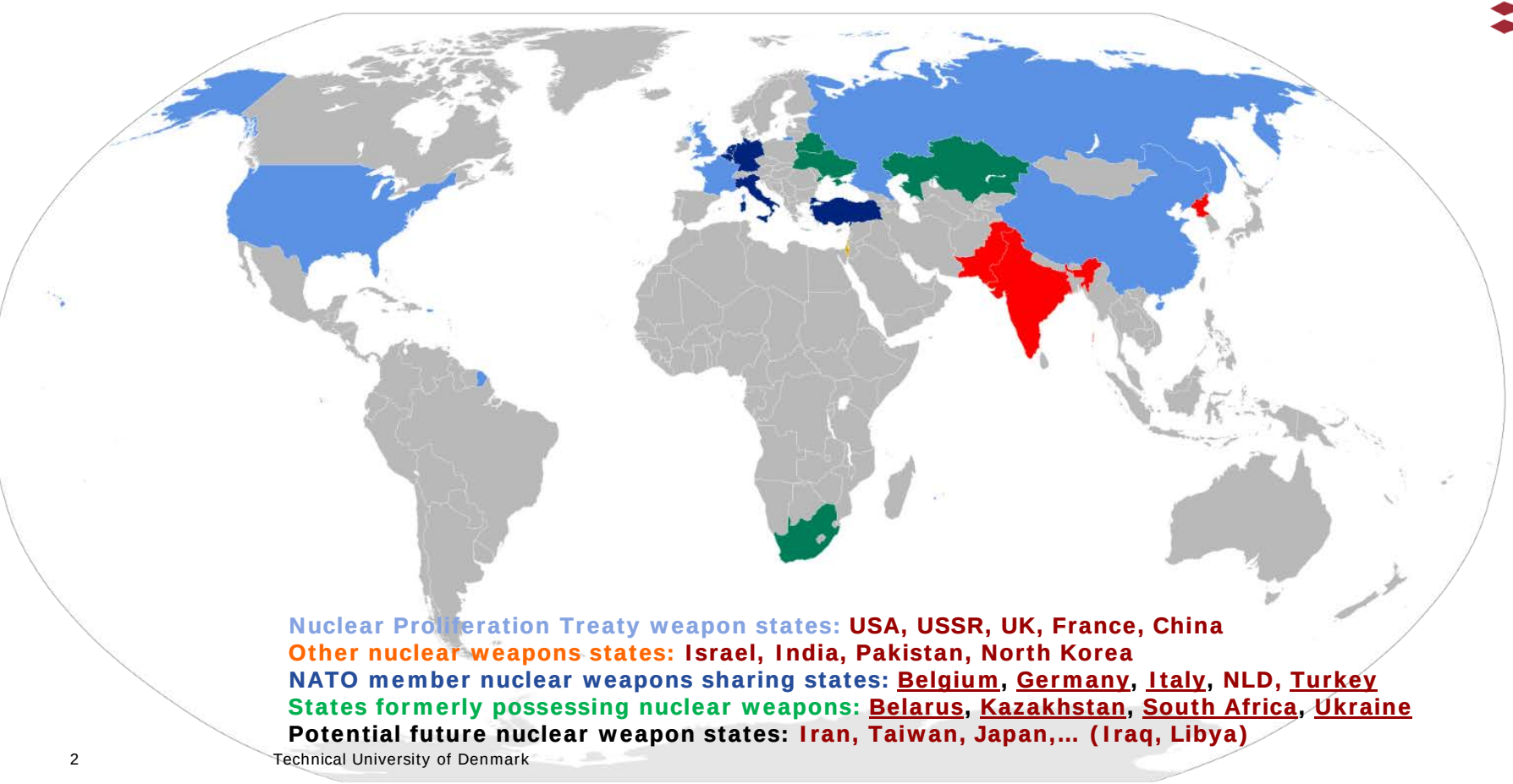
Rusland-Kina og frygten for Nuklear Missiler i Asien - Hvad er Missiler?

