

# Nuclear Weapons

## Lessons from the Cold War and thoughts for the future

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## Broken Arrow



*The Declassified History of U. S. Nuclear Weapons Accidents*

by Michael H. Maggelet and James C. Oskins



# Agenda

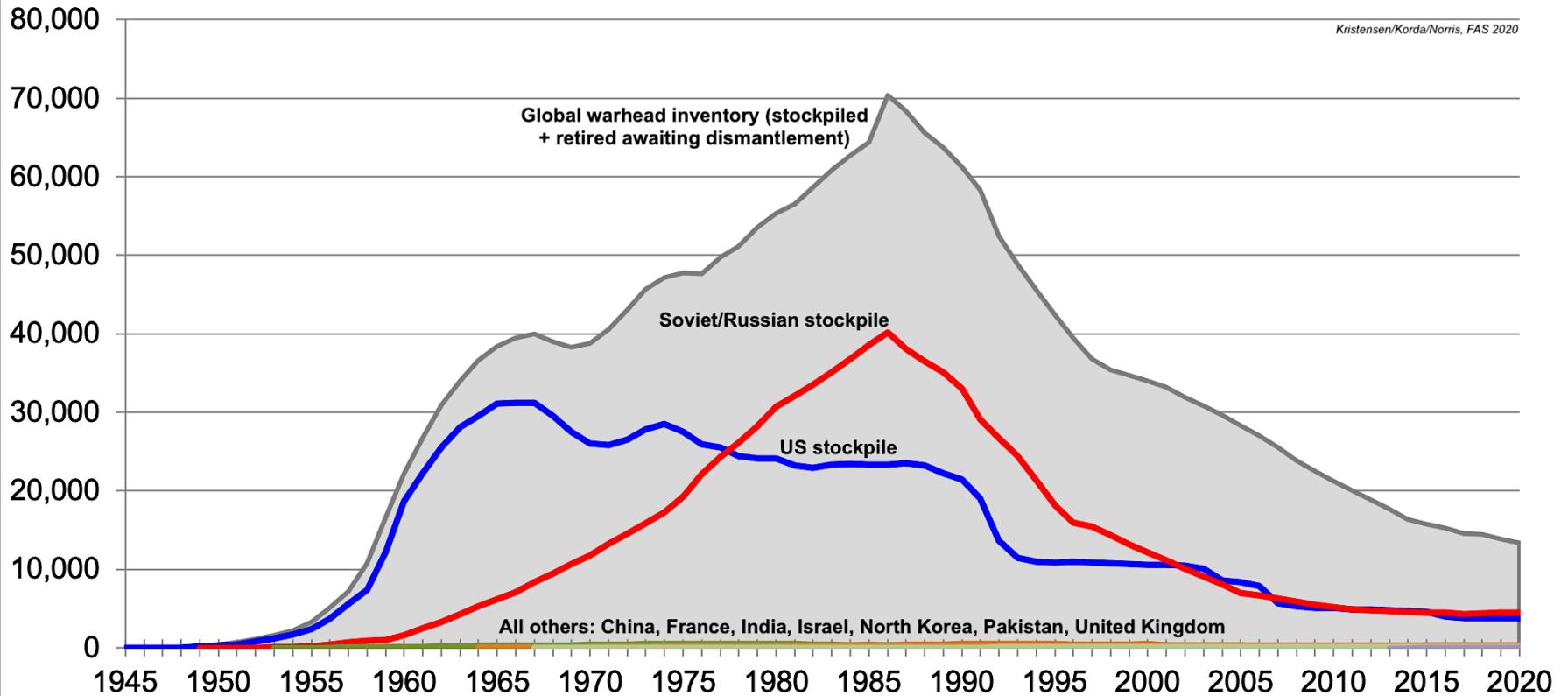
Cold War Era Nuclear Standoffs +

Requirements for successful deterrence

1<sup>st</sup> and 2<sup>nd</sup> Strike

Missile Defense

# Estimated Global Nuclear Warhead Inventories 1945-2020



[Source: Federation of American Scientists](#)



