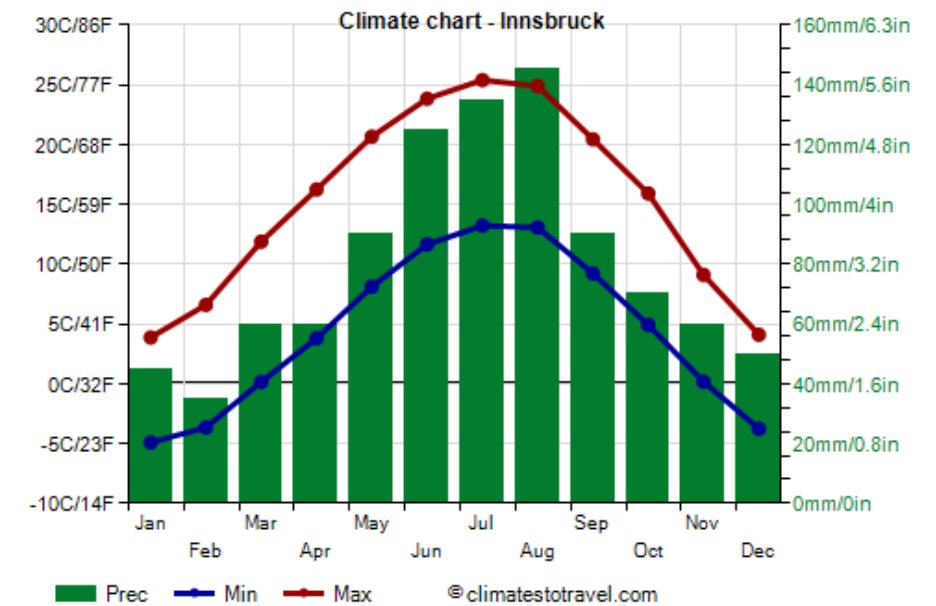
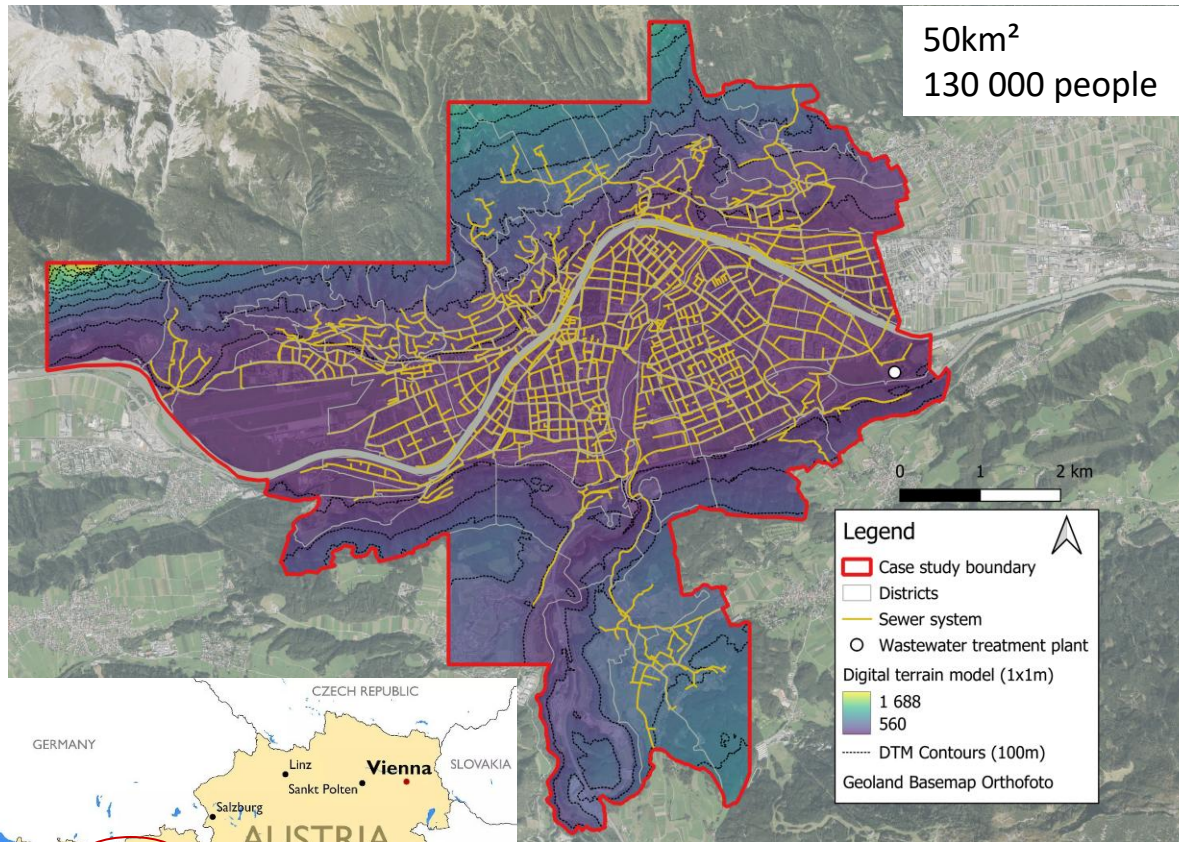




