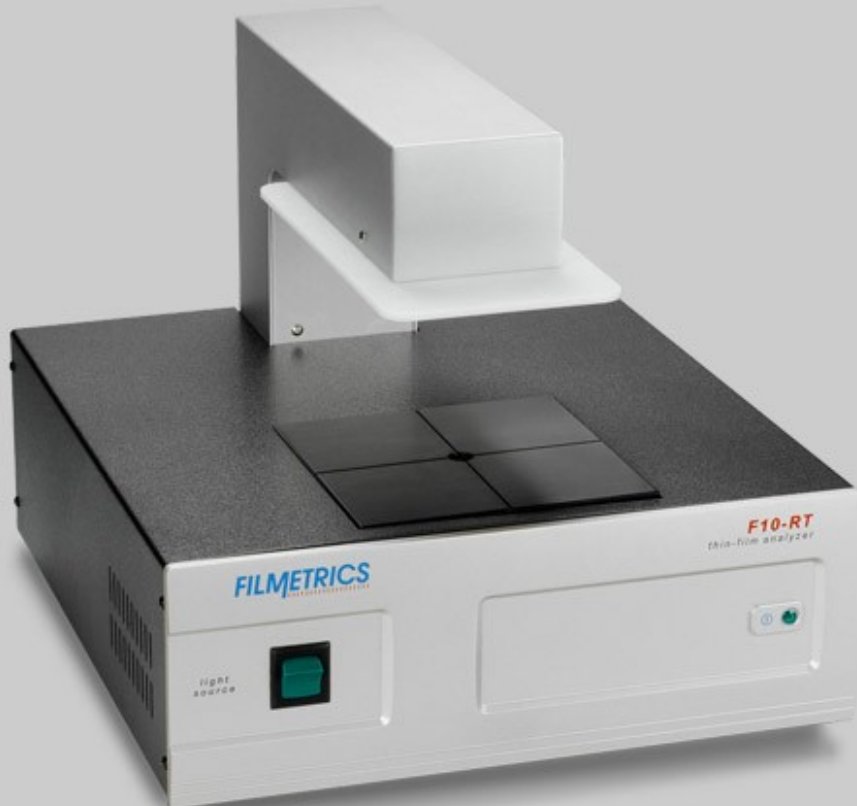


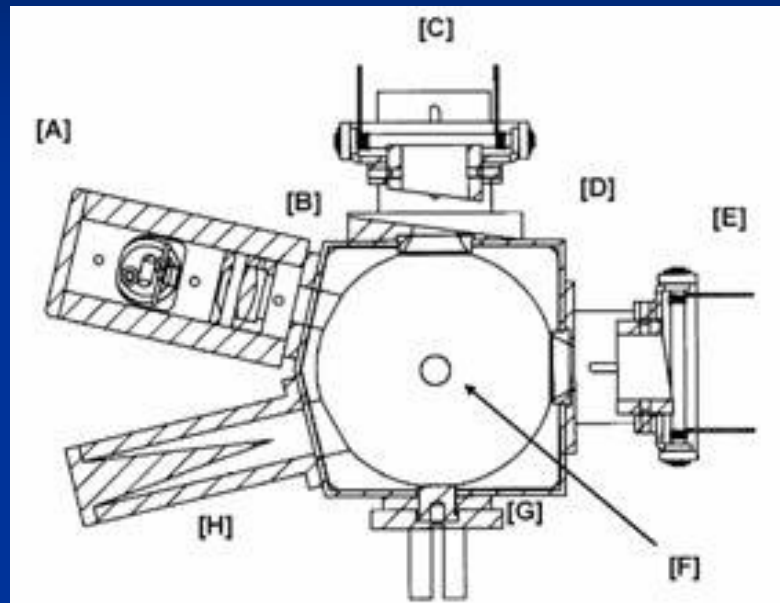
**Spektrální indexy v průběhu
vysychání poikilohydrických
organismů
ve vztahu k fotosyntéze**

Miloš Barták

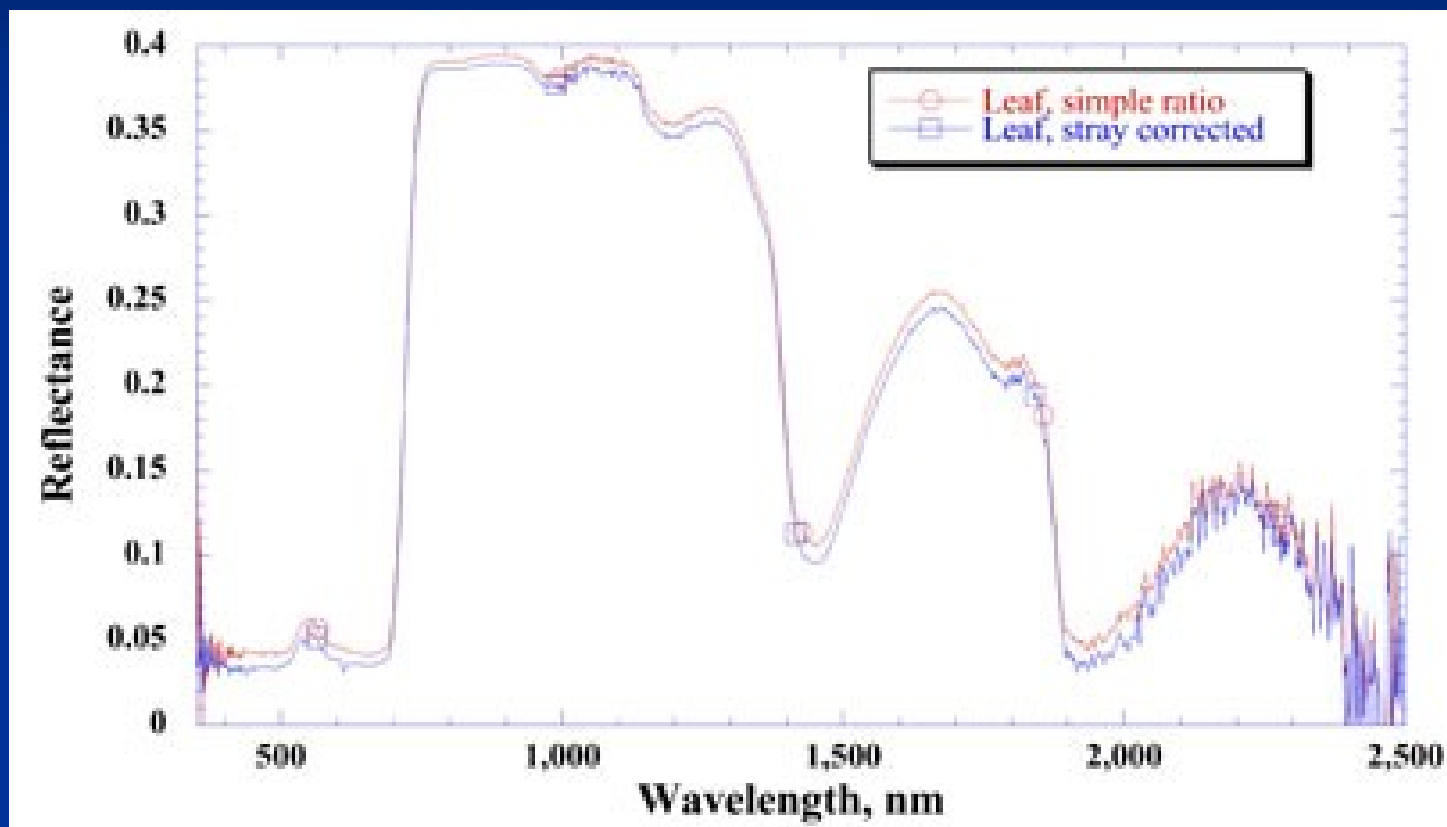
Spektrální reflektometr - laboratoř



Integrační (Ubrichtova) sféra



Spektrální křivka (reflektance)

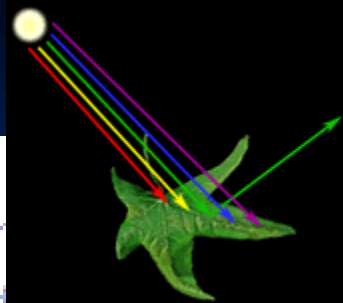


Měřicí přístroj (dle Gamon)



