

Mini-Study

Final Brief

Briefing by **Team Jaguar**

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China's Influence and Presence has Expanded by 2025

- 2nd largest economy in the world, highly connected with both the U.S. and with new economic partners.
- Projection of 'Soft Power' (economic aid, co-economic development, local security cooperation) has been effective in expanding sphere of influence. Results:
 - China obtaining oil and gas resources from developing countries.
 - Securing access to these resources has provided justification for military growth
 - Chinese maritime and aviation forces are operating from forward bases in Burma, Malaysia and Pakistan
 - Chinese military has a ubiquitous presence along Middle Eastern and Asian maritime trade routes.

India-Pakistan Conflict 2025

Bombing in Kashmir

Pakistan
•Mobilize forces to the border

China
•Calls India's embargo act of international piracy
•Send surface task force to escort reoccurring convoys of 10 container ships carrying war supplies to Pakistan

India
•Claimed Pakistan responsible
•Mobilize forces into Kashmir
•Will intercept shipping heading to Pakistan
•Request assistance from U.S. for intelligence and littoral forces

Problem

- No problem for China, only opportunity.
- Opportunity:
 - Display Chinese Navy might on a world stage
 - Make it difficult for India and the United States to withdraw from conflict without concessions.
- Work to be done:
 - Support convoy operations between China and Pakistan.
 - Deter Indian and American intervention.
 - Prepare an effective counter force against possible Indian Embargo.

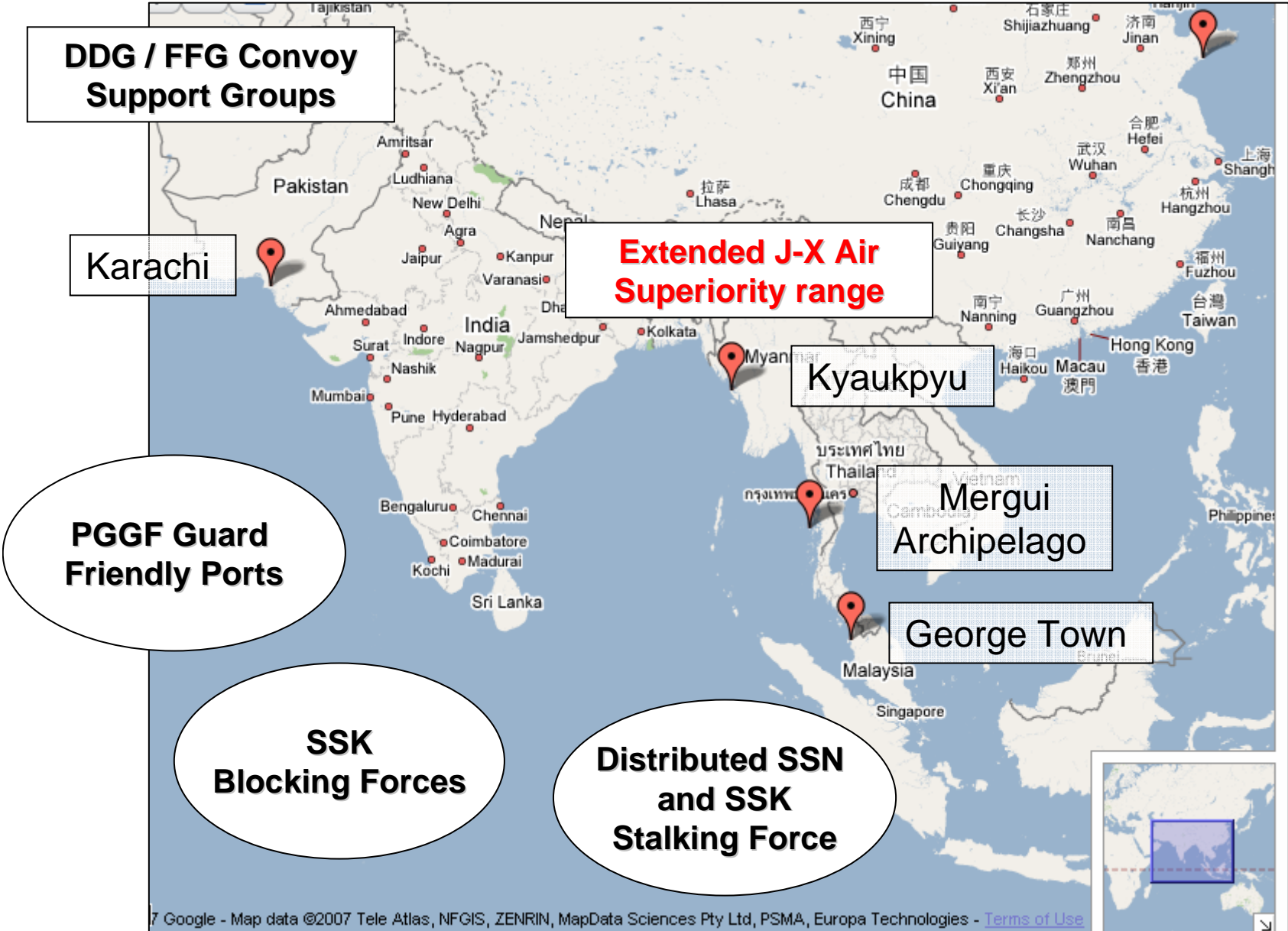
Bottom Line: China has Many Campaign Advantages

- Chinese Navy can support every ship traveling to Karachi in a 10-ship convoy after a 6-day force structuring.
- Superior submarine and air forces, and adequate surface forces, so should win any protracted attrition campaign with India.
- India could mass forces and destroy the escort and convoy in an initial salvo exchange. China can mitigate risk:
 - Scale size of surface escort to current Indian threat
 - Execute Aviation and Submarine first strike should India threaten with a surface force capable of overwhelming Chinese escort.
 - Position Aviation and Submarine forces to dominate Indian counterparts should India strike first.

Overall Assumptions

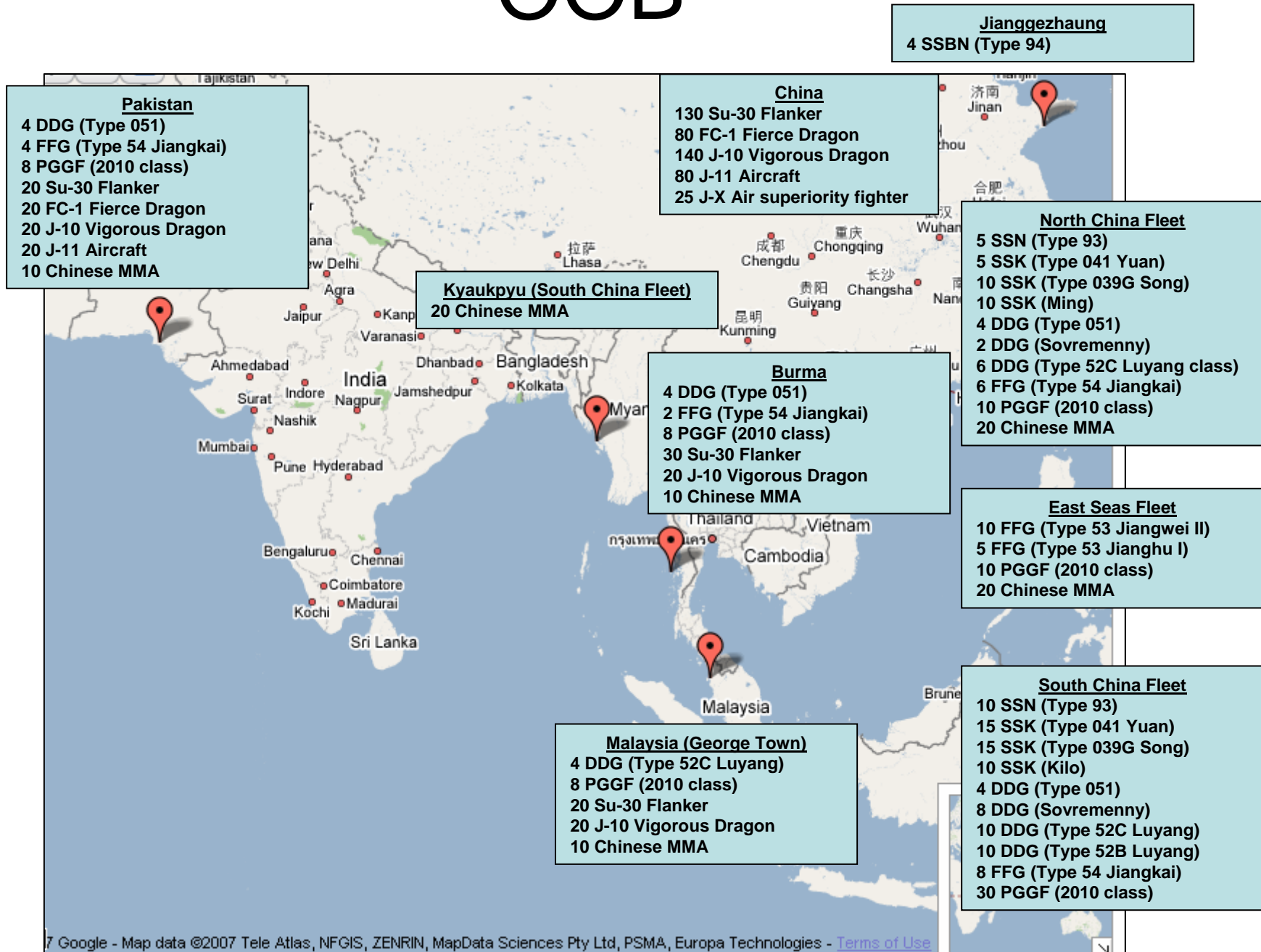
- U.S. intervention limited to providing India with accurate location and track of Chinese convoy.
 - U.S. will employ stand-off assets (satellites, long-range sensors) not likely to get caught up in any maritime or air exchange.
 - Physical harassment from U.S. forces can be discounted because China is confident strategic deterrence and possibility of horizontal escalation makes U.S. threats hollow.
- Chinese sensor capabilities advanced enough to prevent India massing a surface force along the convoy route undetected.
- Major engagements will be along deep water route taken by Chinese convoy, most likely off the southern tip of India.

