The Changing Character of Warfare:
Defense Dominates the Battlespace

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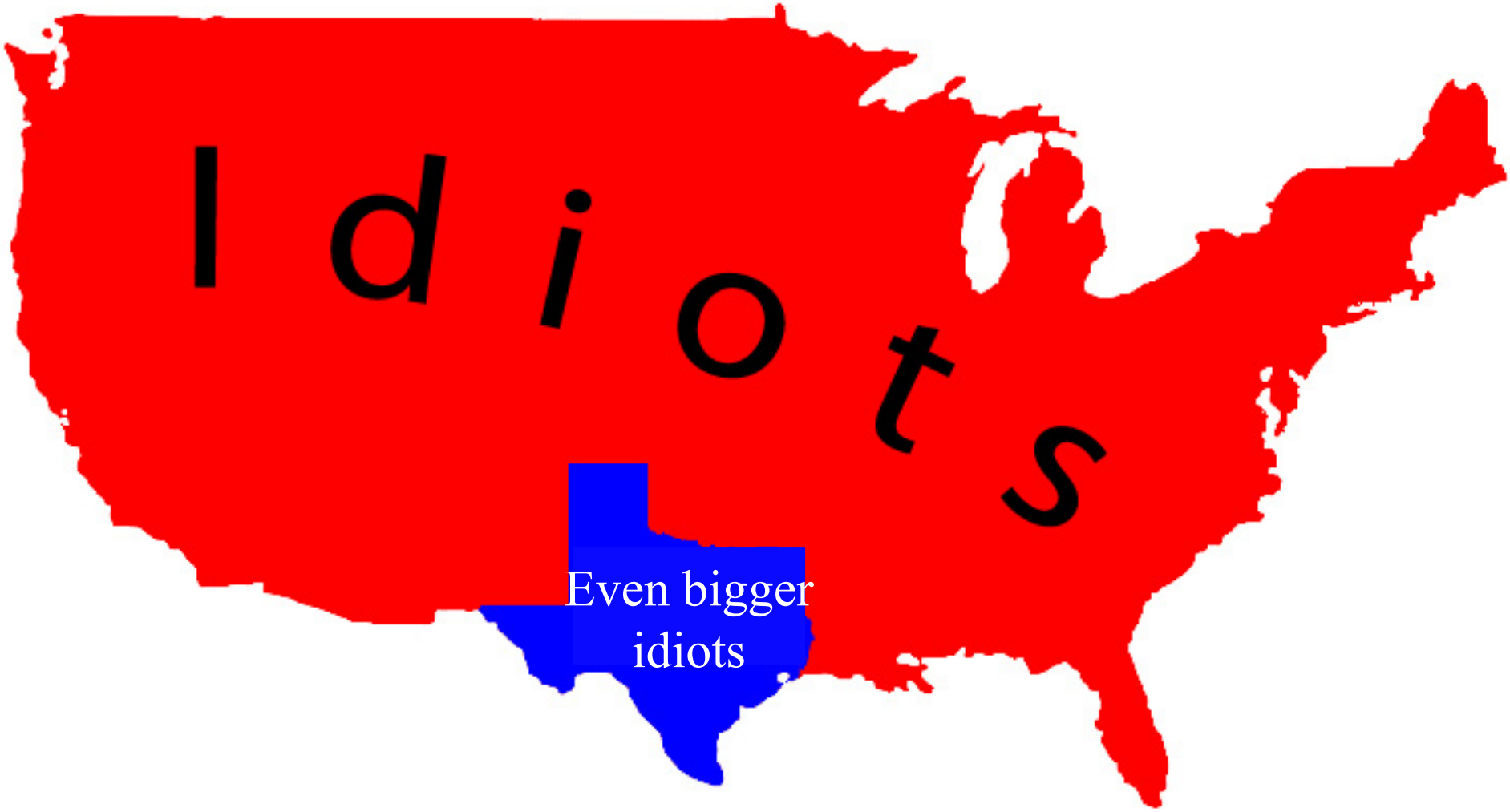
THE WORLD ACCORDING TO AMERICANS

America according to the World



Purpose

- What drives changes in character of warfare?
- What is driving change today?
- What forms will future conflict take?

Underlying
NATURE OF WAR
does not change,

CHARACTER OF WARFARE
changes continually

Key Question -

Why does the character of war evolve?

