Some Practical Considerations in Nuclear Deterrence of North Korea

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November 10, 2011

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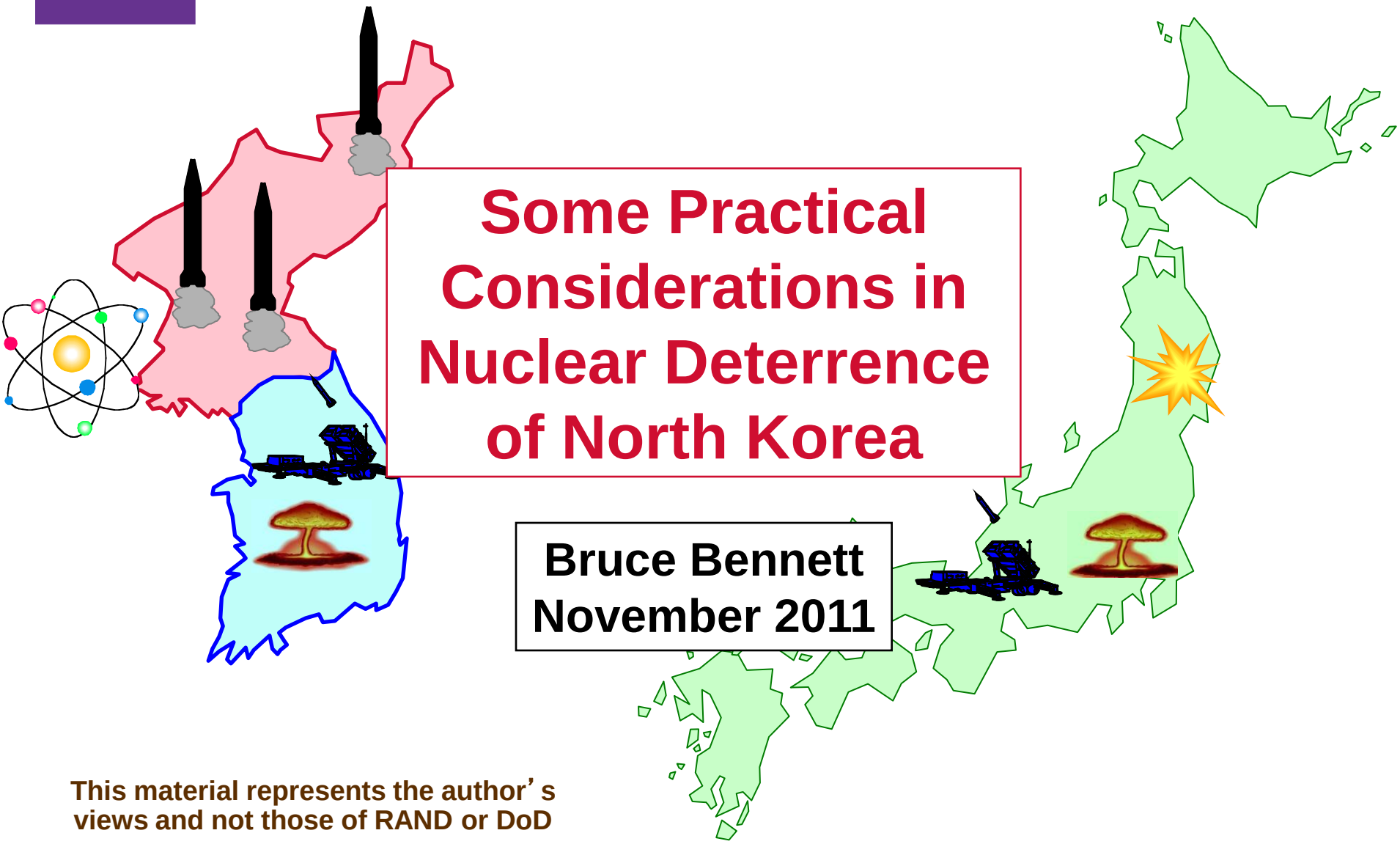

