



Space Strategies Center (SSC)

Outer Space Warfare Challenges, Theory, Doctrine, Strategies and Tactics

- How to Fight and Win the Next Space War -

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Outer Space Warfare
Space Control
Space Defense
Space Supremacy
Space Conflict Escalation

Disclaimer: This briefing reflects the viewpoints of the author only, and is not represented as official policy of any government or military organization.

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About the Author

- **Paul Szymanski**
 - Degrees in Physics, Math and Logic From Carnegie-Mellon University
 - 41 Years Experience In Outer Space Warfare (44 Years Total)
 - Publications: 897 (In Classified and Covert Locations)
 - Worked With:
 - United States (US) Secretary of Air Force at Pentagon
 - US Space and Missile Systems Center (Los Angeles)
 - US Air Force Research Labs (Albuquerque, New Mexico, Rome, New York and Dayton, Ohio)
 - US Space Command (Colorado Springs, Colorado)
 - US Strategic Command (Omaha, Nebraska)
 - US Air Force Electronic Systems Center (Now AFLCMC) (Boston, Massachusetts)
 - Among Others
 - Multiple Awards From Secretary of Air Force, Space Systems Center, Navy Air Systems Command and Air Force Research Labs



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Space Warfare Analyses Purpose

- **Develop Foundational Space War Theory, Doctrine, Strategies and Tactics That Enable Warfighters to Fight & Win the Next Space War**
 - ① **Based on Author's 41 Years Experience Developing Space Warfare Programs & Analyses, & Study of Military History**
 - ② **Integrates Space Grand Strategies, Operational Strategies, & Tactics While Linking These to Terrestrial Warfare Courses of Action (COA's)**
 - ③ **Research Efforts Lead to More Timely & Comprehensive Space Battle Management**
 - ④ **Normalizes Space Battle Management to Reflect Terrestrial Warfighting Principles**

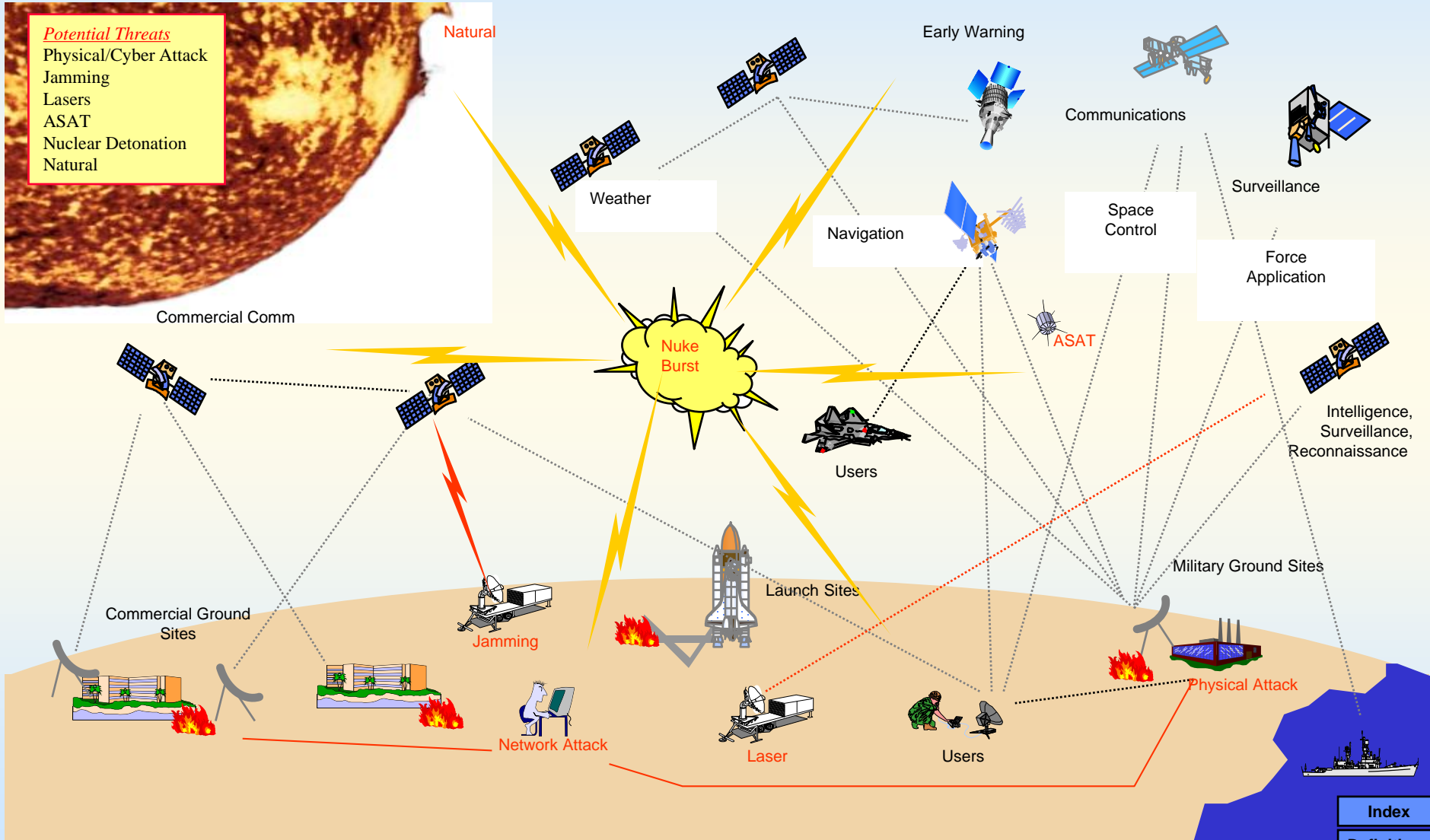
Provides a “Unified Field Theory” for Space Situational Awareness (SSA), Satellite Attack Warning (SAW) & Space Battle Management



Space Threats

Potential Threats

- Physical/Cyber Attack
- Jamming
- Lasers
- ASAT
- Nuclear Detonation
- Natural



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Space Levels of War Phases



“Why, you may take the most gallant sailor, the most intrepid airman, or the most audacious soldier, put them at a table together and what do you get? The sum of their fears.”
(Churchill)



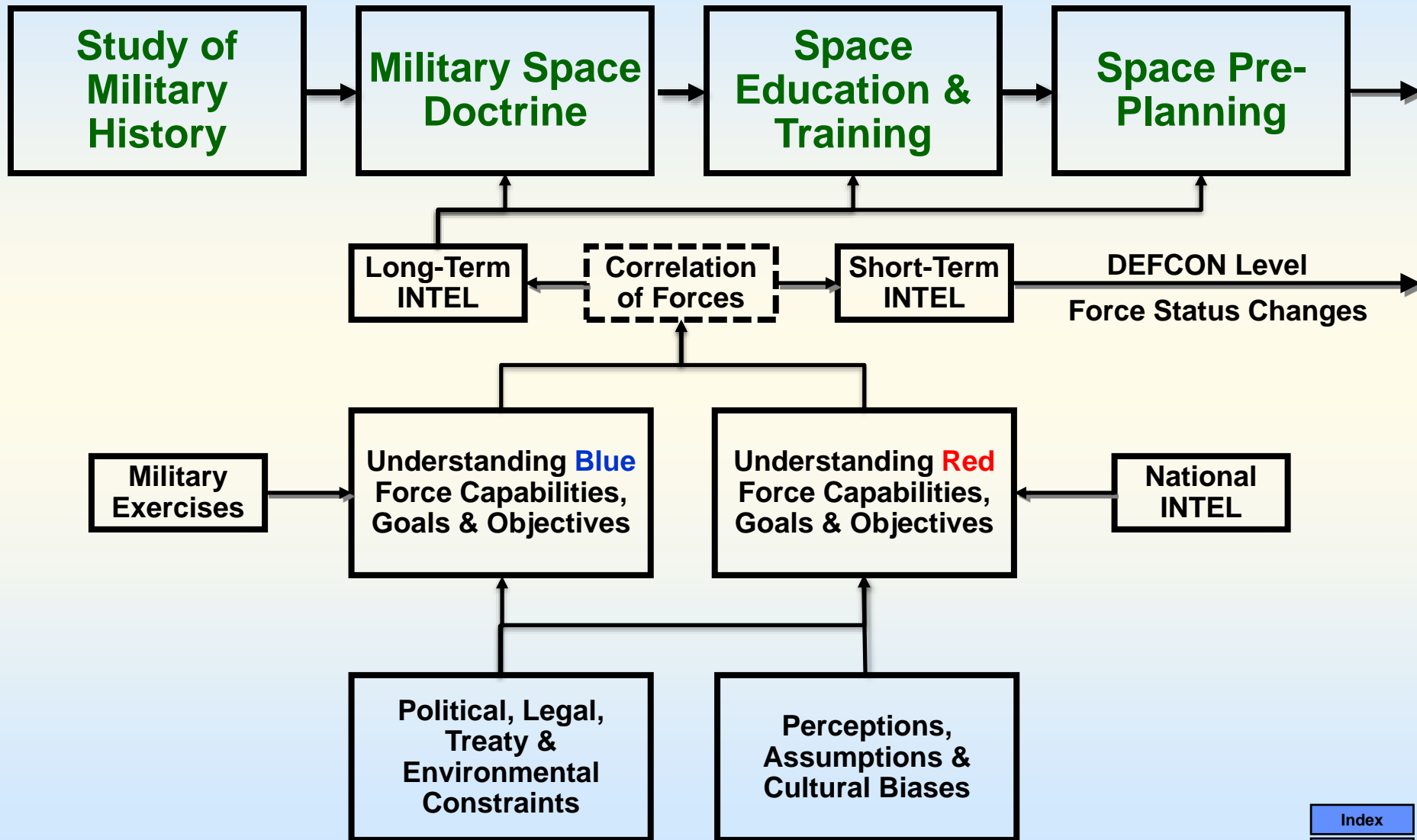
Fundamental Levels of War



Concepts From Terrestrial Warfare Can be Applied to Space Warfare

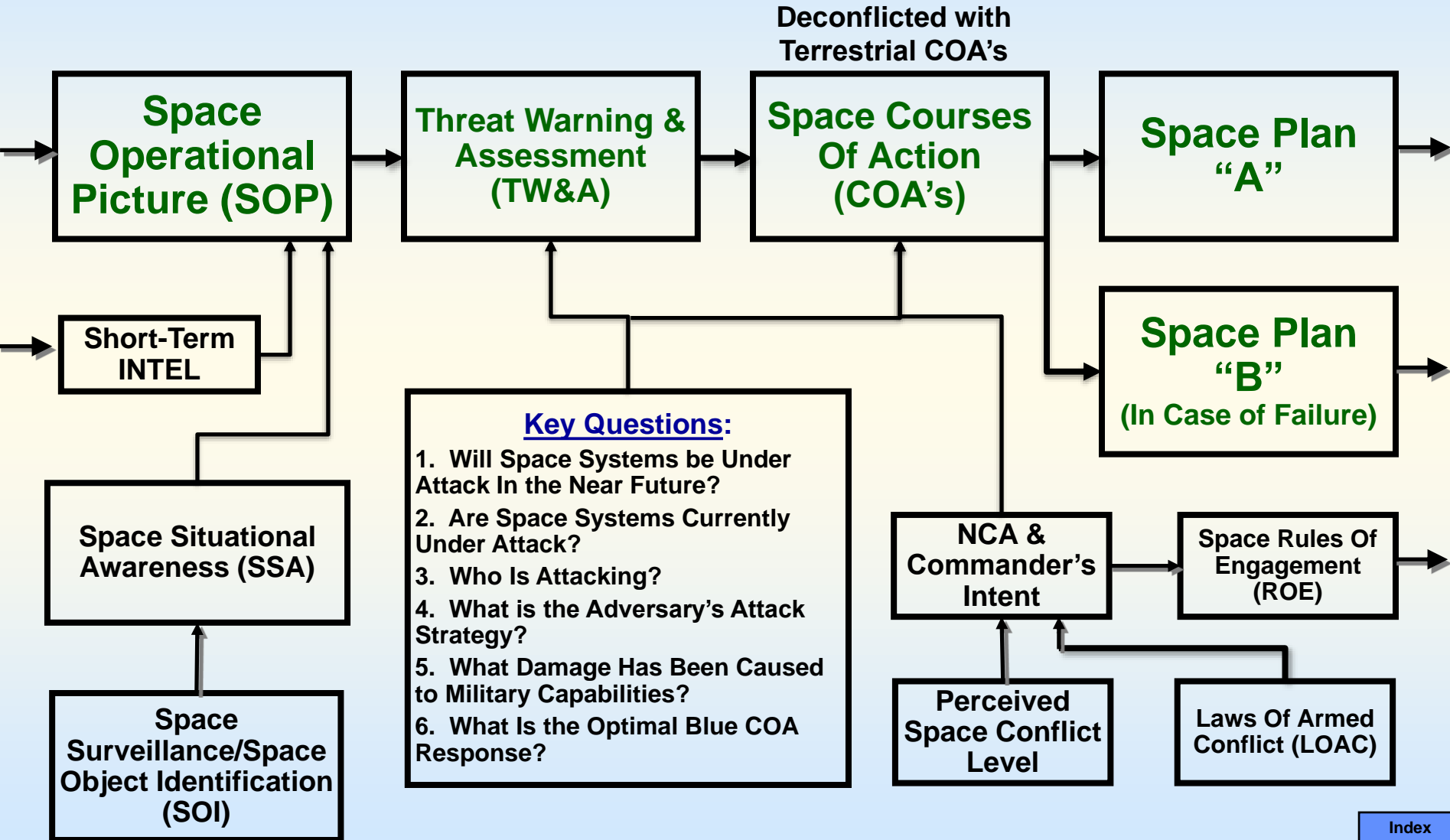


Space Grand Strategy



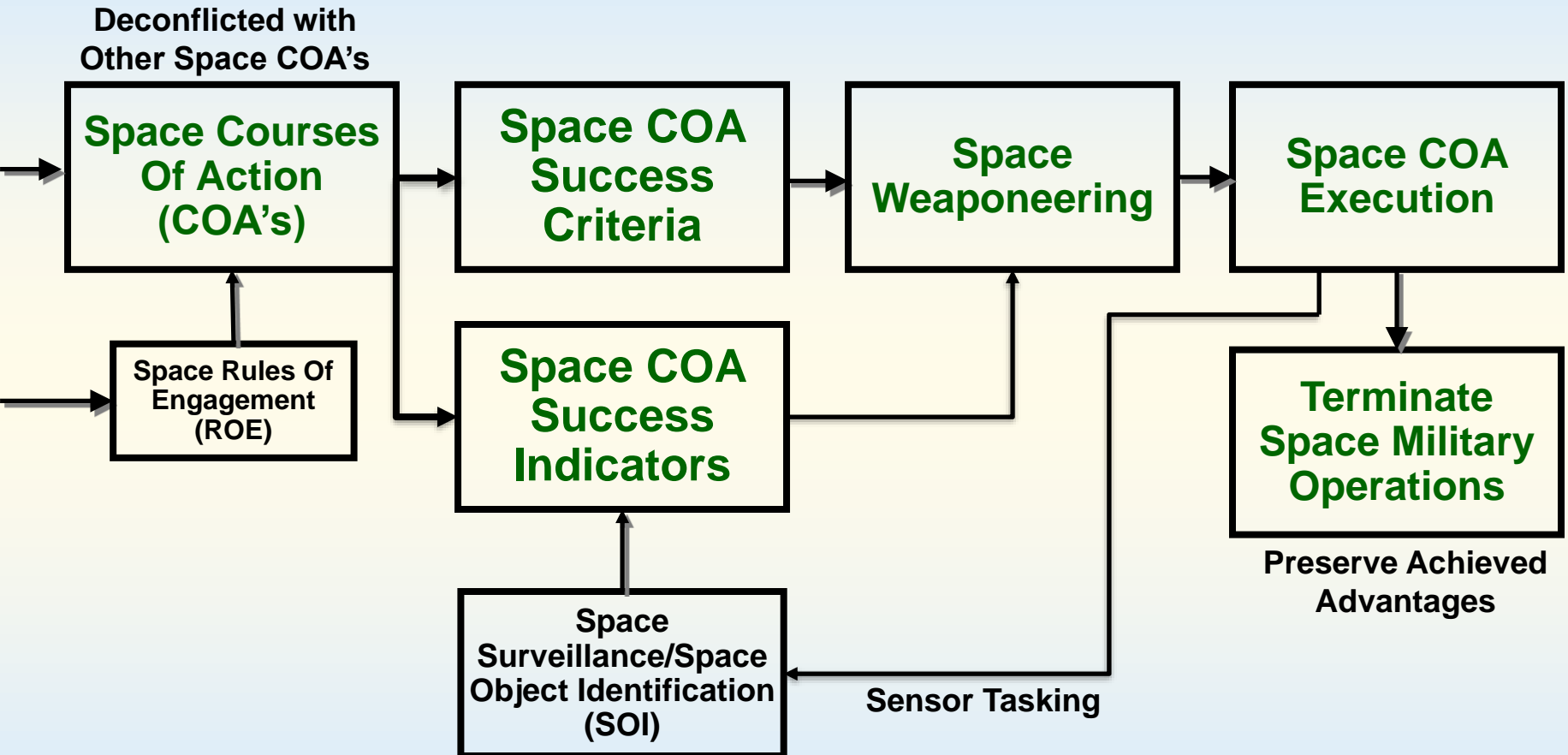


Space Operational Level



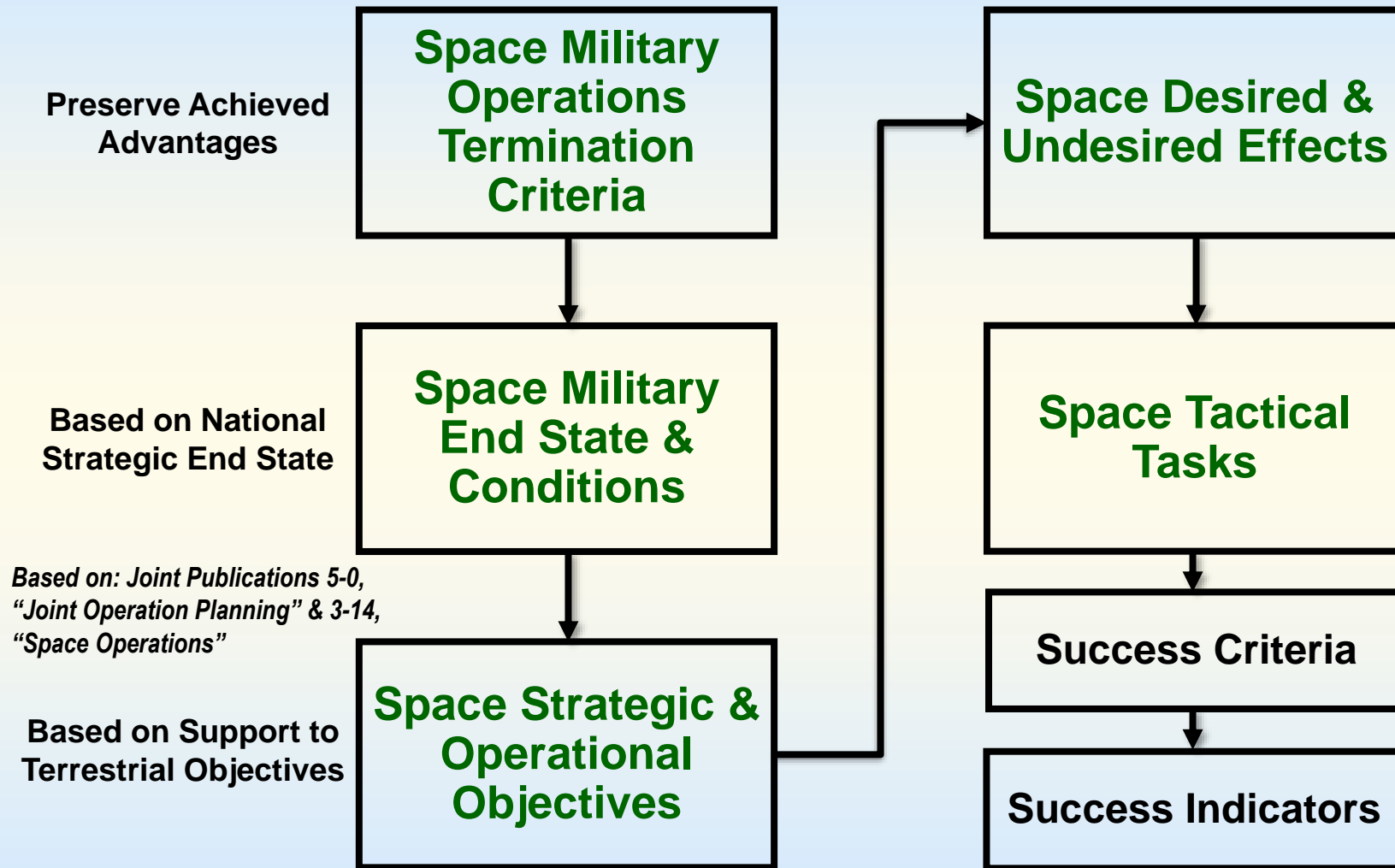


Space Tactical Level





Space Operational Art & Design



Space Objectives Primarily Support Terrestrial Military Operations, Though a Space War May Erupt Solely on Its Own & Have Its Own Objectives.

