Insights into the DPRK Military Threat Gained From Commercial Satellite Imagery

by
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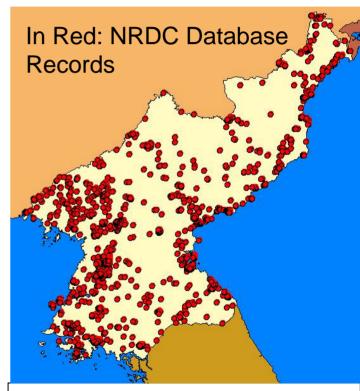
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NRDC Geo-Spatial Database of North Korea a new research tool to analyze security and human rights issues

- High resolution commercial satellite imagery

 first available to non-governmental
 researchers in 1999
- Ikonos (Space Imaging) sun-synchronous, 98-minute orbit – produces a color photo at one-meter resolution
- QuickBird (DigitalGlobe) can achieve 61-centimeter resolution under some conditions.
- Today's commercially available imagery is comparable to U.S. intelligence community of early 1970s
- Computing power current laptops have speed and memory comparable to the Cray II that went to LLNL in 1985
- New research can refine military estimates, provide additional verification by the public



NRDC's Database of Military and Other Features in the DPRK (about 3,700 Records).

Democratic Peoples Republic of Korea Basic Facts

- Occupies 120,000 sq km
 slightly smaller than
 Mississippi or Fujian
 province
- Population 22,700,000
- Coastline 2,495 km
- Borders Russia (19 km), China (1,416 km), ROK (238 km DMZ)
- DMZ extends 2 km on either side of a military demarcation line for 238 km from the Yellow Sea to the Sea of Japan



LandSat7 Image of the DPRK Capital, P'yongyang, built along the Taedong River.

DPRK Military Facts

Most militaristic state in the world...

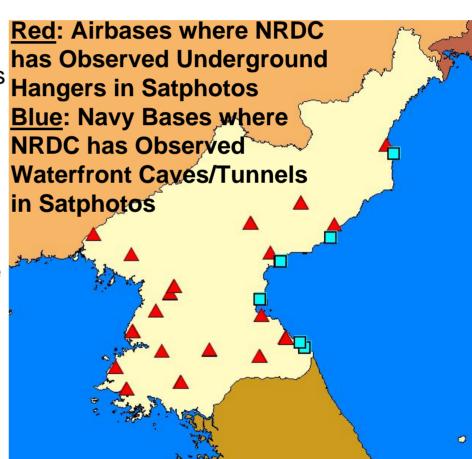
- 23% of GDP for military (\$5.2 billion in 2002) (ROK 4%)
- 40 of 1,000 are in uniform (ROK 14 of 1,000)
- 1,200,000 active forces, 5,000,000 reserve, 4th largest in the world
- Army, Air Force, Navy and Special Operations Force (SOF)
- Military strategy 1) reunify Korean Peninsula under North Korean control within 30 days of the beginning of hostilities 2) defend North Korea
- Most important facilities underground
- DPRK Steadily Building a Nuclear Weapons Capability



DigitalGlobe photo of "Juche Tower," P'yongyang.

DPRK: an Underground Nation and Military After the Korean War experience, Kim II Sung said: "The entire nation must be made into a fortress."

- The degree to which the DPRK military is based underground is unique in the world – takes advantage of mountainous topography;
- Virtually everything of military significance is underground – several hundred large facilities, more than 10,000 smaller facilities;
- It is reported that thousands of artillery pieces are at underground sites; four tunnels have been discovered under the DMZ;
- Concealment of their military infrastructure from satellites and aerial reconnaissance make it an intelligence challenge;
- A verification nightmare for agreements limiting nuclear or other military developments in the DPRK.



Underground Air Force

Nineteen air bases that have associated underground aircraft hangers

•	Airfield Name	Coordinates	
		Latitude	Longitude
•	Changjin-up Air Base	40 21 51.9	127 15 50.1
•	Hwangju Air Base	38 39 13.3	125 47 17.3
•	Hwangsuwon Air Base	40 40 56.0	128 08 55.5
•	Hyon-ri Air Base	38 36 47.8	127 27 04.5
•	Iwon Air Base	40 21 37.9	128 43 08.4
•	Koksan Air Base	38 41 19.5	126 36 08.4
•	Kuum-ni Air Base	38 51 55.1	127 54 12.6
•	Kwail Air Base	38 25 32.2	125 01 09.4
•	Nuchon-ni Air Base	38 14 16.7	126 07 13.4
•	Onch'on Air Base Auxiliary Airstrip	38 53 14.0	125 16 49.9
•	Orang Air Base	41 25 45.3	129 38 52.7
•	Panghyon Air Base	39 55 38.4	125 12 28.1
•	Pukch'ang Air Base	39 30 16.5	125 57 52.9
•	Sunan Air Base/International Airport	39 12 25.7	125 40 09.8
•	Sunch'on Air Base	39 24 41.8	125 53 27.5
•	Taet'an Air Base	38 07 50.4	125 14 43.1
•	Toksan Air Base	39 59 47.8	127 36 43.3
•	U'iju Air Base	40 09 00.4	124 29 50.9
•	Wonsan Air Base	39 09 56.4	127 29 06.9

Underground Navy

Navy Bases with Submarine Caves

		Coordinates		
•	Ch'aho-nodongjagu Navy Base			
	Entrance (1)	40 12 15N 128 39 00E		
	Entrance (2)	40 12 06N 128 39 03E		
•	Kosong Naval Facility			
	Entrance (1)	38 44 04N 128 12 45E		
	Entrance (2)	38 44 00N 128 12 44E		
•	Namae-ri Navy Base			
	Entrance	38 48 12N 128 08 17E		
•	Puam-dong Navy Base			
	Entrance (1)	41 19 18N 129 46 05E		
	Entrance (2)`	41 19 30N 129 46 12E		
•	Songjin pando Navy Base			
	Entrance	39 22 18N 127 26 18E		
•	Yoho'ri Naval Facility			
	Entrance (1)	39 52 33N 127 47 39E		
	Entrance (2)	39 52 39N 128 47 17E		

Other Underground Facilities (Purpose Unknown)

Haqap

40 04 54N; 126 11 22E

- Kumchang-ni 40 06 43N; 125 07 47E (under construction)
- Other suspect underground facilities, whose locations are not publicly known, are cited in the literature

Selected NRDC Imagery & Data Database Feature Categories

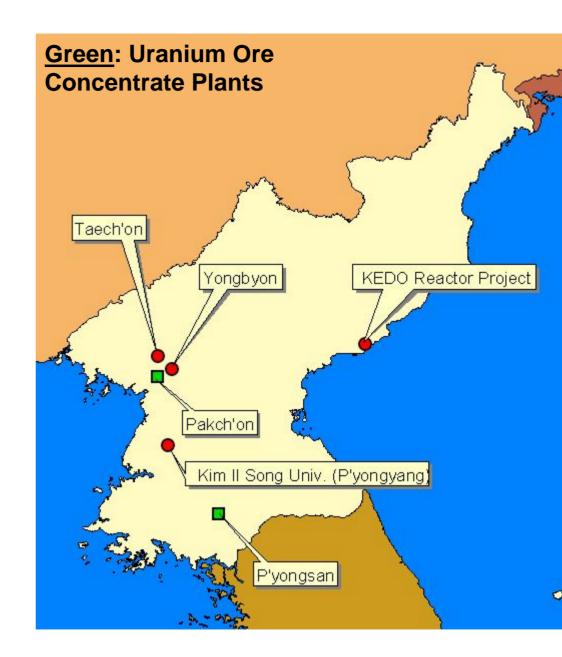
- Nuclear Facilities
- Missile Sites
- Air Bases and Defense
- Navy Bases and Commercial Ports
- National & Military Leadership
- Political Prisons and Prison Camps (Forced Labor)

