

Distinguished Lecture



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**Distinguished Lecture: *Frequency Analysis for Extreme Hydrologic Events:
Annual Floods and Precipitation***
Thursday, November 15, LSC Senate Chambers, 3-4 p.m.

The three-parameter Generalized Extreme Value (GEV) distribution has found wide application for describing annual floods, rainfall, wind speeds, wave heights, snow depths and other maxima. Hosking and Wallis (1997) popularized use of L-moments and the GEV distribution as the basis of an index-flood regional L-moment flood-frequency estimation procedure. L-moments are linear combinations of the ordered observations, and provide nearly unbiased estimators of the L-coefficients of variation and skewness. L-moment can also be used of distribution selection. Recognition of the value of regionalization procedures has been one of the great advances in flood frequency analysis in the last two decades.

Studies showed that small-sample at-site MLE GEV parameter estimators are unstable, and recommend L-moment estimators. Indeed in small samples MLEs can take on absurd values of the GEV-shape parameter κ . Use of a Bayesian prior to restrict κ -values to a statistically/physically reasonable range yields Generalized Maximum Likelihood (GML) analysis that eliminate this problem. GML estimators perform substantially better than both moment and L-moment quantile estimators for heavy-tailed distributions ($\kappa \leq 0$).

We also consider use of the Generalized Pareto (GP) distribution with a Poisson model for arrivals to describe peaks over a threshold. This yields the 3-parameter GEV distribution for the annual maximum series (AMS). A partial duration series (PDS) analysis yields quantile estimators with the same precision as an AMS analysis using GML estimators for the GP and GEV distributions, which were superior to moments and L-moments estimators. The precision of flood quantiles derived from a PDS analysis is insensitive to the arrival rate λ , so that a year of PDS data is generally worth about as much as a year of AMS when estimating the 100-year flood.

*You are cordially invited to a reception before the lecture on Thursday, November 15
from 2:30-3:00 p.m. in the Senate Chambers*

**Special Invited Seminar: *Regional Analysis of Hydrologic Data with
Bayesian Generalized Least Squares***
Friday, November 16, LSC room 224-226. 3 p.m.

Sponsored by PRIMES, Department of Civil and Environmental Engineering,
and Department of Statistics