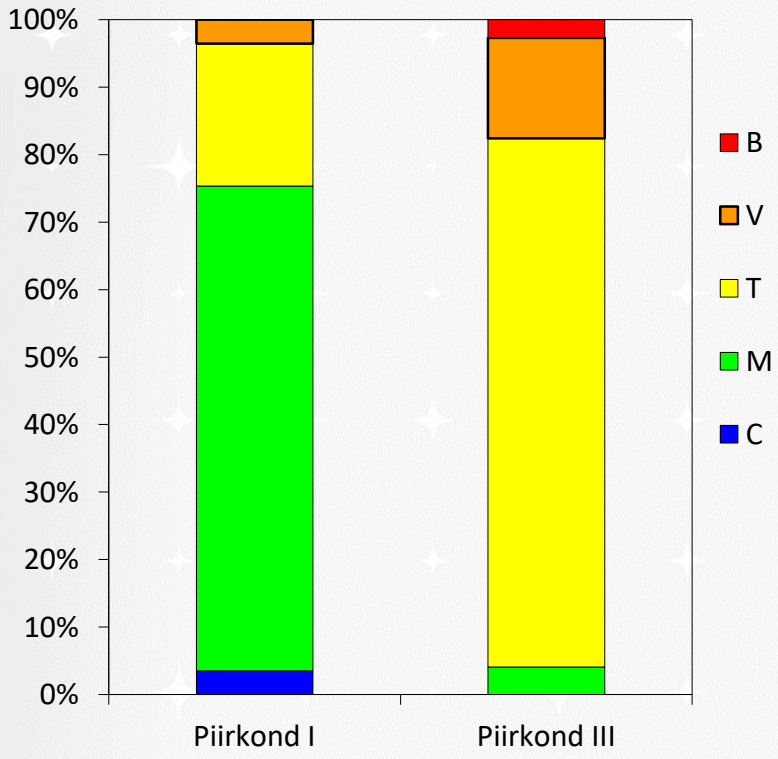
Veetüüpide sessoonne muutlikkus

- Peipsi järve 2008. - 2011. aasta *in situ* andmete põhjal.



Veetüüpide ruumiline muutlikkus

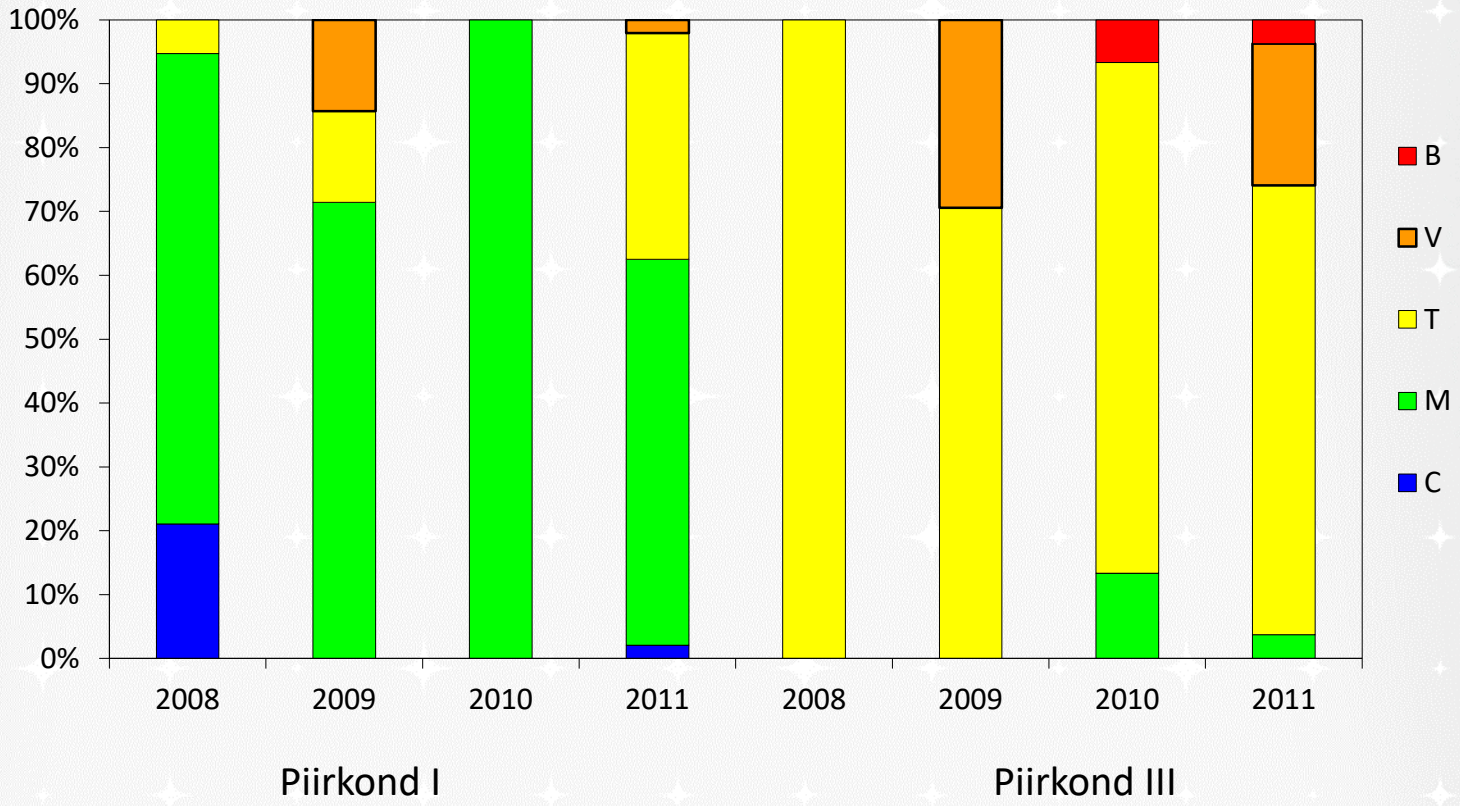
- Peipsi järve 2008. - 2011. aasta *in situ* andmete põhjal.



