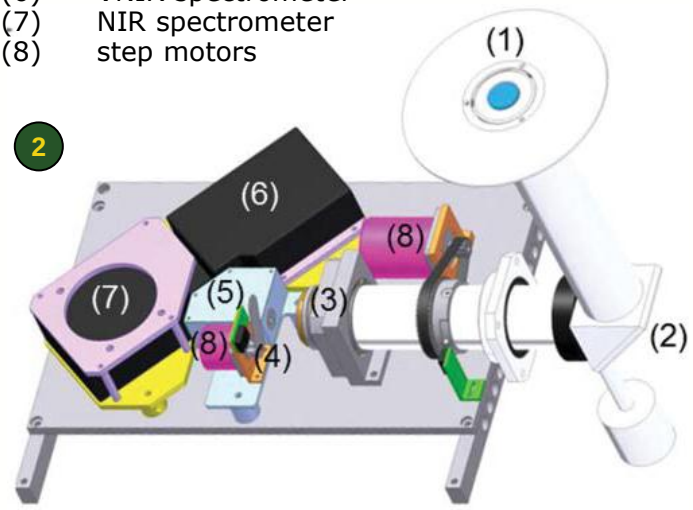
Grassland spectral measurements

Canopy radiance spectra were collected using the HyperSpectral Irradiometer (HSI, fig 1 Meroni et al. 2011, Review of Scientific Instruments) since 2009. Unattended operations have been carried out during the snow-free seasons (from May to October).

The HSI employs a rotating arm to observe alternately the sky and the target surface. A cosine-response foreoptic is used to measure the solar downwelling and upwelling irradiance, allowing the computation of the BHR (Bi-Hemispherical Reflectance factor).

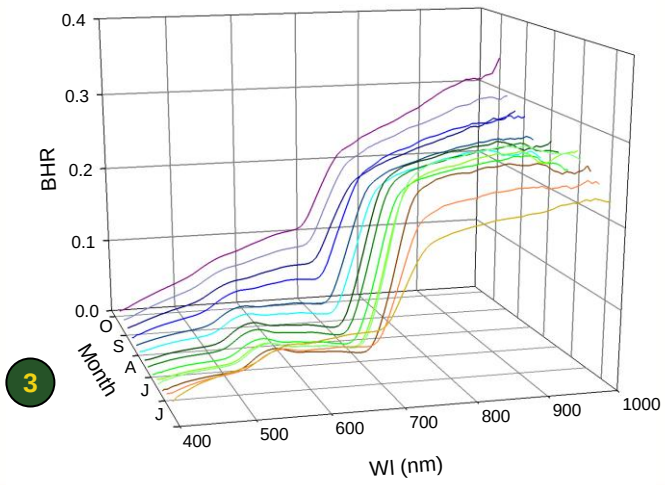
The optical design of HSI is shown in fig 2.

(1) entrance cosine-response optic
(2) 45°folding mirror
(3) aspheric achromatic multiplets
(4) mechanical shutter
(5) beam splitter plate
(6) VNIR spectrometer
(7) NIR spectrometer
(8) step motors



HSI uses two HR4000 spectrometers (OceanOptics, USA).

Spec	FWHM (nm)	Range (nm)	Application
1	1	350-1050	Irrad. measurements, ρ and VIs computation
2	0.1	700-800	Sun-induced Chl fluorescence at O_2-A



Grassland spectral reflectance evolution during the 131 days of HSI operation in 2009 is shown in fig 3.

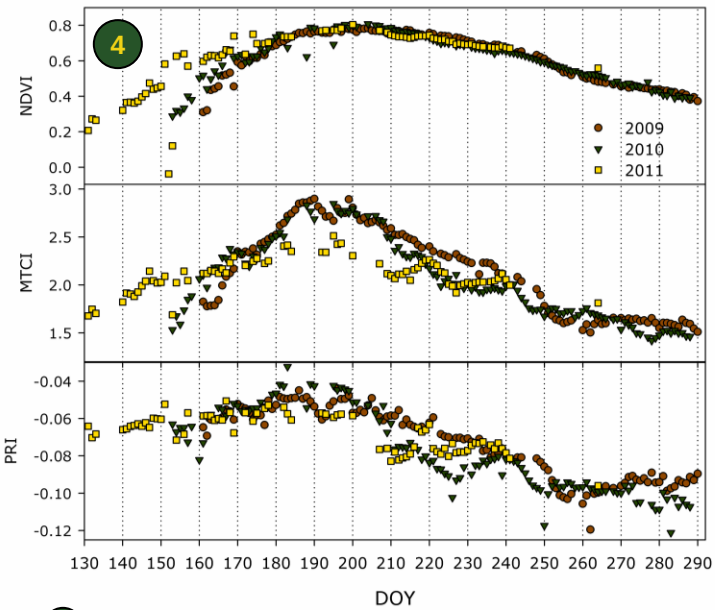


Fig 4. Seasonal trends of NDVI, MTCI and PRI (averaged between 11.00 and 13.00 solar time).

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