Character of War Reflects Societies

- Economic
- Political
- Social
- Technical

Warfare is evolving

- Widespread agreement
- What it will be – continuing disagreement
- Three types of enemy
  - State, Insurgent, Terrorist
  - Crime is always present

Nation States

Key Changes

- Pervasive Surveillance
- Mass with precision
  - Drones/rockets with Task Specific AI
  - Advanced (3D) manufacturing
- C4I that can exploit both

Will this lead to tactical dominance by the defense?

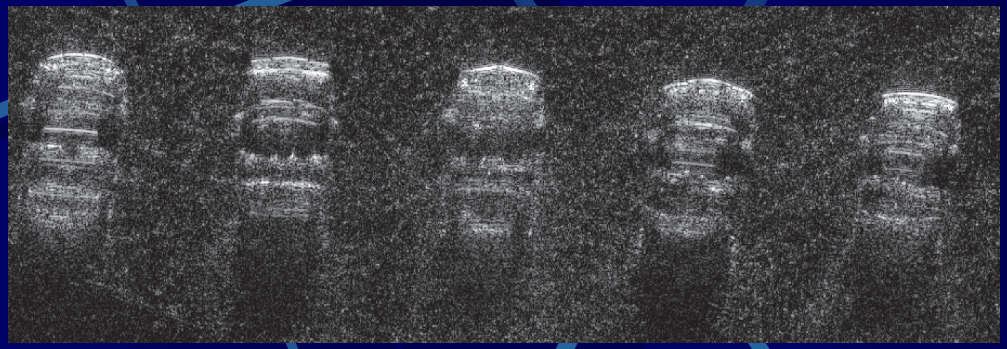
Pervasive Surveillance:
Satellites and Drones

Pervasive Surveillance

- Visual/IR - 24 hours; Targeted – 10x/day
- SAR - Capella Space – 6 hours going to 15 mins
- EW – Hawkeye 360 - locate to 3 KM - every hour
- 100,000 small sats by 2030
- Cyber/Social Media – Continuous

Change Detection Software

CAPELLA SPACE
Very high resolution SAR imagery through vegetation



PLANET LAB
Image taken 9 Apr, posted 10 Apr

Surveillance Drones

Long-range

- Aurora Orion UAV
- 120 hours = 5 days
  - 1,000 lb payload
- 48 hours at 3,000 miles

- Flexrotor
- VTOL
- 1,500 miles
- 30 hours
- E/O, IR, SAR

- V-BAT -128
- VTOL
- 11 Hours
- E/O, IR

Mass with Precision

Artillery, rockets, drones

Artillery

- Swedish Archer
- 155 mm
- Range: 50 km
- Emplace, 3 rounds, displace
  - 72 seconds
- Auto-load, 21 rounds

- French Caesar
- 155 mm
- Family of rockets
- Range: 55 km
- 36 rounds

Missiles/Rockets

Jumper – Israel
50 km – 8/box

HIMARS – PrSM
2022 – 480 km
2025 – 800 km

JLTV – NSM
180 km

Attack Drones

- Harop – loitering munition
- 600 miles – 55 lbs
- Autonomous – Visual, IR, EMS
- Operational in 10 nations

- TUV-S
  - 1,200 miles – 250 lbs unitary
  - 4,000 miles – 1,000 lbs
  - 1 meter CEP
  - C-130, Civilian A/C
- USAF CLEAVER Program

Attack Drones

- XQ-58A *Valkyrie*
- 1,500 miles – 500 lbs
- Autonomous
- Stealth configured
- VTOL
- $3M

170 = 1 F-35 A Purchase + O&M

Attack Drones

Shahed-136
1,000 miles
50 lbs
$30,000
Autonomous

Loitering Munitions

- Warmate – Poland
- $40K each
- Visual/IR
- HE, HEAT, Thermobaric
- Range: 30 km
- Two-man carry