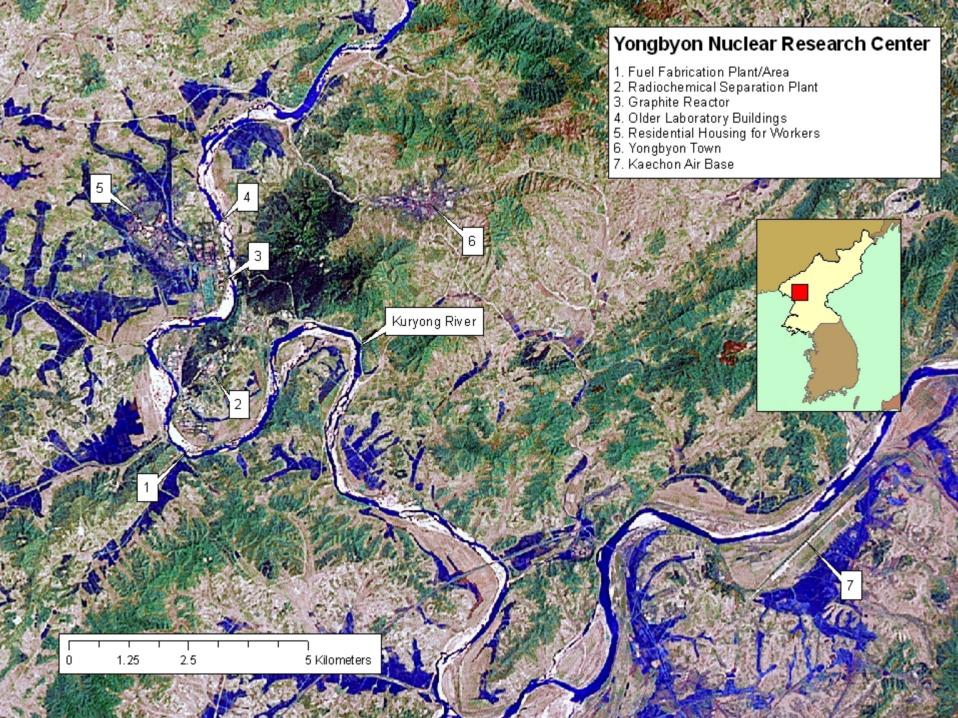
DigitalGlobe

Satphoto: Hamhung, DPRK. NRDC has acquired images and highly detailed map data for nearly all major North Korean cities (database in red).

Key DPRK Nuclear Sites

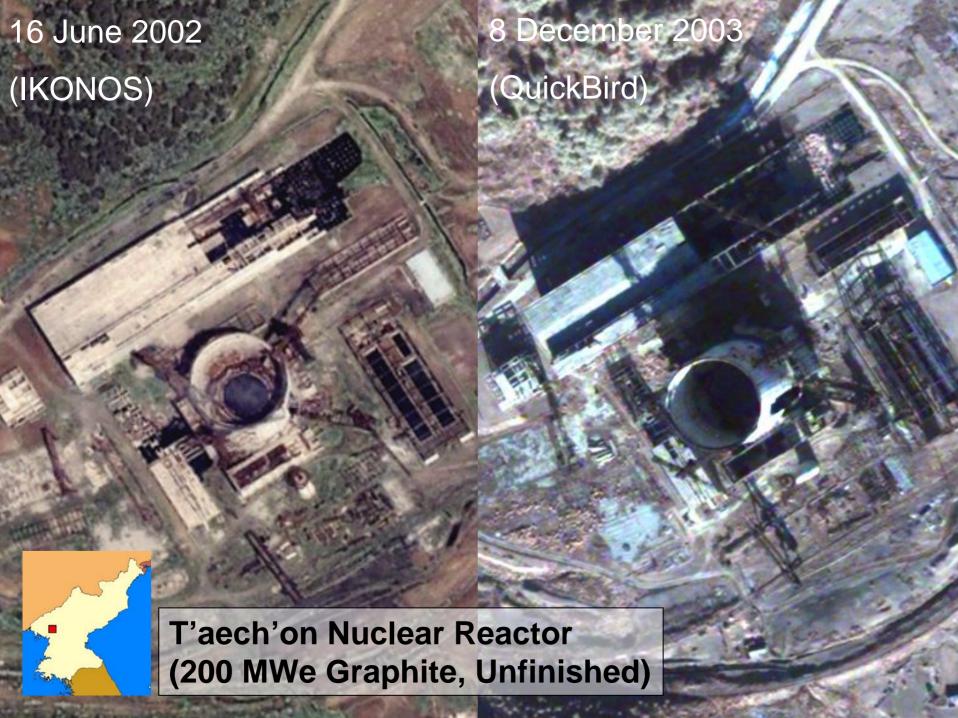
- Yongbyon Nuclear Research Center
- T'aech'on 200 MWe Graphite Nuclear Reactor (Unfinished)
- P'yongsan Uranium Concentrate Plant
- Pakch'on Uranium Concentrate Plant

