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## Annual Truman Lecture USAFA 64th Academy Assembly

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**Annual Truman Lecture  
USAF 64<sup>th</sup> Academy Assembly**

*\*In October 2022, on the occasion of the 64<sup>th</sup> annual Academy Assembly, focused on “Waging Peace on the Final Frontier,” the deputy commander of USSPACEOM Lieutenant General John Shaw spoke at the Air Force Academy’s endowed Truman Lecture, which itself was created to inspire cadets toward careers in National Security leadership.*

LT GEN SHAW: Thank you. Well, good evening. And I can't tell you what an honor it is to be here for the Truman Lecture to cap off what I have heard has been a tremendous couple days of Academy Assembly...talking about space in all of its dimensions. I look forward to spending a few minutes explaining a few things that we've been thinking about in the U.S. Space Force and US Space Command, and then hearing what is on your minds and having a conversation, a little bit of Q&A.

Well, thank you for that wonderful introduction. I really appreciate it. General Clark, sir, always great to be back here at the United States Air Force Academy. You know, it's amazing what stays with you as you do more and more laps around the sun, as I've done. I can't remember all the floor plans of the twenty-plus homes that my wife Tonia, who's here with us tonight...[applause] ... that we've had in our Air Force and Space Force journey, but I can still remember every cadet room that I had. I can picture it in my mind. And I arrived here ... we're going back a ways, gang ... I arrived here in July 1986.

I can still smell the grass on the parade field doing PT for basic cadet training. I can still smell the wet canvas out in Jacks Valley—you all know what I'm talking about on that. And so, in some ways it's like completing another orbit to be able to come back here and spend a little time with all of you.

So, 1990 was a red class, alright, so thanks for the [red] curtains here. Appreciate it. Thank you for making me feel welcome here tonight. I do have a few things, thoughts I want to share with you before I get started. I always have to start with the question that we seem to get the most in the various encounters that I have with folks, whether it's the general public, or even inside the Pentagon ... we still get this question: What is the difference between US Space Force and US Space Command?

Now, most of you should know the answer to that question, but let's review, just to make sure we've got it straight. And remember the year 1986? That year that I showed up here, 1986, was when Congress passed the Goldwater Nichols legislation, which established joint warfighting commands and established the Combatant Commands that we have today. So, we

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do have inside the Department of Defense...we have the services: the Army, the Navy, the Marines, the Air Force and now the Space Force. The chiefs of those services work for the secretaries of those services. The purpose of the services is to organize, train, and equip and present forces to joint combatant commanders and joint commanders for use in warfighting.

You all knew this. We have combatant commands. How many do we have now? Eleven, U.S. Space Command (USSPACECOM) is the eleventh Combatant Command. And those are joint commands. In the headquarters I work in we have folks from all the services. People come in and say, why is there a Marine here in this headquarters? I thought this was Space Force. We have to explain to them what a joint warfighting combatant command is. And the commanders, the four stars of those commands, they work directly for the Secretary of Defense. So, I get to spend a lot of my time on VTCs and sometimes in the room with the Secretary of Defense as the deputy when my boss gives me those meetings to cover. And it's kind of an interesting perspective to be there. So, I like to think that I have one of the best possible jobs to have in the space arena in the Department of Defense today. Because I'm a member of the United States Space Force. Pretty excited about that.

I did transfer into the Space Force. [One day], I get this phone call ... I'm the 14<sup>th</sup> Air Force Commander out at Vandenberg ... now Vandenberg Space Force Base, California. I get the phone call from a Colonel in General Officer matters at the Pentagon, and I knew this call was coming, it wasn't a surprise, but you still have to go through the formal phone call. He said, "Sir, would you like to resign your commission in the US Air Force and accept a commission in the US Space Force?" It sounded like I was joining the French Foreign Legion at the time, is what it sounded like. "Yeah" I said, "why not? Sounds like fun." That's exactly what I said. And it's been interesting to be a Guardian here these past two years. But I also get to serve as a Guardian in United States Space Command alongside warfighters from other branches of our Armed Forces. And I get to come to work every day, and my focus is not on programs. It's not necessarily on budgets. I get to focus on, *How to defeat our adversaries in the next war?* How do we make sure that our space capabilities are available to joint warfighters around the globe, and how do we protect and defend those space capabilities on orbit? So, it has been a fun ride. It's a terrific job to have. And I sometimes measure, by the way, how excited I am about a job by how quickly I get up in the morning to go to work. And in this job, I'm getting up pretty darn quick.