1. Missiler=Raket+Styresystem+Sprængladning(er)
2. Atomvåben
3. Missiler/raketter
4. Spredning fra USSR til Kina, Indien, Pakistan, Nord-Korea, Iran,…
5. Den (U)naturlige teknologiske udvikling og spredning
6. Fremtiden: Ramjets og nuclear powered cruise missiles
7. Mars: Kina, USA, SpaceX

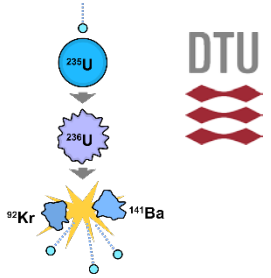
Dr. Henning Heiselberg
Head of Center for Security DTU
Technical University of Denmark
www.security.dtu

Nuclear Weapons Map



Nuclear Proliferation Treaty weapon states: USA, USSR, UK, France, China
Other nuclear weapons states: Israel, India, Pakistan, North Korea
NATO member nuclear weapons sharing states: Belgium, Germany, Italy, NLD, Turkey
States formerly possessing nuclear weapons: Belarus, Kazakhstan, South Africa, Ukraine
Potential future nuclear weapon states: Iran, Taiwan, Japan,… (Iraq, Libya)

Nuclear Weapons

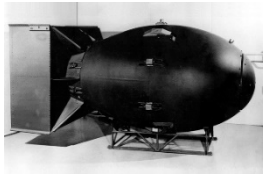


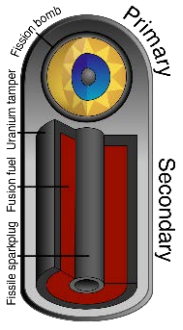
Atomic fission bombs can be made of either U235 or Pu239

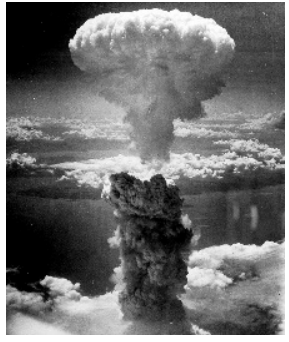
Hydrogen fusion bombs require fission bomb for radiative heating & compression

Technological Bottlenecks:

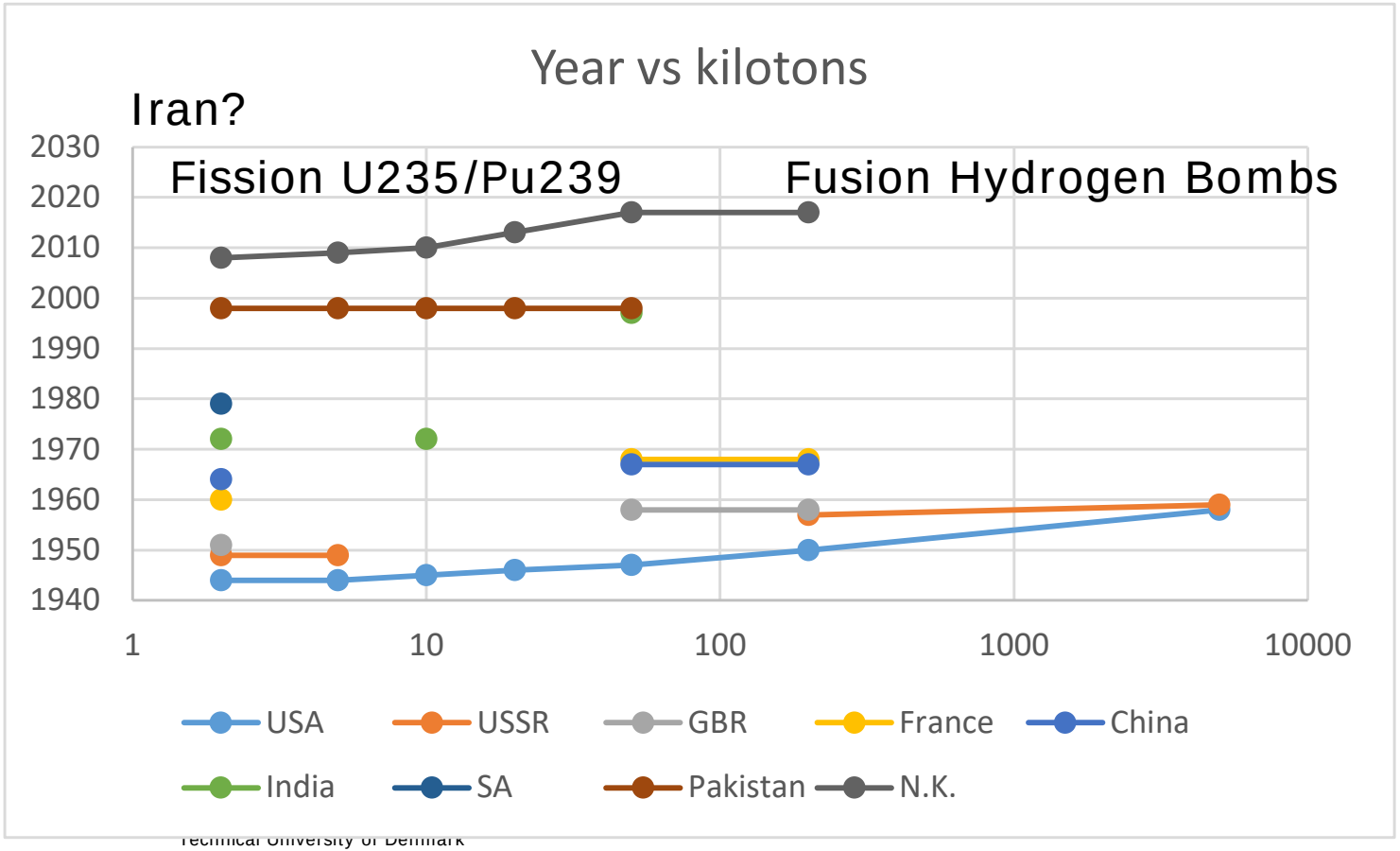
- U235 natural 0,7%, reactor grade >5%, weapons grade >80% (crit.mass dep.)
- isotope (U235) separation centrifuges: slow enrichment process
- Reactors produce U238+n-> Pu239 which is better for fission
- Separation of Pu239 within 2 days
- Neutron chain reaction > critical mass, but Pu239 require implosion
- Miniaturization & Tritium for H-bomb (actually LiD)
- Multiple Independent Reentry Vehicles (MIRVs)
- Testing important -> seismic detection of expl.power