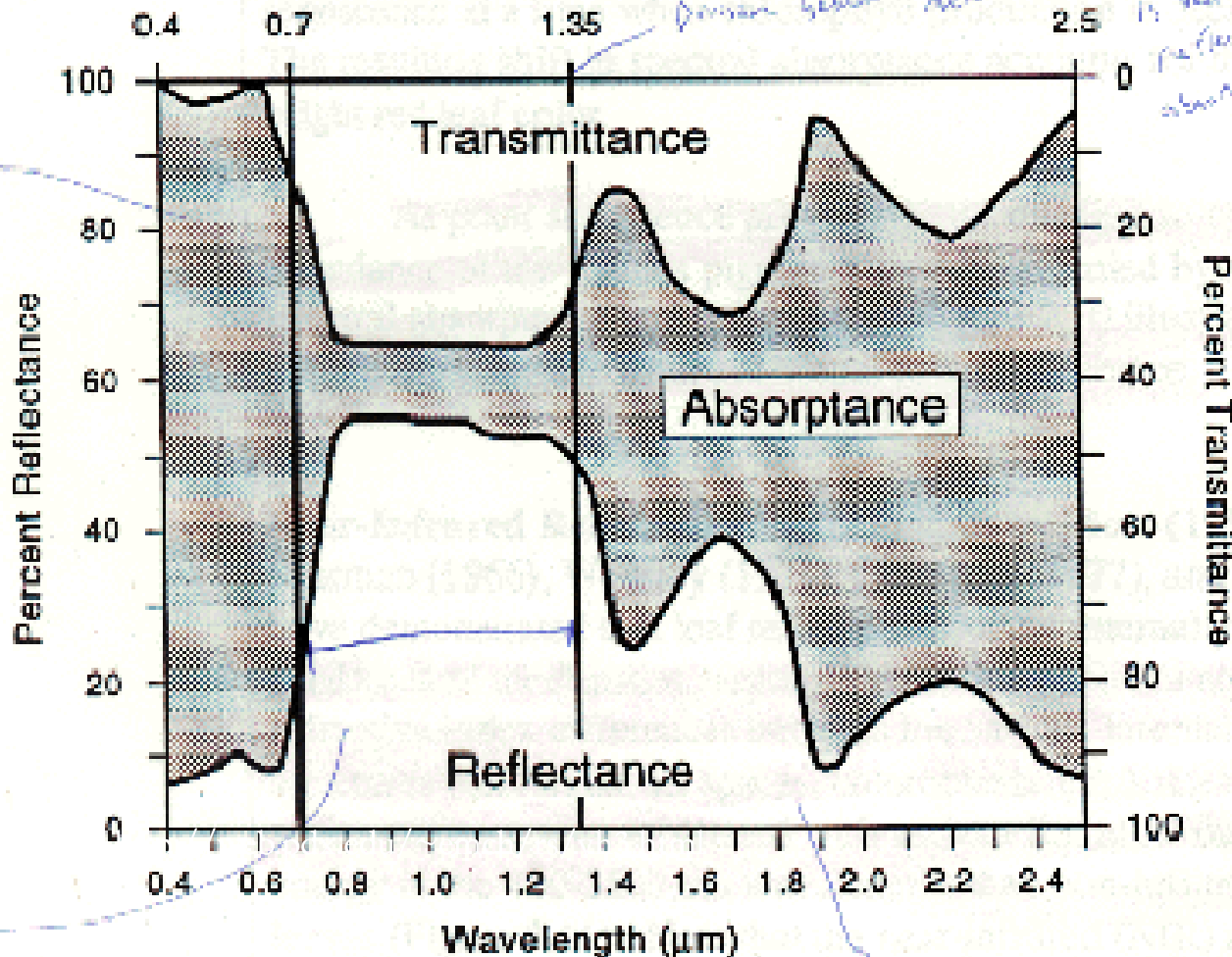
spektrometry



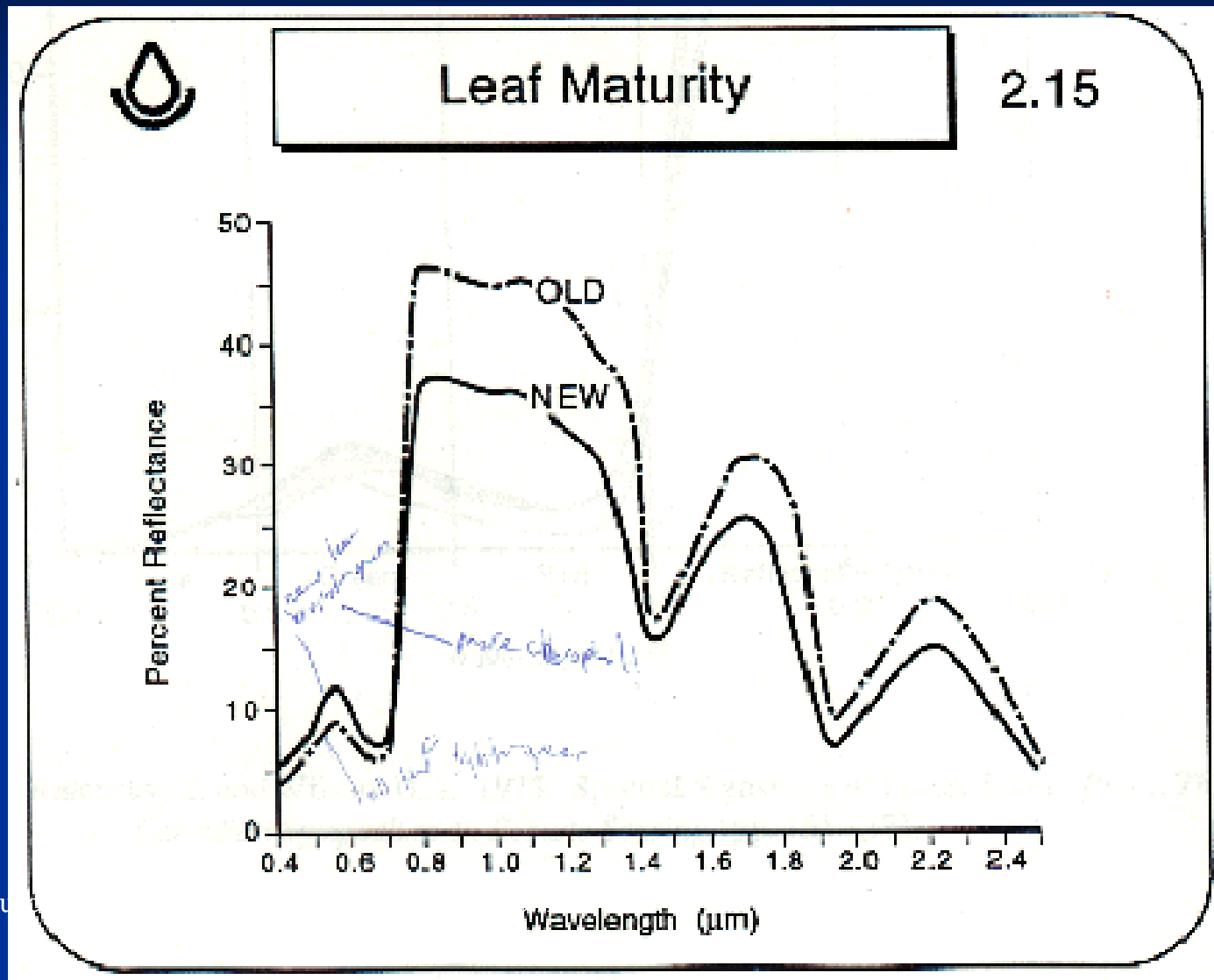


Spectral Partitioning by Vegetation

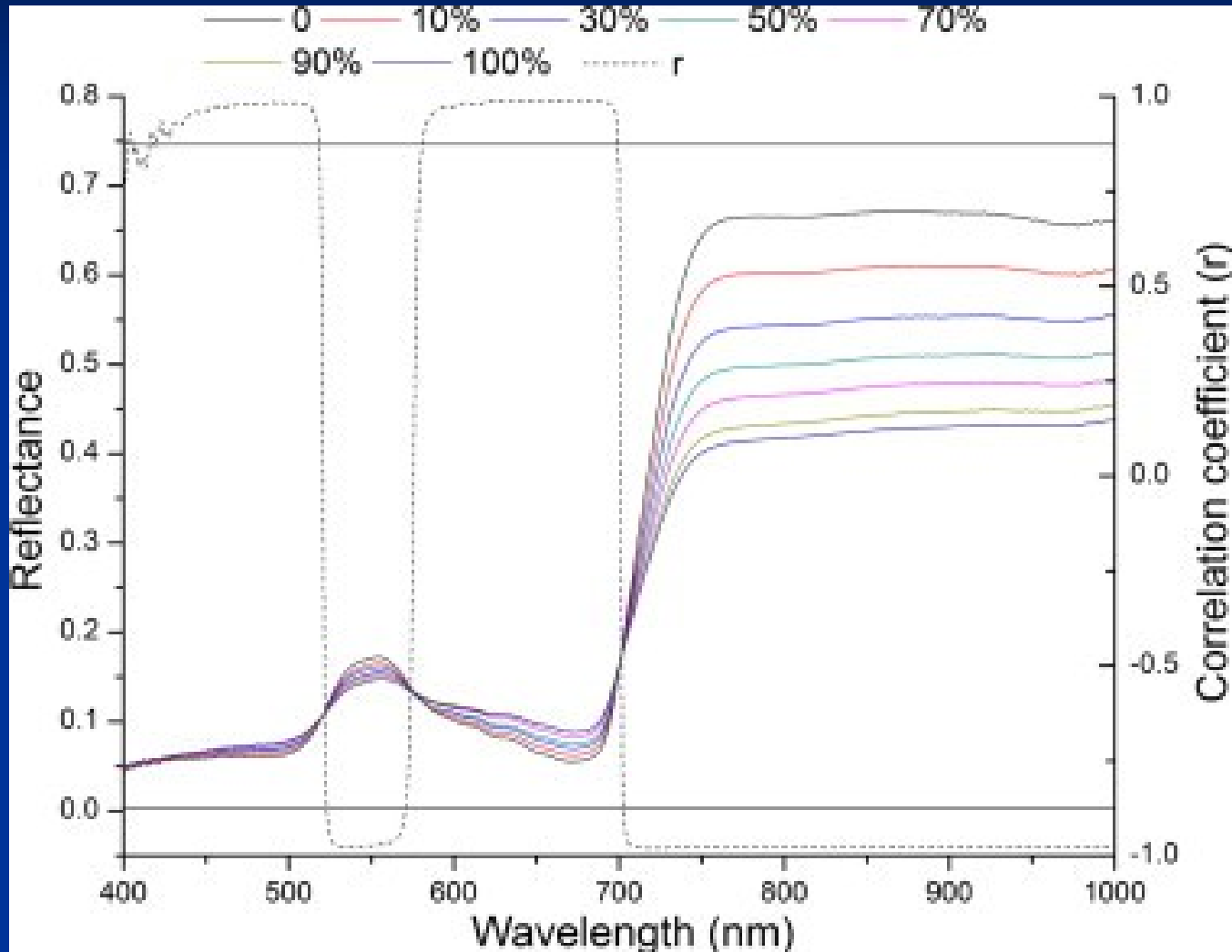
2.7



Spectral Reflectance



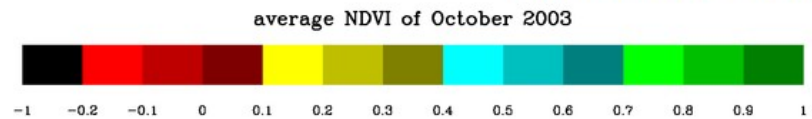
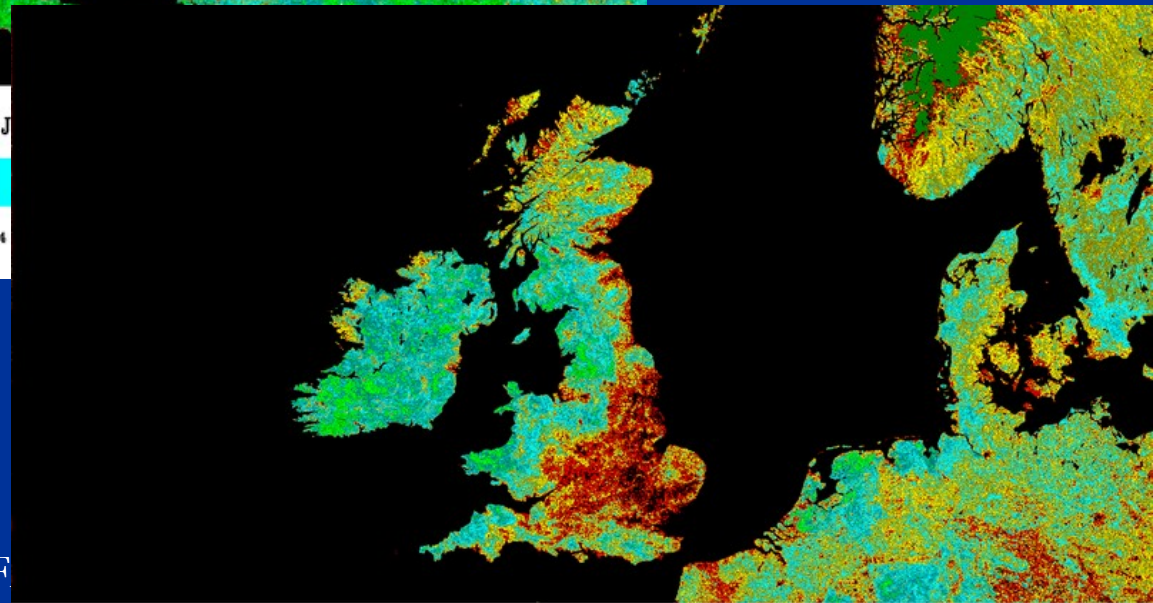
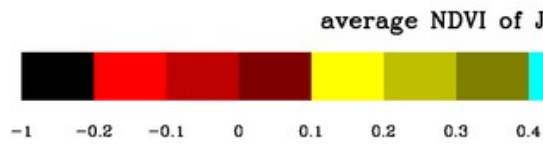
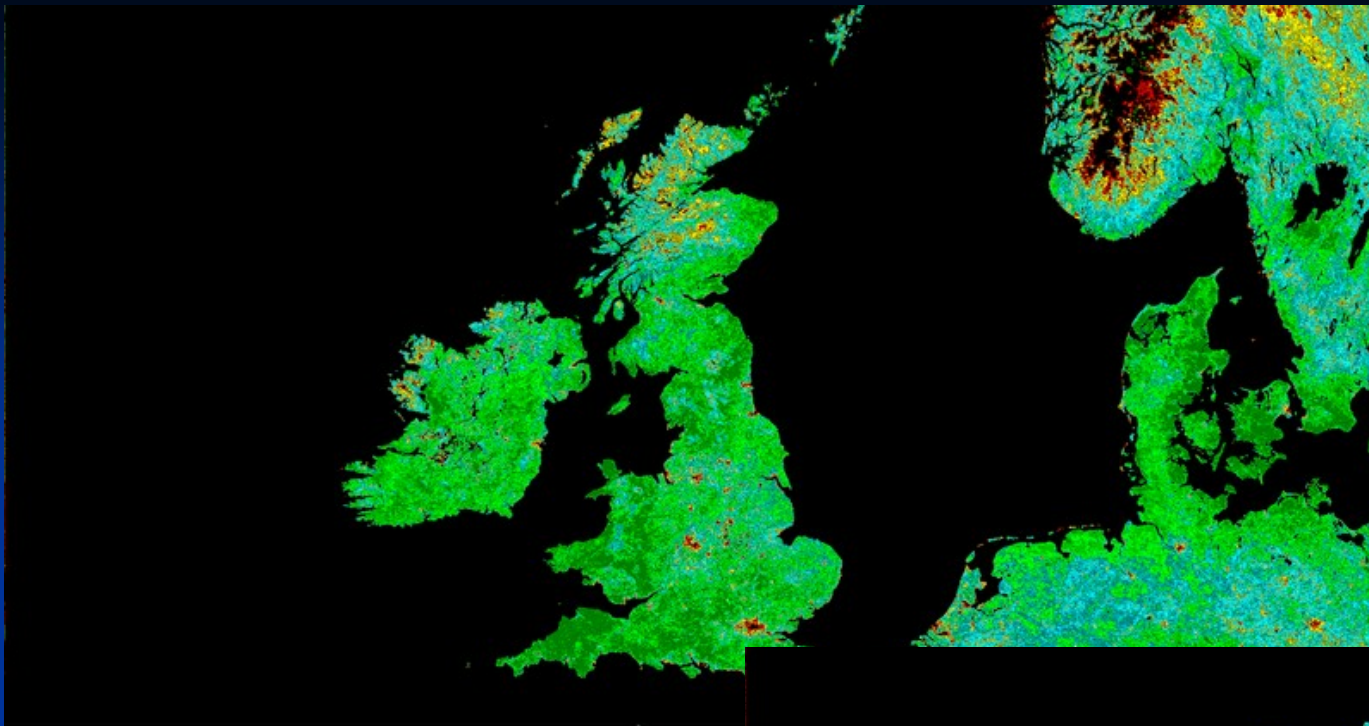
Leaf spectral reflectance



NDVI

- The **Normalized Difference Vegetation Index (NDVI)** is a simple graphical indicator that can be used to analyze remote sensing measurements, typically but not necessarily from a space platform, and assess whether the target being observed contains live green vegetation or not.

- Source: <http://web.pdx.edu/~emch/rs/vh3.html>



■ <http://en.wikipedia.org/wiki/F>

NDVI

- The NDVI is calculated from these individual measurements as follows:



$$(R740 - R660) / (R740 + R660)$$

PRI

Photochemical reflectance index

$$PRI = (R570 - R531) / (R570 + R531)$$

$$PRI = (R531 - R570) / (R531 + R570)$$

PRI

Udává míru zapojení ochranných mechanismů (pigmentů xantoxylového cyklu) = je tedy indikátorem stresu ve fotosyntéze jak vyšších, tak nižších rostlin

Vegetation indices

- **Poměrové indexy**

- Poměrové indexy dávají do vztahu jednoduchým nebo normalizovaným poměrem odrazivost povrchů v červené viditelné a blízké infračervené části spektra. Mezi nejčastěji používané poměrové indexy patří například: Jednoduchý poměrový vegetační index (RVI - Ratio Vegetation Index):

-
-

$$RVI = \frac{NIR}{RED}$$

$$(R740 - R660) / (R740 + R660)$$

- Normalizovaný diferenční vegetační index (NDVI - Normalized Difference Vegetation Index):

-
-

$$NDVI = \frac{NIR - RED}{NIR + RED}$$

- Transformovaný vegetační index (TVI - Transformed Vegetation Index):