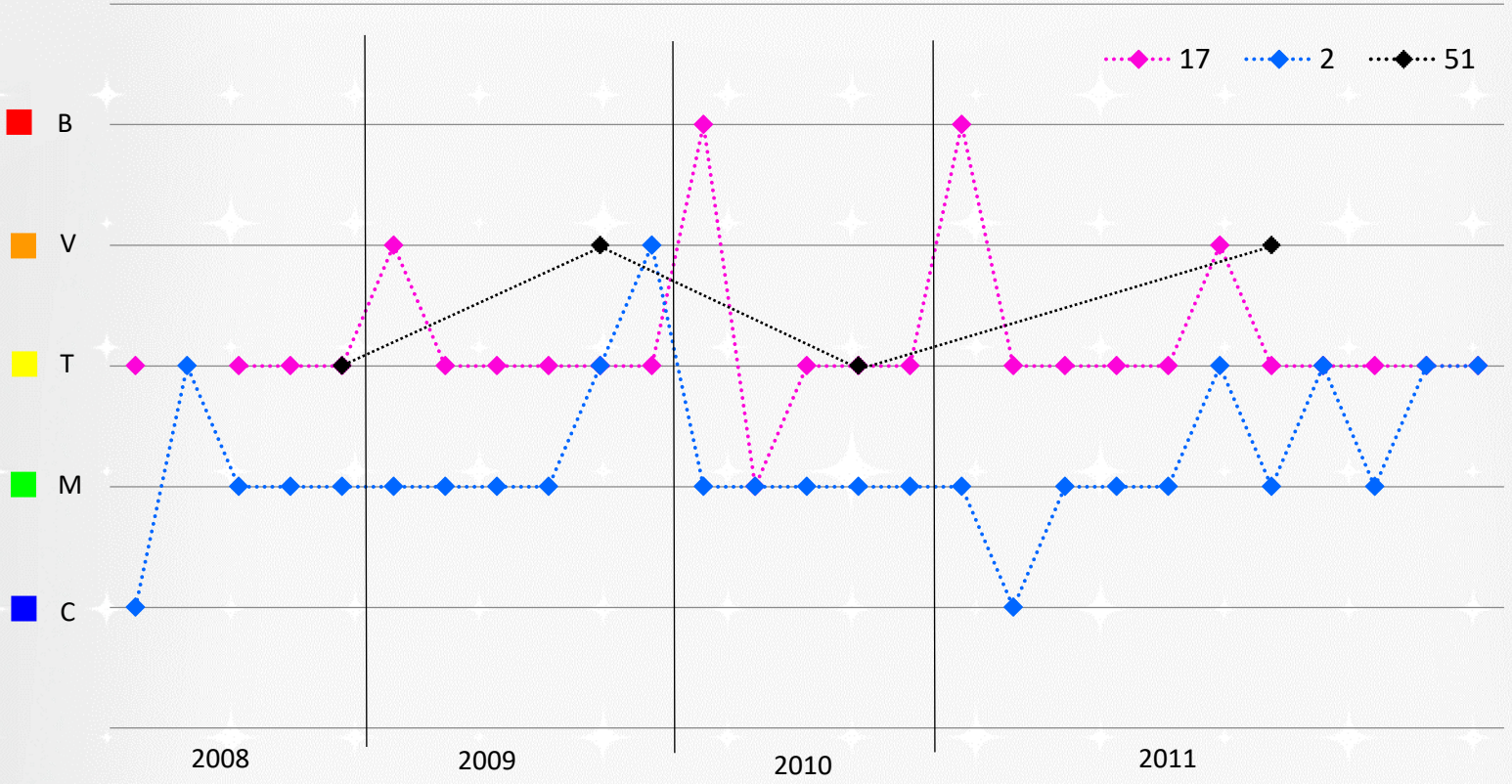


Aastad pole vennad

- Peipsi järve 2008. - 2011. aasta *in situ* andmete põhjal.