Space Operational Art & Design (SOAD)

- Fundamental Elements -

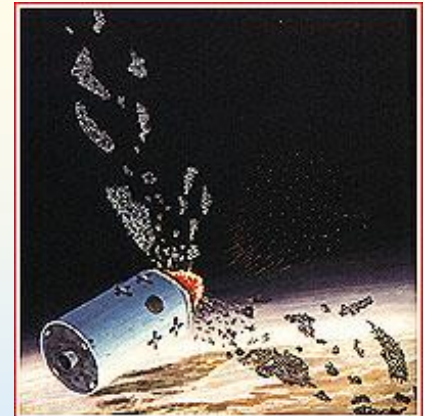


- **Space Centers of Gravity (COG)**
- **Space Decisive Points**
- **Lines of Operation (LOO) – Linkage of Actions Against Nodes & Decisive Points With Objectives**
- **Lines of Effort (LOE) – Linkage of Tasks & Missions to Cause & Effects**
- **Direct / Indirect Approach**
- **Expect Unexpected**
- **Operational Reach (Distance & Duration)**
- **Culmination (Change in Force Exchange Ratios)**
- **Simultaneous vs Sequential Operations**
 - **Simultaneity & Depth Across Multiple Domains**
 - **Timing & Tempo**
- **Effects Against Either Adversary Forces or Functions**
- **Flexible Deterrent Options (FDO's) to Show Resolve & Intent**

Concepts Derived From Joint Publication 3-14 “Space Operations”



Satellite Attack Warning (SAW) Situation Maps



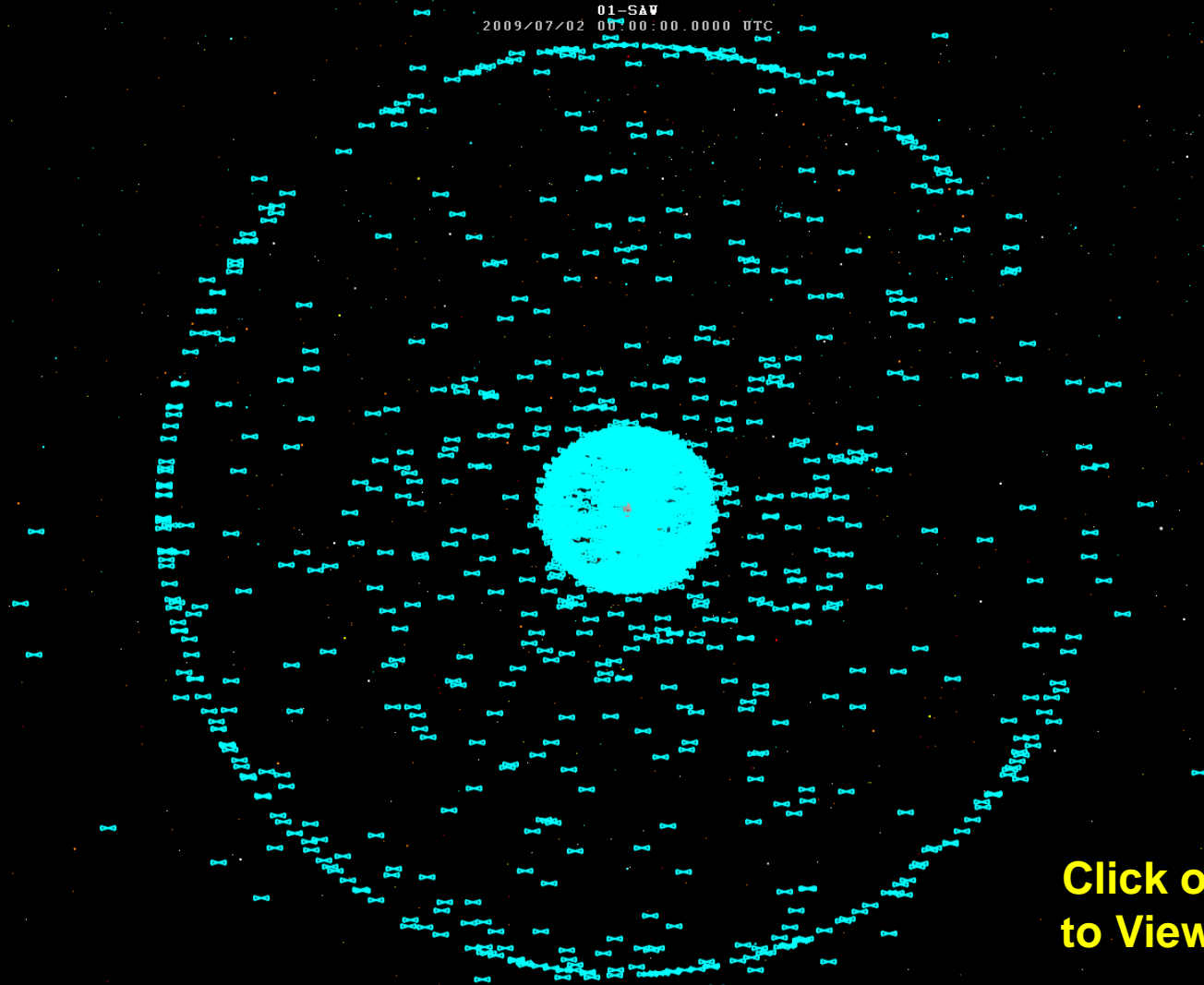
“The nation that will insist on drawing a broad line between the fighting man and the thinking man is liable to find its fighting done by fools and its thinking done by cowards.”

(Sir William Francis Butler)



Traditional Orbital View

01-SAW
2009/07/02 00:00:00.0000 UTC



**Click on Satellites
to View Animation**

>12,000 Space Objects Confuses Users as to Possible Attack Patterns Developing

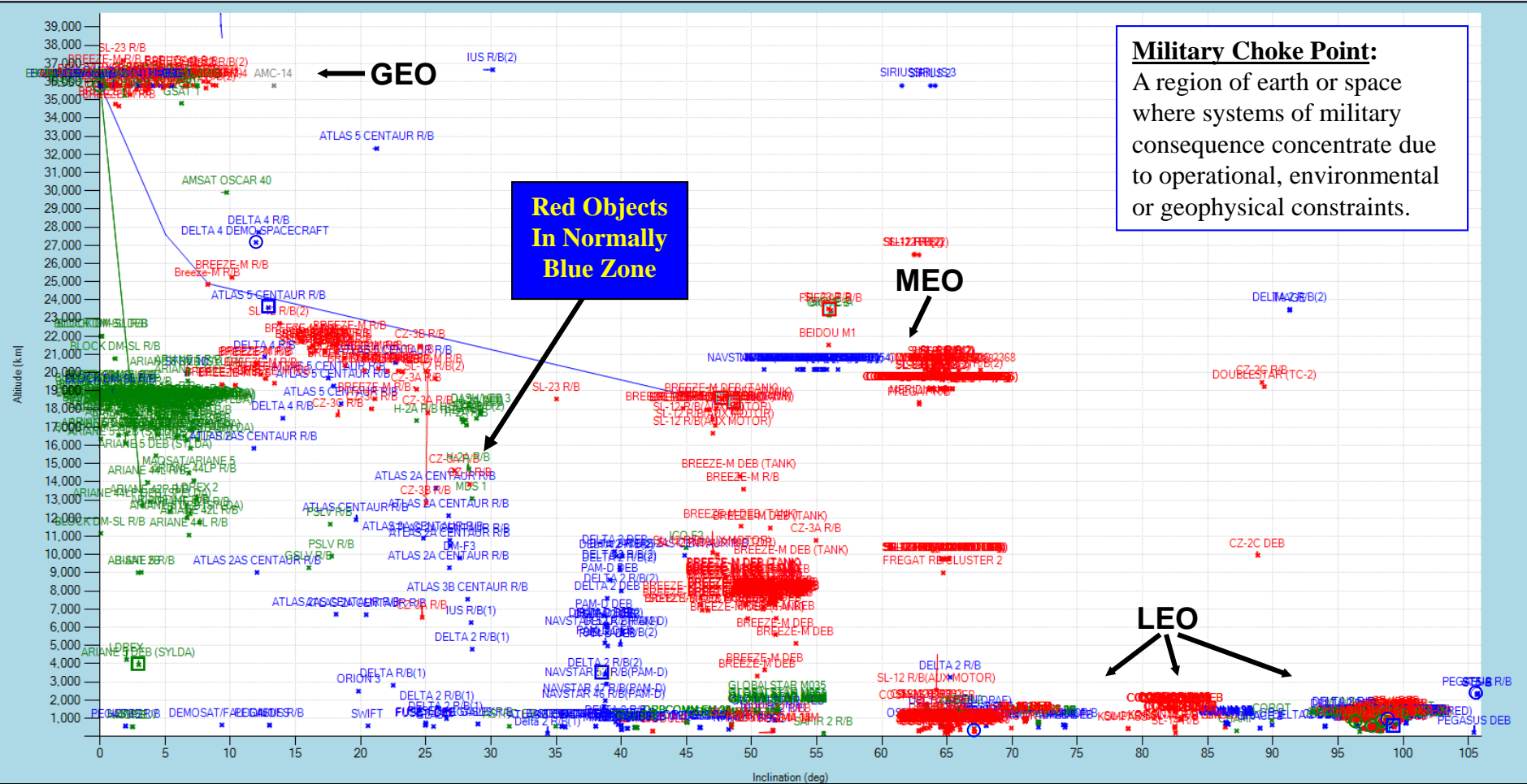
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Satellite Attack Warning (SAW) – All Altitudes



Military Choke Point:
 A region of earth or space where systems of military consequence concentrate due to operational, environmental or geophysical constraints.

**Red Objects
 In Normally
 Blue Zone**

Space Has Choke Points As In Terrestrial Systems – They’re Just Not Stationary

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SAW – Icons

- Based on Mil-Std-2525D
- 1,230 New Space Icons

Friend	Adversary	Neutral	Unknown

Makes SAW Maps Similar to Terrestrial Situation Maps

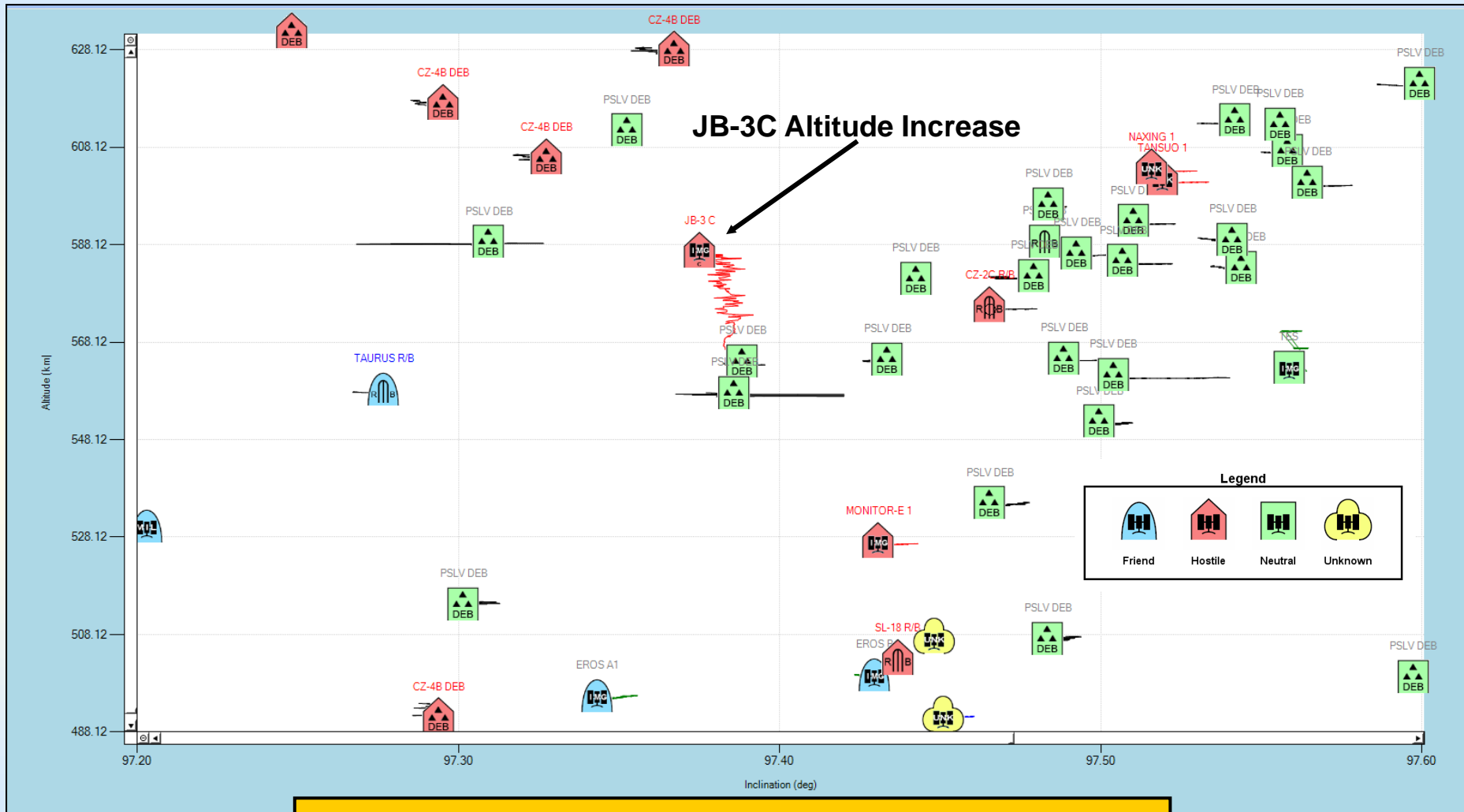
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SAW – View 1

