Global Missile Launch Surveillance for Increasing Nuclear Stability

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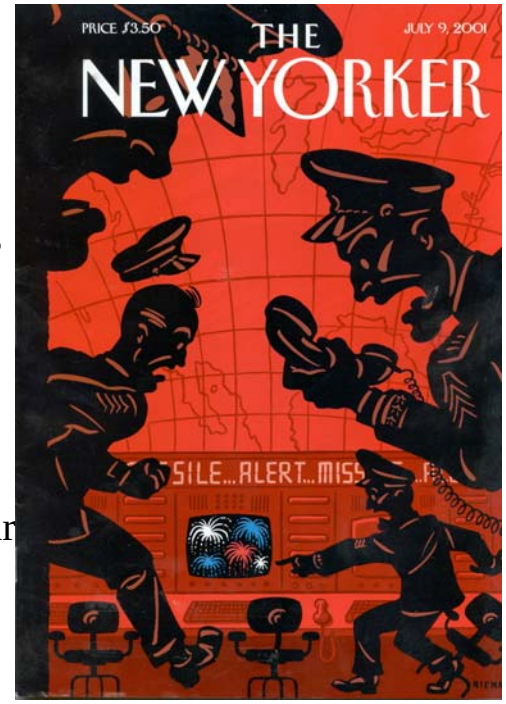
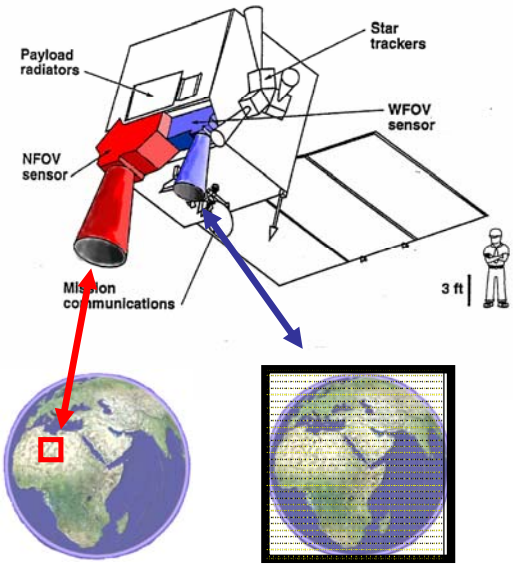
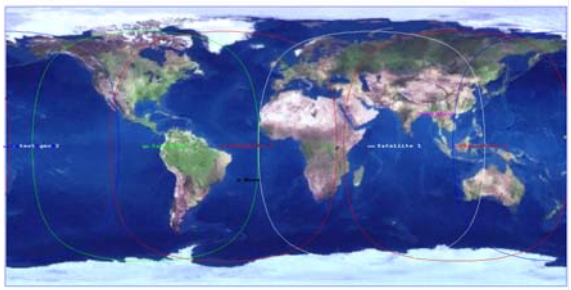
1. Satellites for detecting missile launches from outer space
2. History of U.S. nuclear accidents and one point safety.
3. An application: Accidental Nuclear War in South Asia



A globally shared, five satellite constellation capable of observing missile launches from geostationary orbit.





Most of the light from missile plumes comes from vibrational sates of the combustion products

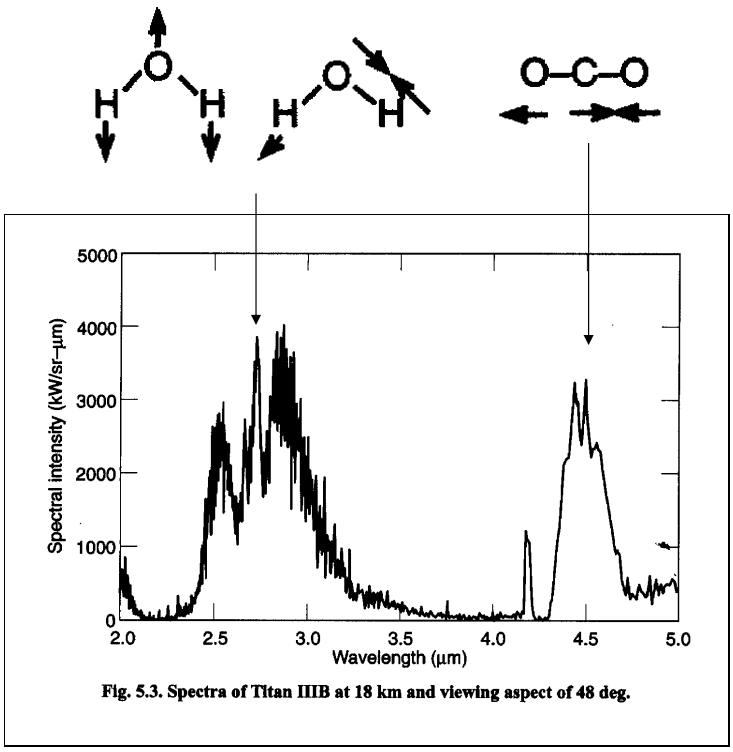
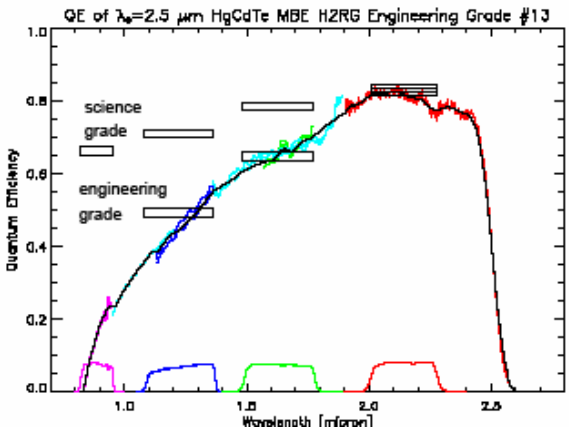


