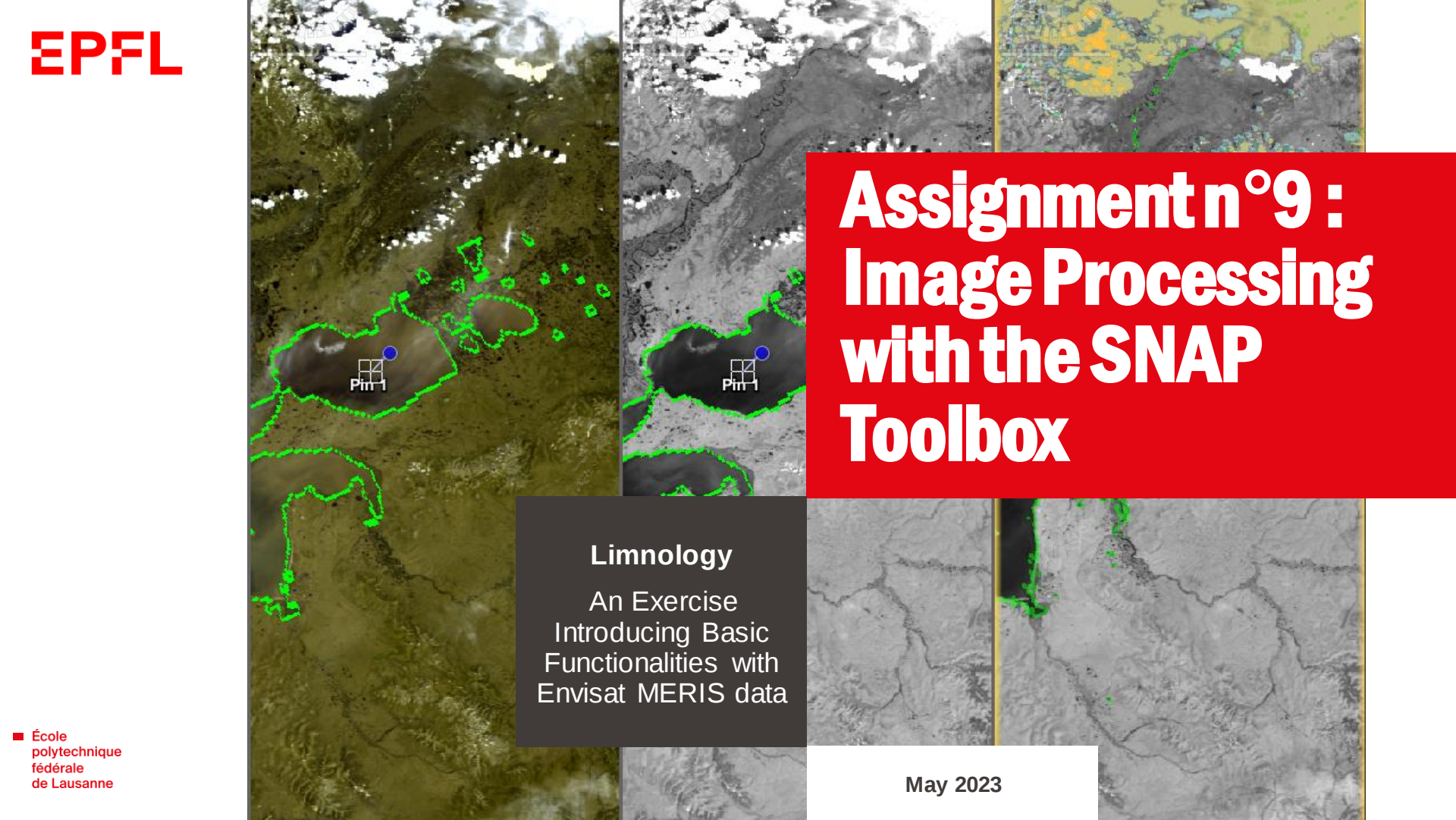




Assignment n°9 : Image Processing with the SNAP Toolbox

Limnology

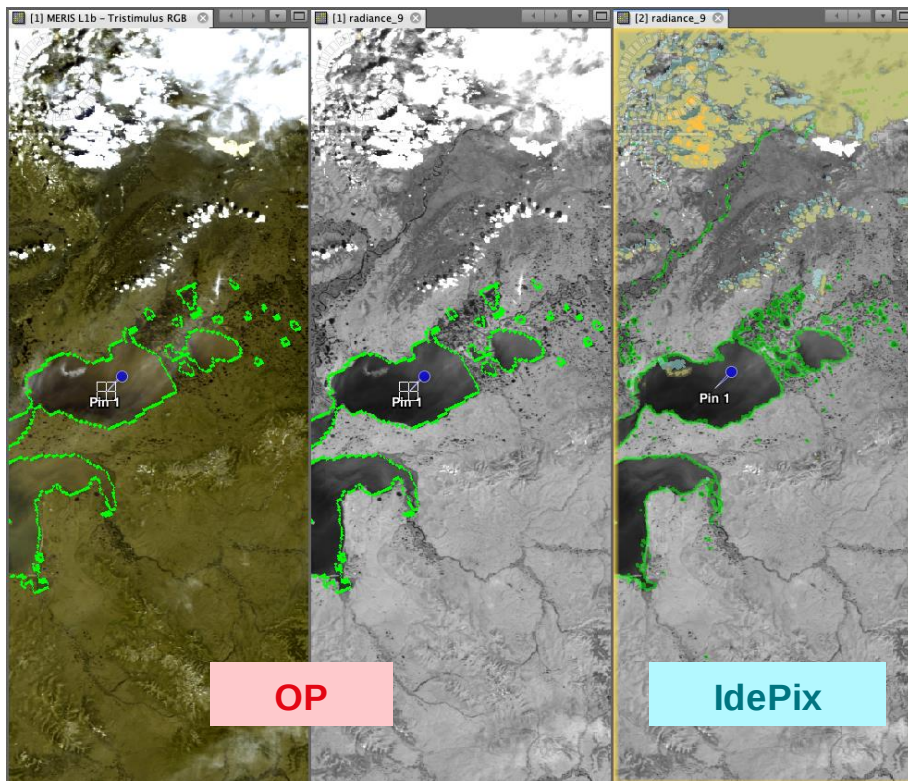
An Exercise
Introducing Basic
Functionalities with
Envisat MERIS data

May 2023



- 1) Take a screenshot depicting a synchronized view of the flags included in the original L1 product, and the one produced with IdePix.**
- 2) Describe the difference between the land/water masking observed in 1)**
