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WUDAPT: current status and next steps

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The WUDAPT (World Urban Database and Access Portal Tool) project is an international community-generated urban canopy information and modeling infrastructure to facilitate urban-focused climate, weather, air quality, and energy-use modeling application studies. The goals of WUDAPT are 1) to acquire and make accessible coherent and consistent descriptions and information on form and function of urban morphology relevant to climate, weather, and environment studies on a worldwide basis and 2) to provide a portal with tools that extract relevant urban parameters and properties for models and for model applications at appropriate scales for various applications. Its guiding principle is to generate "fit for purpose" urban data using a globally consistent methodology, based on publicly accessible input data and tools.

WUDAPT information is organized by level of detail (L), and data at each level are gathered using distinct methodologies and techniques. The lowest level of detail (L0) maps cities and their surrounding natural landscape into local climate zone (LCZ) types. L1 data use the LCZ maps to provide a sampling context for acquiring and managing information at finer scales. L2 data are complete information on all urban elements (e.g., building footprints, envelope fabrics, and heights).

Recently great progress has been made on L0 data. Large-scale continental LCZ mapping is achieved using the state-of-the-art cloud computing resources from Google's Earth Engine, the concept of transferability, sufficient training data and data from several satellite sensors. The accuracy of the resulting large-scale LCZ maps is very good (accuracies > 80% for both urban and natural LCZ), and agreement with meta-information such as ESA CCI land cover, EU's Urban Atlas building height database, and spherical surface fractions (e.g. sky view factor, imperviousness, tree coverage) from Google Street View images is high.

Level 1 and 2 is currently testing and implementing an innovative prototype tool called the Digital Synthetic City (DSC) based on inverse procedural modeling. This framework can infer and provide digitally rendered buildings and other urban morphological features from satellite imagery with a high degree of accuracy. The top-down approach will provide the basis and means for generating user specified gridded Urban Canopy Parameters (UCPs) representing the spatial envelope of geometric form and patterns of building and other urban morphological structures for urban modeling applications. Urban experts around the world are being engaged in specialized testbed protocols to test and customize the DSC towards ascertaining and ensuring the accuracy and cultural differences and building typologies are captured using this methodology. Bottoms-up methodologies to generate information on materials and functional aspects of buildings based on building typology and use of crowdsourcing approaches are currently under development.

WUDAPT is a successful grassroots effort, and continued community involvement is key to assuring success. Please consider engaging in and/or following the progress online (www.wudapt.org).