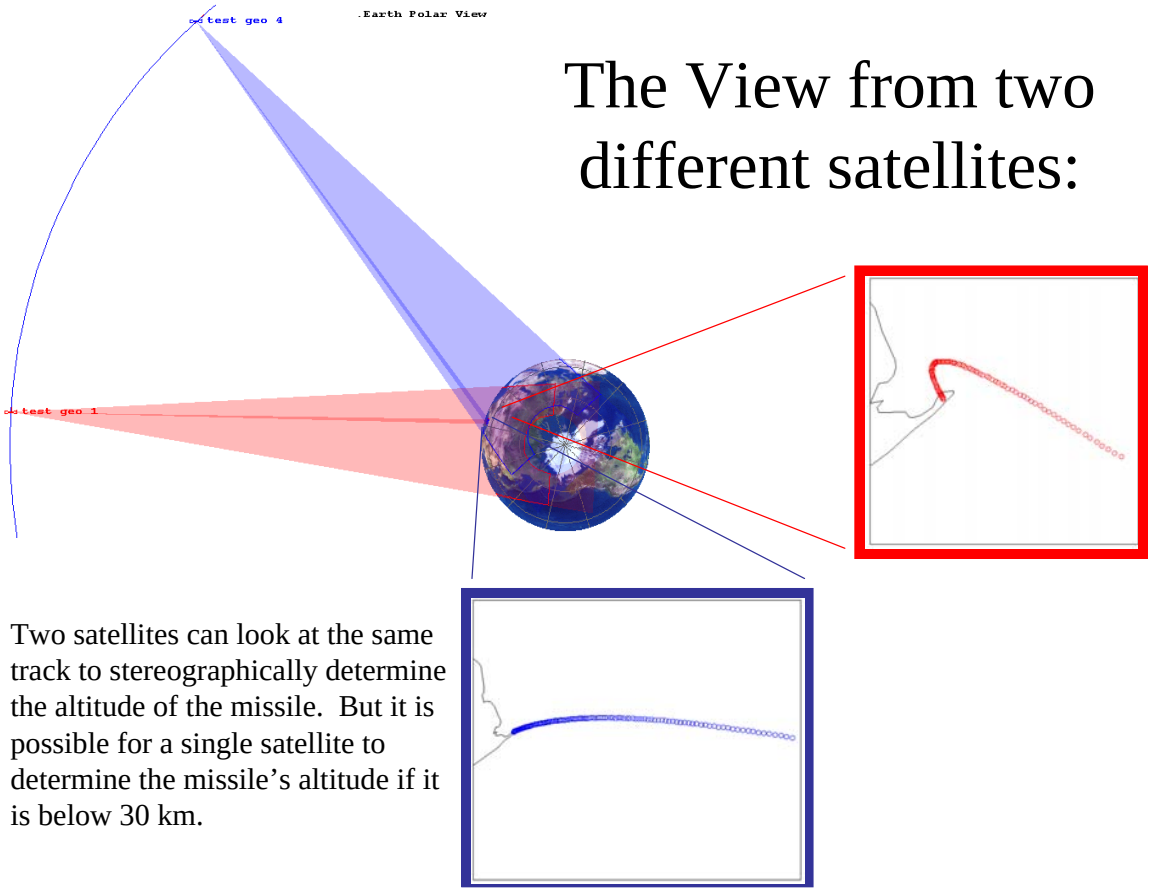
Fig. 5.3. Spectra of Titan IIIB at 18 km and viewing aspect of 48 deg.