The Plan

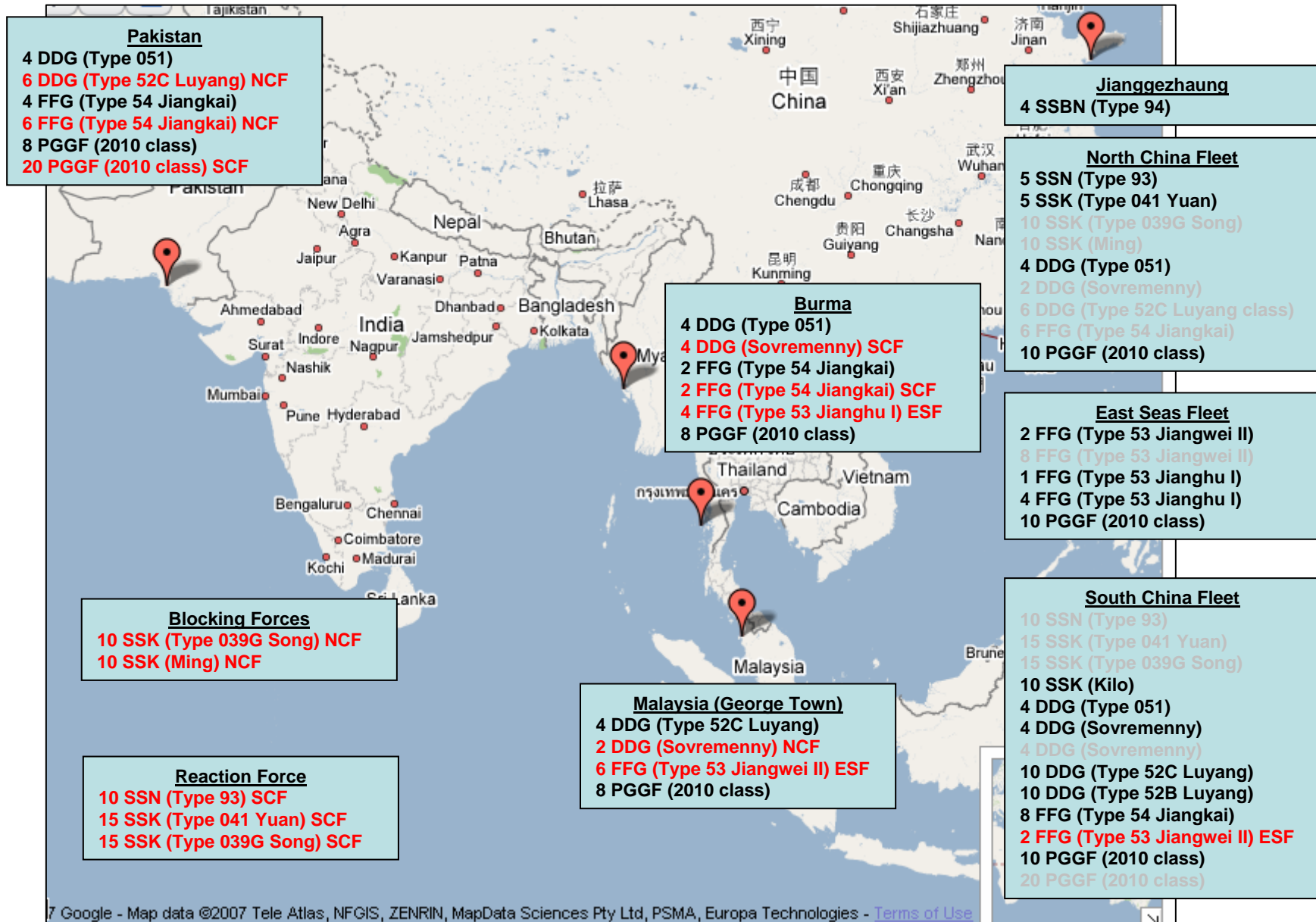


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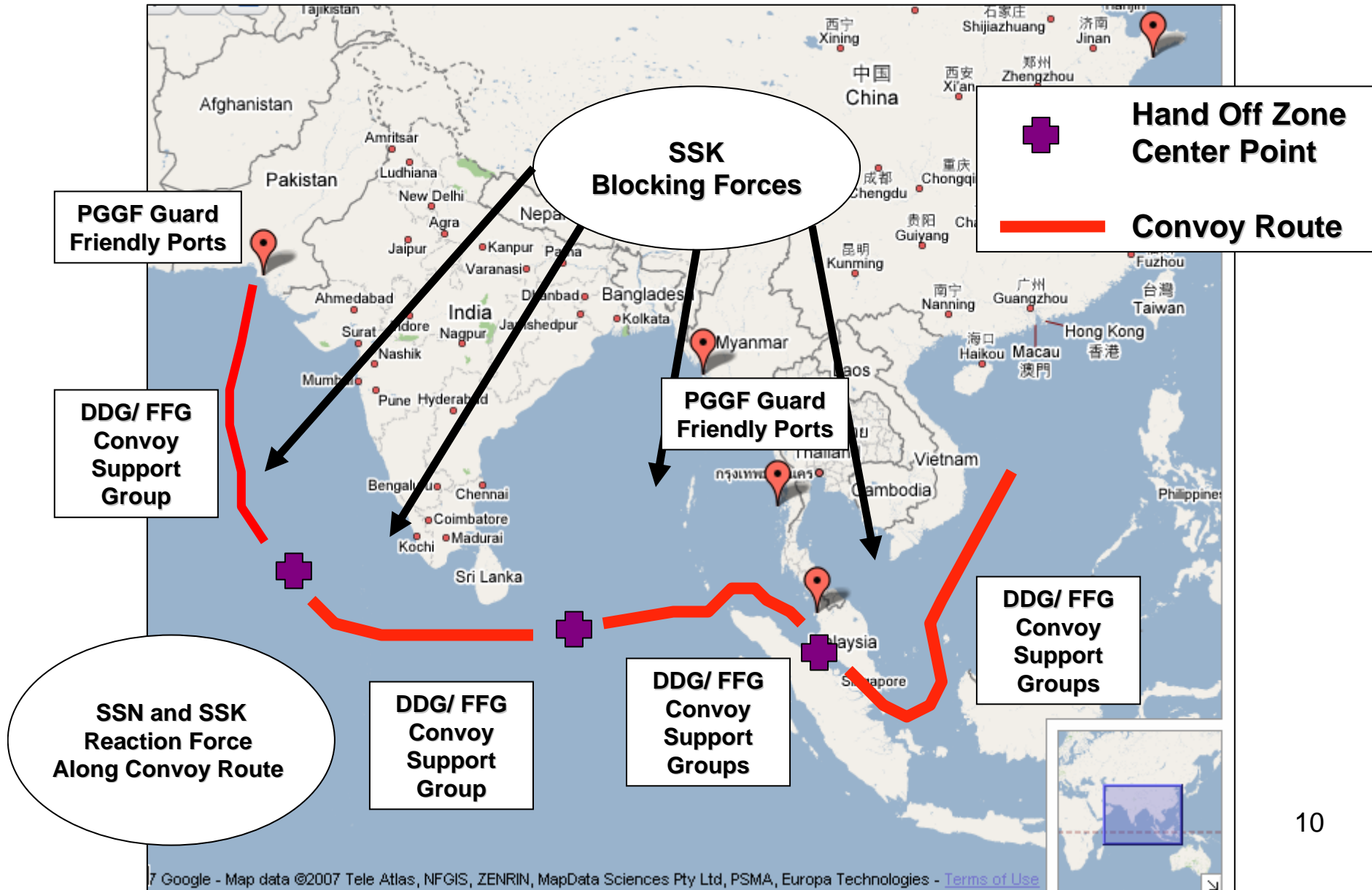
OOB



Naval Force Structure



Naval CONOPS



Analysis of Initial Deployment

- Only one day delay in launch of first convoy after decision made to ensure forces in place for operations
 - 6 days for all forces to redeploy to new posture
 - North China Sea forces take longest to redeploy
 - Can rendezvous with convoy after 1 day
 - Forces redeploy while escorting first convoy

Surface Battle Assumptions

- Chinese convoy escorts will absorb hits until destroyed before escorted merchants will take hits. (successful screening assumed).
- Chinese PGGF will not have sustainment to participate in convoy escort, but Indian FSGM (Veer-class missile ships) could participate in battle at position of India's choosing.
- Indian Carriers will not operate near the area of convoy engagement because they would be too vulnerable in a saturated missile exchange environment.
- Following a surface exchange, convoy and remaining escorts will need to head south, while China solidifies active air and subsurface primacy, before continuing on to port.

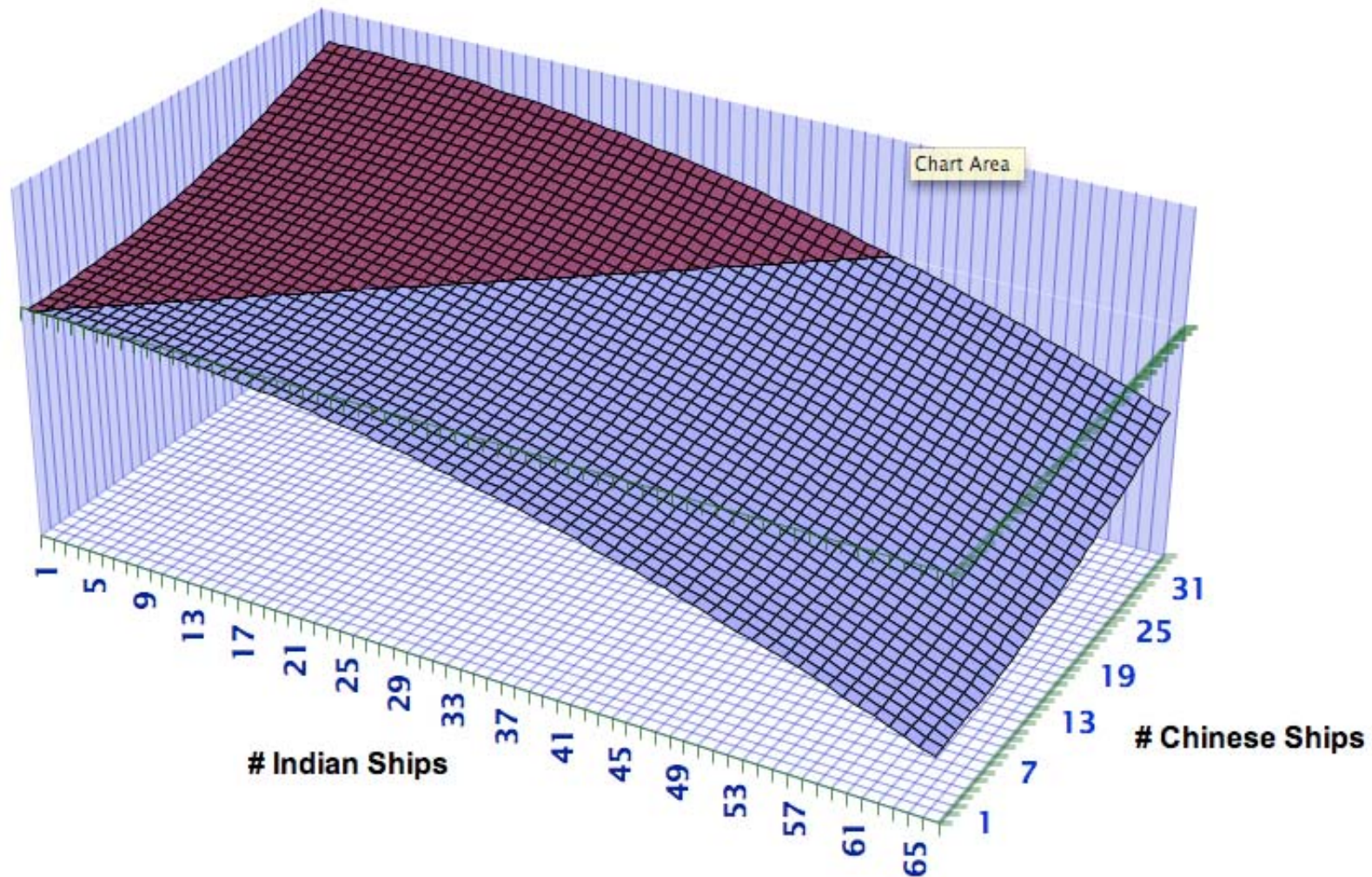
India Wins If Fleets Meet in Pure Surface Battle

