DEVELOPMENT OF PROJECTED (2050–2089) PRECIPITATION DEPTH-DURATION-FREQUENCY CURVES FOR SOUTH FLORIDA

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The Flood Protection Level of Service Program (FPLOS) at the South Florida Water Management District (SFWMD) has been evaluating hydrologic basins throughout south Florida to determine their current and future required level of service for flood protection. In addition to sea level rise scenarios, it is imperative to evaluate projections of future precipitation as part of flood vulnerability assessments. In cooperation with the SFWMD, the U.S. Geological Survey has developed an ensemble of projected changes in precipitation depth-duration-frequency (DDF) curves. The DDF curves were developed by fitting a probability distribution function to simulated precipitation extremes extracted from various bias-corrected statistically- and dynamically- downscaled climate datasets from the World Climate Research Programme Coupled Model Intercomparison Project phases 5 and 6.

An ensemble method was used to determine median change factors and variability in extreme precipitation depths at locations throughout south Florida. These median change factors and their variability can be applied to existing historical DDF curves from NOAA Atlas 14 to obtain a range of plausible future DDF curves. DDF curves were developed for durations of 1, 3, and 7 days and return periods of 5 to 200 years. Change factors were computed as the ratio of two DDF curve values fitted to precipitation extremes from 40-year periods, representing: (1) a model-projected climate for the period 2050–2089 under Representative Concentration Pathways 4.5 and 8.5, and (2) modeled historical conditions from 1966–2005. A constrained maximum likelihood method was used for fitting consistent DDF curves across rainfall durations. Change factors from a subset of climate models that best capture historical precipitation extreme indices will be presented. Median change factors for south Florida increase with return period and range from 1.0 to 1.4, suggesting an overall increase in future extreme precipitation events.

PRESENTER BIO: Michelle Irizarry-Ortiz is a hydrologist with the U.S. Geological Survey Caribbean-Florida Water Science Center with more than 20 years of experience in hydrologic modeling and statistical hydrology. She has extensive experience modeling the hydrology and water management system of south Florida and its vulnerability to climate change.