The HAWAII-2RG Focal Plane Array



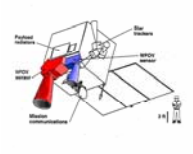
Estimated cost of FPA = $350 K

The View from two different satellites:



Two satellites can look at the same track to stereographically determine the altitude of the missile. But it is possible for a single satellite to determine the missile's altitude if it is below 30 km.

Satellite Cost Estimates



(Assuming Russian launch services)

Unit satellite costs = $250 M

Launch service cost per satellite = $75 M

} **x5**

Development costs = $400 M

Total cost for system = $2,025 M

Why should South Asia Care?

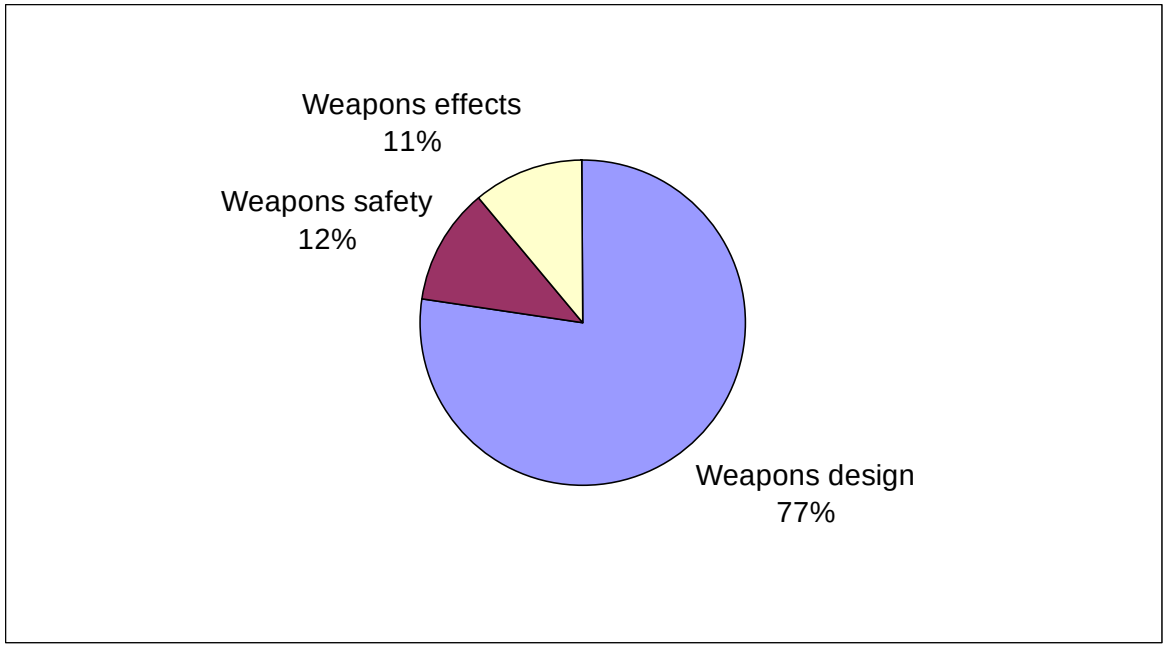
The Problem: Accidental nuclear detonations.

June 7, 1960, a on-alert BOMARC nuclear-tipped air defense missile burned, **melting the plutonium pit in the warhead.**

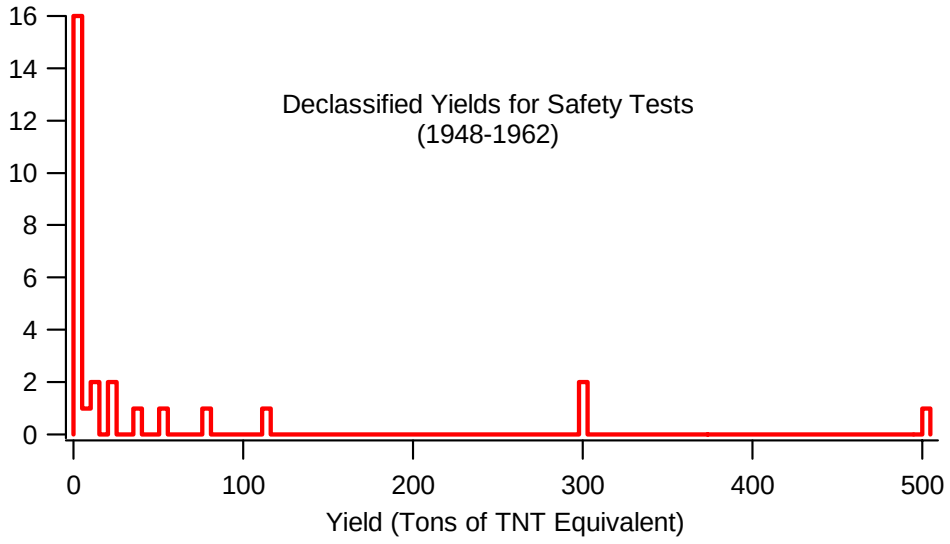
January 16, 1961, A US fighter on quick reaction alert was accidentally burned while loaded with a nuclear weapon. **The Genie (1.7 Kt) nuclear warhead was scorched and blistered**.