- India masses surface force, and attacks off southern tip of subcontinent.
- Chinese convoy escorted by all DDG and FFG from Burma and Pakistan (double coverage)

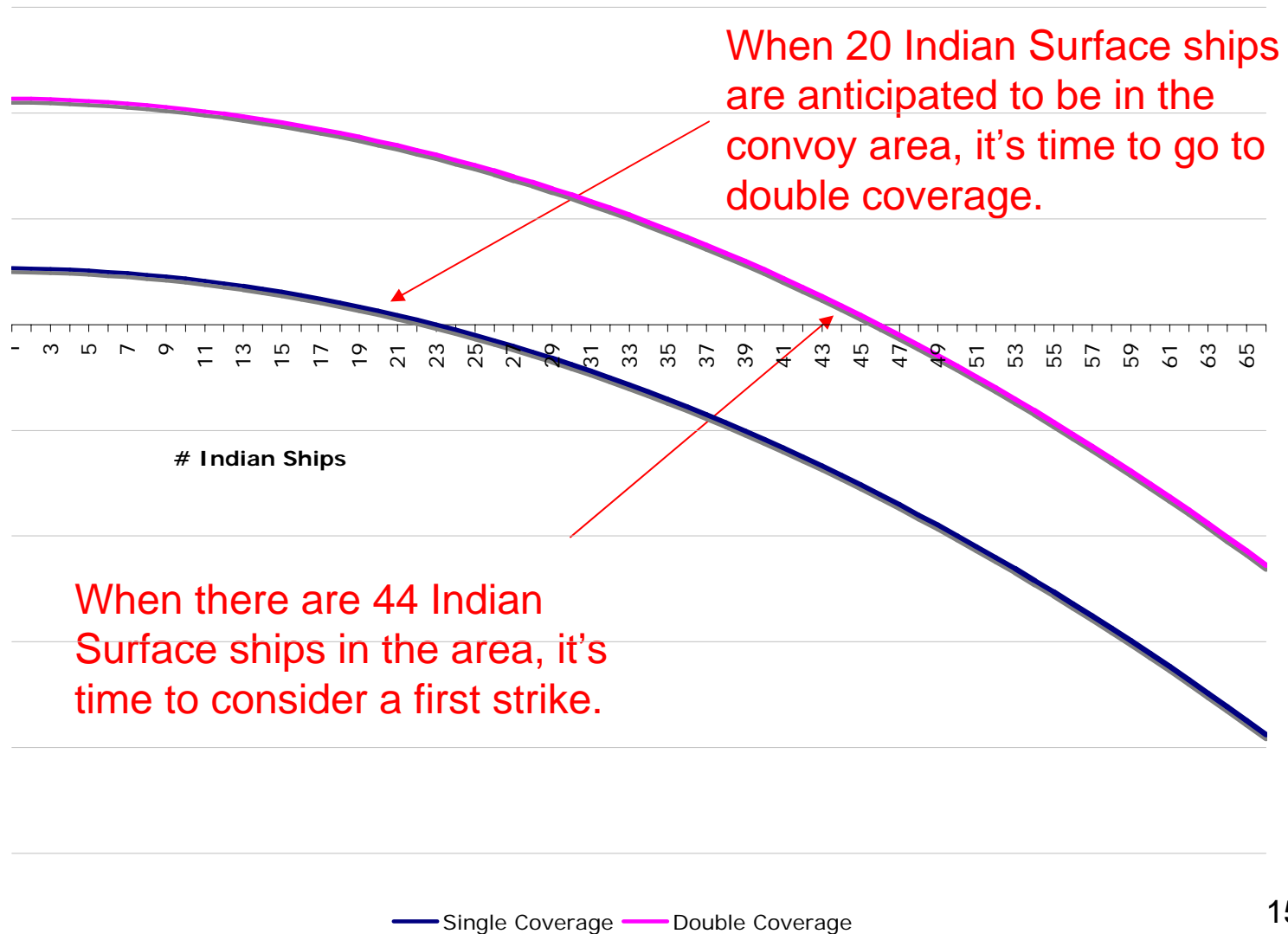
	# Ships	Ave. Offensive Power	Ave. Defensive Power	Ave. Staying Power
China	36	11	1.5	1.5
India	66	7.8	1.3	1.3

- Although Chinese ships are more powerful, India's numbers give them a decisive advantage [calculated with Hughes' Salvo Equations reflecting square law, deterministic analysis]
- This suggests that China must not allow such an Indian surface force near the convoy.

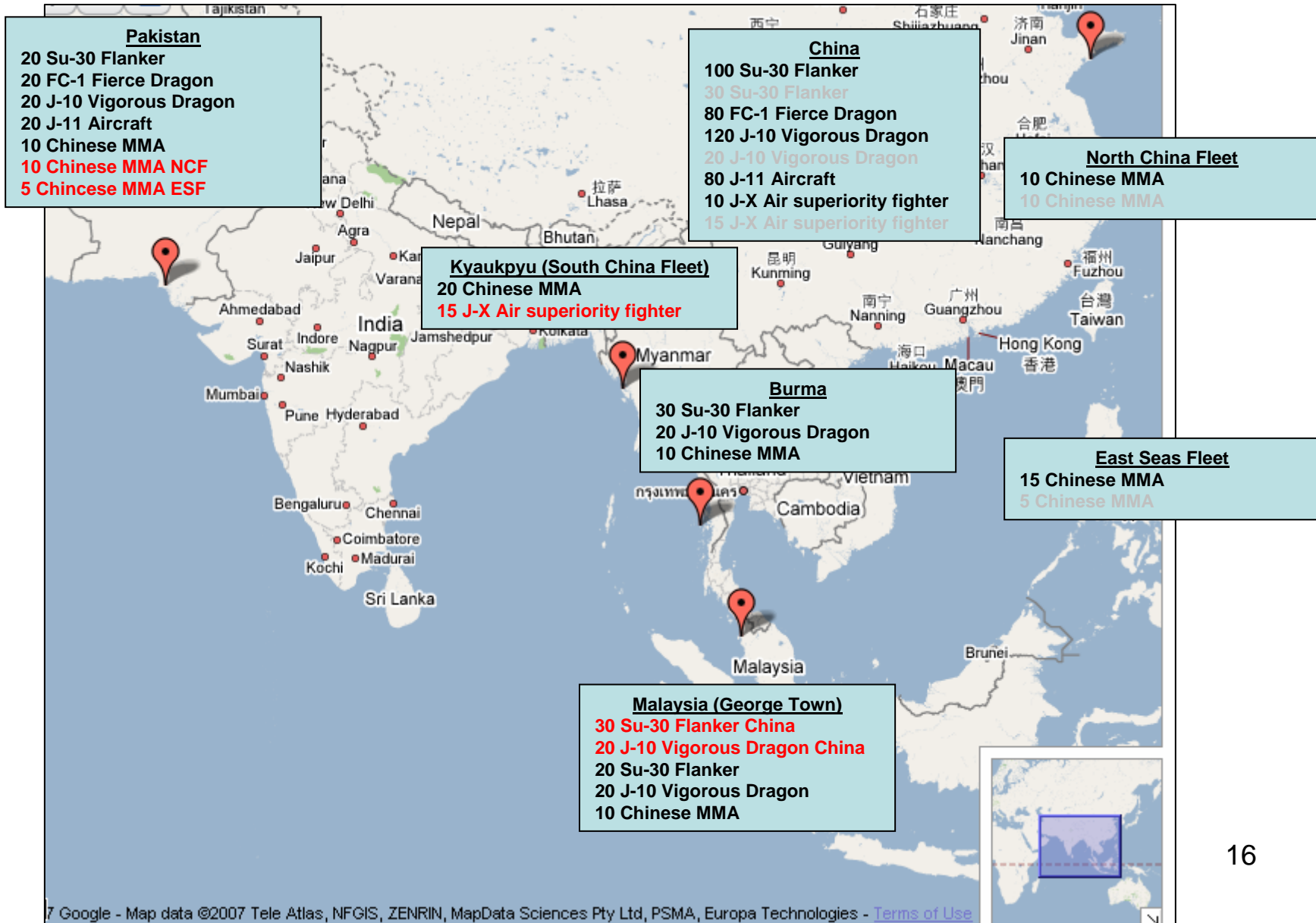
When is a Chinese First Strike Necessary?



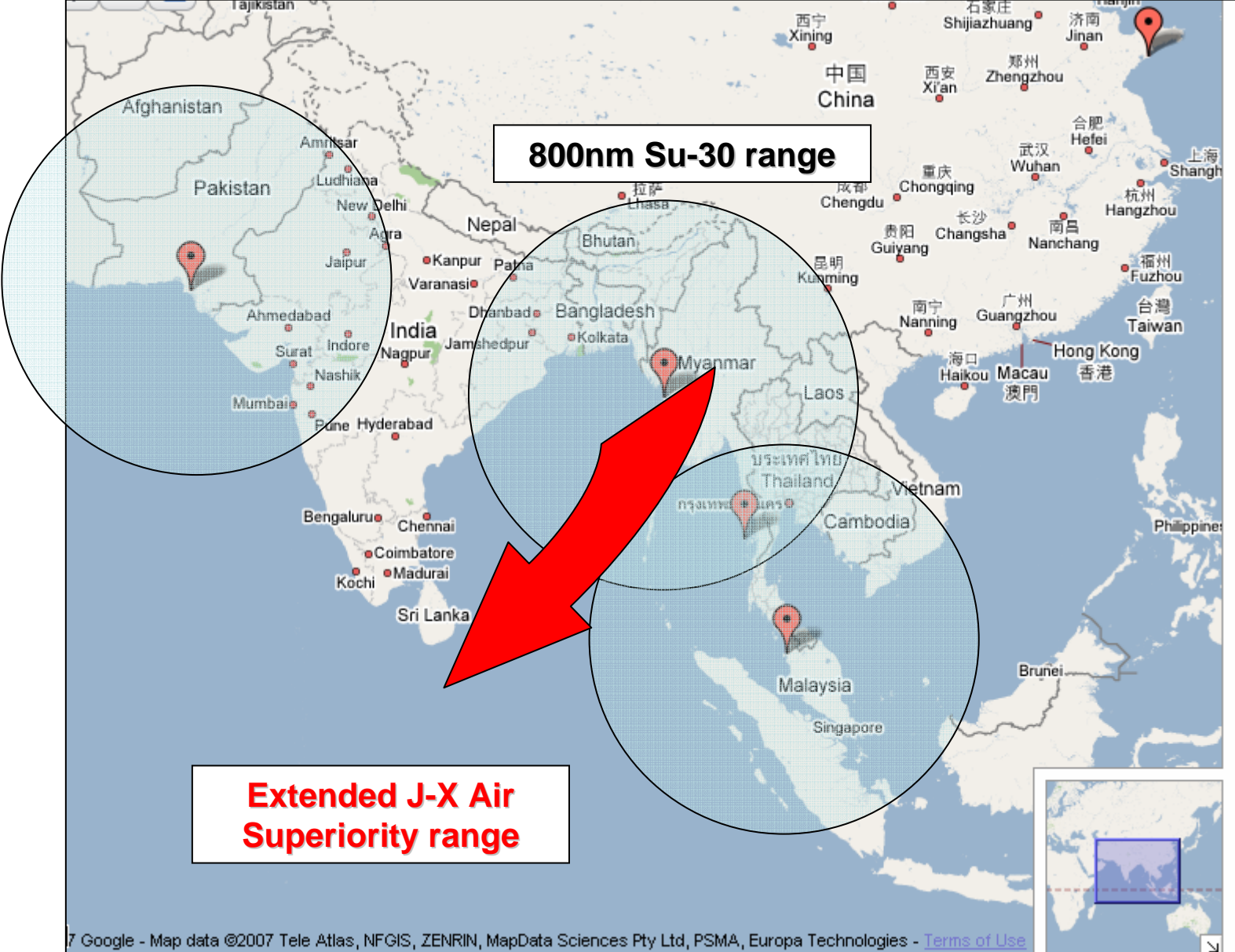
Double Coverage Allows China to Deal With a Larger Indian Force ... To a Point



