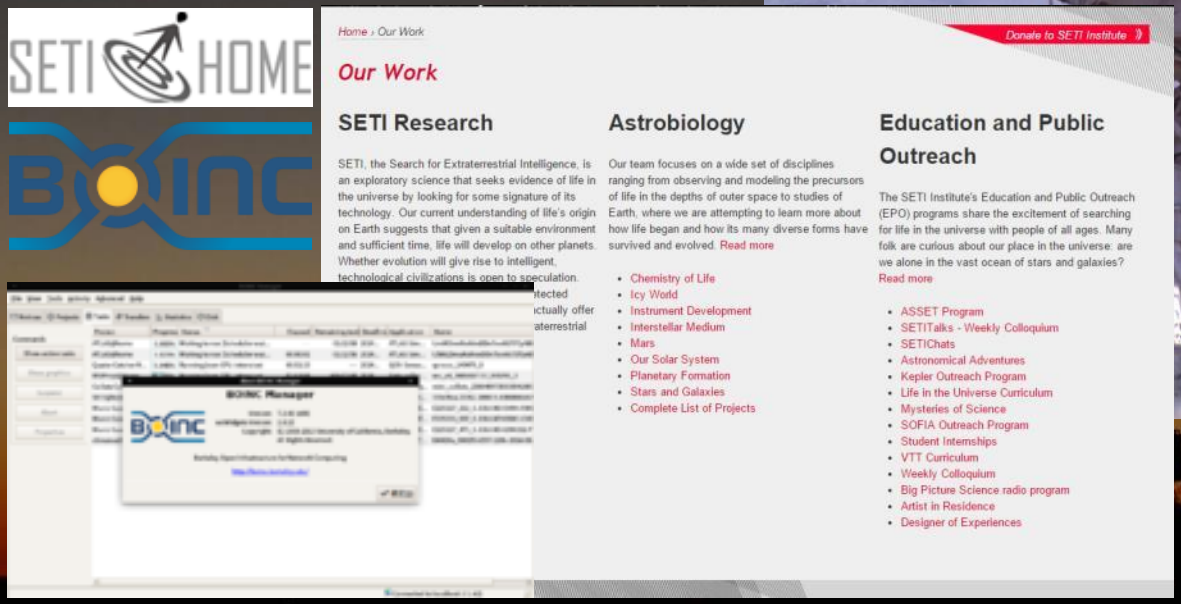
Australian Radio Telescope Array
Graeme L. White & Glen Cozens (James Cook University)