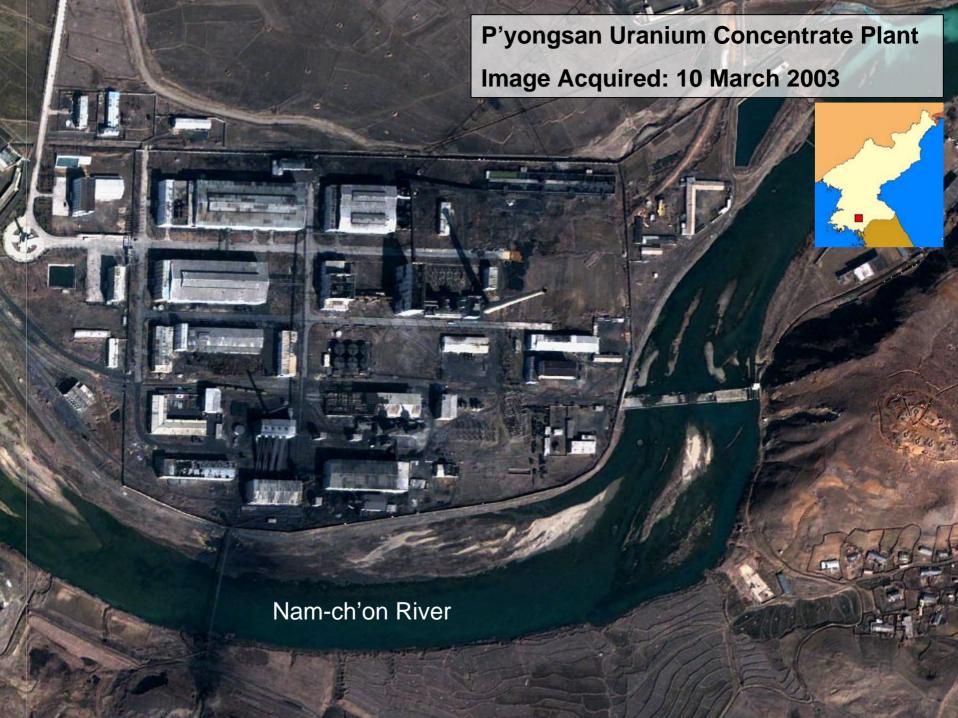








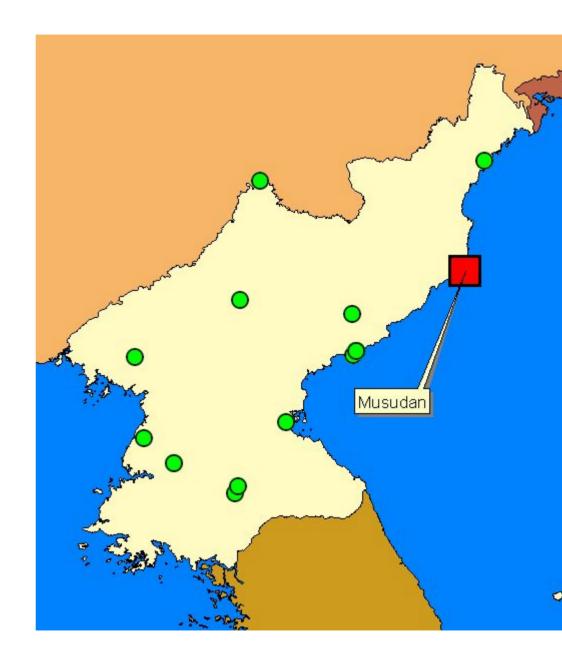


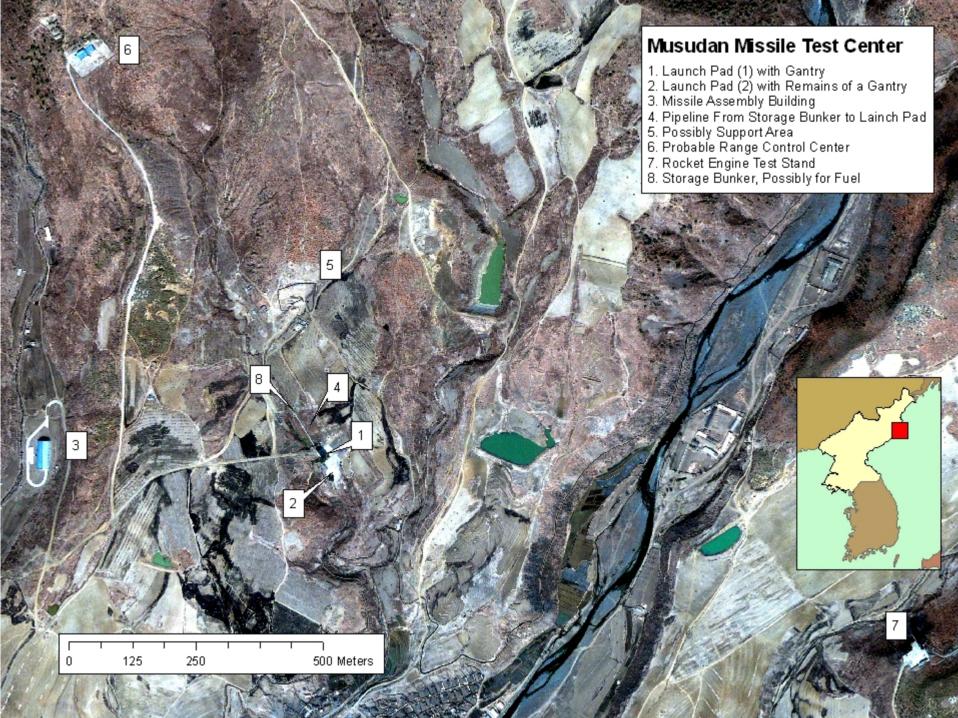


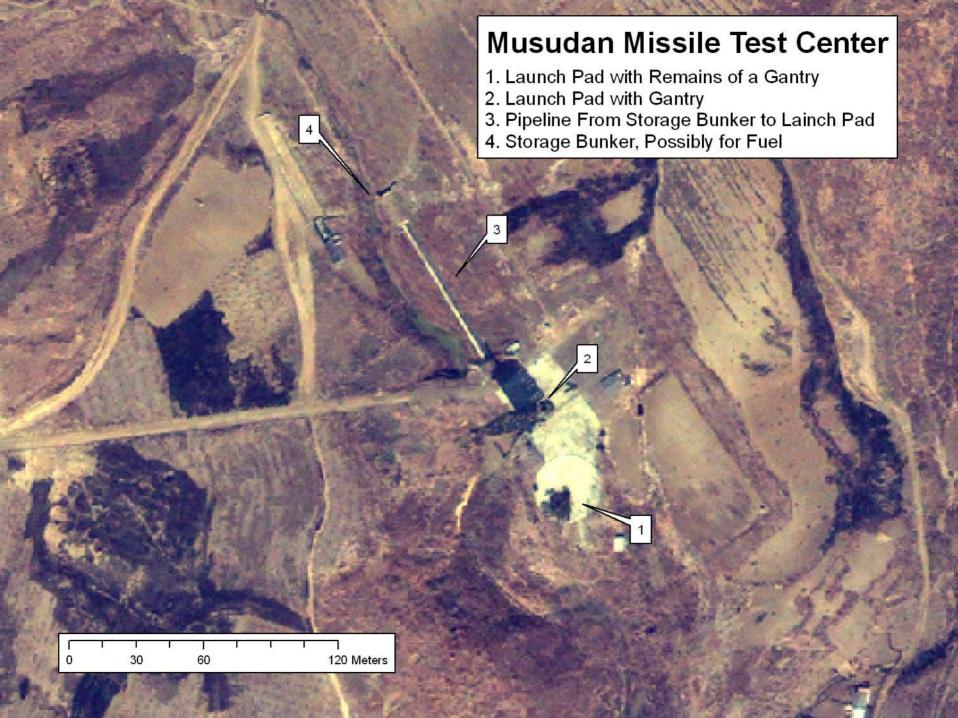


DPRK Missile Sites

Many missile bases are cited in the literature, but only the Musudan test facility has been identified in satellite imagery.

