Conventional Counterforce Strike:
An Option for Damage Limitation Operations against Medium-Sized Nuclear-Armed Adversaries?

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Damage Limitation in Conflicts

- Damage limitation
  - Preemptive strike
  - Strike after being attacked to prevent further offensives
- Nuclear option
- Conventional option
  - Conventional weapons will permit the U.S. to "conduct a counterforce strike without crossing the nuclear threshold, and without killing millions". (Keir A Lieber and Daryl G Press)
  - The risks associated with such conventional strike are "sufficiently low and manageable", and "they do not constitute a reason to forgo acquiring the capability". (National Research Council: U.S. Conventional Prompt Global Strike: Issues for 2008 and Beyond)

Is Conventional Counterforce Strike Feasible?

- Is conventional counterforce strike feasible (against a sophisticated medium-sized nuclear-armed state)?
- Previous studies about conventional counterforce strike
  - Lieber and Press
  - ICBM (Inter-Continental Ballistic Missile)
- Theater nuclear forces vs. strategic nuclear forces
- Hypothetical scenario: U.S.-China conflict over Taiwan
  - Chinese theater nuclear forces

Chinese Theater Nuclear Forces

Type/Chinese designation (US designation)	No. deployed	Year first deployed	Range (km)	Warhead loading	No. of warheads
Land-based missiles with limited mobility	*24*				
DF-3A (CSS-2)	~16	1971	3,100	1 × 3.3 Mt	~16
DF-4 (CSS-3)	~12	1980	5,400 +	1 × 3.3 Mt	~12
Land-based missiles with high mobility	75				
DF-21 (CSS-5 Mods 1, 2)	~60	1991	2,150	1 × 200–300 kt	~60
DF-31 (CSS-10 Mod 1)	10-20	2006	7,200+	1 × 200–300 kt ?	10-20
SLBMs	(*36*)				
JL-1 (CSS-N-3)	(12)	1986	1,000+	1 × 200–300 kt	n.a.
JL-2 (CSS-N-4)	(36)	(?)	~7,400	1 × 200–300 kt ?	n.a.
Aircraft	*>20*				
H-6 (B-6)	~20	1965	3,100	1 × bomb	~20
DH-10	?			?	

Source: Kristensen, H., & Norris, R. (November 01, 2011). Chinese nuclear forces, 2011. *Bulletin of the Atomic Scientists, 67,* 6, 81-87.

Precision-Guided Weapons in the U.S. Inventory

Type	Weight (kg)	Penetrating Munitions	Range (km)	Guidance Systems	CEP (m)	Delivery Systems
			Guided air bombs			
MOP (Massive Ordnance Penetrator)	13600	9000 kg Warhead		INS, GPS		B-52, B-2
GBU-15	1125	BLU-109	8 - 25	Teleguidance system, INS, GPS	~ 3	F-15E
GBU-31 (JDAM)	1070	BLU-109	25	INS, GPS	< 6	B-1, B-2, B-52, F-14, F-15E, F-16, F-22, F/A-18
GBU-32 (JDAM)	450	BLU-110	25	INS, GPS	< 6	
GBU-38 (JDAM)	225	BLU-111	25	INS, GPS	< 6	
GBU-28	2115	BLU-122, BLU-113	5 - 40	Laser, GPS	< 10	B-2, F-15E
GBU-27	1070	BLU-116, BLU-109	5 - 40	Laser, GPS	< 10	F-15E, F-16
GBU-24	1070	BLU-116, BLU-109	5 - 40	Laser, GPS	< 10	F/A-18, F-14
GBU-10 (EGBU-10)	1070	BLU-109	3 - 25	Laser, GPS	< 10	B-52, F-14, F-15E, F-16, F/A-18
AGM-154B (JSOW)	450	BLU-108	< 130	INS, GPS		
			Guided missiles			
AGM-130	1300	BLU-109	> 65	INS, GPS, Teleguided	< 3	F-15E
SLAM-ER	230	WDU-40?B	< 280	INS, GPS, Teleguided	~ 2.5	
JASSM	450		> 320	INS, GPS		
JASSM-ER	450		> 800	INS, GPS		
			Long-rang cruise missiles			
TLAM	340	WDU-43/B	1600	INS, GPS, Automatic self-guided warhead	~ 5	
Tact Tomahawk	450	WDU-43/B	1600	INS, GPS, Automatic self-guided warhead	~ 5	
CALCM	1430	AUP	> 1000	INS, GPS	~ 2.5	

Source: Yevgeny Miasnikov. "The Counterforce Potential of Precision-Guided Munitions." In Nuclear Proliferation: *New Technologies, Weapons, Treaties*, edited by Alexei Arbatov and Vladimir Dvorkin. Moscow: Carnegie Moscow Center, 2009.

