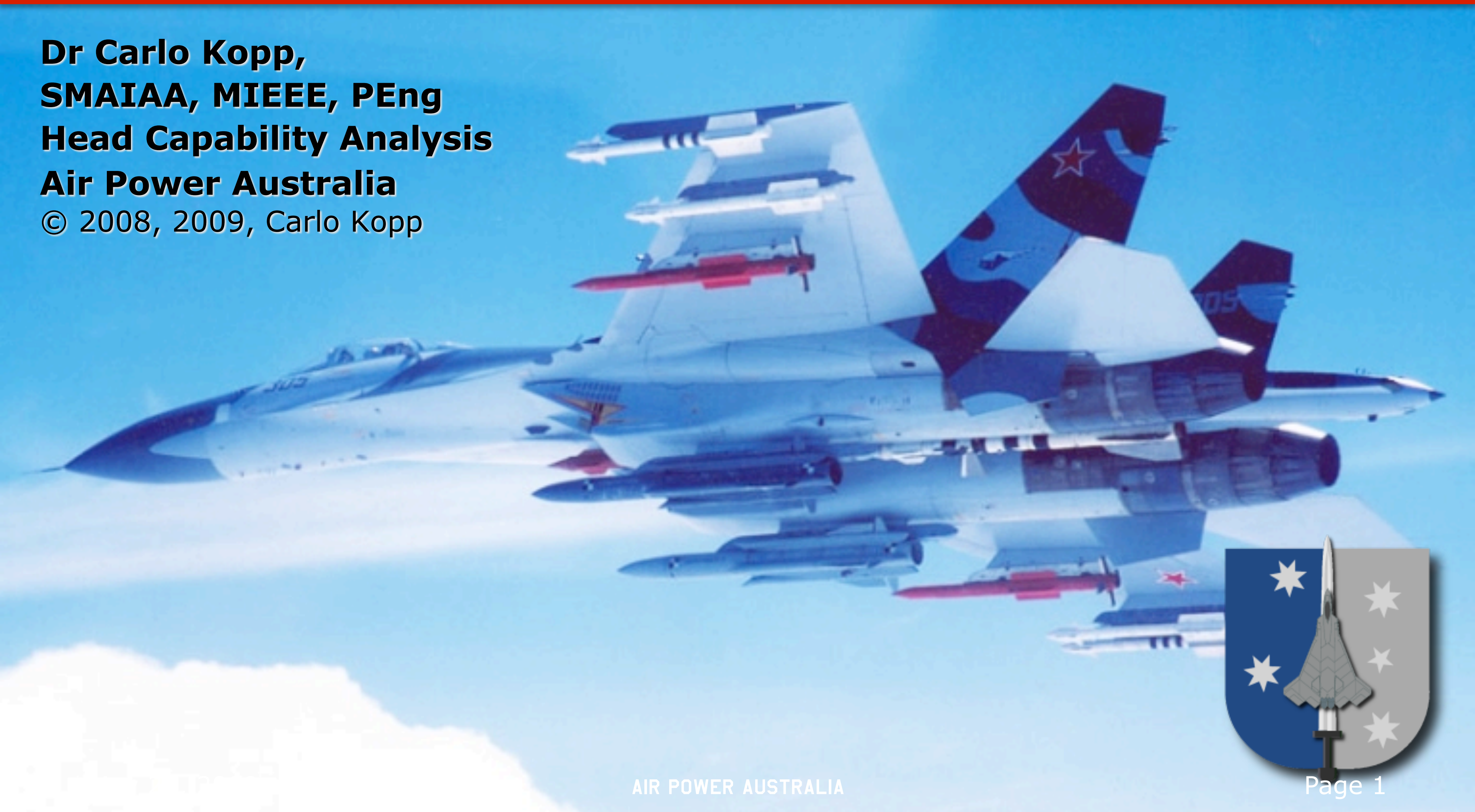
The Collapse of American Air Power: Why 187 F-22s Are Not Sufficient



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Head Capability Analysis
Air Power Australia

US Military Power Depends on Air Superiority

- Since the 1940s, US conventional military power has been predicated on the ability to achieve and maintain air superiority from the outset of a conflict.
- Most critical US military warfighting capabilities therefore depend upon having air superiority and cannot operate or survive without it.
- The force structure model imposed by OSD upon the US Air Force rejects and discards a fundamental model in use for nearly 70 years.
- *An inability to achieve and maintain air superiority puts the whole US conventional warfighting machine in serious jeopardy .*

Defining Air Superiority

- NATO/DoD*: "That degree of dominance in the air battle of one force over another which permits the conduct of operations by the former and its related land, sea and air forces at a given time and place without prohibitive interference by the opposing force".*
- In practical terms this means:

A. The ability to shoot down enemy combat aircraft to prevent them from attacking land, sea and air forces in a theatre of operations.

B. The ability to penetrate and survive hostile environments to conduct attacks against an enemy's vital military capabilities and assets.

US Historical Experience

- In 1941 the US lacked sufficient high performance fighters to prevent the Japanese from annihilating US forces in the West Pacific.
- In 1943 the US lacked sufficient long range escort fighters to protect bombers over Germany suffering prohibitive losses in crews and aircraft.
- In 1950 the US suffered heavy losses in aircraft when the Soviets deployed advanced high performance MiG-15 fighters.
- Between 1966 and 1972 the US lost hundreds of aircraft to North Vietnamese air defences.
- *The price of not having air superiority is measured in the dead bodies of US servicemen and civilians.*

Current Strategic Context

- For the first time since the end of the Cold War the US is being challenged by advanced military technologies which are comparable or superior to US built systems.
- A globalised market for high technology and commodification of key computer and communications technologies has allowed Russian, Chinese and Indian defence industries to close the technological gap with the US in most key areas.
- The US maintains a clear advantage only in a small number of technologies, such as stealth.
- *In most categories of high technology weapons, Russian and Chinese products match or outperform US designs.*

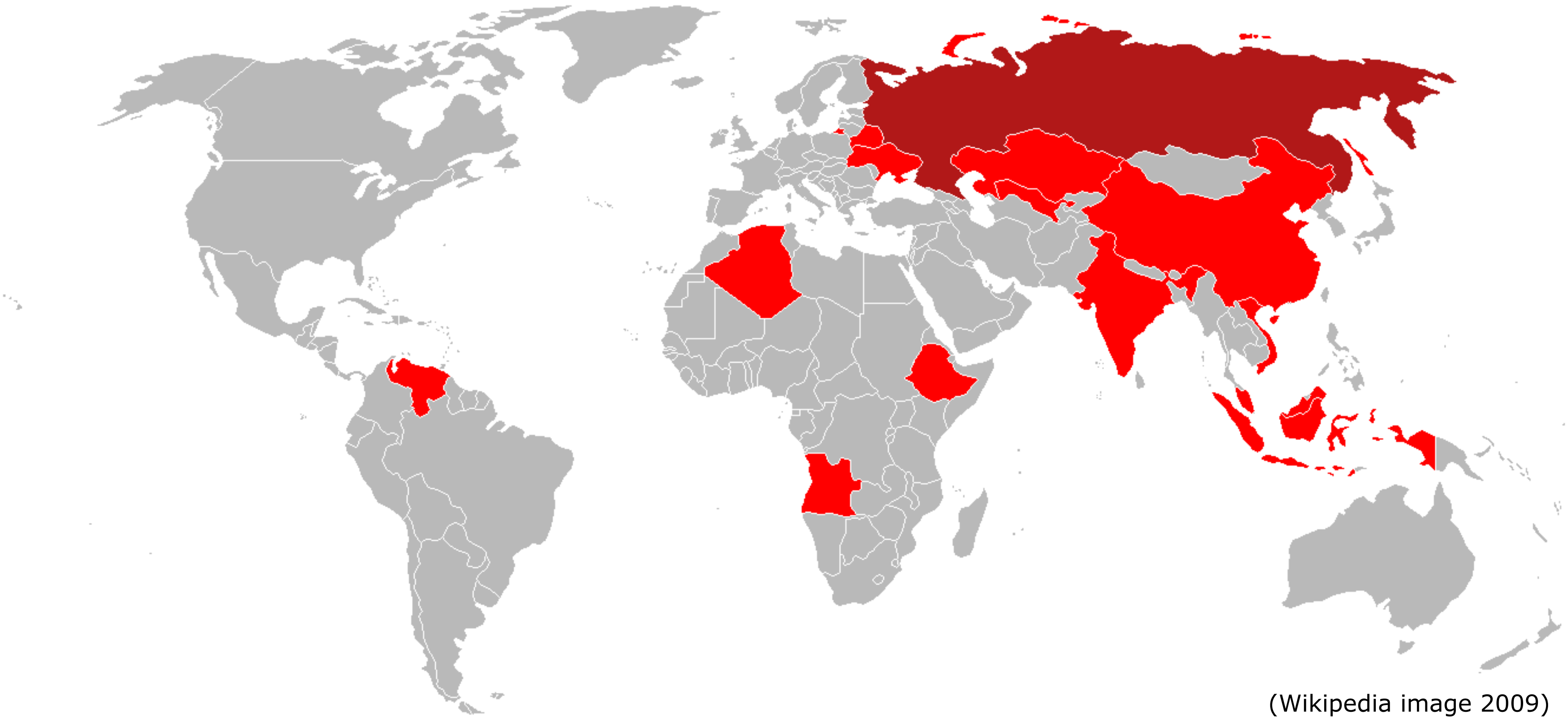
The Proliferation Problem

- A common misconception is that “a nation using a modern weapon = a nation building that weapon”.
- *This Cold War era idea is not valid in a globalised arms market – any nation with the funds can buy advanced weapons which they are not competent to design and build on their own.*
- Iran is deploying Russian built SA-20 SAMs which are three generations beyond Iran’s national technology base.
- China is licensing or reverse engineering many Russian military technologies which are up to a generation ahead of domestic designs.
- Russia and China market these products globally.