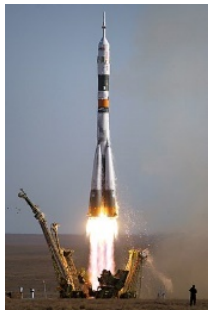


Nuclear Weapon Proliferation



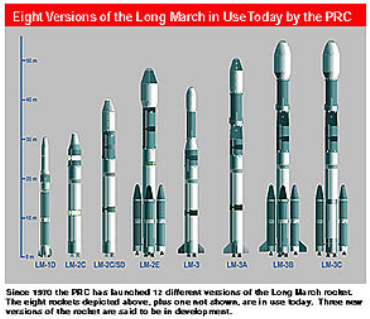
Rockets and Missiles

- Missile=Rocket+guidance system+warhead (nuclear or conventional)
- Bi-Propellant: fuel+oxygen -> no air & fast -> space & missiles
- Fuel: solid (gunpowder, ZiS, Al,..) or liquid (kerosene, LH2, Methane,.. -cooled)
- Oxygen: LOX, Nitric Acid (HNO3)
- Very fuel consuming
- Rocket equation: Mass ratio Rocket/payload grows exponentially with speed, altitude and range
- Short, medium, long (intercontinental) ballistic missil ranges
- ICBM Multiple stages
- High tech development & testing
- Buy, study & reengineer
- Detective work to track development