Survivability of Land-Based Missiles (Limited Mobility)

- DF-3A, DF-4
- Underground Great Wall
- Range of Maximum Destruction for Conventional Precision-Guided Weapons in Granite

Weapon	**Explosive Weight (kg)**	**Yield (kg, TNT equivalent)**	**Range of Destruction (m)**
BLU-109	243	365	14.7
BLU-116	243 or less	365 or less	14.7 or less
BLU-113	N.A.	304	13.8
SLAM-ER (AGM-84H)	230	345	14.4
JASSM (AGM-158A)	450	675	18
TLAM	450 or less	675 or less	18 or less
CALCM (AGM-86C/D)	N.A.	1,300	22.4
MOP (Massive Ordnance Penetrator)	3,500	5,250	35.7

Survivability of Land-Based Missiles (High Mobility)

- DF-21,DF-31
- Transporter-erector-launcher (TEL)
- IMU and GPS guidance
- Problem with barrage strategy
  - Lethal radius is smaller than CEP

Weapon	Guidance system	CEP (m)	LR (m)	SSPK	P(2)	P(3)	P(4)	P(5)	P(6)
BLU-109	INS	~ 30	14.29314	0.146	0.270	0.376	0.467	0.545	0.611
BLU-116	Laser	~ 50	14.29314	0.055	0.107	0.156	0.203	0.247	0.288
BLU-113	Laser	~ 50	13.4479	0.049	0.095	0.140	0.182	0.222	0.260
SLAM-ER (AGM-84H)	INS, Teleguided	~ 12.5	14.02716	0.582	0.825	0.927	0.970	0.987	0.995
JASSM (AGM-158A)	INS	~ 12	17.54411	0.773	0.948	0.988	0.997	0.999	1.000
TLAM	INS, Automatic self-guided warhead	~ 25	17.54411	0.289	0.495	0.641	0.745	0.819	0.871
CALCM (AGM-86C/D)	INS	~ 12.5	21.82786	0.879	0.985	0.998	1.000	1.000	1.000
MOP (Massive Ordnance Penetrator)	INS	~ 25	34.76027	0.738	0.931	0.982	0.995	0.999	1.000

Survivability of SLBM and Nuclear-Capable Bomber

- SLBM
  - JL-1, JL-2
  - Underground submarine facilities
  - Submerged tunnels and entrances
    - Problem of tracking submarines
- Nuclear-capable bomber
  - H-6
  - Runways

Functional Defeat

- Damage limitation operation
- Chinese countermeasure
  - Redundant entrances
  - Camouflage
  - Decoys
- Historical record of identifying WMD facilities
  - Gulf War: facilities unidentified
  - Iraq War: facilities misidentified

Future U.S. Conventional Prompt Global Strike Capability

Weapon Systems	Launch Vehicles	Combat Range (nm, nautical mile)	Munitions Payload Capacity (lb)	Accuracy (meter)	Earliest Initial Operational Capability (IOC)
Conventional Strike Missile (CSM) / Hypersonic Test Vehicle (HTV-2)	Minotaur IV	> 6,000	1,000-2,000	~3	2016-2020
Advanced Hypersonic Weapon (AHW)	Strategic Targets System booster stack	< 6,000	n.a.	<10	n.a.
Arclight	Standard Missile 3	2,000	100-200	n.a.	n.a.
Hypersonic Cruise Missile	Launched on land, from aircraft, or from ships	> 500	1,000-2,000	3-5	2020-2024
Submarine-Launched Global Strike Missile (SLGSM)	2-stage rocket booster	3,000	2,000	<5	2015-2018
Space Operations Vehicle	Trans-atmospheric Vehicle	Global coverage	1,000	~3	Later than 2020
Space-Based Launch Platform	Rockets	Global coverage	> 2,000	~3	Later than 2020

Conclusion and Policy Implication

- Conclusion
  - Conventional counterforce strike/damage limitation operation
  - Ineffective (current and future capabilities) against theater nuclear weapons
  - Countermeasures
    - Robust underground facility
    - Early warning, air defense, missile defense
  - Uncertainty of intelligence
  - Inadvertent escalation
- Policy implication
  - Offense-defense balance
  - Deterrent vs. damage limitation
  - Reassurance to Russian/China
  - Conventional arms race and crisis stability