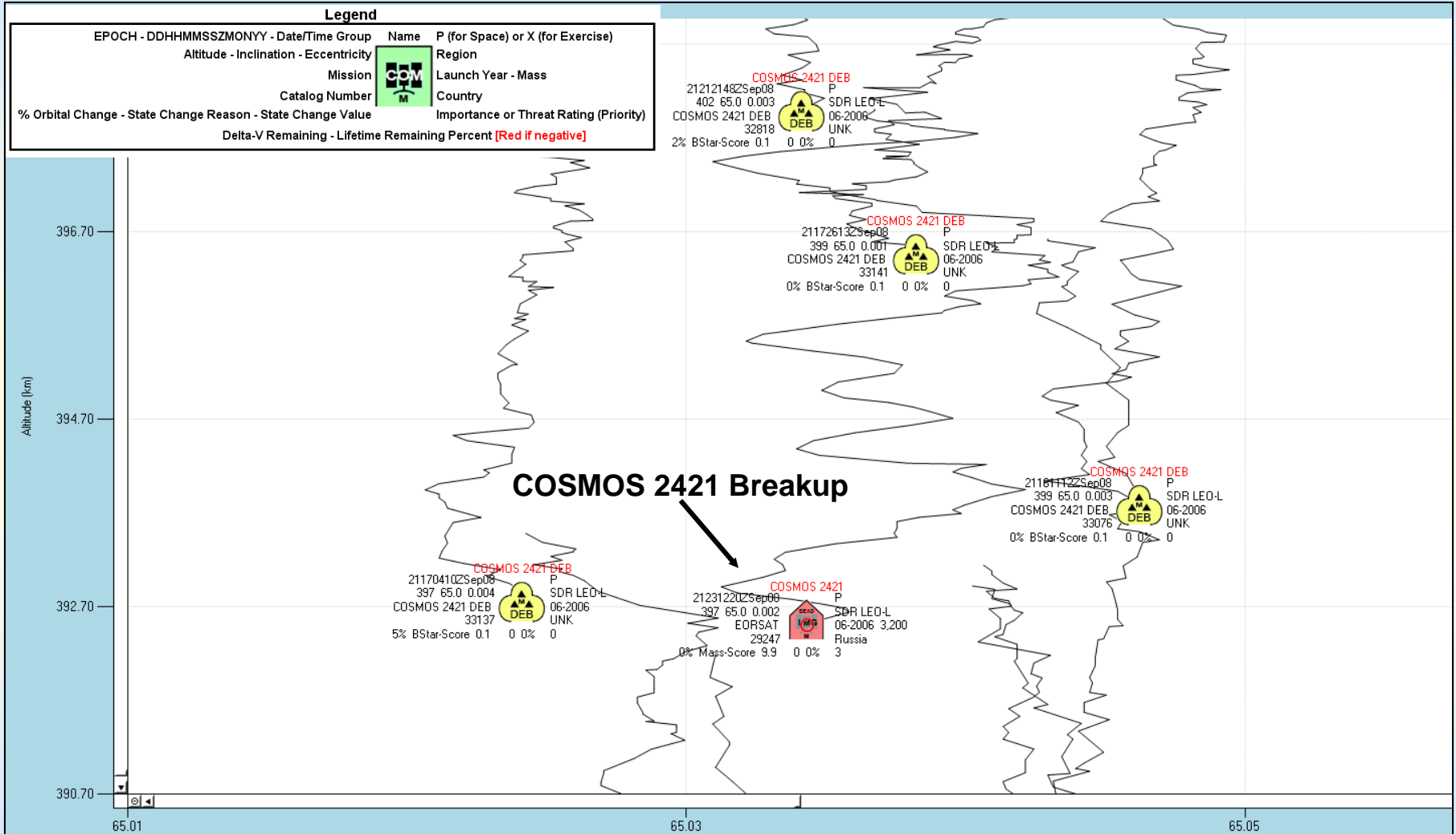


Space Objects Orbital Changes Are Easy to Identify

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SAW – View 2

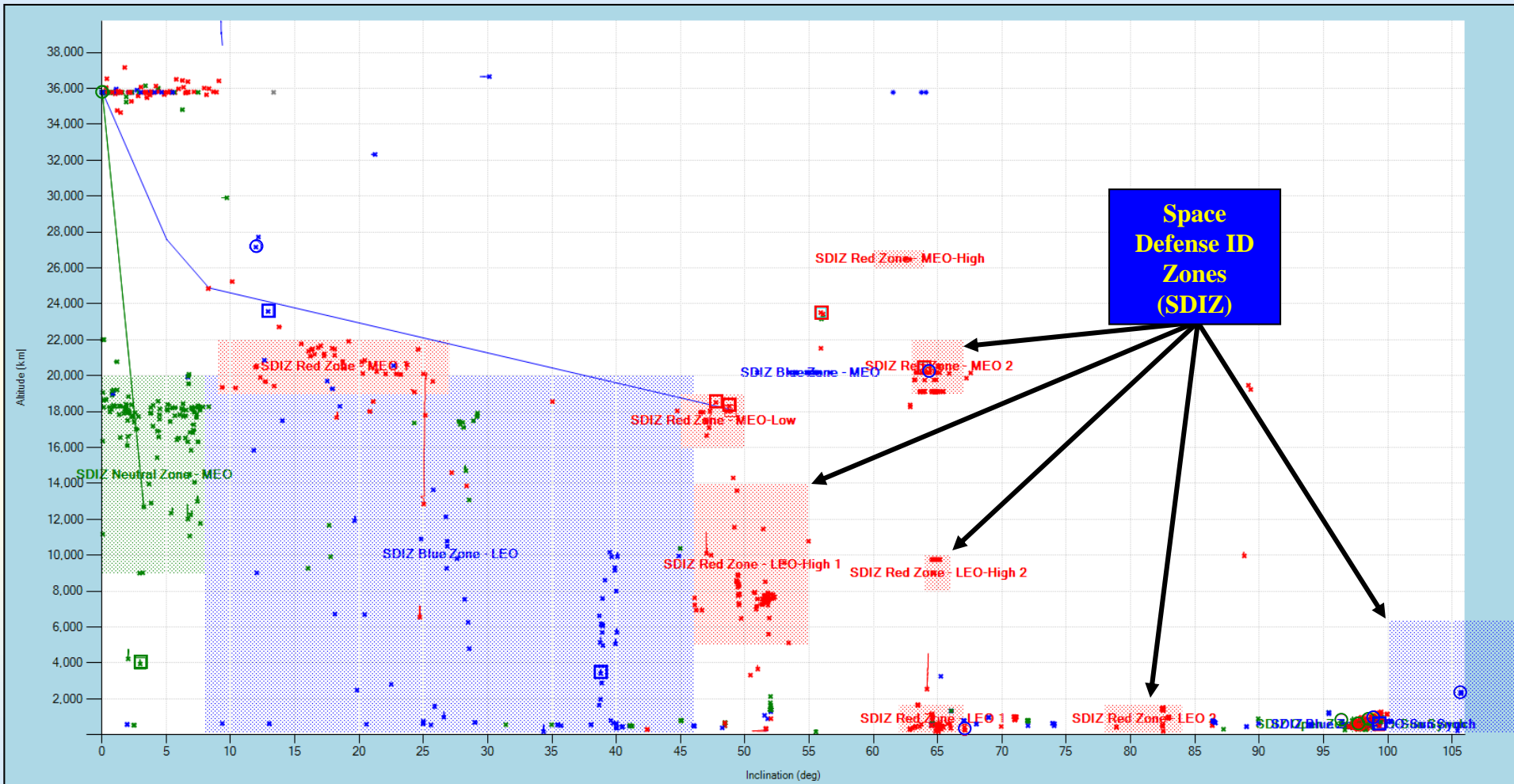


Space Debris Clouds & Their Source Can Easily be Viewed

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SAW – SDIZ

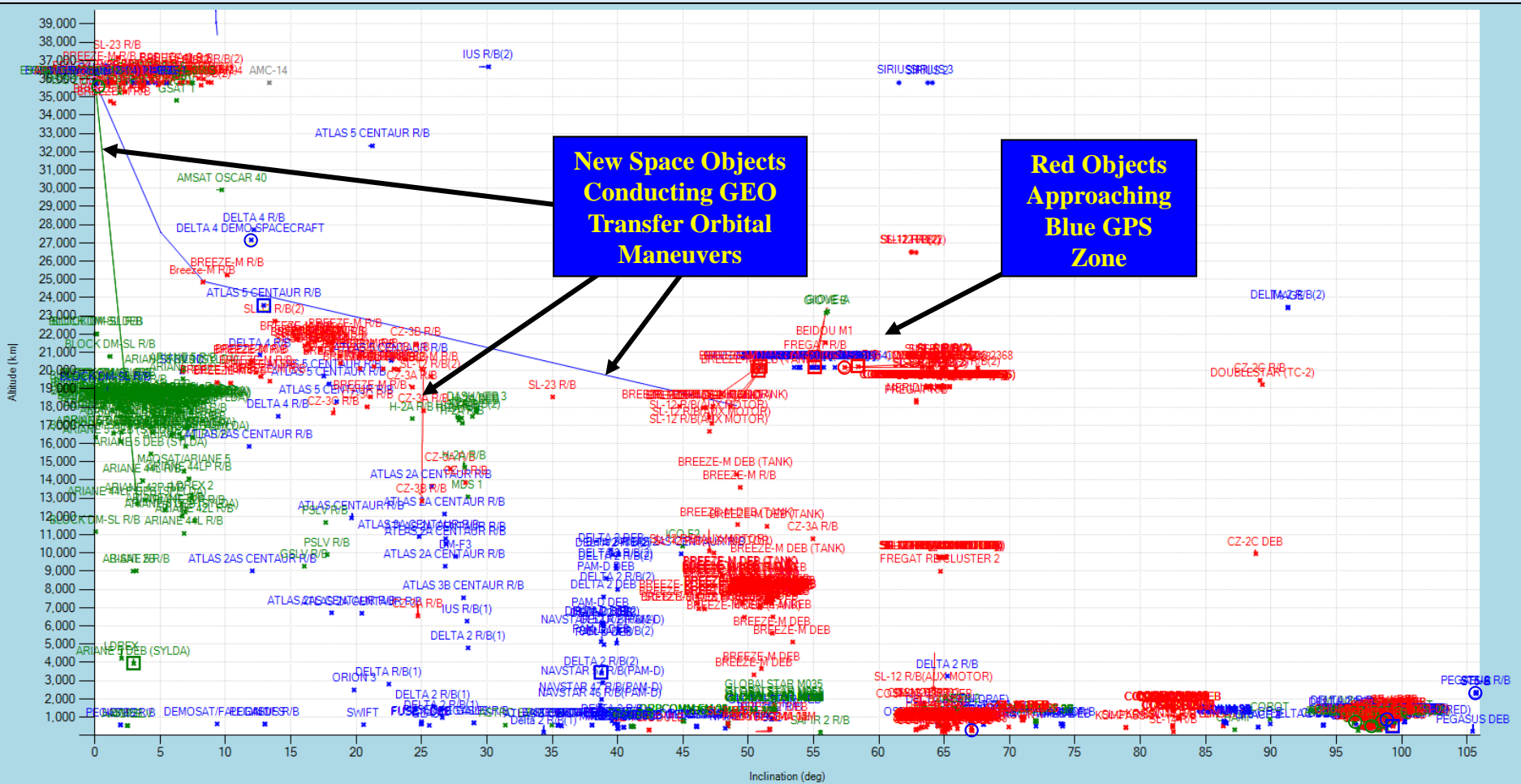


SSA Detection Zones Help Partial Out Operational Responsibility

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SAW – Simulated Attack Against GPS

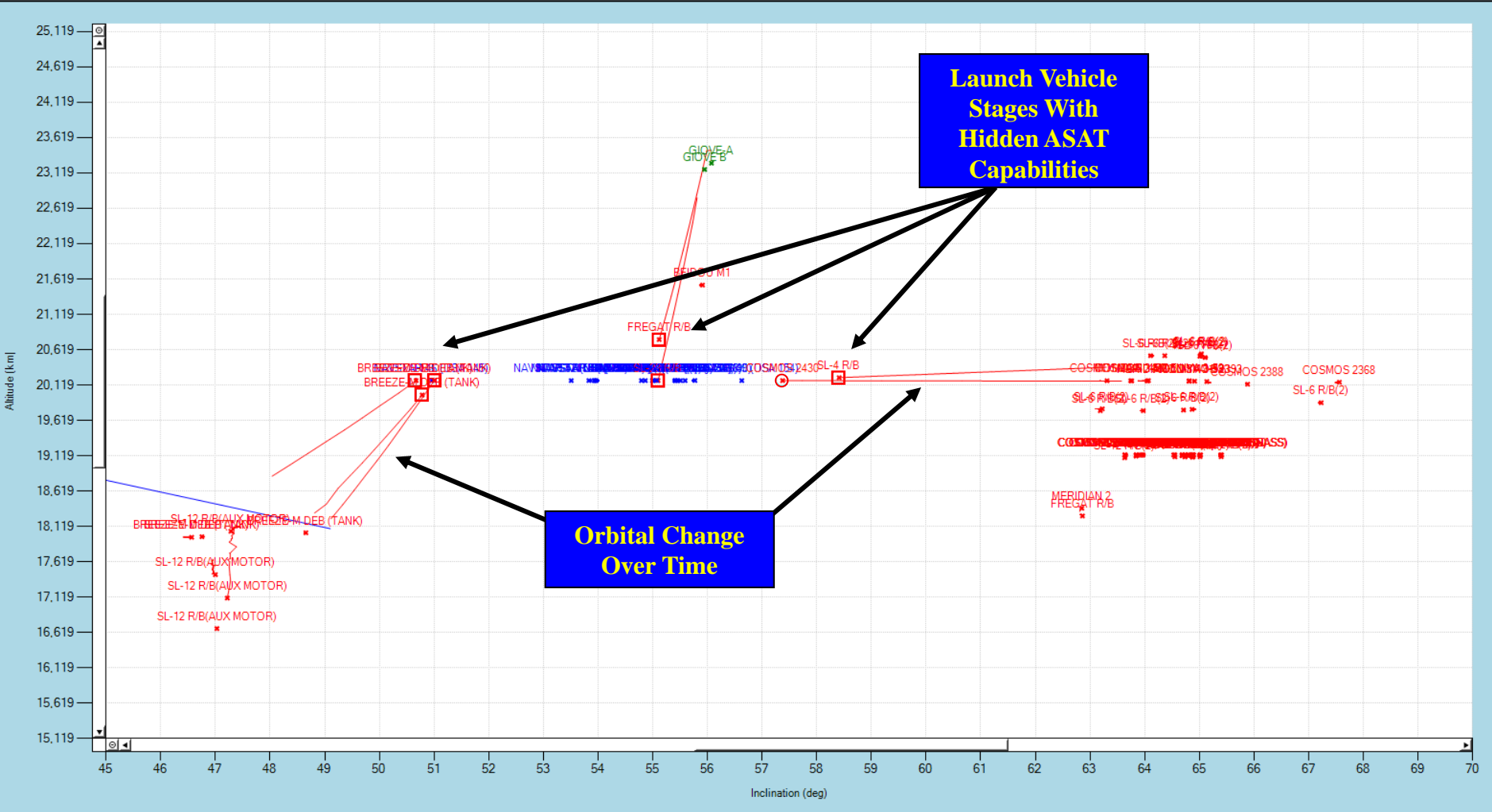


Major Maneuvers of Space Objects are Easily Visualized

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SAW – “Dead” Stages as ASATS

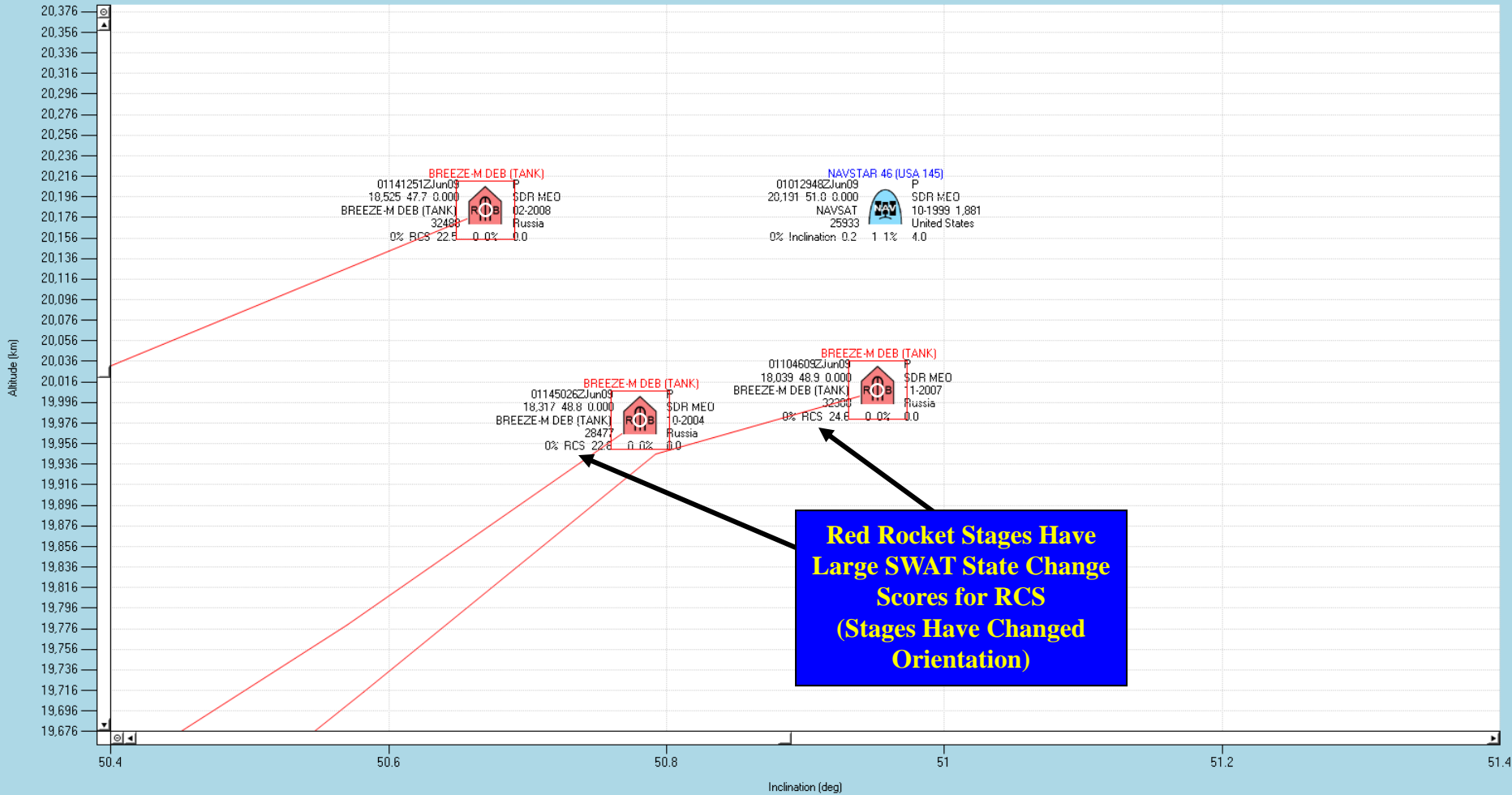


Simultaneous Attack Maneuvers Can Easily be Detected

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SAW – Multiple Attacks Against One GPS

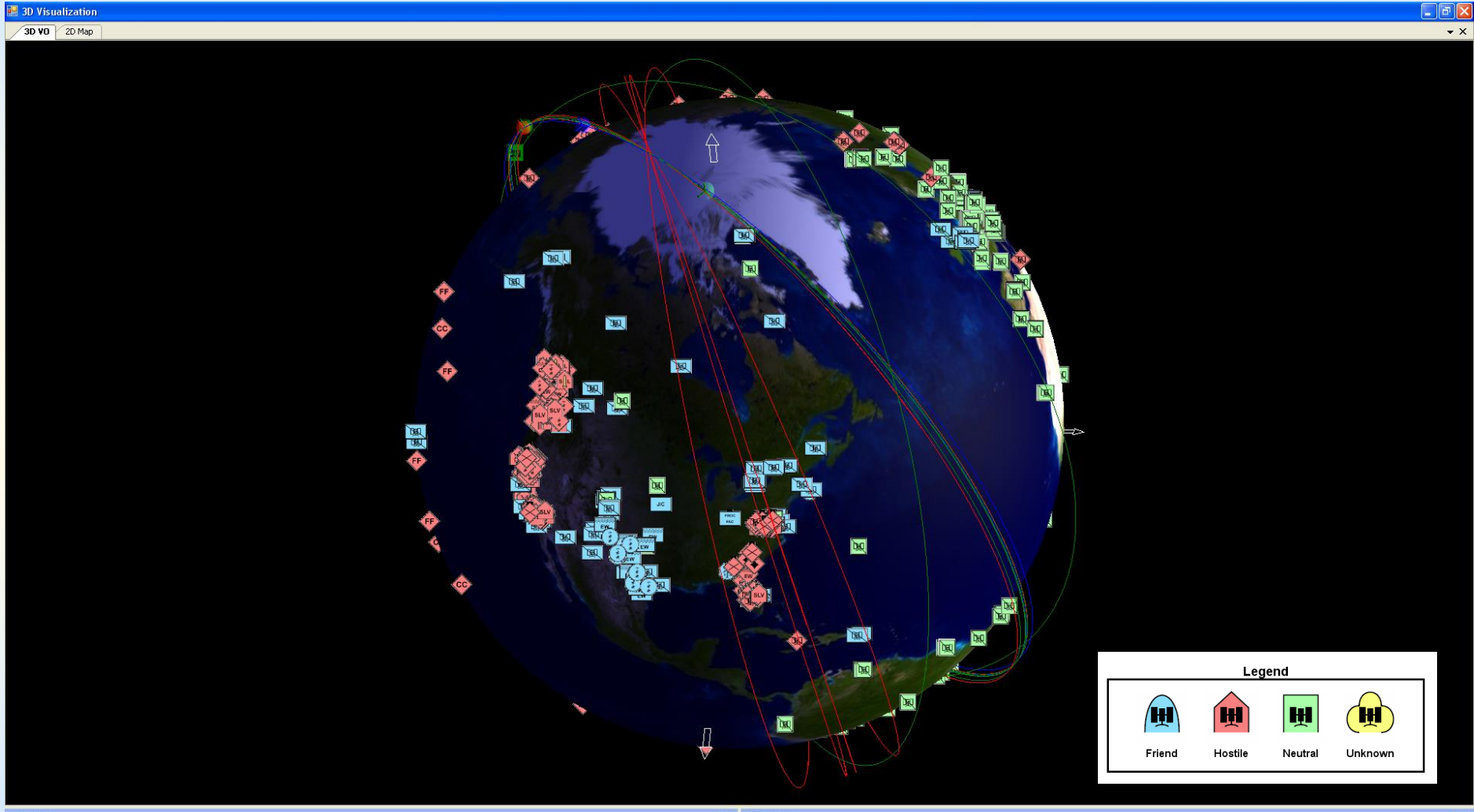


Space Objects Playing Dead Can be Detected With Unusual Movements

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SAW – 3D View (1)

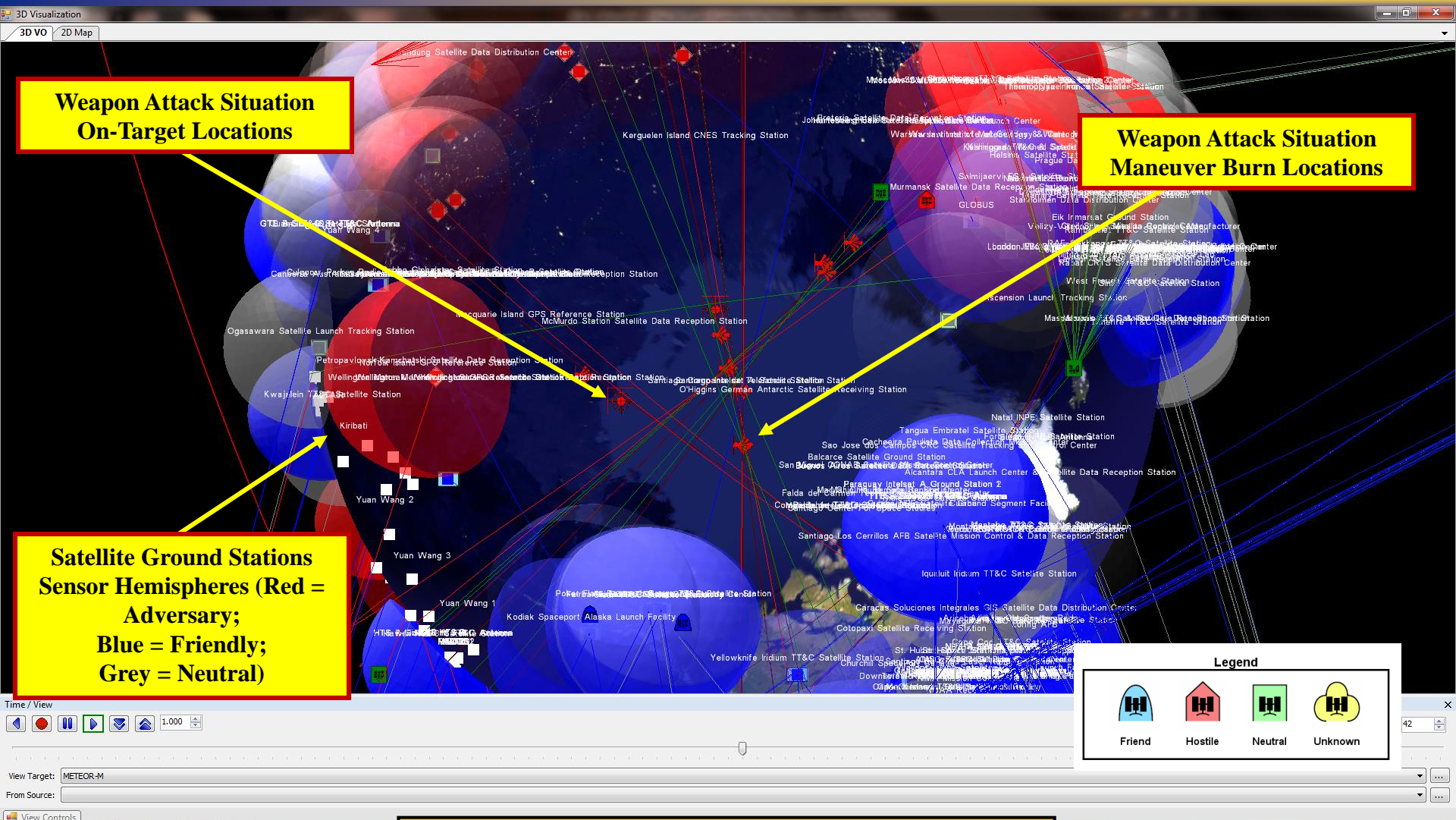


SAW Displays 3D Space Situation Maps

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SAW – 3D View (2)



