Computational Science & Engineering

CSE Seminar at McGill

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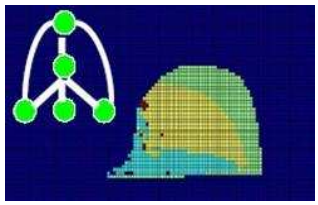
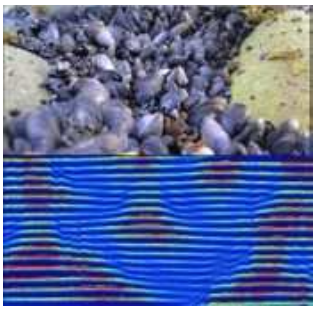
*** Computational Biology in Science CSE Seminar ***

Gregor Fussmann Frédéric Guichard Brian McGill
Department of Biology, McGill University

Friday, October 13, 2006
2:30–3:30 pm
Macdonald-Harrington Building
Room G1 (Basement)

Gregor Fussmann: Ecologists try to understand and predict the dynamics of complex food web structures. Systems of ordinary differential equations are one approach to describing such systems. I apply computational methods to explore the relationship between the structure and dynamic behaviour of these networks (equilibrium, oscillations, chaos).





Frédéric Guichard: Ecosystems are complex systems where regional properties such as persistence and variability can result from nonlinear interactions between individual components. I apply this perspective and associated computational methods to the study of large-scale coastal ecosystems. I more precisely study non-equilibrium local dynamics of marine organisms as interacting particle systems on lattices, which are in turn integrated within coupled-map lattices describing regional dynamics (>1000 km).

Brian McGill: A recent model has stirred great controversy in ecology because of its assumptions - all species are the same. This is called neutral theory. Monte Carlo simulations have proved computationally intense because of the need to model the birth and death of every individual in very large populations over very many years. Similarly, analytical solutions have proved to involve considerable numerical skill to solve correctly. I will also explore the computational challenges in using advanced statistical techniques on a large dataset containing 500 species, 40 years, and 2000 points in space.