Mitigating Urban Heat and Flood Risks in Innsbruck, Austria via Nature-Based Solutions: Outlook to the Nature Thrives project

Fabian Funke – University of Innsbruck, Unit of Environmental Engineering

Case study Innsbruck



BGI implementation Innsbruck

Law of 2020



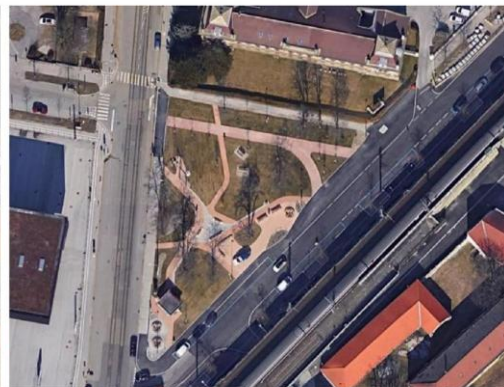
Design of urban squares- Messepark

Vor der Umgestaltung

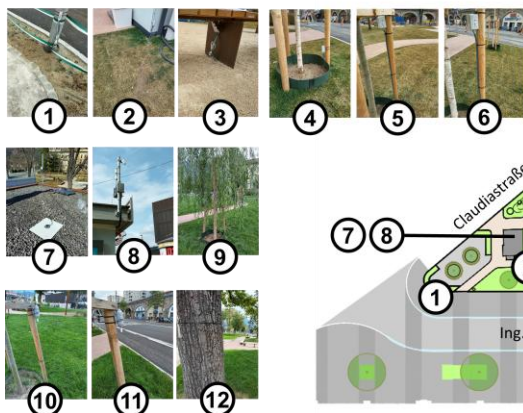
Nach der Umgestaltung



Credit: Land Tirol, 2019

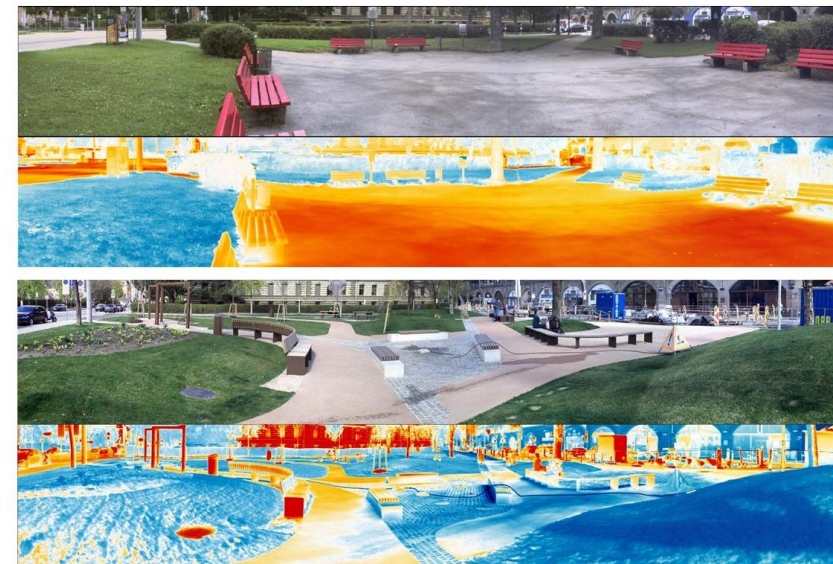
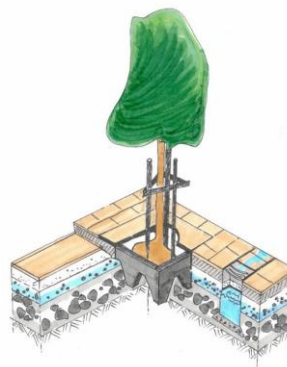


Credit: Google Maps, 2022



Measurement campaign

Sponge city trees



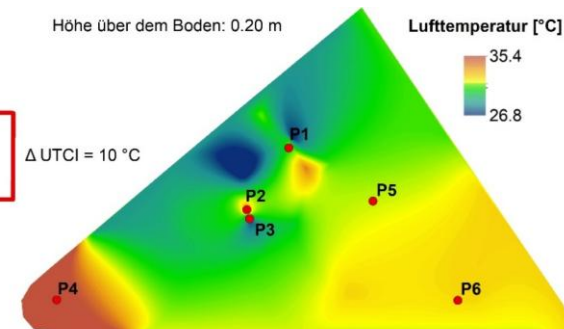
Universal Thermal Climate Index (UTCI) [°C]