And many, many more!

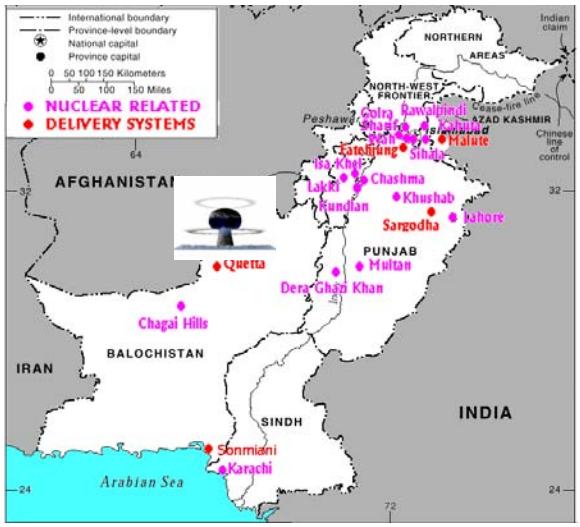
Of the first 281 US Nuclear tests, 33 or 12%, were related to safety.



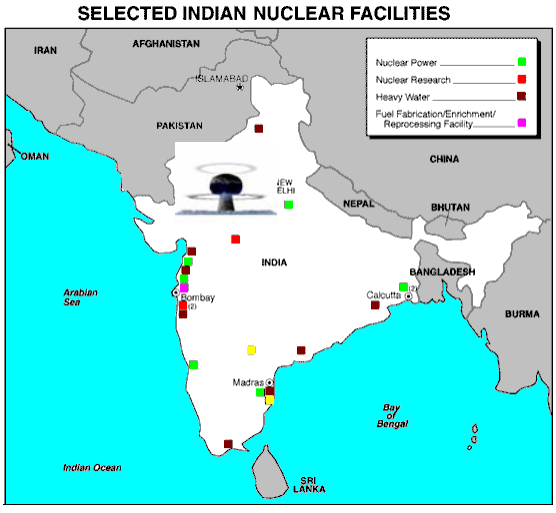
The US has experienced a number of failures of one-point safety designs



What would **Pakistan** think/do if one of **its own** nuclear delivery sites was destroyed by a nuclear explosion?