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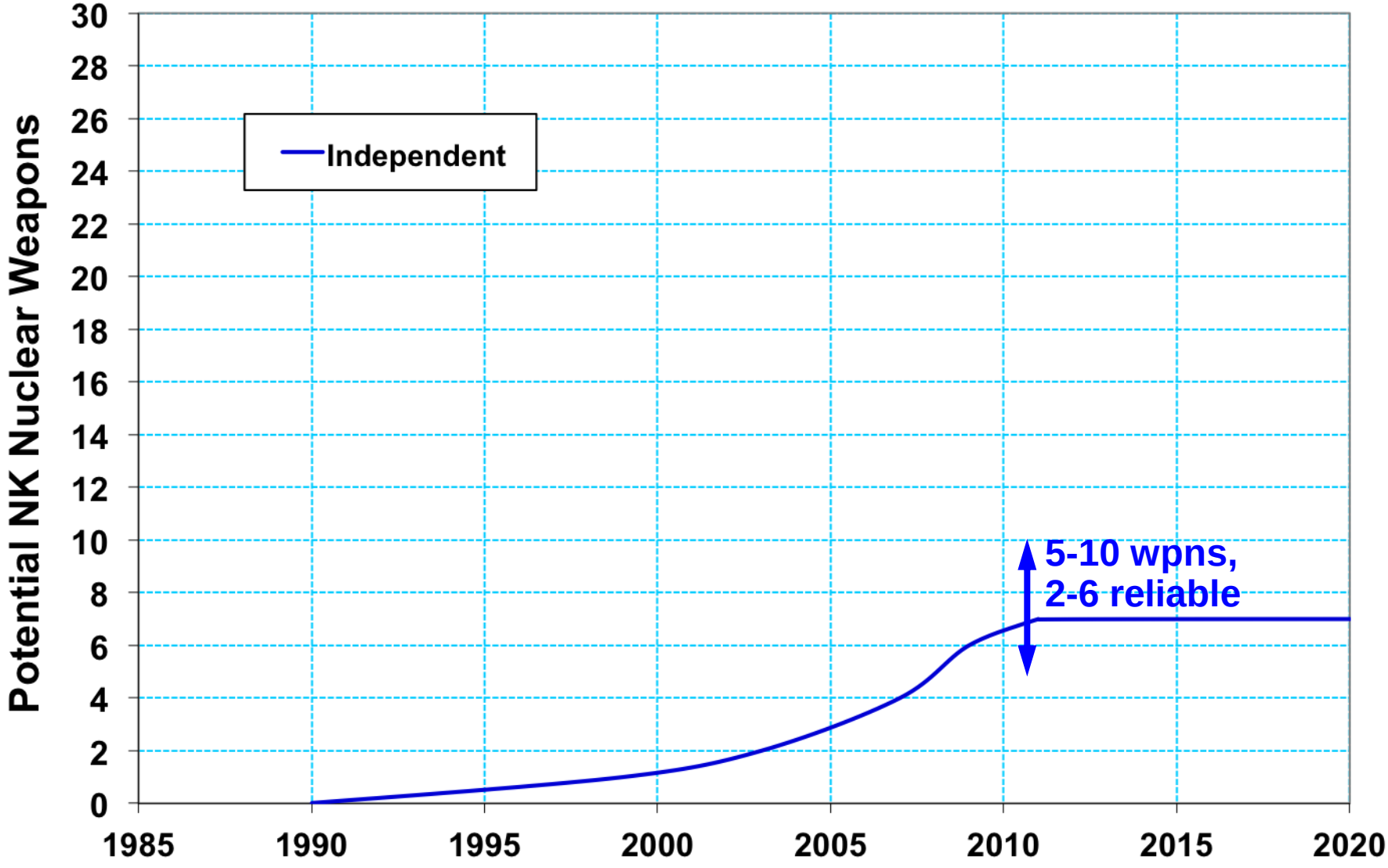
This material represents the author's views and not those of RAND or DoD

Outline

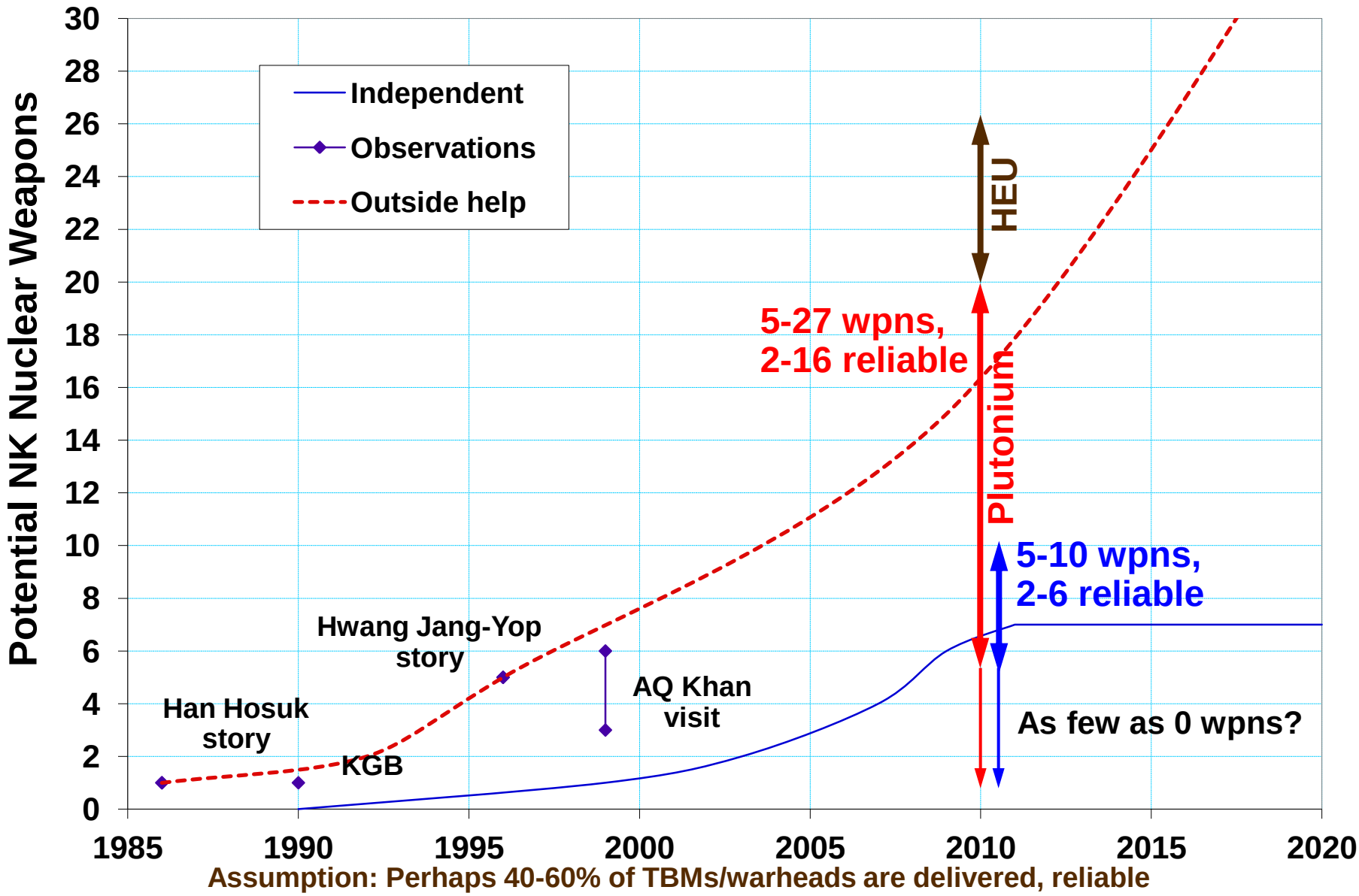
- **The North Korean nuclear weapon threat**
- **Deterring North Korean nuclear weapon use**
- **Contemplating US nuclear responses**