Höhe über dem Boden: 0.20 m

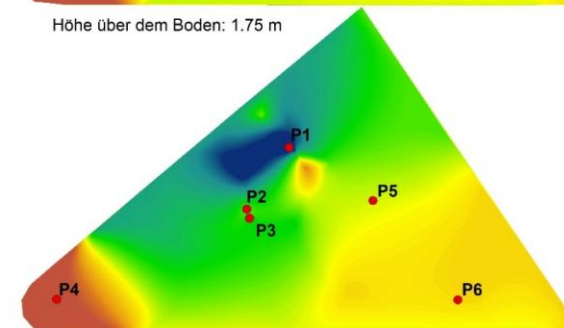
Lufttemperatur [°C]

	0.2	1.75
P1	30.05	25.04
P2	33.05	30.51
P3	27.20	29.49
P4	35.60	35.60
P5	32.15	32.15
P6	30.45	30.45

$\Delta UTCI = 10\text{ °C}$

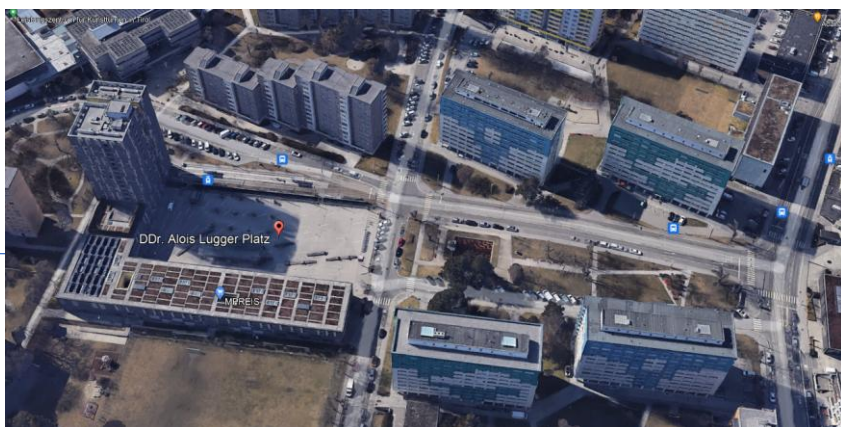


Höhe über dem Boden: 1.75 m



Design of urban squares- Alois-Lugger-Platz

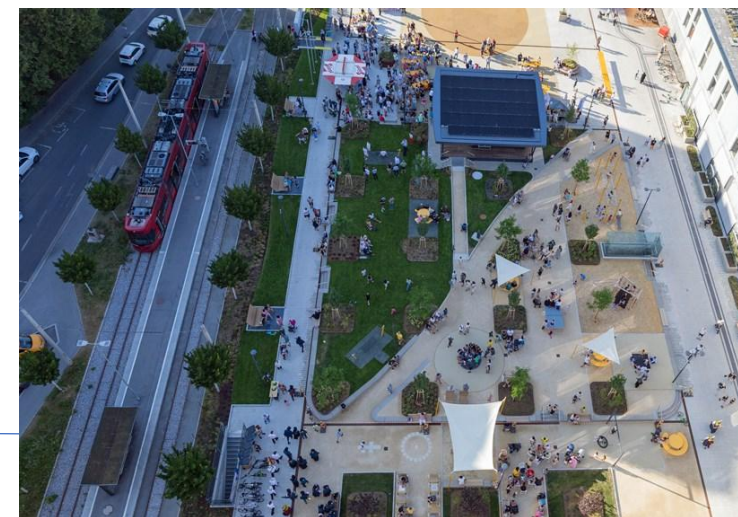
Before



After
redesign



© IKM/F.Bär

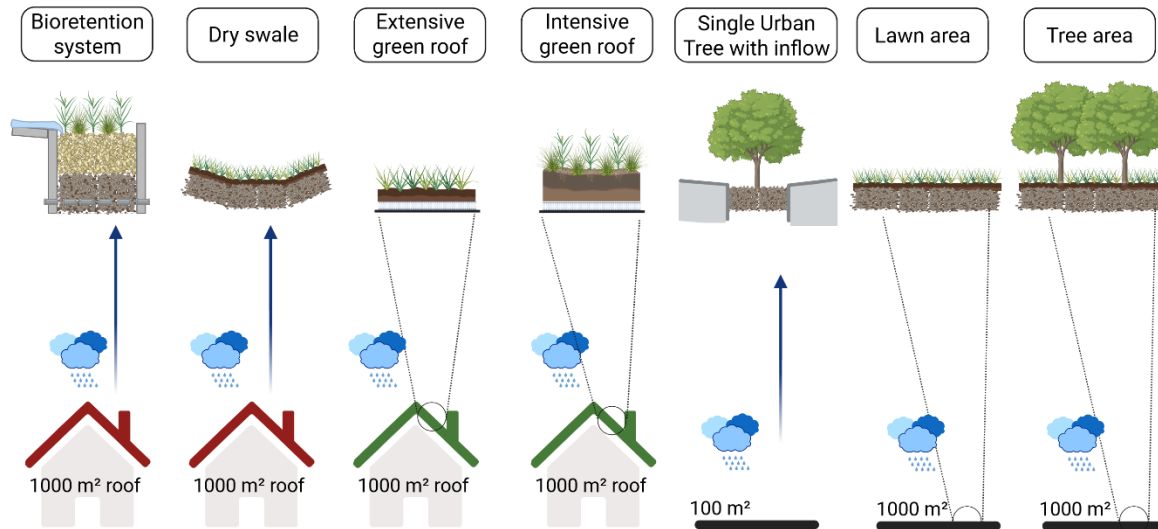


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Modelling of Single BGI



Single BGI model (representative BGI systems)