- 3) Create a map that displays chlorophyll-a distribution over Iain by the cyanobacteria flag layer and 2 pins representing a flagged and an unflagged pixel.**
- 4) For the two pins above, compile a table that consists of pin identifier and coordinates, TOA radiance in bands 7-10 and the MPH chlorophyll-a value.**

1) Take a screenshot depicting a synchronized view of the flags included in the original L1 product, and the one produced with IdePix.

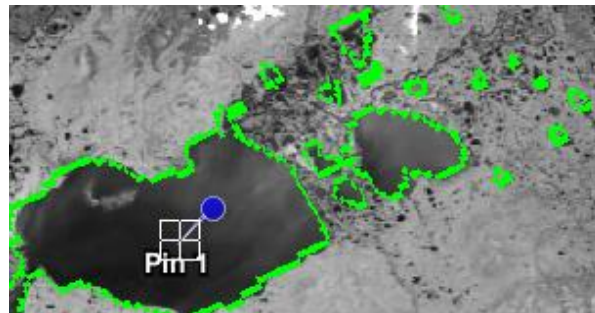
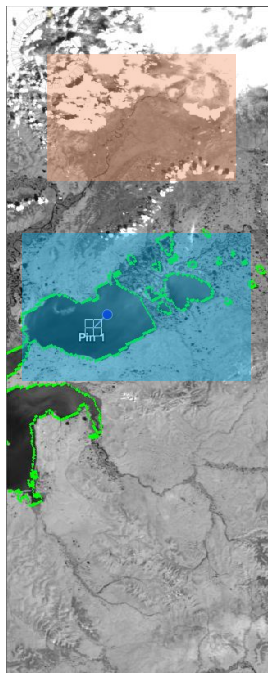


