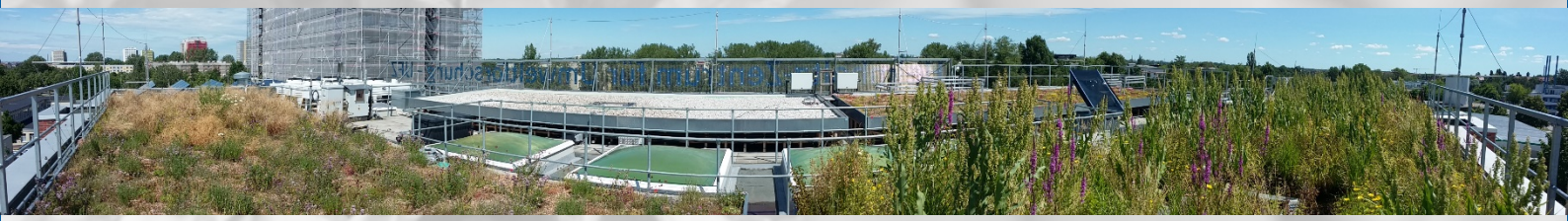
7th UFZ Research Green Roof Newsletter

UFZ – Research Green Roof

Photo: The wetland roof at the UFZ Research Green Roof in July 2021
Author: Lucie Moeller, UFZ

More information on the UFZ Research Green Roof: http://www.ufz.de/forschungsgruendach

Questions to UFZ Research Green Roof: forschungsgruendach@ufz.de



Research green roof
at the Helmholtz Centre for Environmental Research – UFZ

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Praxis partners:

Ingenieurbüro Blumberg

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Research on the UFZ Research Green Roof

Working group "Climate study and climate modeling of the impact of green roofs on buildings and cities "

The WG Climate Modeling (UFZ Department of Urban and Environmental Sociology) investigates the potential of different green roof systems with respect to their cooling effect on the ambient air by considering the corresponding surface energy balance (see Figure 1).

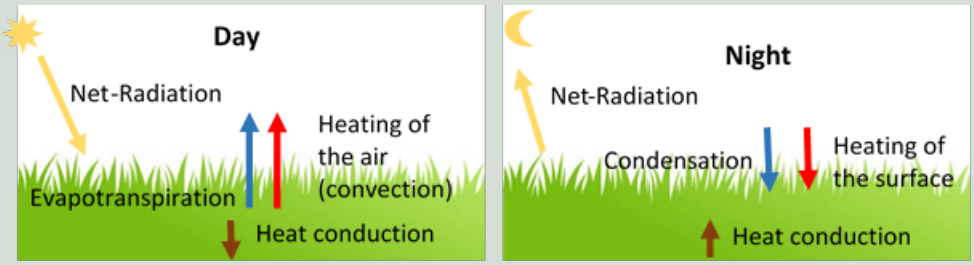

Figure 1: Schematic representation of the surface energy balance
Author: Niels Wollschläger (SUSOZ)

Lysimeters are used to detect the water exchange processes between soil and atmosphere. Initial results indicate significant differences between the roofs in terms of their energy and water balances. Figure 2 shows the lysimeter results of the gravel and wetland roofs for the week of May 10-16, which was characterized by many intense precipitation periods. While the gravel roof already exhibits significant runoff during the respective rainfall events, the wetland roof is able to accumulate precipitation and thus minimize water runoff. Thereby and by supplemental irrigation, the wetland roof exhibits higher water availability, and significantly higher evapotranspiration can be observed. Since the surface of the gravel roof experiences greater night-time cooling, dew formation can be observed more frequently on this roof.