Aviation Force Structure

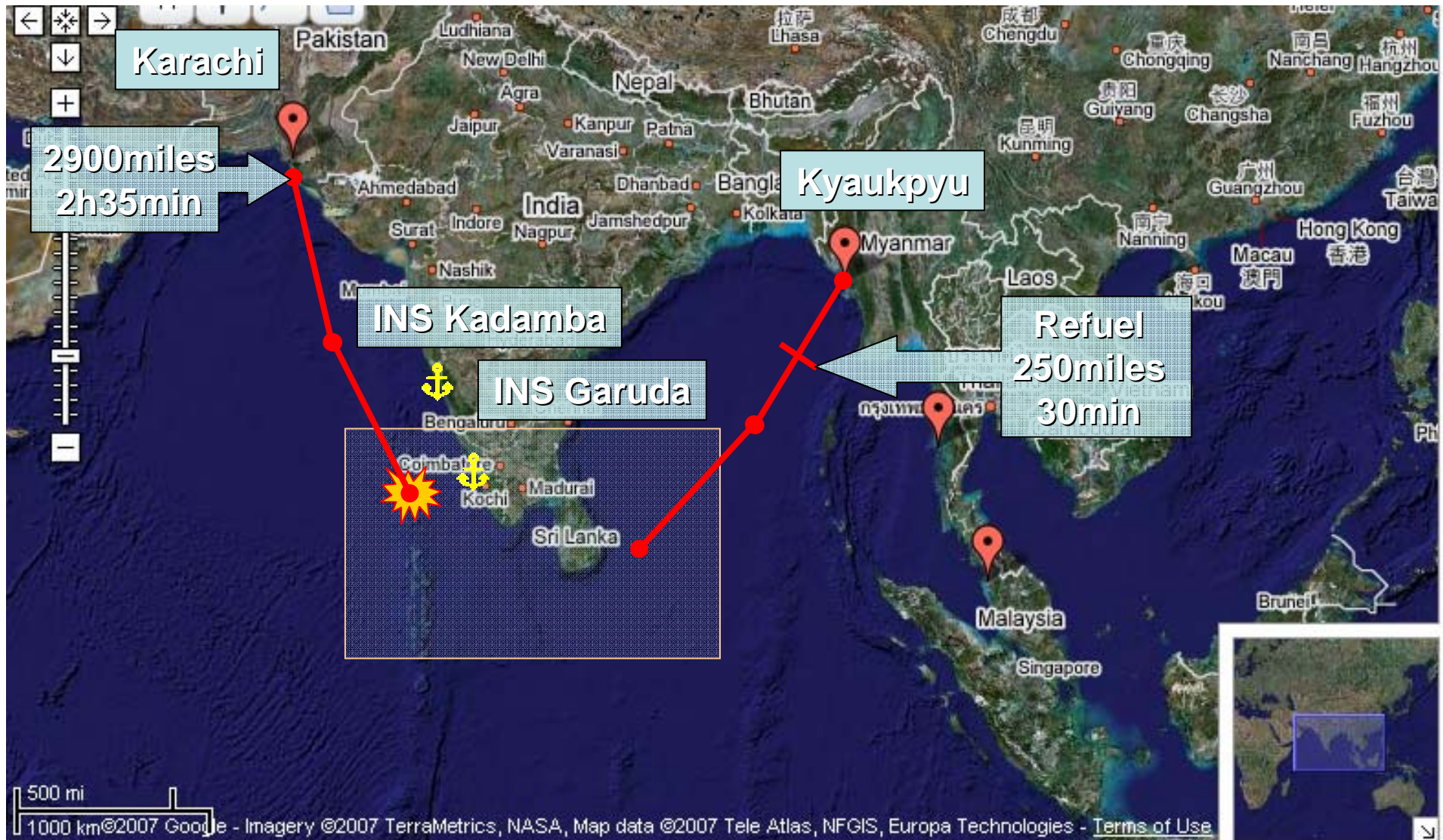


Aviation CONOPS

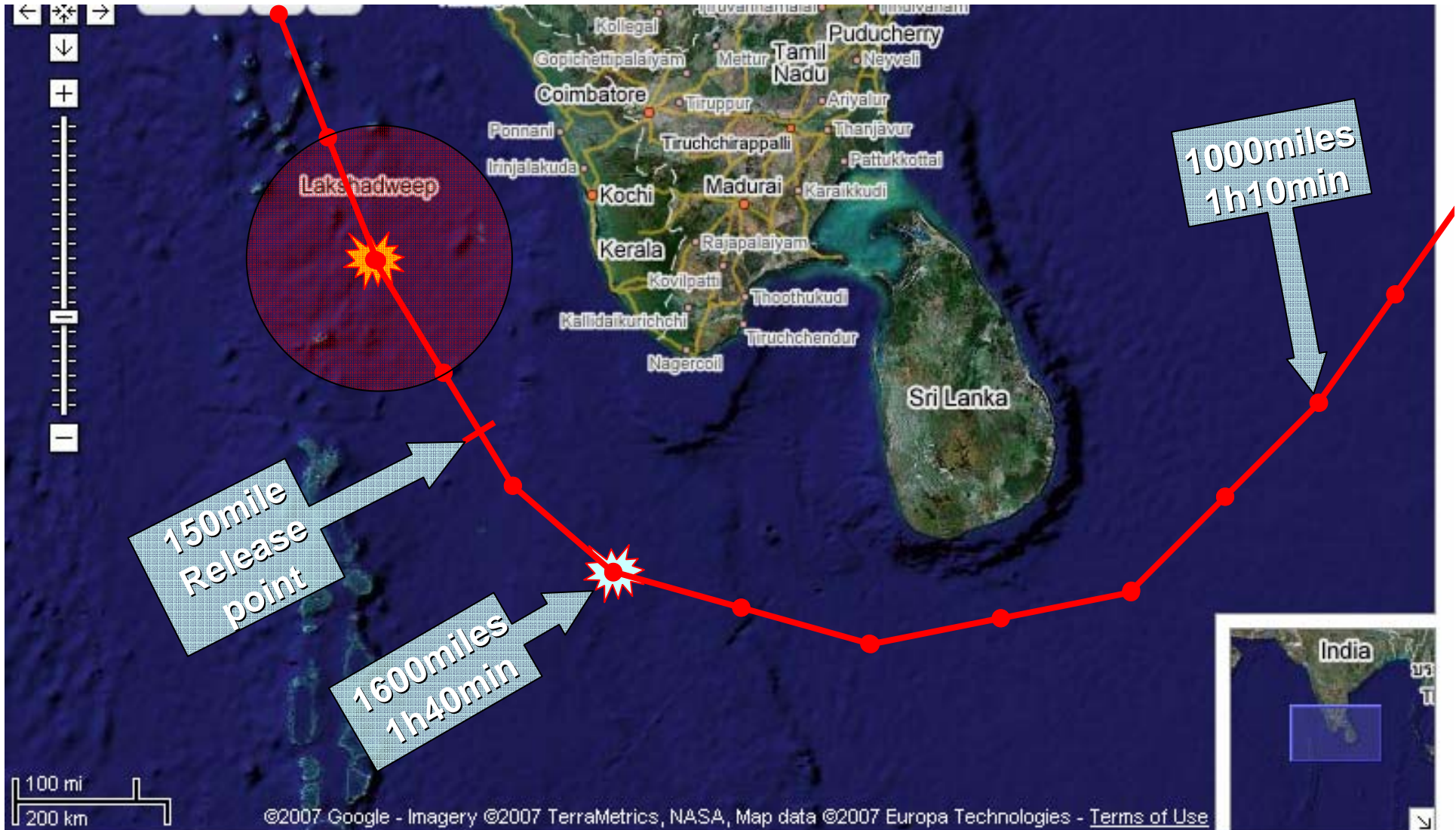


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Air Route



Air Battle



Air to Surface Missile

Grim Reality for Surface Ships

- Yingji-82 Anti-ship missile (C-802, CSS-N-8 Saccade)
 - 0.9 Mach, sea skimming, radar altimeter
 - 165kg armor-piercing warhead
 - 98% hit probability (fas.org)
 - Comparable to Harpoon (AGM-84)
 - 150nm air launched range
- C-803, 1.3 Mach in terminal phase
- 2006 Israel-Lebanon Conflict
- Iran has 60 C-802s

Hold Surface Fight until 50% of ASW assets have been shot

- 15 SSK (Scorpene Class)
- 5 SSK (Kilo)

- 4 CVM (Project 71) (20 Su-33 Aircraft each)
- 5 DDGHM (Delhi Class)
 - Barak, 6 miles (CLOS)

- 15 DDGHM (Project 15A)
 - Barak, 6 miles (CLOS)