Strategic Risk on a Global Scale

- Global proliferation of advanced Russian and Chinese high technology weapons means that US and allied forces may encounter these in combat in any number of scenarios and situations.
- While scenarios involving Russia, China or Iran now present an absolute certainty of having to survive such weapons, future scenarios involving nations such as Venezuela, North Korea or the Islamic world will present similar risks as proliferation continues unabated.
- *The Cold War context of "Soviet aligned nations armed with Soviet weapons" is now replaced by "Any nation with the funds armed with advanced Russian and Chinese weapons."*

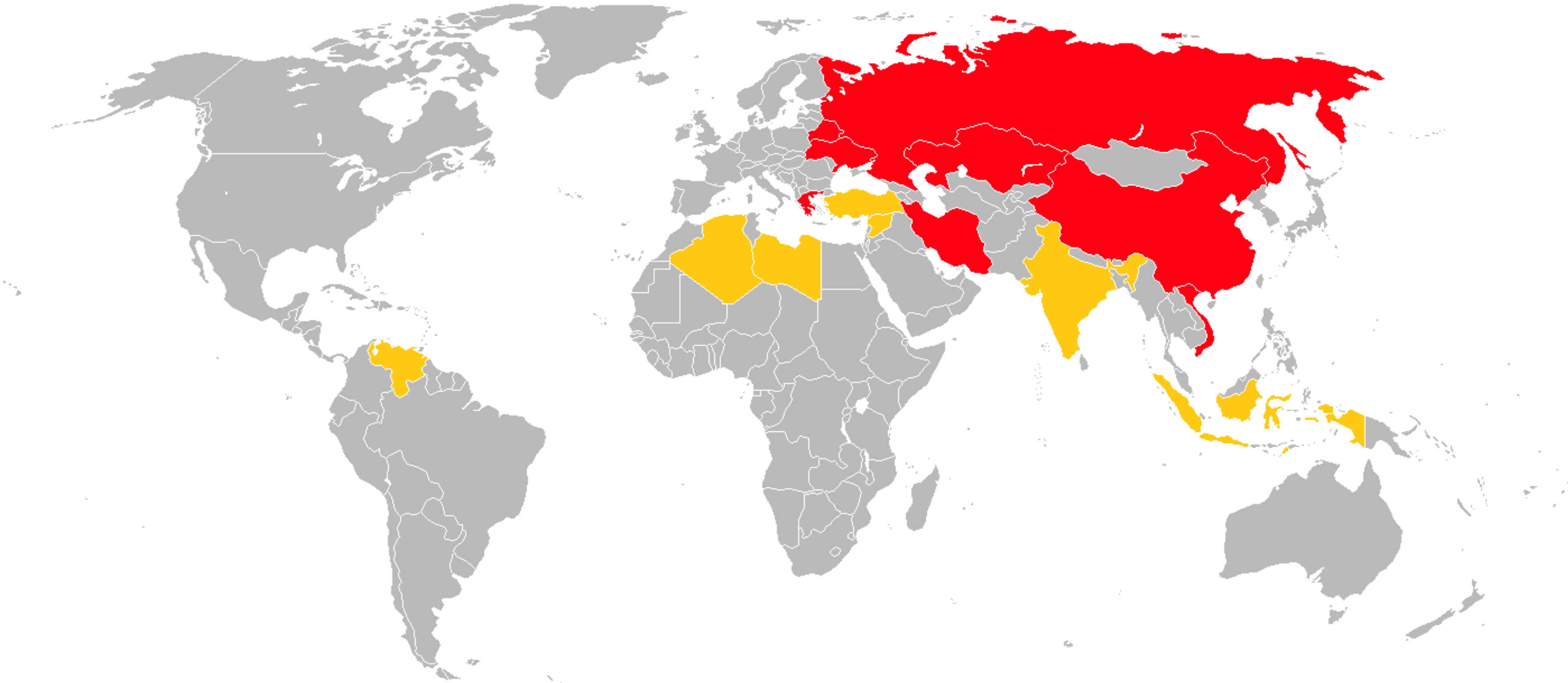
Sukhoi Su-27/30 Flanker Fighter Proliferation



(Wikipedia image 2009)

- Variants: Su-27SK Flanker B, Su-30MKK Flanker G, Su-30MKI /MKM Flanker H, Su-33 Flanker D, J-11B "Sino-Flanker".
- Performance / Systems ranging from F-15A equivalent to F-15E /APG-63(V)2 equivalent. Does not include users of Su-35BM.

SA-10/20/21 SAM System Proliferation



- Variants: S-300PS / SA-10B, S-300PM/PMU /SA-10C, S-300PMU1 / SA-20A, S-300PMU2 / SA-20B, S-400 / SA-21.
- Current operators in red, prospective operators or nations with systems ordered in yellow.

US Systems Dependent on Air Superiority

- Much of the US advantage in combat against hostile air, land and sea forces is based on combining superior Intelligence Surveillance Reconnaissance (ISR) capabilities with Precision Guided Munitions i.e. “smart weapons”.
- Overwhelming superiority in ISR capabilities was pivotal to US wins in Desert Storm, Kosovo, and the invasion of Saddam’s Iraq.
- Key US ISR systems including the E-3 AWACS, E-8 JSTARS, RC-135 Rivet Joint, U-2, Global Hawk, and Predator cannot survive without air superiority, being susceptible to fighter attack.
- The only US counter-ISR system, the EA-6B / EA-18G, also requires air superiority to survive.

Vital Yet Vulnerable ISR Platforms

- Critical to US military potency, none of these ISR systems can survive without air superiority.
- All are susceptible to high performance fighters and specialised very long range missiles.

US Systems Dependent on Air Superiority

- Aerial refuelling tankers such as the KC-135, KC-10, KC-130 and planned KC-X are pivotal enablers for the Air Force, Navy and Marine Corps, providing reach and persistence.
- Without aerial refuelling, US forces are limited in range and weapons payload, and cannot loiter to engage mobile or fleeting targets.
- All US aerial refuelling tankers, current and planned, cannot survive without air superiority.
- Airlifters, such as the C-5, C-17 and C-130, all rely heavily on aerial refuelling.
- Airlifters, like tankers, cannot survive without air superiority.

US Systems Dependent on Air Superiority

- The US heavy bomber fleet, comprises mostly the Cold War era B-1B and B-52H, with only 20 modern survivable B-2A bombers.
- The B-52H and B-1B cannot operate safely without air superiority provided by escorts.
- The legacy fighter-bomber fleet, comprising the F-15C/E, F-16A/C and F/A-18A-D Hornet and F /A-18E/F Super Hornet, cannot operate safely without air superiority.
- *Almost all military aircraft types currently operated by the US cannot survive in combat without air superiority. If the US loses air superiority in a theatre, it will suffer prohibitive losses if it attempts to use these capabilities.*

Land Force Dependency on Air Superiority

- *US land forces, comprising Army and Marine Corps formations, are structured and equipped around the implicit assumption of air superiority.*
- Neither service is equipped with sufficient numbers of long, medium and short range Surface to Air Missile systems to survive against a concerted air attacker armed with smart munitions.
- Most post Cold War US air defence technology development has been focussed into defeating theatre ballistic missiles like the Scud, or harrassment weapons i.e. mortars and rockets.
- Without air superiority both the Army and Marines would suffer prohibitive combat losses.