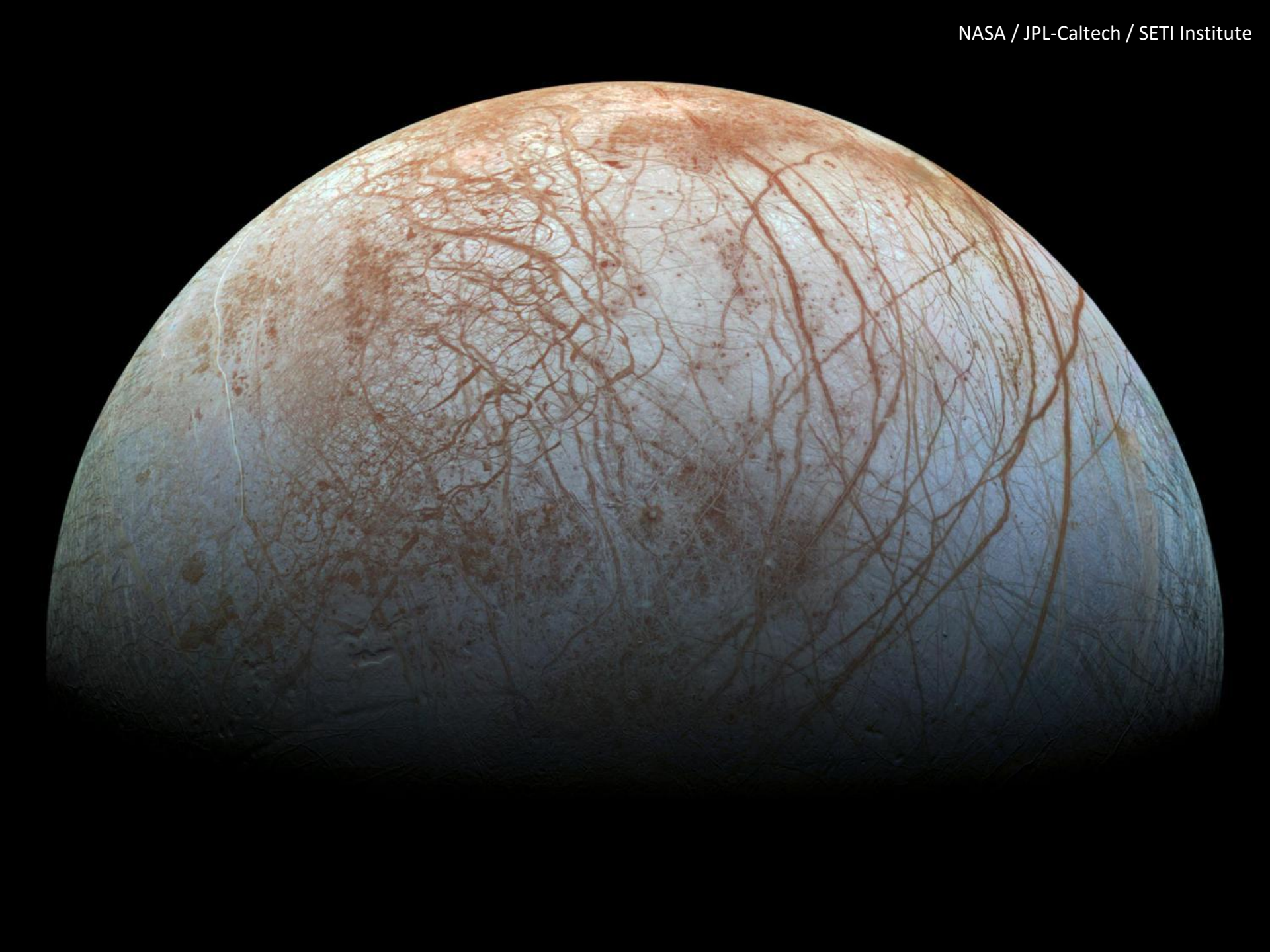
Contato (1997)
Robert Zemeckis

O projeto SETI

ATA / SETI

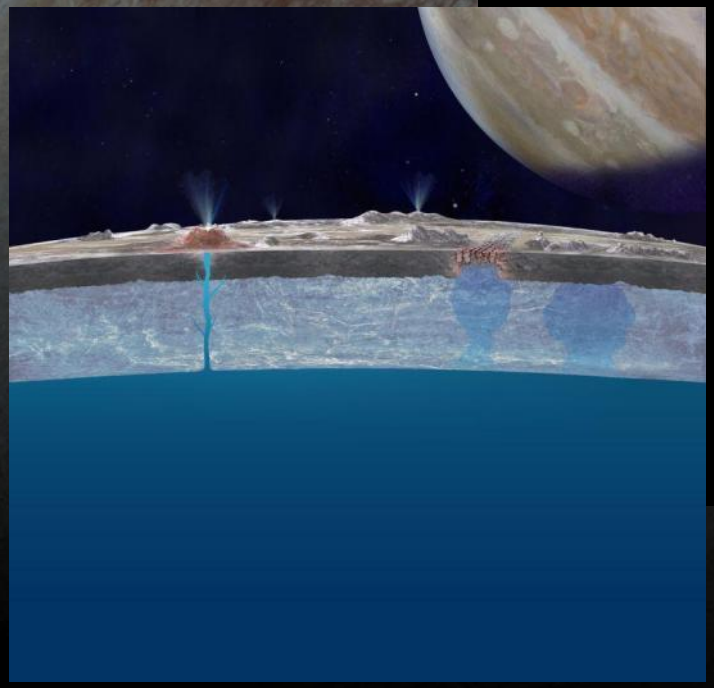


Berkeley Open Infrastucture For Network Computing / SETI@Home

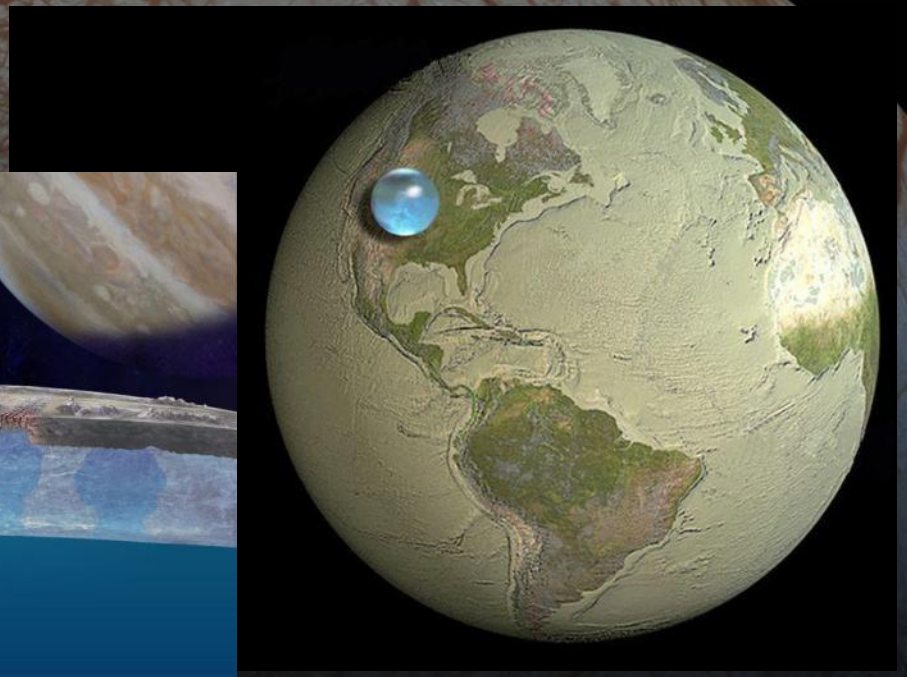

NASA / JPL-Caltech / SETI Institute

2001: Uma odisséia no espaço (1968)
Stanley Kubrick

Europa



An artist's impression of Europa's subsurface ocean. (NASA/JPL-Caltech)