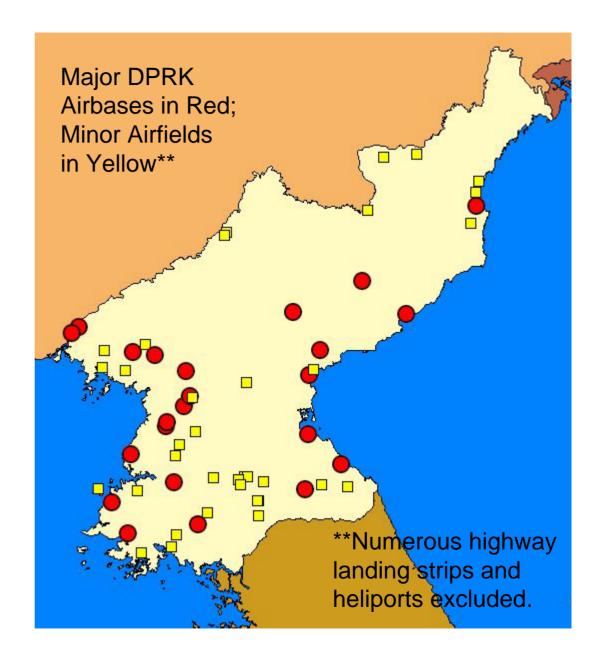




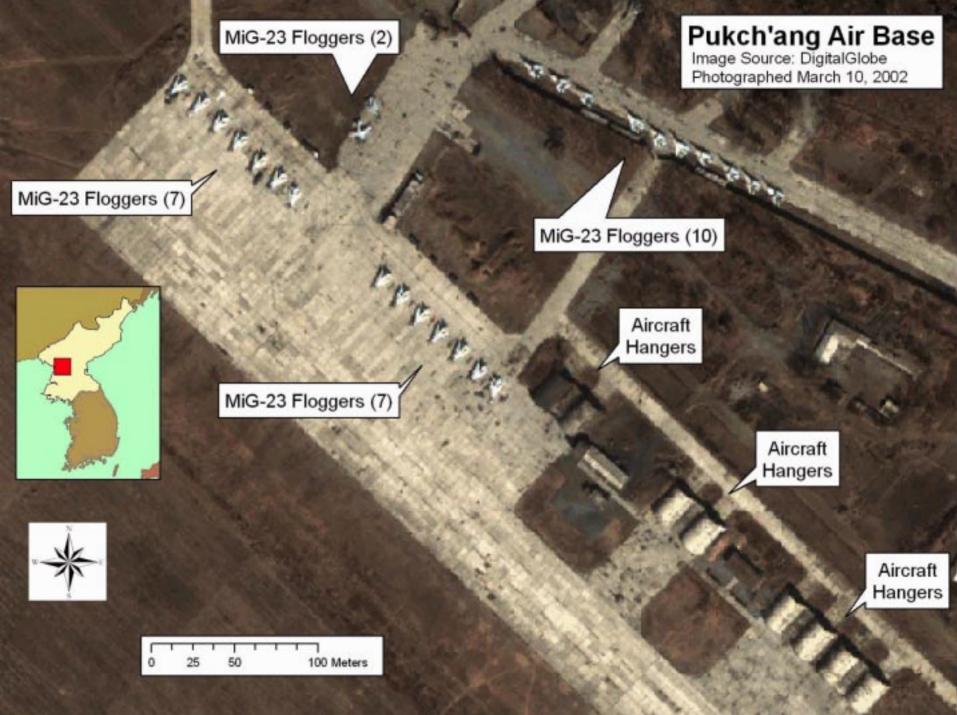




DPRK
Airbases
and
Air Defense

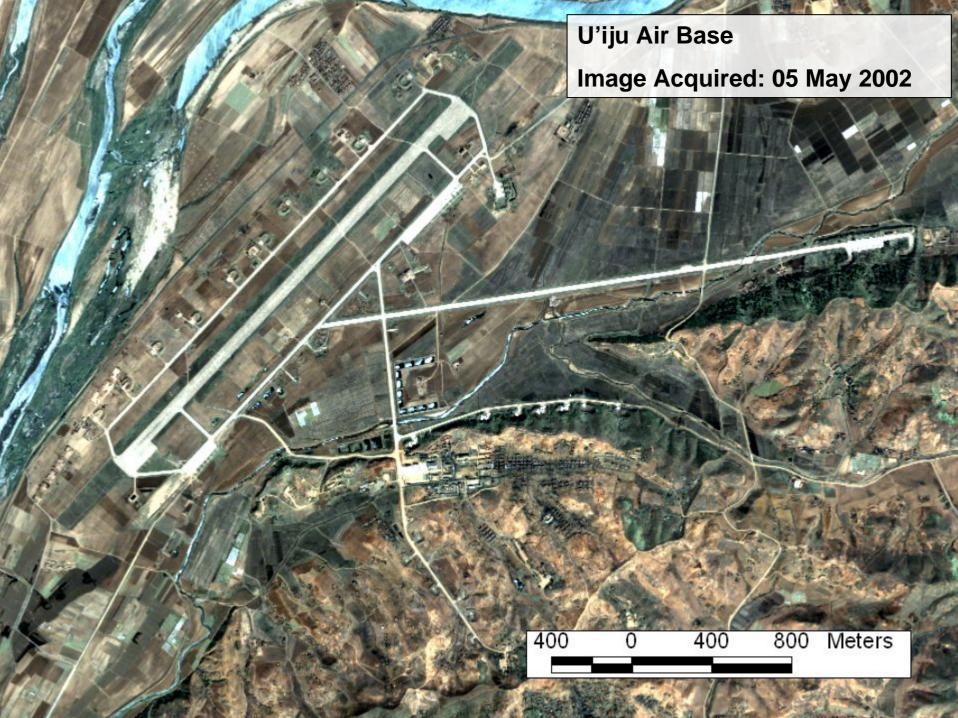


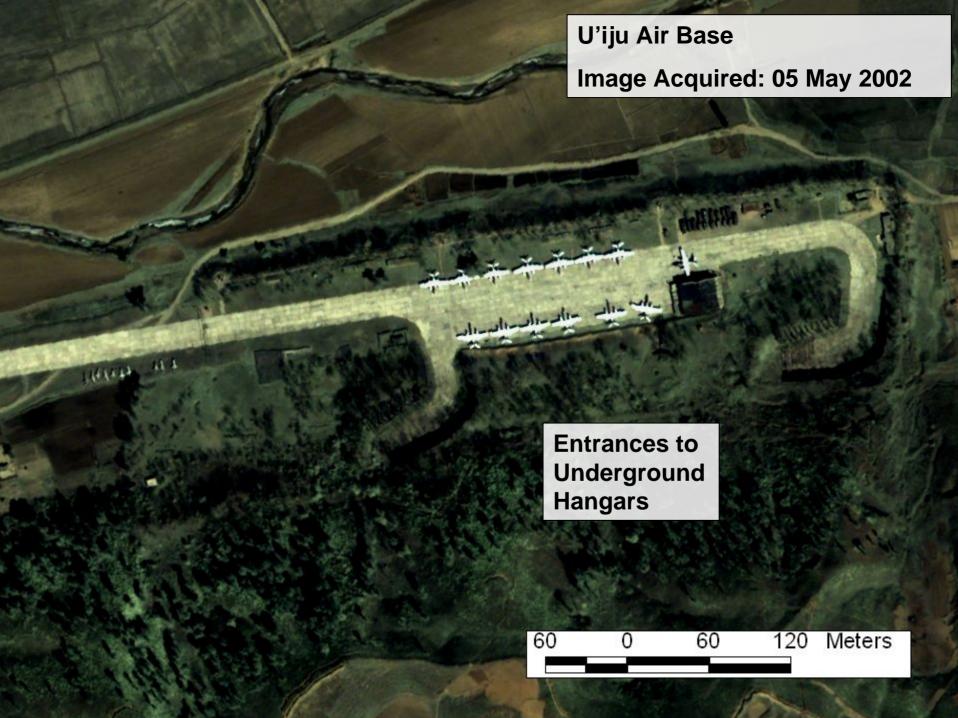