225 per M1A2

Loitering Munitions

- Drone 40
- UK and USMC
- 15 km
- $500-1000

9,000 per M1A2

- Hero Family
- Loitering Munitions
- 15 - 100s of km
- Semi-autonomous

Containerized Weapons

Club – K LACM – 2,400 km
ASCM – 600 km

Tested by Russia, China, Israel, USMC, USN

Hide in Plain Sight

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Autonomous USVs

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Autonomous Boat Swarm TF 59

Ukrainian USV

Autonomous UUVs

- Remus 620
- 5 Days endurance
- 275 NM range

- Australian “Ghost Shark”
- 10 days endurance
- Nextgen – school bus sized

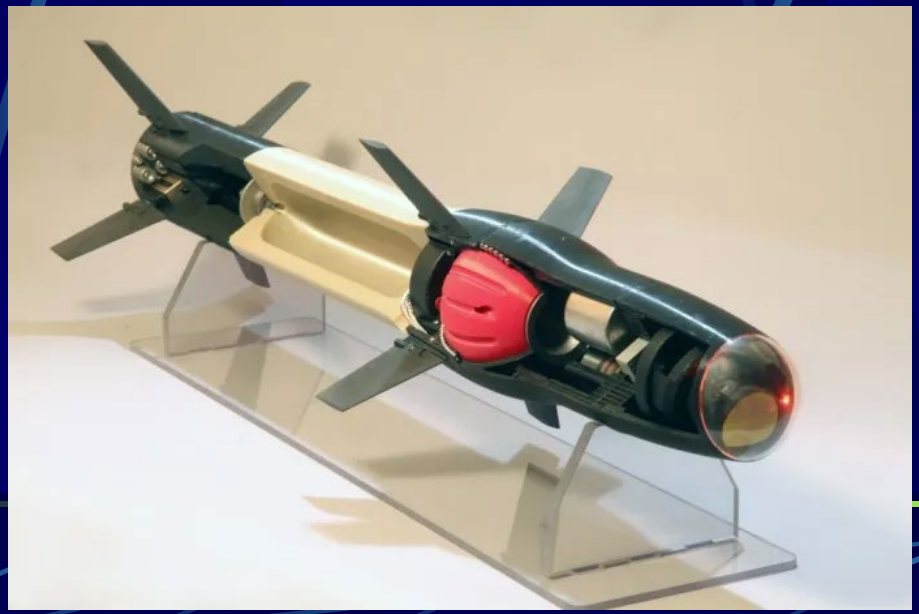
3D: Capability + Volume

2014
Autonomous
50 kms
$800

10,000 to 100,000
a day

Advanced Manufacturing

Turboprop from
855 parts to 10



Raytheon
3D Manufactured
Drone Model

Mass Launch Drones

Countering Mass?

Auto-cannons and Directed Energy Weapons

Auto-cannons

CIWS 20mm

Gephard 35mm

- Range
- Magazine capacity

Lasers

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Microwave Systems

Directed Energy: Lasers and Microwave

- Advantage to land-based defense
  - Massive power generation advantage
  - Concealment
- Weakness
  - Lasers - smoke, haze, reflective coatings
  - Microwave – Faraday cages; hardened electronics

C4I:
Exploit advances

Ukraine

- Initially crippled
- Created “Delta” on the fly
  - Based on Diia
  - Routed through Starlink
    - Can create local networks from one phone
  - Coded almost all potential sensors
- Uber for fires

Non-state actors – Insurgents

- Human network – “Coalitions of angry”
  - Afghanistan, Pakistan, Iraq, ISIS
- Transnational
- Transdimensional
- Self supporting

Insurgents

- Three drivers –
  - 1st driver – anti-colonial
  - 2nd driver – conflict over who rules
  - 3rd driver – identities (borders are wrong)

Implications of Third Driver

- Transborder conflicts
- Coalitions of angry and opportunists
  - Based on societies in conflict
- Historically very long conflicts
- U.S. Doctrine doesn't work

Non-state actors - Super-empowered Terrorists

- Super empowered small group
- Use what society provides
- Loyalty to “cause” not nation

Oklahoma City
1995
3 Tons

Beirut Port
2020
1.1 Kilotons

Texas City
1947
2 Kilotons

Tactical Impacts:
C4I, Pervasive Surveillance, and Mass w/ Precision

Irregular War

- Long-range precision strike; swarms
- Convergence favors non-state actors
  - Little infrastructure to protect
  - Weak drone/missile defense
  - State infrastructure vulnerable
  - Defense of logistics – civil and military
- Powerful role for outside sponsors

Ground Domain

- Combined arms defense becomes dominant
  - Signature minimized – organic ISR
- Mass is essential
  - 10,000 dumb swarm is doable today
- Dispersed commercial containers/pods
  - Independent or networked firing batteries
  - Range allows massing fires from distance

Can you maneuver with 1,000 hunters overhead?

