PREFACE

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 C^4ISR, 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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