An illustration showing the calculated volume of water on Europa, compared to Earth. (Kevin Hand (JPL/Caltech), Jack Cook (Woods Hole Oceanographic Institution), Howard Perlman (USGS))

http://www.vox.com/2015/2/16/8045979/europa-moon-jupiter

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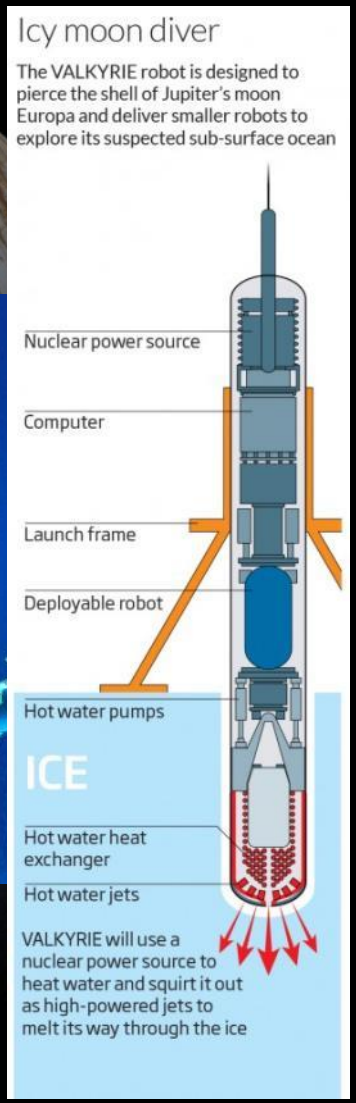
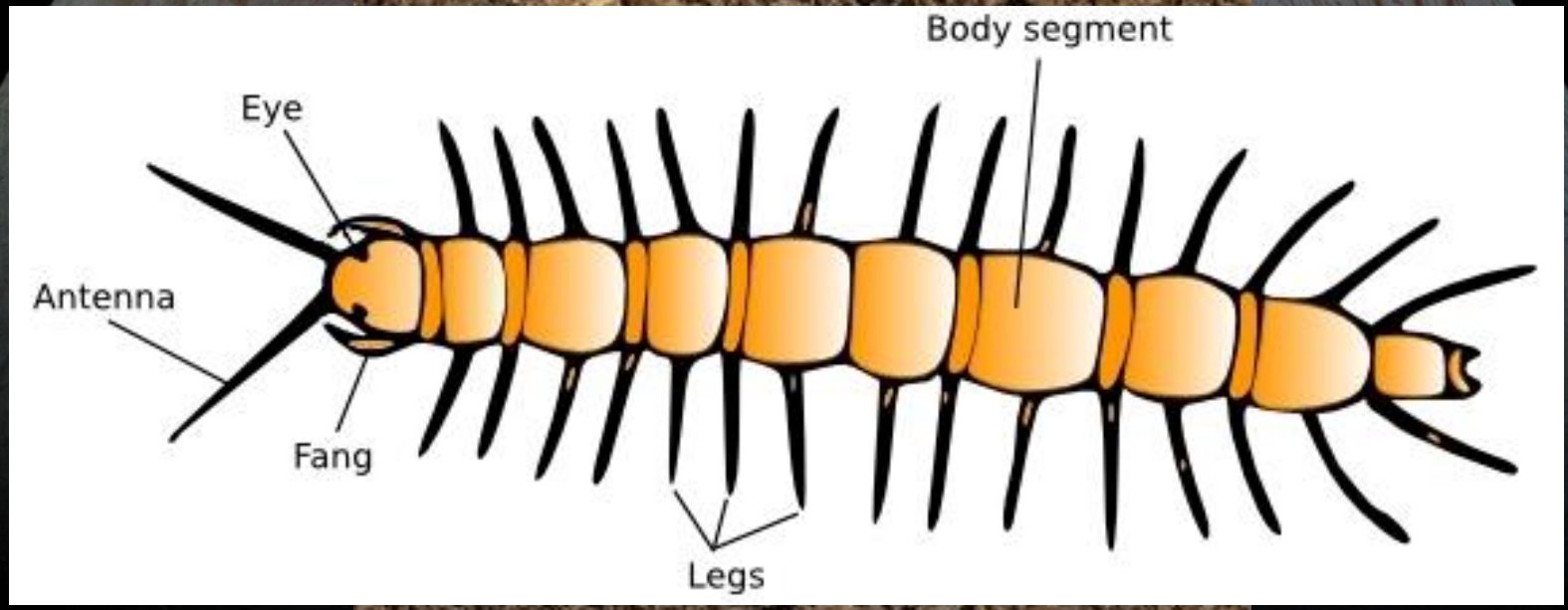


