Thematic Session

Session title: Mathematical models for biological invasion

Organizers:

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Description of the topic:

Biological invasion/migration occurs at different levels and scales. At the organismic level, biological species invade into new habitats and diseased individuals invade healthy populations. At the genetic scale, gene migration/gene flow describes the transfer of alleles or genes from one biological population to another. Between, at the cellular scale, cancer cells may invade into host tissues. It is a challenging question to unravel common organizing principles of biological invasion across the cellular/genetic and organismic scale. Possible answers can be expected from mathematical models of biological invasion. As the modeled processes are various and occur at different levels, the mathematical tools that can be used are various as well. At the macroscopic level of biological species the most typical approach includes differential, functional and integral equations, while at the microscopic level cellular automata and hybrid models are more common. Nowadays, many researchers focus also on the influence of delays or/and stochastic elements into the model dynamics. The goal of our session is to discuss examples of biological invasion ranging from ecological/evolutionary to cell-biological context, to review the state of the art of related mathematical model formalisms and to evaluate simulation and analysis methods that help to unravel common patterns of invasion.

2011 Mathematic Subject Classification:

92B, 92C, 92D