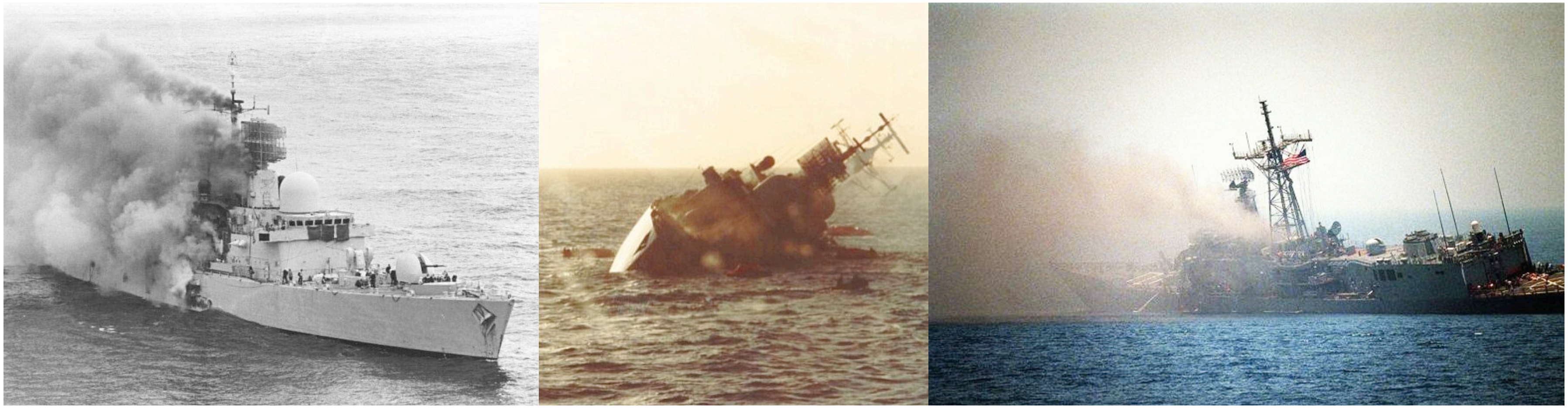
Land Forces Under Air Attack

- Since the 1940s, land forces have suffered prohibitive losses if stripped of defensive air superiority fighter protection.
- Modern smart munitions magnify the risk for land forces subjected to air attack.
- Russian industry manufactures a wide range of potent bomb, missile and submunition warheads, including shaped charge, Fuel Air Explosive and thermobaric warheads intended to kill personnel and soft skinned vehicles en masse.

Navy Dependency on Air Superiority

- Since 1943, the most lethal threat to naval surface fleets have been combat aircraft armed with anti-shipping guided missiles or smart bombs.
- The US Navy abandoned the air superiority role at the end of the Cold War, and retired the F-14 Tomcat fighter some years ago.
- The naval surface fleet is now heavily dependent upon the Air Force to ensure that fleet elements are not exposed to saturation air attacks using anti-ship cruise missiles, especially supersonic cruise missiles.
- Current Carrier Air Wing composition is optimised for low intensity combat, and unable to contest advanced Russian and Chinese land based fighters.

Surface Fleets Under Air Attack



- Naval surface fleets have been unable to survive without air superiority, since the 1940s.
- Modern anti-shipping missiles, especially supersonic designs, when launched in large numbers, will saturate the defences of a surface fleet thus permitting sufficient missiles to hit their targets.
- The Soviets perfected saturation attack technique, which has been exported with modern Russian built anti-shipping missiles.
- Warheads include shaped charge and thermobaric designs.
- Depicted HMS Sheffield and Coventry, USS Stark.

Marine Corps Dependency on Air Superiority

- US Marine Corps amphibious units and supporting amphibious vessels, are structured and equipped around the implicit assumption of air superiority.
- Like naval surface combatants, amphibious ships and landing craft are extremely vulnerable to air and missile attacks, and high losses in personnel and combat equipment would result.
- Until the end of Cold War, Marine Corps aviation was capable of providing robust air combat capability to defend beachheads.
- Post Cold War, Marine Corps aviation has become completely dependent upon the Air Force, as the Navy and Marines are no longer equipped to fight for air superiority over a beachhead.

Amphibious Forces Under Air Attack

- Britain suffered heavy losses in sealift and amphibious ships during the 1982 Falklands campaign, failing to maintain air superiority against obsolete Argentine land based fighters.
- Many British vessels were damaged or sunk after hits by ordinary dumb bombs, with considerable loss of life.

Infrastructure Dependency on Air Superiority

- The US global military posture is predicated on the operation of a large number of in theatre Main and Forward Operating Bases.
- The global chain of US owned or operated air and naval basing infrastructure is, with the exception of some Cold War era bases in Britain and Germany, not hardened to resist air attacks.
- Geographically critical and exposed bases such as Guam, Kadena, and Yokota have hardening comparable at best to safe CONUS bases.
- The operation of the US global basing infrastructure is wholly predicated on the Air Force achieving and maintaining air superiority.

Basing Under Air Attack

- Air attacks against infrastructure, especially military basing, have had a decisive impact in military campaigns from the Pearl Harbour attack to the Desert Storm campaign.
- Few existing US military bases are hardened against attack with smart bombs or modern cruise missiles.
- Significant losses in aircraft, warships and personnel would result if such an attack were prosecuted.

Logistics Chain Dependency on Air Superiority

- The US global military posture is predicated on the operation of a large logistics chain, comprising in-theatre basing and resupply by military and contract civil air and sealift.
- The basing infrastructure lacks required hardening to survive air attacks.
- Airlift, sealift, and supporting aerial refuelling assets cannot survive without a protective umbrella of air superiority fighters.
- The operation of the US global logistics chain is predicated on air superiority and unusable otherwise, without prohibitive losses.
- Air superiority is a prerequisite for all US military operations in any theatre.

A House of Cards

- The complete US military “warfighting system” which has evolved since the 1940s, evolved in an environment where air superiority could be reasonably assumed due to the Air Force always having sufficient numbers of highly competitive air superiority fighters, relative to potential opponents.
- The capability to win and maintain air superiority is a “single point of failure” for the US military, impacting air, land, sea, logistics and basing operations, globally.
- *If the US cannot win and maintain air superiority, its whole military machine collapses like a house of cards.*

Loss of Corporate Memory

- The last time a key US naval base was subjected to a major air attack was in 1941.
- The last time a major Navy capital ship was sunk by air attack was in 1945.
- The last time US land forces were subjected to air attack was in 1950.
- The last time the Air Force suffered major combat losses to enemy air defences was in 1972.
- Personnel with direct experience of enemy air attack are all retired or deceased.
- *Air superiority is today largely assumed to be the natural state of the world, not requiring effort or investment to achieve or to maintain.*

How is Air Superiority Achieved / Maintained?

- To achieve air superiority it is necessary to shoot down enemy fighter aircraft, destroy enemy air bases and aircraft on the ground, and destroy the supporting infrastructure.
- Prevailing over enemy aircraft in aerial combat requires not only superior fighter aircraft in sufficient numbers, but also supporting capabilities such as ISR and aerial refuelling.
- Destroying enemy airbases, aircraft and ground infrastructure requires the ability to repeatedly penetrate enemy fighter and SAM defences with low losses.
- These are the two most challenging capability requirements for any air force.

Impact of Advanced SAMs and Radars

- Advanced SAMs such as the HQ-9, SA-20 and SA-21 are lethal against all US aircraft other than the F-22A and B-2A, which were designed with high stealth required to evade these systems.
- Operators of advanced fighters such as the Su-30MK and Su-35BM/35-1 typically defend their airfields with such SAM systems.
- These SAMs and supporting radars are highly mobile, making them extremely difficult to kill, and are highly resistant to jamming.
- Russian/Chinese technological strategy sees all SAM system radars defended by countermeasures and short range missiles or guns intended to kill US smart munitions, such as the HARM or JASSM.

Impact of Advanced Fighter Aircraft

- Advanced fighters such as the Su-30MKI, J-11B, Su-35BM/35-1 or PAK-FA outclass all US legacy fighters in performance, and mostly in radar range and missile payload.
- These fighters mostly outclass US equivalents in long range combat due to better radar range and twice or more the payload of Beyond Visual Range missiles.
- In close combat many of these fighters have comparable agility to the US F-22.
- Advanced digital avionics, passive sensors and digital jamming equipment impair the effectiveness of the US AIM-120 AMRAAM missile.
- Only the F-22 has a clear margin of superiority.