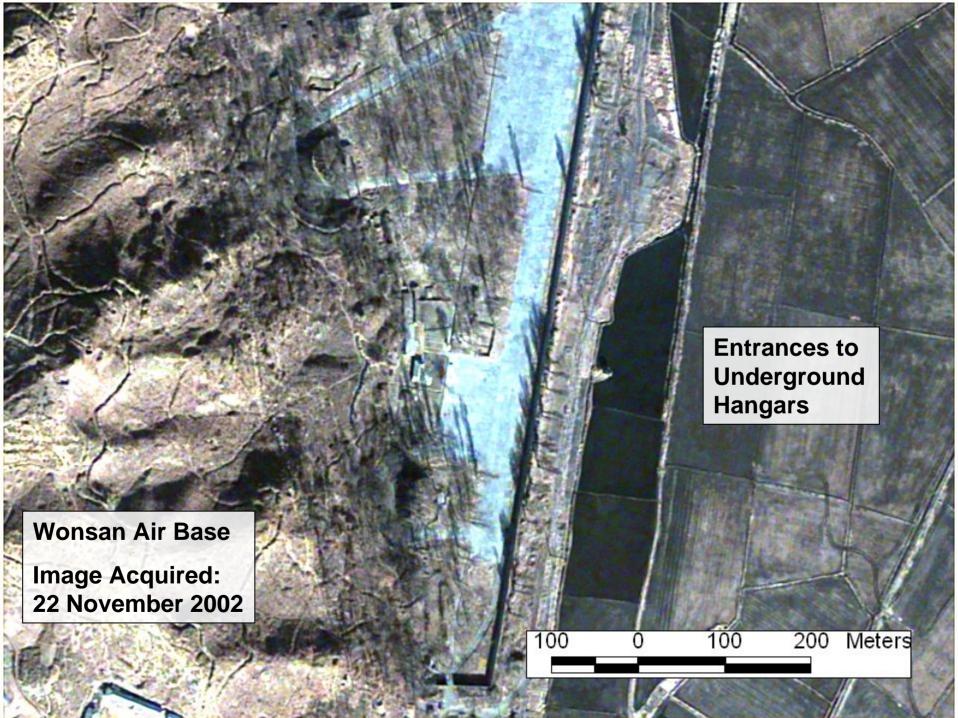


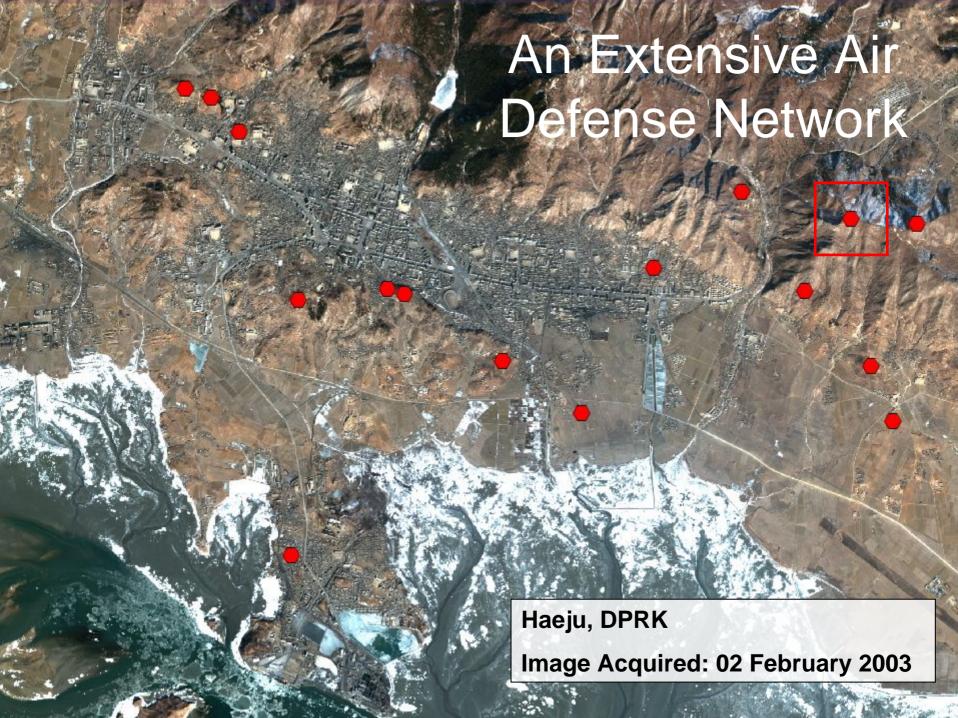








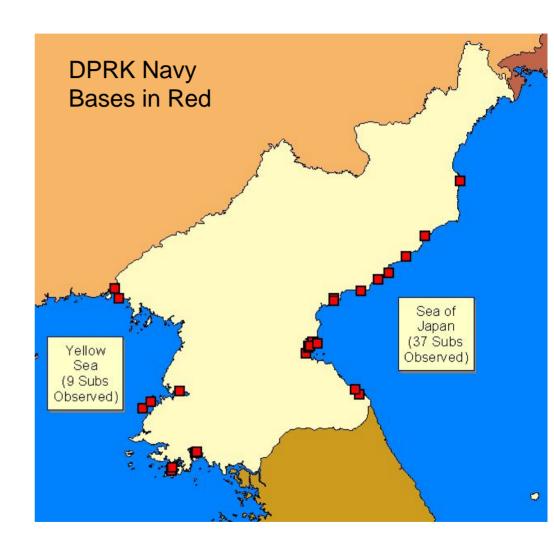


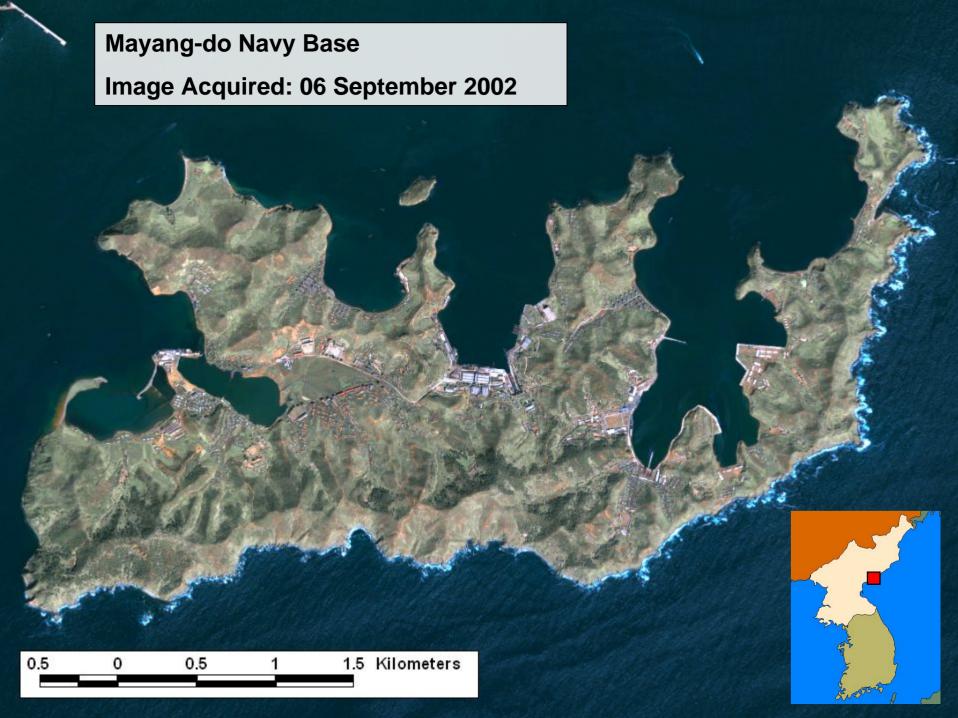


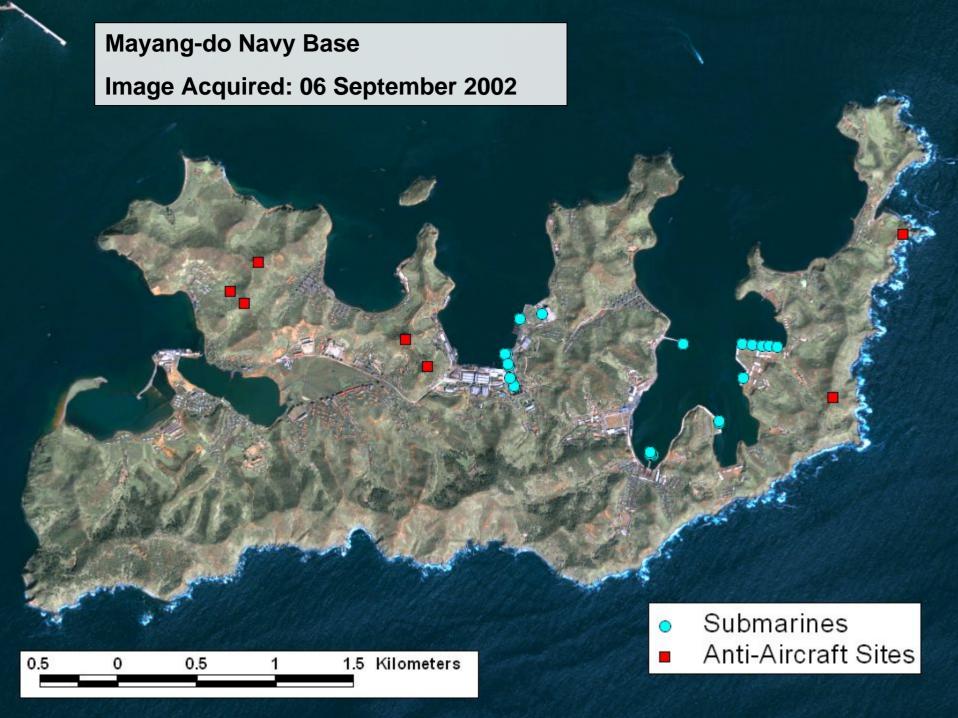