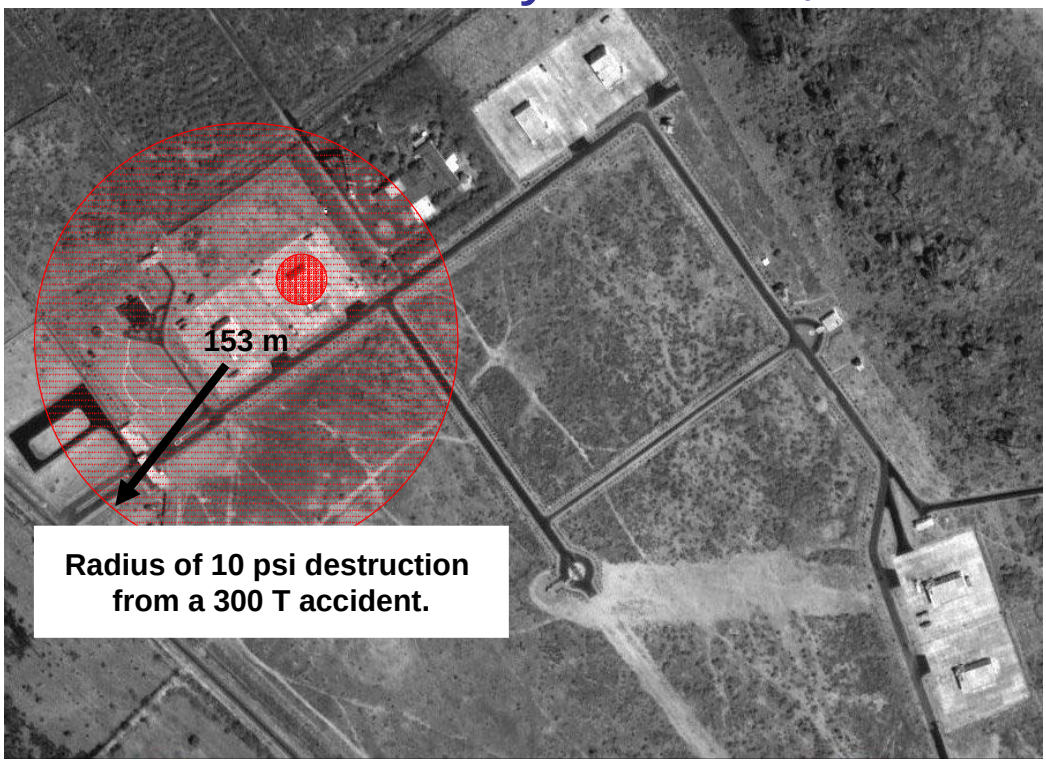


What would **India** think/do if one of **its own** nuclear delivery sites was destroyed by a nuclear explosion?

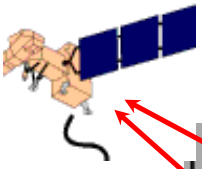


What if the explosion was caused by the country's own nuclear weapon detonating?

Probable Prithvi TEL Garages, outside Hyderabad, India



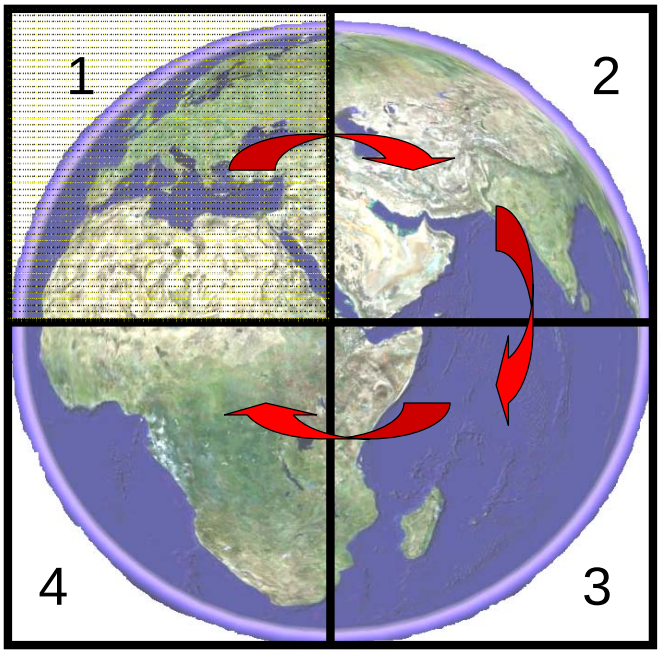
Each country would have direct access to the raw data

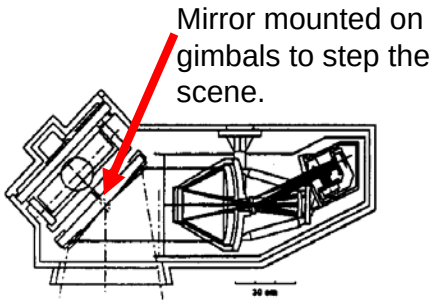


More information (including a paper detailing the system capabilities and a conceptual design) can be found on the web at:

http://mit.edu/stgs/southasia.html

Step-Stare Pattern





Unfortunately, there are all too many other examples of accidents involving nuclear weapons!

27 July 1956—RAF Base Lakenheath. A B-47 practicing touch-and-go landings, slid off the runway and crashed into a nuclear weapons storage igloo spilling jet fuel from the bomber. Fire engulfed the storage igloo and the nuclear weapons inside.

31 January 1958—SAC Base Reflex, French Morocoo. A B-47 with one nuclear weapon in full strike mode, skidded off the end of the runway, rupturing its fuel tanks and spilling jet fuel over the weapon. The base was evacuated fearing a nuclear explosion.

11 March 1958—Florence, South Carolina. During a SAC exercise, a B-47 accidentally released a nuclear weapon over a sparsely populated area near Florence. The high explosive in the weapon exploded on impact but there was no nuclear detonation.

4 November 1958, Dyess AFB, Abilene, Texas—A B-47 caught fire on takeoff with one nuclear weapon onboard. The weapon's high explosive detonated (causing a crater 35 feet in diameter and six feet deep) but did not cause a nuclear explosion.

…and many, many more!