-

$$TVI = \text{SQRT} \left(\frac{NIR - RED}{NIR + RED} + 0.5 \right)$$

Fotosyntéza, PRI, NDVI v průběhu vysychání mechů

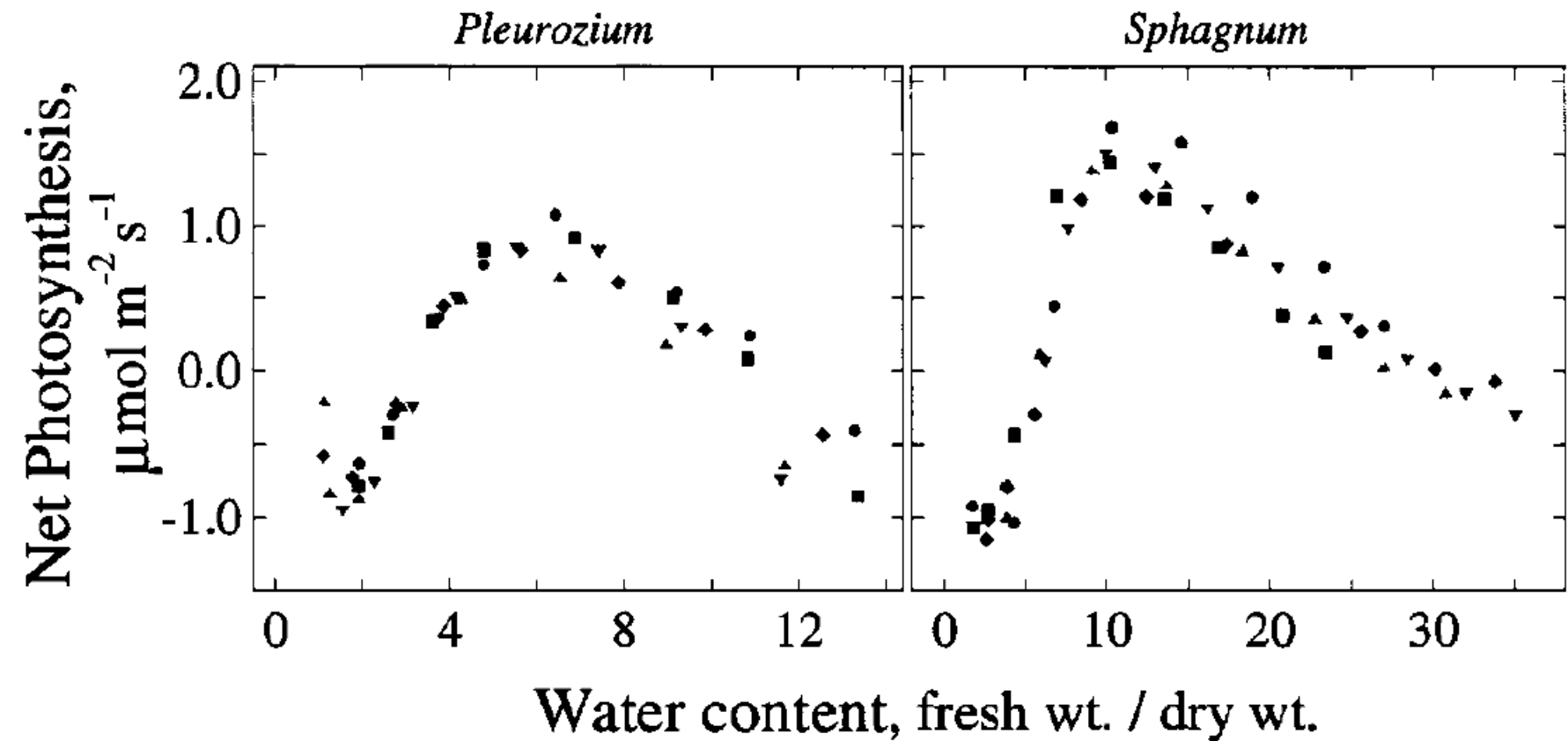
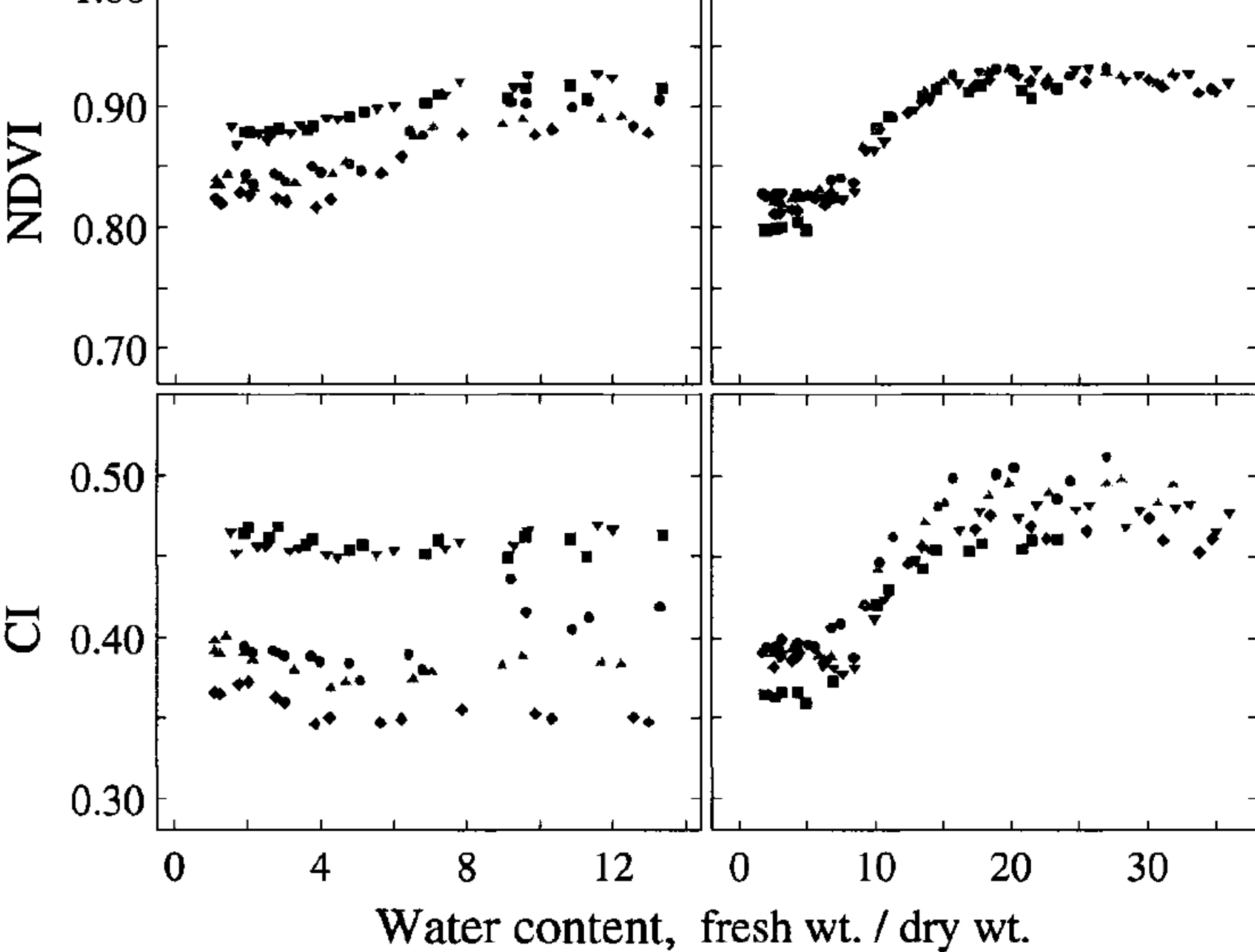


Figure 5: Influence of changes in water content on net photosynthesis rate in *Sphagnum* and *Pleurozium*. Symbols represent separate replicated dry down experiments: replicate 1 ●, 2 ■, 3 ◆, 4 ▲, and 5 ▼.