- 20 FFGHM (Talwar class)
 - SA-N-12, 31miles

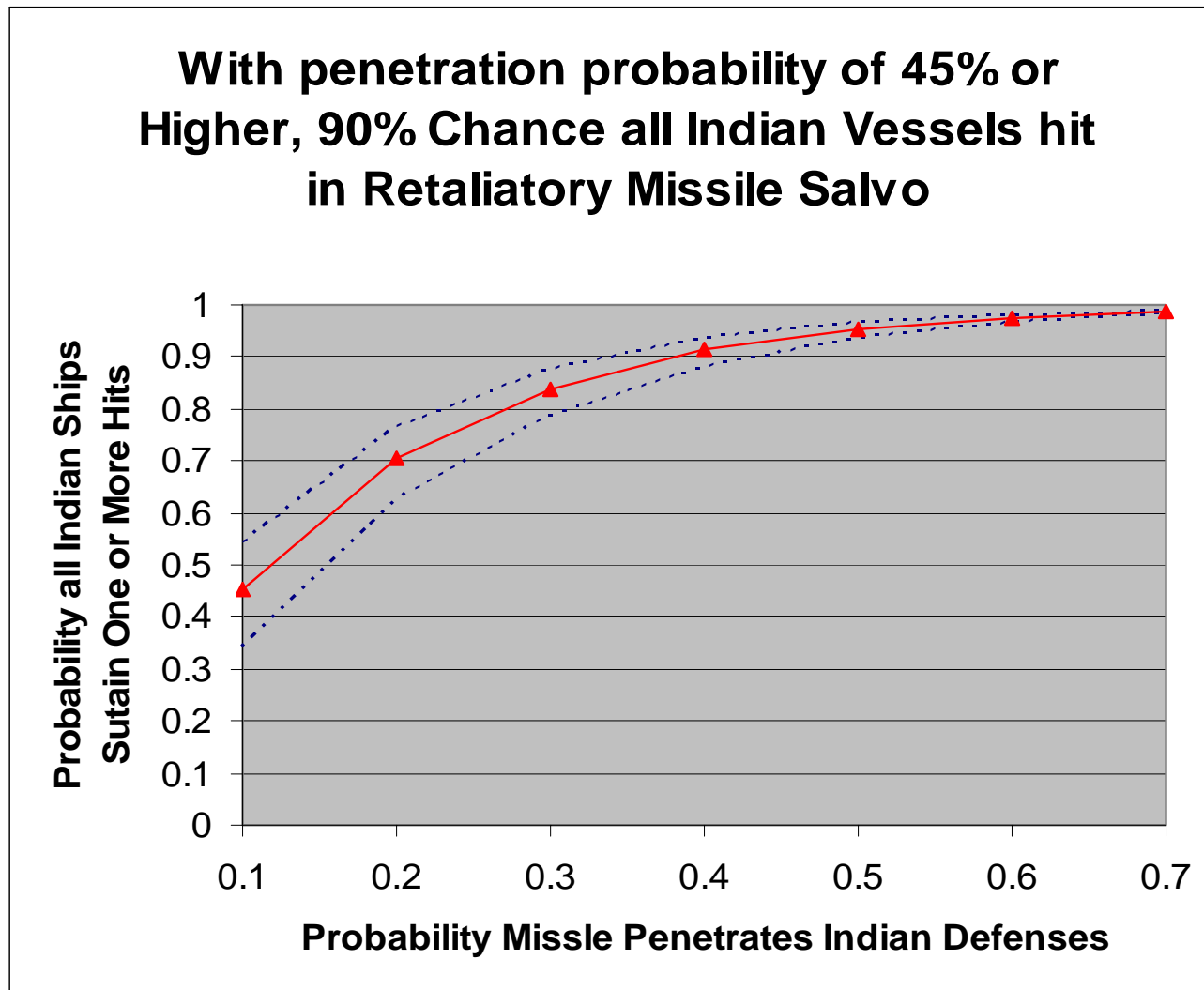
- 10 FFGHM (Project 17 Shivalik class)
 - Barak, 6 miles (CLOS)

- 3 FFGHM (Project 16A Brahmaputra class)
 - Barak, 6 miles (CLOS)

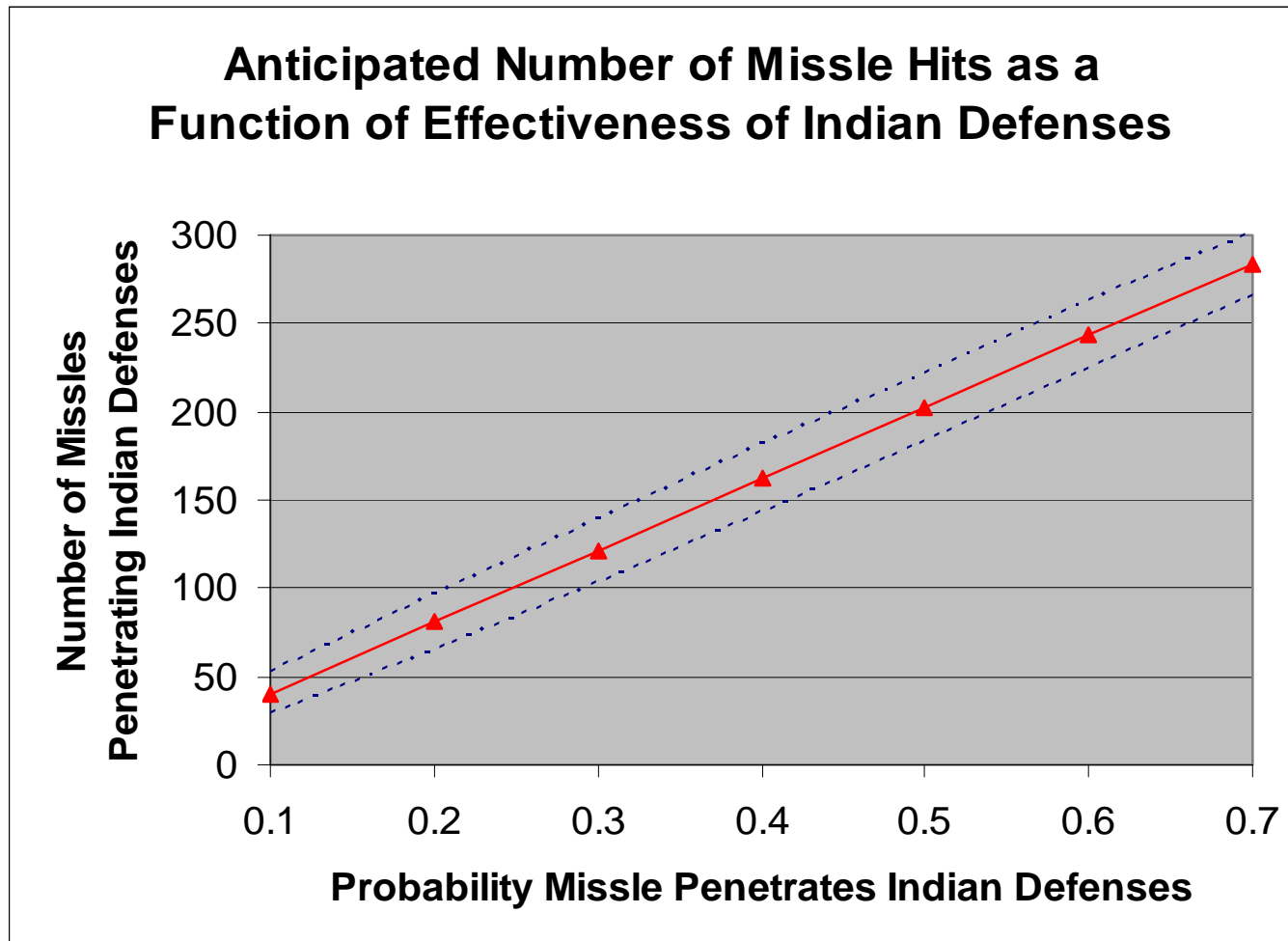
- 13 FSGM (Veer-class missile ships)

57 vessels
29 hits
4 AC/sortie
2 missiles/AC
~4 sorties
16 hours

With Coordinated Retaliatory Salvo of Chinese Subs and Surface Ships, All Indian Surface Vessels Hit by ASMs

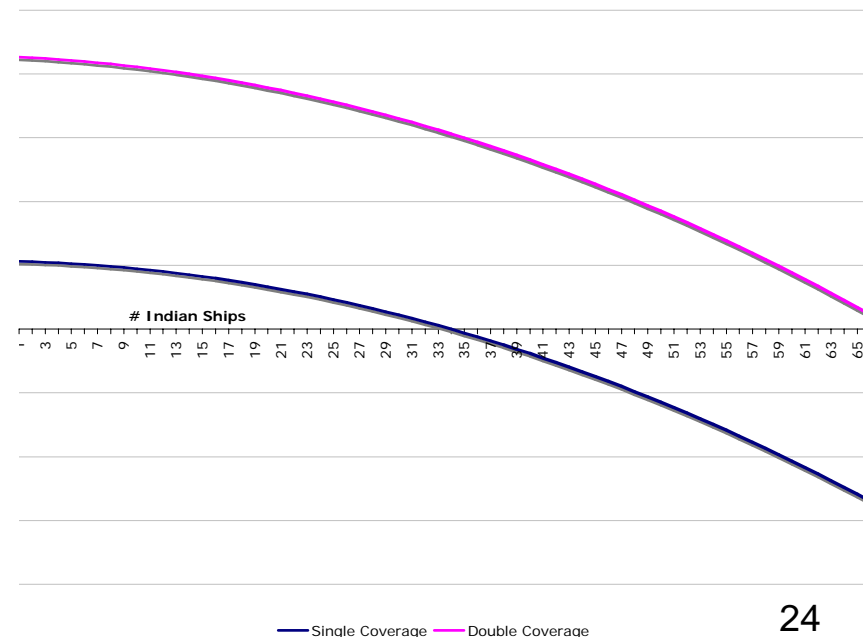
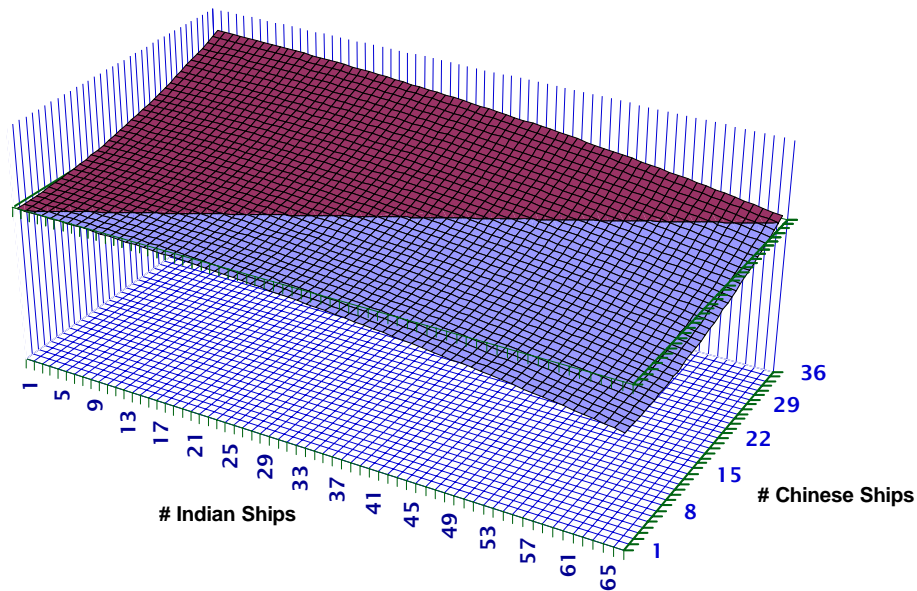


