Time series of spectral vegetation indices acquired over the first Polish optical measurement network

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POLISH NETWORK OF GHG FLUXES and OPTICAL MEASUREMENTS

Rzecin - peatland

52°45' N, 16°18'

Sphagnum spp., *Dicranum* spp., *Carex* spp.

Average annual precipitation: 526 mm

Average annual temperature: 8.5°C

Tuczno – coniferous forest

53°11' N, 16°5' E

58 year old Scots pine

Average annual precipitation: 570 mm

Average annual temperature: 7.6°C

Brody - cropland

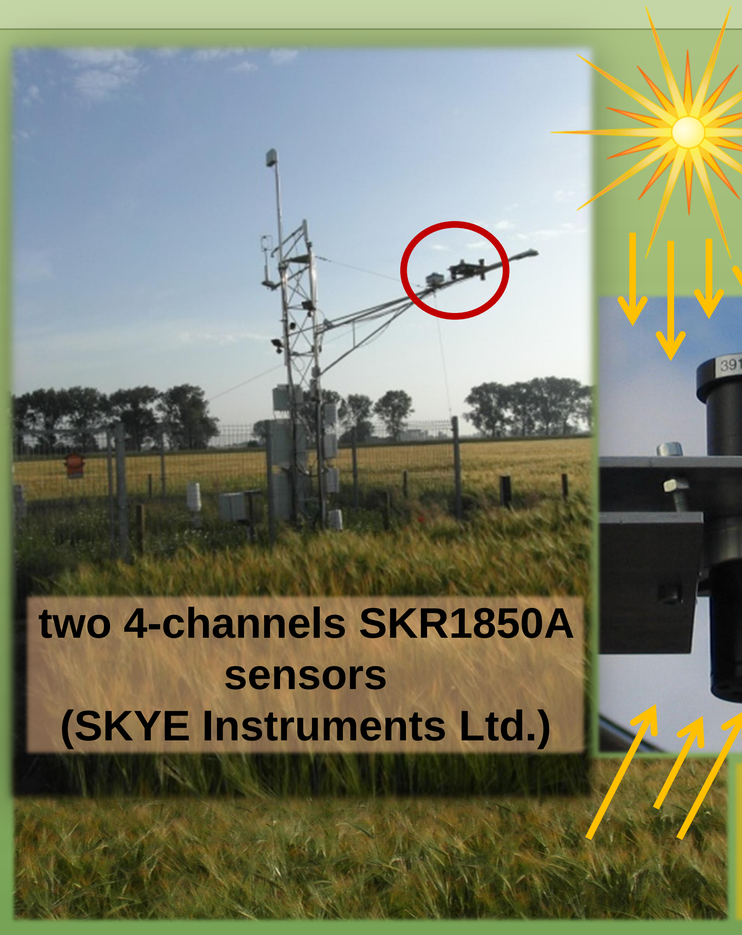
52°26' N, 16°17' E

Spring barley

Average annual precipitation: 571 mm

Average annual temperature: 7.9°C

METHODS



INCIDENT RADIATION
530 nm, 570 nm, 670 nm, 850 nm

$$\rho_\lambda = \frac{P_{\lambda(reflected)}}{P_{\lambda(incident)}}$$

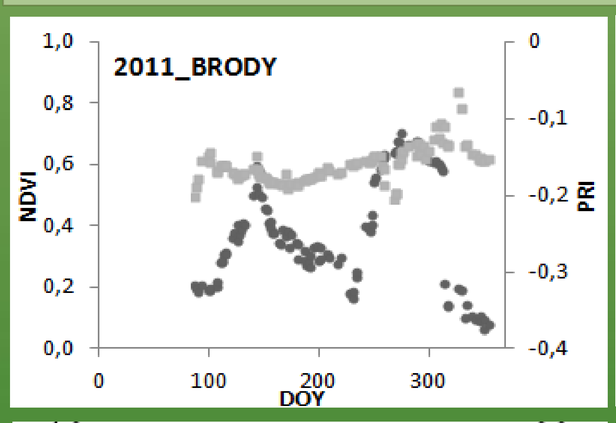
REFLECTED RADIATION
530 nm, 570 nm, 670 nm, 850 nm

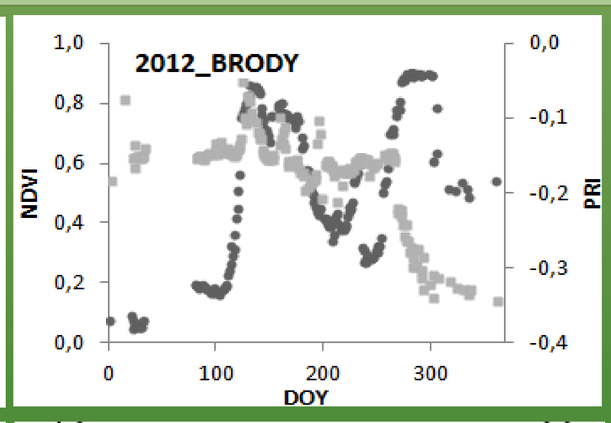
$$NDVI = \frac{\rho_{850} - \rho_{670}}{\rho_{850} + \rho_{670}}$$