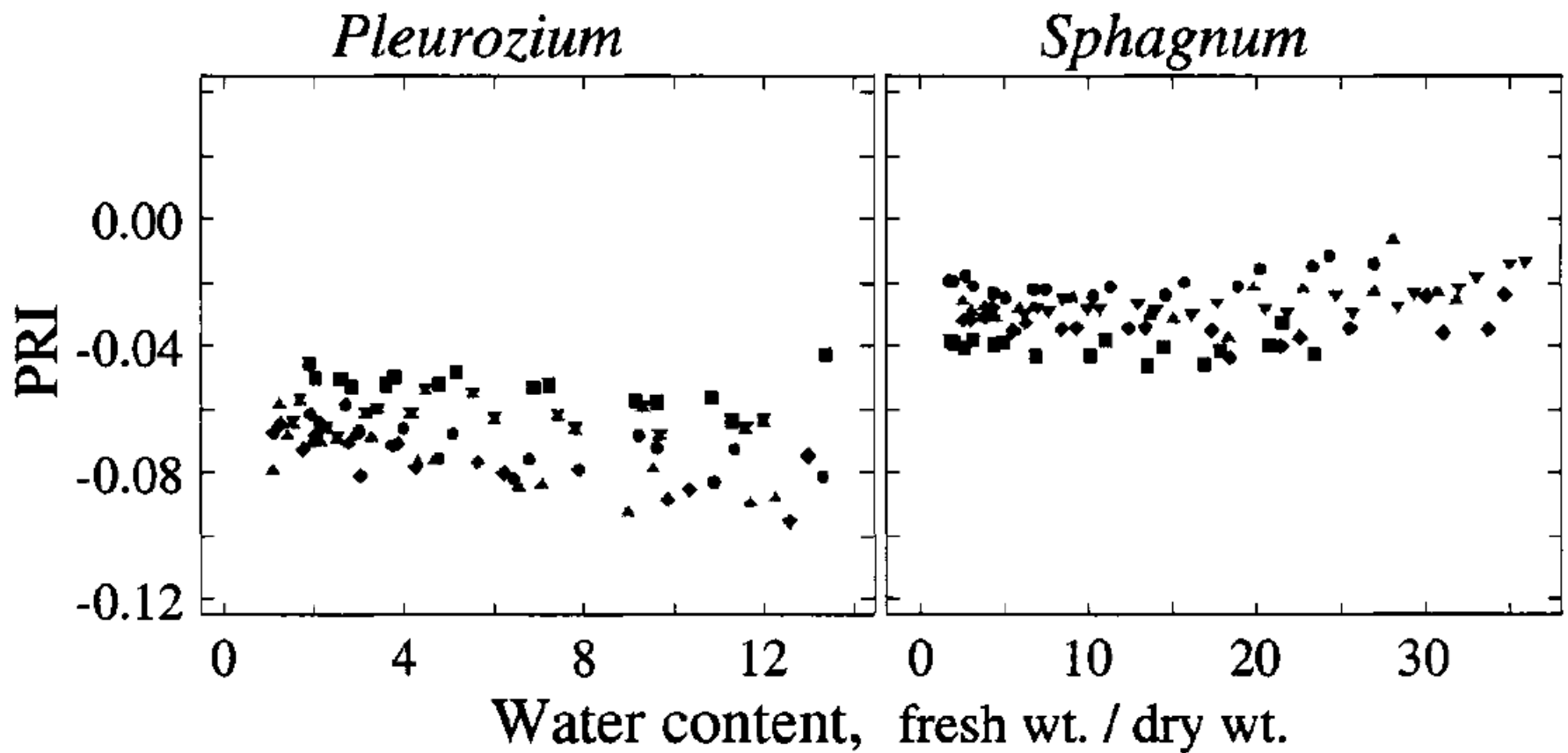
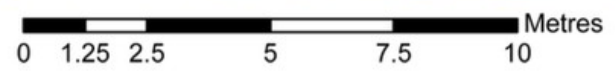
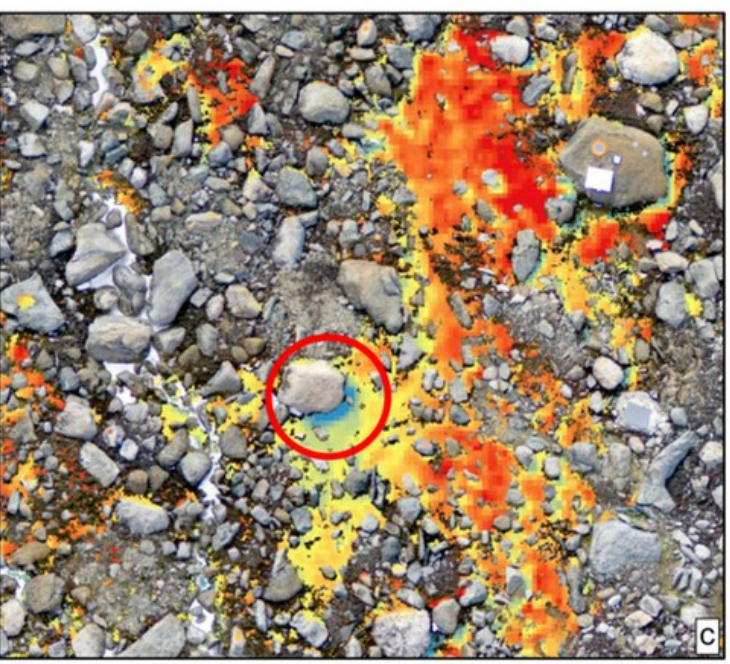
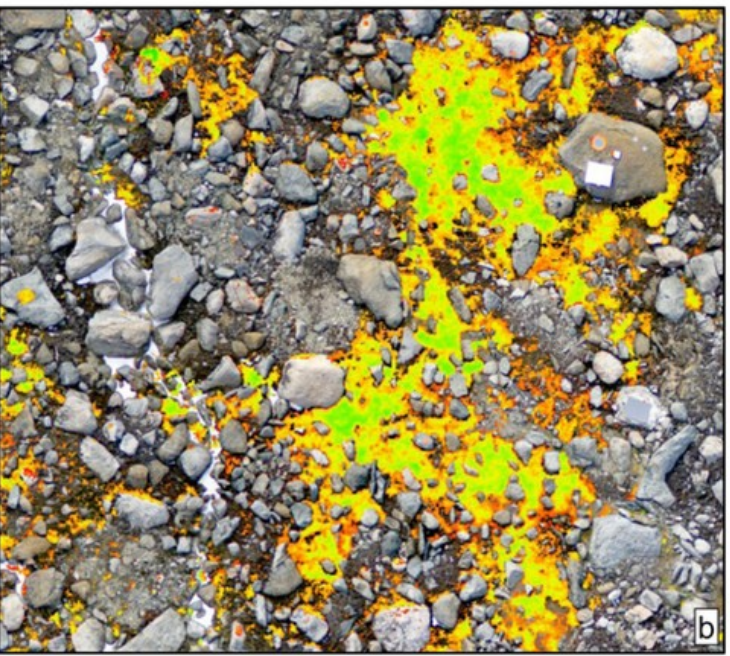


Figure 11: Influence of changes in moss water content on PRI in the laboratory. Symbols represent separate replicated dry down experiments: replicate 1 ●, 2 ■, 3 ◆, 4 ▲, and 5 ▼.



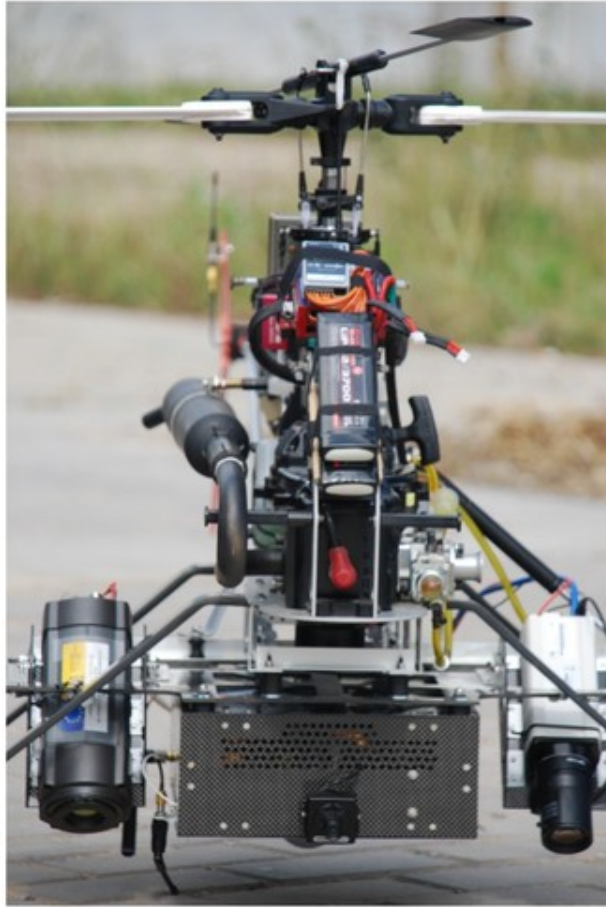


AggieAir



Microkopter

Parrot



Vario



Pathfinder



Atair



A boulder covered with lichen and moss. The whitish area is crustose lichen covering the surface of the boulder. The dark moss is *Dicranum cf. fulvum*, and the lighter moss is *Thuidium delicatulum*.