IdePix legend

Name	Colour
☒ IDEPIX_INVALID	
☒ IDEPIX_CLOUD	
☒ IDEPIX_CLOUD_AMBIGUOUS	
☒ IDEPIX_CLOUD_SURE	
☒ IDEPIX_CLOUD_BUFFER	
☒ IDEPIX_CLOUD_SHADOW	
☒ IDEPIX_SNOW_ICE	
☒ IDEPIX_BRIGHT	
☒ IDEPIX_WHITE	
☒ IDEPIX_COASTLINE	
☐ IDEPIX_LAND	

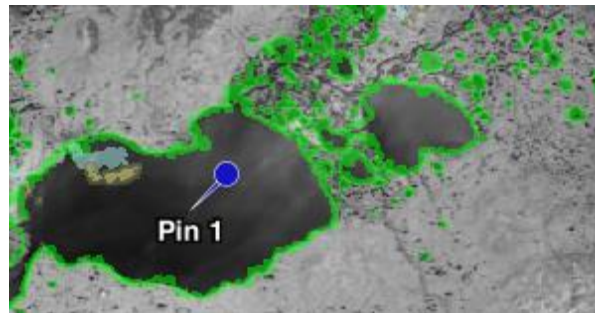
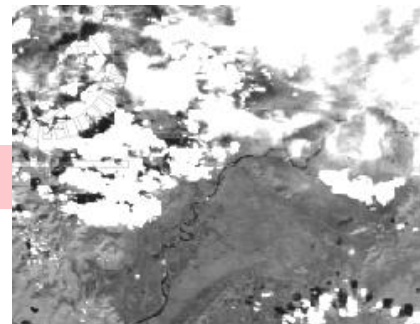
1) Take a screenshot depicting a synchronized view of the flags included in the original L1 product, and the one produced with IdePix.

Comparison on **water**

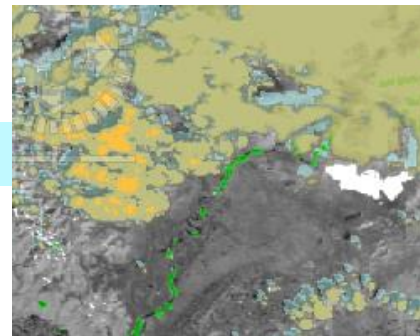


OP

Comparison on **clouds**



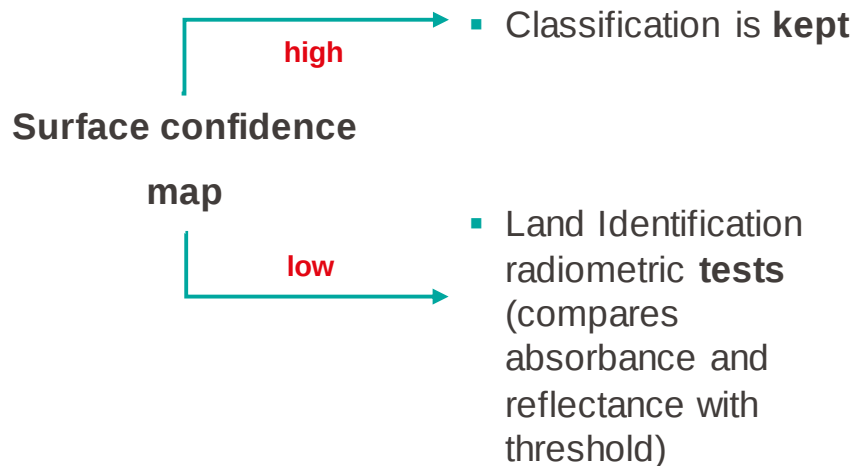
IdePix



2) Describe the difference between the land/water masking observed in 1)