Peipsi seirepunktide muutlikkus

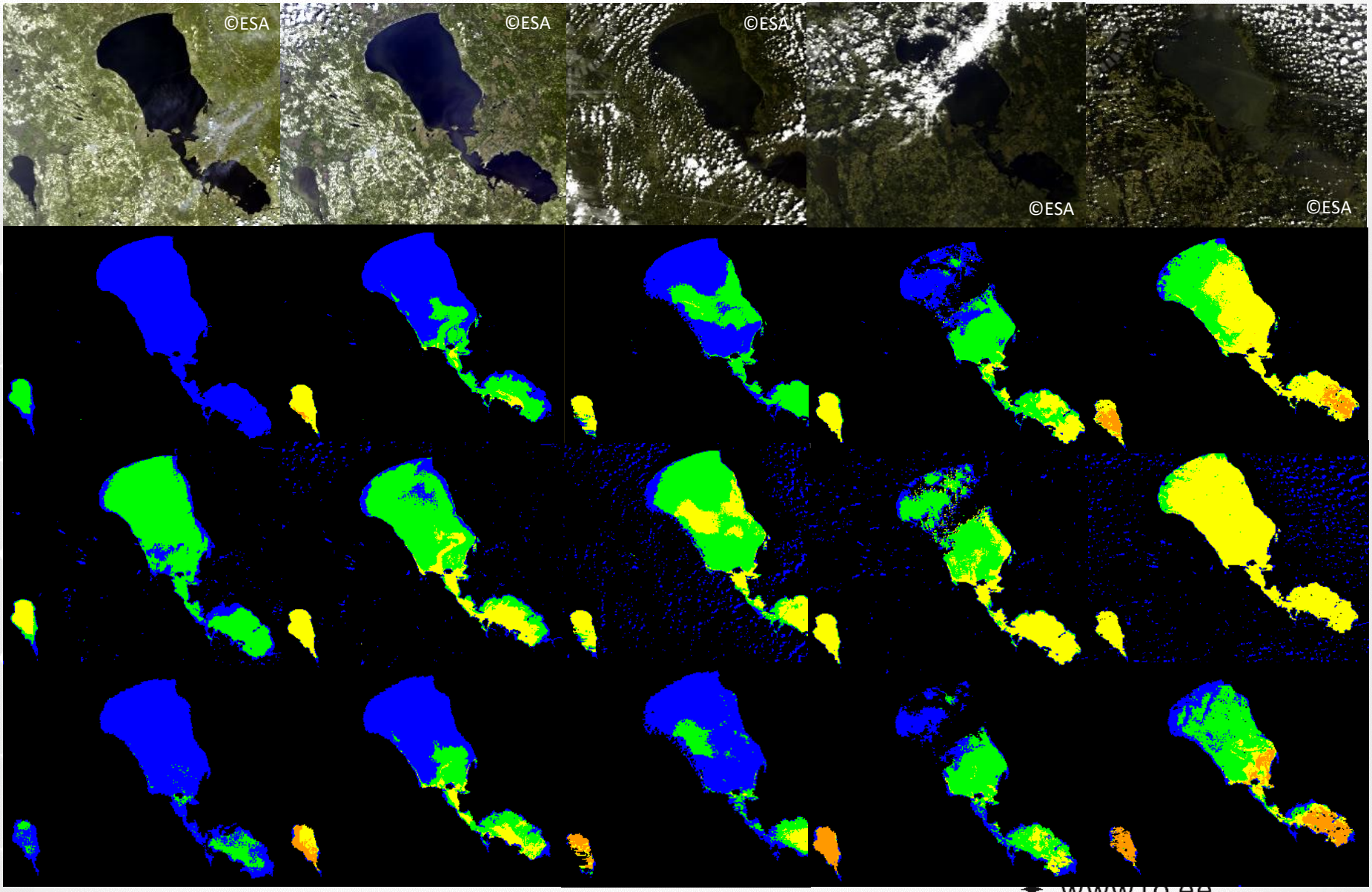


MERIS

- MERIS – *MEdium Resolution Imaging Spectrometer*
- Andmed
  - 2008. aasta
- Töötlused
  - L2
  - Boreal
  - C2R