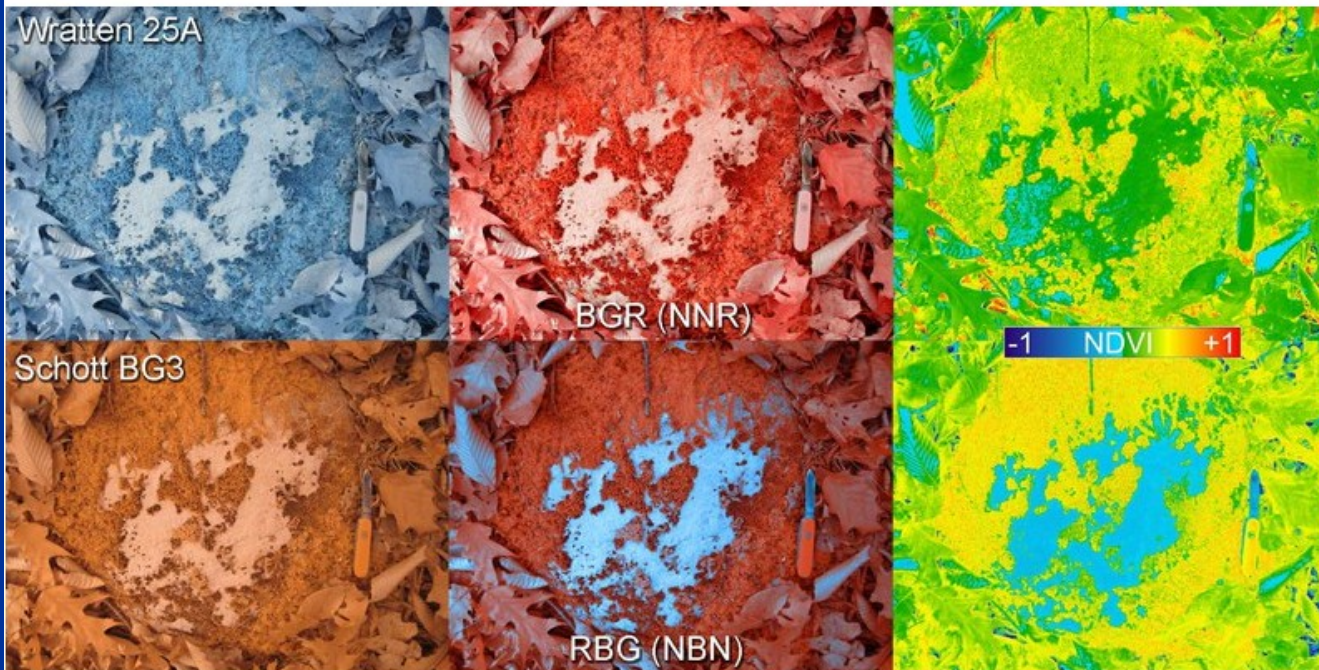


Photo from camera (left), false color IR (middle), and NDVI image (right) from a Powershot A2200 with a Wratten 25A filter (top) or Schott BG3 filter (bottom).

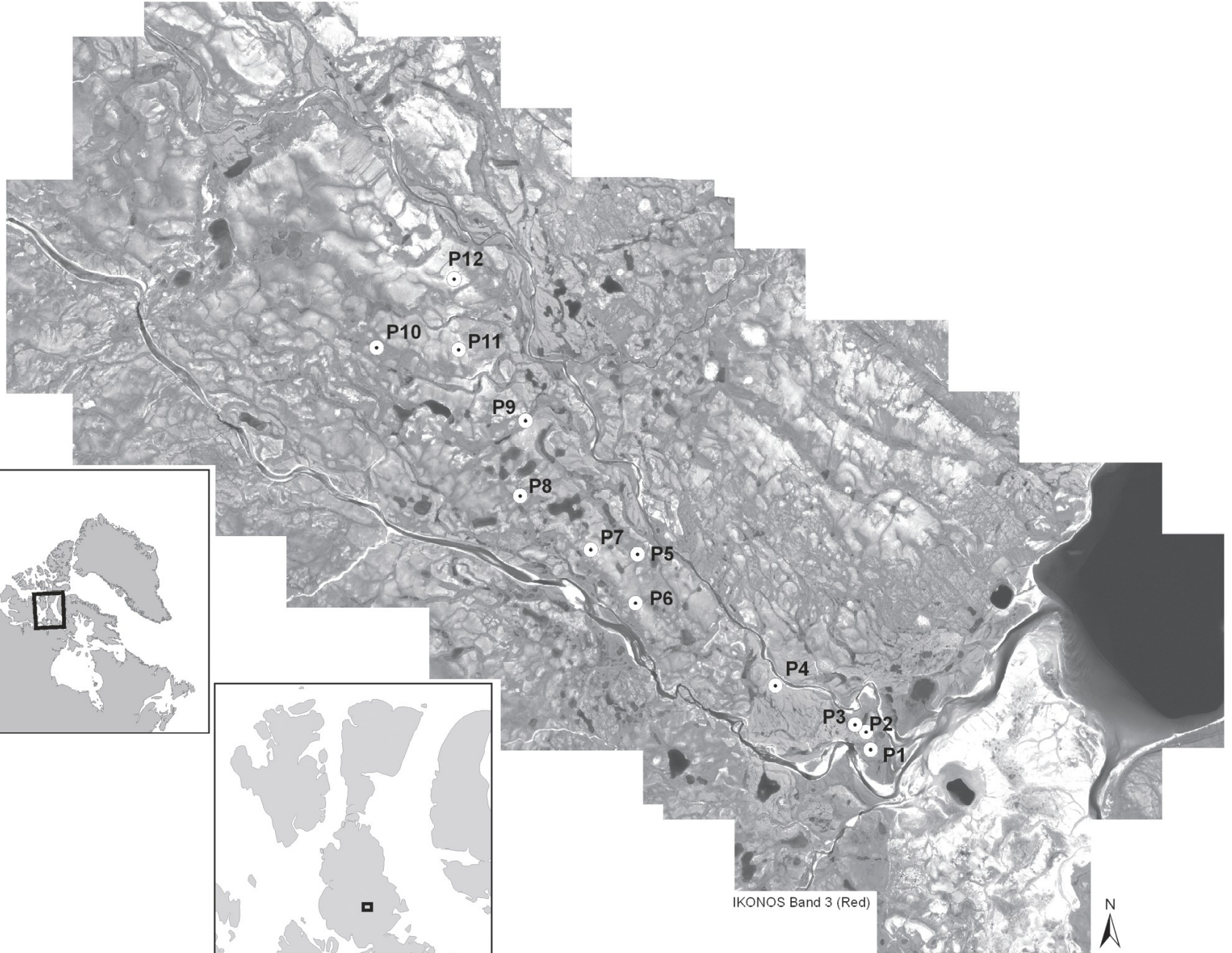
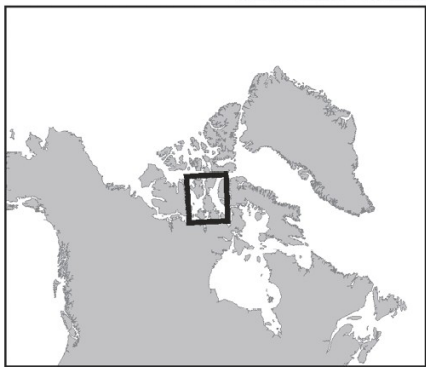
Využití v polárních oblastech

ARCTIC

VOL. 61, NO. 1 (MARCH 2008) P. 1–13

Remote Sensing of Arctic Vegetation: Relations
between the NDVI, Spatial Resolution and
Vegetation Cover on Boothia Peninsula,
Nunavut

GITA J. LAIDLER, PAUL M. TREITZ and DAVID M. ATKINSON



IKONOS Band 3 (Red)



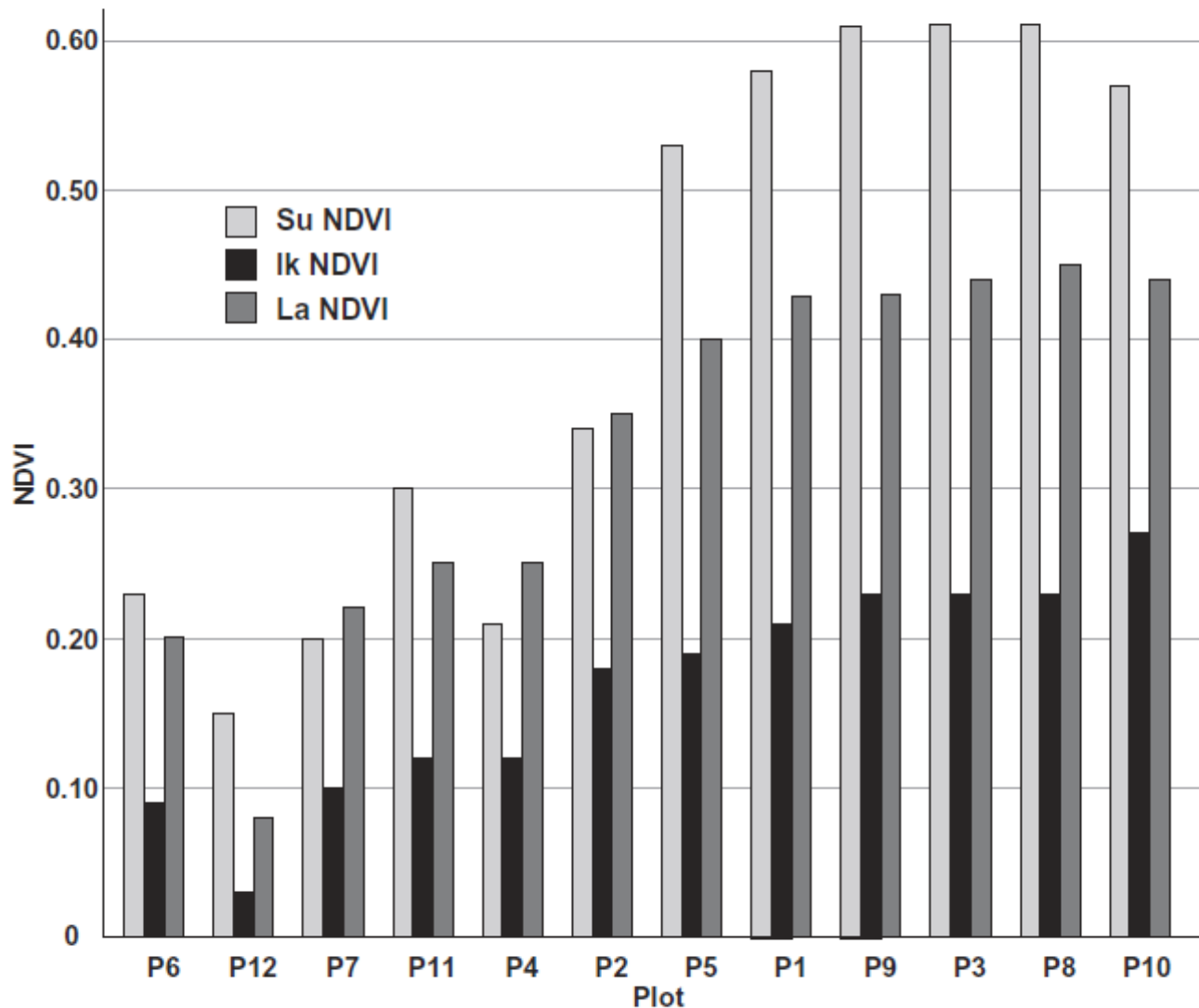


FIG. 5. NDVI values for the 12 study plots, calculated with data from surface (Su), IKONOS (Ik), and Landsat (La) sensors.