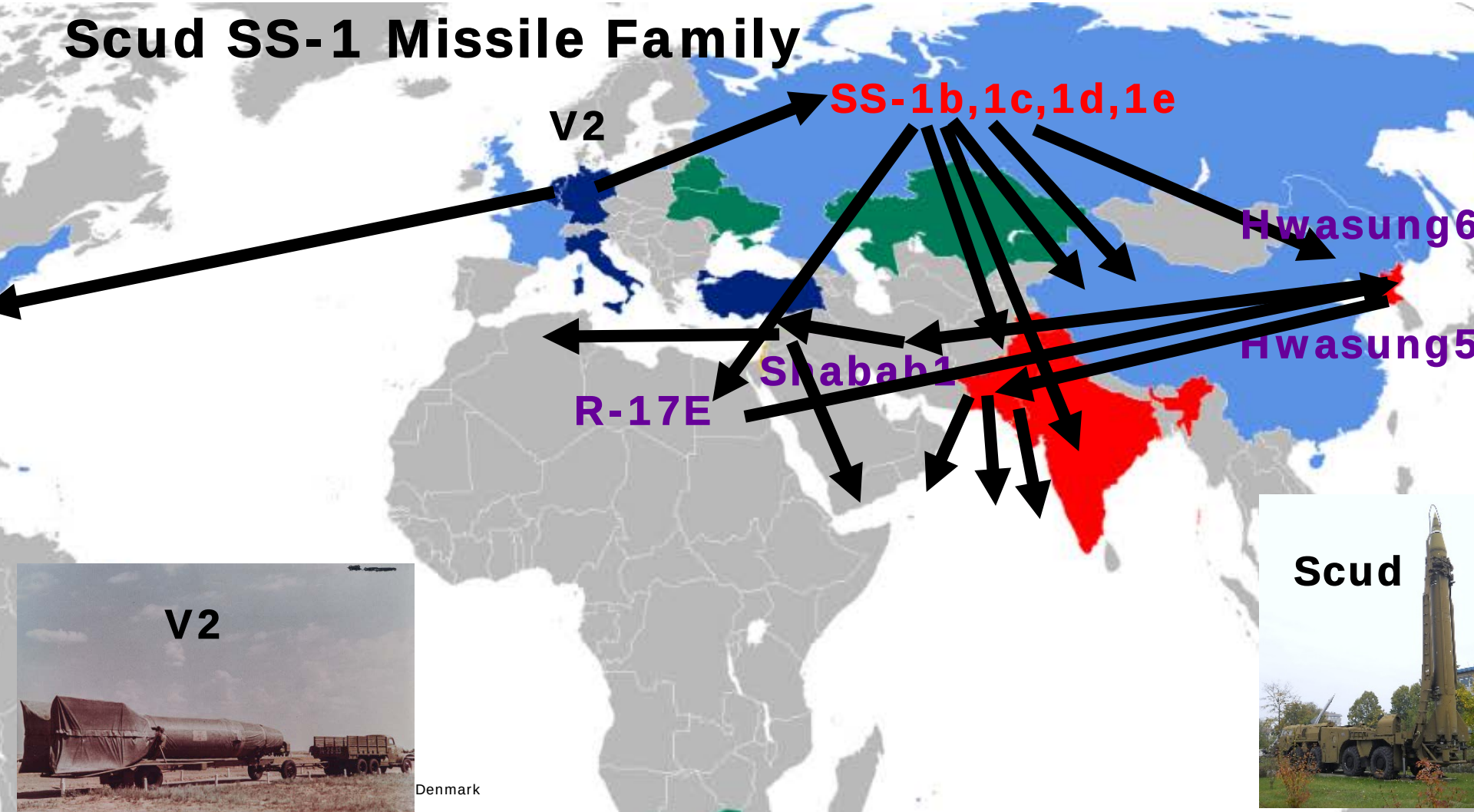
Soyuz,

Space Shuttle,



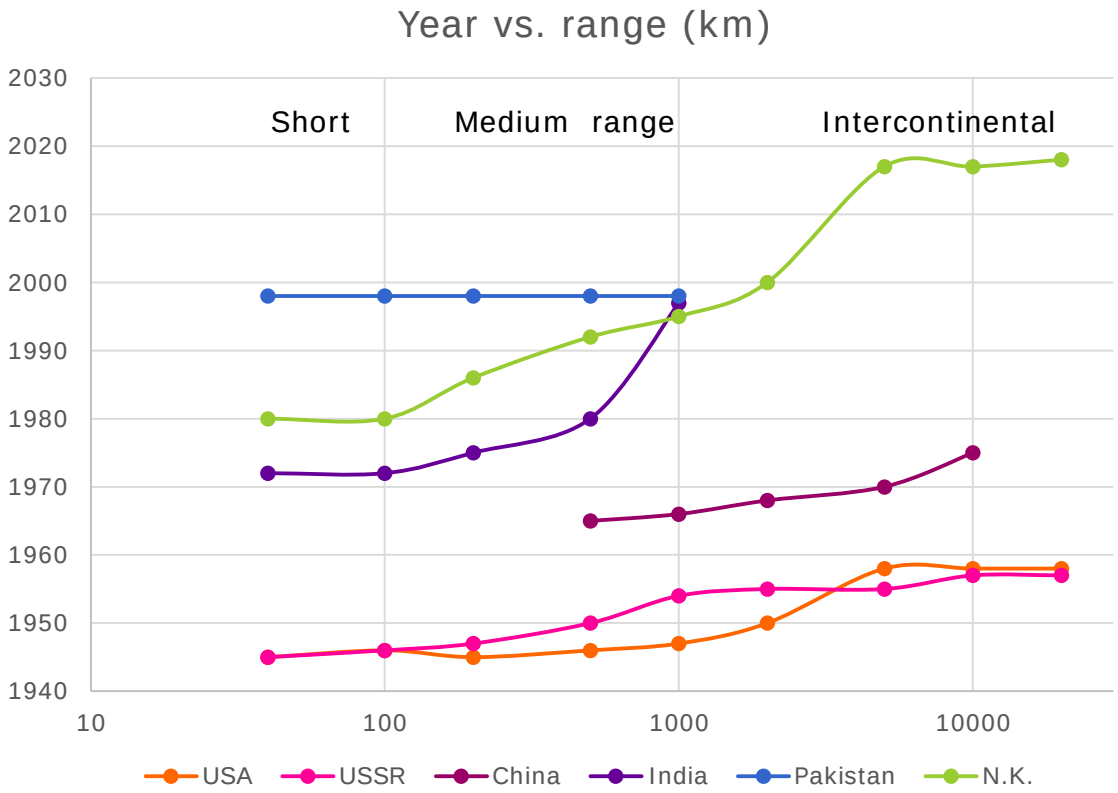
Long March China

Scud SS-1 Missile Family



Denmark

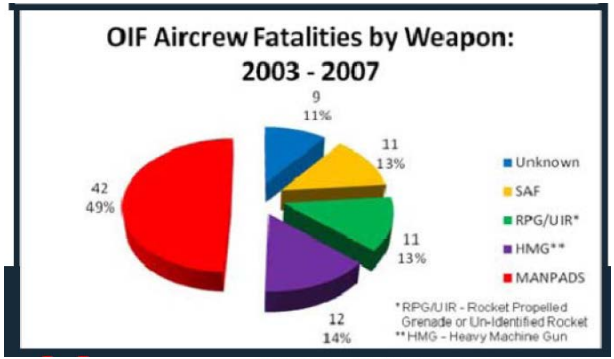
Missile proliferation



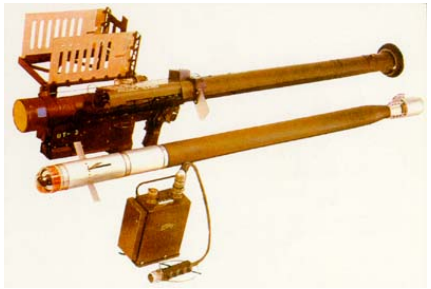
Air Defense: Surface to Air Missiles

- Radar tracking SA-1,SA-2,SA-6,SA-11,… - ranges 10-300km
- First strike (cruise missiles, stealth A/C) take out radar air defense systems
- ManPADS are passive heat seeking, simple, effective, cheap missiles
  - Stinger, SA-7,SA-11,SA-14,SA-18,SA-21,CSA-…, - 5km ranges
- Almost all aircraft kills by ManPADS, grenades or gunfire the last decades
- Used in asymmetric warfare in Afghanistan, Iraq, Libya, etc.
- Retroengineered in China, Pakistan, Iran,…