IdePix product masking

Original product masking



Input : (15 reflectance bands at TOA)²

Output : classification between 'cloud sure', 'cloud ambiguous', 'cloud', and 'snow/ice'

Shuttle Radar Topography Station :

- = 0 : '**land**'

Water fraction

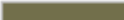
- > 0 and < 100 : '**coastline**'

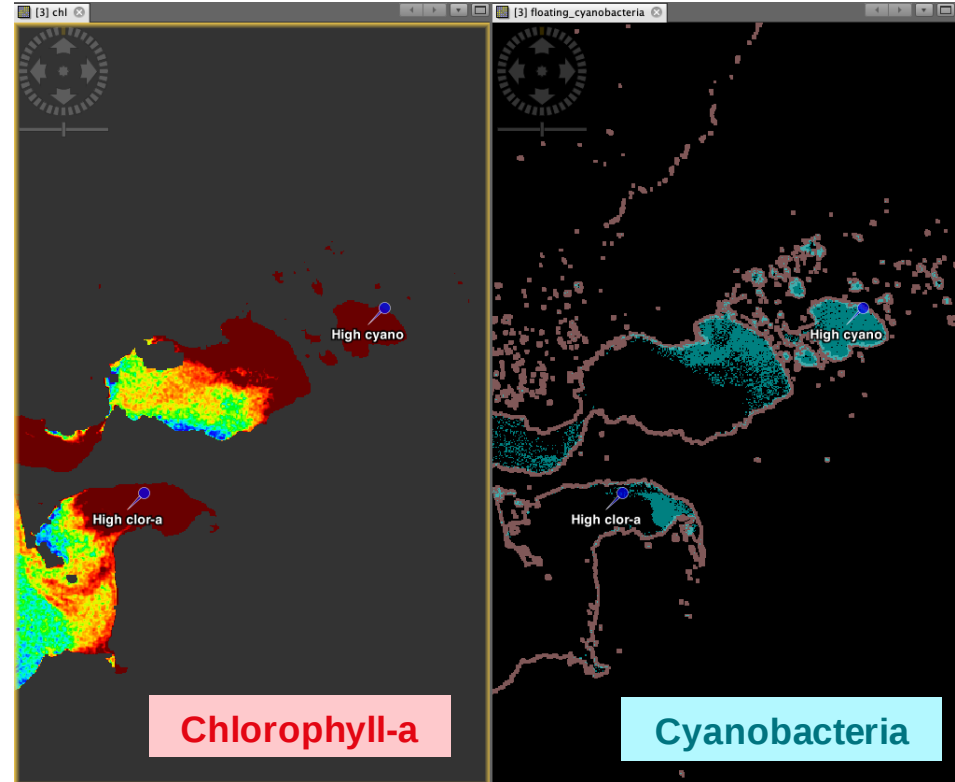
- > 100 : '**water**'

→ much more **complete** classification !