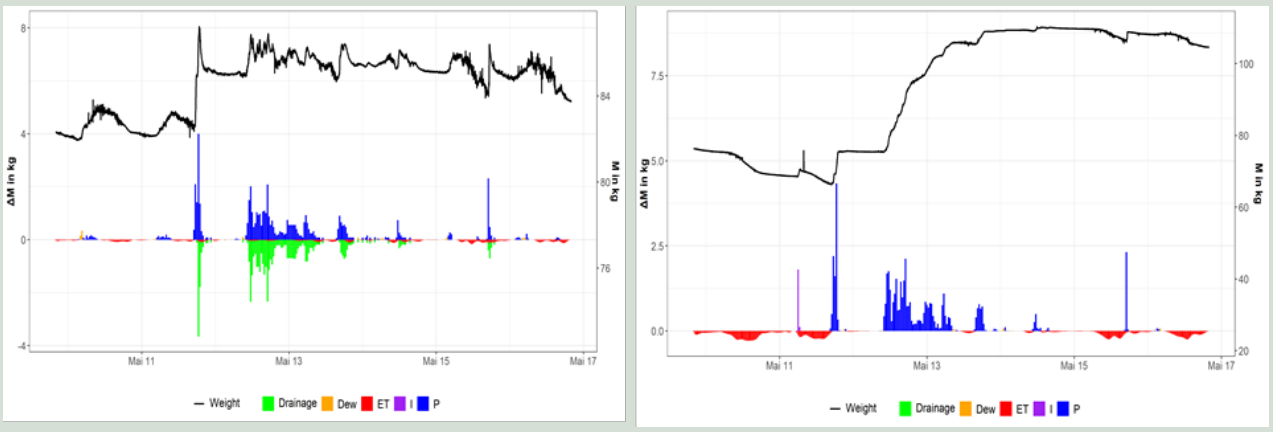

Figure 2: Weight of the substrate in the gravel (left) and wetland roof (right) with certain water exchange processes for the 19th calendar week of the year 2021: The water exchange processes are shown with a temporal resolution of 30 minutes via colored bars (blue=rainfall, purple=irrigation, green = runoff, orange= dewfall, red=evapotranspiration).
Author: Niels Wollschläger (SUSOZ)

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Working group "Biodiversity"

Stefanie Arnold: "**Possibilities and limits of integrated 3D scanning and image processing data to support the monitoring of green roof vegetation**" (project work at the TU Dresden in cooperation with the UFZ, Department of Nature Conservation Research in Leipzig)

As part of the “Natural Resource Project” module in the “Spatial Development and Natural Resource Management” course at the TU Dresden, my search for a topic resulted in a collaboration with the UFZ.

The aim of the work was to investigate integrated total station measurements with 3D scanning and photogrammetric recordings as a potential support for green roof monitoring. The focus here was on developing the potential and limits of technology for this purpose. To do this, the Trimble SX10 scanning total station (see Figure 3) was used to record the beds on the UFZ Research Green Roof and examine the recorded data using the associated Trimble Business Center software.

As a result, it turned out that the previously existing limits only affect certain areas, such as the identification of plants, certain functions did not achieve the intended results, such as the presumed precision with increased scan density, or the limits can be overcome, like that lack of knowledge in dealing with technology. The possibilities of measuring and scanning technology consist in particular of documenting plant development at regular intervals on a digital basis and processing data with regard to various characteristics. The results obtained from this can finally be passed on to the responsible and professionally qualified experts, who can continue to work with the database and react accordingly.

Figure 3: Trimble SX10 scanning total station on the research canopy
Author: Stefanie Arnold

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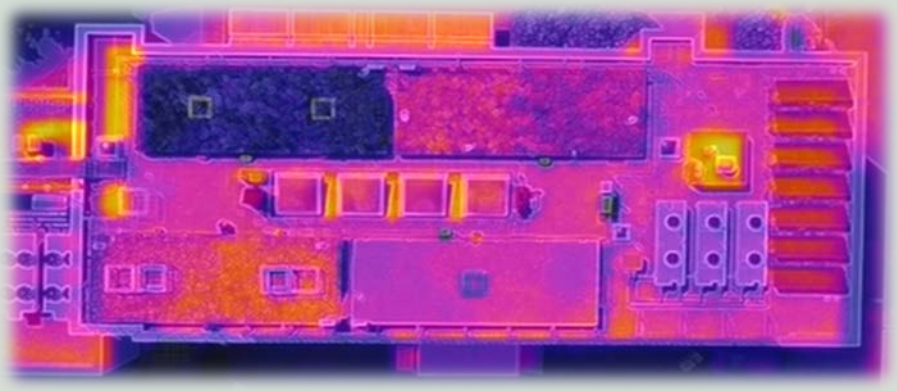
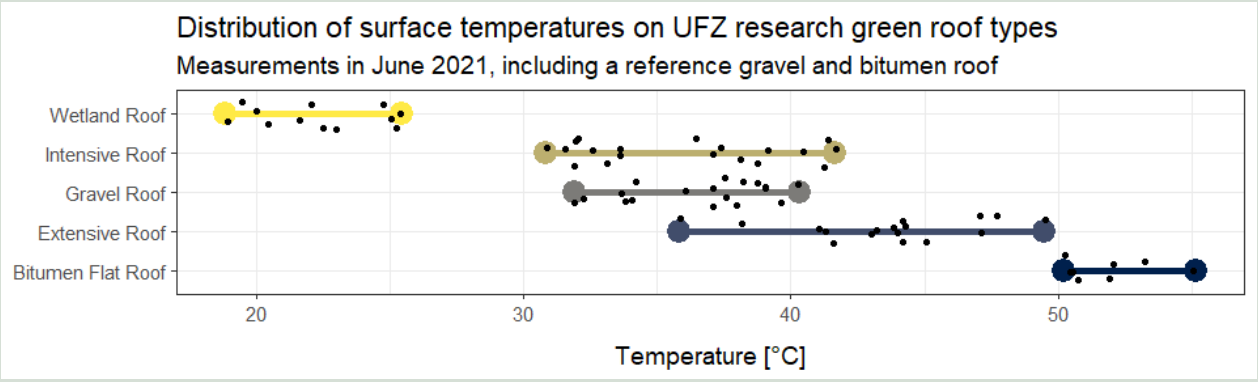
Working group "Process-related indicators of different green roof variants"