Sea Domain

- Defense dominant to increasing ranges
  - Choke points closed
- Land based concealment & magazine advantages
- Small states/insurgents challenge navies
- Weapons not platforms
  - Missiles, drones, mines

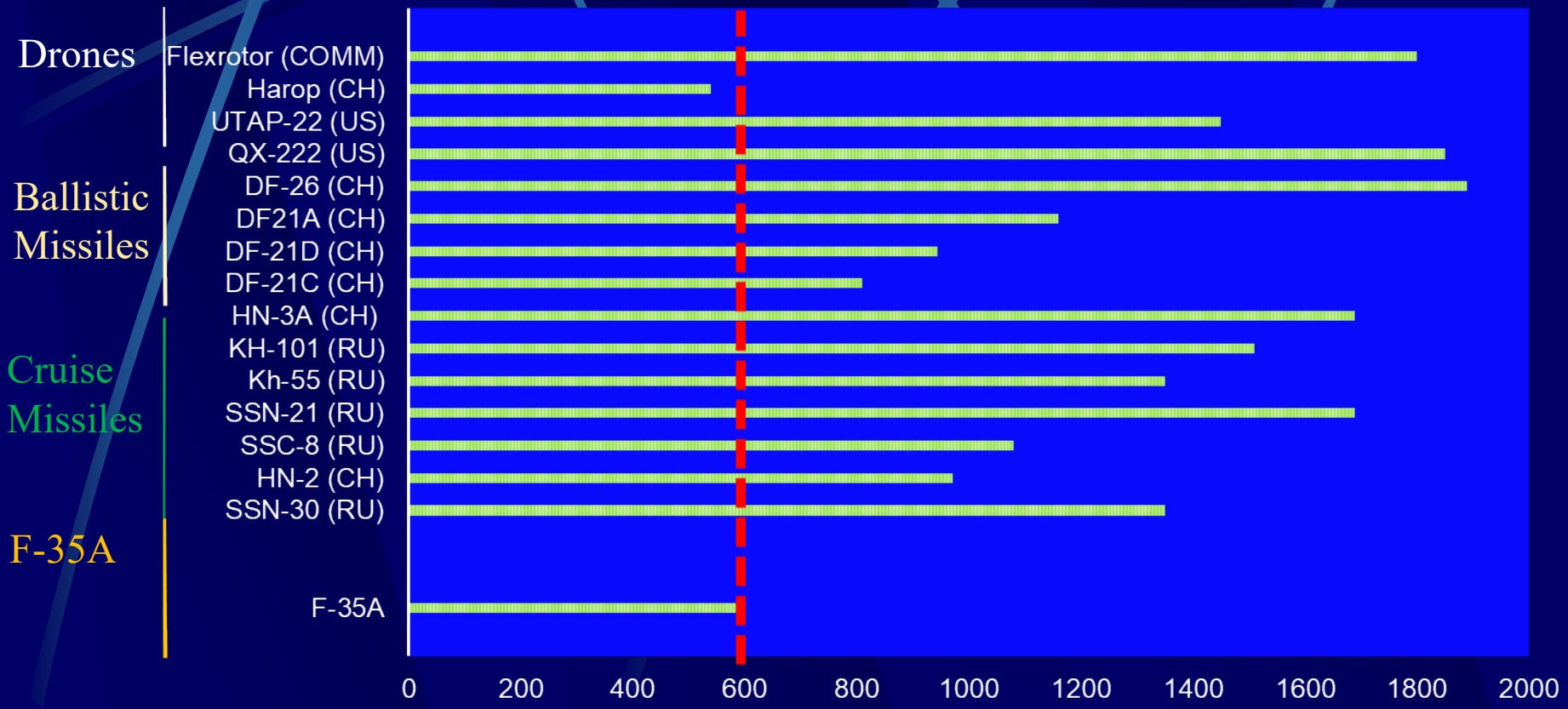
Air Domain

- Weapons not platforms
- Fixed bases become untenable
- Kill aircraft and enablers on the ground
- With right weapons, defense dominates
- Offense may be forced to attack commercial targets

Are manned aircraft range obsolete?