Hydrothermal vents on Earth's ocean floor are the best analogue for what Europa's ecosystems might look like. (NOAA)

http://www.vox.com/2015/2/16/8045979/europa-moon-jupiter
http://gizmodo.com/5374524/all-these-worlds-are-yours-except-europa
http://www.geek.com/science/nasas-ice-drilling-europa-robot-gets-tested-in-alaska-1600265/

2001: Uma odisséia no espaço (1968)
Stanley Kubrick

Europa

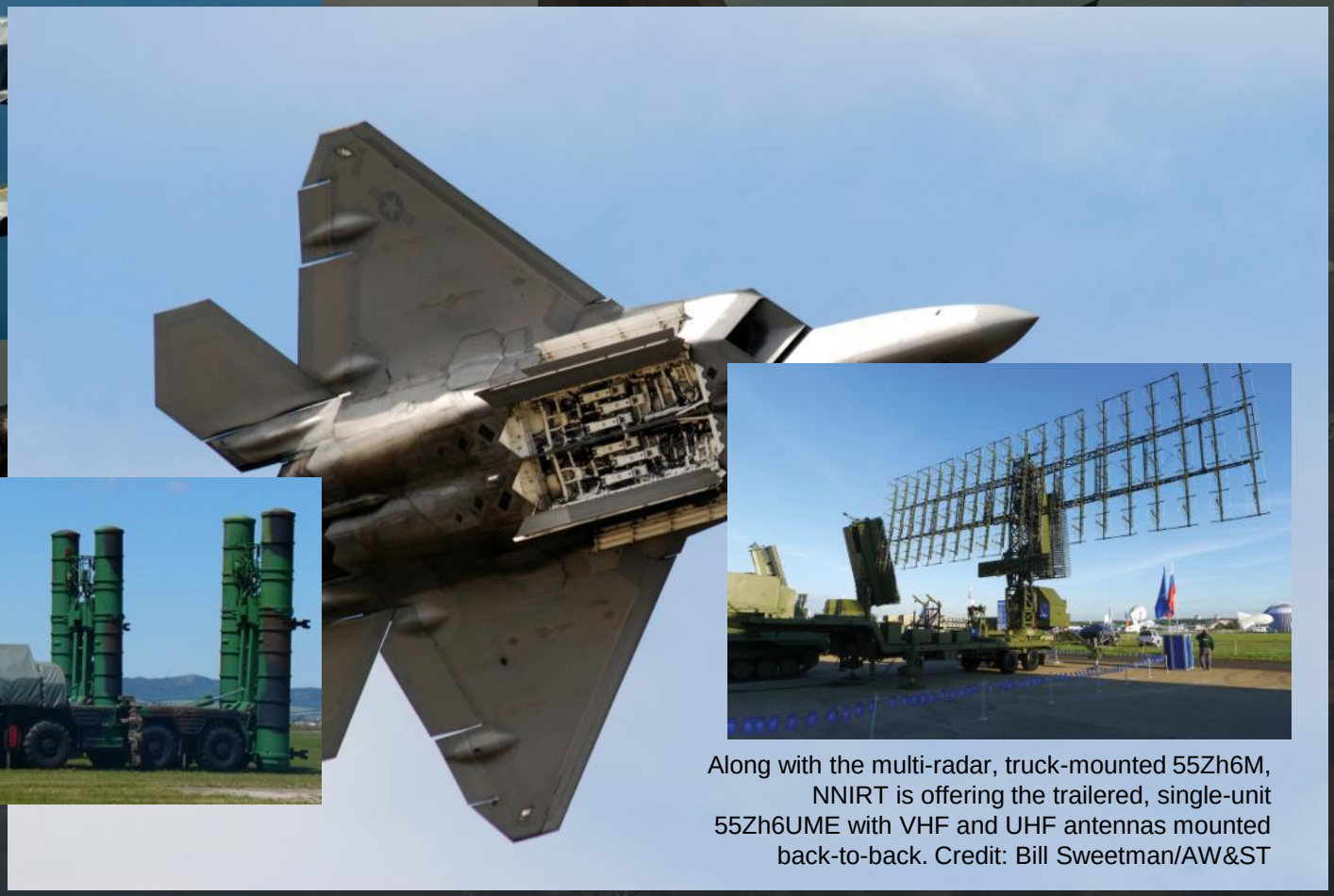



Lockheed Martin F-22A Raptor (G5)
Comprimento: 18.92 m
Altura: 5.08 m
Área alar: 78.04 m²
Peso: 19,700 kg / 29,410 kg
Potência: 116 kN each ~ 156+ kN each
Velocidade máxima: Mach 2.25 (2,410 km/h) / Mach 1.82 (1,960 km/h)
Alcance: 2,960 km with 2 external fuel tanks
Raio de combate: 760 km
Teto de serviço: 20,000 m
Carga-g: −3.0/+9.0g
Construídos: 195
Custo do programa: US$66.7 billion as of 2011
Custo unitário: US$150 million
https://en.wikipedia.org/wiki/Lockheed_artin_F-22_Raptor

Lockheed Martin F-22A Raptor (G5)

Formation of 1st Fighter Wing F-22 Raptors

