Cold Region Hydrology in a Changing Climate (Proceedings of symposium H02 held during IUGG2011 in Melbourne, Australia, July 2011) (IAHS Publ. 346, 2011). 198-206

Stream guiding algorithm for deriving flow direction from DEM and location of main streams

JIAHU WANG[1], LI LI[1], ZHENCHUN HAO[1] & JONATHAN J. GOURLEY[2]

1 *State Key Laboratory of Hydrology-Water Resources and Hydraulic Engineering, Hohai University, Nanjing 210098, China*
tigerlly@126.com

2 *NOAA/National Severe Storm Laboratory, Norman, Oklahoma 73072, USA*

Abstract The drainage paths and directions within the drainage basin are important for analyses of the interactions between human and nature. The *stream burning* algorithm is a popular D8-based method and can be effective in the digital reproduction of a known and generally accepted stream network. The *stream guiding* algorithm has been developed in this paper to overcome the stream burning algorithm's disadvantage of locally altering elevation in order to provide the consistency between existing vector hydrography and the DEM. In the new algorithm, flow direction of LMS (location of main streams) grids will be determined first; then possible outlets in non-LMS area will be found; and finally, the flow direction of undetermined area will be calculated by a "filling up" technique. Evaluations for Taiwan Island show that the new algorithm has a similar performance to that of the stream burning algorithm in river network reproduction. The new algorithm obeys the "steepest decent rule" and DEM data more strictly than the stream burning algorithm, especially around the LMS grids.

Key words flow direction derivation; DEM; location of main stream