

# USER GUIDE TO THE UNC PROCESS AND THREE UTILITY PROGRAMS FOR COMPUTATION OF NONLINEAR CONFIDENCE AND PREDICTION INTERVALS USING MODFLOW-2000

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## Abstract

This report introduces and documents the Uncertainty (UNC) Process, a new Process in MODFLOW-2000 that calculates uncertainty measures for model parameters and for predictions produced by the model. Uncertainty measures can be computed by various methods, but when regression is applied to calibrate a model (for example when using the Parameter-Estimation Process of MODFLOW-2000) it is advantageous to also use regression-based methods to quantify uncertainty. For this reason the UNC Process computes (1) confidence intervals for parameters of the Parameter-Estimation Process and (2) confidence and prediction intervals for most types of functions that can be computed by a MODFLOW-2000 model calibrated by the Parameter-Estimation Process. The types of functions for which the Process works include hydraulic heads, hydraulic head differences, head-dependent flows computed by the head-dependent flow packages for drains (DRN6), rivers (RIV6), general-head boundaries (GHB6), streams (STR6), drain-return cells (DRT1), and constant-head boundaries (CHD), and for differences between flows computed by any of the mentioned flow packages. The UNC Process does not allow computation of intervals for the difference between flows computed by two different flow packages.

The report also documents three programs, RESAN2-2k, BEALE2-2k, and CORFAC-2k, which are valuable for the evaluation of results from the Parameter-Estimation Process and for the preparation of input values for the UNC Process. RESAN2-2k and BEALE2-2k are significant updates of the residual analysis and modified Beale's measure programs first published by Cooley and Naff (1990) and later modified for use with MODFLOWP (Hill, 1994) and MODFLOW-2000 (Hill and others, 2000). CORFAC-2k is a new program that computes correction factors to be used by UNC.

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