**Weapon Attack Situation
On-Target Locations**

**Weapon Attack Situation
Maneuver Burn Locations**

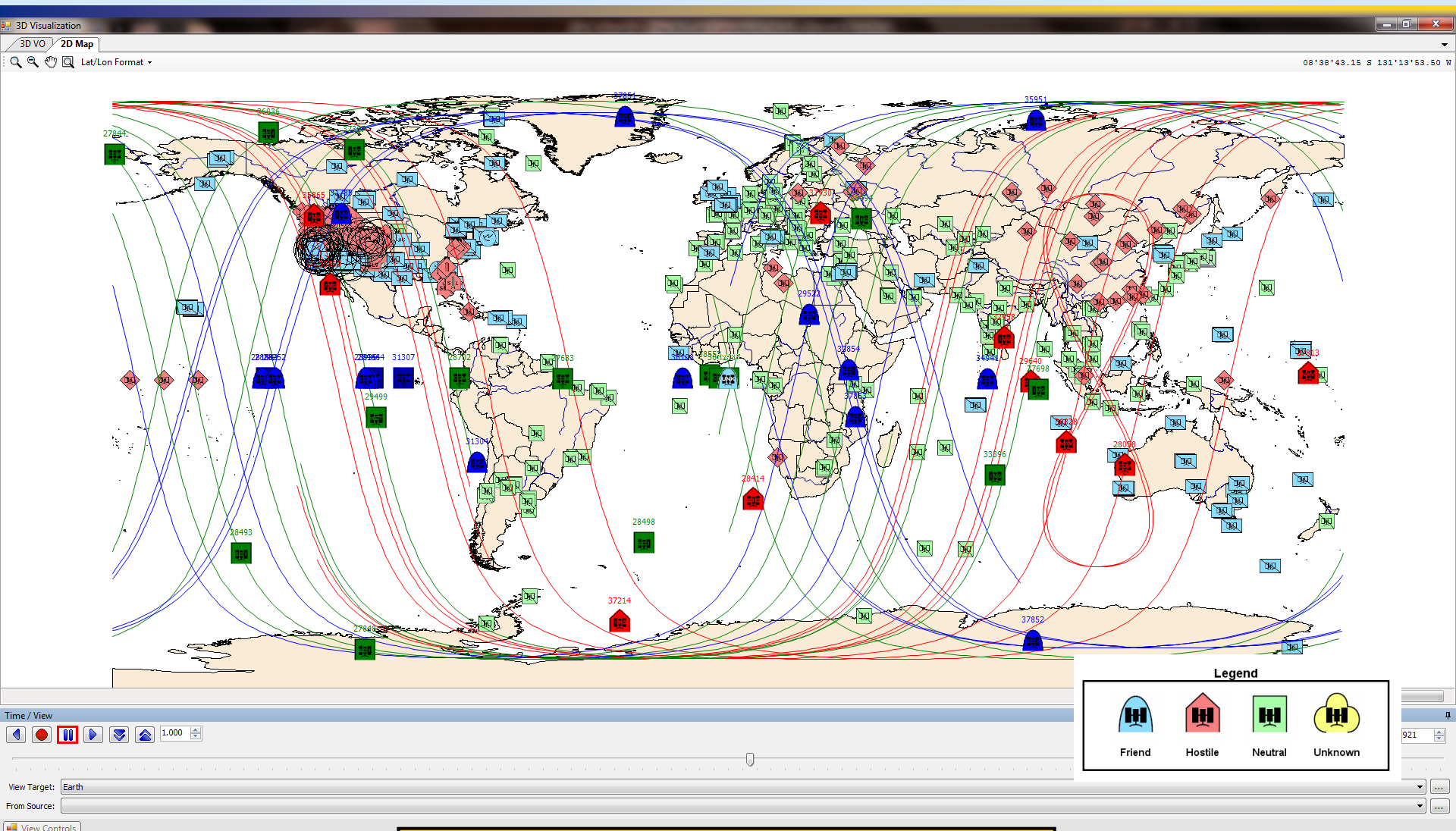
**Satellite Ground Stations
Sensor Hemispheres (Red =
Adversary;
Blue = Friendly;
Grey = Neutral)**

SAW Displays 3D Space Situation Maps

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SAW – Flat Map View

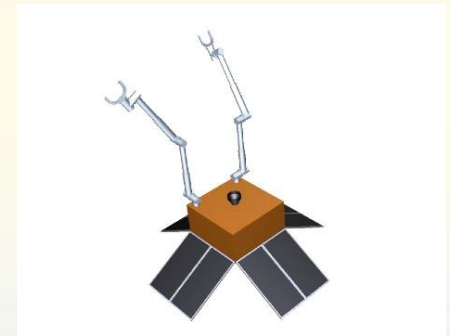


SAW Displays 3D Space Situation Maps

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Space Courses of Action (COA's) Refinements



“National safety would be endangered by an air force whose doctrine and techniques are tied solely to the equipment and processes of the moment. Present equipment is but a step in progress, and any air force which does not keep its doctrine ahead of its equipment, and its vision far into the future, can only delude the nation into a false sense of security.”

(Billy Mitchell)

Additional Tools to Achieve Optimized Space COA's



Principles of War

- **Objective**
- **Offensive**
- **Mass**
- **Economy of Force**
- **Maneuver**
- **Unity of Command**
- **Security**
- **Surprise**
- **Simplicity**

Principles of War Equally Applicable to Space & Terrestrial Warfare



Space Principles of War Example

- Mass

- **Terrestrial:** *“Mass the effects of overwhelming combat power at the decisive place and time”*
- **Space:** Are there sufficient weapons to achieve continuous, or sustained space control. Can the adversary re-configure to avoid attack. Are the space weapons overwhelming to the military function they are trying to deny. Is there political will to implement massed space attack. Can space weapons get into position at the decisive place and time. Do we know the decisive place and time for space weapons application. Can space weapons be synchronized for employment simultaneously.

Space Strategy Planning Has Not Had the Benefit of a Long History



Space Escalation Ladder

WBS	Conflict Phase	Terrestrial Campaign Phase	Space Campaign Phase	Weapon Type	Space Campaign Phase Full Name	Weapon Category
P.1.A.0	Pre-Conflict	Phase 0: Pre-War Buildup (Shape)	1st Wave Attacks Phase A	Pre-Conflict Deter	1st Wave Attacks Phase A - Pre-Conflict Deter	Overt Weapons Testing & Deployment; Treaties; Saber Rattling; Space Alliances; Normal Space Surveillance, Tracking & Reconnaissance Activities; Satellite Close Inspectors
P.1.B.0	Pre-Conflict	Phase 0: Pre-War Buildup (Shape)	1st Wave Attacks Phase B	Persuade; Spying; Propaganda; Avoidance Maneuvering; Increased Space Surveillance & Close Satellite Inspections	1st Wave Attacks Phase B - Pre-Conflict Persuade	Diplomatic Requests & Démarches; Economic Actions; Embargos; Legal Actions; Administrative Actions; Transmitting Propaganda Broadcasts; Jamming Propaganda Broadcasts; Increased Spying & Surveillance; Unusual Increases in Space Surveillance and Tracking Activities; Threaten Allies of Your Adversaries; Maneuver to Avoid Attacks
P.1.C.0	Pre-Conflict Crisis	Phase 0: Pre-War Buildup (Shape)	1st Wave Attacks Phase C	Hide; Covert; Cyber; Political Disruptions; Mobilize Forces; Increase Military Alert Level; Threatening Satellite Maneuvers; Increase Space Radiation; Initiate Satellite Defensive Measures; Employ Nation's Astronauts on International Space Station for Military Uses	1st Wave Attacks Phase C - Pre-Conflict Hide	Camouflage; Stop Activities; Mobility; Covert Technology Developments; Small Covert SOF Attacks; Cyber Attacks; Covert Actions in Violation of International Treaties; Cutoff Diplomatic Relations; Inspire Social Disruptions and Agitation; Employ Lethal Force Against Your Own Citizens; Mobilize Forces; Increase Military Alert Level (DEFCON); Maneuver Close Enough to Adversary Satellites to Purposely Appear as a Threat; Reveal Covert Programs to Appear Threatening; Enter Into War-Reserve Modes (Hide) for Critical Satellites; Hide Senior Leadership; Increase Radiation Environment in Orbits Used by Adversaries; Initiate Satellite Defensive Measures; Employ Nation's Astronauts on International Space Station for Military Reconnaissance and Surveillance; Spoof and Falsify World-Wide Distribution of Satellite Location Orbital Tracking Data
P.2.A.0	Trans-Conflict	Phase I: Deployment / Deterrence (Deter)	2nd Wave Attacks	Trans-Conflict Deter	2nd Wave Attacks - Trans-Conflict Deter	Provocative but False Attacks; Linked Attacks; Demo Attacks; Alternate Country Attacks; Blockades; Major Covert SOF Attacks; Terrorist Attacks; Summarily Execute Saboteurs; Seize & Sequester Suspected Terrorists; Alert Anti-Satellite Systems; Arm Satellite Self-Defense Mechanisms; Alert Anti-Missile Defenses; Alert Anti-Aircraft Defenses; Arm Allied Astronauts on International Space Station

Space Actions May Be Conducted Pre-Conflict

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Space Escalation Ladder (Cont.)

WBS	Conflict Phase	Terrestrial Campaign Phase	Space Campaign Phase	Weapon Type	Space Campaign Phase Full Name	Weapon Category
P.3.A.1	Trans-Conflict	Phase II: Halt Incursion (Seize Initiative)	3rd Wave Attacks Phase A1 – Gnd Based	From Terrestrial Partial Temporary Kill	3rd Wave Attacks Phase A1 – Terrestrial-to-Space Partial Temporary Effects	Delay, Deny, Covertly Assassinate Adversary Diplomatic Ambassador
P.3.A.2	Trans-Conflict	Phase II: Halt Incursion (Seize Initiative)	3rd Wave Attacks Phase A2 – Gnd Based	From Terrestrial Total Temporary Kill	3rd Wave Attacks Phase A2 – Terrestrial-to-Space Total Temporary Effects	Disrupt
P.3.B.1	Trans-Conflict	Phase III: Air Counter-Offensive (Dominate)	3rd Wave Attacks Phase B1 – Space Based	From Space Partial Temporary Kill	3rd Wave Attacks Phase B1 – Space-to-Space Partial Temporary Effects	Delay, Deny
P.3.B.2	Trans-Conflict	Phase III: Air Counter-Offensive (Dominate)	3rd Wave Attacks Phase B2 – Space Based	From Space Total Temporary Kill	3rd Wave Attacks Phase B2 – Space-to-Space Total Temporary Effects	Disrupt
P.4.A.1	Trans-Conflict	Phase IV: Joint Counter-Offensive to Restore Friendly Pre-Conflict Status (Stabilize Borders)	4th Wave Attacks Phase A1 – Gnd Based	From Terrestrial Partial Permanent Kill	4th Wave Attacks Phase A1 – Terrestrial-to-Space Partial Permanent Kill	Degrade
P.4.A.2	Trans-Conflict	Phase IV: Joint Counter-Offensive to Restore Friendly Pre-Conflict Status (Stabilize Borders)	4th Wave Attacks Phase A2 – Gnd Based	From Terrestrial Total Permanent Kill	4th Wave Attacks Phase A2 – Terrestrial-to-Space Total Permanent Kill	Destroy
P.4.B.1	Trans-Conflict	Phase V: Joint Counter-Offensive to Capture Adversary Capitol (Enable New	4th Wave Attacks Phase B1 – Space Based	From Space Partial Permanent Kill	4th Wave Attacks Phase B1 – Space-to-Space Partial Permanent Kill	Degrade
P.4.B.2	Trans-Conflict	Phase V: Joint Counter-Offensive to Capture Adversary Capitol (Enable New	4th Wave Attacks Phase B2 – Space Based	From Space Total Permanent Kill	4th Wave Attacks Phase B2 – Space-to-Space Total Permanent Kill	Destroy
P.5.A.0	Trans-Conflict	Phase VI: Defend Against Adversary Counter-Attacks Against Friendly Homeland (Defend Friendly Citizens)	5th Wave Attacks	Space-Manned Permanent Kill: Kill Adversary Astronauts	5th Wave Attacks - Space-Manned Permanent Kill	Degrade, Destroy: Kill Adversary Astronauts on International Space Station
P.6.A.0	Trans-Conflict	Phase VI: Defend Against Adversary Counter-Attacks Against Friendly Homeland (Defend Friendly Citizens)	6th Wave Attacks	Space-to-Earth Permanent Kill	6th Wave Attacks - Space-to-Earth Permanent Kill	Degrade, Destroy
P.7.A.0	Trans-Conflict	Phase VII: Defend Against Adversary Use of Nuclear Weapons in Space (Defend Friendly Military)	7th Wave Attacks	NBC Use - Space	7th Wave Attacks - NBC Use - Space	Degrade, Destroy
P.8.A.0	Trans-Conflict	Phase VIII: Defend Against Adversary Use of NBC Against Friendly Military Targets (Defend Friendly Military)	8th Wave Attacks; Phase A – Military Targets	NBC Use - Space & Terrestrial	8th Wave Attacks Phase A – NBC Use - Space & Terrestrial - Military Targets	Degrade, Destroy
P.8.B.0	Trans-Conflict	Phase IX: Defend Against Adversary Use of NBC Against All Friendly Targets (Defend Friendly Military & Civilians)	8th Wave Attacks; Phase B – Civilian Targets	NBC Use - Space & Terrestrial	8th Wave Attacks Phase B – NBC Use - Space & Terrestrial - Civilian Targets	Degrade, Destroy
P.9.A.0	Post-Conflict	Phase X: Post-Hostilities (Reconstruction & Stabilization)	9th Wave Attacks	Post-Conflict Deter	9th Wave Attacks - Post-Conflict Deter	Diplomatic Requests; Economic Actions; Legal Actions; Administrative Actions; Jamming Propaganda Broadcasts

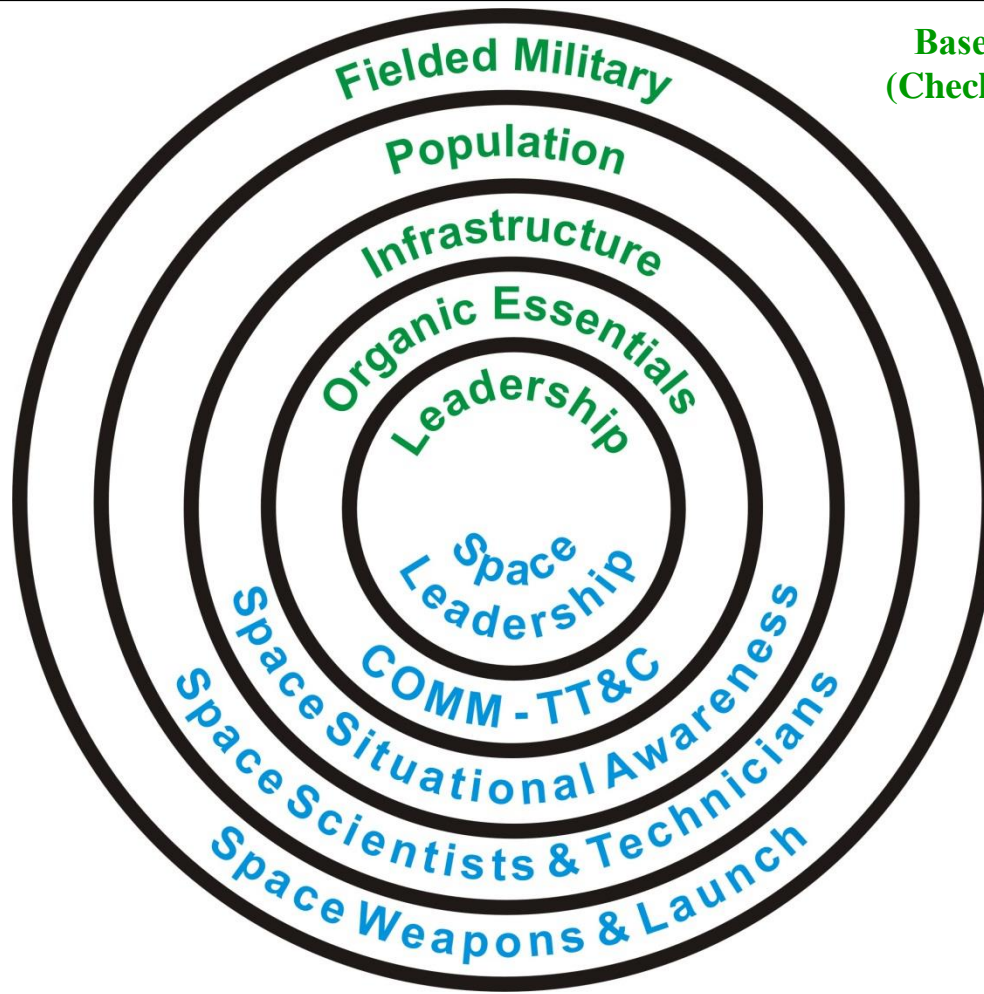
Space Provides Finer Gradations & Thus Better Control During Conflict Escalation

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Space Centers of Gravity Model

Based On Col John Warden's (Checkmate) 5-Ring COG Model



Space Equivalent
5-Ring COG Model

Space Systems Strategic Targeting Is Similar to Terrestrial Targeting Strategies

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Example Space Centers of Gravity

➔	Launch corridors
	GEO belt sectors
	Sun-Synchronous LEO orbits
	GEO satellites changing orbital position
	Space-related command centers / commanders / INTEL Centers
	Space surveillance systems
	Space technicians / scientists
	Electric grid serving ground space facilities
	Space design and manufacturing facilities
➔	Leader's confidence in their new space technologies
	Blue and Red side political will to start and continue a space war
➔	Space-related decision cycle times (OODA loops)
	Low delta-v/transit time points in space to reach High Value Targets
	Points in space with high/low coverage from space surveillance assets
➔	Regions of space and time with advantageous solar phase angles
	Times of high solar storm activity
	On-orbit spares or launch replenishment or ability to reconstitute space capability with terrestrial systems
➔	Antipodal nodes 180 degrees from launch sites around the world
	Manned launch (Shuttle, Space Station) of satellites
	Initial satellite checkout after launch or orbital insertion
	Periods of solar eclipse / low battery charge for satellites
	Approach trajectories outside the field of regard of the target's on-board sensors
	Approach trajectories when the Sun/Moon/Earth is in the background of a target's sensors
	Approach trajectories outside normally employed orbits
	Near a satellite's thrusters
	Near a satellite's high power antennas
	Just after loss of contact with adversary satellite ground controllers / space surveillance assets

⋮

SWAT Has Extensive Space Centers of Gravity Checklists



Example Space Objectives

⋮ ← 5,000 Other Space Objectives

Blind Blue capabilities to observe the terrestrial battlefield
Blind Blue capabilities to observe space from terrestrial sensors
Blind Blue capabilities to observe space from space-based sensors
Spoof Blue capabilities to observe the battlefield
Deny Blue ability to launch new satellites
Destroy some Blue space capability as a warning to Gray space systems support to Blue
Wear down Blue Defensive Counter-Space capabilities by instigating multiple false alarm attacks
Attack Blue satellites before the start of the terrestrial conflict
Spoof Blue perceptions of Red space strengths
Conduct diplomatic offensive to restrict Blue ability to employ ASAT's
Actively defend key launch corridors and orbits critical to Red conduct of war
Preposition Red space assets to maximize their effectiveness at the start of the conflict
Disrupt Blue command and control capabilities for space systems
Embargo Blue access to space systems
Prevent Blue ability to service or re-fuel on-orbit satellites
Develop propaganda campaign against Blue use of ASAT's
Shape and delay Blue plans for space warfare
Deny Blue ability to achieve Space Situational Awareness
Disrupt Blue space attacks so they become uncoordinated
Constantly shift points of application of space control weapons to confuse adversary response
Herd Blue space communications paths to those that are more easily monitored by Red SIGINT assets
Attack key Blue space personnel and technicians
Disperse Red assets (maneuver satellites) just before launching first attack

⋮

SWAT Has Space Objectives for Both Red & Blue Sides

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Example Space COA Indicators

→ Are a small number of Blue and Gray satellites experiencing anomalies over a long time period

→ Are a small number of Blue and Gray satellites losing contact with terrestrial controllers

→ Are a small number of new Red satellites appearing in orbit

→ Are a small number of Red satellites changing orientation

→ Are a small number of Red satellites changing shape

→ Are a small number of Red satellites changing thermal signatures

→ Are a small number of Red satellites concentrating towards potential Blue and Gray satellites

→ Are Red ASAT forces appearing to line up in a sequence of timed attacks against Blue and Gray assets

→ Are Red forces capable of attacking space-related terrestrial sites in Blue countries appearing to line up in a sequence of timed attacks

→ Are Red SIGINT assets appearing to line up in a sequence of timed operations against Blue and Gray Communications assets

→ Are there indications of Red aircraft activities that appear to concentrate on space-related terrestrial sites around the world

→ Are there indications of Red missile activities that appear to concentrate on space-related terrestrial sites around the world