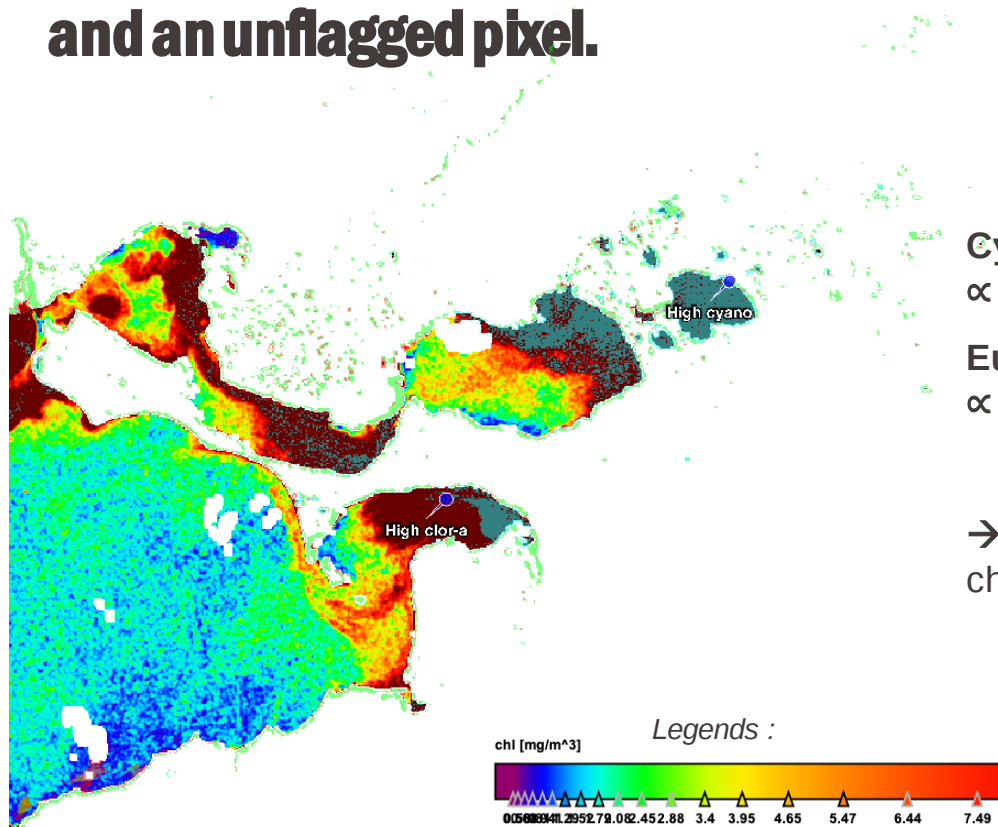
3) Create a map that displays chlorophyll-a distribution overlain by the cyanobacteria flag layer and 2 pins representing a flagged and an unflagged pixel.

IdePix pixels not considered

 Name	Colour
 IDEPIX_INVALID	
 IDEPIX_CLOUD	
 IDEPIX_CLOUD_AMBIGUOUS	
 IDEPIX_CLOUD_SURE	
 IDEPIX_CLOUD_BUFFER	
 IDEPIX_CLOUD_SHADOW	
 IDEPIX_SNOW_ICE	
 IDEPIX_BRIGHT	
 IDEPIX_WHITE	
 IDEPIX_COASTLINE	
 IDEPIX_LAND	



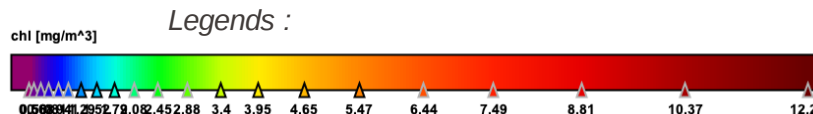
3) Create a map that displays chlorophyll-a distribution overlain by the cyanobacteria flag layer and 2 pins representing a flagged and an unflagged pixel.



Cyanobacteria dominated waters
 $\propto$ **High chlorophyll-a**

Eucaryote dominated waters
 $\propto$ **Low chlorophyll-a**

→ Cyanobacteria produce **more** chlorophyll-a than eucaryotes !



