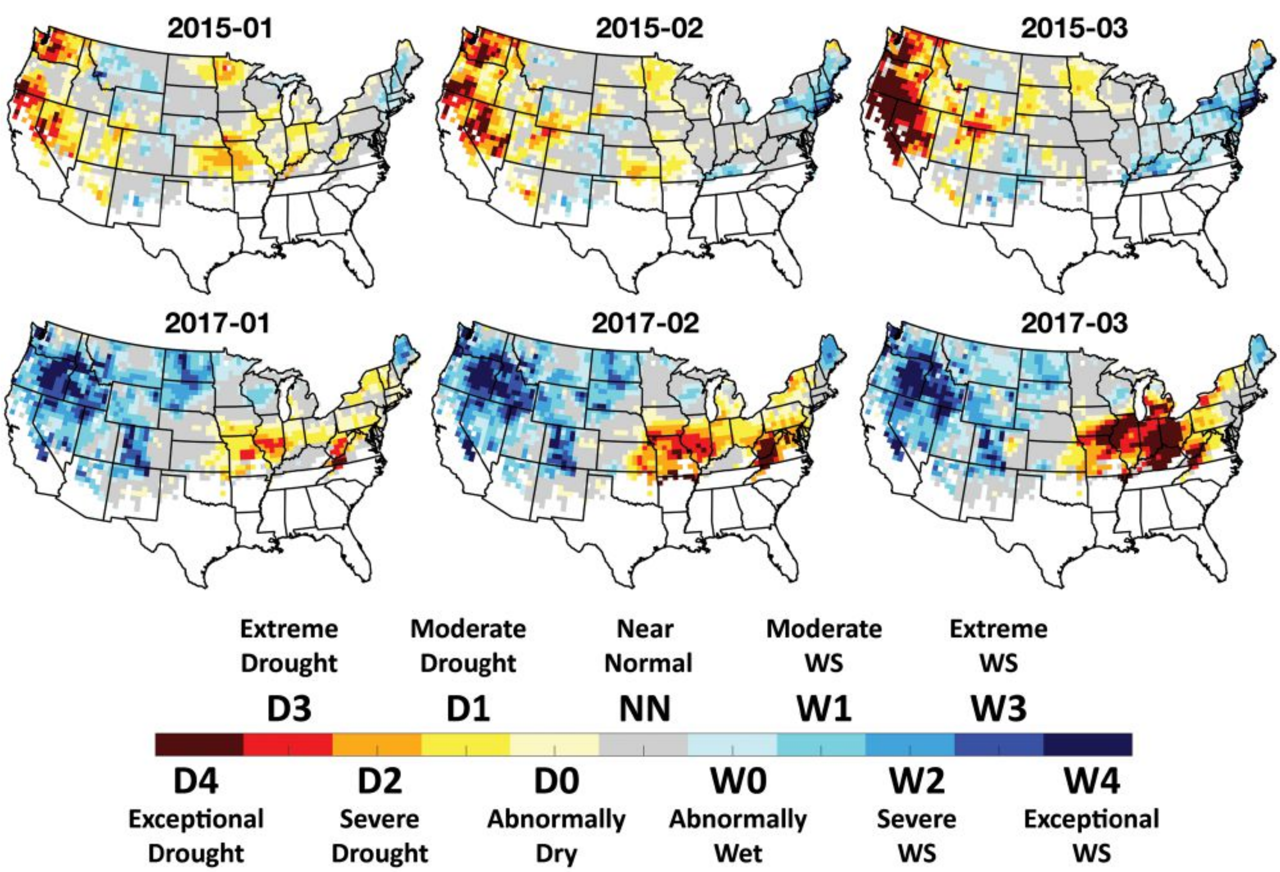
(e.g., using population density in gridbox weather types to see if/how cities affect rainfall).—Tim Hewson (ECMWF) and F. Pillosu, "'ecPoint'—A new postprocessing technique with multiple applications," presented at the Ninth Conference on Transition of Research to Operations, 6–11 January 2019, Phoenix, Arizona.

Characterizing Snow Drought Conditions Across the United States

In many regions around the world, drought is not uncommon, and in higher elevations and latitudes it can manifest as low snow water equivalent (SWE) accumulation or storage. Since populations worldwide derive large fractions of their water resources from seasonal snowmelt, years of below-average SWE and shifts in its distribution (spatial and temporal) can stress available freshwater resources. In addition, such shifts in snow accumulation and/or melt can critically impact ecosystems, agriculture, hydropower generation, recreational activities, tourism, transportation, economics, etc., from local to global scales. Since snow drought is less often studied relative to other types of drought, characterizing and monitoring its conditions are necessary as well as warranted.

Snow drought can result from below-average precipitation or warm temperatures that shift the partitioning of precipitation from snowfall to rainfall and/or promote faster melt, leading to below-average SWE at subseasonal or seasonal scales. We developed a standardized SWE index (SI) for classifying both drought and wet spell conditions in snow-covered regions on such scales. We derived the SI values and applied classifications (based on the U.S. Drought Monitor classifications) at a 3-month scale from October 1980 to September 2018 to better understand the spatial and temporal variability of SWE across the conterminous United States (CONUS). Our approach offers a new way to characterize SWE that reflects subseasonal-to-seasonal drought conditions. It also improves our understanding of when and to what extent different



Snow Drought and Wet Spell Classifications. **3-month standardized snow water equivalent (SWE) index (SI) classification for Jan, Feb, and Mar during (top) winter 2015 and (bottom) winter 2017. Drought classifications are based on those used in the U.S. Drought Monitor and mirrored for wet spell (WS) conditions.**

regions are experiencing more or less SWE than normal. For instance, our framework facilitates the study of the onset and evolution of the exceptionally severe snow drought that occurred in the western United States during winter 2015, while providing insight into the concurrent winter SWE conditions in the eastern United States. It also enables a comparison of those corresponding Western drought severity patterns with other historical snow droughts in the region as well as large winter snow accumulation patterns, as in 2017 across the same region.

Although our study focused on SWE characterization across the CONUS, given the generality of our approach and with worldwide applications of our framework, a new, global perspective on SWE drought (and wet spell) conditions should be possible. Near-real time implementation of our methods should provide water managers and officials with a better indication of when drought mitigation in snowmelt-reliant regions is needed. Our work moves toward a better understanding of the changing characteristics of SWE accumulation and melt and the development of an early drought warning system that leverages snowpack information.—Laurie S. Huning (University of California, Irvine) and Amir AghaKouchak, "Characterizing snow drought conditions across the United States," presented at the 33rd Conference on Hydrology, 6-11 January 2019, Phoenix, Arizona.

Simulating Personal Heat Exposure in Cities with the Icarus Model

Recognition that urban heat exposure poses threats to health, quality of life, and economic growth has motivated cities to deploy a variety of mitigation and adaptation strategies ranging from immediate emergency response services to long-term infrastructure changes. Many of these strategies are designed to reduce personal exposure to dangerous heat. Despite this implicit focus, data regarding spatial and temporal patterns in personal heat exposure are scarce. Without time- and place-specific exposure information, urban decision makers are constrained in their ability to deploy appropriate intervention measures in a targeted manner. A new approach will change that.

Our multidisciplinary team of engineers, geographers, computer scientists, and health and medical professionals is developing a model called Icarus to simulate the personal heat exposure of urban residents. The model pairs activity-based travel models with meteorological models to estimate the thermal conditions experienced by each resident of the study city as they complete their daily activities. Icarus takes in regional activity model inputs and simulates travel of each agent (at subminute fidelity) using MatSim, a state-of-the-art mesoscale travel simulation.