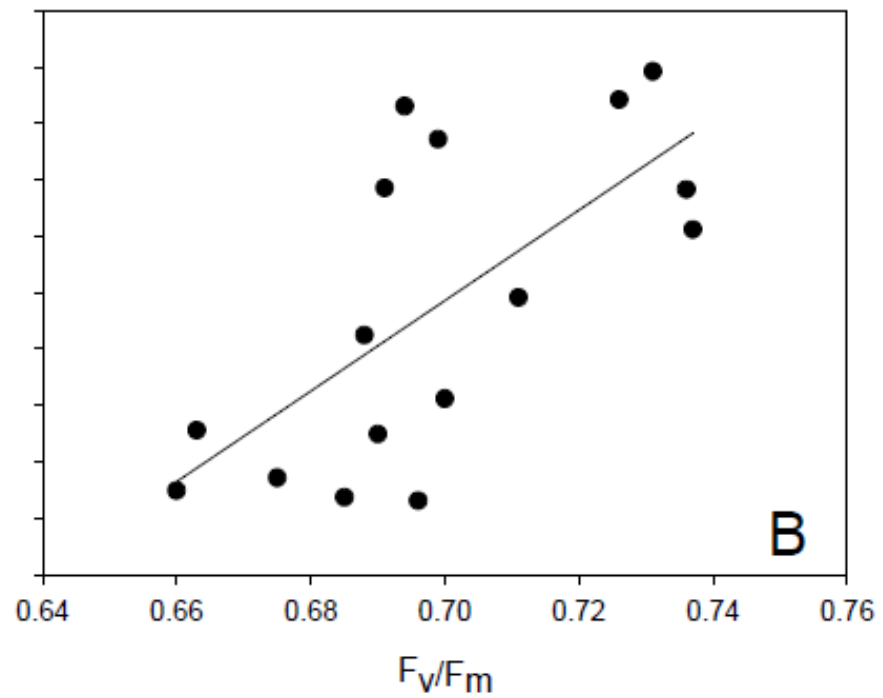
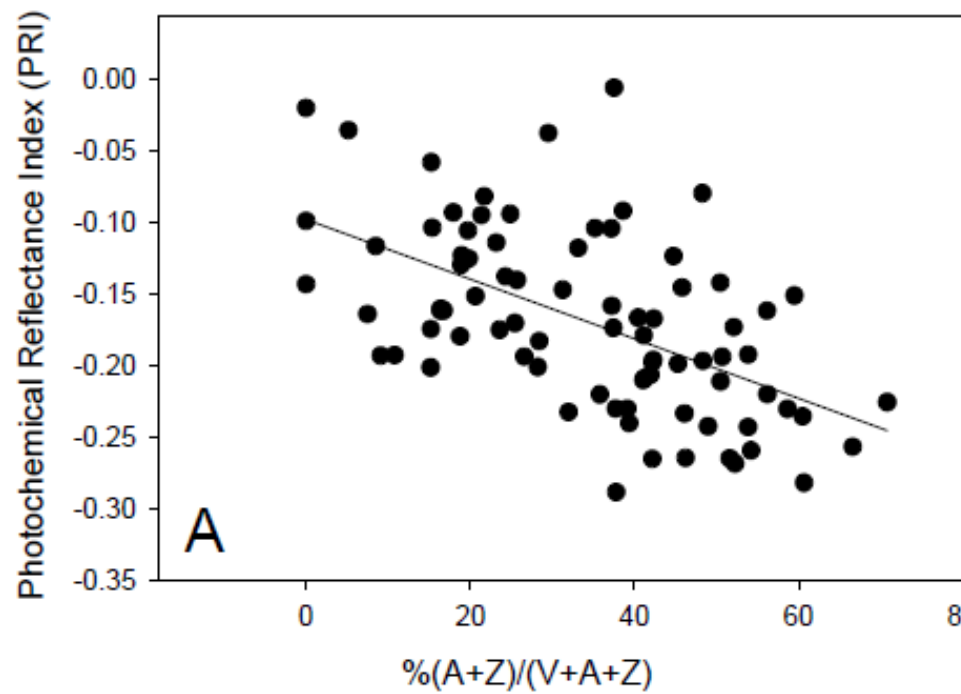
Prof. S. Robinson, prof. Lovelock (Australia)

Table 3. Surface reflectance characteristics and pigment concentrations for three common moss species in Continental Antarctica, N = 11, 12, 63 respectively. NS signifies a non-significant difference at the $P=0.10$ level).

	<i>Bryum pseudotriquetrum</i>	<i>Ceratodon purpureus</i>	<i>Grimmia antarctici</i>	F	P
Reflectance					
R320	0.0070 ± 0.0008	0.0071 ± 0.0010	0.0070 ± 0.0003		NS
R526	0.049 ± 0.005	0.022 ± 0.006	0.023 ± 0.001	28.40	<0.0001
R550	0.055 ± 0.007	0.034 ± 0.008	0.034 ± 0.002	5.84	0.0074
R850	0.388 ± 0.037	0.275 ± 0.020	0.311 ± 0.012	4.29	0.0170
RE	0.0101 ± 0.0001	0.0060 ± 0.0001	0.0068 ± 0.0001	8.74	0.0004
REF	705.4 ± 1.9	700.6 ± 1.0	700.4 ± 0.5	7.33	0.0012
					NS
					NS
NPCI	0.442 ± 0.057	0.484 ± 0.043	0.398 ± 0.024		
EGFR	6.04 ± 1.58	8.82 ± 2.43	8.03 ± 0.85		NS
EGFN	0.643 ± 0.042	0.784 ± 0.072	0.701 ± 0.021		NS
CHB	0.349 ± 0.058	0.229 ± 0.021	0.261 ± 0.015	2.74	0.0708
Pigments					
Anthocyanins	1.2 ± 0.2	1.3 ± 0.2	1.2 ± 0.2		NS
$A_{526 \text{ diff}} \text{ g}^{-1} \text{ fwt}$					
Anthocyanins/TChl.	2.9 ± 0.3	5.7 ± 1.2	3.0 ± 0.2	7.42	0.0011
$A_{526 \text{ diff}} \text{ mol}^{-1}$					
UV absorbing pigments	266 ± 42	127 ± 22	110 ± 9	15.34	<0.0001
Mean $A_{(320-280\text{nm})} \text{ g}^{-1} \text{ dwt}$					
Total Chlorophyll	475 ± 60	241 ± 40	453 ± 44	2.50	0.0882
$\text{nmol g}^{-1} \text{ fwt}$					
Chl a:b ratio	3.2 ± 0.2	3.6 ± 0.3	3.2 ± 0.1		NS
VAZ/TChl	64 ± 5	132 ± 36	103 ± 6	3.64	0.0305
mmol mol^{-1}					
%(AZ/VAZ)	18.0 ± 3.9	39.4 ± 4.9	37.4 ± 2.5	6.37	0.0026
Tcar./Tchl.	443 ± 15	643 ± 96	631 ± 31	2.86	0.0629
mmol mol^{-1}					

Table 4. Surface reflectance properties and pigment concentrations of *Grimmia antarctici* over different microtopographic positions. Moss is from ridges or valleys at Robinson Ridge and Red Shed sites, $N=8$. NS signifies a non-significant difference at the $P=0.10$ level).

