THUNDER Overview for Schriever 2001

Mr. Damon Lum
Model Overview

• THUNDER is the Air Force’s theater-level analytical campaign simulation
  • Two-sided, stochastic simulation
  • Developed by US Air Force Studies and Analyses Agency
  • Deterministic ground war attrition based on US Army’s CAA combat models

• Focuses primarily on
  • Planning and execution of the aerospace and ground war as constrained by logistics, ISR, weather, etc. and their interactions at the campaign level
THUNDER’s Domain

Level of War

- Strategic
- Operational
- Tactical

Spectrum of Conflict

- MOOTW
- Small Scale Contingency
- Major Theater War
- Global Thermo-Nuclear War

Heart of the Envelope
Joint Force Commander’s Perspective

- Close Battle
- High Battle
- Rear Battle
- Space Battle
- Deep Battle
- Sea Based Airpower
Analytic Process

Quantify the contribution of alternative weapon systems or force structures to the combat outcomes for key operational objectives

**ALTERNATIVES**

1. Base Case, DSP
2. SBIRS High
3. SBIRS High + P4I
4. SBIRS High + P4I + SBIRS Low

**ANALYSIS TOOLS**

- THUNDER
- BRAWLER
- EADSIM
- INTEL DATA
- SABSEL
- MOBILITY LP

**MEASURES OF OUTCOME**

- Gain control of the air
- Halt the invading army
- Destroy enemy war supporting infrastructure
- Destroy the occupying army
- Eject the occupying army
- Destroy enemy leadership
- Destroy enemy infrastructure for reconstitution
- Manage the cost of the campaign (losses)
THUNDER Inputs I

- “Hard Data” -- bean counts and locations of “things”
  - Air orders of battle
  - Ground orders of battle and unit TO&E’s
  - Air defense/missile orders of battle
  - Infrastructure data such as:
    - Logistics Facilities
    - Transportation Network
    - Satellite constellations
- Strategic targets
  - Weapons R&D
  - Electric power
  - National C3
THUNDER Inputs II

• “Soft Data” -- Strategy, operational art, tactics
  • Flight tactics, escort ROE, support package makeup
  • Ground unit movement orders, defensive strength, offensive potential
  • Air defense fire doctrine, degraded modes
  • Repair and engineering data
  • Typically the most difficult to build
  • Often subject to critiques from outside observers
THUNDER Output Examples

- Graphics
  - Graphs
  - Situation Map
- Reports
  - Air-to-Air Encounters/Kills
  - Surface-to-Air Encounters/Kills
  - Equipment Kills
  - Munitions Expenditures
- Database Output
  - Who shot John?
Sample Results

Red Ground Force Drawdown

FLOT Location
(Along Corridors of Interest)

U.S. Sorties per Day by Mission

Red Aircraft Inventory
• THUNDER provides campaign metrics for Schriever 2001
  • Focus
    • Provides bounds of possible outcomes of courses taken by players
    • Provide assessors regimes from which to challenge players
  • Strengths
    • Provides campaign insights on courses of action
    • Provides analytical foundation for subsequent analyses
  • Weaknesses
    • Does not have fidelity of mission or engagement models
    • Communications is difficult to capture
    • Naval portrayal limited to air warfare
In Game Support

• Provide campaign level metrics for assessors
  • 36 pre-run cases to cover a spectrum of conditions
  • Player moves outside this spectrum will require overnight assessment
    • Inputs: typically less than 60 min
    • Average Model Run: ~4 hours (30 days of combat)
    • Analysis Time: ~45 min

• Products
  • Campaign metrics-- FLOT movement, Ground unit and air strengths, Selected target drawdowns, attrition reports
  • Results coordinated with EADSIM and other SMEs for integrated assessment
Summary

• Focus for Schriever 2001 is campaign results
  • During the game, assessments based on pre-game results
    • General losses
    • Air situation
    • Ground situation
  • Overnight assessments to support unanticipated player moves
  • Mature databases and lessons learned for subsequent analyses