Blue-Green Systems

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Blue-Green Systems Vol 6 No 1, 33 doi: 10.2166/bgs.2024.046

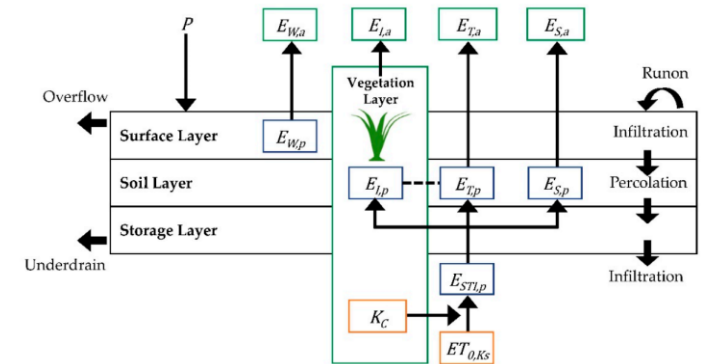


Sensitivity of sustainable urban drainage systems to precipitation events and malfunctions

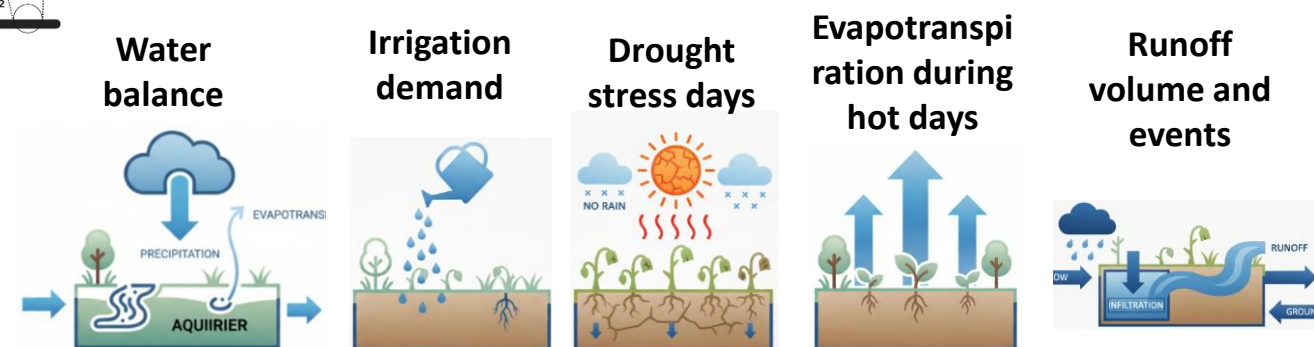
Fabian Funke^{*} and Manfred Kleidorfer^{IWA}

Department of Infrastructure, Unit of Environmental Engineering, University of Innsbruck, Technikerstr. 13, Innsbruck 6020, Austria
^{*}Corresponding author. E-mail: fabian.funke@uibk.ac.at