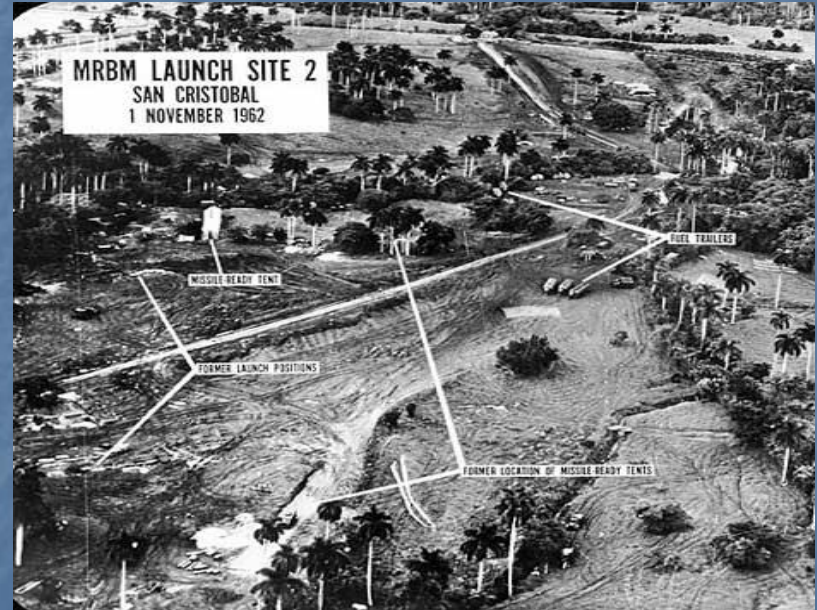
### Status of World Nuclear Forces 2020\*

Country	Deployed Strategic	Deployed Nonstrategic	Reserve/ Nondeployed	Military Stockpile <sup>a</sup>	Total Invent
Russia	1,572 <sup>c</sup>	0 <sup>d</sup>	2,740 <sup>e</sup>	4,312	6,372 <sup>f</sup>
United States	1,600 <sup>g</sup>	150 <sup>h</sup>	2,050 <sup>i</sup>	3,800 <sup>j</sup>	5,800 <sup>k</sup>
France	280 <sup>l</sup>	n.a.	10 <sup>l</sup>	290	290
China	0 <sup>m</sup>	?	320	320	320 <sup>m</sup>
United Kingdom	120 <sup>n</sup>	n.a.	75	195	195 <sup>n</sup>
Israel	0	n.a.	90	90	90 <sup>o</sup>
Pakistan	0	n.a.	160	160	160 <sup>p</sup>
India	0	n.a.	150	150	150 <sup>q</sup>
North Korea	0	n.a.	35	35	35 <sup>r</sup>
<b>Total:<sup>s</sup></b>	<b>~3,720</b>	<b>~150</b>	<b>~5,630</b>	<b>~9,320</b>	<b>~13,410</b>

[Source: FAS 2020](#)

# Nuclear Deterrence: Mixed Record

- Cold War – Cuba 1962; +



# Nuclear Deterrence: Mixed Record



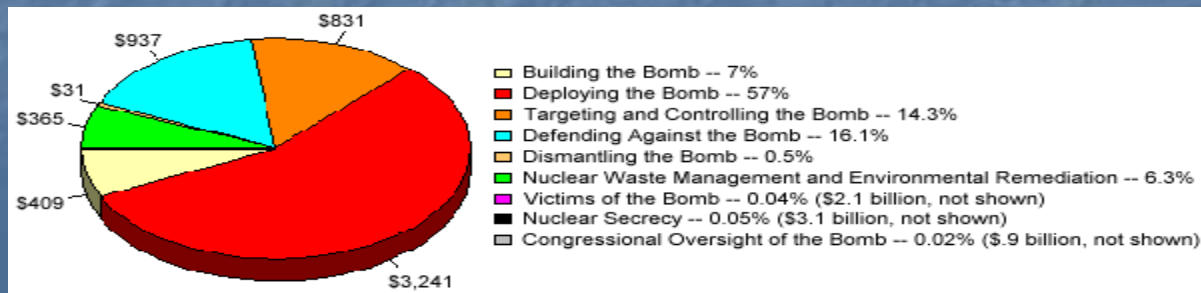
USSR V PRC @ Ussuri River 1969



India V Pakistan @ Kargil 1999

# Opportunity Costs of Nuclear Program

- US Spent > \$5.5 Trillion dollars 1944-96
  - ~10% Govt spending
- Cleanup
  - Hanford Alone \$11.3B