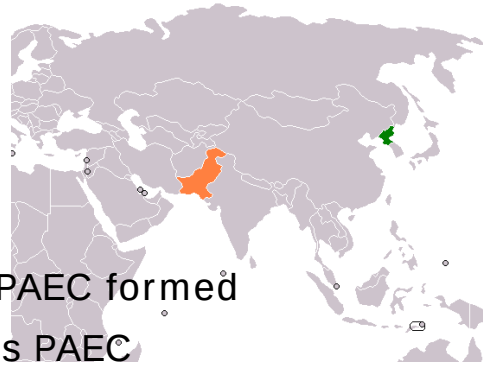
SA-11 Buk shot MH17 down



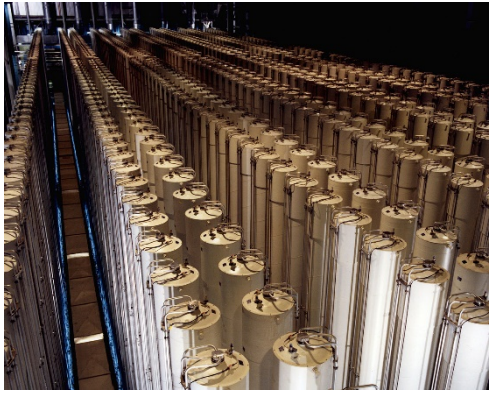
ManPADS trusler: SA-7, SA-16, SA-18, SA-24, Stinger, og kinesiske kopier.



The Pakistani Problem



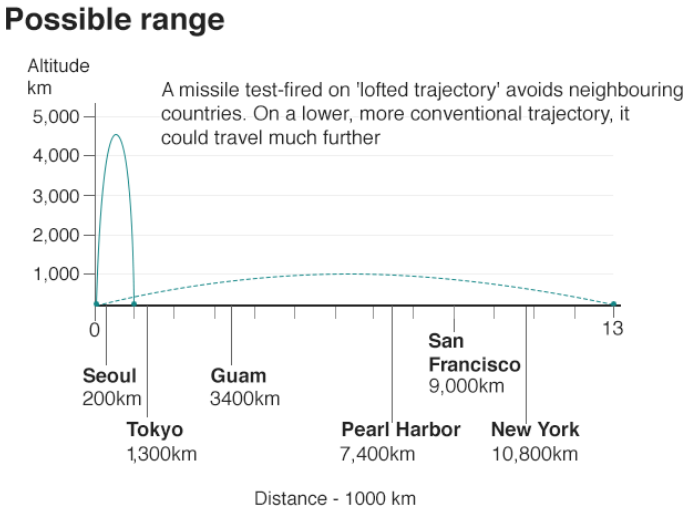
- 1972 India nuclear bomb test -> Zulfikar Bhutto: ”We will eat grass…”, PAEC formed
- 1976 Abdul Q. Khan flees Urenco in NLD with centrifuge blueprints, joins PAEC
- Five tests 1998 of both U+Pu bombs
- Exchange with rocket technology from North Korea in ‘90s
- Khan Research Lab – nuclear proliferation to China, North Korea, Iraq, Iran, Libya, Syria,… - and leading an international black marked ring
- High tech trade also from Germany, UK, France, …
- Proliferation to ICBM, MIRV, cruise missiles, submarines, …
- Pakistan does NOT have a no-first-strike policy
- Taleban refuge

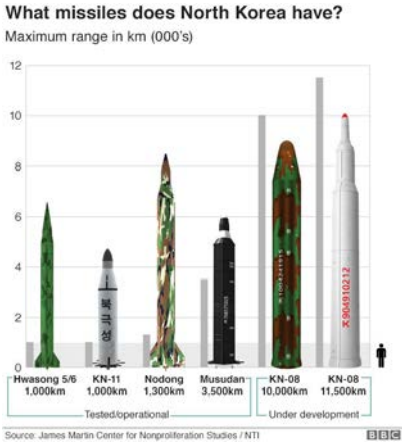


The North-Korean Problem

- ‘90s: Pakistan nuclear technology in exchange for rocket technology
- A-bomb 2006-9, H-bomb in 2017

- ‘80s: Hwasong 1,2 missiles based on Scuds from USSR
- ‘00s: Hwasong 11 MRBM missile - solid fuel
- 2017-19: Hwasong 12, 14, 15. Russian RD-250 liquid fuel engines





The Iran (Iraq) Problems

<‘76 USA supply reactor technology to the Shah
>’76 USA pressure on Germany, France, Argentina to stop U supply
’80 Iran bomb Iraqi reactors with North Korean & Pakistani missiles
‘81 Israel destroy Iraqi reactors when France deliver weapons grade U to Iraq
‘84 Iraq bomb Iranian reactors (with french missiles)
Mid 80s: centrifuges from Pakistan
>’90 China and Russia sell reactors for U enrichment
- but later state ”not interested in muslim nuclear weapons”
IAEA find U+Pu enrichment and centrifuges on several occasions
IAEA investigations, accusations, sanctions, refusals, bargaining,…
2012 IAEA find >20% U enrichment (weapons grade >90%)