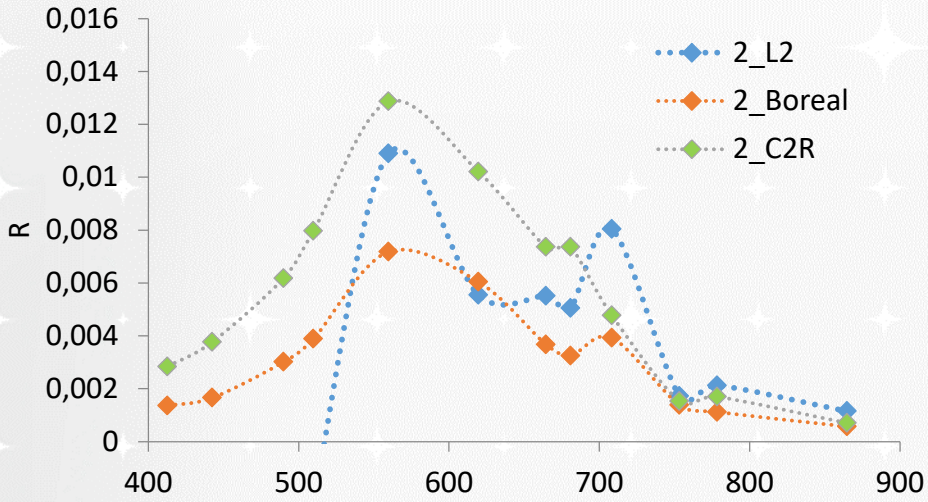
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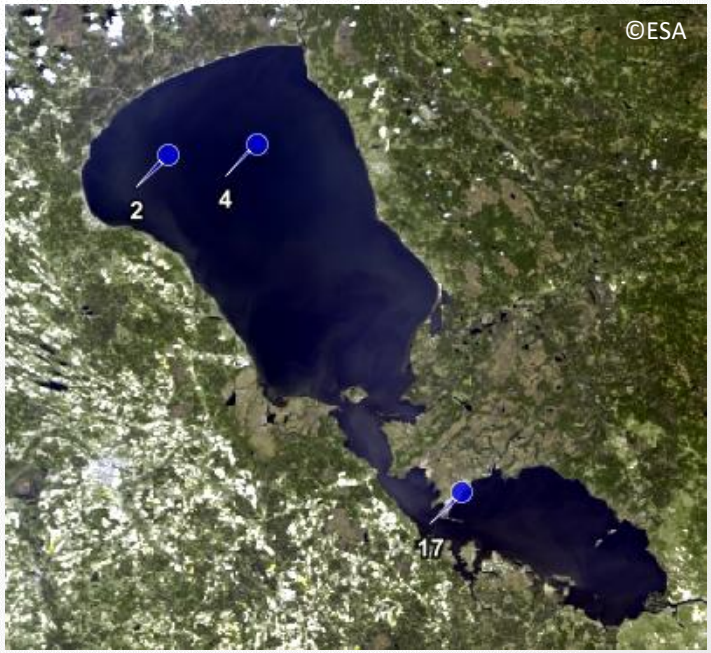
C M T V B