# Successful Deterrence

- Capability
- Credibility
- Communication

# 1<sup>ST</sup> STRIKE VS 2<sup>ND</sup> STRIKE

# 1<sup>st</sup> Strike vs 2<sup>nd</sup> Strike

## 1<sup>st</sup> Strike Weapon



Russian SS-18

## 2<sup>nd</sup> Strike Weapon



Chinese DF-31A

# 1<sup>st</sup> Strike vs 2<sup>nd</sup> Strike

## 1<sup>st</sup> Strike Weapon



Minuteman III

## 2<sup>nd</sup> Strike Weapon

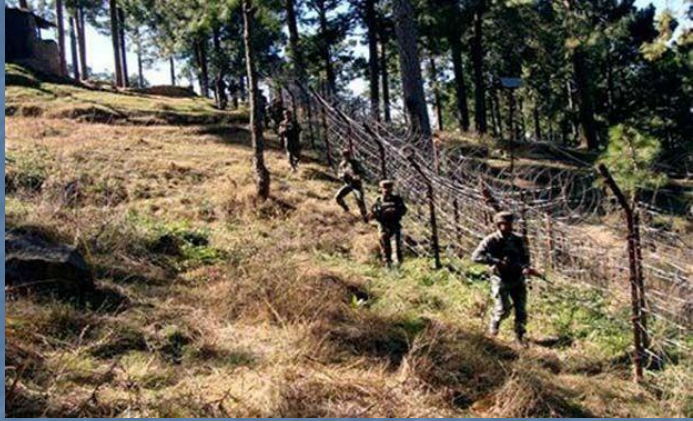


Ohio Class Submarine 12



# Our Nuclear deterrence future...

# Nuclear Deterrence: Future?



LOC – S Asia



DMZ - Korea



Taiwan Straits



Russia

# AVANGARD HYPERSONIC MISSILE



# Russia



Администрация  
**Государственный ракетный центр**  
научно-исследовательский Ц.П. Машинов

Новости Государства Деятельность Проекты Социальная Миссия

### Опытно-конструкторская работа «Сармат»

В соответствии с Программой государственного вооружения на 2011-2020 гг. в рамках проекта «Сармат» в АО «ЦСКБ ЦСКВ» начата опытно-конструкторская работа (ОКР) по созданию гиперзвуковой ракеты «Сармат». Проектная работа ведется в тесном взаимодействии с Минобороны России и другими заинтересованными организациями. Техническое задание ОКР утверждено в 2011 году.



# China

Menu Search

Bloomberg

Welcome

Politics

## Pentagon Warns China Is Nearing a Milestone in Nuclear Weapons Buildup

By [Anthony Capaccio](#)

September 1, 2020, 6:00 AM HST *Updated on September 1, 2020, 11:22 PM HST*

- China is on the cusp of deploying nuclear capable bombers, Giving it a “triad”

