Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Panic reactions and global disease dynamics
RAFAEL BRUNE, CHRISTIAN THIEMANN, Max-Planck-Institute for Dynamics and Self-Organization, Goettingen, Germany, BERND BLASIUS, ICBM Oldenburg, Germany, THEO GEISEL[1], DIRK BROCKMANN[2], Max-Planck-Institute for Dynamics and Self-Organization, Goettingen, Germany — We analyze spatially extended disease dynamics in a system in which individuals change their dispersal characteristics in response to the local infection level. The key question is to what extent infectious wave front dynamics and the time course of the global infection change in response to host awareness and individuals trying to avoid infection by increased dispersal. We investigate two qualitatively different responses to the local degree of infection. In one system (panic reaction) the local diffusion coefficient increases with the concentration of infecteds, in the other system (directed reaction) individuals drift proportional to infection level gradients. For both systems we develop a mean field model. Although one expects that the individual rationale of avoiding an epidemic wave mitigates disease dynamics we find extended parameter regimes in which this rationale actually facilitates epidemic spread. Finally we investigate the dynamics of a fully stochastic system in which the effects prevail but which also show an increased extinction probability of the epidemic as a function of increasing dispersal response.

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Date submitted: 27 Nov 2007 Electronic form version 1.4