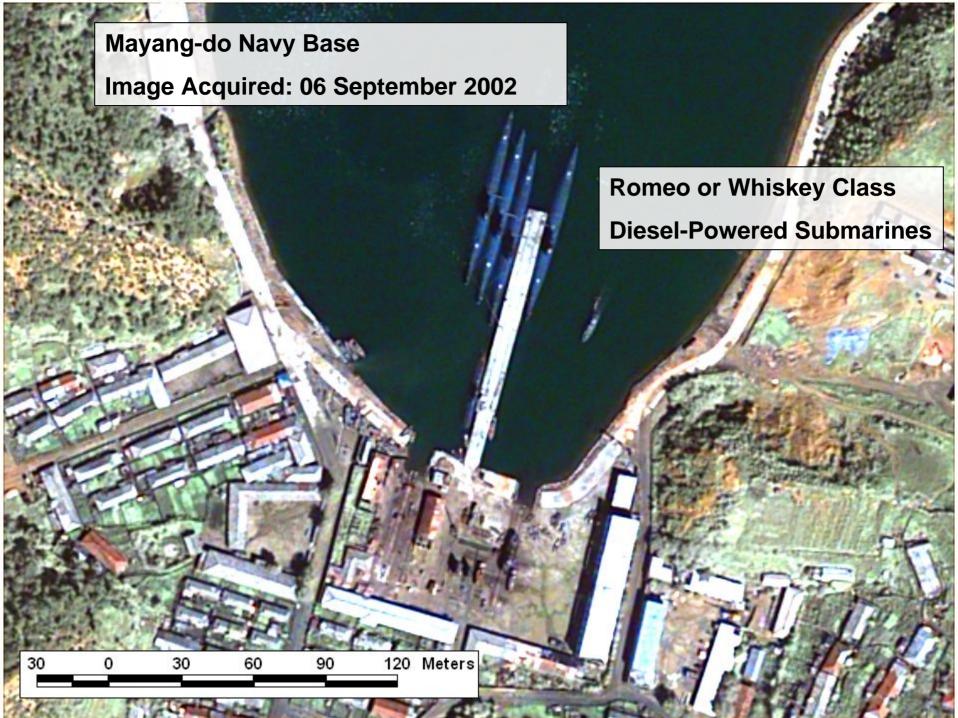
DRPK Navy Bases

- Mayang-do Navy Base (23 Subs Observed in Satellite Imagery)
- Ch'aho-nodongjagu Navy Base (14 Subs)
- Pip'a-got Navy Base (9 Subs)