North Korean Nuclear Weapons Over Time



Assumption: Perhaps 40-60% of TBMs/warheads are delivered, reliable

North Korean Nuclear Weapons Over Time



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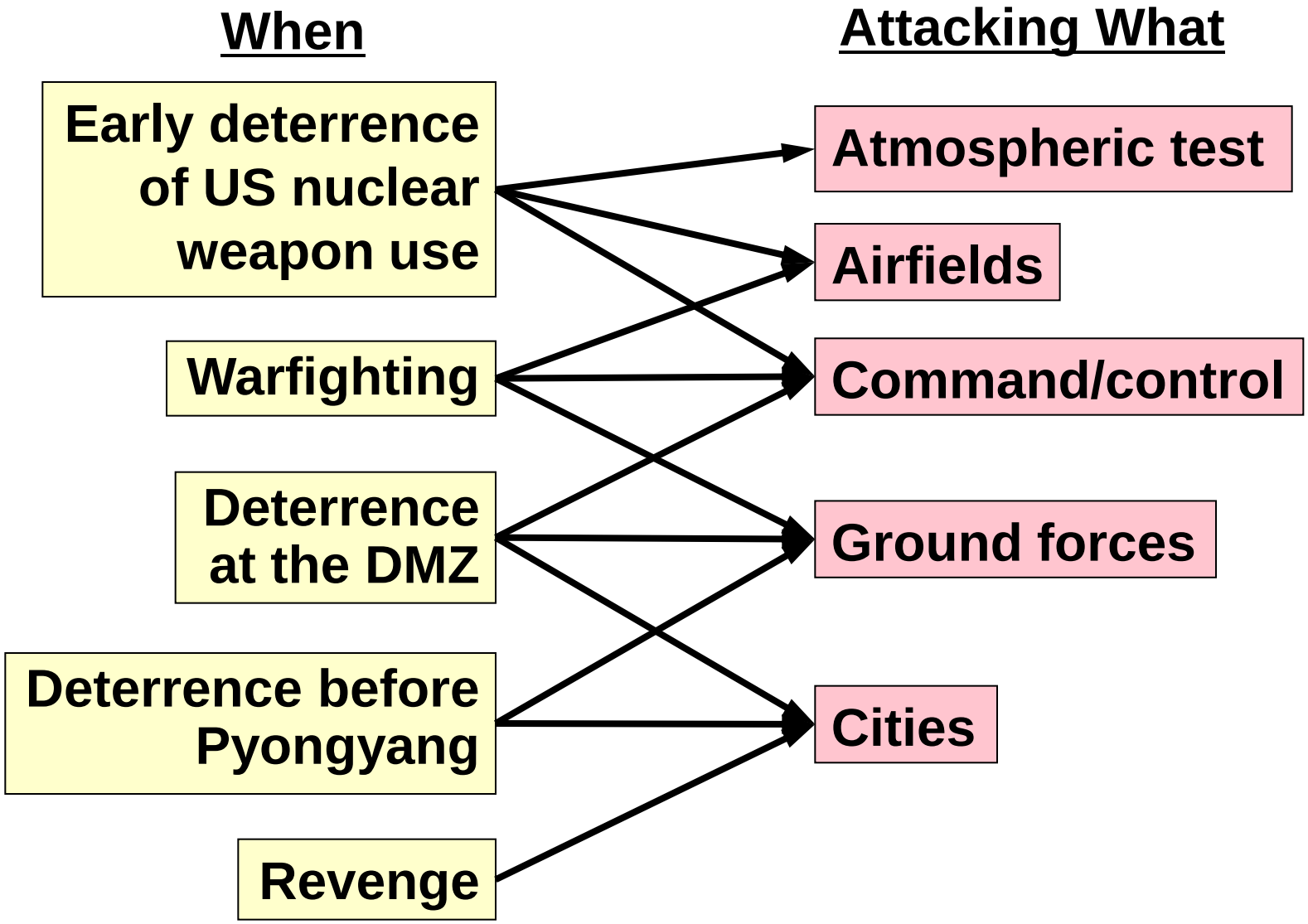
More details at www.rand.org/pubs/documented_briefings/DB589

How Could North Korea Use Nuclear Weapons?