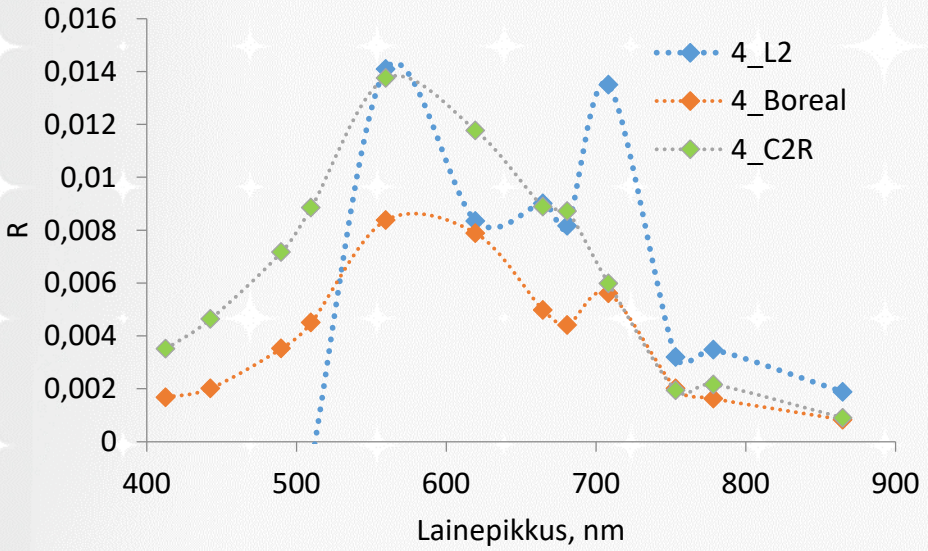


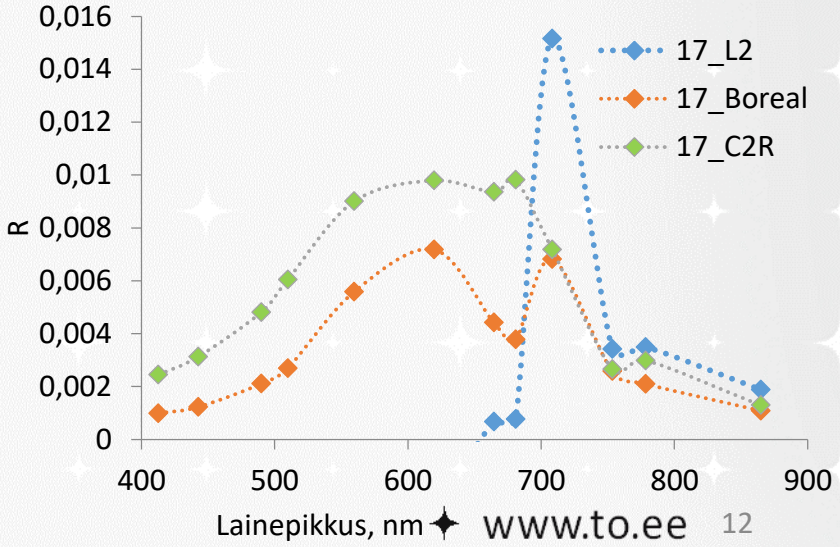
www.to.ee

MERISe R-id


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2_Boreal
2_C2R

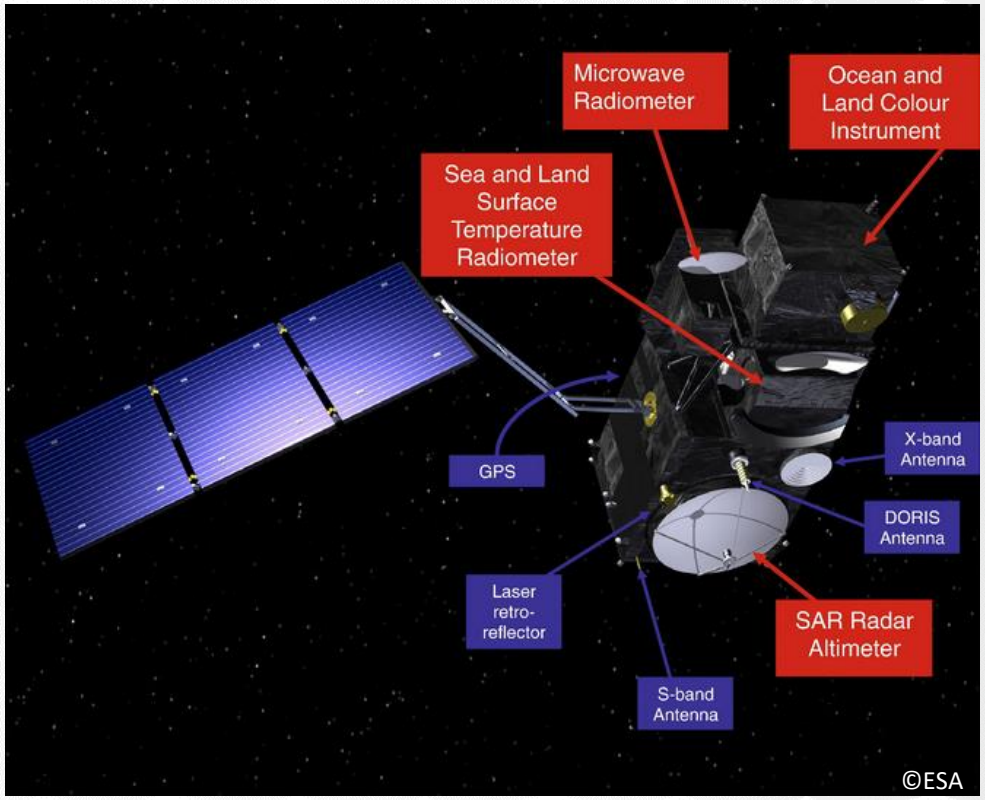

©ESA
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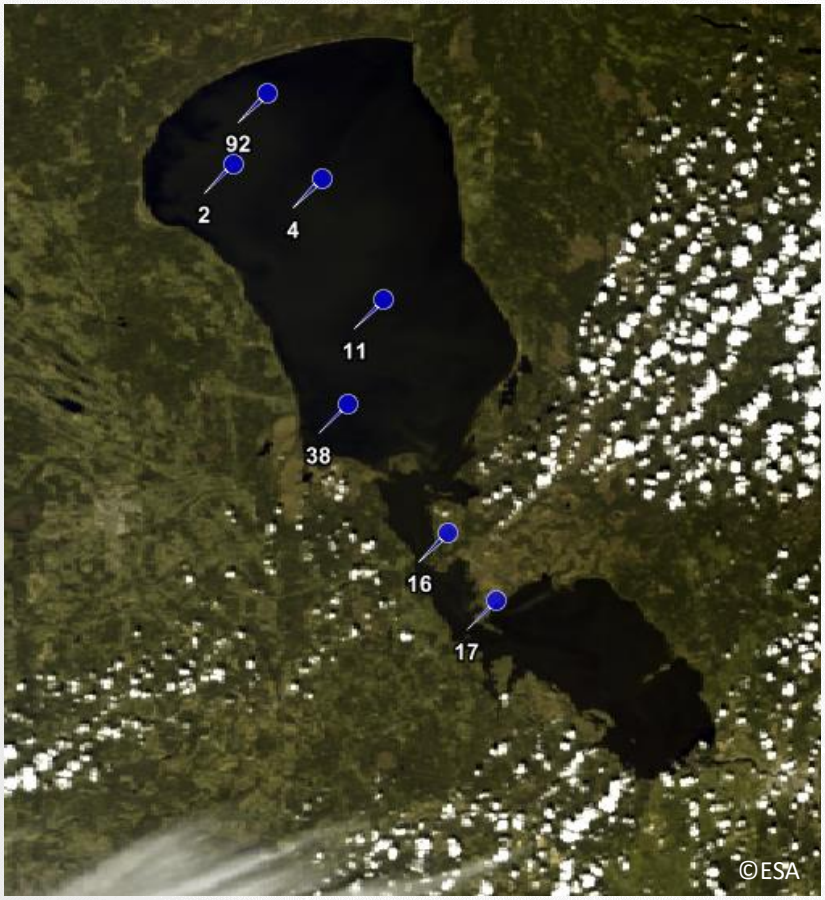

