

Conjunctive Use Simulation and Applications with MODFLOW-OWHM

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The U.S. Geological Survey's MODFLOW One-Water Hydrologic Flow Model (MF-OWHM) is a MODFLOW-based conjunctive use simulation software. The first version¹ was selected by the World Bank Water Resource Software Review² as one of three recommended simulation programs for conjunctive use and management modeling. MF-OWHM builds upon the MODFLOW-2005 groundwater-flow simulation framework and multiple MODFLOW-2005 variants. This fusion of the MODFLOW-2005 variants and MF-OWHM specific enhancements allow for the following process-based simulations: saturated groundwater flow (three-dimensional); surface-water flow (one- and two-dimensional); landscape and irrigated agriculture; estimation of unknown agricultural irrigation and additional irrigation requirements for salinity flushing; reservoir operations and management; aquifer compaction and subsidence; seawater intrusion by a sharp-interface assumption; karst-aquifer and fractured-bedrock flow; and vertical unsaturated groundwater flow (one-dimensional). This presentation introduces the second major release³ and briefly introduces the application of MF-OWHM to the California Central Valley, Salinas Valley, and Pajaro Valley.

¹Hanson, R.T., Boyce, S.E., Schmid, Wolfgang, Hughes, J.D., Mehl, S.M., Leake, S.A., Maddock, Thomas, III, and Niswonger, R.G., 2014, One-Water Hydrologic Flow Model (MODFLOW-OWHM): U.S. Geological Survey Techniques and Methods 6-A51, 120 p., <https://dx.doi.org/10.3133/tm6A51>.

²Borden, John Carter; Gaur, Anju; Singh, Chabungbam Rajagopal, 2016, Water resource software: application overview and review. Washington, D.C.: World Bank Group.

³Boyce, S.E., Hanson, R.T., Ferguson, I., Schmid, W., Henson, W., Reimann, T., Mehl, S.M., and Earll, M.M., 2020, One-Water Hydrologic Flow Model: A MODFLOW Based Conjunctive Use and Integrated Hydrologic Flow Model: U.S. Geological Survey Techniques and Methods 6-A60, 576 p

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