3 launcher of Slovak S-300PMU on 3rd National Airdays in Piešťany - EllsworthSK



Along with the multi-radar, truck-mounted 55Zh6M, NNIRT is offering the trailered, single-unit 55Zh6UME with VHF and UHF antennas mounted back-to-back. Credit: Bill Sweetman/AW&ST

A Lockheed Martin F-22A fighter shows off its internal weapons bays at the 2008 Joint Services Open House (JSOH) airshow at Andrews AFB. The F-22 holds all of its air-to-air and air-to-ground weapons in these internal bays so as to preserve its high stealth characteristics.

http://aviationweek.com/technology/new-radars-irst-strengthen-stealth-detection-claims
https://en.wikipedia.org/wiki/Lockheed_Martin_F-22_Raptor


2

Lockheed Martin F-35 Lightning II (G5)

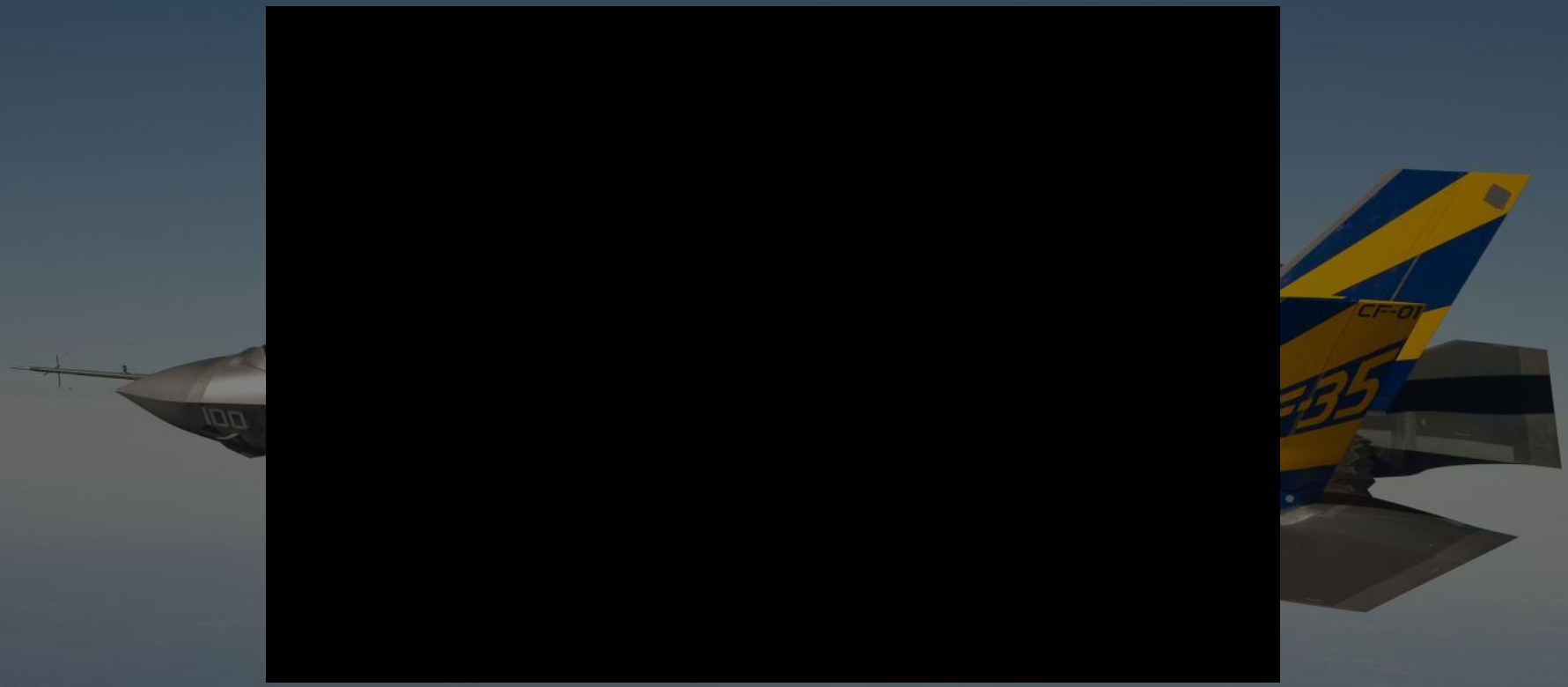
Comprimento: 15.67 m
Altura: 4.33 m
Área alar: 42.7 m²
Peso: 13,199 kg / 22,470 kg
Potência: 125 kN each ~ 191+ kN each
Velocidade máxima: Mach 1.61 (1,930 km/h)
Alcance: 2,220 km
Raio de combate: 1,135 km
Carga-g: 9g