Combined Chinese Surface and Sub Retaliatory Salvo Missile Penetration



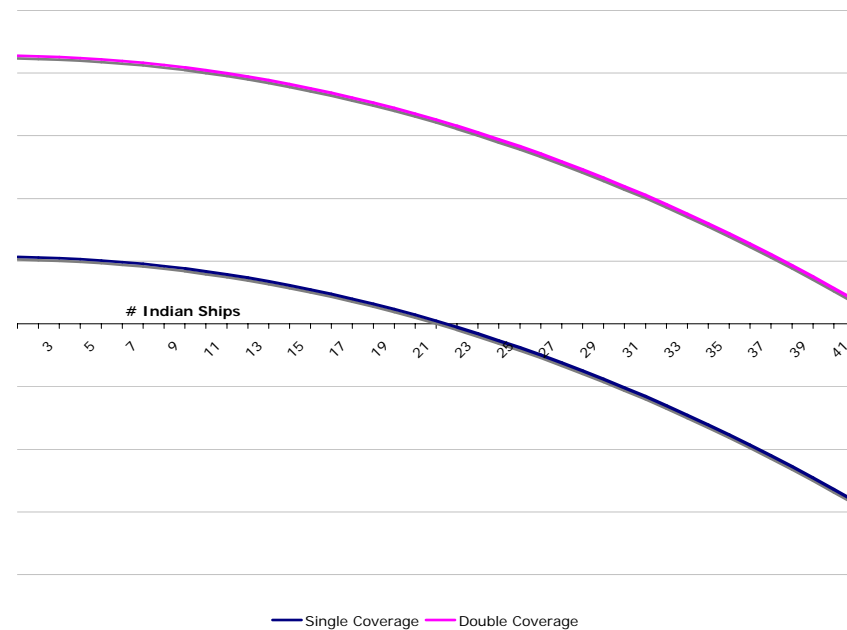
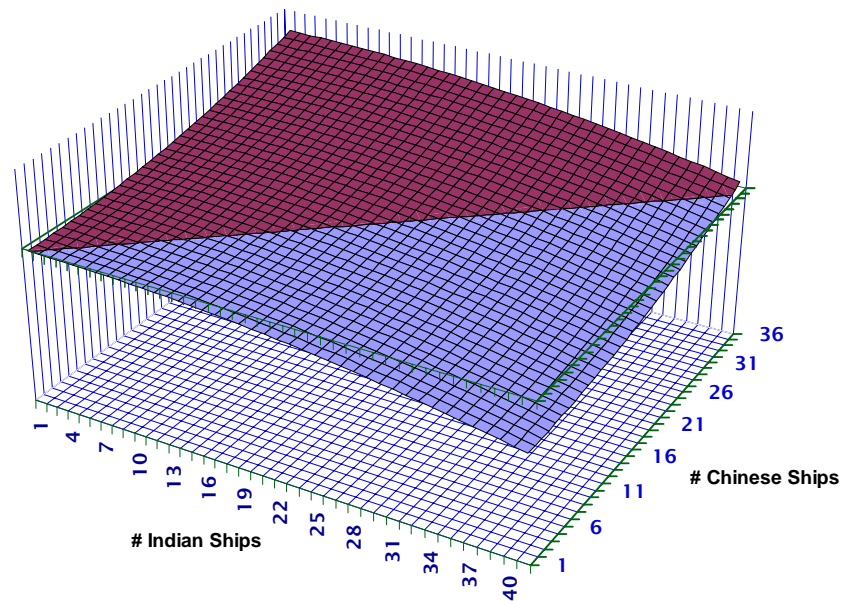
Add a Coordinated Chinese Submarine & Surface Salvo: China Wins

- If Chinese Subs and Surface Combatants launch coordinated retaliatory strike, even assuming only 13% penetration (52 hits) China destroys Indian Surface Fleet in every scenario.



Or, Let Chinese Airpower Strike First: China Wins

- By Attriting the Indian Talwar Class and Dehli Class, Chinese Airpower evens the numbers, allowing China's greater offensive power to go about its grim business.



Questions?

“The general who wins a battle makes many calculations in his temple ere the battle is fought.

The general who loses a battle makes but few calculations beforehand. Thus do many calculations lead to victory, and few calculations to defeat.”

– *Sun Tzu*

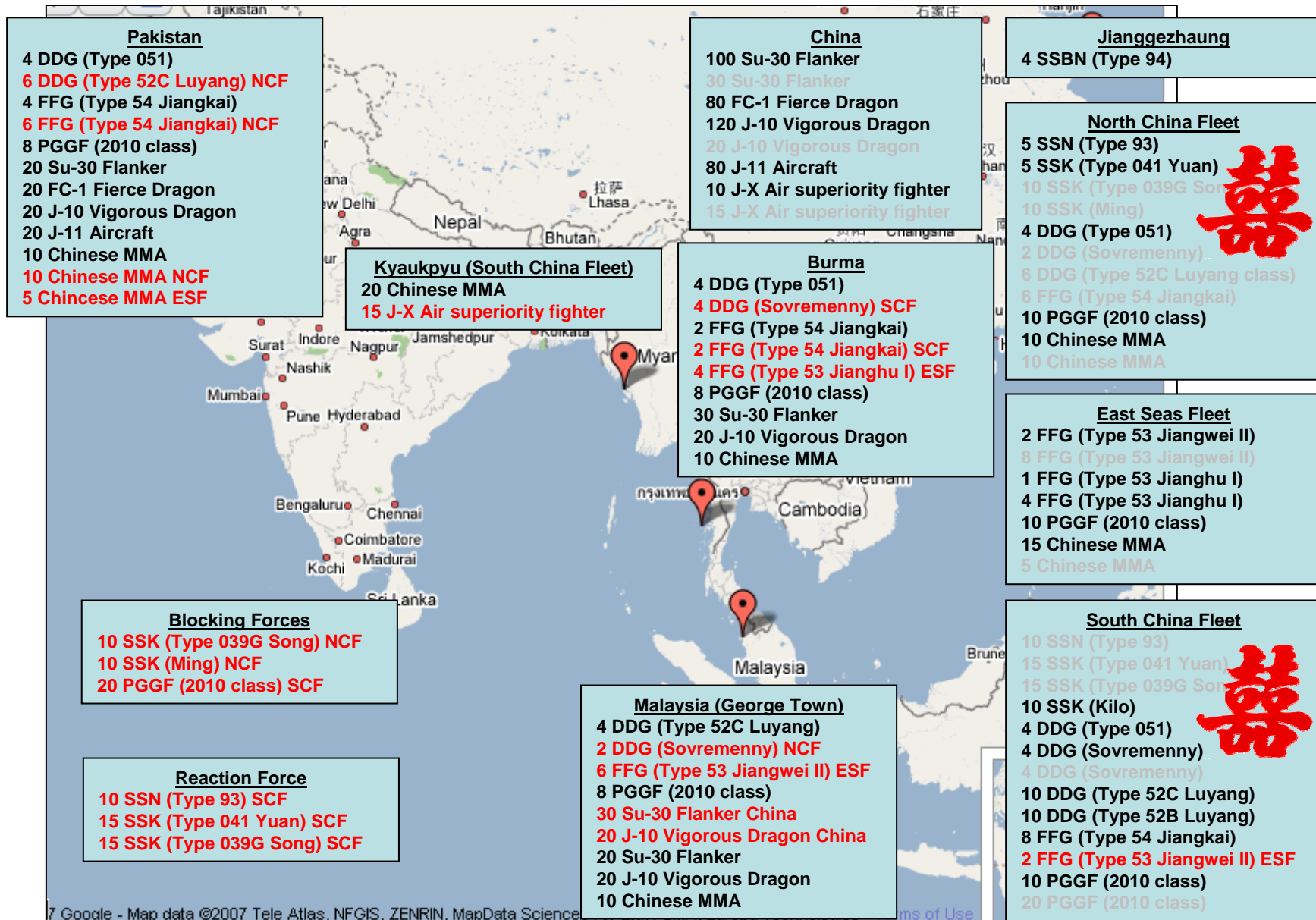
BACKUP SLIDES



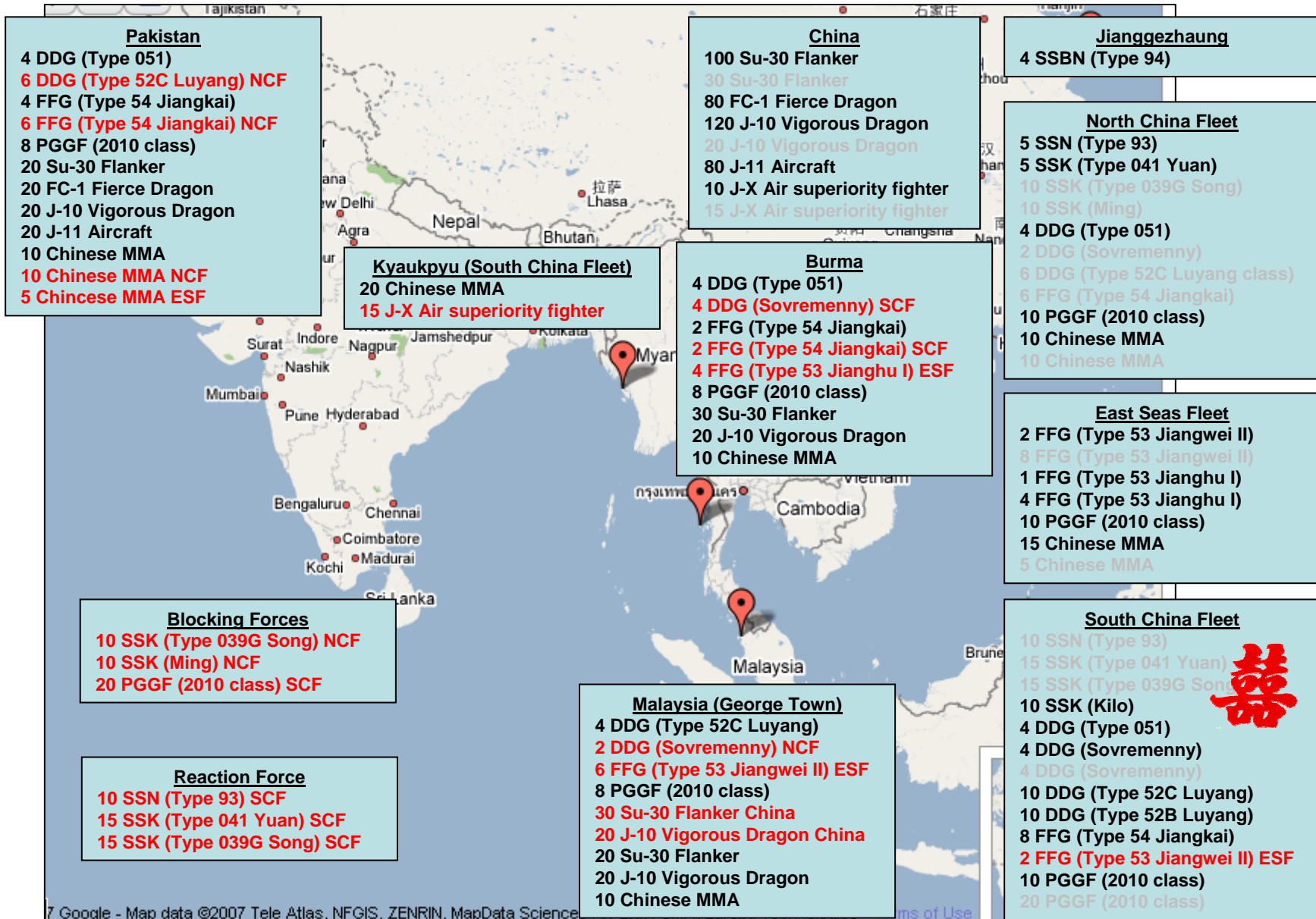
Concept of Operations

- Surface
 - Attach small surface groups to 10-ship convoys.
 - Escort convoys to hand off points, at the straits and southern tip of India, expanding into hand off zones of overlapping coverage if imminent attack likely.
- Maritime/Aviation
 - Patrols to deter Indian/American ISR capabilities against Chinese ASW
 - In the case of conflict, long range strike force on standby to destroy ISR assets in the Indian Ocean.
- Anti-Surface Warfare
 - Diesel submarines pre-positioned along the convoy route practicing strict EMCON.
 - Preponderance of nuclear submarines positioned to counter attack potential embargo.
 - Nuclear submarines supporting convoy escorts (level of effort).
- Strategic
 - Deter direct U.S. intervention by sortieing SSBNs and threatening horizontal escalation in proportion to threatening disposition of U.S. Naval forces.