Cyanobacterias

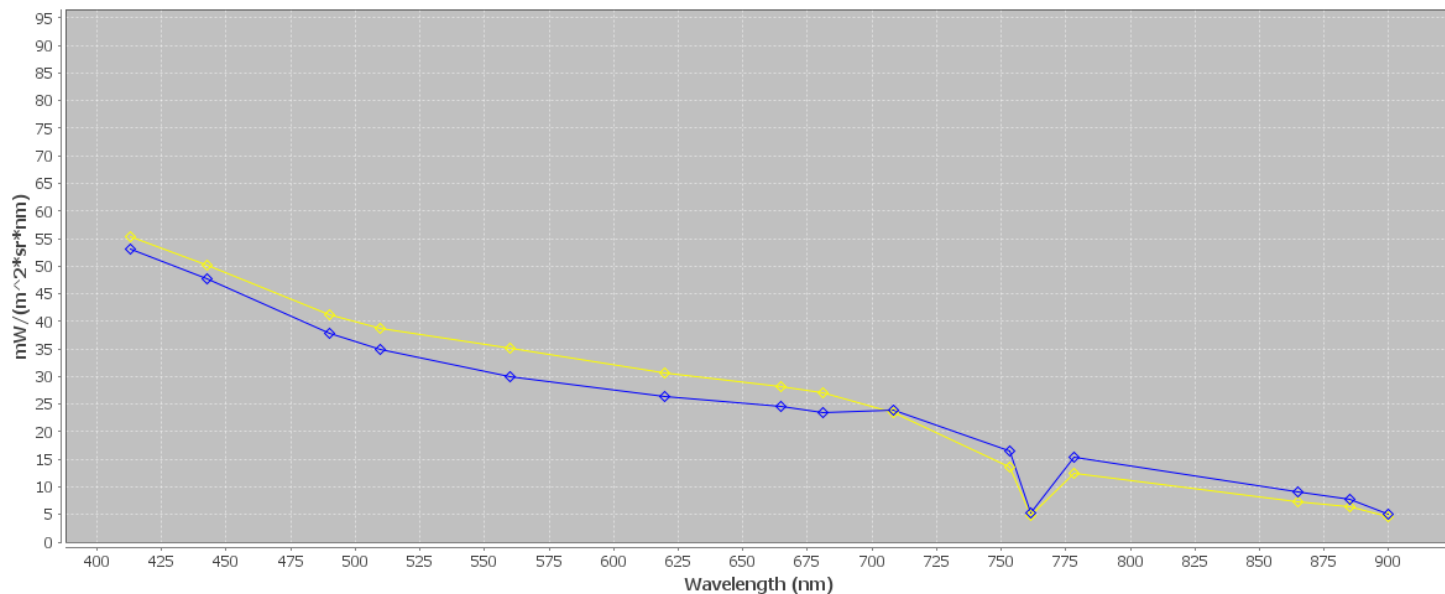
4) For the two pins above, compile a table that consists of pin identifier and coordinates, TOA radiance in bands 7-10 and the MPH chlorophyll-a value.

Name	Pin1	Pin2
X	3004.106	2782.838
Y	1739.647	1883.187
Lon	-159.823	-161.402
Lat	66.45722	66.35122
Color	Blue	Yellow
Label	High chlor-a	High cyano
radiance7 (664.6nm)	24.53665	28.20037
radiance8 (680.8nm)	23.45728	27.00952
radiance9 (708.3nm)	23.87946	23.37474
radiance10 (753.4nm)	16.41948	13.66413
Chlorophyll-a concentration	40.18662	39.14753

Table 1: Pin informations. Radiances are in units $[mW/m^2 * sr * nm]$ and chlorophyll-a concentration in units $[mg/m^3]$.

4) For the two pins above, compile a table that consists of pin identifier and coordinates, TOA radiance in bands 7-10 and the MPH chlorophyll-a value.

Spectrum View



Intermediate eucaryotes waters : local minimum at 665nm (?), peak at 681nm.

Cyanobacteria dominated waters : local minimum at 681nm (?), no peak because they are not fluorescent, phytoplanktons are.

Thankyou !

