CONTINUOUS IMPROVEMENT FOR THE INTEGRATED HYDROLOGIC MODEL AND INTEGRATED NORTHERN TAMPA BAY MODEL

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The Integrated Northern Tampa Bay (INTB) model, a calibrated application of the Integrated Hydrologic Model (IHM) simulation engine, has been used for more than two decades in west-central Florida to support decision-making for: water-supply planning, sustainability assessment, and operations; ecologic systems protection; and assessment of hydrologic response due to changes in water use, climate, and land use. The IHM dynamically couples HSPF with MODFLOW. A continuous improvement program is used to ensure the INTB model includes the most recent advancements in hydrological modeling and can continuously provide decision support in response to changing operational and regulatory requirements. The four phases of the continuous improvement cycle include: identify potential gaps, recommend corresponding improvements for identified gaps, plan for implementing improvements and resource allocation, and implement improvements.

All four phases of the continuous improvement cycle are focused on the intersection of categories within three evidence domains of hydrologic flow systems, decision support questions, and water resource constraints, uniquely suitable for applications of integrated surface-groundwater models. Within the context of the three evidence domains, multiple sources of uncertainty lead to inaccuracies or large variance error in modeling results. Four primary sources of uncertainty in hydrologic model results include: suitability match among simulation engine, model domain, and model purpose; conceptualization and discretization of model domain; resolution and quality of time series inputs; and resolution and quality of calibration targets and constraints. Continuous improvement program goals for the IHM and the INTB model can be met by reducing uncertainty through improving codes of HSPF, MODFLOW, and IHM integration; accurately representing land use change and applying suitable discretization; using Bayesian radar rainfall (fusion of gauge and radar); and providing sufficient and accurate calibration targets for streamflow, spring flow, aquifer heads, and actual evapotranspiration. This presentation will include discussion of example projects and methods within the continuous improvement program.

PRESENTER BIO: Jeff Geurink is lead water resources system engineer with Tampa Bay Water, a wholesale regional water supply utility. He has over 35 years of water resources experience and 25 years of experience in fully-integrated hydrologic modeling including development of simulation code, user training, and water resources and sustainability applications.