→ Are there a small number of new satellite launches from Red facilities

Many Insignificant Space Indicators May Add Up to Predicting a Major Attack



Example INTEL Indicators

1.2.5.1.5.21	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Wear On Roads at Sites
1.2.5.1.5.22	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Improved / New Roads at Sites
1.2.5.1.5.23	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Improved / New Parking at Sites
1.2.5.1.5.24	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Improved / New Railroad Tracks at Sites
1.2.5.1.5.25	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Improved / New Railroad Sidings at Sites
1.2.5.1.5.26	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Disturbed Vegetation / Soil at Sites
1.2.5.1.5.27	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Different Communications Patterns To / From Sites
1.2.5.1.5.27.1	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Communications Traffic To / From Sites
1.2.5.1.5.27.2	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Decreased (More Attempts to Hide) Communications Traffic To / From Sites
1.2.5.1.5.27.3	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers No Net Increase or Decrease of Communications Traffic To / From Sites, But Changed Patterns
1.2.5.1.5.27.4	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Encrypted Communications Traffic To / From Sites
1.2.5.1.5.28	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Hours / New Shifts for Personnel at Sites
1.2.5.1.5.29	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Number of Scientists & Engineers at Sites
1.2.5.1.5.30	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Number of Military Personnel at Sites
1.2.5.1.5.31	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Number of Military Personnel of Higher Ranks at Sites
1.2.5.1.5.32	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Number of Foreign Personnel at Sites
1.2.5.1.5.33	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Number of VIPs at Sites
1.2.5.1.5.34	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Housing Demand In Local Area
1.2.5.1.5.35	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers New / Expanded / Improved Housing Built On-Site
1.2.5.1.5.36	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers New / Expanded / Improved Recreational Facilities On-Site
1.2.5.1.5.37	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Food Intake
1.2.5.1.5.38	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Power Consumption
1.2.5.1.5.39	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Water Consumption
1.2.5.1.5.40	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Sewer Outake
1.2.5.1.5.41	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Refuse Outake
1.2.5.1.5.42	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Smoke Plumes from Sites
1.2.5.1.5.43	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Chemical Contamination at Sites
1.2.5.1.5.44	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers New or Increased Settling / Effluents Ponds at Sites
1.2.5.1.5.45	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Use of Data Processing Assets at Site
1.2.5.1.5.46	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased / Different Patterns of Thermal Images
1.2.5.1.5.47	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Number of Large Mobile Vehicles with Erection Gantries at Sites
1.2.5.1.5.48	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Number of Mobile Vehicles with Cooling at Sites
1.2.5.1.5.49	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Number of Chemical Support Equipment at Sites
1.2.5.1.5.50	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Number of Optical Test Equipment at Sites
1.2.5.1.5.51	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Number of RF Test Equipment at Sites
1.2.5.1.5.52	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Number of Electrical Test Equipment at Sites
1.2.5.1.5.53	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Number of Optical Test Stands at Sites
1.2.5.1.5.54	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Number of RF Test Stands at Sites
1.2.5.1.5.55	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Number of Large Mobile Vehicle Storage Sheds at Sites
1.2.5.1.5.56	Chicanean Yuan Hsi Mobile Direct Ascent ASAT Manufacturing Centers Increased Security at Sites



Example COA Reactions

Time Sequence	Category	Actor	Target	Escalation Ladder	Probability of Occurrence	WBS	Action	Reaction
35	Satellites	Califon	Newmex	P.4.A.1	8	N.S.R.3		Newmex Bicudo Large LEO Photo Satellite is permanently partially blinded when over flying the disputed oil fields
35A	Political	Newmex	Califon	P.1.C.0	1	N.S.R.3.0	→	Do nothing to increase escalation ladder
35B	INTEL	Newmex	Califon	P.1.A.0	10	N.S.R.3.1		Determine if degradation is caused by natural events, equipment failure or human actions, whether intentional or unintentional
35C	Forces	Newmex	Califon	P.1.C.0	9	N.S.R.3.2		Increase military alert level (DEFCON)
35D	Ground Stations	Newmex	Califon	P.1.A.0	9	N.S.R.3.3	→	Contact other Newmexian space-related ground facilities to determine if multiple ground outage incidents are occurring
35E	Satellites	Newmex	Califon	P.1.A.0	9	N.S.R.3.4		Contact other Newmexian TTC ground facilities to determine if multiple satellite outage incidents are occurring
35F	Satellites	Newmex	Califon	P.1.A.0	9	N.S.R.3.5		Check with Newmexian supreme military command to determine if other military incidents are occurring to Newmexian and allied forces
35I	Space Surveillance	Newmex	Califon	P.1.B.0	10	N.S.R.3.8	→	Increase surveillance and tracking for new and suspicious space objects
35J	Satellites	Newmex	Califon	P.1.B.0	10	N.S.R.3.9		Increase mission identification and country of origin determination for new and suspicious space objects (Space Object Identification - SOI)
35K	Satellites	Newmex	Califon	P.1.B.0	10	N.S.R.3.10		Increase signals intelligence collection on new and suspicious space objects
35L	Satellites	Orgonia	Califon	P.1.B.0	10	N.S.R.3.11		Maneuver Orgonian ABragh Nano LEO Inspector Satellite close to Newmex Bicudo Large LEO Photo Satellite for close inspection to help determine origin of mission degradations
35M	Satellites	Newmex	Califon	P.1.B.0	9	N.S.R.3.12		Increase satellite imagery, OPIR and RADAR surveillance and signals intelligence collection of Newmexian border areas
35N	Satellites	Newmex	Califon	P.1.B.0	8	N.S.R.3.13		Increase satellite imagery, OPIR and RADAR surveillance and signals intelligence collection of Newmexian internal areas
35O	Satellites	Newmex	Califon	P.1.B.0	10	N.S.R.3.14		Increase satellite imagery, OPIR and RADAR surveillance and signals intelligence collection of internal Califon activities
35P	Satellites	Newmex	Califon	P.1.B.0	9	N.S.R.3.15		Increase satellite imagery, OPIR and RADAR surveillance and signals intelligence collection of Califon allied activities
35Q	Forces	Newmex	Califon	P.1.A.0	9	N.S.R.3.16		Increase critical infrastructures defenses and surveillance
35AG	Political	Newmex	Califon	P.1.C.0	5	N.S.R.3.32		Cutoff diplomatic relations with Califon
35AP	Political	Newmex	Califon	P.1.B.0	9	N.S.R.3.41		Increase world attention to the problems of orbital space debris in order to slow down Califon's launching of new satellites
35BB	Political	Newmex	Califon	P.1.A.0	10	N.S.R.3.53		Engage in negotiations for space treaties and mutual defense pacts with other countries to increase space defense protection
35BC	Political	Newmex	Califon	P.1.A.0	10	N.S.R.3.54	→	Publicly declare that any use of space weapons against Newmexian satellites will have a corresponding attack on the aggressor's space facilities associated with this attack, whether they be research centers, launch facilities, space surveillance sites, or command and control centers
35BD	Political	Newmex	Califon	P.1.B.0	9	N.S.R.3.55		Publicly declare that any use of space weapons against Newmexian satellites will have a corresponding attack on the aggressor's and their allies space facilities associated with this attack, whether they be research centers, launch facilities, space surveillance sites, or command and control centers
35BE	Forces	Newmex	Califon	P.1.C.0	8	N.S.R.3.56	→	Initiate multiple false starts, threatening space and terrestrial maneuvers, etc. to induce your adversaries to begin constant satellite maneuvering, so as to waste their on-board fuel reserves before actual conflict starts
35BF	Forces	Newmex	Califon	P.1.C.0	8	N.S.R.3.57		Initiate random military orders, communications traffic, re-deployments and satellite maneuvers to confuse potential adversaries of your immediate plans and goals
35BG	Forces	Newmex	Califon	P.1.C.0	7	N.S.R.3.58		Launch or maneuver a new mysterious satellite that comes close to critical Califon satellites, to make Califon pause in its military execution plans, to show resolve, and as a warning to Califon to back down
35BH	ASAT	Newmex	Califon	P.1.B.0	10	N.S.R.3.59		Jam Califon propaganda broadcasts from their communications satellites directed at Newmexian dissidents
35BI	ASAT	Newmex	Califon	P.1.C.0	10	N.S.R.3.60		Initiate operational deployment of Newmexian Anti-Satellite (ASAT) systems

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Example COA Reactions (Cont.)

Time Sequence	Category	Actor	Target	Escalation Ladder	Probability of Occurrence	WBS	Action	Reaction
35BJ	ASAT	Newmex	Califon	P.3.A.1	8	N.S.R.3.61	➔	Attack Califon Darapi Large LEO Photo Satellite with a Lagoa Mobile Ground Jammer-RF that temporarily denies Califon access to its intelligence collection capabilities, to show resolve and as a warning to Califon to back down
35BK	ASAT	Newmex	Califon	P.4.A.2	6	N.S.R.3.62		Attack Califon Darapi Large LEO Photo Satellite with an Ouro Space Launch ASAT Ground Mobile Missile that permanently destroys it, to show resolve and as a warning to Califon to back down
35BL	ASAT	Orgonia	Califon	P.3.A.2	9	N.S.R.3.63		Attack Califon Darapi Large LEO Photo Satellite with an Orgonian Dimbabah Nano LEO Mine-Paint that temporarily denies Califon access to its intelligence collection capabilities (covers lenses with temporary paint), to show resolve and as a warning to Califon to back down
35BM	Cyber	Newmex	Califon	P.2.A.0	9	N.S.R.3.64	➔	Attack Califon Jeanton Large Ground Fixed Command Center with a cyber attack that temporarily disables its ability to command forces, to show resolve and as a warning to Califon to back down
35BN	Forces	Newmex	Califon	P.3.A.2	5	N.S.R.3.65		Attack Califon Jeanton Large Ground Fixed Command Center with Newmexian Irece SOF forces that permanently disables its ability to command forces, to show resolve and as a warning to Califon to back down
35BO	Forces	Newmex	Califon	P.2.A.0	5	N.S.R.3.66	➔	Attack a Califon terrestrial system of similar military and economic value to deter Califon from further aggression
35BP	Forces	Newmex	Califon	P.1.C.0	10	N.S.R.3.67		Attack by cyber means the Califon facility that caused the Newmex Bicudo Large LEO Photo Satellite to be temporarily or permanently damaged
35BQ	Forces	Newmex	Califon	P.2.A.0	5	N.S.R.3.68		Attack by Newmexian Irece SOF forces the Califon facility that caused the Newmex Bicudo Large LEO Photo Satellite to be temporarily or permanently damaged
35BR	Forces	Newmex	Califon	P.4.A.2	3	N.S.R.3.69		Attack by the Newmexian Air Force Califon's facility that caused the Newmex Bicudo Large LEO Photo Satellite to be temporarily or permanently damaged
35BY	Industrial	Newmex	Califon	P.1.A.0	10	N.S.R.3.76		Prepare any remaining satellite launch facilities for rapid reaction capabilities enabling quick satellite launches
35BZ	Satellites	Newmex	Califon	P.1.A.0	9	N.S.R.3.77	➔	Increase on-orbit spares for critical satellites
35CA	Satellites	Newmex	Califon	P.1.A.0	9	N.S.R.3.78		Increase on-orbit satellite decoys to confuse Califon and its allies' space surveillance networks
35CB	Satellites	Newmex	Califon	P.1.C.0	8	N.S.R.3.79		Initiate war-reserve modes for critical Newmexian satellite assets that begin to maneuver and reduce RADAR and optical signatures to avoid Califon and its allies' space surveillance networks
35CC	Satellites	Newmex	Califon	P.1.C.0	9	N.S.R.3.80		Recharge Newmexian satellite batteries on-orbit
35CD	Satellites	Newmex	Califon	P.1.C.0	9	N.S.R.3.81		Refuel Newmexian satellites on-orbit
35CE	Satellites	Newmex	Califon	P.1.C.0	9	N.S.R.3.82		Refuel Newmexian space support sites backup generators
35CF	Satellites	Newmex	Califon	P.1.C.0	9	N.S.R.3.83	➔	Maneuver Newmexian space weapons (space-based and terrestrial-based) into optimized offensive and defensive positions
35CG	Satellites	Newmex	Califon	P.1.C.0	9	N.S.R.3.84		Deploy Newmexian space support assets (space-based and terrestrial-based) into optimized offensive and defensive support positions
35CH	Satellites	Newmex	Califon	P.1.C.0	9	N.S.R.3.85		Maneuver and deploy space control assets that later enable sealing off the Earth from adversary satellites, in order to fix these adversary space assets into a steady state that cannot be changed from the ground. This would include positioning for jamming, spoofing and cyber attacks, along with denying an adversary the ability to launch new satellites
35CI	Launch	Newmex	Orgonia	P.1.A.0	8	N.S.R.3.86		Request Orgonia provide satellite launch support from its Nuwayr Space Launch Ground Mobile Systems for Newmexian satellites
35CJ	Forces	Newmex	Califon	P.1.A.0	10	N.S.R.3.87		Explore non-space mission replacements for reduced satellite capabilities
35CP	Forces	Newmex	Califon	P.1.C.0	9	N.S.R.3.93		Increase surveillance, protection and defenses of space systems terrestrial terminals, command and control sites, space sensor sites, launch sites, space weapons marshaling areas, research centers and factories
35CQ	Environmental	Space	Space	P.1.B.0	9	N.S.R.3.94	➔	Increase surveillance of solar events to better determine if potential satellite outages are caused by natural or human intents
35CR	Forces	Newmex	Califon	P.1.C.0	10	N.S.R.3.95		Determine if Califon and/or their allies have terrestrial forces maneuvering or deploying to operational locations and appear to be pre-positioning for attack
35CS	Satellites	Newmex	Califon	P.1.C.0	10	N.S.R.3.96		Command critical Newmexian satellites to initiate defensive measures (spinning, close shutters, increased heat transfer, etc.)
35CT	Satellites	Newmex	Califon	P.1.B.0	9	N.S.R.3.97		Maneuver critical Newmexian satellites beyond the range of potential threats
35CU	Satellites	Newmex	Newmex	P.1.A.0	10	N.S.R.3.98		Conduct a full battery of diagnostic testing on Newmexian satellites to determine if intermittent failures are a possibility
35CV	Launch	Newmex	Califon	P.1.A.0	9	N.S.R.3.99		If critical Newmexian satellites are permanently damaged, then launch other satellites with similar capabilities
35CW	Forces	Newmex	Newmex	P.1.A.0	10	N.S.R.3.100		Determine the effects on the overall space system mission of any space systems degradations
35CX	Forces	Newmex	Newmex	P.1.A.0	10	N.S.R.3.101		Modify previously planned space strategies and tactics due to current adversary and their allies' actions
35CY	Satellites	Newmex	Califon	P.1.A.0	10	N.S.R.3.102		Increase training for satellite operators that allows them to recognize intentional attacks and respond promptly

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Possible Space Strategies

Space Situational Awareness Tools (SSA-T)

Home Create External Data Database Tools Add-Ins

Space Warning and Assessment Tools Space Situational Awareness Tools Military Requirements **Attack Strategies**

UNCLASSIFIED Copy New Find Delete Close Exit Space Strategies Briefing

Title	Strategy	Desired End State	Comments
Funnel COMM	Selectively disrupt select Red space systems communications assets so that critical Red sensor and C4 info gets directed to communications paths with low data rates, effectively delaying receipt of critical data beyond its useful life.	Delay receipt of critical info while conserving space control weapons employment.	
Herd COMM	Selectively destroy or temporarily disrupt specific Red space systems communications assets so that critical Red sensor and C4 info gets directed to known paths that can be monitored by Blue sensors.	Make Red more vulnerable to intelligence exploitation.	
Herd Sensors	Temporarily deny Red space sensors, or only certain sensors. This will blind them, until they are allowed to use them again when Blue side wants them to observe certain fake Blue force dispositions. This directs Red sensors to see only what Blue	Control Red perception of Blue strengths and battlefield situation.	
Herd Space Personnel	Destroy all Red space-related ground targets, except purposely lightly damage one ground center. Assume that key space support personnel will converge to this lightly damaged site to conduct repairs. 12 hours later, use anti-personnel weapons at	Destroys Red country's most import space asset: key technically trained space personnel. Also sends message to international community that foreign personnel supporting Red space efforts will be at risk.	
Hidden Disrupt	Employ weapons with low probability of detection and attribution, to minimize world reaction to Blue side counter space. Temporarily disrupt spacecraft operations at random times.	Red side loses confidence in his space systems. He is constantly kept off-balance by repeated disruption of his space capabilities. That are timed within his decision cycle times. Political implications of space control need	
Hidden Negate	Employ weapons with low probability of detection and attribution, to minimize Red perception that Blue has begun counter space operations. Slowly increase tempo of Red satellite disruption, starting with minor anomalies easily	Red probably hasn't used space systems in a real conflict before, and their decreasing reliability under combat stress might be understandable and acceptable to them.	
Periodic Degrade	Use degrade type of weapons whose attack cycles are timed to correspond with the reconstitution or replacement time of that target's capability.	As Red starts to bring on-line an alternate space capability, it is negated. This minimizes space weapons employment, but does not have as much shock value as a Sweep The Skies attack.	
Rolling Disrupt	Temporarily disrupt Gray space assets for small lengths of time, then move on to other Gray assets. Use low probability of detection and attribution weapons. This will give the impression of reliability issues with Gray equipment, not intentional attack.	Keep Gray side guessing as to the ultimate fate of their space systems if they continue to support Red side.	
Sweep The Ground	Destroy all prime Red space-related ground targets with a minimum of collateral damage.	With all ground sites destroyed, satellites cannot be tasked or download data. Probably a more politically acceptable solution, but space-related ground sites can be replaced easier than satellites after the war, and data	
Sweep The Skies	Destroy all Red satellites whether military, civil, or commercial, in a synchronized simultaneous attack so that Red protective/reconstitution measures cannot be implemented in time.	One large synchronized blow keeps red off balance.	

Navigation Pane

Some Unique Space Strategies

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Example Space Strategies

Title:

Herd Space Personnel

Action:

Destroy all Red space-related ground targets, except purposely lightly damage one ground center. Assume that key space support personnel will converge to this lightly damaged site to conduct repairs. 12 hours later, use anti-personnel weapons at this site, with destroy weapons 2 hours later.

Desired Effect:

Destroys Red country's most import space asset: key technically trained space personnel. Also sends message to international community that foreign personnel supporting Red space efforts will be at risk.

