

PP 054

## Application of Evolutionary Computation to river phytoplankton dynamics (the Nakdong River): time-series modelling with Genetic Programming

Jeong, K. S.<sup>1\*</sup>, Ha, K., Kim, H. W.<sup>2</sup>, and Joo, G. J.<sup>1</sup>

<sup>1</sup>Dept. of Biology, Pusan National Univ., Jang-Jeon Dong, Gum-Jeong Gu, Busan 609-735, S. Korea. <sup>2</sup>Dept. of Environmental Education, Suncheon National University, Suncheon, Chonnam, 540-742, S. Korea

Dynamics of a bloom-forming cyanobacteria (*Microcystis aeruginosa*) was modelled using Genetic Programming (GP) algorithm in a eutrophic river-reservoir hybrid system. The lower Nakdong River has been eutrophicated since the construction of an estuarine barrage in 1987

(five years average (1994-1998): NO<sub>3</sub>-N, 2.7 mg l<sup>-1</sup>; NH<sub>4</sub><sup>+</sup>-N, 0.6 mg l<sup>-1</sup>; PO<sub>4</sub><sup>3-</sup>-P, 34.7 μg l<sup>-1</sup>; chlorophyll *a*, 50.2 μg l<sup>-1</sup>). Blooms of *M. aeruginosa* occurred in droughty summers. With four years (1995-1998) limnological dataset, GP developed an equation for predicting *M. aeruginosa*. Validation of the model was implemented on the year of severe summer blooms (1994), and the predictability was successful. The lower Nakdong River exhibits a type of reservoir-like ecological dynamics rather than a river system, thus river mechanistic models have failed to describe this uncertainty. This result may suggest that a technique of inductive-empirical approach is suitable for modelling the dynamics of bloom-forming algal species in a river-reservoir transitional system.

Key words : Genetic programming, *Microcystis aeruginosa*, algal blooms, ecological modelling, the Nakdong River