Estimating Evaporation from Elephant Butte Reservoir with the Monin Obukhov Simularity Theory Using Simple Instrumentation

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Purpose of the Study

Evaporation from the Elephant Butte Reservoir is a major factor in the hydrologic balance of the Rio Grande. Currently, evaporation from Elephant Butte is estimated using a single Class-A evaporation pan placed at the southern end of the reservoir. Pan evaporation measurements are not as accurate as other methods of estimating, such as the three-dimensional eddy covariance technique. However, the three-dimensional eddy covariance technique requires expertise and expensive specialized equipment. The researcher will apply the Monin-Obukhov Similarity Theory, a simple, low-cost technique, to estimate evaporation from Elephant Butte and will verify the method by comparing it to other evaporation measurements currently taken at the reservoir.

Study Underway

→ The air temperature, humidity, wind speed, and water surface temperature will be measured daily at two off-shore towers, one installed in a shallow portion of the reservoir and the other installed in a deeper portion.

→ Using the Monin-Obukhov method, the researcher will calculate evaporation estimates and compare those estimates to the three-dimensional eddy covariance method.

Benefits

→ The Monin-Obukhov method does not require a high level of expertise or expensive, complex instrumentation and could be a simple way to calculate evaporation more accurately than with pan coefficients.

→ More accurate estimates of evaporation will lead to a better understanding of the hydrologic balance of the Rio Grande.

Top: Jimmy collects data from the datalogger. He is from Deming, NM, and received a B.S. in geological engineering and an M.S. in civil engineering from NMSU. After obtaining his Ph.D. in 2008, he plans to obtain a P.E. license. Left: An off-shore tower equipped with the instruments used to measure air and water conditions.