The US Force Structure Dilemma

- US planning is currently predicated upon the "silver bullet" model.
- It assumes that advanced SAMs can be rapidly killed off by a small number of F-22s, allowing the much less capable F-35 and legacy aircraft to destroy an opponent's airfields and thus rapidly achieve air superiority.
- The same planning also assumes that a small number of F-22s is sufficient to protect all vital US assets such as ISR platforms, tankers and basing, as well as legacy fighters and F-35s.
- *Unfortunately, evolving technology has rendered this strategy obsolete, as the advanced SAMs and fighters are much harder to kill than expected.*

The F-35 Cannot Substitute for the F-22

- *A common misconception is that the F-35 can substitute for the F-22 in the US force structure.*
- The F-35 was defined and designed to survive in airspace which has been previously “sanitised” by a force of F-22s.
- The F-35 lacks the stealth performance, speed and agility to prevail over advanced SAMs and fighters – it was not designed for this purpose.
- Fundamental design limitations in the F-35 preclude it from ever performing the role of the F-22 – no upgrades can overcome these limitations.
- *An opponent armed with advanced SAMs can only be defeated by a sufficient number of F-22s.*

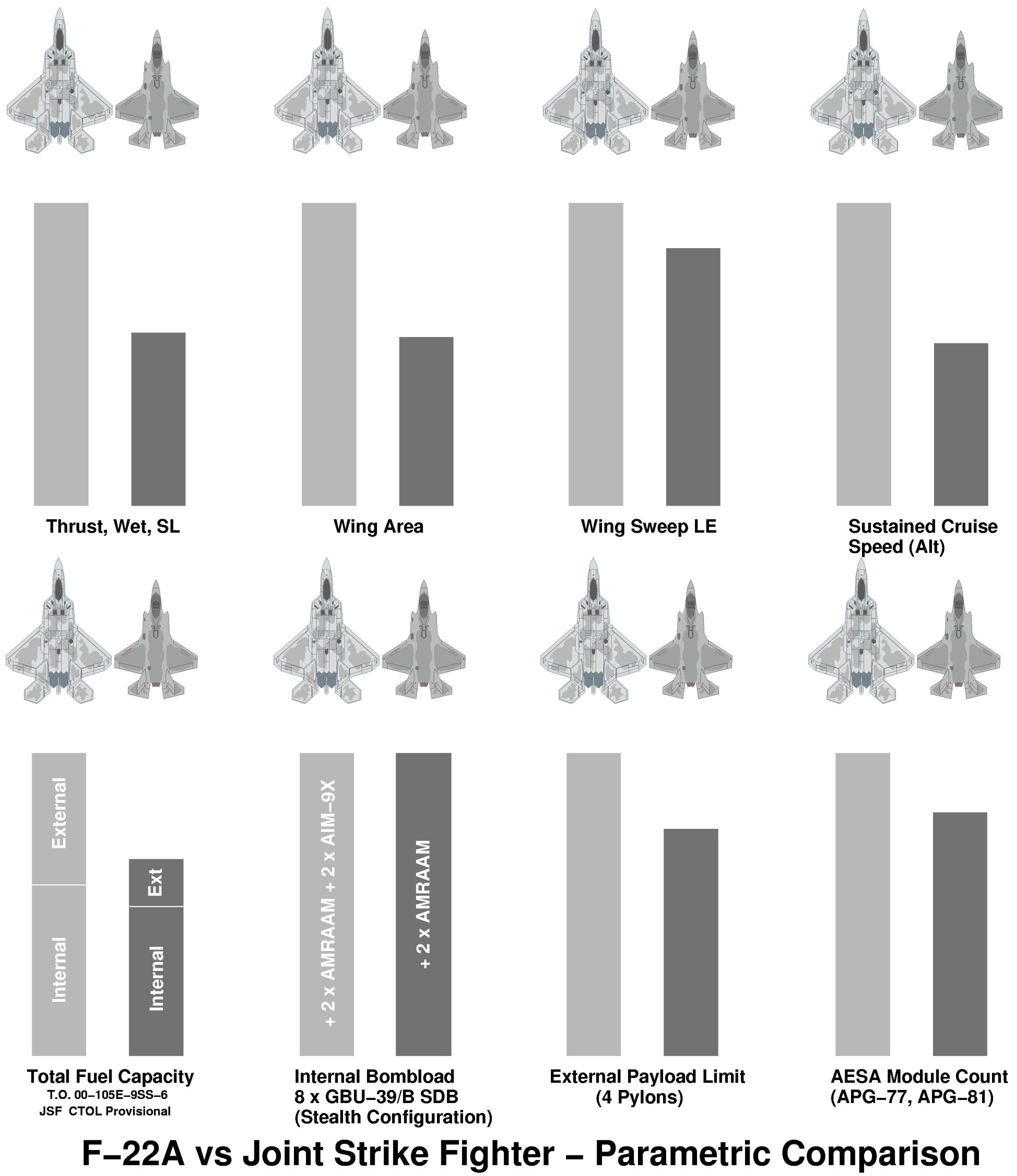
Fighter Pilot's "Holy Grail"

- Decades of operational experience in aerial combat define what a fighter aircraft needs to provide its pilot with:

"A fighter aircraft must be able to engage, disengage and re-engage at will throughout the space/time continuum of air combat, while staying outside an opponent's kill envelope"

- The F-22 was explicitly designed with this in mind, the F-35 Joint Strike Fighter was not.

F-22 Raptor vs F-35 Joint Strike Fighter



The Strategic Reality

- An opponent armed with advanced SAMs like the HQ-9, SA-20 and SA-21 can use these to deny access to all US combat aircraft other than the F-22 and B-2A.
- As these SAMs could take weeks to destroy completely, the US would have few opportunities to safely deploy either the F-35 or legacy types into combat.
- This forces the US into “overloading” the F-22 force as it will have to defend high value air and surface assets, perform offensive air superiority patrols, attack advanced SAMs, provide ISR capabilities, and attack strategic targets.
- Ten combat coded F-22 squadrons is not enough.

The Failure of US Technological Strategy

- The US technological strategy for recapitalising the fighter fleet was predicated on multiple optimistic long term assumptions about the evolution of opposing SAMs and fighters.
- Russian SAM and fighter technology has evolved much faster than expected during the 1990s, and it has also proliferated faster and more widely than expected.
- The US is now left with only two aircraft designs capable of surviving a sustained conflict in which the opponent deploys advanced SAMs and fighter aircraft – the F-22 and the B-2.
- *The "silver bullet" model was defeated by Russia and China by improving SAM system survivability.*

Toppling the House of Cards

- The OSD mandated force structure model with ten combat coded F-22 squadrons guarantees that the US will not be able to engage in conflicts involving nations armed with advanced SAMs, without sustaining heavy losses in combat aircraft.
- If the opponent operates advanced fighters such as the Su-35BM or PAK-FA, the US is very likely to also suffer heavy losses in land, sea and air assets in the theatre, unless all F-22s are committed to defending these assets.
- *The OSD mandated force structure model topples the US force structure “house of cards” by rejecting the need for air superiority, despite most US capabilities being predicated upon having it.*

What Ratio of F-22 to F-35 is Viable?

- If we assume that development of the F-35 can be successfully completed and a viable combat aircraft produced, what balance of numbers between the F-22 and F-35 would be viable?
- Historical experience from 1966 to 1999 shows that for every strike aircraft deployed, typically multiple fighter and SAM suppression escorts are required.
- This suggests that 1 to 2 F-22s would be required to keep every F-35 deployed alive in the theatre.
- A force of 100 F-35s would thus require 100-200 F-22s to provide fighter escort and SAM suppression.
- This raises serious questions about US planning.

How Many F-22s is Enough?

- The scale of a contingency determines how many strike capable aircraft need to be deployed; in turn this number determines the number of fighter escorts and SAM suppression escorts, as well as supporting ISR and aerial refuelling assets.
- The lethality of advanced SAMs requires that most sorties be flown by the F-22 alone.

A. OAF scale contingency needs: DCA/OCA, Strike /ISR missions total ~300 F-22As.

B. Desert Storm scale contingency needs: Strike/ISR missions total ~600 F-22As.

C. Taiwan / PRC scale contingency needs: 600 – 1,000 F-22As, subject to operational assumptions and intended operational tempo.

Conclusions

- Unless the US builds and deploys many more than the currently planned 187 F-22A Raptors, it will not be able to guarantee air superiority in any contingencies where opponents deploy advanced SAMs and fighters.
- The US force structure across all four services is predicated upon achieving and maintaining air superiority, without which there is potential for heavy combat losses in US personnel and materiel.
- Unless the US intends to opt out of fighting wars with industrialised nation state opponents over the next three decades, it will have to abandon the OSD mandated force structure plan for the Air Force, and procure many more F-22A Raptors.