- China will double it’s nuclear force in next 10 years



## Estimated Chinese Nuclear Forces 2020 And 2030\*

Type	Fielded	Loading	2020 Estimate		2030 Projection	
			Launchers	Warheads	Launchers	Warheads
<i>Land-based ballistic missiles</i>						
DF-4	1980	1 x 3.3 mt	6	6	0	0
DF-5A	2005	1 x 4-5 mt	10	10	10	10
DF-5B	2015	5 x 200-300 kt MIRV	10	50	10	50
DF-21A	1996	1 x 200-300 kt	20	20	0	0
DF-21E	2016	1 x 200-300 kt	20	20	40	40
DF-26	2016	1 x 200-300 kt	200	20	300	20
DF-31	2006	1 x 200-300 kt	6	6	0	0
DF-31A	2007	1 x 200-300 kt	36	36	0	0
DF-31AG	2018	1 x 200-300 kt	36	36	72	72
DF-41	(2020)	3 x 200-300 kt MIRV	(16)	(48)	24	72
<b>Subtotal</b>			<b>336</b>	<b>216</b>	<b>456</b>	<b>284</b>
<i>Sea-based ballistic missiles</i>						
JL-2	(2015)	1 x 200-300 kt	48	48	72	72
JL-3	(2026)	3 x 200-300 kt			24	72
<b>Subtotal</b>			<b>48</b>	<b>48</b>	<b>96</b>	<b>144</b>
<b>Subtotal ballistic missiles</b>			<b>384</b>	<b>264</b>	<b>552</b>	<b>428</b>
<i>Air-based weapons</i>						
H-6K	(2015)	1 x bomb	20	20	0	0
H-6N	(2020)	1 x ALBM	(0)	0	10	10
H-20	(2025)	2 x ALCM?	0	0	10	20
<b>Subtotal</b>			<b>20</b>	<b>20</b>	<b>20</b>	<b>30</b>
<b>Total</b>			<b>404</b>	<b>284**</b>	<b>572</b>	<b>458</b>

\* This table builds on estimates published earlier this year but modified for new information included in the 2020 DOD report. The 2030 projection shows what the “more than doubling” of the Chinese stockpile that DOD anticipates over the next decade could potentially look like.

\*\* The DOD report states that China currently maintains an “operational” nuclear warhead stockpile in the low-200s. The estimate probably does not include warheads produced for weapons that are not yet operational, including the DF-41 and JL-2 SLBMs on the two additional SSBNs, and probably does not count bombs for bombers.

*Kristensen/Korda, FAS 2020*

# South Asia

- Cold Start
- Terror Attacks
- Loss of control



# Can We Counter Nuclear Weapons?

# Missile Defense

From 1985 – 2019

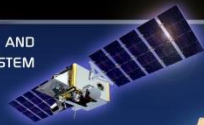
\$200B +



# BMDs - THE BALLISTIC MISSILE DEFENSE SYSTEM

## SENSORS

SPACE TRACKING AND SURVEILLANCE SYSTEM



SEA-BASED X-BAND RADAR



AEGIS BMD SPY-1 RADAR



FORWARD-BASED RADAR



EARLY WARNING RADAR

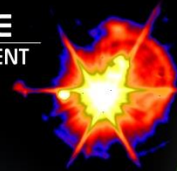


## BOOST/ASCENT DEFENSE SEGMENT



POTENTIAL NEW TECHNOLOGIES

## MIDCOURSE DEFENSE SEGMENT



## TERMINAL DEFENSE SEGMENT

SEA-BASED TERMINAL



AEGIS BALLISTIC MISSILE DEFENSE STANDARD MISSILE-3



SM-3

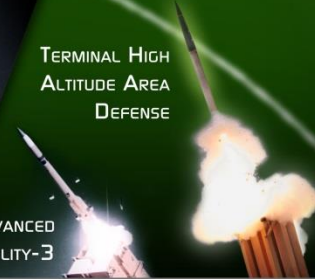
GBI



GROUND-BASED MIDCOURSE DEFENSE



TERMINAL HIGH ALTITUDE AREA DEFENSE



PATRIOT ADVANCED CAPABILITY-3



## C2BMC

COMMAND, CONTROL, BATTLE MANAGEMENT AND COMMUNICATIONS

NMCC

USSTRATCOM

USNORTHCOM

USPACOM

EUROM

CENTCOM

APPROVED FOR PUBLIC RELEASE  
10-MDA-5382 (13 MAR 10)

# Missile Defense

- Faster = harder
- Offense is cheaper
- Alternative delivery systems
- Arms race continues....

# The only real counter to nuclear weapons...

- Deterrence via second strike capability

# Future Proliferation





# Discussion



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