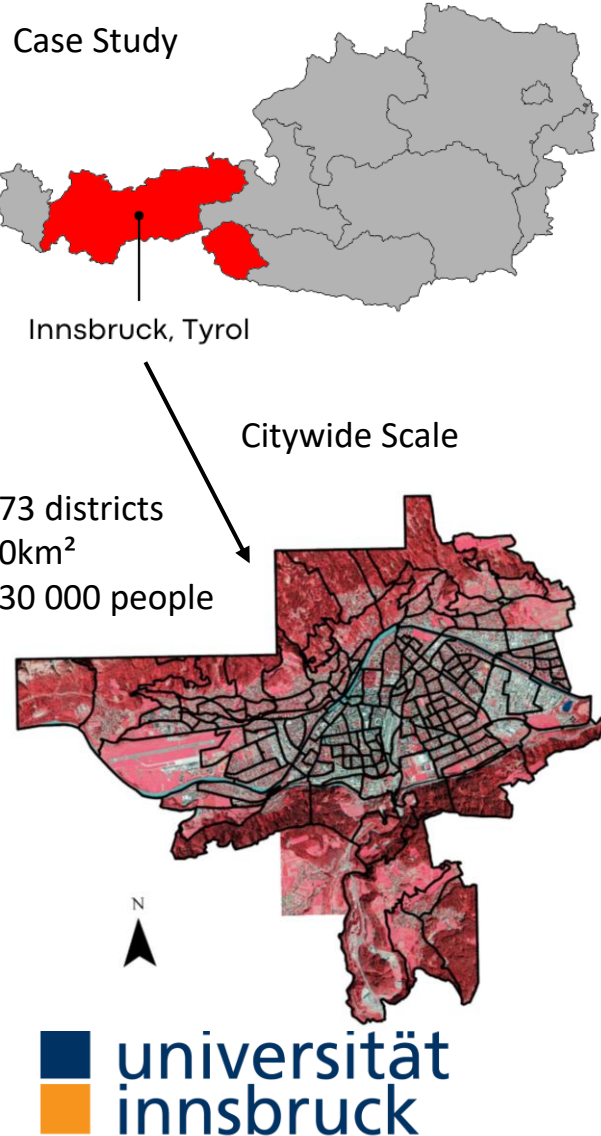
SWMM UrbanEVA



Hörschemeyer, Birgitta, Henrichs, Malte und Uhl, Mathias (2021). „SWMM UrbanEVA: A Model for the Evapotranspiration of Urban Vegetation“. In: Water 13.2. ISSN: 2073-4441. URL: <https://www.mdpi.com/2073-4441/13/2/243>.



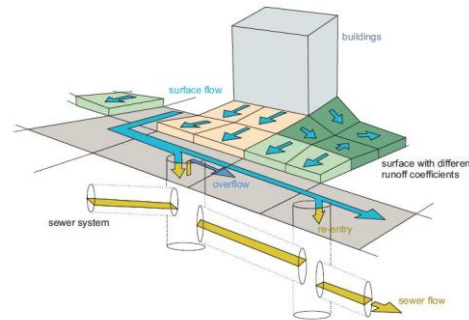
Modelling of city scale BGI implementation



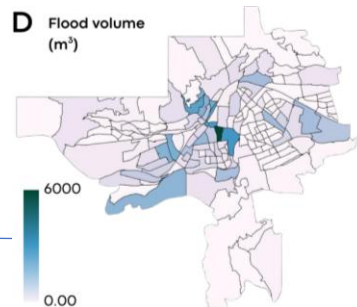
1D-2D urban fast flood model (SWMM-based CA-ffé Model)

Flooding

Flood Volume
Flood Area



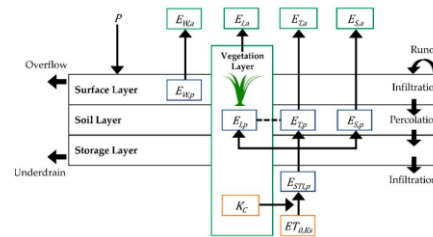
D Flood volume (m³)



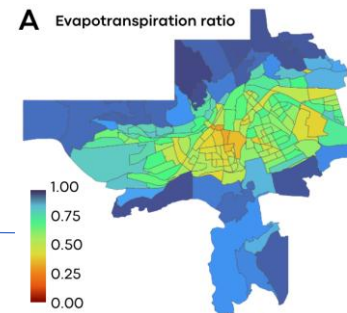
SWMM-based Urban EVA Model

Water Balance

Evapotranspiration
Infiltration
Runoff



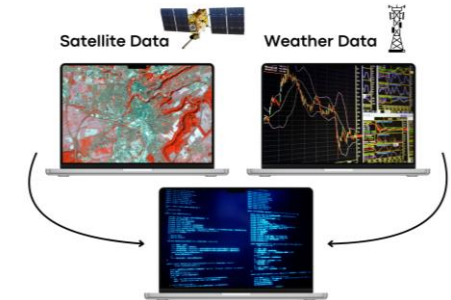
A Evapotranspiration ratio



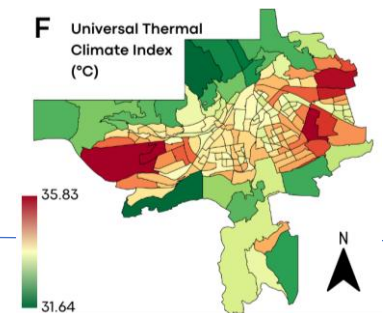
GIS-based Land-Atmosphere Interactions Model