Advanced Russian and Chinese Weapons

Post Cold War High Technology Weapons

- Advanced Derivative Fighters – Su-35BM, MIG-35, Su-30MK, Su-27SKM
- Low Observable Fighters – PAK-FA, J-XX
- Advanced Radars – Irbis E, Zhuk AE/ASE
- Cruise missiles – supersonic and subsonic
- Smart Bombs – EO, Laser, Satnav/Inertial
- Electronic Warfare – DRFM Jammers
- High Mobility Surface to Air Missiles
- Advanced Counter-VLO VHF Radars – Nebo SVU, JY-27, Vostok E

PAK-FA – F-22 Class Agility + Stealth

Sukhoi Su-35BM/Su-35-1 Flanker E+

Intended IOC 2011

Sukhoi Su-35BM/Su-35-1 Flanker E+

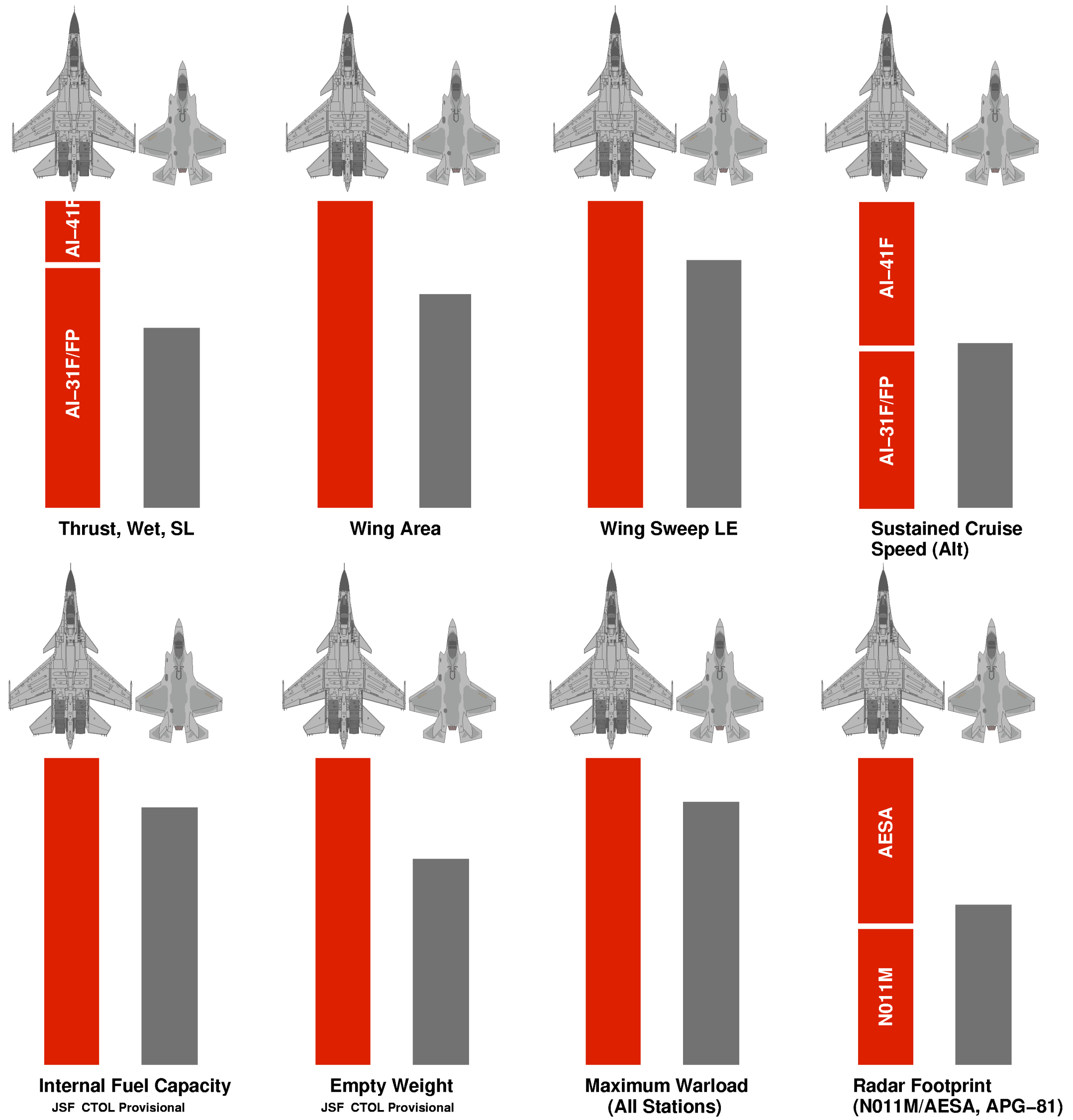
Sukhoi Su-35BM/Su-35-1 Flanker E+

- “Deep” redesign of Su-35 – fully digital weapon system, flight controls, systems
- Supersonic cruise AL-31FU-117S engines
- Large area glass cockpit emulating JSF
- Digital datalinks – TKS-2 and “JTIDS-ski”
- Radar absorbent materials – inlets
- Advanced 20 kiloWatt Irbis E hybrid ESA
- Optional Zhuk ASE 20+ kiloWatt AESA
- R-172, R-77M, RVV-AE-PD, R-27, R-74 AAMs; mostly digital designs

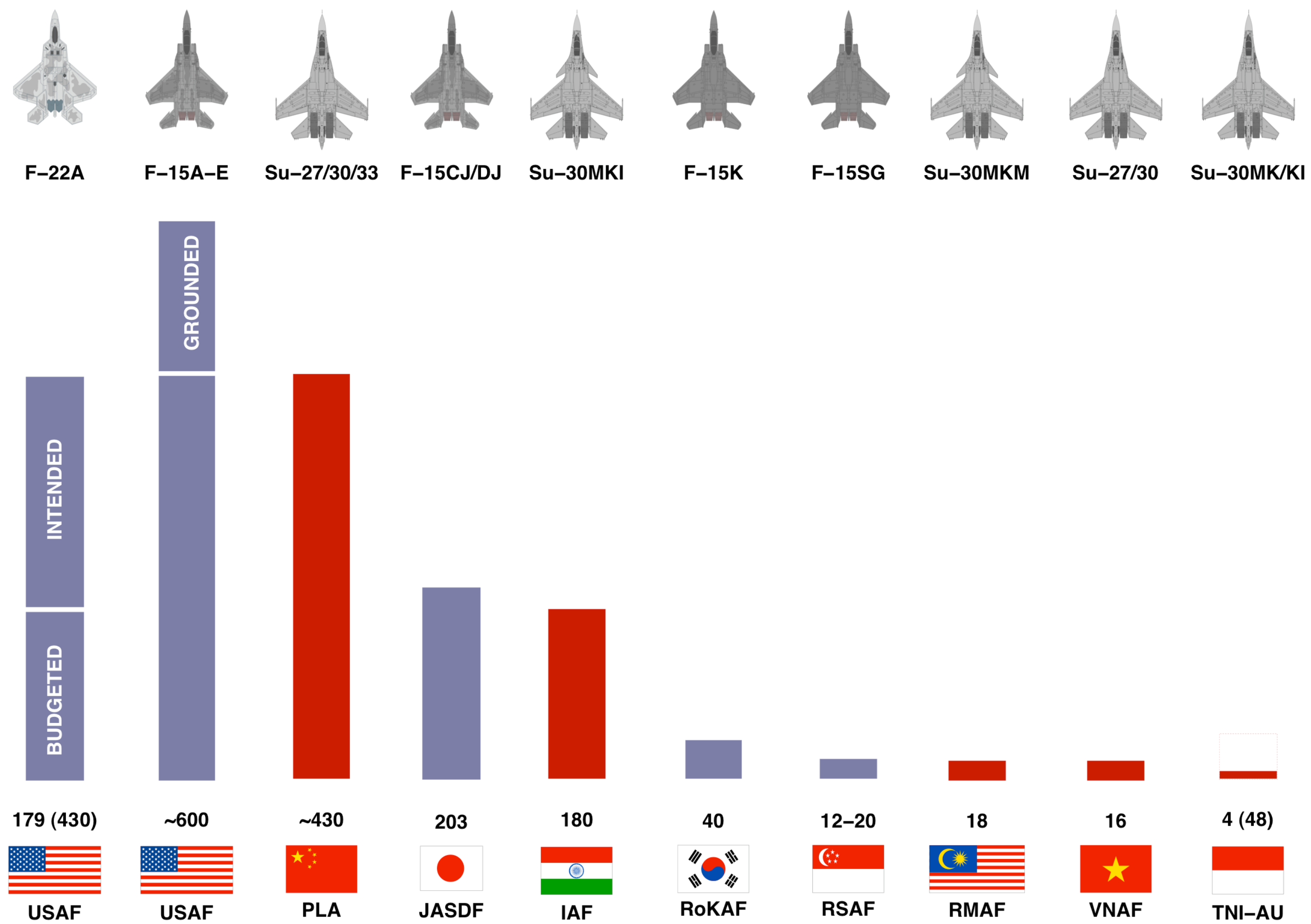
Sukhoi Su-35BM/Su-35-1 Flanker E+

- Khibiny M passive radio frequency surveillance and targeting system
- DRFM self protection jammer
- Missile Approach Warning System (MAWS)
- Electro-Optical targeting system for A/A and A/G
- Tail warning radar system
- Superior to all F-15, F-16 and F/A-18 variants, and Eurocanard fighters
- IOC ~ 2010-2011
- Intended for volume export

Flanker vs JSF



High Performance Fighters in Asia - 2009



RSK MiG-35 Fulcrum

RSK MiG-35 Fulcrum

RSK MiG-35 Fulcrum

- "Deep" redesign of MiG-29 – fully digital weapon system, flight controls, systems
- Zhuk AE Active Electronically Steered Array radar
- Digital datalinks – TKS-2 and "JTIDS-ski"
- Advanced Electro-Optical targeting system
- DRFM self protection jammer
- Missile Approach Warning System
- R-172, R-77M, RVV-AE-PD, R-27, R-74 AAMs; mostly digital designs

