Nuclear Modernization and National Security
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Reducing the Dangers of Nuclear War
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• Why is Russia so worried about missile defense?
• Why are we arming on such a scale?
  what is the message, what are the consequences?
• Ballistic missile defense
• Increasing missile accuracy
• our interdependent MAD world
  the more we spend the less secure we are
Why are the Russians afraid of US missile defense?

• started in the Star Wars era “space strike weapons”
• Overlooked fear of high tech developments in surveillance, command, and control
• US spending large sums in high tech weaponry
  Russia cannot/does not want to compete
• their fear is important today
• they fear a decapitating first strike
• a major impediment to progress in stability, arms control
Nuclear Weapons Maintenance

- Last US test 1992 (No. 1132)
- 1994 Science Based Los Alamos Stockpile Stewardship maintains weapons without exploding them: experiments test components, supercomputers model weapons
- enhanced safety, reliability
- Life extension, annual assessment

Modernization

- 30 to 50 year plans to modernize all strategic delivery systems
- new Start level-although Pentagon certified 1/3 reduction OK
- cost ~ $18b/y 2021 to 2035 in FY 2016 dollars, increase from ~ 3% to 7% military budget
- total cost of ~ $1T over the next 30 years
- improve missile accuracy: advanced fusing
- improved accuracy: B61-12 bomb
- ~ 1000 cruise missiles
Modernization: Improving missile accuracy
burst height compensation fuse

Destructive power
\( \sim \frac{Y(kT)}{\text{CEP}^2} \)

slide from T. Postel
how does it work?

conventional fuse

burst height compensation fuse

slide from T. Postel
Crater Dimensions from a 475kt W-88 Near-Surface Nuclear Explosion

Trident II W88 475 kt Warhead
Against a Deeply Buried Underground Command Post

Underground Command Center the Size of the Capitol Building

slide from T. Postel
Accidental Nuclear War

- US- Russia have ~900 missile on Launch on warning
- flight times are ~ 30 min for ICMB, ~ 15 min for SLBM
  US SLBM systems are now first strike capable
  ICBM more vulnerable – Russian reliance
- decision times are shorter
- Russian early warning system antiquated
- as tensions rise these could be automated
  leading to crisis instability
- combination of all factors including US modernization ⇒
greater danger, perhaps than during the cold war
**B61-12** improved accuracy  CEP 100m -> 30 m
standoff firing from bomber     variable yields  0.3 -> 50kT

**A More Accurate Atom Bomb**
The United States military is replacing the fixed tail section of the B61 bomb with steerable fins and adding other advanced technology. The result is a bomb that can make more accurate nuclear strikes and a warhead whose destructive power can be adjusted to minimize collateral damage and radioactive fallout.
We live in an interconnected MAD world

- Russian early warning system error → mutual annihilation
- fire, blast, radiation; nuclear winter
- probability increases with rising tension, suspicion
- we need appropriate levels of defense, not offense
- At this time less military spending leads to a safer world