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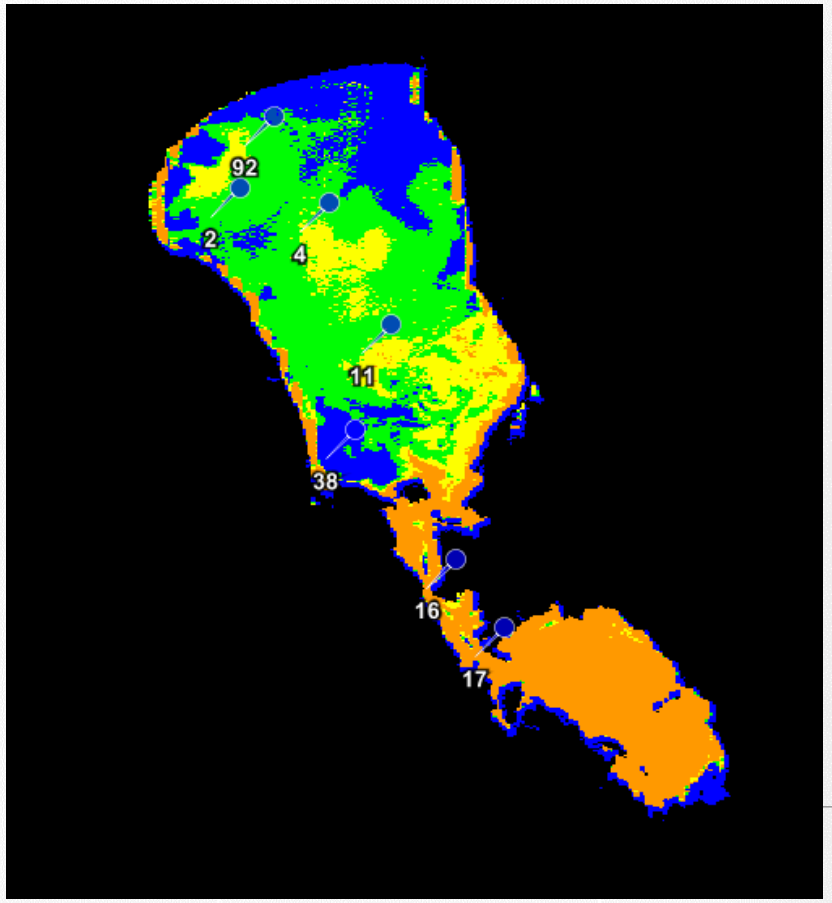
OLCI

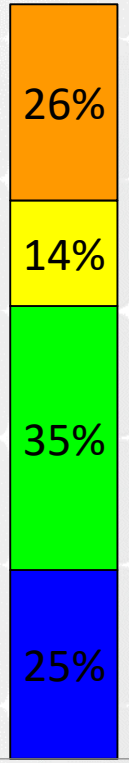
- OLCI - *Ocean and Land Colour Instrument*
  - 16.02.2016 - üles
  - 20.10.2016 – andmed avalikud
- Andmed
  - 14.06.2016
- Töötlus
  - C2RCC