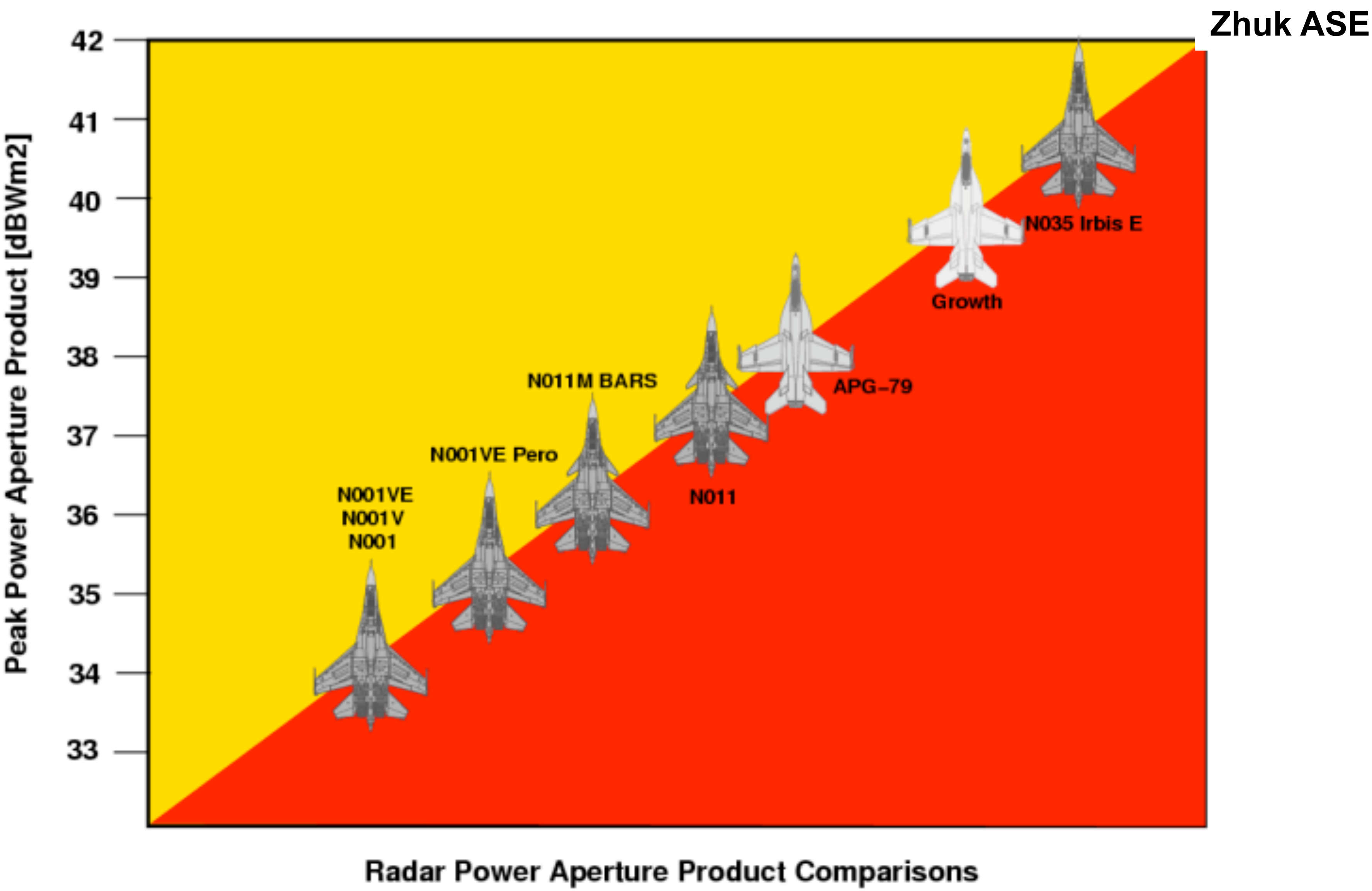
Su-30MK and Su-27SKM

- Digital derivatives of baseline Su-27SK and Su-30K – glass cockpits
- Full range of AAMs and smart PGMs
- Su-30MKI/MKM - digital flight controls and TVC engines – India and RMAF deployed
- Su-30MKK/MK2 – equiv F-15E – PLA-AF, PLA-N, TNI-AU, PAVN
- Many upgrade options especially in radar:
- Irbis E hybrid, Zhuk-ASE AESA, Zhuk MSFE PESA, Pero reflective ESA

Su-30MKM Flanker H Malaysia – IOC 2009

- Based on Su-30MKI Flanker H but with improved systems, and licensed Russian built French Thales Damocles EO targeting pod fitted.

How do Russian Radars Compare?



Russian Beyond Visual Range Missiles

Seeker Technology:

A.Monopulse Active Radar

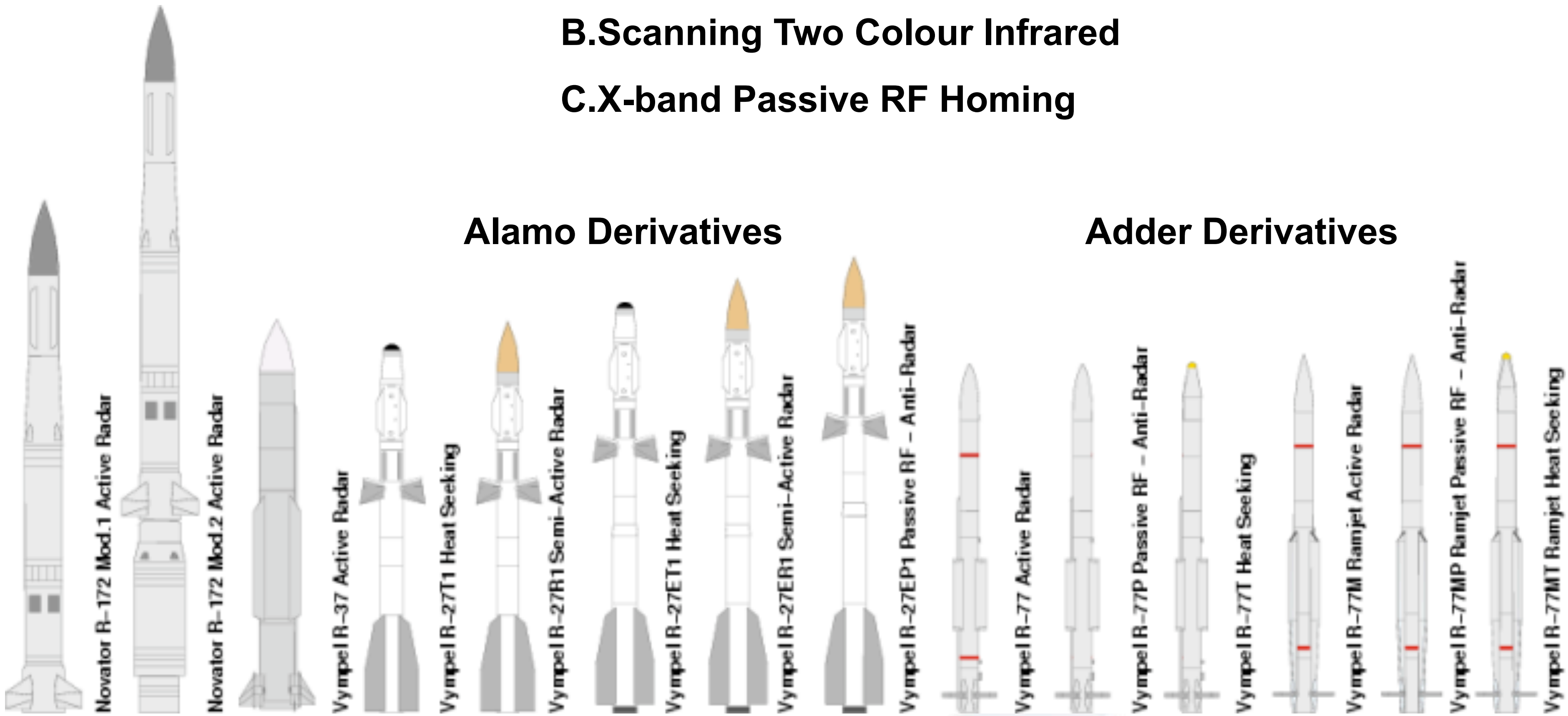
B.Scanning Two Colour Infrared

C.X-band Passive RF Homing

Counter-ISR

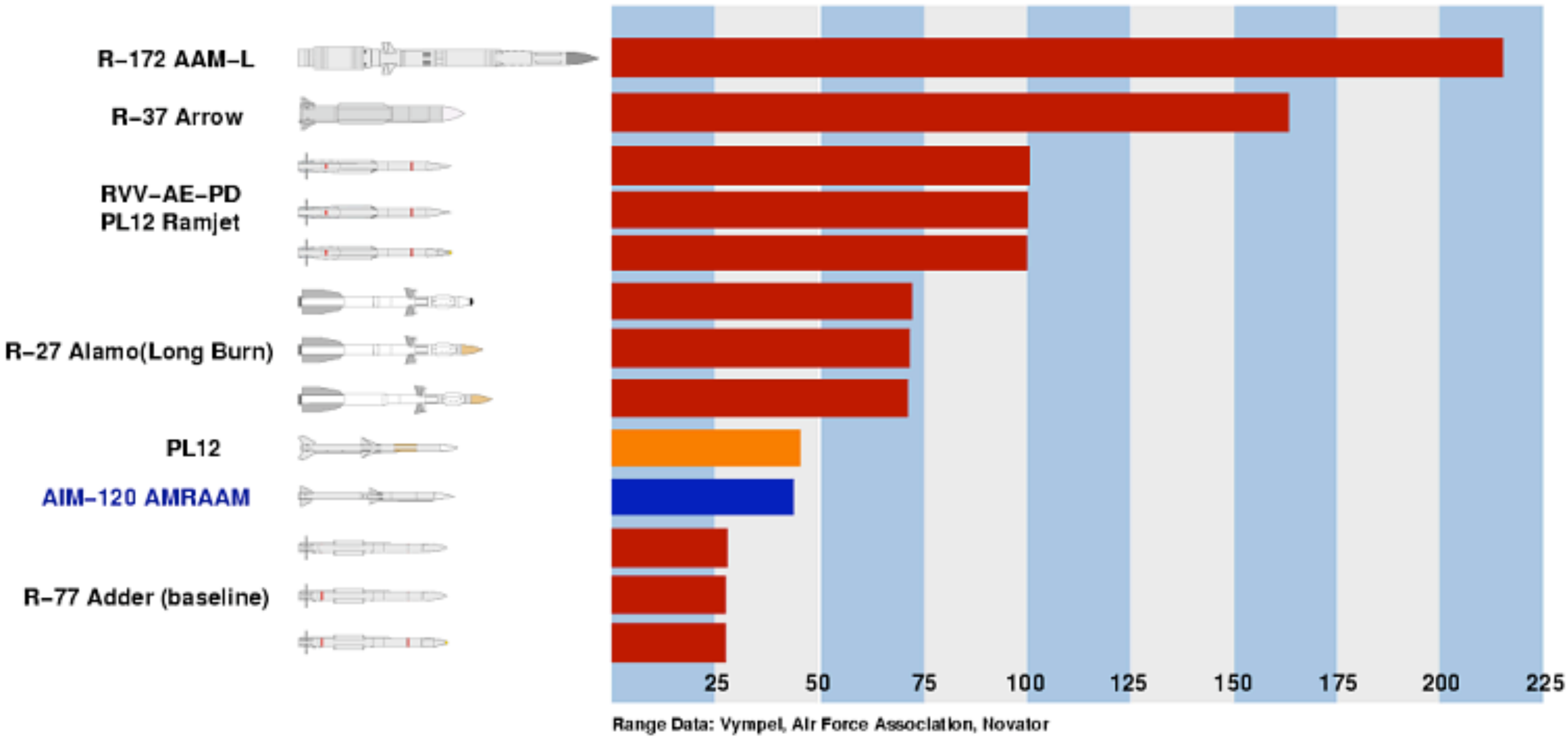
Alamo Derivatives

Adder Derivatives



Ramjet Engine

How do Russian BVR AAMs Compare?



- R-27 Alamo, R-77 Adder and RVV-AE-PD – active radar, anti -radiation and heatseeking guidance equipped variants.
- PL12 Ramjet reported development of baseline Chinese PL-12 AMRAAM analogue.

Russian Missile Capabilities

- Diversity in missile seekers – active radar, infrared, passive X-band anti-radiation
- Diversity in missile airframes:
- R-27 Alamo family short and long burn
- R-77 Adder family AIM-120 AMRAAM class
- RVV-AE-PD family MBDA Meteor class
- R-37 Arrow – 160 NMI – no equivalent
- R-172 – 200 NMI – no equivalent
- Jam resistant seekers, digital controls, midcourse datalinks

Su-35-1 Flanker – BVR Missiles (MAKS2007)

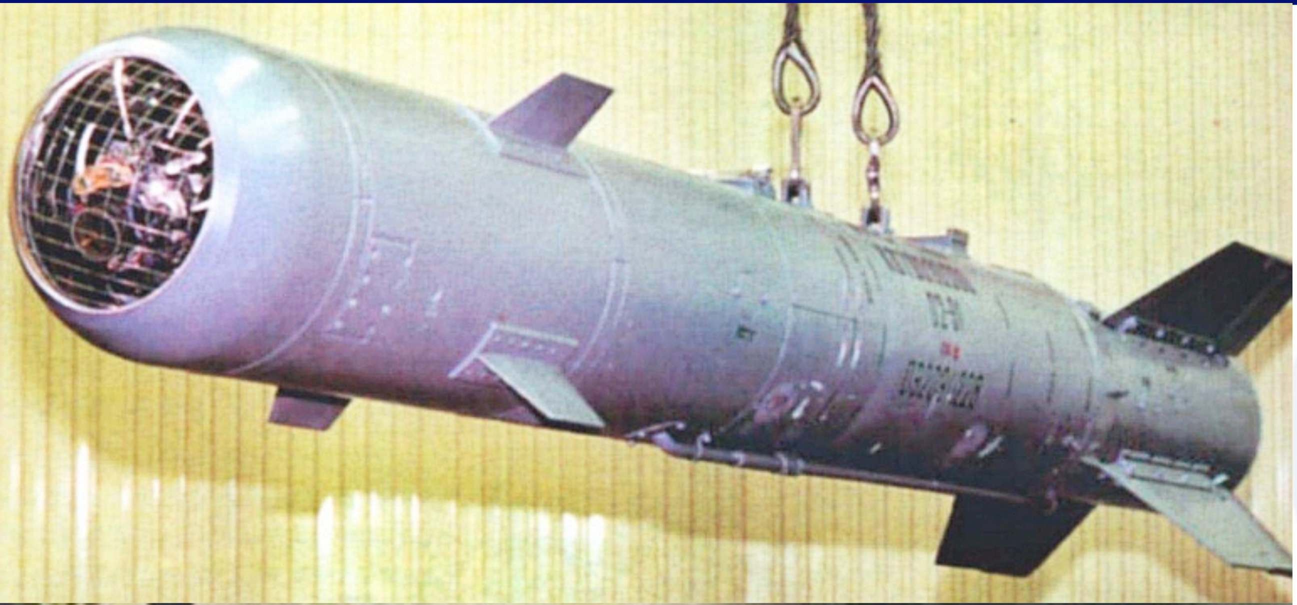
- R-172 also designated as R-100 and KS-172.

Smart Bombs - KAB-500/1500

- Fusion of Paveway and HOBOS technology
- Modular design – warheads and seekers
- Equivalents to Paveway/GBU-15/JDAM
- Warheads – blast/frag, concrete piercing, Fuel Air Explosive / Thermobaric
- ElectroOptical Correlator – cf US DSMAC
- ElectroOptical Datalink – cf US EGBU-15
- Semiactive Laser – cf US Paveway II/IV
- GPS/Glonass – cf US JDAM and SDB
- 1,000 lb and 3,000 lb standard warheads

Smart Bombs – GNPP KAB-1500

Smart Bombs - GNPP KAB-500



500 kg E/O
Seeker

500 kg Laser Seeker

500 kg Satellite
Guidance

Cruise Missiles

- Novator 3M54E/3M14 Sizzler – air, sub, ship and ground launched; subsonic and supersonic terminal stage variants; anti -ship and land attack variants;
- Kh-61 Yakhont/PJ-10 Brahmos A/S air, sub, ship and ground launched supersonic
- Raduga 3M80/81/82 Sunburn – air and ship launched supersonic ASCM
- Raduga Kh-55SM – eq US AGM-86
- DH-10 – eq US Tomahawk
- YJ-63 – eq US Tomahawk MRASM

