

Master thesis: *Construction of a data package in R and data analysis within the framework of a worldwide spectral daylight data collection campaign*



Motivation

Nowadays, a reconstruction procedure of the CIE (Commission International de l'Eclairage) is used to calculate the spectral power distribution of daylight at a nominally correlated colour temperature. This means that if one only measures the colour of the sky, one can derive the spectrum of that daylight from it. This method is used world-wide, even though it is expected that with the same measurements of colour of the sky there may be local differences in spectral power distributions of daylight, due to geographical or atmospheric differences.

An international project dealing with spectral daylight measurements is investigating whether there are geographical, seasonal and diurnal variations in the spectral power distribution of the daylight for the range between 380 nm and 780 nm. Hence, there is an initiative within the project to collect world-wide spectral data of daylight.

In this master thesis project, the measurement data of some participants of the project will be shared. The data will be in different formats and hence has to be imported and processed into standardised R data frames. With these data frames the thesis can dive deep into data analysis using Principal Component Analysis to create local reconstruction procedures for each location data shared. Local reconstruction procedures created can then be compared with the standard CIE procedure for further recommendations

Assignment

Construction of a data package in R and data analysis within the framework of a worldwide spectral daylight data collection campaign:

- Literature review to define to geographical parameters that could lead to differences in spectral composition of the daylight
- Selection of material of project partners based on parameters found in literature review
- Import and process data from different locations having different formats into standardised R data frames.
- Create local reconstruction procedures with PCA
- Assess the appropriateness of local reconstruction procedures in comparison to the CIE reconstruction procedure by means of the Goodness-of-Fit Coefficient
- In depth analysis of the impact of either
 - the PCA settings,
 - the methods to derive the reconstruction method, or
 - the data mining approach.

Start Immediately

Kontakt Dr. Martine Knoop, Faculty IV of Electrical Engineering, Lighting Technology
030 314 27476 / martine.knoop@tu-berlin.de or
Jan Mayer, MSc, Faculty V of Mechanical Engineering and Transport Systems, Quality Science
030 314 22005 / j.mayer@tu-berlin.de