Construídos: 115 as of November 2014

Custo do programa: US$1.3 trillion,
US$59.2B para desenvolvimento,
$261B para provisionamento,
$590B para operações & manutenção em 2012

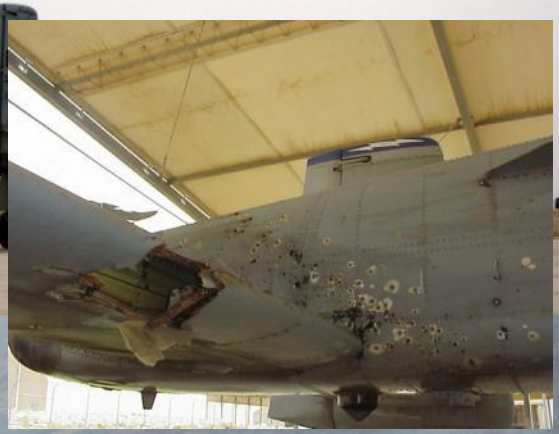
Custo unitário: F-35A: $98M,
F-35B: US$104M,
F-35C: US$116M

https://en.wikipedia.org/wiki/Lockheed_Martin_F-35_Lightning_II


100
CF-01
F-35

Lockheed Martin F-35 Lightning II (G5)

F-16C/D: US$18.8 million (1998 dollars)



Fairchild Republic A-10 Thunderbolt II

GAU-8A Avenger, canhão Gatling de 7 canos de 30 mm com 1,350 cartuchos. A munição padrão é de alumínio com núcleo de urânio exaurido, incendiária e perfuradora de blindagem, numa relação de quatro para um. Velocidade inicial do projétil: 1067 m/s.

O A-10 está projetado para permanecer ao serviço até 2028. Porém, este avião pode permanecer ao serviço indefinidamente devido ao baixo custo e características únicas que o F-35 não poderá incluir, como a metralhadora e a baixa velocidade.

https://pt.wikipedia.org/wiki/A-10_Thunderbolt_II
https://en.wikipedia.org/wiki/Lockheed_Martin_F-35_Lightning_II

Eurofighter Typhoon (G4.5++)

Construídos: 444 as of September 2015
Custo do programa: US$ 56,7 billion (UK only)
Custo unitário: US$102M

Typhoon at Farnborough International Airshow 2012 / Giovanni Maduli

Comprimento: 15.96 m
Altura: 5.28 m
Área alar: 52.1 m²
Peso: 11,000 kg / 16,000 kg
Potência: 60 kN each ~ >90 kN each
Velocidade máxima: Mach 2 (2,495 km/h)
Alcance: 2,900 km
Raio de combate: 1,389 km
Teto de serviço: 19,812 m
Carga-g: -3/9g

http://theaviationist.com/2012/07/13/fia12-typhoon-raptor/
http://theaviationist.com/2012/07/23/f-22-raptor-kill-markings/
https://en.wikipedia.org/wiki/Eurofighter_Typhoon

Dassault Rafale (G4.5++)

Construídos: 141 as of September 2015

Custo do programa: US$62.7 billion

Custo unitário: Rafale B: US$101M,
Rafale C: US$94M,
Rafale M: US$108M

Comprimento: 15.27 m
Altura: 5.34 m
Área alar: 45.7 m²
Peso: 9,850 kg / 15,000 kg
Potência: 50,04 kN each ~ 75,62 kN each
Velocidade máxima: Mach 1.8 (1,912 km/h)
Alcance: 3,700 km with 3 drop tanks
Raio de combate: 1,852+ km
Teto de serviço: 15,235 m
Maximum g-load: -3.6/9g

https://en.wikipedia.org/wiki/Dassault_Rafale

Sukhoi SU-27/30/35 Flanker (G4~4.5)

Comprimento: 21.9 m
Altura: 5.9 m
Área alar: 62 m²
Peso: 18,400 kg / 25,300 kg
Potência: 86,3 kN each ~ 142 kN each
Velocidade máxima: Mach 2,25 (2,390 km/h)
Alcance: 3,600 km
Teto de serviço: 18,000 m
Carga-g: 9g

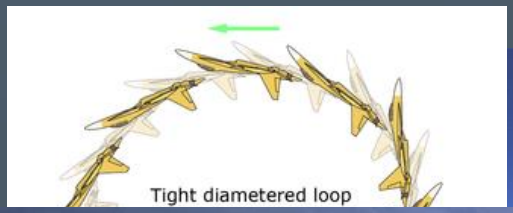
Construídos: SU-27 809, SU-30 500+, SU-35 51

Custo do programa: ?