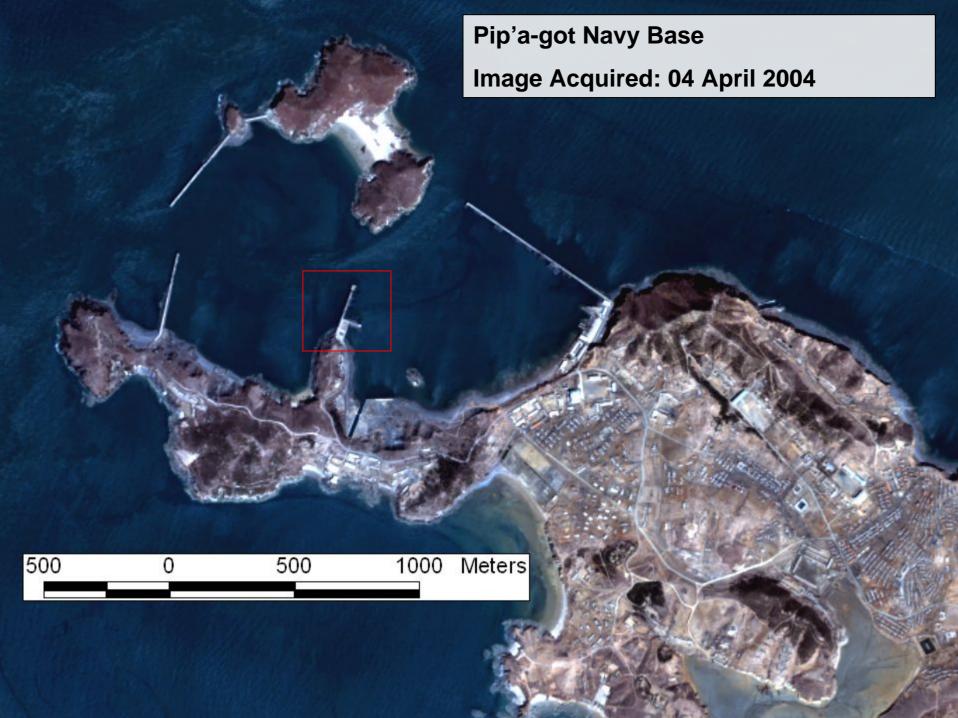




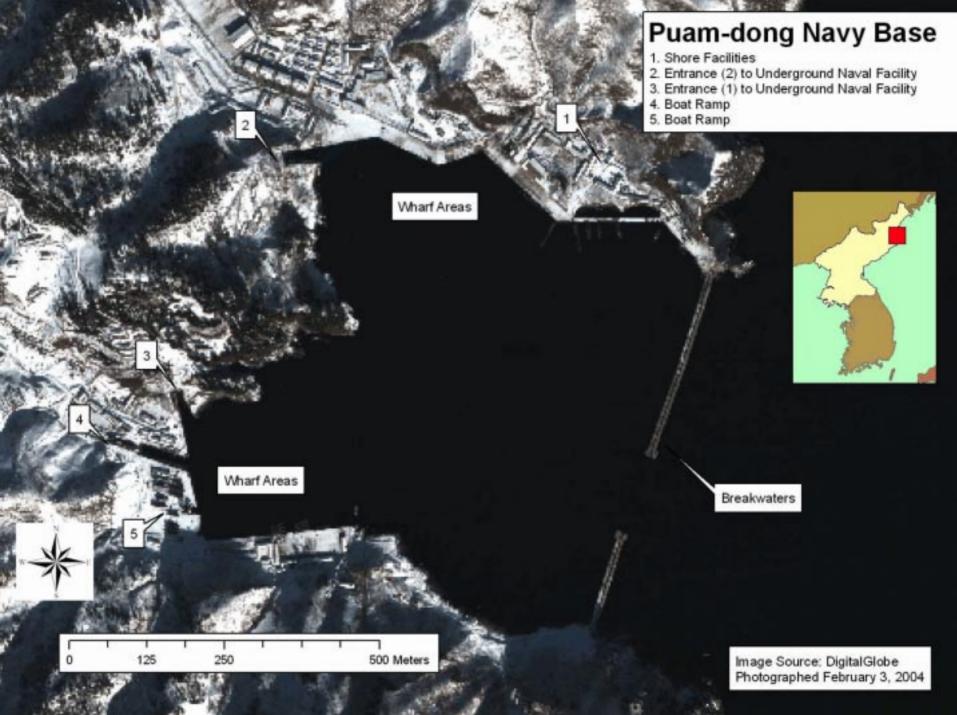
Image Acquired: 04 April 2004

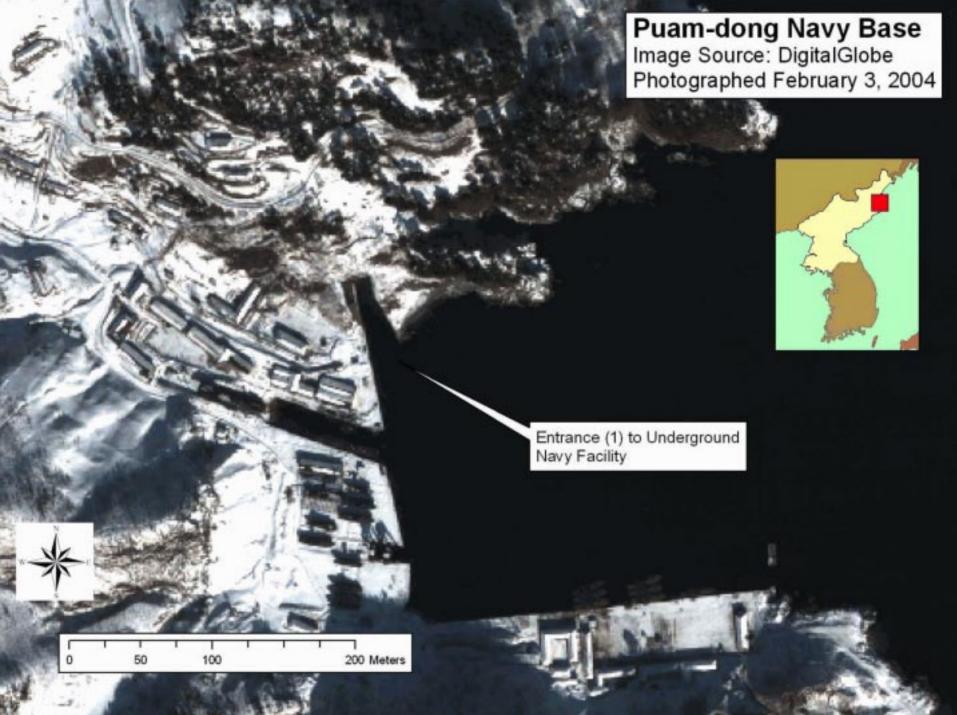


Romeo Diesel-Powered Submarines

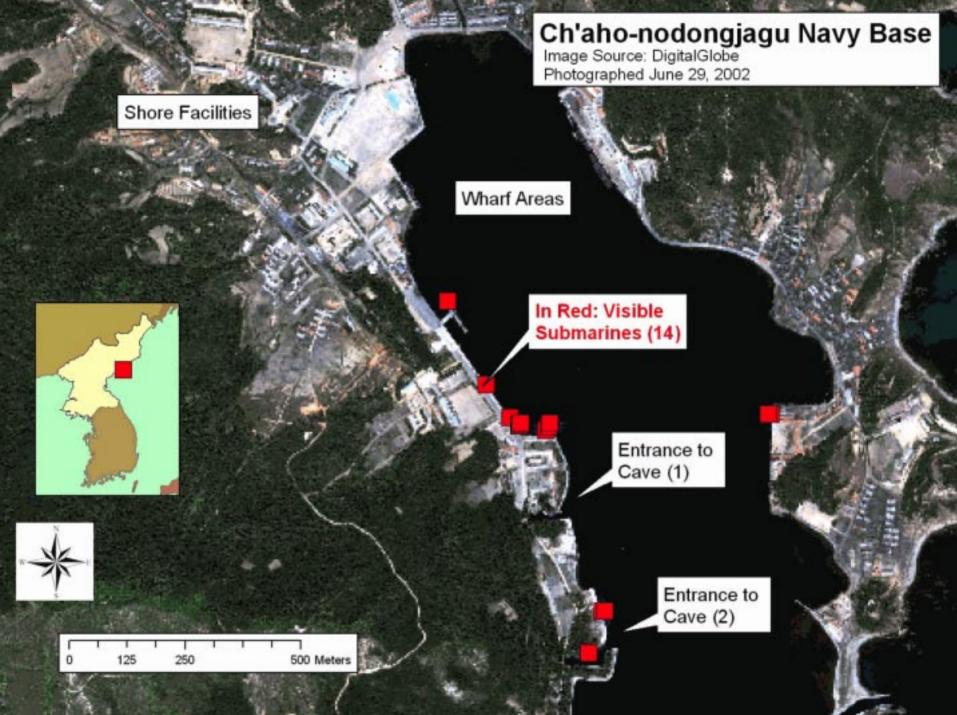
Coastal Sang-O Class
Diesel-Powered Submarines