Must deter all, not just best estimate

Approximate Nuclear Effects on ROK, Japanese Cities*

City	10 Kt		Casualties	
	Fatalities	Casualties	1 Kt	50 Kt[a]
Seoul	180,000	340,000	92,000	900,000
Pusan	150,000	260,000	72,000	650,000
Taegu	125,000	220,000	60,000	500,000
Kwangju	170,000	290,000	80,000	600,000
Taejon	110,000	200,000	56,000	500,000
Tokyo	170,000	320,000	90,000	800,000
Osaka	160,000	280,000	80,000	600,000

[a]Maximum casualties, assuming weapon detonates in the worst location.

*Ground burst

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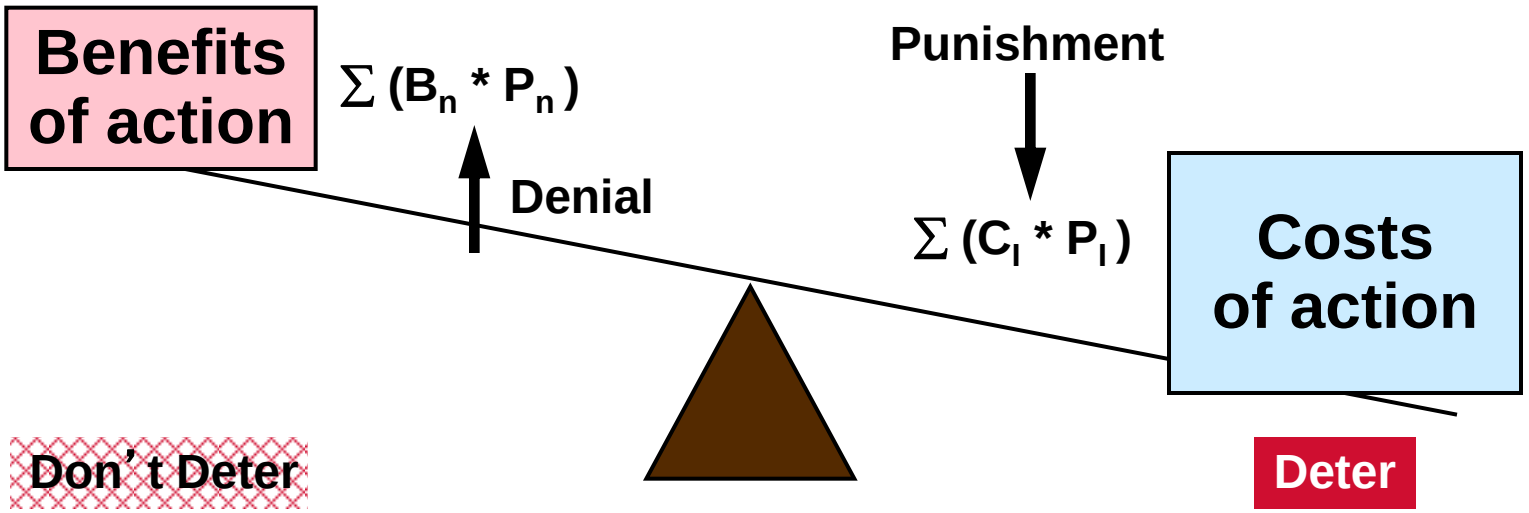
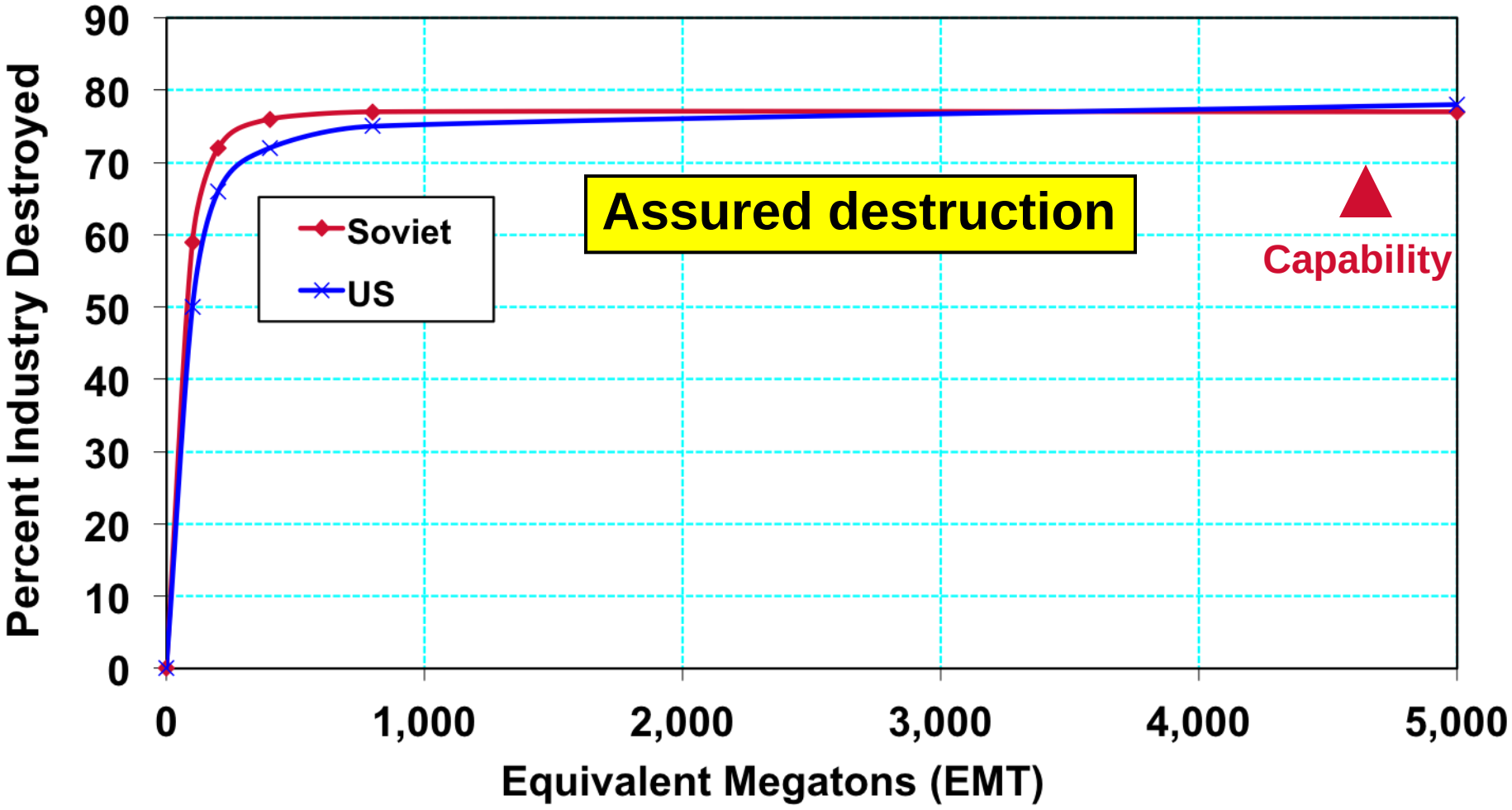
Deterrence: Adversary Balancing Between Perceived Benefits and Costs

