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Exploring Earth's Critical Zone Through the U.S. Critical Zone Collaborative Network

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The Critical Zone Collaborative Network (CZ Net) is a national research initiative in the United States supporting investigations of the Earth's critical zone (CZ) -- the vital near-surface environment extending from the top of the vegetation canopy to the weathered bedrock beneath. CZ Net fosters collaboration, data sharing, and interdisciplinary research to understand complex landscapes. The network comprises nine thematic clusters covering diverse geological, climatic, and land use settings. The thematic clusters explore many areas, including bedrock geology's effects on landscapes and ecosystems, ecosystem responses to climate and land-use disturbances, processes occurring between land and sea affected by sea-level rise, land-water interactions in agricultural regions, water and carbon cycles in arid regions, the impact of mineral dust transported in the atmosphere on ecosystems, water storage's influence on landscape and ecosystem processes, relationships between landscapes and microbial communities, and ecosystem processes in cities. A coordinating hub provides cross-cluster support. In the presentation, we introduce CZ Net and the focal research areas of each thematic cluster. We consider synthesis work addressing environmental challenges faced by the CZ, which is under increasing pressure to meet societal needs while safeguarding the environment for future generations. Further, we discuss opportunities for engagement with the network, reflecting CZ Net's dedication to advancing knowledge and addressing critical environmental issues through collaborative efforts. International coordination through developing a network of networks can

foster collaborative research that transcends national boundaries, allowing scientists to combine expertise, data, and resources for a deeper understanding of CZ processes. Such collaboration is imperative for addressing pressing global environmental challenges.