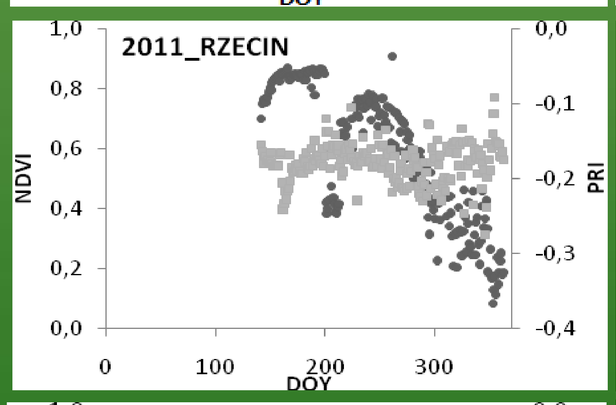
$$PRI = \frac{\rho_{530} - \rho_{570}}{\rho_{530} + \rho_{570}}$$

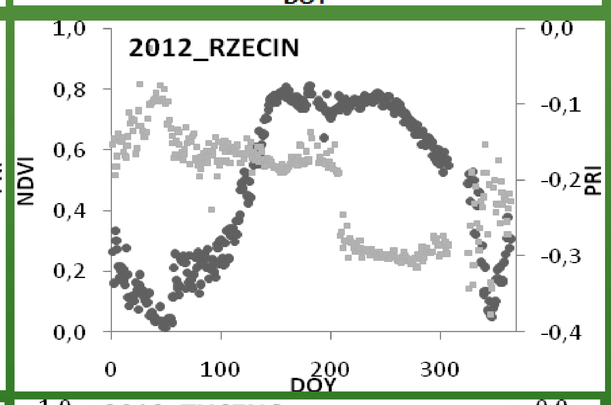
The SKR1850A (Skye Instruments, UK) sensors were installed on the towers in spring 2011 in order to deliver the continuous year-round series of *NDVI* and *PRI* indices.
The sensors were calibrated in March 2011 and were installed on the towers to acquire target radiance (downwards sensor) and solar irradiance (upwards sensor) at four wavelengths (530, 570, 670, 849 nm).
The bandwidth of the spectrum which was used is about 10nm. Only the data recorded between 10:00 a.m. and 2:00 p.m., when the ratio between the diffuse and total incoming photosynthetically active radiation did not exceed 50%, were used for analyses and presented in this study.

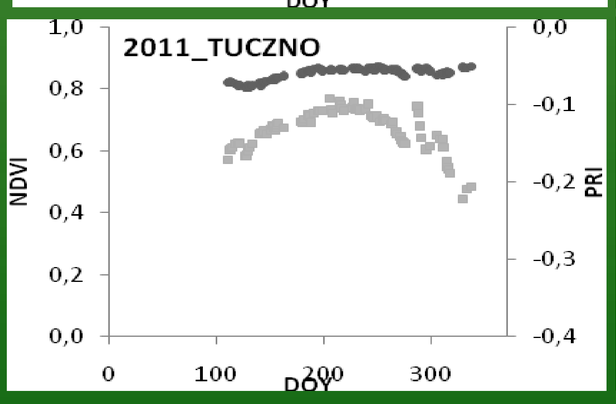
RESULTS AND CONCLUSIONS

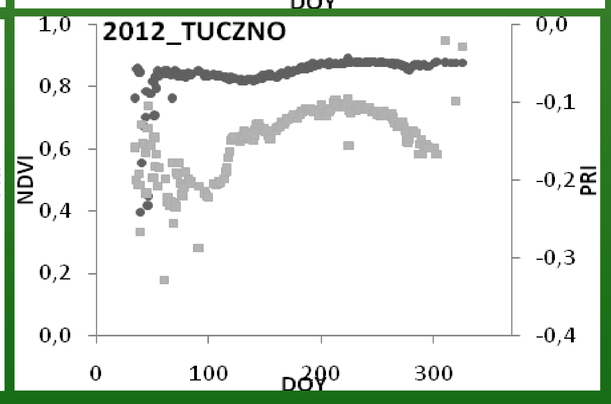












CONCLUSIONS

Cooperative initiatives undertaken within the EUROSPEC COST Action resulted in development of a first Polish network of optical measurements carried out at the flux towers. The measured data have been/will be reported to the European Fluxes Database, hence the data will be accessible to the broad scientific community dealing with spectral and fluxes analyses.
Time series of *NDVI* and *PRI* indices at the three Polish flux sites corresponded with those observed by other research teams in the similar ecosystems. In the coniferous forests in which fraction of absorbed photosynthetically active radiation (*fAPAR*) and thus *NDVI* is relatively constant throughout the whole year, *PRI* is expected to be a good proxy of light use efficiency and to give an important information about gross primary production (*GPP*). In contrary, in the dynamic ecosystems such as croplands and peatlands, *NDVI* might explain most of the variability in gross ecosystem production.
Special care must be taken to maintain the multispectral sensors installed on the towers because they seem to be vulnerable to damages caused by insects, water and dust which affects the reliability of the acquired data.

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