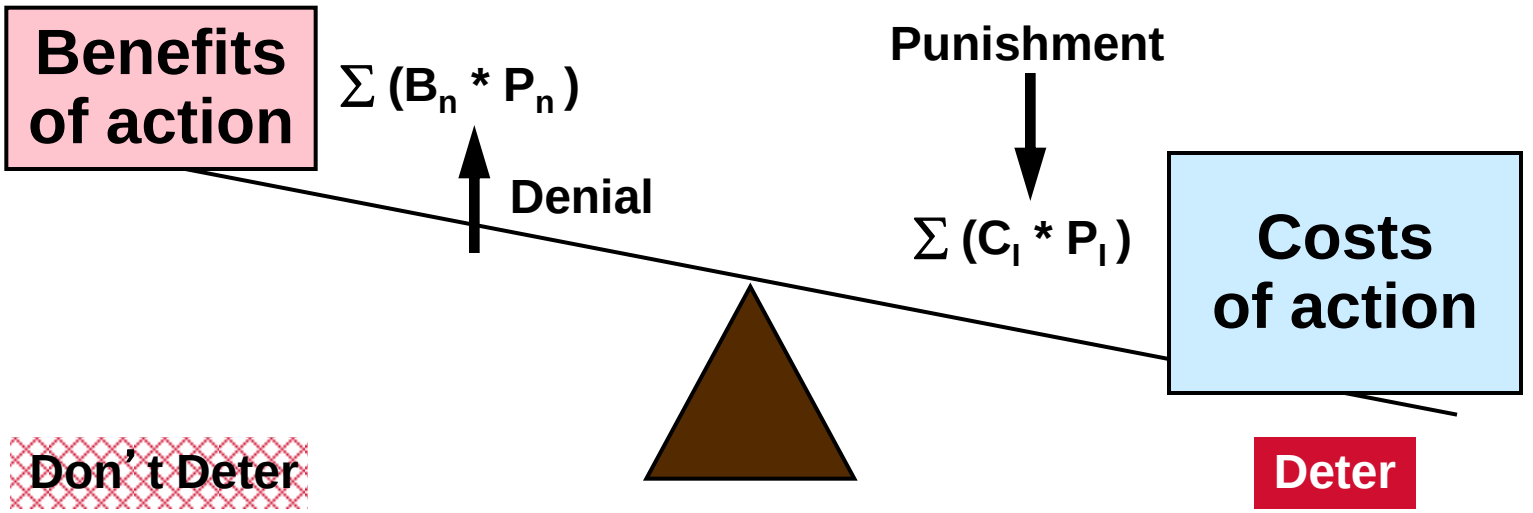


Cold War: Denial Not Feasible?