	Ridge	Valley	<i>F</i>	<i>P</i>
Reflectance				
R320	0.0058 ± 0.0003	0.0066 ± 0.0006	NS	
R526	0.027 ± 0.003	0.0022 ± 0.001	NS	
R550	0.035 ± 0.004	0.042 ± 0.003	NS	
R850	0.362 ± 0.016	0.374 ± 0.023	NS	
RE	0.0079 ± 0.0001	0.0084 ± 0.0001	NS	
ΔRE	700.75 ± 1.26	700.25 ± 1.19	NS	
			18.79	0.0001
			NS	
NPCI	0.333 ± 0.064	0.425 ± 0.069	NS	
EGFR	8.90 ± 1.77	9.33 ± 2.16	NS	
EGFN	0.761 ± 0.032	0.780 ± 0.043	NS	
CHB	0.295 ± 0.025	0.256 ± 0.036	NS	
Pigments				
Anthocyanins	1.0 ± 0.4	1.9 ± 0.3	NS	
$A_{526 \text{ diff}} \text{ g}^{-1} \text{ fwt}$				
Anthocyanins/TChl.	2.7 ± 0.5	2.6 ± 0.6	NS	
$A_{526 \text{ diff}} \text{ mol}^{-1}$				
Total Chlorophyll	375 ± 73	791 ± 66	17.88	0.0008
$\text{nmol g}^{-1} \text{ fwt}$				
Chl a:b ratio	3.3 ± 0.2	3.1 ± 0.2	NS	
VAZ/TChl	130 ± 12	81 ± 6	12.87	0.0030
mmol mol^{-1}				
%(AZ/VAZ)	40.9 ± 5.4	27.1 ± 3.3	4.82	0.0454
Tcar./Tchl.	761 ± 87	465 ± 18	10.98	0.0051
mmol mol^{-1}				



H. Arkimaa, J. Laitinen a, R. Korhonen a , M. Moisanen a
, T. Hirvasniemi b and V. Kuosmanen

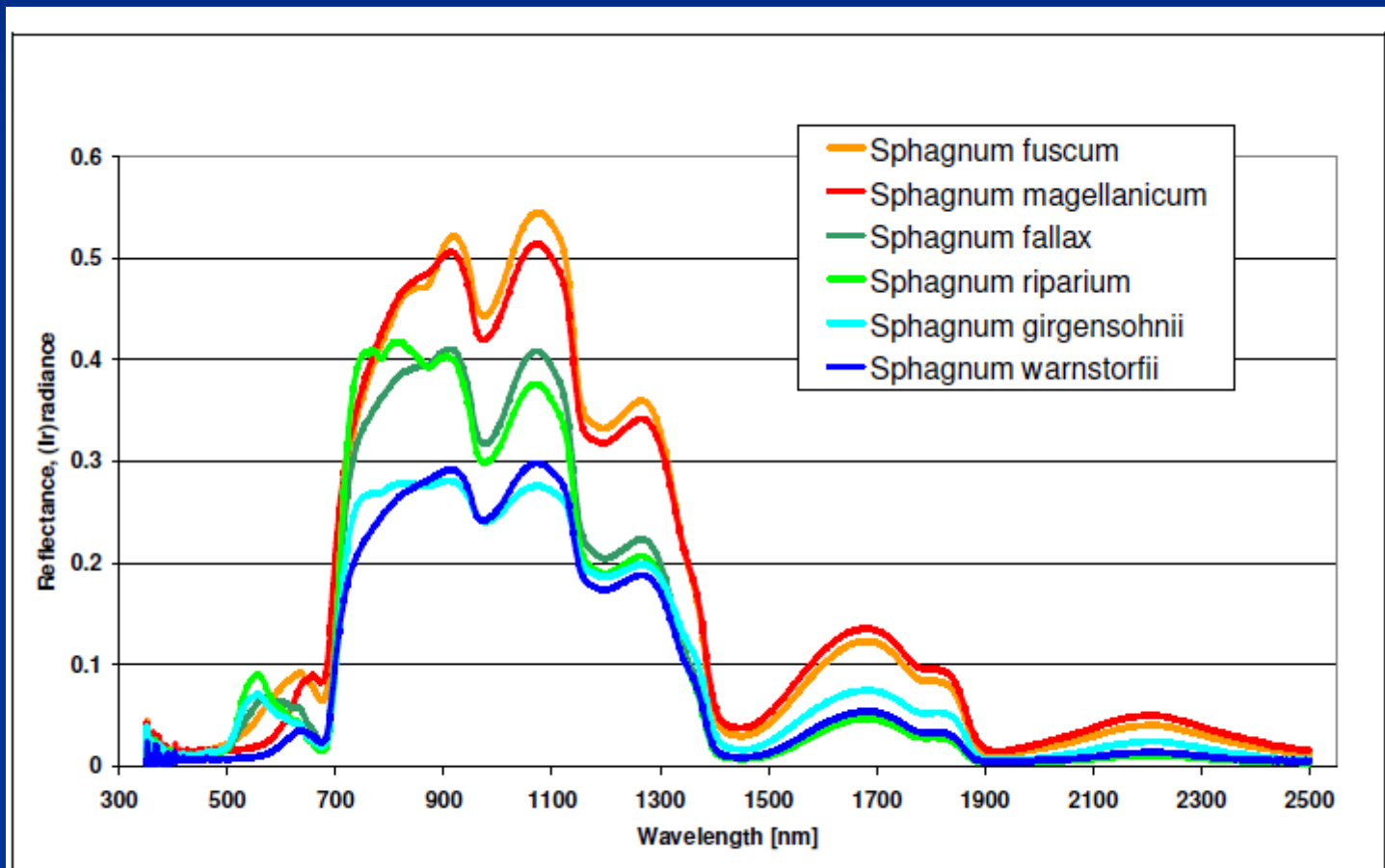


Fig. 1. Typical reflectance spectra of *Sphagnum* species.

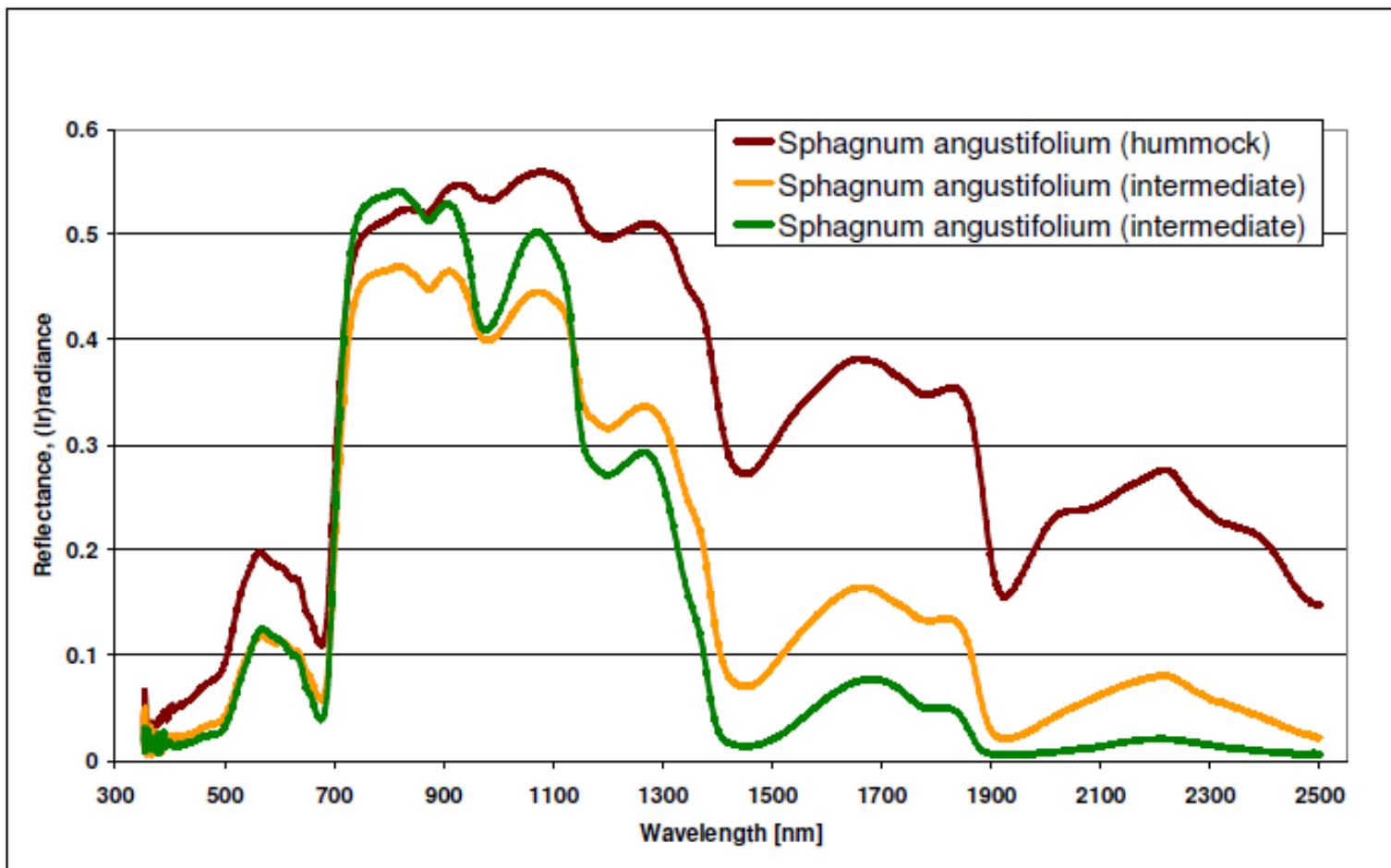


Fig. 2. Reflectance spectra of *S angustifolium* in different moisture level

Dámy a pánové, děkuji Vám za pozornost