Since the beginning of this year, we are flying a drone over the UFZ research green roof in biweekly intervals. Aside from the standard aerial images, which allows us to track plant growth and species distribution over time for the various green roof types, we also use infrared imaging to survey the green roof surface temperatures. While the observed temperature differences were relatively small early in the year due to the overall moderate temperatures, going into summer, we expect the differences to become more drastic, especially on hot days. In late June, we e.g. overserved clear differences not only between the green roof types but also between areas of different vegetation on the same green roof. Clear winner here is the wetland roof which, due to its high evaporative potential, expressed surface temperatures about 15 to 20 K below these of the other green roof types and about 30 K lower than a traditional bitumen roof. However, this high evaporative potential has to be met with an increased demand for irrigation, especially during extended dry spells where sufficient rainwater cannot be retained on the roof itself. However, we are looking forward to see how these trends evolve going into the hotter summer months ahead. Additionally, we are planning a measurement campaign to record a diurnal temperature cycle within the next few weeks.





Author: Jan Knappe (UBZ)

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Working group “Green Roofs as a Pollutant Sink“

The pollutant sink working group (UFZ Departments ISOBIO, TUCHEM und UMB) aims to investigate uptake, transport, and transformation/degradation processes of air- and waterborne environmental pollutants; in order to evaluate green roofs’ potentials for pollutant removal.

The project MIXAS (Mitigation of xenobiotic pollution and sustainable waste management in arid and saline environments; Georg Foster Research Fellowship for Dr. Rim Mtibaa, Tunisia; funded by the Alexander von Humboldt Foundation) has started in the working group Environmental Mycology at UFZ’s Department of Environmental Microbiology. It will provide a thematic link to fungi-related research activities of members of the “Pollution Sink Working Group” on the research green roof.

Dr. Rim Mtibaa

New topics for student work as part of the UFZ green roof research

The working group "Pollutant Sink" assigns the following research topic for a thesis (or two theses in tandem):

Implementation of adsorbents in green-roof water treatment

For more information see https://www.ufz.de/index.php?de=47921&nopagecache

UFZ Research Green Roof in the media

„plan b“ in ZDF: a contribution with Dr. Jan Knappe as part of the broadcast „Socken aus CO_2“ (https://www.zdf.de/gesellschaft/plan-b/plan-b-socken-aus-co2-100.html, min. 11:33 and 24:33)

There is also great potential in bog: even if only three percent of the earth's land surface is bog, peat binds more CO2 than all forests in the world combined. But moors are rare in an increasingly densely populated landscape. So why not put the super storage on the roof? The principle is being tested at the Helmholtz Institute in Leipzig.

„Eine natürliche Klimaanlage auf dem Dach“ by detektor.fm: a contribution with Dr. Jan Knappe on the sidelines of the 3rd Leipzig Green Roof Academy (https://detektor.fm/wissen/mission-energiewende-gruendaecher)

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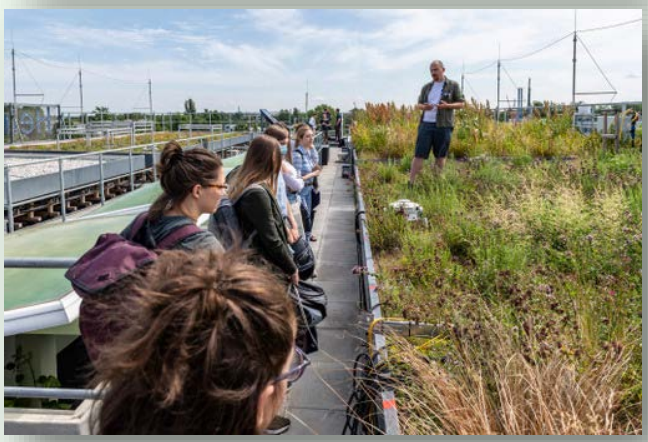
3rd Green Roof Academy

On 26.07.2021 the kick-off event of the 3rd Leipzig Green Roof Academy took place at the UFZ. In total 16 students from a wide range of disciplines are creating green roof designs in 4 groups in a competition. The basis is a new school building in Leipzig, which the city of Leipzig kindly provided. In addition to the Office for Environmental Protection of the City of Leipzig, the Academy is supported by our sponsors ZinCo, Optigrün and the Kommunale Wasserwerke Leipzig. The Berufsakademie Sachsen, the Bundesverband Gebäudegrün and the Bundesamt für Naturschutz are also valuable supporters. The impulse lectures on the morning of 26th July 2021 also came from this consortium. From the topic of water-sensitive urban planning to the Leipzig green roof strategy and examples of innovative building greenery as well as promotion of biodiversity, there was a wide range of information for the students. On 27th July 2021, the group visited green roofs in Leipzig. In the next 6 weeks, the designs will be developed, then evaluated and awarded on 16th September 2012 in the context of a final event in the New City Hall Leipzig.

Text: Maximilian Ueberham, Pictures: André Künzelmann



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