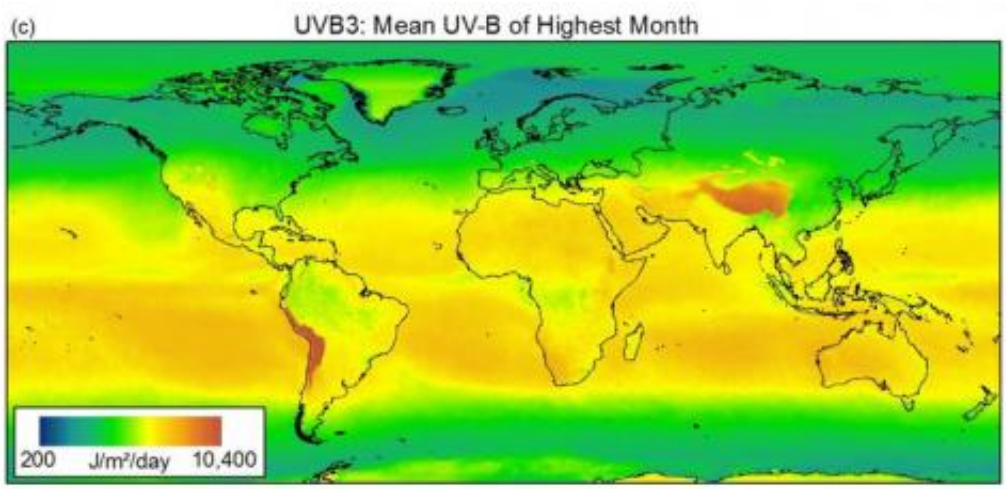
# UV-radiation data to help ecological research

April 22 2014



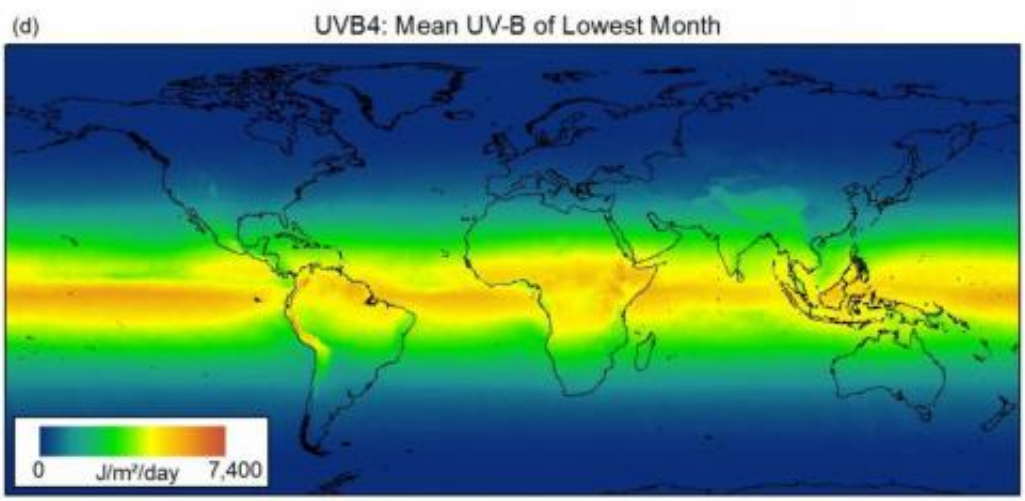

This image shows the average intensity of global UV-B radiation -- mean UV-B of highest month. Credit: Tomáš Václavík/UFZ

Many research projects study the effects of temperature and precipitation on the global distribution of plant and animal species. However, an important component of climate research, the UV-B radiation, is often neglected. The landscape ecologists from UFZ in collaboration with their colleagues from the Universities in Olomouc (Czechia), Halle and Lüneburg have processed UV-B data from the U.S. NASA space agency in such a way that they can be used to study the influence of UV-B radiation on organisms.

The basic input data were provided by a NASA satellite that regularly, since 2004, orbits the Earth at an altitude of 705 kilometres and takes

daily measurements of the UV-B radiation. "For us, however, not daily but the long-term radiation values are crucial, as these are relevant for organisms", says the UFZ researcher Michael Beckmann, the lead author of the study. The researchers therefore derived six variables from the UV-B radiation data. These include annual average, seasonality, as well as months and quarters with the highest or lowest radiation intensity.

In order to process the enormous NASA data set, the UFZ researchers developed a computational algorithm, which not only removed missing or incorrect readings, but also summed up the daily measurements on a monthly basis and determined long-term averages. The processed data are currently available for the years 2004-2013 and will be updated annually.




This image shows the average intensity of global UV-B radiation -- mean UV-B of lowest month. Credit: Tomáš Václavík/UFZ

With this data set, scientists can now perform macro-ecological analyses on the effects of UV-B radiation on the global distribution of animal and

plant species. "While there are still many uncertainties", says Michael Beckmann, "the UV radiation is another factor that may explain why species are present or absent at specific sites." The data set can also help addressing other research questions. Material scientists can identify strategies to provide better protection to UV-sensitive materials, such as paints or plastics, in specific regions of the world. Human medicine could use the data set to better explain the regional prevalence of skin diseases. "There are no set limits as to how researchers can use these data", says Beckmann.

The data are now freely available for download on the internet and visually presented in the form of maps. These maps show, for example, that in countries in the southern hemisphere, such as New Zealand, the UV-B radiation is up to 50 percent higher than in the countries in the northern hemisphere, such as Germany. In general, the UV irradiation in winter is lower than in summer due to a shorter daily sunshine duration.

**More information:** Beckmann, M., Václavík, T., Manceur, A. M., Šprtová, L., von Wehrden, H., Welk, E., Cord, A. F. (2014), glUV: a global UV-B radiation data set for macroecological studies. *Methods in Ecology and Evolution*. DOI: 10.1111/2041-210X.12168

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