0 50 100 Meters

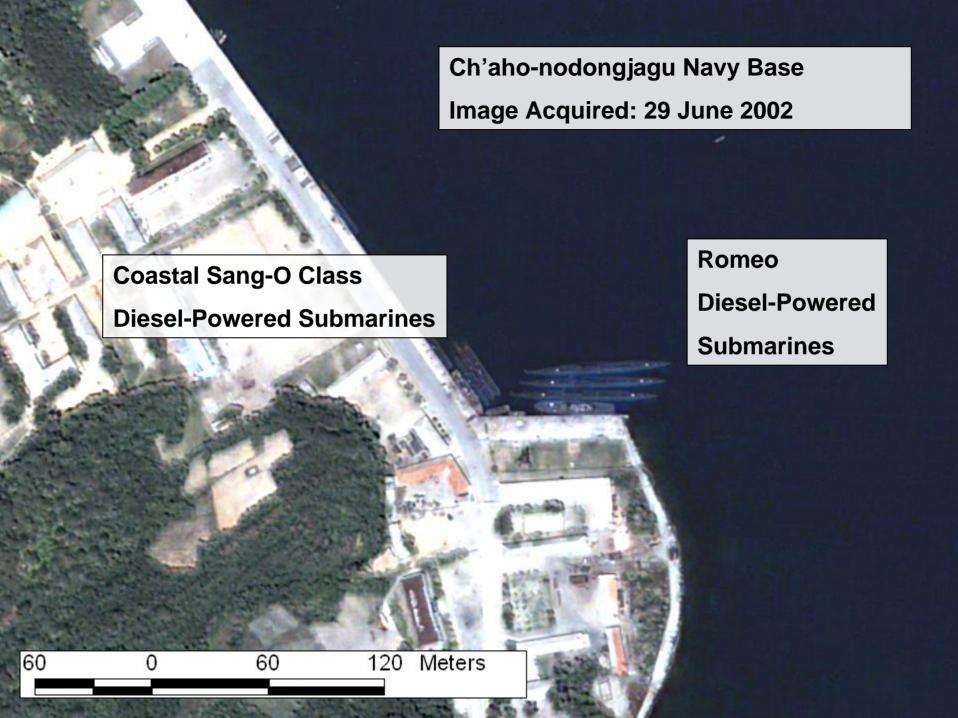




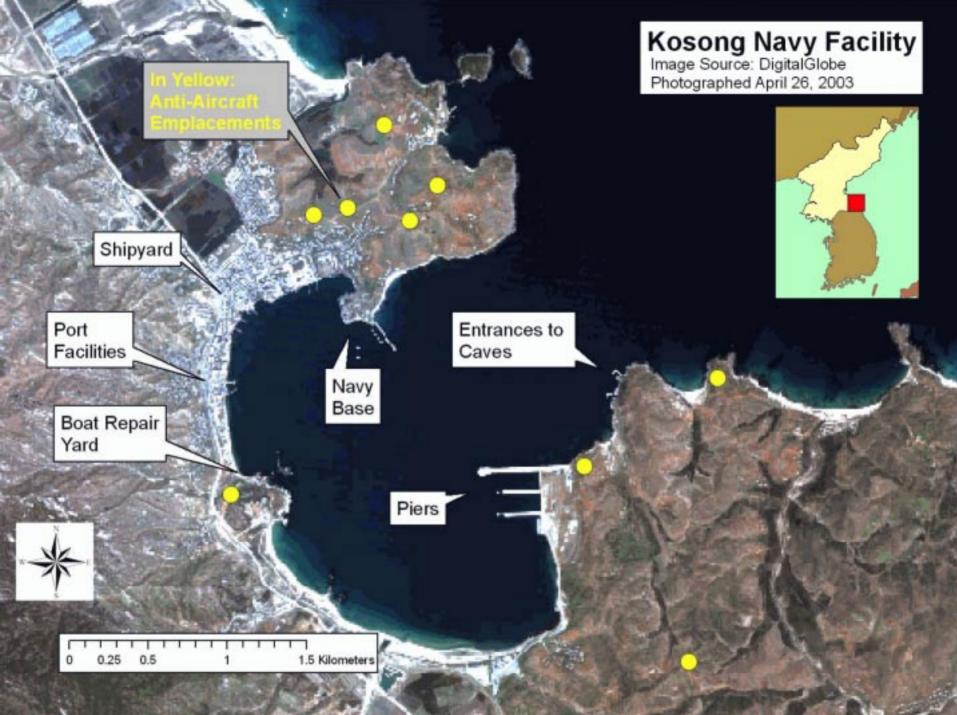






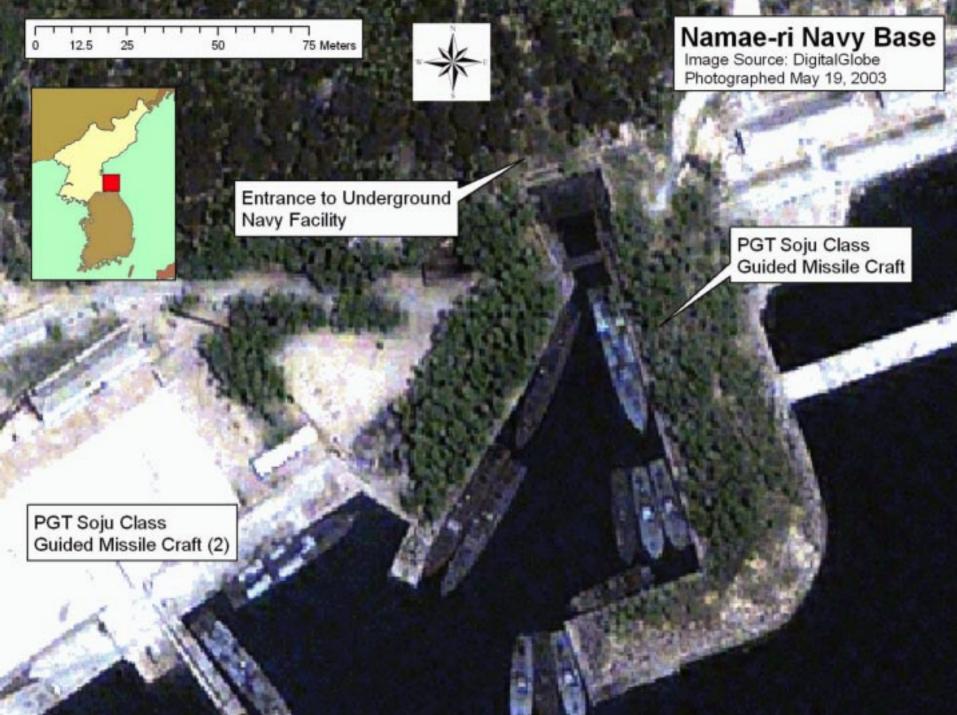










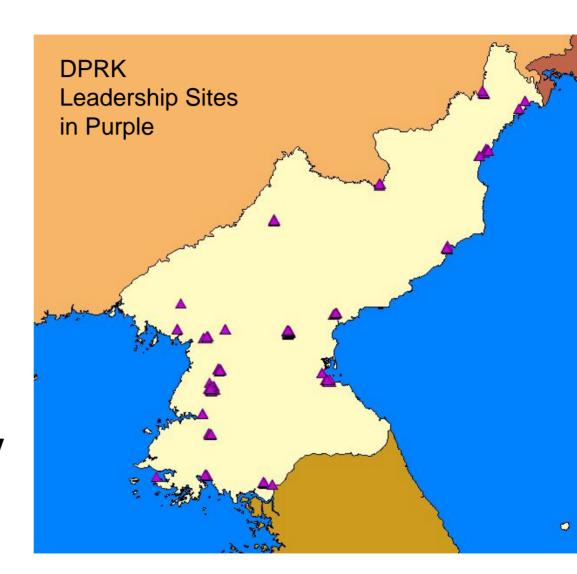


National and Provincial Government and Leadership Sites

People's Study Palace

Foreign Ministry and Cabinet Offices

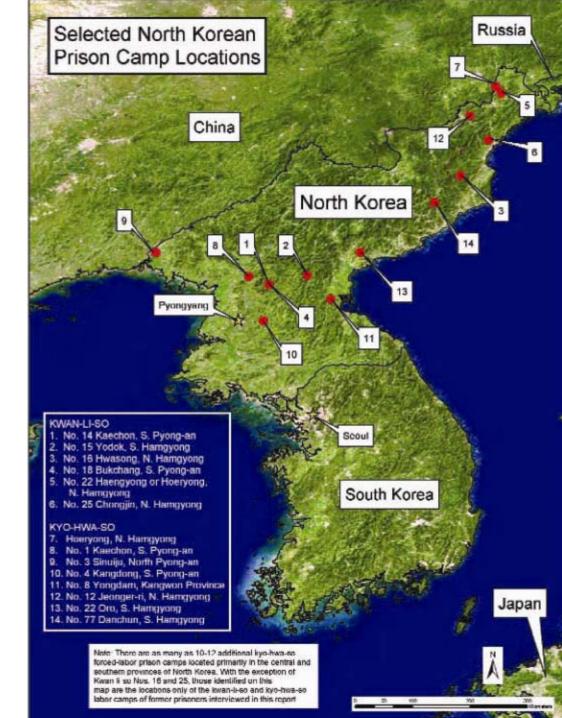
Korean Workers' Party Complex







DPRK Political Prisons and Prison Camps (Forced Labor)





Conclusion Slide Current Projects and Future Work...

We have found this tool very useful and we would be interested in collaborating with other institutions;

Arms control, energy and humanitarian issues.