Custo unitário: SU-27: US$30M,
SU-30: US$37.5M,
SU-35: US$40M

https://en.wikipedia.org/wiki/Sukhoi_Su-27
https://en.wikipedia.org/wiki/Sukhoi_Su-30
https://en.wikipedia.org/wiki/Sukhoi_Su-35

Sukhoi SU-27/30/35 Flanker (G4~4.5)



Sukhoi SU-47 Berkut

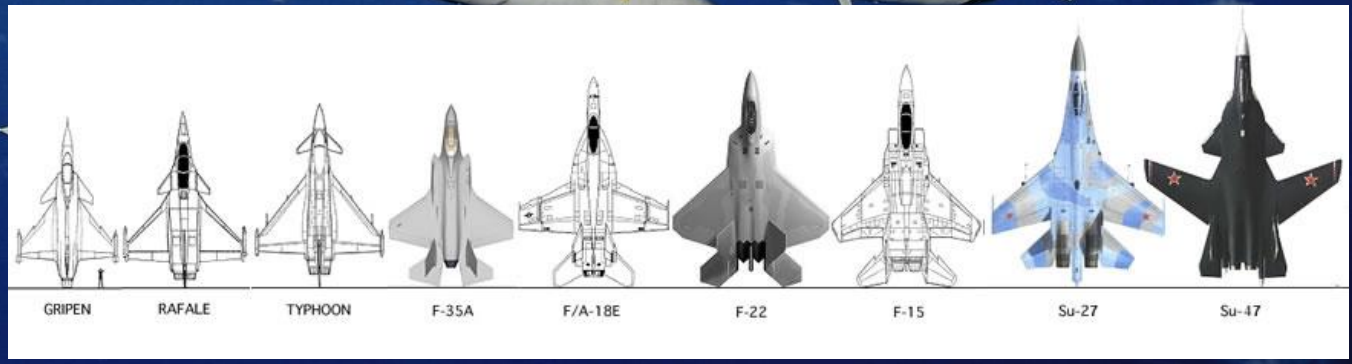
Sukhoi T-50 Beltyukov / Alex Beltyukov

https://en.wikipedia.org/wiki/Sukhoi_Su-27
https://en.wikipedia.org/wiki/Sukhoi_Su-30
https://en.wikipedia.org/wiki/Sukhoi_Su-35

Saab JAS 39C/D Gripen (G4.5)

Construídos: +247
Custo do programa: US$ 13,54 billion
Custo unitário: US$68,9M

Comprimento: 14,1 m
Altura: 4.4 m
Área alar: 30 m²
Peso: 6,800 kg / 8,500 kg
Potência: 54 kN ~ 80,5 kN
Velocidade máxima: Mach 2 (2,204 km/h)
Raio de combate: 800 km
Alcance: 3,200 km with drop tanks
Teto de serviço: 15,240 m
Carga-g: 9g



Size comparison / mil-avia

http://defence.pk/threads/combat-aircraft-projects-designs-index-in-2nd-post.75408/page-50
https://pt.wikipedia.org/wiki/JAS_39_Gripen

Saab JAS 39E/F Gripen (G4.5++)

Gripen F (K. Tokunaga / Saab)

Novo motor GE F414G +22% de potência, menor consumo
Redesenho das tomadas de ar
Novo trem de pouso e redesenho da fuselagem inferior
+40% de combustível
4.000km de alcance
1,300 km de raio de combate / 30min sobre o alvo
+2 cabides
+200Kg de peso
+1,800 Kg de carga
Supercruzeiro a Mach 1.2
Capacidade STOL

Substituição de motor < 1 hora
Tempo de imobilização no solo < 10 min
Custo por hora de voo < US$ 4,000.00

Lockheed Martin's definition of 5-th generation fighter is following:
— stealth
— high maneuverability
— advanced avionics
— networked data fusion from sensors and avionics; and
— the ability to assume multiple roles.

"Comparing F-35 and Gripen, it can be seen that while F-35 is stealthier on radar, Gripen has far lower IR and lower visual signature. Unlike F-35, it also has high maneuverability, and both aircraft have advanced avionics and multirole capability, while networked data fusion will be avaliable on Gripen NG. F-22 has high maneuverability but is not multirole, while Rafale and Typhoon only lack stealth. Thus, F-22, F-35, Typhoon, Rafale and Gripen NG are all equally 5-th generation aircraft, with Gripen C/D being just one step away."