Heat Stress

Universal Thermal Climate Index



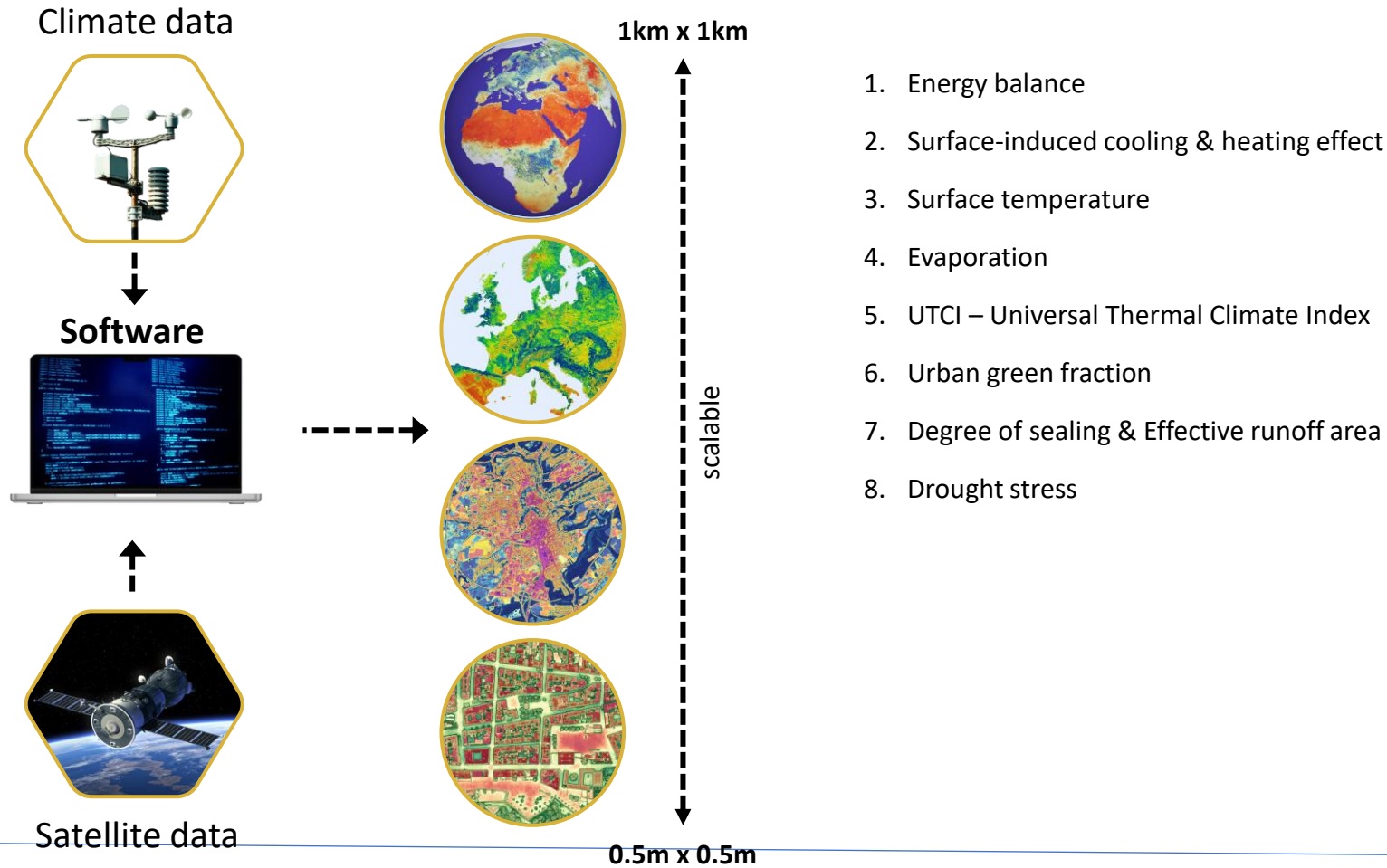
F Universal Thermal Climate Index (°C)



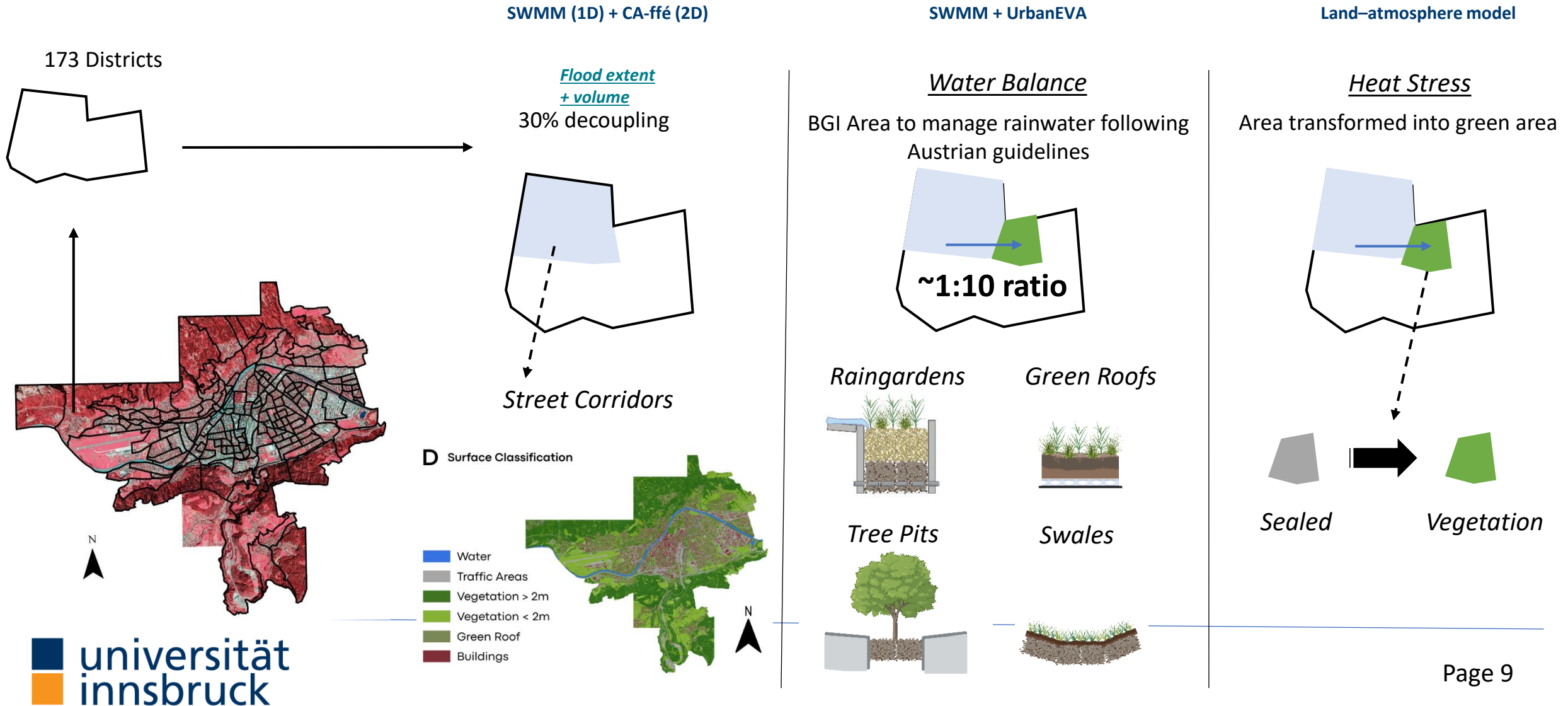
From Research to Application: Terra Atmos

