This study was motivated by the results of high-resolution simulations of long-range precision fires that were employed against an invader marching through mixed terrain. Although effectiveness was expected to be less than for desert-terrain cases, it proved much less than anticipated (DSB, 1998a,b). It was clear that many factors were at work, so providing a physical explanation and projecting results for other circumstances was not straightforward.

We therefore began to develop a multiresolution family of models to better understand the phenomena, permit the broad-ranging exploratory analysis for which high-resolution simulation is inappropriate, and suggest priorities for field experiments. If successful, our work would illustrate concretely how such a family-of-models approach—coupled with experiments—could be taken routinely to improve military analysis and its underlying military science.

This report, then, describes a fast-running, stochastic, multiresolution desktop model (PEM) and its calibration to data from high-resolution simulation. We also describe a simplified and deterministic “Repro model” called RPEM for possible use in more aggregated campaign-level models such as JICM or JWARS. PEM and RPEM could substantially improve the defense community’s ability to reflect, in routine analysis, many effects of C4ISR, the maneuver tactics of the invasion force, and relatively detailed characteristics of the long-range fires. However, more empirical work and high-resolution simulations are also badly needed.

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