Complete Force Structure



Force Structure: Tech Inject



Deter Active U.S. Involvement

- Assume we can't prevent passive involvement (passing on satellite tracking information).
- Game Theory analysis to devise (possibly horizontal) escalation options tied to deterring active U.S. involvement. Examples:
 - China sorties Northern Fleet SSNs to shadow U.S. CSG's in Pacific (or SSBNs to open ocean) corresponding to the number of U.S. ships shadowing protected convoy.
 - China sells off U.S. T-bonds at a rate based on U.S. naval presence in region.
 - Chinese computer network attack (CNA) against PACOM / PACFLT, escalating based on U.S. operations.

Dynamic Convoy Pacing

- Measure Indian combat power at sea: ships at sea minus ships currently stalked by Chinese SSN/SSKs.
 - Increase convoy pace (shorter overlapping escort spans) when Indian combat power low.
 - Slow convoys and tighten defense by overlapping escort coverage and pulling SSN/SSKs not successfully stalking Indian forces into escort screen when Indian combat power high.

Force Structure

3	Jiangqazhaung		East Seas Fleet						
4	4 SSBN (Type 94)		2 FFG (Type 053 Jiangwei II class)						
5			1 FFG (Type 53 Jianghu I class)						
6	North China Fleet		10 PGGF (2010 class)						
7	5 SSN (Type 93)								
8	5 SSK (Type 041 Yuan)		Burma						
9	4 DDG (Type 051)		4 DDG (Type 051)						
10	10 PGGF (2010 class)		2 FFG (Type 054 Jiangkai class)						
11			8 PGGF (2010 class)						
12	South China Fleet		4 DDG (Sovermenny)						
13	4 DDG (Sovermenny)		2 FFG (Type 054 Jiangkai class)						
14	10 SSK (Kilo)		4 FFG (Type 53 Jianghu I class)						
15	4 DDG (Type 051)								
16	10 DDG (Type 52C Luyang class)		Malaysia						
17	10 DDG (Type 52B Luyang class)		4 DDG (Type 52C Luyang class)						
18	6 FFG (Type 054 Jiangkai class)		2 DDG (Sovermenny)						
19	10 PGGF (2010 class)		6 FFG (Type 053 Jiangwei II class)						
20	2 FFG (Type 053 Jiangwei II class)		8 PGGF (2010 class)						
21	10 PGGF (2010 class)								
22			Pakistan						
23	Reaction Force		4 DDG (Type 051)						
24	10 SSN (Type 93)		4 FFG (Type 054 Jiangkai class)						
25	15 SSK (Type 041 Yuan)		8 PGGF (2010 class)						
26	5 SSK (Type 039G Song)		6 DDG (Type 52C Luyang class)						
27			6 FFG (Type 054 Jiangkai class)						
28	Blocking Force								
29	20 PGGF (2010 class)								
30	10 SSK (Type 039G Song)								
31	10 SSK (Ming)								
32									
33									
34									

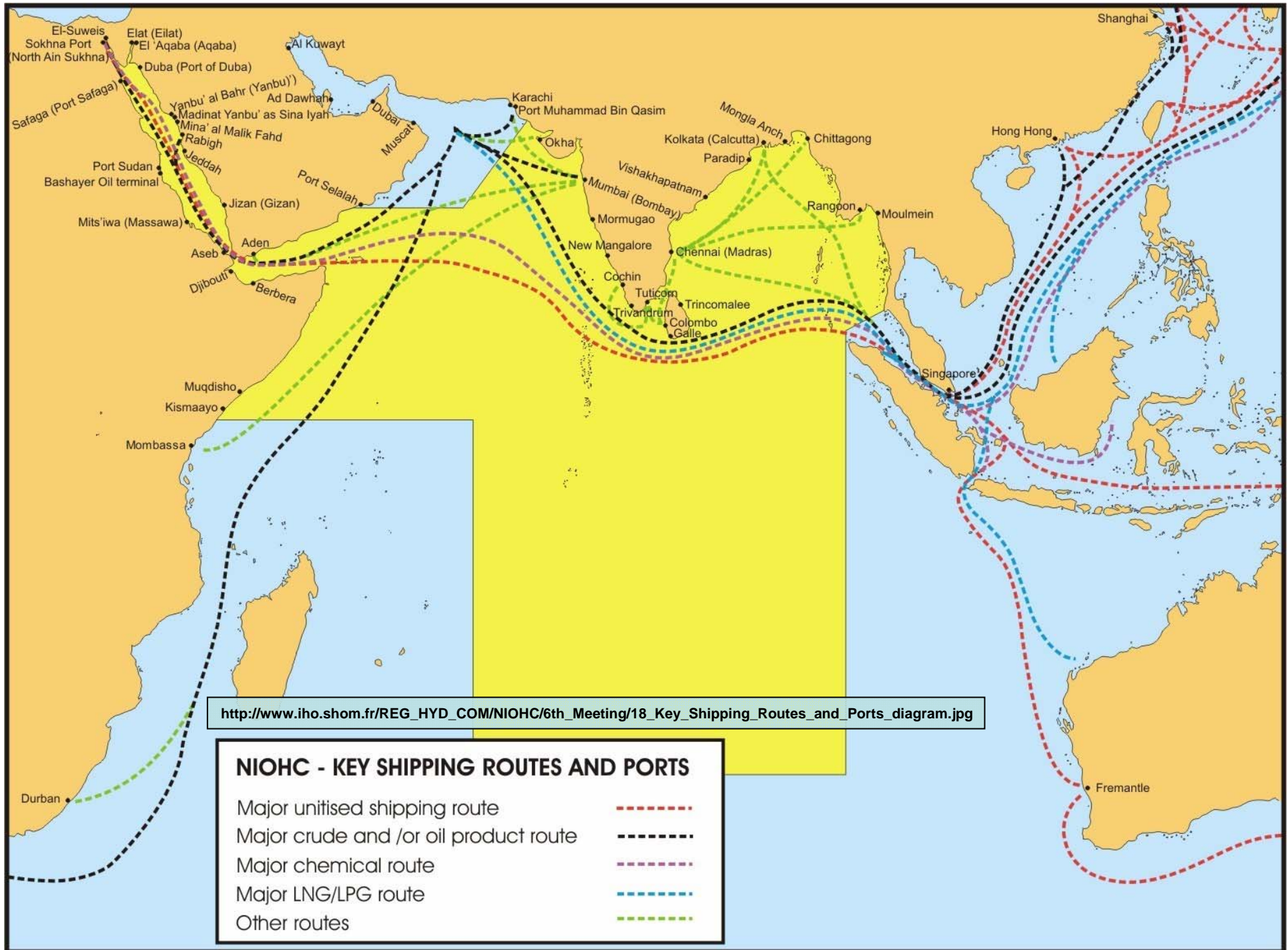
Day 6 / Day 5 / Day 4 / Day 3 / Day 2 / Day 1 / Initial Laydown / Fin OOB / Transfer Schedule /

Draw AutoShapes

Ready

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Shipping Operations, Today



KARACHI PORT TRUST
GATEWAY TO PAKISTAN



Port Operations

Updated on Tuesday, 11 September 2007

DURING 24 HRS. ENDING 0700 HRS. ON 11/09/2007

CARGO HANDLING				SHIPPING POSITION		
CARGO TYPES	Import	Export	Total	Type of Ship	Arrival	Sailing
Containers (TEUs)	2,735	2,095	4,830	Containers	3	2
Containers (TONs)	41,260	18,722	59,982	General Cargo	1	-
TP Cont. (TEUs)	-	-	-	Non Working	1	-
General Cargo	1,639	1,065	2,704	Fertilizer	1	-
Sub. Total Gen. Cargo	42,899	19,787	62,686	Coal	-	1
Bulk Cargo	16,012	9,722	25,734	Rice	-	-
Total Dry Cargo	58,911	29,509	88,420	Chrome Ore	-	-
Liquid Cargo	30,000	-	30,000	Oil Tanker	1	-
GRAND TOTAL	88,911	29,509	118,420	TOTAL	7	3

Container Handling:

Type of Handling	Loaded Containers			Empty Containers			Total Teus
	20'	40'	Over 40'	20'	40'	Over 40'	
Import	1,437	638	0	0	11	0	2,735
Export	552	357	0	751	39	0	2,095
Total	1,989	995	0	751	50	0	4,830

<http://www.kpt.gov.pk/>

<http://www.businessmonitor.com/freight/china.html>

Shipping Operations, Yesterday



KARACHI PORT TRUST

GATEWAY TO PAKISTAN



Port Operations

Updated on Monday, 10 September 2007

DURING 24 HRS. ENDING 0700 HRS. ON 10/09/2007

CARGO HANDLING				SHIPPING POSITION		
CARGO TYPES	Import	Export	Total	Type of Ship	Arrival	Sailing
Containers (TEUs)	2,282	879	3,161	Containers	3	1
Containers (TONs)	35,768	2,817	38,585	General Cargo	-	-
TP Cont. (TEUs)	-	-	-	Non Working	1	-
General Cargo	202	-	202	Rock Phosphate	-	-
Sub. Total Gen. Cargo	35,970	2,817	38,787	L.Cement	1	-
Bulk Cargo	16,967	7,298	24,265	Rice	-	-
Total Dry Cargo	52,937	10,115	63,052	Chrome Ore	-	-
Liquid Cargo	-	-	-	Oil Tanker	-	-
GRAND TOTAL	52,937	10,115	63,052	TOTAL	5	1

Container Handling:

Type of Handling	Loaded Containers			Empty Containers			Total Teus
	20'	40'	Over 40'	20'	40'	Over 40'	
Import	1,236	482	0	32	25	0	2,282
Export	60	92	0	487	74	0	879
Total	1,296	574	0	519	99	0	3,161

Shipping Operations, 21 August



KARACHI PORT TRUST

GATEWAY TO PAKISTAN



Port Operations

Updated on Tuesday, 21 August 2007

DURING 24 HRS. ENDING 0700 HRS. ON 21/08/2007

CARGO HANDLING				SHIPPING POSITION		
CARGO TYPES	Import	Export	Total	Type of Ship	Arrival	Sailing
Containers (TEUs)	2,563	2,055	4,618	Containers	3	2
Containers (TONs)	34,988	9,029	44,017	General Cargo	-	1
TP Cont. (TEUs)	-	-	-	Fertilizer	1	-
General Cargo	79	54	133	Rock Phosphate	-	-
Sub. Total Gen. Cargo	35,067	9,083	44,150	Iron Scrap	-	-
Bulk Cargo	13,801	4,928	18,729	Rice	-	-
Total Dry Cargo	48,868	14,011	62,879	L. Cement	-	1
Liquid Cargo	636	6,100	6,736	Oil Tanker	-	2
GRAND TOTAL	49,504	20,111	69,615	TOTAL	4	6

Container Handling:

Type of Handling	Loaded Containers			Empty Containers			Total Teus
	20'	40'	Over 40'	20'	40'	Over 40'	
Import	1,012	747	0	15	21	0	2,563
Export	202	330	0	709	242	0	2,055
Total	1,214	1,077	0	724	263	0	4,618