UIBK spin-off founded by former team member Yannick Back

Scalable modelling of relationships between the land surface and the atmosphere

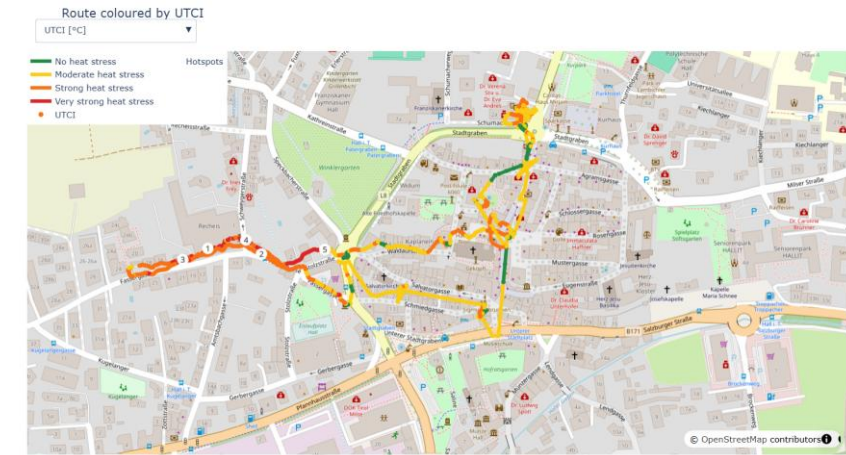


Modelling of city scale BGI implementation



Urban microclimate measurements

Data source: ComfortCube CSV and configured GPS/GPX track. Units: Map coordinates in degrees; distance in km; profile axes state physical units.