War Is Hell

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Space Strategies Derived From Sun Tzu

- Sun Tzu's "The Art of War" (544 BC – 496 BC) Used to Derive Modern Space Strategies
- Analysis in Progress (Currently Halted)
 - 546 Space Warfare Strategies Already Derived
 - Only 1/3 the Way Through Sun Tzu's Teachings

8	Info War
9	Force Status
10	Sun Tzu Statement 1: When able to attack, we must seem unable. When using our forces, we must seem inactive. Pretend to be weak, that he may grow arrogant.
11	Space Warfare Strategy 1: Deploy many covert space weapon systems & sensors with remote basing (air, sea, undersea, ground mobile, space, Moon).
12	Space Warfare Strategy 2: Deploy space weapon systems & sensors with multiple camouflage coverings.
13	Space Warfare Strategy 3: Deploy space weapon systems & sensors in space with low observables coatings.
14	Space Warfare Strategy 4: Deploy space weapon systems & sensors in space with special shapes that do not readily reflect light back to the Earth.
15	Space Warfare Strategy 5: Deploy space weapon systems & sensors in space that can change attitude so they do not readily reflect light back to the Earth.
16	Space Warfare Strategy 6: Deploy covert space weapon systems & sensors in unusual orbits to avoid detection and precise targeting (highly eccentric, Lagrangian points, between geosynchronous orbits and the Moon, & beyond the Moon).
17	Space Warfare Strategy 7: Deploy covert space weapon systems & sensors that continuously change their orbits while outside an adversary's sensor coverage (e.g., maneuver over the South Pacific and the Poles). Continuous low-level thrusting may frustrate or
18	Space Warfare Strategy 8: Develop covert space weapon systems that hide inside innocuous space objects (civilian & science missions, space objects playing dead). Have exit doors on side of space object away from the Earth (zenith face) & most sensors.
19	Space Warfare Strategy 9: Develop some overt space weapon systems that stay in garrison, or are transported to other theaters that do not threaten the theater that one is planning to attack.
20	Space Warfare Strategy 10: Develop some overt space weapon systems that have limited technical and operational capabilities and appear to be the main space threat, but a covert weapon system is actually firing at the same time as the overt system.
21	Space Warfare Strategy 11: Develop some overt space weapon systems that have limited technical and operational capabilities and that will adsorb an adversary's main spooling or counter-attacks (including SOF, HUMINT, & Cyber attacks that may take consider
22	Space Warfare Strategy 12: Develop some overt civil & commercial space systems that can also have space weapons capabilities (e.g., space maintenance robot).
23	Space Warfare Strategy 13: Develop a plan for space sensors to "ping" space objects according to a harmless, pre-planned schedule that does not reveal plans for a surprise attack against intended targets.
24	Space Warfare Strategy 14: Encourage allied space sensors to "ping" only space objects that are not part of an overall surprise attack plan.
25	Space Warfare Strategy 15: Do not deploy non-space forces in any threatening way, or deploy them in theaters other than those one intends to support with space weapons.
26	Space Warfare Strategy 16: Have the State Department devote considerable energy in emphasizing different political and social theaters that do not point to the intended targets and theater of the surprise attack.
27	Space Warfare Strategy 17: Have the State Department devote considerable energy in emphasizing no first use of space weapons.
28	Space Warfare Strategy 18: Have the State Department devote considerable energy in emphasizing no use of debris-causing space weapons, especially if these types of weapons will be used in the surprise attacks.
29	Space Warfare Strategy 19: Have the Military Departments devote some energy in emphasizing possessing limited, if any, space weapons capabilities.
30	Space Warfare Strategy 20: Develop alliances and treaties with more capable space partners so that you may make use of their space weapon systems in times of war.
31	Space Warfare Strategy 21: Deceive, Deny, Disrupt, Degrade, or Destroy adversary space sensors and intelligence collection capabilities. This includes use of cyber weapons and counterintelligence techniques. Cover up when adversary space intelligence collecti
32	Space Warfare Strategy 22: Shield indicators of space weapons beginning attack sequences (maneuvering, thrusters warming up, thrust plumes in space, other powering up, increased thermal signatures, new systems coming on-line, increased telemetry traffic, ac
33	Space Warfare Strategy 23: Fake the deaths of various satellites with covert, reserve space weapons missions, over a period of months and years before the surprise attacks.
34	Space Warfare Strategy 24: Determine the most threatening regions of space to pre-position space weapons for the best coordinated & optimized attack sequences. These are not necessarily physically close to the targets, but are close in orbital space (minimize
35	Space Warfare Strategy 25: Concentrate space forces only at the last moment before attack.
36	
37	Sun Tzu Statement 2: By discovering the enemy's dispositions and remaining invisible ourselves, we can keep our forces concentrated, while the enemy's must be divided. Let your plans be dark and impenetrable as night, and when you move, lo
38	Space Warfare Strategy 26: Develop & employ covert space surveillance systems.
39	Space Warfare Strategy 27: Only openly report space surveillance capabilities that are less capable (range, sensitivity, throughput, numbers of systems, mobility of systems, etc.) than reality.
40	Space Warfare Strategy 28: Hide space surveillance systems communications & data rate channels.
41	Space Warfare Strategy 29: Be careful of which & how many orbital elements are reported openly, so as not to give a potential adversary an idea of your space surveillance system's full capabilities.
42	Space Warfare Strategy 30: Conduct multiple fake space system maneuvers (& terrestrial mobility re-deployments) to draw away an adversary's space systems from the main point of attack.
43	Space Warfare Strategy 31: Conduct multiple small space system attacks to draw away an adversary's space systems from the main point of attack.
44	Space Warfare Strategy 32: Detect, understand & monitor both allied and adversary space choke points and centers of gravity (geographic, orbital, communications, social, doctrinal, etc.)
45	Space Warfare Strategy 33: Truly understand not only your adversary's space force status and dispositions, but also allied force status and dispositions. Do not let security restrictions obscure to competent commanders the true capabilities of your own forces, or
46	Space Warfare Strategy 34: Concentrate anti-satellite resources only against key regions of space (sun-synchronous, part of the geo-synchronous belt, etc.) that are significant Centers Of Gravity both for allied and adversary space systems. Gain space superior
47	Space Warfare Strategy 35: Concentrate attacks against key regions of space only at the last moment when a shock & awe effect is warranted. For example, attack portions of the GEO belt from trans-lunar, vacant GEO belt sectors, highly eccentric orbits that are
48	Space Warfare Strategy 36: To attack Low Earth Orbits (LEO) space systems, use low inclination (close to zero degrees) anti-satellite systems that only need to increase altitude to engage their targets (low delta-v maneuvers), yet would have little adversary space
49	Space Warfare Strategy 37: Employ mobile anti-satellite systems to attack adversary space systems, particularly those that can be based in regions of low or no adversary space surveillance coverage (e.g., South Pacific, South Pole, Equatorial regions, etc.) to e
50	Space Warfare Strategy 38: Pre-conflict, have very visible, but relatively harmless, space control development programs, while the real space weapon systems are covertly developed.
51	Space Warfare Strategy 39: For kinetic kill anti-satellites, deploy more than one on the same booster, so that subsequent ASATs can hide in the debris clouds of the first attack. They can also act as multiple weapons on target to increase probability of kill (PK).

Methods of War Are Eternal

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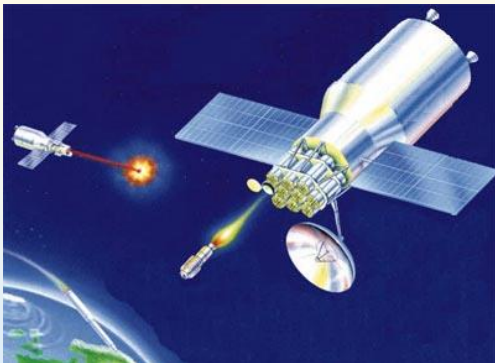
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Space COA's Baseline Considerations



“Control of space means control of the world, far more certainly, far more totally than any control that has been achieved by weapons or troops of occupation. Space is the ultimate position, the position of total control over Earth.”
(President Lyndon Baines Johnson)



Command and Control Relationships

	OODA Loop			
Level of Command	Observe	Orient	Decide	Act
Strategic	National Intelligence Assets	National INTEL Center	JFACC	Theater Forces
Operational	SSN	Space INTEL Center	JSpOC/ JICSPOC	AFSCN
Tactical	On-Board Sensors	On-Board Sensor Fusion	On-Board Decision Algorithms	On-Board Execution Algorithms



Conflict Level of War

Level of War	Rules Of Engagement (ROE)				
	<u>Deception</u>	<u>Disruption</u>	<u>Denial</u>	<u>Degradation</u>	<u>Destruction</u>
Peace	Yes	Maybe	No	No	No
Space Crisis	Yes	Yes	Yes	No	No
Conventional Terrestrial	Yes	Yes	Yes	No	No
Conventional Terrestrial & Space	Yes	Yes	Yes	Yes	Yes

Space Crisis - Does not necessarily mean a terrestrial crisis, but certainly means a crisis concerning on-orbit space systems. This would include space objects making controlled close approaches to potential targets in a threatening manner.

Note: D6 Actions Also Include “Deterrence”



Weapons Release Authorization Levels

Assumes Satellite **Does** Support Area Of Responsibility (AOR) of Current Concern or Conflict

Level of War	Weapons Release Authorization Level				
	<u>Space Positive Control</u>	<u>Space Autonomous Operation</u>	<u>Space Weapons Hold</u>	<u>Space Weapons Tight</u>	<u>Space Weapons Free</u>
Peace	Yes	No	No	No	No
Space Crisis	Yes	Maybe	Maybe	No	No
Conventional Terrestrial	Yes	Yes	Yes	Maybe	No
Conventional Terrestrial & Space	Yes	Yes	Yes	Yes	Maybe

Extended lost communications from ground controllers (e.g., 24 hrs.) automatically increases Weapons Release Level by one step



GEO Areas Of Responsibility (AOR's)

Assumes Satellite Does **Not** Support Area Of Responsibility (AOR) of Current Concern or Conflict

Level of War	Weapons Release Authorization Level				
	<u>Space Positive Control</u>	<u>Space Autonomous Operation</u>	<u>Space Weapons Hold</u>	<u>Space Weapons Tight</u>	<u>Space Weapons Free</u>
Peace	Yes	No	No	No	No
Space Crisis	Yes	Maybe	Maybe	No	No
Conventional Terrestrial	Yes	Maybe	Maybe	No	No
Conventional Terrestrial & Space	Yes	Yes	Yes	Maybe	No

Extended lost communications from ground controllers (e.g., 24 hrs.) automatically increases Weapons Release Level by one step



Potential Conflict Escalation

Assumes Satellite **Does** Support Area Of Responsibility (AOR) of Current Concern or Conflict

Level of War	Weapons Release Authorization Level				
	<u>Space Positive Control</u>	<u>Space Autonomous Operation</u>	<u>Space Weapons Hold</u>	<u>Space Weapons Tight</u>	<u>Space Weapons Free</u>
Peace	0%	10%	20%	80%	90%
Space Crisis	0%	20%	30%	90%	90%
Conventional Terrestrial	0%	30%	50%	100%	100%
Conventional Terrestrial & Space	0%	20%	30%	40%	50%

Numbers listed are probabilities that satellite actions taken at their authorized Weapons Release Level will cause conflict escalation to next Level of War



Fundamental Command Decisions



“Strategy is the art of making use of time and space. I am less concerned about the latter than the former. Space we can recover, lost time never.”

(Napoleon Bonaparte)

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General Considerations for Commanders' Decisions to Execute Space COA's (1)

- **Conflict Escalation Ladder**
 - Estimate of Current Conflict Escalation Ladder Level
 - Assumption of Conflict Escalation Ladder Level Changes Due to Space COA Execution
- **Space COA Coverttness**
 - Required Space COA Coverttness
 - Confidence in Space COA Coverttness
 - Have Steps Been Taken to Reduce the "Fog of War"
- **Space COA Execution Impact on Post-Conflict World**
 - New Space Treaties Required?
 - Potential Adversary Buildup of Space Warfare Capabilities
 - Attacked Adversary Reconstitution of Space Warfare Capabilities Post-Conflict
 - Impacts on Allies



General Considerations for Commanders' Decisions to Execute Space COA's (2)

- **Space COA Restrictions (A)**
 - Satisfies Commanders Intent
 - Exhibits Commander Decisiveness
 - Within Required Effect Timelines
 - Space COA's Keeps Inside Adversary OODA (Observe, Orient, Decide, Act) Loops
 - Execution Results Can be Verified
 - Target is Within Effective Range of Space Weapon
 - Within Rules of Engagement (ROE)
 - Within Laws of Armed Conflict (LOAC)



General Considerations for Commanders' Decisions to Execute Space COA's (3)

- **Space COA Restrictions (B)**
 - **Within Acceptable Probability of Kill (Pk) – May Require Multiple Attacks by Different Phenomenology Weapon Systems to Increase Pk**
 - **Target is Not on Restricted Target List (RTL)**
 - **Target Does Not Have Radiological (Satellite Manufacturing Facilities – RTG's) or Prone to Toxic Chemical Leaks (e.g., Space Launch Sites)**
 - **Has Decisive Impact on Terrestrial Battlefield (Impacts Space Centers of Gravity & Space Choke Points)**
 - **Has Acceptable Cost Exchange Ratio (ASAT Cost vs Target Cost)**
 - **Minimizes Space Debris Creation**



General Considerations for Commanders' Decisions to Execute Space COA's (4)

- **Space COA Restrictions (C)**
 - **Does Space COA Take Advantage of Regions of Space & Time With Advantageous Solar Phase Angles / Terrestrial Sensor Coverage?**
 - **Does Space Weapon Approach Target From its “Blind” Side?**
 - **Approach Trajectories Outside the Field Of Regard of the Target's On-Board Sensors**
 - **Approach Trajectories When the Sun/Moon/Earth Is In the Background of a Target's Sensors**
 - **Approach Trajectories Outside Normally Employed Orbits**
 - **Does Space Weapon Approach When Target is Out of View of Adversary?**
 - **Just After Loss of Contact With Adversary Satellite Ground Controllers**
 - **Just After Loss of Contact With Adversary Space Surveillance Assets**
 - **Times of Cloud Cover/Weather/Natural Disasters for Terrestrial-Based Space Surveillance Systems**



General Considerations for Commanders' Decisions to Execute Space COA's (5)

- **Space Force Readiness (A)**
 - **Space Forces Available & Ready to Execute**
 - **Confidence Space Forces Have Adequate Training to Execute Mission Correctly**
 - **Confidence in Exotic Space Weapons Technologies that May Have Not Been Employed Previously**
 - **Have Space Weapons Been Available to Previous Space Conflicts & Have Been Able to be Used in Training & Doctrine Development?**
 - **Are Space Forces Executing COA Survivable?**
 - **Impact on Space Forces Re-Load Timelines**



General Considerations for Commanders' Decisions to Execute Space COA's (6)

- **Space Force Readiness (B)**
 - Amount of Delta-V Space Forces Must Expend to Execute Mission
 - Have Space Sensors Adequately Located Targets & Defending Assets
 - Many Times a Space COA May Simply be Pre-Positioning Your Space Forces to Critical Space Choke Points to Possibly Deter Your Enemy
 - Does the Employment of Blue Space Weapons Impact the Ability to Use Them Later?
 - War-Reserve Covert Weapons are Now Observable, and Kill Mechanisms May No Longer be Effective
 - Space Weapons are Probably Limited in Quantities, & Use for One specific COA Ensures They Are Not Available for Other Subsequent Attacks



General Considerations for Commanders' Decisions to Execute Space COA's (7)

- **Political Restrictions**

- **Is There Decisive Political Will to Execute Space COA's & Accept Potential Trans-Conflict & Post-Conflict Consequences**
- **Can Space Weapon Employment Approval be Gained in a Timely Manner From Higher Authorities?**
- **Space COA's Impact on Space Alliances & Treaties**
- **Will Space COA Execution Re-Align Both Blue & Red Allies?**
- **Space COA Execution Impact on United States Population Attitudes About War in Space**
- **Space COA Execution Impact on Post-Conflict Commercial / Civil Use of Space**
- **Is the Intended Target Employed by Both Military & Commercial / Civil Users that May Require Surgical Targeting?**



General Considerations for Commanders' Decisions to Execute Space COA's (8)

- **Military Considerations (A)**
 - Have You Delineated the Definition of “Wining” the Space War?
 - Do Space COA's Have Well-Defined Goals, End States, Branches, Sequels & Expected Action-Reaction Consequences?
 - Does the Space COA's Vary Employed Space Weapon Phenomenology Types & Basing Locations?
 - Has Space Strategy / Tactic Been Tried Before?
 - Space COA Ability to Surprise / Confuse, Shock & Awe Adversary
 - Ability of Adversary to Frustrate Space COA Preparations, Execution, & Attack Verifications



General Considerations for Commanders' Decisions to Execute Space COA's (9)

- **Military Considerations (B)**
 - **Has Space COA Been Co-ordinated / De-conflicted With Terrestrial & Other Space COA's?**
 - **Are Potential Adversary Counter-Actions to Blue Space COA Executions Acceptable?**
 - **What is the Probability of Collateral Damage?**
 - **Are Allied Intelligence Agencies Collecting on the Intended Target, and Thus They May Lose Valuable Intelligence Data?**
 - **Are You Attacking at Adversary Organizational Boundaries Between Competing Space Departments' Responsibilities. Similar to Attacking at the Geographic Boundaries Between Two Different Infantry Divisions**
 - **Do You Understand & Assess the Many Unknowns Associated with Space Warfare? Do you Believe in the Confidence Levels of These Unknowns?**



General Considerations for Commanders' Decisions to Execute Space COA's (10)

- **Space COA's Satisfy Space Principles of War (A)**
 - **Objective** – “Set Clear Goals”
 - Are space COA's clearly defined, decisive, & have attainable objectives with measurable effects?
 - **Offensive** – “Seize, Retain, & Exploit the Initiative”
 - Do space COA's seize, retain, & exploit the initiative?
 - Are you setting the time, place & terms of the space battle?
 - Does the battle tempo include space attacks on a continuing basis to keep your adversary off-balance?
 - Is there a pre-approved ramp-up of space attack severity to exploit successes for further gain?
 - **Mass** – “Mass the Effects of Overwhelming Combat Power at the Decisive Place and Time”
 - Are there sufficient weapons to achieve continuous, or sustained space control?
 - Are the space weapons overwhelming to the military function they are trying to deny?
 - Is there political will to implement massed space attack?
 - Can space weapons get into position at the decisive place and time?
 - Do You know the decisive place and time for space weapons application?
 - Can space weapons be synchronized for employment simultaneously?



General Considerations for Commanders' Decisions to Execute Space COA's (11)

- **Space COA's Satisfy Space Principles of War (B)**
 - **Economy of Force** – “Allocate Minimum Essential Combat Power”
 - Are all space control efforts and weapon systems integrated into one deployment / employment plan?
 - Are all space control systems employed purposefully at all times of the conflict, even in delay, limited or deceptive kinds of attack that focus the adversary's attention away from the main space attack?
 - **Maneuver** – “Place the enemy in a position of disadvantage through the flexible application of combat power”
 - Have space weapons been deployed in optimal positions and time-space phasing?
 - Are there critical orbits/time phasing/launch corridors/communications paths around the world contributing to the battlefield that need space superiority consideration?
 - Has blue freedom of action been maximized while minimizing red freedom of action in space?
 - Are points of application of space control weapons constantly shifted to confuse adversary response, and avoid predictable patterns of operation, for survivability reasons?



General Considerations for Commanders' Decisions to Execute Space COA's (12)

- **Space COA's Satisfy Space Principles of War (C)**
 - **Unity of Command** – “For every objective, seek unity of command and unity of effort”
 - Have space control, info war, and air/ground attack plans been integrated with each other and with intelligence collection requirements?
 - Is there adequate space/info war delineation of chain of command and decision responsibility?
 - Are space target lists traceable back to objectives (both red and blue)?
 - Do blue and red terrestrial commanders appreciate the importance of space to their conduct of the war?
 - **Security** – “Never permit the enemy to acquire unexpected advantage”
 - Are space forces survivable in the battlefield environment?
 - Have OPSEC and fratricide concerns been met?
 - Have blue space choke points (orbits/time phasing/launch corridors/communications paths), centers of gravity (TT&C and launch sites), logistics, and command structures been identified and protected?
 - Does blue have alternative space-related sensor, processing, command, and communications paths?
 - Are red space strategies, tactics, doctrine, organization, and intentions assessed?



General Considerations for Commanders' Decisions to Execute Space COA's (13)

- **Space COA's Satisfy Space Principles of War (D)**
 - **Surprise** – “Strike the enemy at a time or place or in a manner for which he is unprepared”
 - Are space control weapons existence known to an adversary, or does he know they have been deployed to the theater, or do they have war operating modes to surprise the enemy by their use?
 - Are there a series of surprise space control weapons that can be alternated in use to maintain cover?
 - Is the use of these weapons detectable or attributable to a specific country by an adversary?
 - Timing and tempo of space weapon use can surprise also, even if their existence is known
 - Threat of weapon use, even if does not exist, can effectively surprise



General Considerations for Commanders' Decisions to Execute Space COA's (14)

- **Space COA's Satisfy Space Principles of War (E)**
 - **Simplicity** – “Prepare clear, uncomplicated plans and concise orders to ensure thorough understanding”
 - How complex are space weapons, and are the effects of their use easily understandable by non-space blue and red commanders (do they know they've been hurt bad)?
 - Are there branches and sequels to space control operations if they fail or if they are successful?
- **All Space COA's Must Also Consider Post-Conflict Reconstruction / Reconstitution**



General Considerations for Commanders' Decisions to Execute Space COA's (15)

- **Space COA's Use of Combined Arms**
 - Space vs Terrestrial Attack
 - Delay vs Kill Effects
 - Deterrence vs Employment
 - Covert vs Overt Weapons
- **Space COA's Balance**
 - Offense vs Defense
 - Levels of Attack Also Include Deterrence
 - Deter
 - Pre-Conflict
 - Trans-Conflict
 - Deceive
 - Deny
 - Disrupt
 - Degrade
 - Destroy



General Considerations for Commanders' Decisions to Execute Space COA's (16)

- **Space COA Considerations Based on a Few of Sun Tzu's Ancient Military Teachings (A)**
 - **Employ Feint Attacks Along With Space COA Main Attack Directions**
 - **Constantly or intermittently conduct small maneuvers to frustrate an adversary's ability to calculate precise orbital parameters in order to target allied satellites, and prevent him from understanding allied space plans, doctrine, strategies and tactics**
 - **Only use space weapons if the effect is commensurate with the political and financial costs, loss of future surprise, and loss of future capabilities (weapon system magazines used up and consequences of adversary responses affecting Blue and Gray systems)**



General Considerations for Commanders' Decisions to Execute Space COA's (17)

- **Space COA Considerations Based on a Few of Sun Tzu's Ancient Military Teachings (B)**
 - Study an adversary's space doctrine, strategies, tactics, organizations, and leadership personalities to discover his strengths and weaknesses so that you may better catch him off-guard during surprise space systems attacks
 - Continually harass your adversaries' fixed space systems defenses, so that they are constantly off balance, more hurried and less timely in fulfilling their mission objectives
 - Remember, you are not fighting an adversary's forces and machines as much as you are fighting an adversary commander's perceptions, biases, experiences, training, organizational structures, his upper military and political managers, intelligence, mental, and emotional strengths, weaknesses and endurances. The weakest point in a space system may be the human element, including scientists, engineers, technologist and additional supporting staff



General Considerations for Commanders' Decisions to Execute Space COA's (18)