OLCI 14.06.16 pildi veetüübid



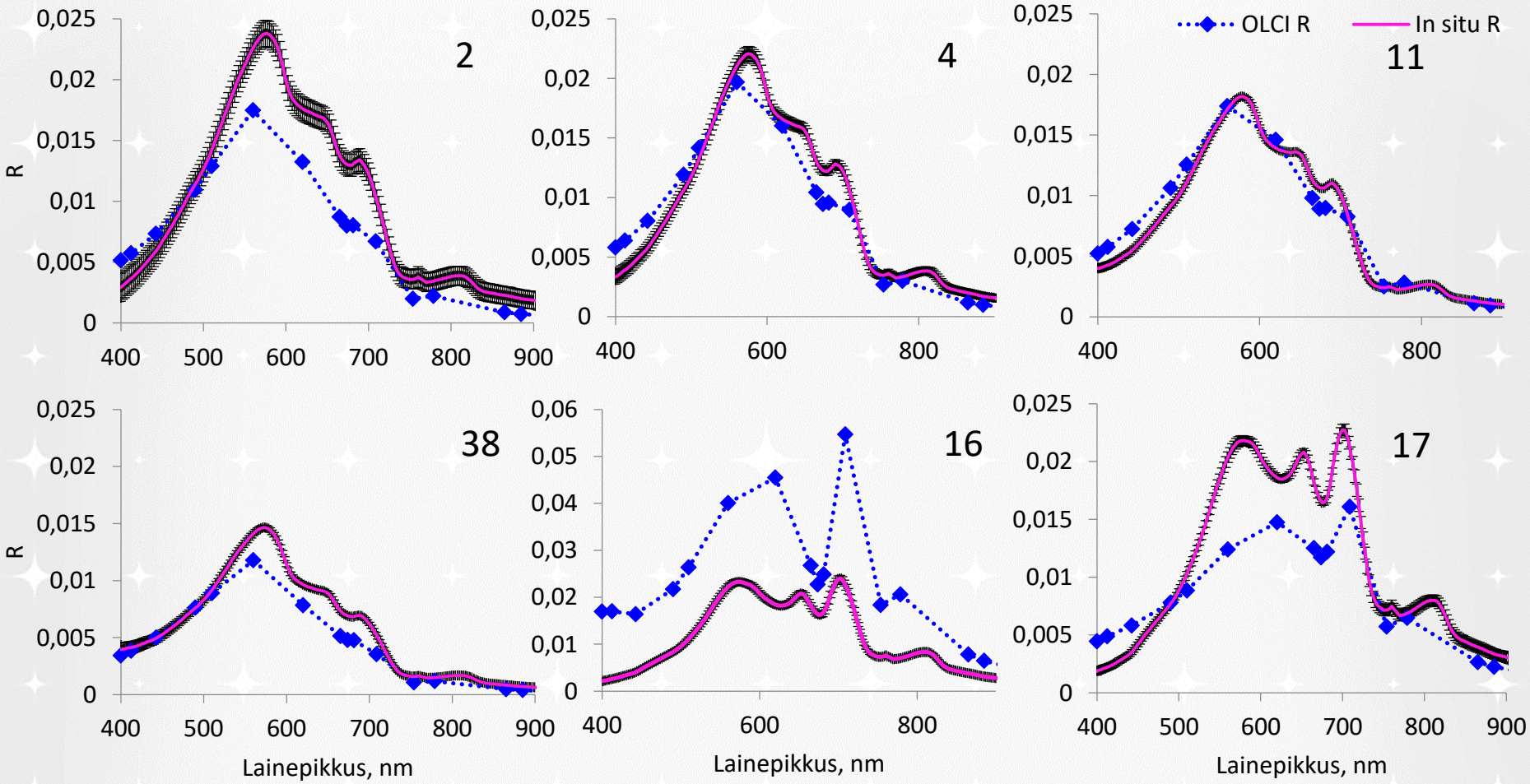




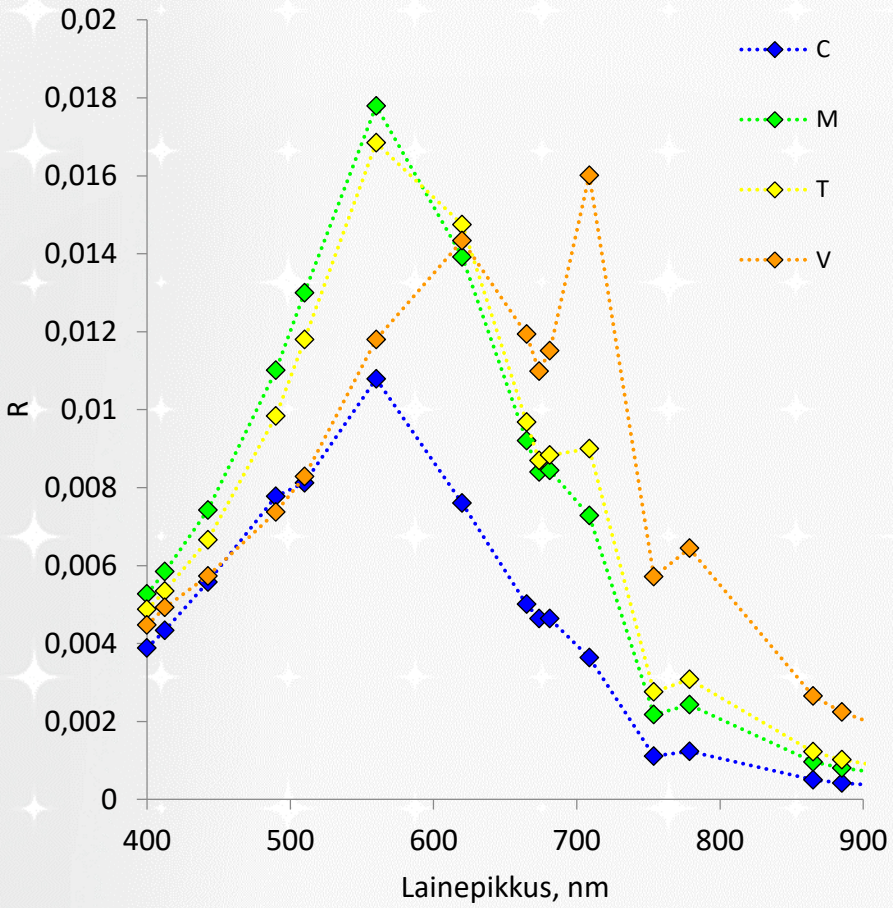
Peipsi

	2	4	11	16	17	38	92
In situ	M	M	M	T	T	M	M
OLCI	M	T	M	V	V	C	T

OLCI R vs *in situ* R



OLCI – veetüüpide keskmised R-id



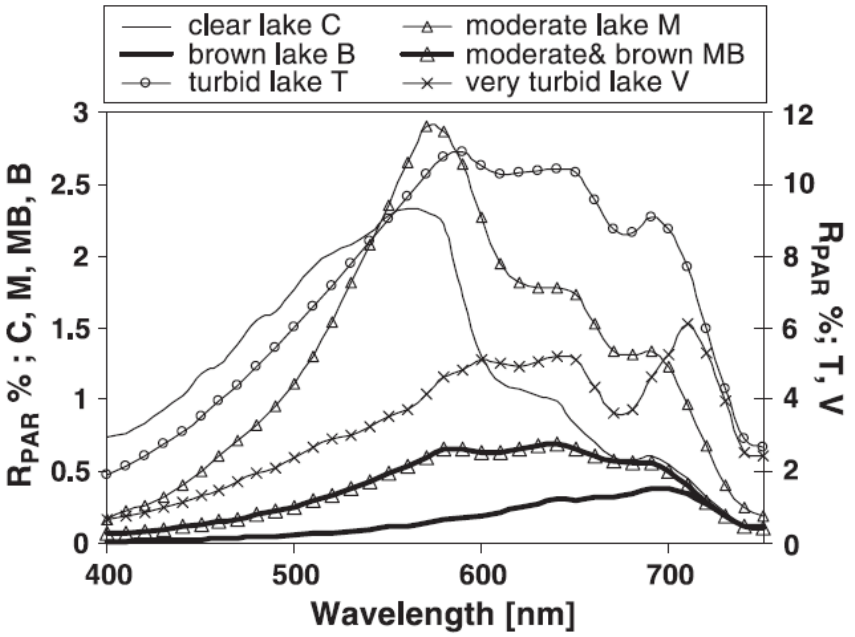


Fig. 3. Diffuse reflectance spectra of different types of investigated waters. Curves are marked similarly as in Fig. 2 and additionally type MB is presented. (For types T and V see the right axis.).

Reinart *et al.* 2003

Kokkuvõte

- Veetüübid muutuvad nii ajaliselt kui ka ruumiliselt.
- Satelliidipiltidelt on näha veetüüpide muutlikkust.
- Erinevad töötlused ei anna ühtset tulemust, aga dünaamika on olemas.
- OLCI peegeldumisspektid on paljulubavad.

- Klassifikatsioon R põhiseks.
- Väikejärved.

Tänan kuulamast!

Suured tänud:

- Peipsi seiremeeskond
- Evi Lill