F-35A vs Missiles/Drones

Operational Range in Nautical Miles



Space Domain

- Heavily congested and contested
- Everyone has access to space
  - Surveillance, Communications, Attack
- Rapid space replacement evolving
  - Commercial space, drones, balloons
- Key issue = PNT for civilians

Cyber Domain

- Nodes vulnerable to precision strike
- Conventional wisdom – offense dominated
  - Ukraine shows the opposite
- Historical precedence
  - Espionage
  - Theft
  - Destructive attacks
    - Lovebug to NotPetya
    - Solarwinds/Holiday Bear

Conventional – Electromagnetic

- The critical domain??
- Contested by combined arms
- Russia in Ukraine, Syria, Nagorno-Karabakh
- China - SSF

Transition pattern

- Historical pattern – takes time
- Helper – Partner – Replacement
- Pike to musket; battleship to carrier
- Manned A/C to cruise missiles/drones
  - Helper – Gulf War I – IADS suppression
  - Partner – Gulf War II/Afghanistan
  - Replacement –
    - Strike vs heavily defended
    - Long-endurance missions

Operational Implications

- Connected C2 critical
  - Ukraine improvised “Delta”
- Defense dominates air, sea, land domains
- Space and electromagnetic contested
- Cyber uncertain
- Power projection much more costly

Strategic Implications

- Geography favors the defense
  - Major Allied advantage in Europe/Asia
- Smaller states/non-states deny major powers
- Greater allied contributions
- Mass returns
- National mobilization required

Big Questions

- Should joint operating concepts focus on defense?
- Are we buying the wrong stuff?
- Production for long wars?
- Implications for joint/combined forces?

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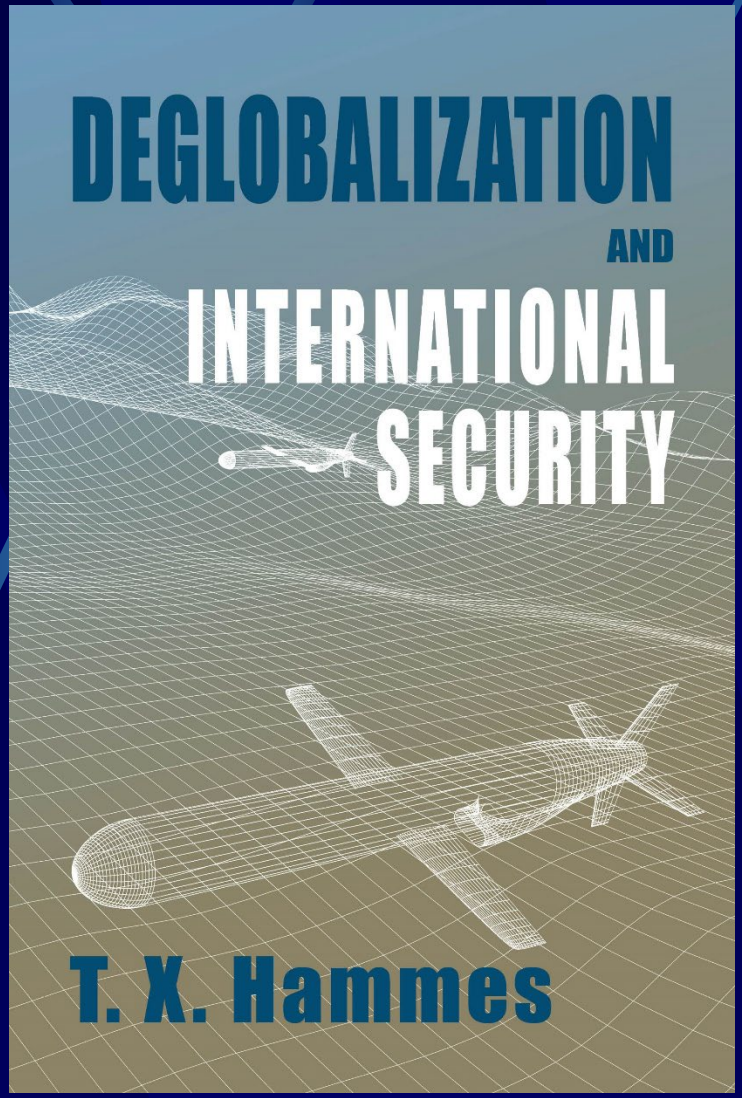

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