- **Space COA Considerations Based on a Few of Sun Tzu's Ancient Military Teachings (C)**
 - Dangle out in front of your adversaries tempting space systems targets to draw out his space control resources and military plans and intents
 - Those who start conflicts and attack first, best know the place and time of the coming space battle
 - Due to orbital dynamics, and continual satellite movement, the place and time of the coming battle is constantly moving and changing. This requires different strategic and tactical perspectives than terrestrial battles, and demands unique graphical solutions and highly dynamic computer processing to support battle planning
 - Many times, those that get to the battle the quickest are the winners, not those who wait in order to concentrate the most forces



General Considerations for Commanders' Decisions to Execute Space COA's (19)

- **Space COA Considerations Based on a Few of Sun Tzu's Ancient Military Teachings (D)**
 - A good space plan requires your adversaries to come at you, and use up their maneuvering resources more so than yourself, allowing allied systems to perform better aggressive attacks later on
 - You may sacrifice some space assets to make your adversaries believe in your carefully falsified military objectives
 - Periodically launch new space vehicles to keep your adversaries confused and off balance
 - Launch or maneuver a new mysterious satellite that comes close to critical adversary satellites, to make your adversaries pause in their military execution plans, and to show resolve, and as a warning for them to back down



General Considerations for Commanders' Decisions to Execute Space COA's (20)

- **Space COA Considerations Based on a Few of Sun Tzu's Ancient Military Teachings (E)**
 - Heavily defend certain orbits to force an adversary's spacecraft to other orbits of your choosing
 - During space conflicts you may decide to trade orbital space for time - in other words you may give up key orbits and maneuvering room solely because it will take your adversaries some time to fill this void, or chase you down, or simply force him to use up valuable satellite fuel, while giving yourself more time to make better counter-attack preparations
 - Initiate multiple false starts, threatening space and terrestrial maneuvers, etc. to induce your adversaries to begin constant satellite maneuvering, so as to waste their on-board fuel reserves before actual conflict starts
 - The most easily accessed orbits might also be the best killing zones



Top 40 Rules for Outer Space Warfare (Select Examples)



“All warfare is based on deception.”
(Sun Tzu)



Space War Rule # 3

- Pre-Conflict Positioning -

- **Since it is very difficult to change orbits at the last minute (especially changing orbital inclination), immediate space combat can only be fought with the current resources on hand in the local area. There will be no trans-conflict redistribution of space forces to help those forces under immediate attack. Thus, pre-conflict positioning of space assets is possibly the most important aspect of space strategies. This principle is related to the other fundamental principle of maximizing high maneuvering abilities of space assets.**



Space War Rule # 4

- Value of Space -

- **Due to the newness of space warfare, our adversary probably does not fully understand the value of space both to himself, and to his adversaries. This complicates his ability to prioritize his targeting plans, and may contribute to him wasting precious maneuvering fuel and limited "shots" from space weapons, along with ceding time and tempo advantages to the other side.**



Space War Rule # 7

- Mistakes Will be Made -

- **Due to the newness of space warfare, most carefully laid plans, doctrines, strategies, tactics, techniques, political, technological and correlation of forces assumptions will prove false and be immediately thrown out (or worse, be so dearly held, they lead to immediate defeat). This rule equally applies to both sides of the conflict, unless one side is lucky enough to have gotten space doctrine slightly more right than the opposing side.**



Space War Rule # 9

- Define Winning -

- **The concept of "winning" in space warfare is not clearly defined. Its definition may be made by political leadership with limited technological, or military knowledge, and may be based on purely political, propagandistic or failed doctrinal principles. Your adversary will certainly have a very different definition of winning, which means both sides may perceive they have "won" the space conflict, and derive quite different conclusions that will dominate their military, political, diplomatic and economic (commercial and procurement strategies) thinking for decades to come. One's space strategies employed during the conflict should take this into consideration to place your nation into a favorable position, post-conflict.**



Space War Rule # 11

- Future Political Impacts -

- **You may be assured that after the conduct of a major space war, national and international protocols, treaties and rules of conduct will be radically changed for space. One's space strategies employed during the conflict should take these into consideration to place your nation into a favorable position, post-conflict.**



Space War Rule # 13

- Space Escalation Ladder -

- Due to the remote nature of space systems, the world's populace may be kept in the dark (especially for low-level space conflicts) of what is truly happening, which provides addition, more subtle rungs, on the conflict escalation ladder, allowing nations to privately exhibit resolve and to send determined political messages.



Space War Rule # 15

- Quick Space Attacks Possible -

- **Due to the remote nature of satellites in space, small-scale space attacks may be initiated, executed and completed before the recipient even knows he is under attack, who is attacking, what are their attack strategies and goals (end states), and when can an uncomprehending senior political leadership validate the attack and respond in a military, political, diplomatic or economic manner. Large-scale space attacks may be initiated, executed and completed within 24-48 hours. Without adequate and timely Space Situational Awareness (SSA) and determined political will, an adversary can easily get within Blue Observe, Orient, Decide, Act (OODA) command and control loops for space, and shock and confuse them.**



Space War Rule # 20

- Small Space Forces Can Beat Larger -

- **As in many other conflicts past and present, having space forces that appear superior in numbers and technological quality on paper does not guarantee a "win" under all circumstances. There are many examples throughout thousands of years of military history of numerically inferior forces beating their "betters." Many times it is the forces with better doctrine, planning, morale (political will) or positioning that win. This can only be all the more true for a new area of conflict in space that has little, if any, past military examples and experiences.**



Space War Rule # 21

- Decisive Political Will -

- **Having space forces that are superior in numbers and technological quality are useless if there is not the political will to fully and quickly use them.**



Space War Rule # 27

- Defense vs. Offense -

- **Those Nations that have more space systems being used by their military also have more space systems to defend, and probably must emphasize defense over offense in their technology developments and in their military planning. If your adversary has few space systems, then there are fewer targets for your offensive space weapons, and you must emphasize defense, unless you believe that you have perfect Space Situational Awareness, and you know all of your adversaries' and their allies' offensive space weapons, and believe you can target and neutralize these early in the space conflict before he can fully implement his offensive space warfare plans.**



Space War Rule # 28

- Space Situational Awareness Is Prime -

- **Because of the inherent instability of offense vs. defense in space warfare, the most important tool for senior military and political space leaders is space surveillance and identification sensors with corresponding automated assessment algorithms.**



Space War Rule # 32

- Decisive Commander -

- **For those countries at war with roughly equal space warfare forces, the main decisive factor would be which country may be lucky enough to discover and believe in the one decisive commander who is a genius in space warfare organization, doctrine, strategies and tactics. This is especially true for the non-traditional nature of space warfare. In addition, those countries with the least meddling in military matters by their politicians might be the decisive factor in winning the war (though possibly "loosing" the peace after words).**



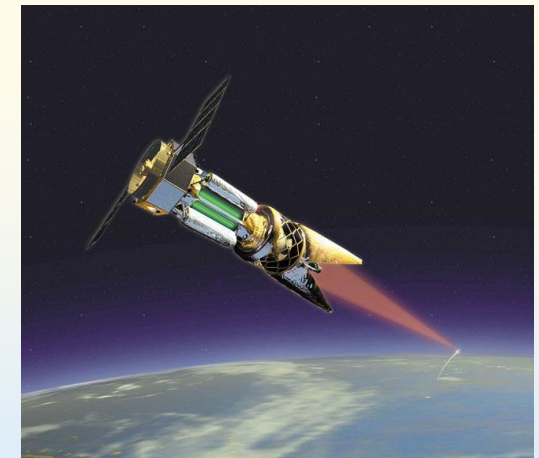
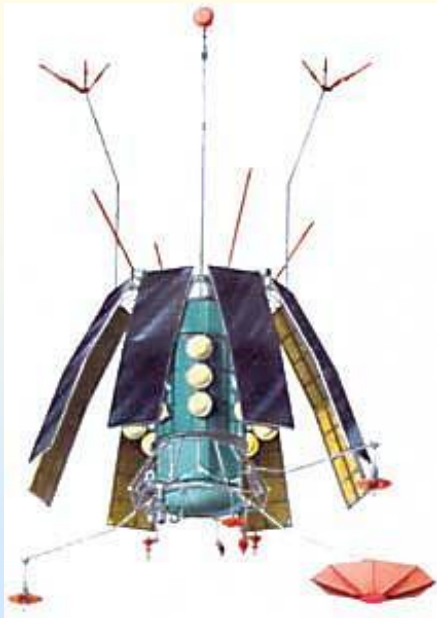
Space War Rule # 36

- Commercial Satellites Are On Their Own -

- **Commercial satellite operators whose expectations are that the military will protect their space systems during conflicts will have a rude awakening.**



Space War Termination Criteria



“Satellites have no mothers.”
(Maj Gen Roger G. DeKok (deceased), Air Force Space
Command’s Director of Operations and Plans)

Helps Develop Space War Plans



Examples of Terrestrial War Termination Criteria

- • Country X's borders are secure
- Country Y no longer poses an offensive threat to the countries of the region
- Country X's national security force is sufficient to repress internal rebellion
- Percentage of US forces have redeployed with sufficient combat power postured in theater to support Country X's national army
- X capability destroyed / eliminated
- • Legitimate Government restored
- Hostages returned
- Forces separated
- Agreement to start negotiations

“Victory smiles upon those who anticipate the changes in the character of war, not upon those who wait to adapt themselves after the changes occur.”

(Giulio Douhet)

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Possible Space War Termination Criteria (1)

- Political goals met
- Red force reduction goals met
- Red disarmament
- • The balance of power in space between Red and Blue is sufficient to deter Red from any near-future space attacks for the next 10 years
- • Red will and ability to continue fighting in space has been severely restricted
- Red maneuvers satellites outside immediate threat zones that endanger Blue critical space assets



Possible Space War Termination Criteria (2)

- Blue space assets and ASAT systems remain in ready strike positions to assure Red treaty compliance
- Red ceases production of space weapons
- • Red cannot image battlefield with less than 1 meter resolution
- Red cannot recover major space capabilities in less than 10 years
- Red space launch capabilities reduced by 50%
- • Red on-orbit military space assets supporting current conflict region (AOR) delta-v maneuvering capability reduced by 50%



Possible Space War Termination Criteria (3)

- ➔ • Red on-orbit ASAT (anti-satellite) capabilities reduced to 10% remainder (capabilities de-orbited)
- ➔ • 90% of Red space assets have been visited by Blue inspector satellites and verified in compliance
- Red forced to negotiating table over ASAT weapons
- Red open to inspection of space launch sites, rocker fuel production facilities and space research facilities
- Red returns control of any Blue or Gray satellites held hostage / captured through cyber means
- Red mobile ASAT systems returned to garrison / storage



BACKUP

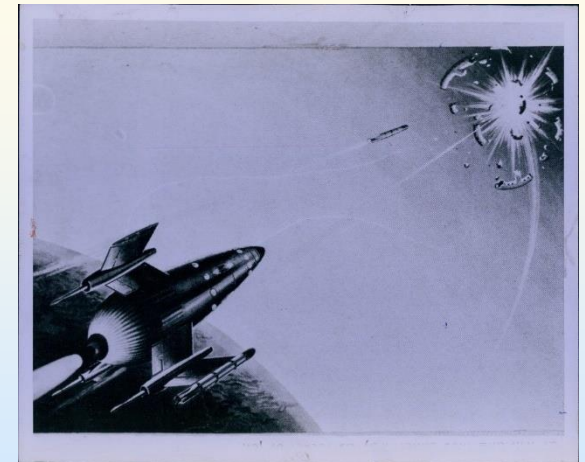
**“It is not the object of war to annihilate those who have given provocation for it, but to cause them to mend their ways.”
- Polybius, History (2nd century B.C.) -**



Space Scenarios Details



*“If everyone is thinking alike, then
somebody isn't thinking.”*
(General George S. Patton)





Scenarios Purpose

- **Develop Detailed and Stressing Military Space Scenarios that Combine Strategic and Tactical Courses of Action (COA's) to Test Automated Space Battle Management Command & Control (BMC²) Systems and Space Commanders' Fundamental Decision-Making Processes**

Delineates Fundamental Space Battle Management Issues




“Operation Blue Talon (OBT)” Scenarios


- Scenario Notional Space Systems Names, [Mil-STD 2525 Icons](#), and Photos Are Automatically, Randomly Generated and Assigned to Non-Attribution Country Names to Keep Scenarios UNCLASSIFIED

Operation Blue Talon		
Country-Blue	Country-Gray	Country-Red
Newmex (NX)	Washorgon (WO)	Califon (CA)
		Orgonia (OR)
		Nevidah (NV)



Operation Blue Talon (OBT) Scenarios

OBT Scenario	Scenario Sequence	Scenario Name	Attacker	<u>Conflict Escalation Ladder</u> Space Campaign Phase	Attacker Mission
 A	Space Scenarios Phase I	Troubled Peace	RED attacks BLUE	1st Wave Attacks Phase A - Pre-Conflict Deter	Satellite Close Inspection INTEL Collection
B	Space Scenarios Phase IIA	Regional Crisis - Deter -	RED attacks BLUE	2nd Wave Attacks - Trans- Conflict Deter	Show of Force Deterrence
C	Space Scenarios Phase IIB	Regional Crisis - Reversible Effects -	RED attacks BLUE	3rd Wave Attacks Phase A1 – Terrestrial-to-Space Partial Temporary Effects	Temporarily Jam Satellites
D	Space Scenarios Phase III	Beginning Salvos of Space Conflict	RED attacks BLUE	4th Wave Attacks Phase A2 – Terrestrial-to-Space Total Permanent Kill	"Combined Arms" Satellite Destruction
E	Space Scenarios Phase IV	Terrestrial & Space Conflict	RED attacks BLUE	4th Wave Attacks Phase B2 – Space-to-Space Total Permanent Kill	"Combined Arms" Satellite Destruction
F	Space Scenarios Phase V	Blue Space Counterattacks	BLUE attacks RED	4th Wave Attacks Phase B2 – Space-to-Space Total Permanent Kill	Blue Counterstrike in Space

 Baseline Scenario



Space Scenarios Phase I

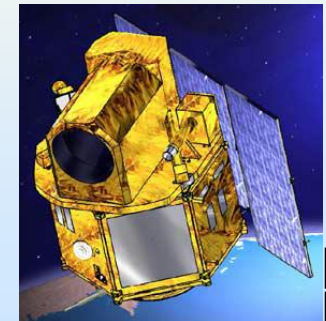
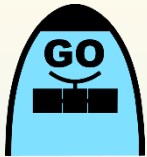
– Troubled Peace –

Conflict Escalation Ladder Space Campaign
Phase: “1st Wave Attacks Phase A - Pre-
Conflict Deter”



OBT Scenario A - Background

- **Scenario A:**
 - Conflict Level: Peace
 - Weapons Release Authorization Level: [Space Positive Control](#)
 - Space Rules Of Engagement ([ROE](#)): Only [Deception](#)
 - Space WX Condition: Unusually High Solar Storm Activity
 - Space Defense Region: [GEO ASIA](#)
 - Satellite at Risk: **Blue** Newmex Itatingui Large GEO COMM Satellite (BE NX90F01003)
 - Pre-Event Satellite Condition: Nominal
 - Possible **Red** ASAT Satellite: Califon Savanne Micro GEO Inspector Satellite (BE CA90F08005)


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OBT Scenario A - Description

- **Scenario A Events:**
 - During a period of intense Solar activity the **Blue Newmex** Itatingui Large GEO COMM Satellite (BE NX90F01003) experiences unusual upset events and internal systems dysfunctional behaviors, degrading communications antennas power output, causing reductions of about 20%.
 - During these outages the Itatingui GEO COMM Satellite was supporting **Newmex** military exercises in the Western Pacific
 - Also during these outages a **Califon** Savanne Micro GEO Inspector Satellite may have been nearby



OBT Scenario A - Truth

- **Blue Perceptions:**
 - It is uncertain whether the upset conditions are caused by natural phenomena (Solar storm) or the approaching **Red** satellite. Due to this uncertainty, and the currently low Conflict Level (Peace), only passive protective COA's are taken that do not significantly impact the **Blue** satellite mission
- **Actual Red Satellite Mission:**
 - **Red** waited until high Solar activity to approach the **Blue** satellite to cover its tracks
 - **Red** satellite was near **Blue** satellite to monitor the effects of a covert terrestrial-based cyber weapon that was tested against **Blue** satellite



OBT Scenario

– Potential Commanders' Decisions (A) –

- Decide on Perceived Space Threat Level
 - Previous Military Actions (Space & Terrestrial, Red & Blue) Affecting Space Forces
 - Declare a Space Defense Emergency
- Increase Space Weapons Release Authorization Level
 - Terrestrial Military Forces Supporting Space Control
 - On-Orbit Satellite Self-Defenses
 - Impacts on Conflict Escalation Ladder
 - Political Implications of Precipitating “Space War”
 - Rules of Engagement (ROE)
 - Laws of Armed Conflict (LOAC)



OBT Scenario

– Potential Commanders' Decisions (B) –

- **Chose Space Course(s) of Action in Response, if Any**
 - **Active Measures**
 - **Passive Measures**
 - **Increase Readiness Posture of In-place Forces (Terrestrial & Space)**
 - **Upgrade Alert Status**
 - **Increase Intelligence, Surveillance, & Reconnaissance**
 - **Initiate or Increase Show-of-Force Actions**
 - **Increase Training & Exercise Activities**
 - **Increase Defense Support to Public Diplomacy**
 - **Increase Information Operations**
 - **Deploy Forces Into or Near the Potential Operational Area**
 - **Increase Active & Passive Protection Measures**
 - **Flexible Deterrent Options (FDO's)**
 - **Declare Demarche Through Diplomatic Channels**



OBT Scenario A

– Potential Commanders' Decisions (1) –

- Increase Space Weapons Release Authorization Level (A)
 - ① INFO REQUIRED TO MAKE DECISION (A):
 - Perceived **Current** Space & Terrestrial **Conflict Level** (*Data Source: Space Coordinating Authority (SCA); COMAFFOR/JFACC; DIRSPACEFOR*)
 - **Current** Blue Space **Weapons Release Authorization Level** (*Data Source: Space Coordinating Authority (SCA); COMAFFOR/JFACC; DIRSPACEFOR*)
 - Blue & Red **Allied Relationships** (*Data Source: State Department*)
 - Blue Relationships with **Non-Military Organizations** (e.g., NRO, NASA, NOAA, Intelsat, etc.) (*Data Source: USSTRATCOM*)
 - **Red** Space & Terrestrial **Military/Political/Diplomatic/Economic/Cyber Intentions** (*Data Sources: NASIC, CIA, DIA, Cyber Command, State Department*)
 - **Blue** NCA & Commanders' **Intents** (*Data Source: Space Coordinating Authority (SCA); COMAFFOR/JFACC; DIRSPACEFOR*)



OBT Scenario A

– Potential Commanders' Decisions (2) –

- **Increase Space Weapons Release Authorization Level (A)**
 - ① **INFO REQUIRED TO MAKE DECISION (B):**
 - Blue Rules of Engagement (**ROE**), Laws of Armed Conflict (**LOAC**) & Which Space Systems Are on the Restricted Target List (**RTL**) (*Data Sources: Space Coordinating Authority (SCA); COMAFFOR/JFACC; DIRSPACEFOR*)
 - **Previously** Executed Blue & Red Space & Terrestrial **COA's** (*Data Source: CAOC*)
 - **Current** & Planned Blue/Allied Air Tasking Order (**ATO**) / Space Tasking Order (**STO**) (*Data Source: CAOC*)
 - Possible **Red Counteractions** (*Data Sources: NASIC; CAOC Plans*)
 - Most Probable Red COA
 - Most Dangerous Red COA
 - Possible Blue, Red, Neutral **Collateral Damage** Effects (*Data Sources: NASIC; CAOC Weaponneering*)
 - Space & Terrestrial Weather (**WX**) Conditions (*Data Source: CAOC*)



OBT Scenario A

– Potential Commanders' Decisions (3) –

- Increase Space Weapons Release Authorization Level (A)

① INFO REQUIRED TO MAKE DECISION (C):

- Red Active & Passive Space Systems **Defensive Measures** (*Data Source: NASIC*)
- **Red Force Status**, Estimated Probabilities of Kill (**Pk**), Potential Execution **Timelines**, & **Re-Fire** Capabilities (*Data Source: NASIC*)
- **Blue Force Status**, Probabilities of Kill (**Pk**), Potential Execution **Timelines**, & **Re-Fire** Capabilities (*Data Source: CAOC Weaponneering*)
- **Red** Potential Threat Space Objects **TLE's** (Orbital Elements)
 - **General Accuracy** (*Data Source: SSN*)
- **Blue** Potentially Threatened Space Objects **TLE's** (Orbital Elements) – **General Accuracy** (*Data Source: SSN*)



OBT Scenario A

– Potential Commanders' Decisions (4) –

- **Increase Space Weapons Release Authorization Level (A)**

② REQUIRED DECISION TIMELINE:

- ~24-48 Hours = REASONS:

- Typical Maneuver Timeline for Anti-Satellites (ASAT's) to Match Target Orbits
- Probable Political Cycle Time for Adversary to React to Deterrence Attacks
- Future ATO/JSTO (Air Tasking Order/Joint Space Tasking Order) Cycle Timelines

③ POSSIBLE CONSEQUENCES OF DECISION:

- Possible **Increase** in Space & Terrestrial **Conflict Level**
- May Inspire Subsequent **Red Space Counter-Actions**
- May Inspire Subsequent **Red Terrestrial Military Actions**
- Blue & World **Negative Public Opinion** Reactions
- Blue **Allied Negative Reactions**
- **Red May Increase Allied Solidarity & Add New Allies**
- **Reveals SSA Capabilities to Potential Adversaries**



OBT Scenario A

– Potential Commanders' Decisions (5) –

- **Declare Demarche Through Diplomatic Channels (B)**

- ① INFO REQUIRED TO MAKE DECISION (A):**

- **Current Conflict Level** (*Data Source: Higher HQ*)
- **Current Weapons Release Authorization Level** (*Data Source: Higher HQ*)
- **Blue & Red Allied Relationships** (*Data Source: State Department*)
- **Red Intentions** (*Data Sources: NASIC, CIA, Cyber Command, State Department*)
- **Blue Commanders' Intents** (*Data Source: Higher HQ*)
- **Blue ROE, LOAC, & RTL** (*Data Source: Higher HQ*)



OBT Scenario A

– Potential Commanders' Decisions (6) –

- **Declare Demarche Through Diplomatic Channels (B)**

- ① INFO REQUIRED TO MAKE DECISION (B):**

- **Previous COA's** (*Data Source: CAOC*)
- **Current ATO / JSTO** (*Data Source: CAOC*)
- **Red Force Status, Pk, Execution Timelines, & Re-Fire** (*Data Source: NASIC*)
- **Blue Force Status, Pk, Execution Timelines, & Re-Fire** (*Data Source: CAOC Weaponering*)
- **Red Counteractions** (*Data Source: CAOC Plans*)
- **Space & Terrestrial Weather (WX)** (*Data Source: CAOC*)
- **Diplomatic Corps Security Clearances** to be Able to Fully Understand Proposed ASAT Employments (*Data Source: State Department*)
- **Current United Nations Attitudes** Towards Affected Countries (*Data Source: State Department*)



OBT Scenario A

– Potential Commanders' Decisions (7) –

- **Declare Demarche Through Diplomatic Channels (B)**

- ② **REQUIRED DECISION TIMELINE:**

- ~24-48 Hours = REASONS:

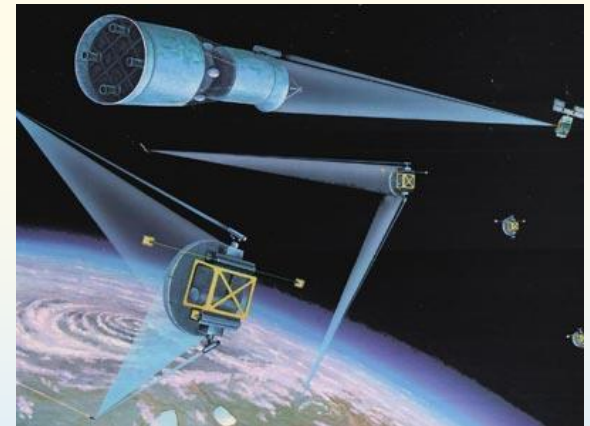
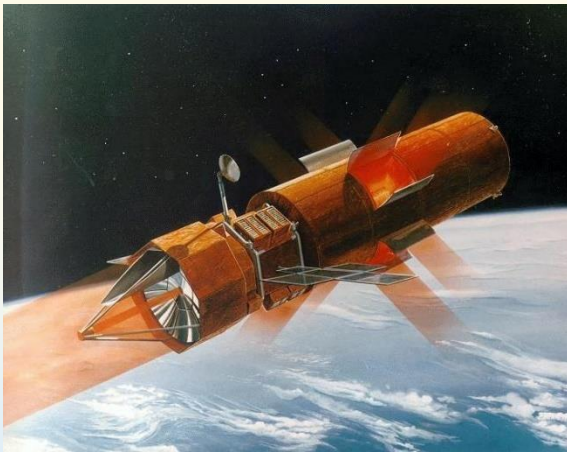
- Typical Maneuver Timeline for Anti-Satellites (ASAT's) to Match Target Orbits
 - Probable Political Cycle Time for Adversary to React to Diplomatic Requests
 - ATO/STO Cycle Timelines

- ③ **POSSIBLE CONSEQUENCES OF DECISION:**

- **Increase** in Space & Terrestrial **Conflict Level**
 - May Inspire Subsequent **Red Terrestrial Military Actions** (Red Deterrence/Show Resolve Actions)
 - Adverse **Adversary Counter-Actions**
 - Blue & World **Negative Public Opinion** Reactions
 - Blue **Allied Negative Reactions**
 - **Red May Increase Allied Solidarity & Add New Allies**
 - **Reveals SSA Capabilities** to Potential Adversaries



Space Warfare Definitions



“Mere tonnage of explosives is a fallacious criterion. In the final analysis, victories are achieved because of the effect produced, not simply because of the effort expended.”
(Brigadier General Haywood S. “Possum” Hansell, Jr., Memorandum to Army Air Force Chief of Staff General “Hap” Arnold, 26 July 1944)



Space Defense Definitions (1)

- **Space Sovereignty** - A nation's inherent right to exercise absolute control and authority over the orbital space near its satellites. Also see **Space Sovereignty Mission**.
- **Space Sovereignty Mission** - The integrated tasks of surveillance and control, the execution of which enforces a nation's authority over the orbital space near its satellites.
- **Space Control Operations** - The employment of space forces, supported by air, ground and naval forces, as appropriate, to achieve military objectives in vital areas of concern to space systems. Such operations include destruction of enemy in-space assets, space-related ground systems and surface-to-space forces (launch), interdiction of enemy space operations, protection of vital space lines of communication (links from ground to space to ground), and the establishment of local military superiority in areas of space operations.

Definitions Derived from Joint Pub 3-01.1 Modified for Space Control



Space Defense Definitions (2)

- **Space Autonomous Operation** - In space defense, the mode of operation assumed by a space system after it has lost all communications with human controllers. The space system assumes full responsibility for control of weapons and engagement of hostile targets, based in accordance with on-board surveillance and weapon system control logic. This automatic state may occur on a regular basis due to orbital movements outside regions of ground coverage and control.
- **Space Positive Control** - A method of space control which relies on positive identification, tracking, and situation assessment of spacecraft within a Space Defense Area, conducted with electronic means by an agency having the authority and responsibility therein.
- **Space Weapons Hold** - In space defense, a weapon control order imposing a status whereby weapons systems may only be fired in self defense or in response to a formal order.
- **Space Weapons Tight** - In space defense, a weapon control order imposing a status whereby weapons systems may be fired only at targets recognized as hostile.
- **Space Weapons Free** - In space defense, a weapon control order imposing a status whereby weapons systems may be fired at any target in orbital space of defined altitude and inclination, not positively recognized as friendly.

Definitions Derived from Joint Pub 3-01.1 Modified for Space Control



Space Defense Definitions (3)

- **Active Space Defense** - Direct defensive action taken to destroy, nullify, or reduce the effectiveness of hostile space actions. It includes the use of anti-satellite weapon systems, defensive counter space weapons, electronic warfare, and other available weapons not primarily used in a space defense role. See also Space Defense.
- **Passive Space Defense** - All measures, other than Active Space Defense, taken to reduce the probability of and to minimize the effects of damage to space systems caused by hostile action without the intention of taking the initiative. These measures include camouflage, deception, dispersion, and the use of protective construction and design. See also Space Defense.
- **Space Centralized Control** - In space defense, the control mode whereby a higher echelon makes direct target assignments to fire units.
- **Space Decentralized Control** - In space defense, the normal mode whereby a higher echelon monitors unit actions, making direct target assignments to units only when necessary to ensure proper fire distribution or to prevent engagement of friendly spacecraft. See also Centralized Control.
- **Broadcast-Controlled Space Interception** - An interception in which the interceptor is given a continuous broadcast of information concerning the space defense situation and effects interception without further control.
- **Close-Controlled Space Interception** - An interception in which the interceptor is continuously controlled to a position from which the target is within local sensor range.

Definitions Derived from Joint Pub 3-01.1 Modified for Space Control



Space Defense Definitions (4)

- **Suppression of Adversary Counterspace Capabilities** - Suppression that neutralizes or negates an adversary offensive counterspace system through deception, denial, disruption, degradation, and/or destruction. These operations can target ground, air, missile, or space threats in response to an attack or threat of attack. (AFDD 2-2.1)
- **Space Control Sector** - A sub element of the space control area, established to facilitate the control of the overall orbit. Space control sector boundaries normally coincide with space defense organization subdivision boundaries. Space control sectors are designated in accordance with procedures and guidance contained in the space control plan in consideration of Service component and allied space control capabilities and requirements.
- **Space Deconfliction In The Combat Zone** - A process used to increase combat effectiveness by promoting the safe, efficient, and flexible use of space systems. Space Deconfliction is provided in order to prevent fratricide, enhance space defense operations, and permit greater flexibility of operations. Space Deconfliction does not infringe on the authority vested in commanders to approve, disapprove, or deny combat operations. Also called combat space deconfliction; space deconfliction.
- **Space Point Defense** - The defense or protection of special vital elements, orbital positions (geosynchronous slots, and advantageous orbits, such as sun-synchronous) and installations; e.g., command and control facilities, space launch facilities, Tracking, Telemetry and Control facilities, space surveillance sensors, and high-value satellites.

Definitions Derived from Joint Pub 3-01.1 Modified for Space Control



Space Defense Definitions (5)

- **Space Defense Operations Area** - An area and the orbital space around it within which procedures are established to minimize mutual interference between space defense and other operations; it may include designation of one or more of the following: Space Defense Action Area, Space Defense Area; Space Defense Identification Zone, and, or firepower umbrella.
- **Space Defense Action Area** - An orbit and the space around it within which friendly spacecraft or surface-to-space weapons are normally given precedence in operations except under specified conditions.
- **Space Defense Area** - 1.) A specifically defined orbit for which space defense must be planned and provided. 2.) An orbit and a region surrounding it of defined dimensions designated by the appropriate agency within which the ready control of space borne vehicles is required in the interest of national security during a **Space Defense Emergency**.
- **Space Defense Region** - An orbital subdivision of a Space Defense Area.
- **Space Defense Sector** - An orbital subdivision of a Space Defense Region.
- **Space Defense Division** - A geographic subdivision of a Space Defense Region.
- **Space Defense Identification Zone (SDIZ)** - Orbital space of defined parameters within which the ready identification, location, and control of space borne vehicles is required.
- **Space Defense Battle Zone** - A volume of space surrounding a space defense fire unit or defended area, extending to a specified orbital altitude and inclination, in which the fire unit commander will engage and destroy targets not identified as friendly under criteria established by higher headquarters. In other words, this would be a **free-fire zone around a defended satellite**.

Definitions Derived from Joint Pub 3-01.1 Modified for Space Control



Space Defense Definitions (6)

- **Space Weapon Engagement Zone (SWEZ)** - In space defense, orbital space of defined altitude and inclination within which the responsibility for engagement of space threats normally rests with a particular weapon system.
- **Direct-Ascent Engagement Zone (DAEZ)** - In space defense, that orbital space of defined altitude and inclination within which the responsibility for engagement of space threats normally rests with a direct-ascent anti-satellite system of terrestrial launch origin.
- **Directed Energy Engagement Zone (DEEZ)** - In space defense, that orbital space of defined altitude and inclination within which the responsibility for engagement of space threats normally rests with a directed energy (laser or microwave) ASAT or electronic warfare system of terrestrial location.
- **Electronic Warfare Engagement Zone (EWEZ)** - In space defense, that orbital space of defined altitude and inclination within which the responsibility for engagement of space threats normally rests with an electronic warfare system of terrestrial location.
- **Close Attack Engagement Zone (CAEZ)** - In space defense, that orbital space of defined altitude and inclination within which the responsibility for engagement of space threats normally rests with a defense system that is stationed within 10 kilometers of its target.
- **Long Range Engagement Zone (LREZ)** - In space defense, that orbital space of defined altitude and inclination within which the responsibility for engagement of space threats normally rests with long range space defense weapons, that are space-based, but are normally stationed at more than 10 kilometers from its target.
- **Joint Engagement Zone (JEZ)** - In space defense, that orbital space of defined altitude and inclination within which multiple space defense systems (from both terrestrial and space-based locations) are simultaneously employed to engage space targets.

Definitions Derived from Joint Pub 3-01.1 Modified for Space Control



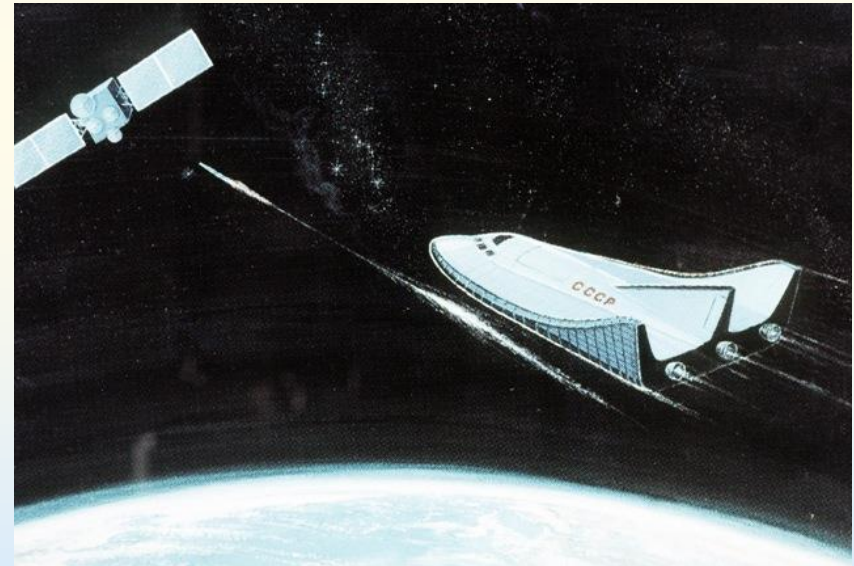
Space Defense Definitions (7)

- 1) **Deception** consists of those measures designed to mislead the adversary by manipulation, distortion, or falsification of evidence to induce the adversary to react in a manner prejudicial to their interests.
- 2) **Disruption** is the temporary impairment of the utility of space systems, usually without physical damage to the space segments. These operations include delaying critical mission data support to an adversary. Given the perishability of information required to effectively command and control military operations, this disruption impedes the effective application or exploitation of that data. Examples of this type of operation include jamming or refusing or withholding data support or spare parts.
- 3) **Denial** is the temporary elimination of the utility of the space systems, usually without physical damage. This objective is accomplished by such measures as denying electrical power to the space ground nodes or computer centers where data and information are processed and stored.
- 4) **Degradation** is the permanent impairment of the utility of space systems, usually with physical damage. This option may include attacks against the terrestrial or space element of the space system. For example, a ground-based laser could be used to damage the optics of an imaging sensor without impairing other functions of the satellite bus.
- 5) **Destruction** is the permanent elimination of the utility of space systems, usually with physical damage. This last option includes special operations forces (SOF) missions to interdict critical ground nodes, airpower missions to bomb uplink/downlink facilities, and attacks against space elements with either kinetic-kill or directed-energy weapons.

Definitions Derived from AFDD 2-2



Regions of Responsibility



“The past tempts us, the present confuses us and the future frightens us.”
(Science Fiction series, Babylon 5 (Ep. 1, Disk 3, Season 2, the line spoken by an ailing Centauri Emperor))

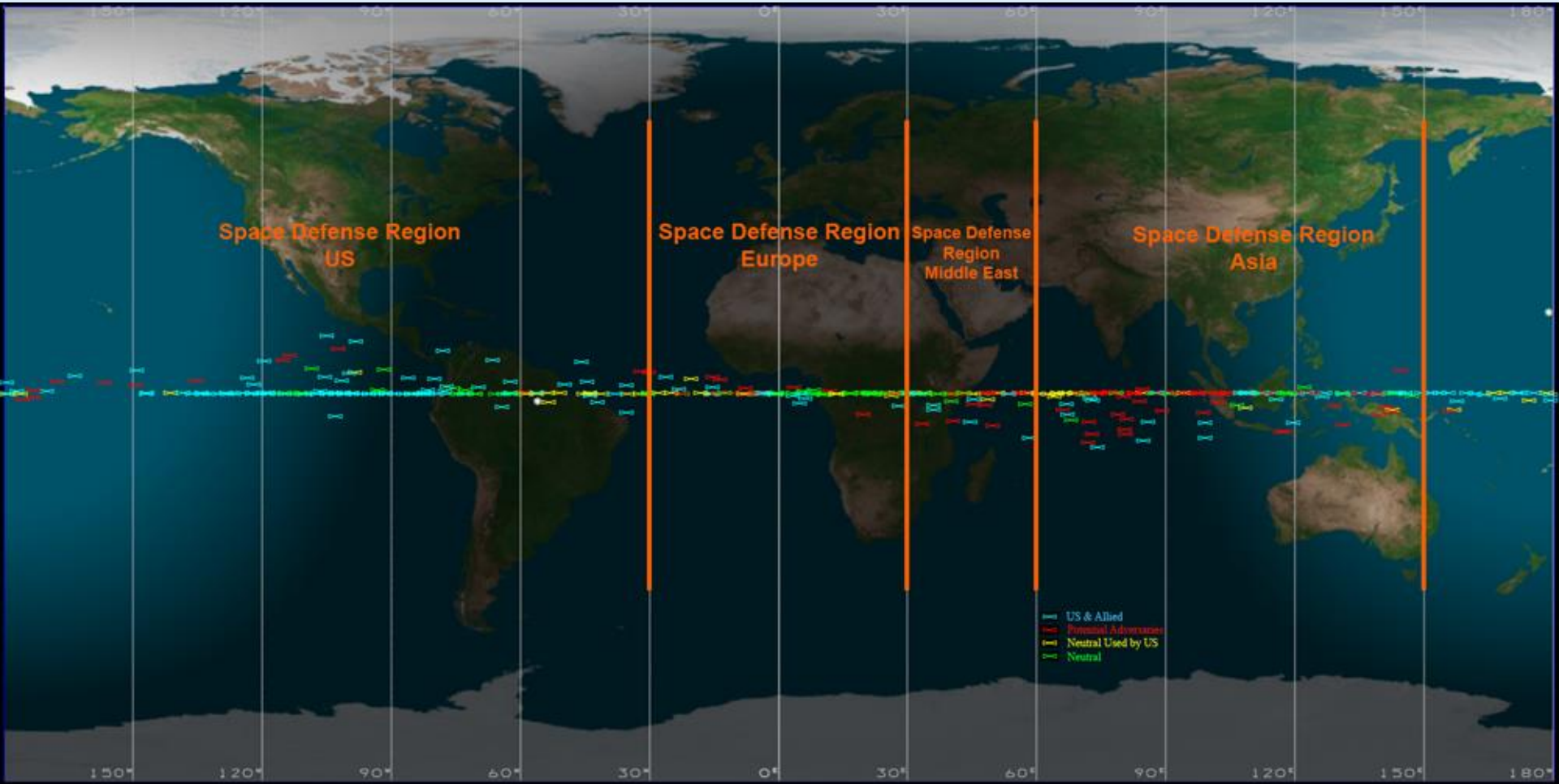


All Space Defense Regions

Region	Region Definition
SDR GEO	Space Defense Region Geosynchronous
SDR GEO ASIA	Space Defense Region Geosynchronous over Asia
SDR GEO EU	Space Defense Region Geosynchronous over Europe
SDR GEO ME	Space Defense Region Geosynchronous over the Middle East
SDR GEO US	Space Defense Region Geosynchronous over the United States
SDR GEO-G-A	Space Defense Region Graveyard Orbit Above Geosynchronous
SDR GEO-G-B	Space Defense Region Graveyard Orbit Below Geosynchronous
SDR GEO-I	Space Defense Region Geosynchronous Inclined
SDR HEO	Space Defense Region Above Geosynchronous (High Earth Orbit)
SDR LEO-E	Space Defense Region Low Earth Orbit Highly Eccentric
SDR LEO-H	Space Defense Region Low Earth Orbit - High (>600 and <5,000 km)
SDR LEO-L	Space Defense Region Low Earth Orbit - Low (<=500 km)
SDR LEO-M	Space Defense Region Low Earth Orbit - Medium (>500 and <=600 km)
SDR LEO-R	Space Defense Region Low Earth Orbit Retrograde
SDR LEO-S	Space Defense Region Low Earth Orbit Sun-Synchronous
SDR MEO	Space Defense Region Medium Earth Orbit (>=5,000 and <25,000 km)
SDR MOLY	Space Defense Region Molniya
SDR NOE	Space Defense Region No Orbital Elements



Geo Space Defense Regions



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