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Abstract

Consistent monitoring of the US Virgin Islands (USVI) microclimates is essential to: enable scientific study of the Caribbean climatology; support safety and stability of residential water supplies; and ensure the safety of scientific instrumentation operated by the University of the Virgin Islands (UVI) in support of federal research projects. Understanding the varied USVI microclimates is critical to the study of terrestrial and near-shore marine ecosystem modulations, Caribbean climate variability, and to improving the accuracy and precision of real-time weather forecasting in the Caribbean. In addition, with minimal surface or ground water available, most residents in the USVI rely on rain water collected through personal cisterns, making accurate and precise precipitation data and forecasting a particularly critical need. Finally, UVI is home to the Etelman Observatory, a fully-robotic 0.5m telescope funded through cooperative agreements with NASA (NASA-EPSCoR NNX13AD28A and NASA-MIRO NNX15AP95A) to provide astrophysics research capacity in the USVI. Due to the rapidly changing precipitation patterns in the USVI, this facility relies on accurate real-time weather monitoring and near-term prediction to enable automated weather-related closures. To support these needs, we will build and implement automated microclimate data collection, management, and analysis algorithms custom-designed to interface with the UVI's existing network of weather stations deployed around the island of St. Thomas. Moreover, we will include exception handling capacity to allow expansion of the network to include additional stations both on St. Thomas and the other USVI islands of St. John and St. Croix.

This proposed project represents a significant improvement over currently implemented microclimate data collection and management procedures, which rely on generic software (www.weatherlink.com) and human-intensive spreadsheet statistics. We will carry out living maintenance on a microclimate data archive for the USVI that will provide a wealth of interdisciplinary educational and research opportunities to UVI's undergraduate researchers (an 88% underrepresented population). We anticipate that 1-2 UVI undergraduate students will be directly involved in this effort over the next 12 months and that the data set produced will be mined by future UVI undergraduates doing research in Caribbean weather patterns for years to come. Finally, our work will also compliment the currently active WRRI-supported Water Ambassadors Program, provide

strategic data resources to the USVI Department of Agriculture, grow UVI's research Science, Technology, Engineering, and Mathematics (STEM) infrastructure, and provide valuable real-time weather data to the general public, as we will make freely-available all data and analysis products of this proposed work.