- Even a small city attack would be devastating
- Marginal cost of more warheads less than marginal defense cost

Deterrence: Adversary Balancing Between Perceived Benefits and Costs



US nuclear attack options vs. North Korea

1. Counterforce
2. Counter-leadership
3. Counter-military
4. EMP?

1. Counter-leadership
2. Counterforce
3. Counter-military
4. Demo

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US Nuclear Forces Under New START

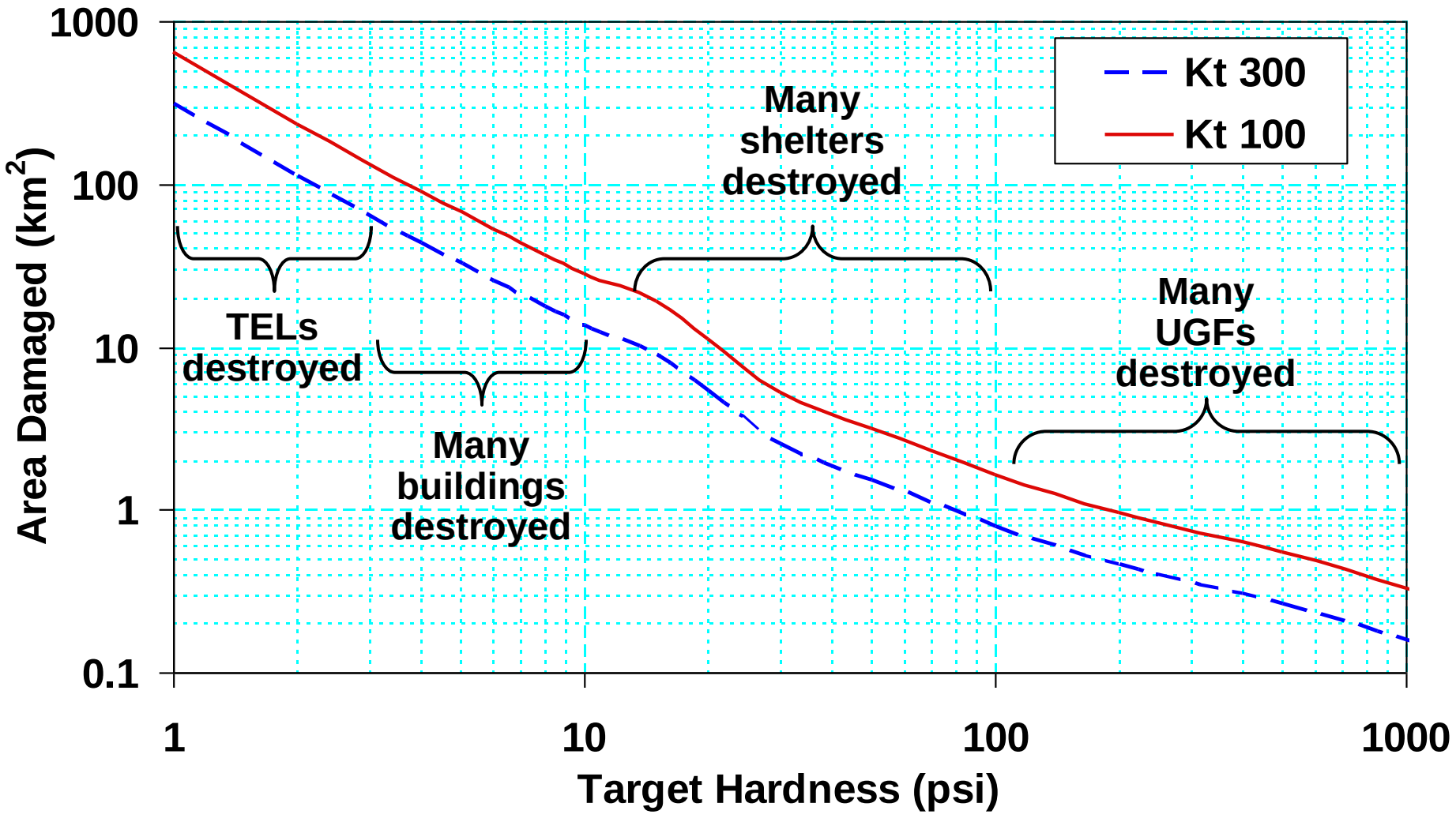
Weapon Type	Warhead Yield (Kt)	Accuracy (CEP, m)	Delivery Prob.	Availability (Day/War)	Deployed Total	
					New START Del. Veh.[a]	New START Warheads[a]
ICBM						
Minuteman III	335/300	183	85%	95%/99%	400/420	400/420
SLBM						
Trident D5	100	130-183	85%	50%/78%	240/280	660/760
	475	130-183	85%	50%/78%		300/360
Bomber						
B-2	≤ 1,200	Small[b]	85%	0%/90%	16/20	16/100
B-52	150	Small[b]	80%	0%/90%	44/50	44/216
Strategic total					700/770	1,420/1,856
Tactical bombs	≤ 170			0%/90%	—	—/400
TLAM-N	150			—	—	0
Totals						—/2,256

[a]Delivery vehicles or warheads: Allowed/total.

[b]At risk to GPS jamming

Sources: *Bulletin of the Atomic Scientists*, Arms Control Association, National Resources Defense Council, "U.S. Nuclear Weapon Enduring Stockpile"

Blast Effects Area Covered at Varying Hardness*



*Glasstone and Dolan, *The Effects of Nuclear Weapons*, 1977, pp. 111-115

Some Key Issues in Planning Nuclear Responses

- Intelligence
  - Does the United States know target locations?
  - Can the United States follow dispersal, mobility?
- Attribution: Was North Korea responsible for the attack?
- Doctrine, strategy, and C2
  - How should the US respond to NK threats?
    - Can conventional forces handle all targets?
    - How will the US respond to chem/bio use?
    - Will the US rely less on nuclear weapons?
  - Would proportional response suffice?
  - How long will a US response decision take?