Atmos 41 Weatherstation
12 Parameters

Data Logger

NDVI

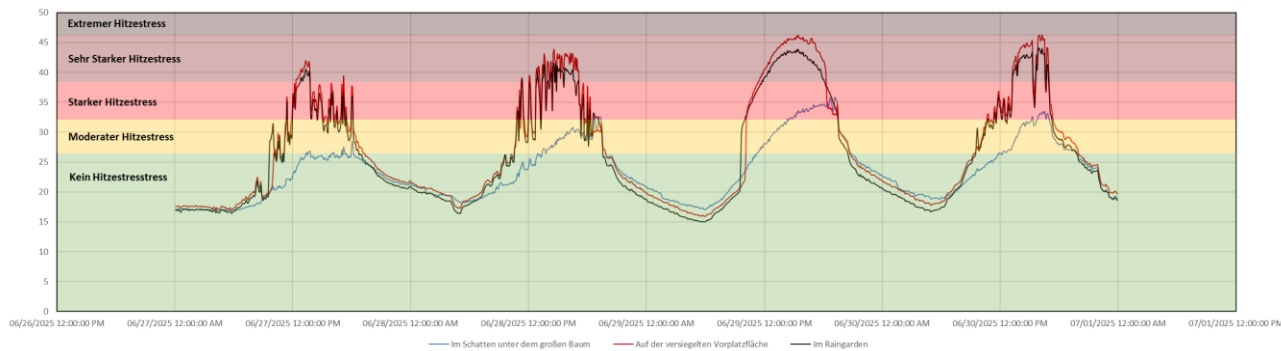
Net Radiation

Surface Temperature

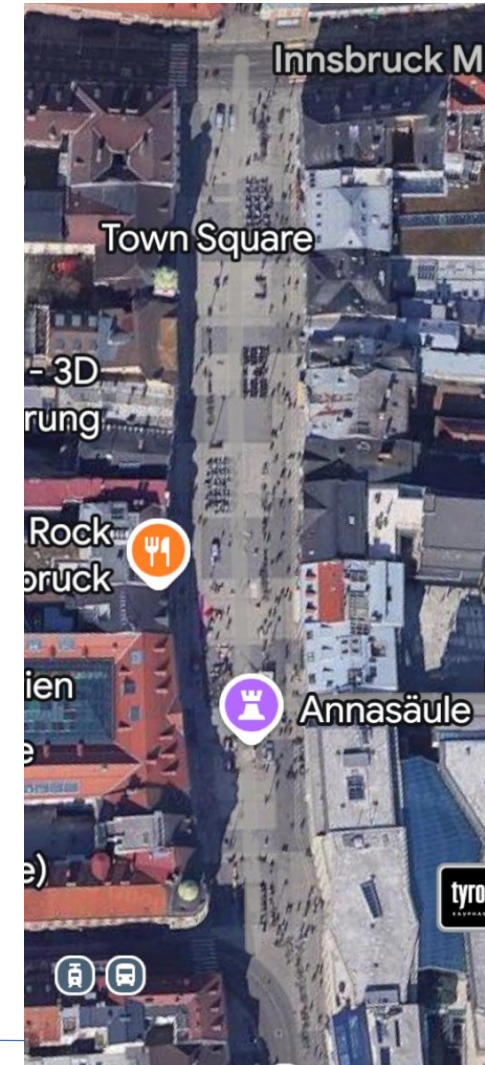
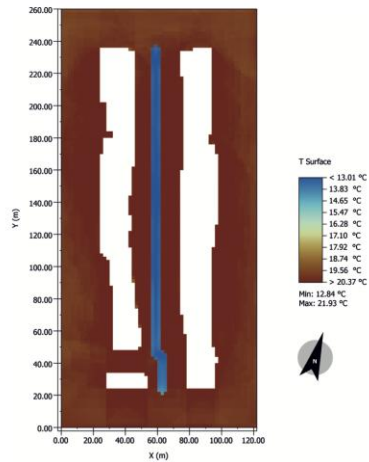
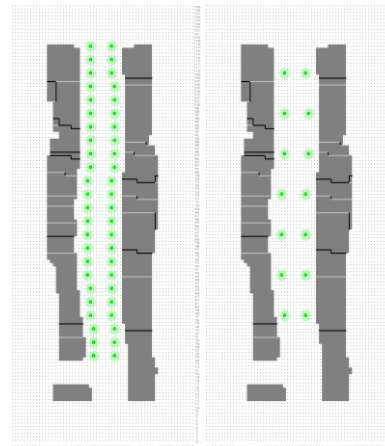
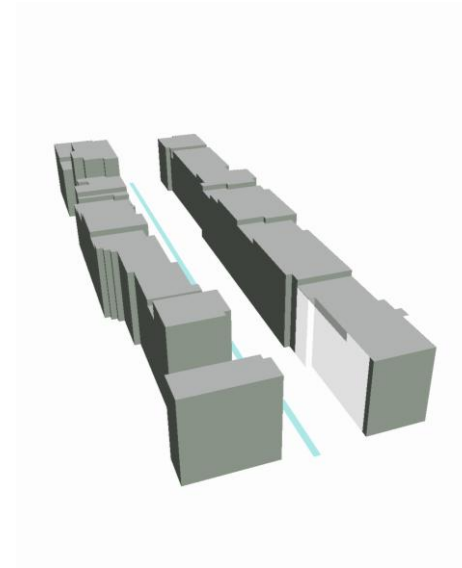
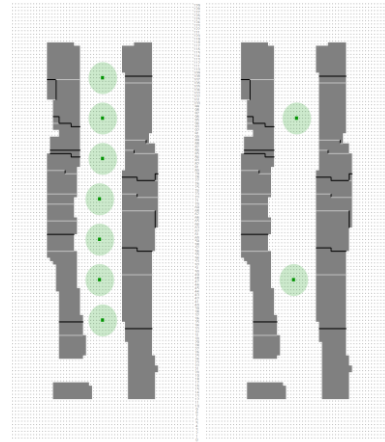
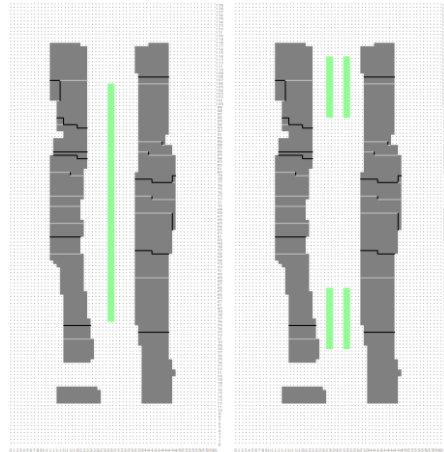
Teros 11
Water Content
Soil Temperature



Menschlicher Hitzestress - Universal Thermal Climate Index (°C)



ENVI-met high-resolution 3D climate modeling



OUT Nature Thrives

NATURE-based urban water Transitions for
Healthy, Resilient, InclusiVE regional Scapes



Co-funded by
the European Union



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