HMD,WAD,HUD Gripen Demo/ Saab

Cockpit Gripen E / Saab

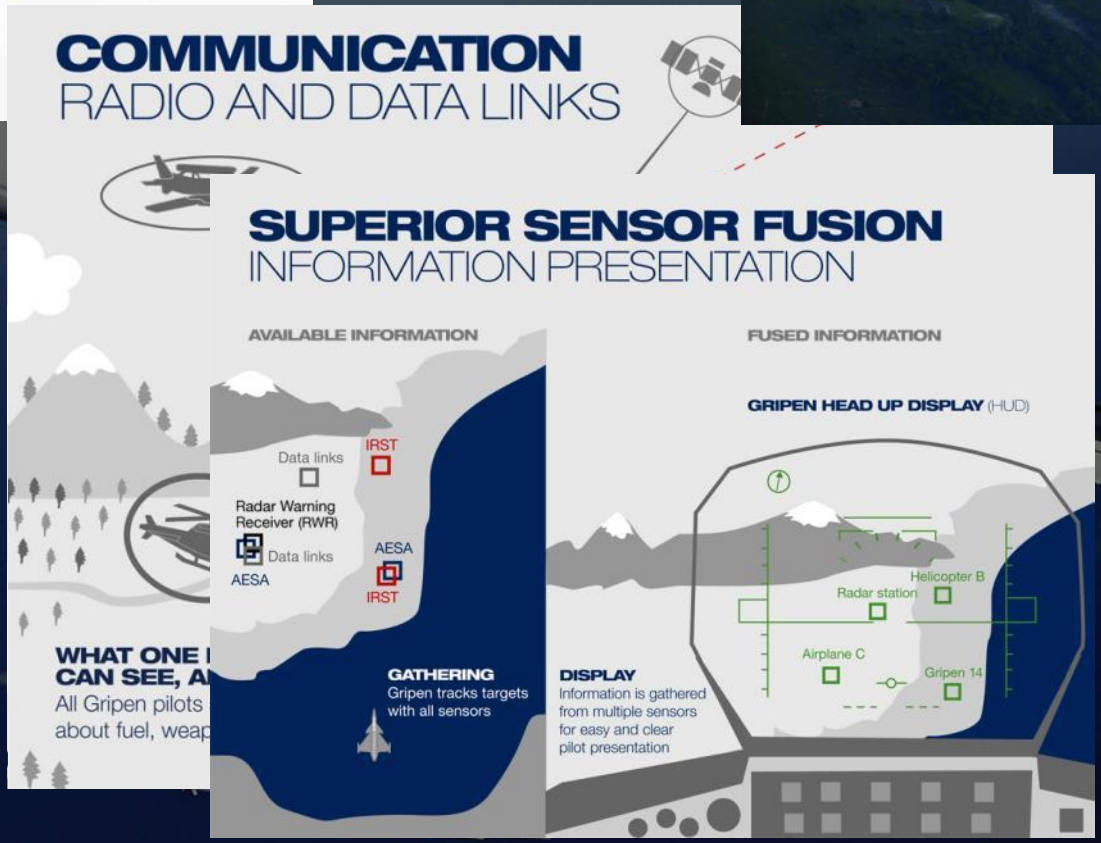
http://www.aereo.jor.br/2010/07/28/perguntas-e-respostas-sobre-o-programa-gripen-ng/
http://www.aereo.jor.br/2015/09/03/ael-entrega-prototipos-wad-e-hud-modelo-a-como-parte-do-programa-brasileiro-para-o-gripen-ng/
http://www.gripenng.fab.mil.br/ https://pt.wikipedia.org/wiki/JAS_39_Gripen https://defenseissues.wordpress.com/2013/03/16/saab-gripen-vs-f-35/

Saab JAS 39E/F Gripen (G4.5++)

IRST “Skyward-G” Test / Saab
Detecção apartir de 300 nós ~555 km/h

Embraer R-99 Erieye
(Custo unitário: US$80M)

Radar AESA 2G ES 05 Raven / Selex
Plataforma +/- 100 graus



http://www.gripenng.fab.mil.br/ http://saab.com/pt/air/gripen-fighter-system/gripen/gripen.com/
https://pt.wikipedia.org/wiki/JAS_39_Gripen http://www.aereo.jor.br/2014/03/19/novos-sensores-do-gripen-e-poderao-detectar-alvos-com-tecnologia-stealth/
http://saab.com/it/air/gripen-fighter-system/gripen/gripen/newsandpress/gripen-news-feed/Saab-successfully-completes-flight-test-with-IRST-for-Gripen-E/