Shabab-2,3,4 MRBM missiles from N.K. and cruise missiles from Ukraine

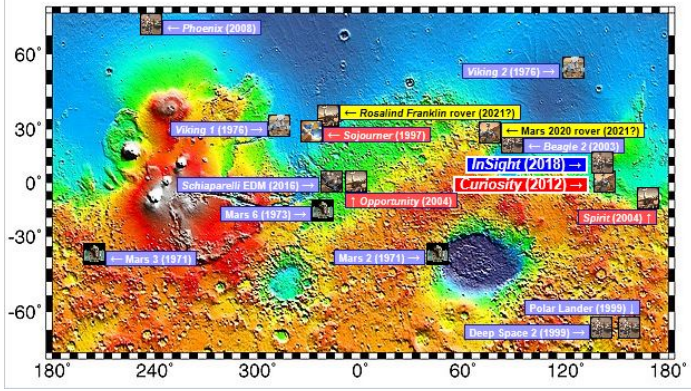
The future: supersonic ramjets & scramjets

Stealth jets and cruise missiles can fly under the radar – but are only transonic
Blackbird SR-71 turbo/ramjet at Mach 3.2, stealthy
Ramjets and Scramjets can reach Mach 3-10
Less fuel consuming than rockets, smaller, stealthy, longer, return,…

1961-64 US project ”Pluto”: nuclear powered radiative heating engine
2018 Putin announce development of nuclear powered ramjet cruise missile
2019, aug.7th Nuclear explosion near Archangelsk – Skyfall SSC-X-9

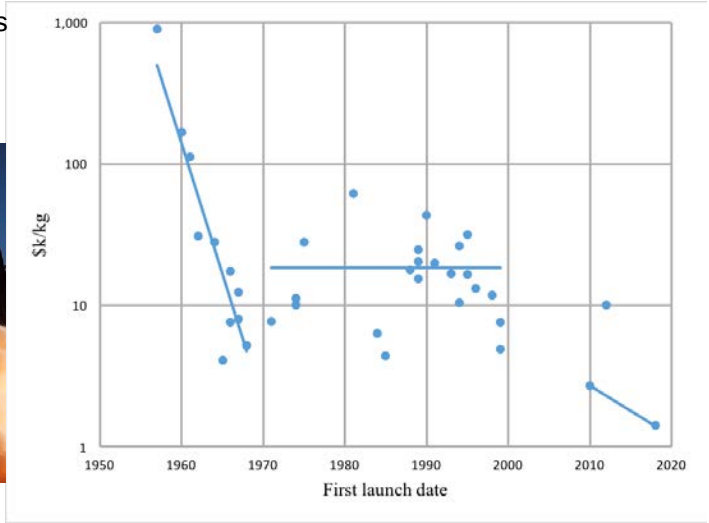
Blackbird SR-71, Boing X-51 Waverider ramjet under B-52 wing, X-43 scramjet, ”Pluto” nucl.pow.ramjet

The Quest for Mars



- <2000 Many failed USSR and few succesful NASA missions
- >2000 Few succesful NASA, ESA, Russian, India, (Japan, China)
- 2009 China's Mars program with Russia
- 2012 Russian spacecraft with Chinese orbiter Yinghuo-1 crash
- 2020 China launch Mars orbiter and rover
- Trump: "For all of the money we are spending, NASA should NOT be talking about going to the Moon - We did that 50 years ago. They should be focused on the much bigger things we are doing, including Mars (of which the Moon is a part), Defense and Science!"

- SpaceX Falcon-Super-Heavy for manned missions to Mars
- Starhopper tests 2019, orbit 2020, moon 2023, mars ?
- Carbon composites, methane and oxygen (H2O) on Mars



Summary

- Pandoras box is wide open
- Gradual/natural technological development is a telltale: what, where, when?
- New and improved missiles, MRBM in Königsberg
- Weapons trade is big business. Follow the money!
- Don’t listen to what they say – Observe what they do!
- A lot of (changing) politics, scheming, accusations, refusals,…
- Bans do not work with several (willing) supply contries/industries
- Long term planning behind developments
- Political use of North Korea as deflectors