Sample Strategic Targeting

- **Likely regime locations**
  - **Assume about 5**
  - **Buildings with UGFs**
  - **Need 2 warheads (or 3 ALCMs) per location to achieve 90% overall damage**
- **Missile complexes**
  - **10 complexes**
  - **Multiple UGFs/complex**
- **Nuclear facility**
  - **1 main—Yongbyon**
  - **Covers a large land area**

The Challenges of Using an ICBM

- 30 minute flight
  - No recall option
- Boosters falling on friendly territory
- Overflight—Risk ICBM failure
- Overflight—Will Russia mistake an attack?

Source: http://www.gcmap.com/

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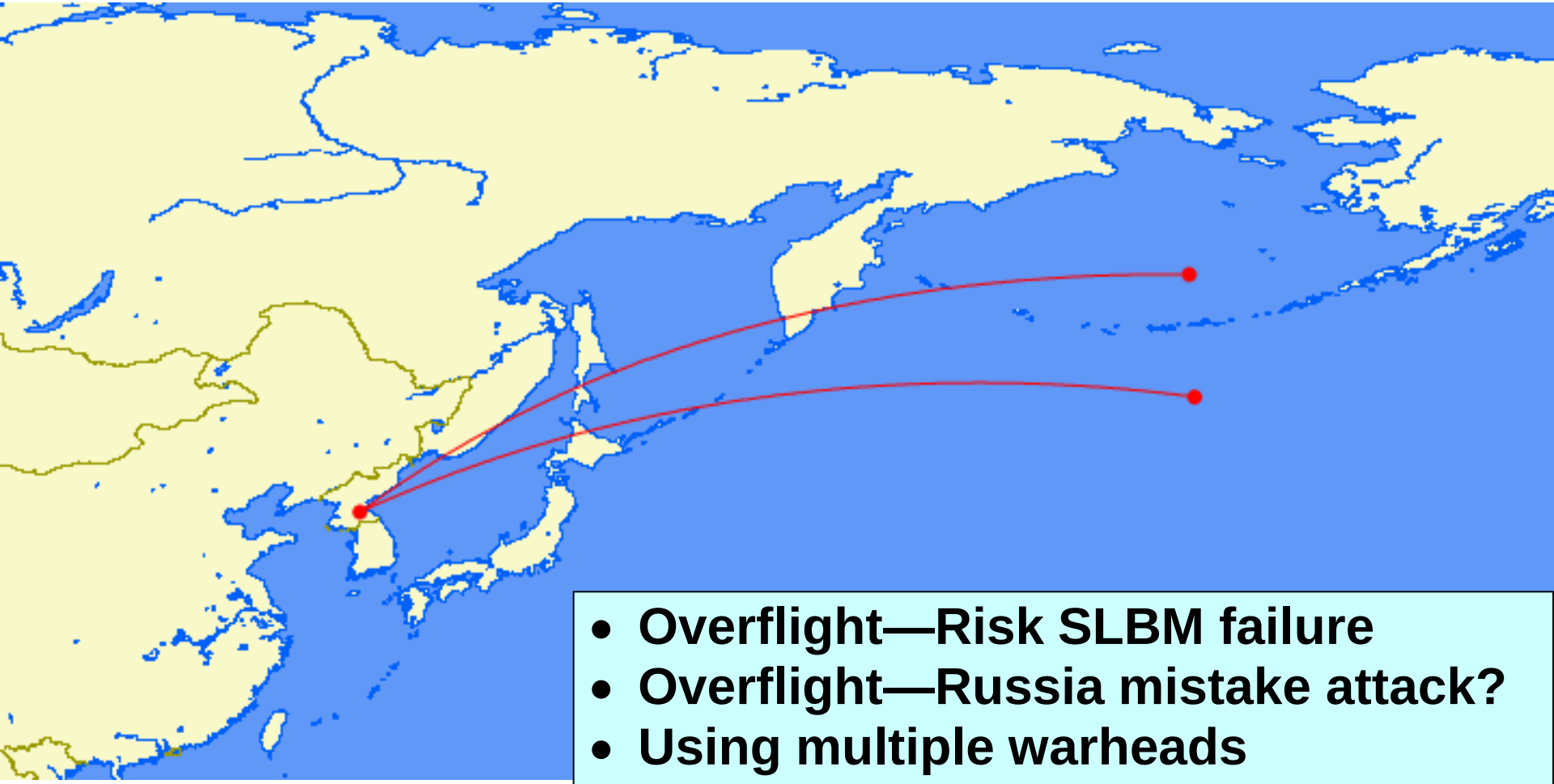
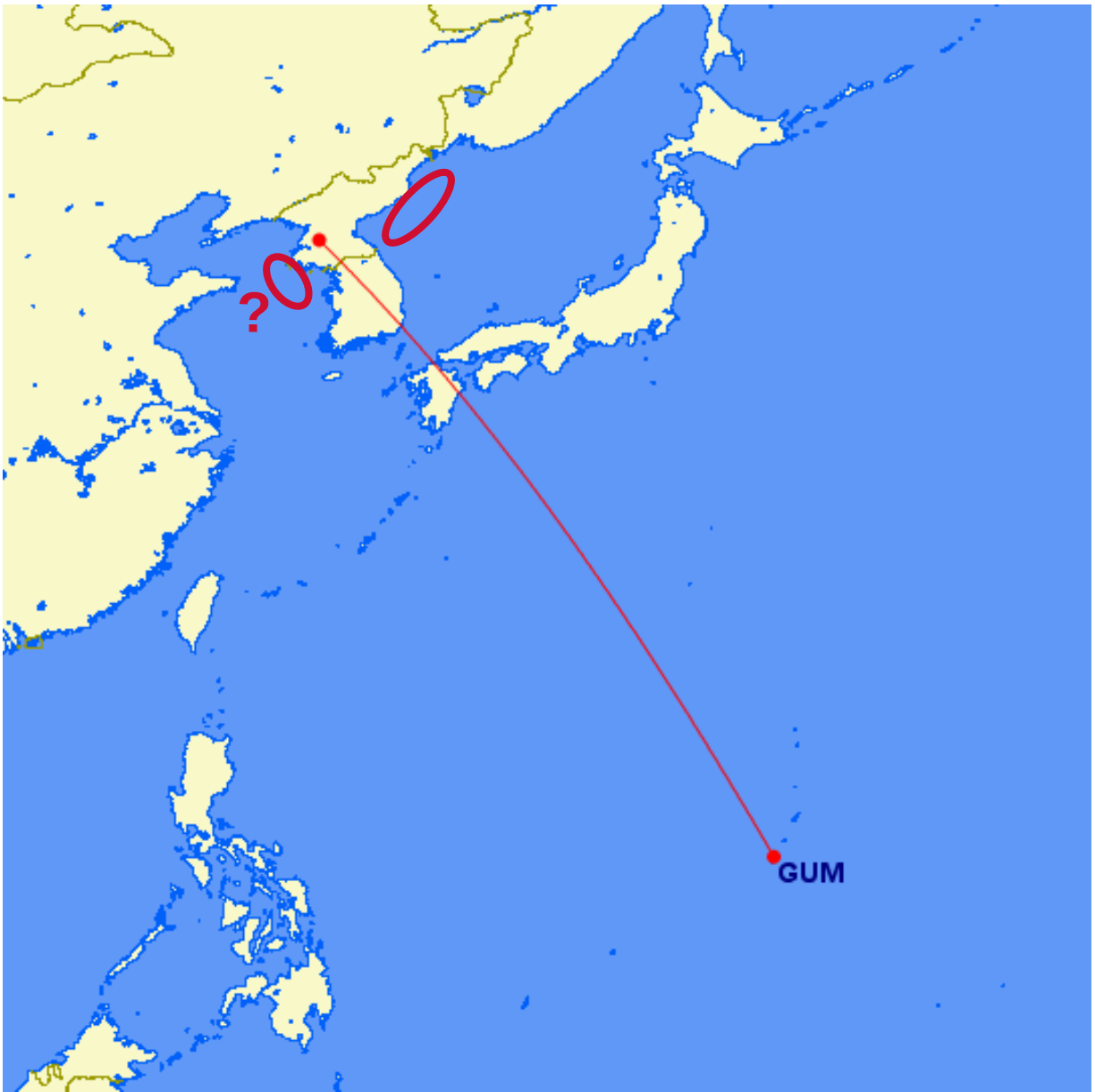
The Challenges of Using an SLBM