Shipping Operations, 22 August



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GATEWAY TO PAKISTAN

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Port Operations

Updated on Wednesday, 22 August 2007

DURING 24 HRS. ENDING 0700 HRS. ON 22/08/2007

CARGO HANDLING				SHIPPING POSITION		
CARGO TYPES	Import	Export	Total	Type of Ship	Arrival	Sailing
Containers (TEUs)	1,463	1,380	2,843	Containers	2	5
Containers (TONs)	20,238	6,138	26,376	General Cargo	2	1
TP Cont. (TEUs)	-	-	-	Fertilizer	-	-
General Cargo	5,094	237	5,331	Coal	1	1
Sub. Total Gen. Cargo	25,332	6,375	31,707	Iron Scrap	-	-
Bulk Cargo	7,051	4,844	11,895	Rice	-	-
Total Dry Cargo	32,383	11,219	43,602	Chrome Ore	-	-
Liquid Cargo	20,000	1,330	21,330	Oil Tanker	1	2
GRAND TOTAL	52,383	12,549	64,932	TOTAL	6	9

Container Handling:

Type of Handling	Loaded Containers			Empty Containers			Total Teus
	20'	40'	Over 40'	20'	40'	Over 40'	
Import	557	449	0	0	4	0	1,463
Export	119	155	0	413	269	0	1,380
Total	676	604	0	413	273	0	2,843

Shipping Operations, 23 August



KARACHI PORT TRUST
GATEWAY TO PAKISTAN



Port Operations

Updated on Thursday, 23 August 2007

DURING 24 HRS. ENDING 0700 HRS. ON 23/08/2007

CARGO HANDLING				SHIPPING POSITION		
CARGO TYPES	Import	Export	Total	Type of Ship	Arrival	Sailing
Containers (TEUs)	1,002	816	1,818	Containers	2	1
Containers (TONs)	14,055	6,008	20,063	General Cargo	-	2
TP Cont. (TEUs)	-	-	-	Fertilizer	-	-
General Cargo	1,504	-	1,504	Rock Phosphate	-	-
Sub. Total Gen. Cargo	15,559	6,008	21,567	Iron Scrap	-	-
Bulk Cargo	9,804	4,146	13,950	Rice	-	-
Total Dry Cargo	25,363	10,154	35,517	L. Cement	1	1
Liquid Cargo	44,703	-	44,703	Oil Tanker	-	1
GRAND TOTAL	70,066	10,154	80,220	TOTAL	3	5

Container Handling:

Type of Handling	Loaded Containers			Empty Containers			Total Teus
	20'	40'	Over 40'	20'	40'	Over 40'	
Import	408	261	0	62	5	0	1,002
Export	68	228	0	142	75	0	816
Total	476	489	0	204	80	0	1,818

Surface Battle Salvo Equation

- Offensive Power (alpha and beta).
 - *The actual power projected by the opposing forces, its 'fighting power.'*
 - *This number revolves around the idea of a 'good' salvo.*
 - *It may not be just a blanket number of ASCM tubes available.*
- Staying Power (a1 and b1).
 - *The measurement of how much 'punishment' a ship can take.*
- Defensive Power (a3 and b3).
 - *How well the force defends itself in terms of defeating incoming ASCMs.*
 - *Used to counter the offensive power of the opposing force.*
- Salvo Equations use Lanchester Square Law ideas to show who wins salvo exchanges
- Takes into account the defense capability.

$$\text{If } a_1\alpha A^2 - a_1Ab_3B > b_1\beta B^2 - b_1Ba_3A \text{ then 'A' wins}$$

F-22/J-X Capabilities (cont.)



Key Performance Parameter	Requirement	Current Estimate	Margin
Radar Cross Section (dB)	X dB	Favorable	Favorable
Supercruise	1.5 Mach	1.72 Mach	15%
Acceleration (vs Time)	54 sec	53 sec	2%
Maneuverability (0.9M/30Kft)	3.7 g	3.7 g	0%
Combat Radius (NM) Mission 1 (Sub+Super)	260+100nm	310+100nm	14%
Radar Detection Range	100%	105%	5%
Airlift Support	8	8.4	(0.4)
Mean Time Between Maintenance (hrs)	3.0	3.0	Meets

I was able to kill all adversaries and accomplish the mission outnumbered 4 to 1. There is no current fielded jet that could accomplish this feat today.

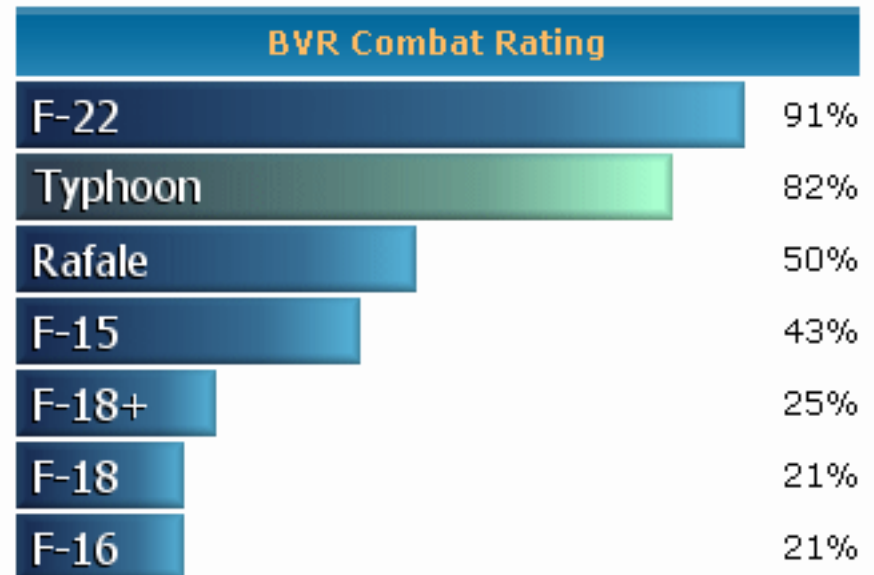
-USAF F-22 Pilot After Operational Test Mission (1 F-22 vs. 4 Legacy Fighters)



<http://www.f22-raptor.com/technology/data.html>

Modeled engagements vs. Su-37
Resulting Exchange Ratios

10.1:1 F-22
4.5:1 Typhoon
0.8:1 F-15C
0.3:1 F-16C
0.4:1 F-18+



F-22/J-X Capabilities

- In November 2005, an exercise involving just eight F-22s "We killed 33 F-15Cs and didn't suffer a single loss. They didn't see us at all."
 - [*Jane's Defence Weekly*](#). [18 January 2006](#).
- In June 2006 during Exercise Northern Edge (Alaska's largest joint military training exercise), the F-22A achieved a 144-to-zero kill-to-loss ratio against F-15s, F-16s and F/A-18s
 - The F-22 force of 12 aircraft generated 49% of the total kills for the exercise, outnumbered 5:1
 - Van Nierop, D."PACAF unveils first F-22." [*United States Air Force*](#) press release. [3 August 2006](#)

Lanchester Equations

LINEAR DETERMINISTIC						
x0	8	4	2	8	4	2
y0	12	12	12	24	24	24
a	0.01	0.01	0.01	0.01	0.01	0.01
b	0.1	0.1	0.1	0.1	0.1	0.1
win	2.108185	1.054093	0.527046	1.054093	0.527046	0.263523
xf	6.8	2.8	0.8	5.6	1.6	-0.4
yf	-68	-28	-8	-56	-16	4
z	2.804753	37.97367	-3.22874	37.97367	-3.22874	-1.71563
t	16.30653	57.50433	#NUM!	57.50433	#NUM!	#NUM!

- Deterministic Lanchester
- 10:1 Exchange Rate
- Kill 180 Su-32/33/35 (entire Indian TAC-air)
- Lose 18 J-X (of 25)
- 4:1 Exchange Rate
- Kill 100 Indians, Lose all J-X

Lanchester Equations

	Xrate	Yrate	X	Y	Trials	Pages	Total X	Total Y
	1	4	4	12	30	10	1200	3600
LINEAR	x	y	a	b	Rate	rand	killed	
16	4	12	3	16	0.842105	0.813537	y	
15	4	11	2.75	16	0.853333	0.598849	y	
14	4	10	2.5	16	0.864865	0.299305	y	
13	4	9	2.25	16	0.876712	0.781063	y	
12	4	8	2	16	0.888889	0.007694	y	
11	4	7	1.75	16	0.901408	0.561597	y	
10	4	6	1.5	16	0.914286	0.750369	y	
9	4	5	1.25	16	0.927536	0.799762	y	
8	4	4	1	16	0.941176	0.375771	y	
7	4	3	0.75	16	0.955224	0.466327	y	
6	4	2	0.5	16	0.969697	0.508116	y	
5	4	1	0.25	16	0.984615	0.786353	y	
4	4	0	0	16	1	0.231385	y	
3	4	-1	-0.25	16	1.015873	0.591054	y	
2	4	-2	-0.5	16	1.032258	0.877841	y	
1	4	-3	-0.75	16	1.04918	0.929942	y	
0	4	-4	-1	16	1.066667	0.517581	y	
-1	4	-5	-1.25	16	1.084746	0.694501	y	
-2	4	-6	-1.5	16	1.103448	0.352459	y	
-3	4	-7	-1.75	16	1.122807	0.538783	y	
-4	4	-8	-2	16	1.142857	0.721458	y	
Result	4	0						

Sums	4v12		
	4v12 (2)	77	37
	4v12 (3)	82	23
	4v12 (4)	76	30
	4v12 (5)	69	29
	4v12 (6)	68	62
	4v12 (7)	73	34
	4v12 (8)	71	41
	4v12 (9)	71	34
	4v12 (10)	61	27
Total Losses		475	3258
	J-X		Su-32/33/37

Ratio	6.858947
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- 10:1 Kill 180 Indians, lose 3 (yes three) J-X
- 4:1 Kill 171 Indians, lose all 25 J-X



Sergio Coniglio

China Develops Stealth Fighter

<http://www.jucee.org/China/China-Develops-Stealth-Fighter-J14.html>

come available of the new Chinese

<http://www.centurychina.com/cgi-bin/anyboard.cgi/plaboard/?cmd=get&cG=33736353034393&zu=33373635303439&v=2&gV=0&p=>

The aircraft, which is being

producing combat air-
ological level in line with
China's status as the "other" world superpow-

IV even the USA.

the J-12) indicates that the type has been
selected for development, or the competition is
still going on with parallel activities underway

the J-13.
at the J-14,

to the attempt

SM-2 Block IV Extended Range

- **Primary Function:** Fleet and extended area air defense.
- **Contractor:** Raytheon and others.
- **Date Deployed:** 1998.
- **Propulsion:** Two-stage solid fuel rockets.
- **Length:** 21 feet 6 inches with booster (6.55 meters).
- **Diameter:** 21 inches (booster) (34.3 cm).
- **Wingspan:** 3 feet 6 inches (1.08 meters).
- **Weight:** 3,225 pounds (1466 kg).
- **Range:** 100-200 nautical miles (115-230 statute miles).
- **Guidance System:** Semi-active radar homing.
- **Warhead:** Radar and contact fuse, blast-fragment warhead.

Air Defense Weaknesses

- The system is designed for blue water and littoral operations however AN/SPY-1 configuration must be modified to look above the terrain to avoid causing excessive false targets from land clutter.
- These configuration changes may increase ship susceptibility to low and fast targets.
- Once a target is engaged and the initial salvo fired, WCS will not allow the target to be reengaged (second salvo) until a kill evaluation has been completed.
- AN/SPY-1 antenna height is lower than the AN/SPS-49 radar system resulting in reduced radar horizon.
- DDG-51 Class are not equipped with a AN/SPS-49 radar (no secondary air search radar)
- Must hold an AN/SPY-1 track. Cannot engage on a remote or AN/SPS-49 track unless equipped with CEC.