Cruise Missiles – 3M54/SS-N-27 Sizzler

Kilo SSK; DDG/FFG SLCM

Su-27/30/35; MiG-29/35 ALCM

MZKT-7930 8 x 8 GLCM

Cruise Missiles – Yakhont/Brahmos / SS-N-26

Su-27/30/35 ALCM

Tatra 815 8 x 8 GLCM

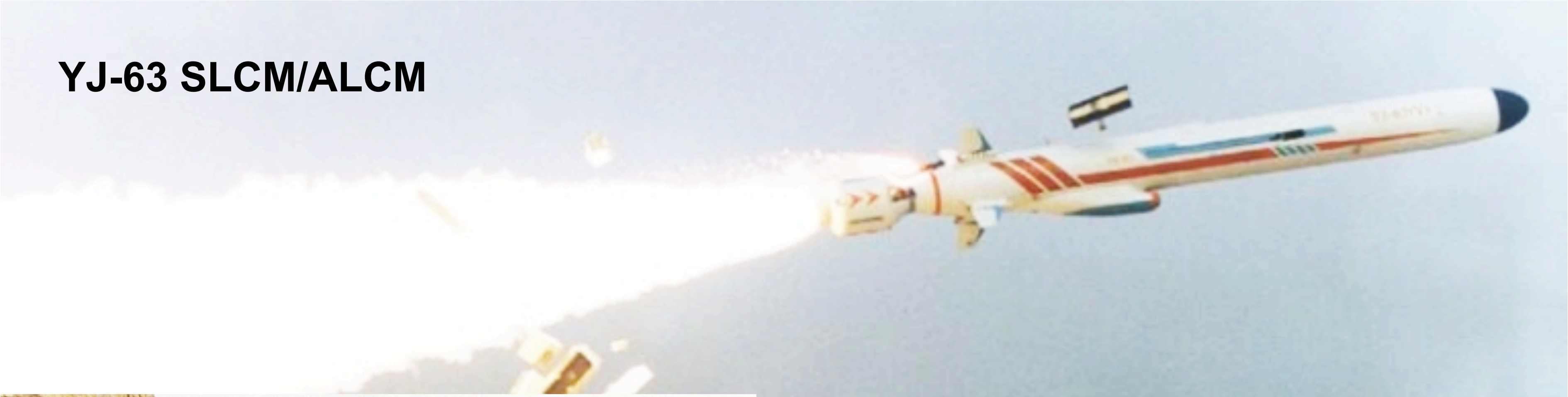
SSK, DDG/FFG SLCM

3M80/81/82 Moskit / SS-N-22 Sunburn

Ship Launch – Type 956 DDG

Air Launch – Centreline Su-33/Su-35BM

Thermobaric or Shaped Charge W/H


YJ-63 SLCM/ALCM


Raduga Kh-55SM ALCM


AGM-86/109 Analogues
DH-10 SLCM

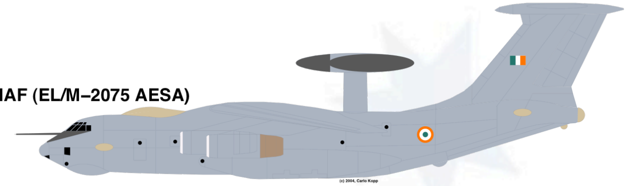
KJ-2000 AWACS – AESA Technology

- The L-band AESA radar in this Chinese design is two generations of antenna technology ahead of the E-3 AWACS APY-2 radar.

AWACS Capabilities vs WestPac Region

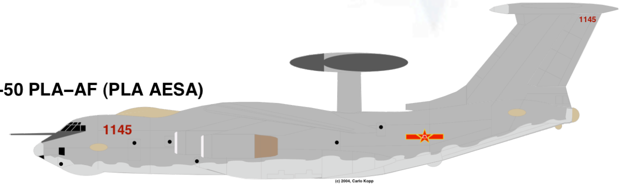
IAF

Elta/Beriev A-50I IAF (EL/M-2075 AESA)



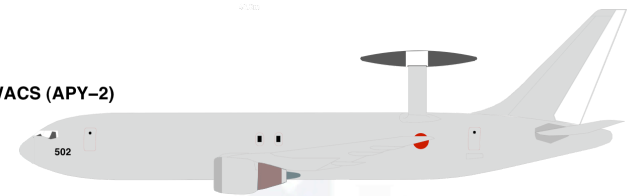
PLAAF

Beriev KJ-2000/A-50 PLA-AF (PLA AESA)



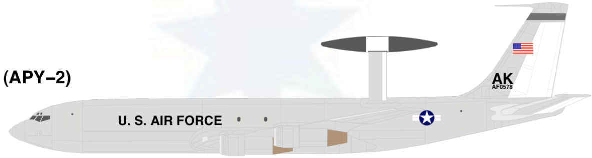
JASDF

Boeing E-767 AWACS (APY-2)



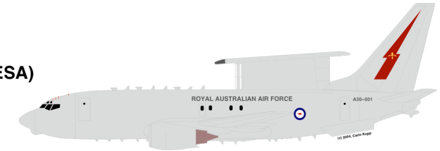
USAF

Boeing E-3C AWACS (APY-2)



RAAF

NG/Boeing Wedgetail AEW&C RAAF (MESA)

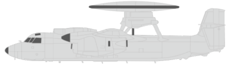


US Navy | JASDF | RSAF | RoCAF

Northrop-Grumman E-2C (APS-145)

US Navy

Northrop-Grumman E-2D Advanced Hawkeye (UHF AESA)



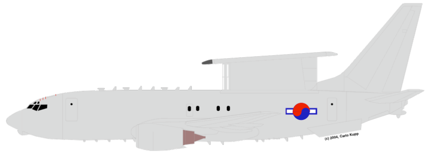
RMAF

Evaluation

PLANNED

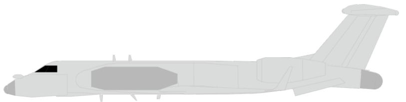
RoKAF

NG/Boeing EX AEW&C (MESA)

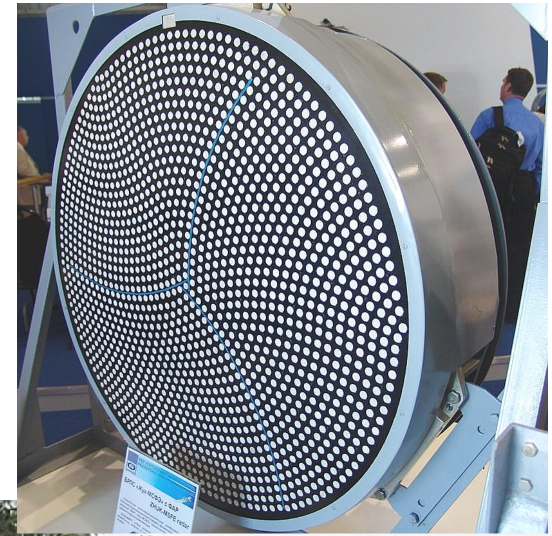


RSAF

Gulfstream Eitam G550 AEW (EL/M-2052)



Sukhoi Su-33/33UB Flanker D - CV



Su-33UB Navalised Flanker

Zhuk MSFE PESA / TVC

Su-33 Navalised Flanker

PLA-N – 48 Ordered

Tailhook/Ski-Jump

Full Su-30MK Capabilities

Single/Dual Variants

Sukhoi Su-34 Fullback – LRIP for RuAF

- Long Range Strike Fighter – F-111 Class
- PESA Attack Radar
- Khibiny M Emitter Locating System
- All Su-30MK Smart Weapons
- LRIP in 2007 – On Offer to PLA-AF/PLA-N

Chengdu J-10 Sino Canard Fighter

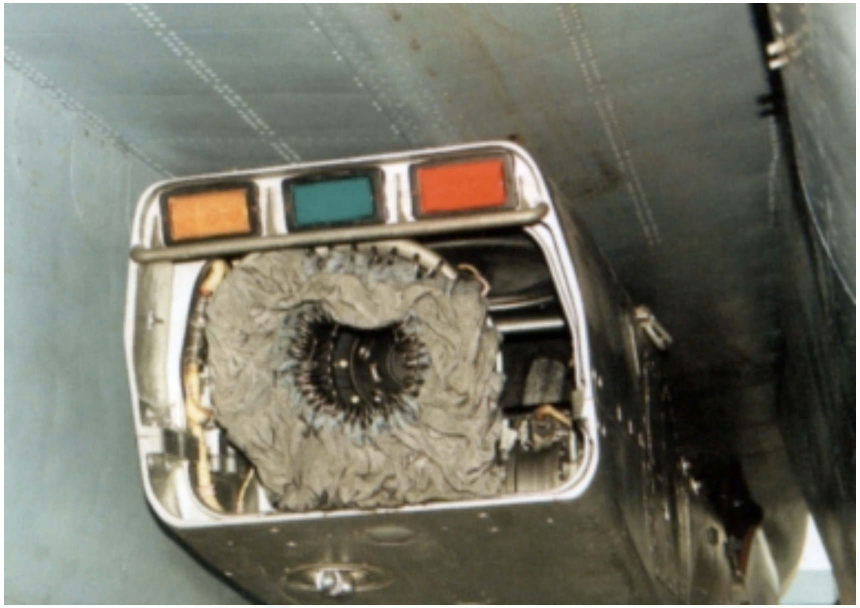
Xian H-6K Turbofan Badger ~2000 NMI

New Build ALCM Carrier

Turbofan D-30KP - ~2,000 NMI Radius

Revised Nose, Wing Designs

Su-33/35 Buddy Refuelling Capability



Il-78 Midas Tanker

S-400 Triumf / SA-21 Growler – 200 NMI

92N2E Grave Stone Engagement

4/16 Round TEL

96L6 Cheese Board – Acquisition

Missiles 48N6E3, 40N6,M96E/E2

Equivalent Patriot PAC3 / ERINT

S-300PMU1/2 / SA-20 Gargoyle – 80-110 NMI

End Presentation