- Overflight—Risk SLBM failure
- Overflight—Russia mistake attack?
- Using multiple warheads
- 15-20 minute flight
  - No recall option

Source: http://www.gcmap.com/

The Challenges of Using a Bomber



- 4 hour flight
  - Recall option
- Overflight—Risk bomber/tanker failure
- Stationing
  - Limited time
  - Allowed over West Sea?

Source: http://www.gcmap.com/

Other Constraints: Altitude, Collateral Damage, Fallout

- Altitude
  - Bombers, fighters fly too low for EMP delivery
- Collateral damage
  - Problem with larger warhead yields
  - Lower yield weapons on fighters, bombers preferred?
    - Must deal with GPS jamming?
- Fallout (mainly for 100+ Kt yields)
  - Significant for attacks on hardened, underground targets
  - Lower to near zero for standard airbursts
  - Can cause casualties tens of kilometers downwind
  - Measurable hundreds of kilometers downwind

Possible Fallout Patterns

- Would affect N Korea
  - Expect large casualty levels
  - Deaths occur over time
- Could affect the ROK, Japan
  - Depends on wind direction, height of burst
  - Radiation detectable, could be many times Fukushima levels
- Could affect China
- Could affect ships at sea

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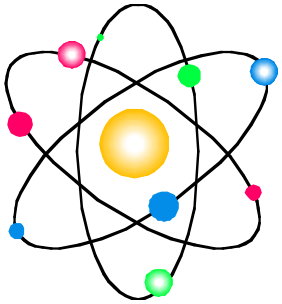
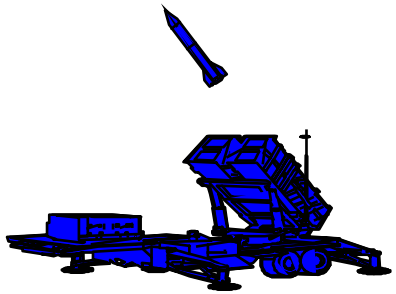
Conclusions

- North Korea poses a serious nuclear weapon threat
- The United States hopes to deter that threat
- But US efforts will be constrained by
  - Intelligence and attribution
  - Strategy
  - Overflight
  - Collateral damage/fallout
  - Force reduction





Questions?