We'll talk a little bit more about Space Force and Space Command, but let me get to what I think is the heart of the intellectual thought I wanted to propose to you today. And that is this: welcome to the Third Space Age.

Now most of you have been thinking about space the last couple of days, so hopefully everything you've thought, maybe this will fit into it, this template that I'm going to describe to

you. I believe that we have entered the Third Space Age. When was the first space age? Well, it starts at the beginning. We can discuss where those beginnings were. Was it Sputnik? Was it even further back? Was it when we first started thinking about putting satellites into orbit? But it extends, I think, right about to the end of the Cold War. And in this era, it was defined mostly by the sectors of national security and civil space.

By civil space, I mean mostly the Mercury, Gemini, and Apollo programs that happened...that were part of a contest...a contest with the Soviet Union, which we started out not looking so good in, folks. The first picture of the far side of the moon was not taken by an American spacecraft. The first person in orbit was not an American. The first woman in orbit was not an American. We started out slow, but we finally got geared up and made it, and we were the first to the moon. At the same time, there was a lot of effort in national security. And it played a major role, I think, in containment of the Soviet Union and ultimately the winning of the Cold War. And that ranges from what we now can say openly, but we could not say, even when I worked for the National Reconnaissance Office as a captain, couldn't talk about it publicly. Its origins were in the Cold War.

When Gary Francis Powers was shot down in his U2, we no longer could overfly the Soviet Union with aircraft safely, reliably, and consistently. We had to find another way. The National Reconnaissance Office came into being as a way to understand what was going on in the rather hermetic Soviet Union.

And then we could even fast-forward in the 1980s to the Strategic Defense Initiative, which was really focused on space technologies. We actually never fielded a lot of the capabilities that we were planning, but SDI sure captured the Soviet Union's attention. This probably contributed to the early collapse of the Soviet economy and the end of the Cold War. That's the first space race, folks, mostly national security and civil sectors.

The second space race started somewhere ... you know, history doesn't like to give us really bright lines, right? But if we have to look for a time, it's probably 1991, 1992, the collapse of the Soviet Union and then a rather remarkable agreement in 1993 between the President of the United States and the President of Russia to cooperate in space. Up to that point, they'd been developing their space stations on their own. We were looking to develop our own space station with our allies, and we agreed to cooperate. And then, in a remarkable fashion, civil space turned into an international endeavor in low earth orbit that started out with the former Soviet space station Mir, and then culminated in the International Space Station in the early 2000s, which to this day represents multiple nations, including the Russians.

\*\*\*What else happened in that second space age? I would call it linear development in many sectors. It was expansive, but it was linear. There was very little commercial in the first

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space age. Yes, we got our MTV through satellites, but there was very little. And it continued in a linear path. We increased geosynchronous satellite communications. We brought GPS into the game, which was a big game changer. It actually started in the Cold War, but then got pushed into the commercial and civil sector where everybody could use it. And we started to develop other commercial capabilities in that second space age, but they were rather linear in nature, just a continuation of what we'd been doing, but on a broader scale.

And then when it came to national security, what did we do? During the Cold War, we actually faced threats in space. If we were going to have a strategic confrontation with the Soviet Union, there were going to be satellites held at risk that supported that strategic confrontation. That went away when the Soviet Union went away, and we entered the second space age, a period of a rather...fairly benign domain. We were not under threat. And we developed our capabilities accordingly. They weren't necessarily built to withstand threats, but they were built to be as capable as they could to support terrestrial warfighting. And I spent the lion's share of my career doing that. Making sure the GPS was as accurate and available as possible to any warfighter, whoever they were, in the Middle East, out on the high seas, in the air; that SATCOM was as versatile and capable and omnipresent as it could possibly be; that missile warning transitioned from just detecting strategic threats to our homeland to detecting tactical ballistic missiles and other kinds of events that could be seen from space. Such things marked what we did in national security in the second space age.

And from the intelligence perspective, the National Reconnaissance Office (NRO) came out of the closet, didn't need to be secret anymore. A lot of their capabilities stayed classified, but they did much the same that we did on the military side, and that was to just make their capabilities better and better, better to understand what was happening on the surface of the Earth.

But then things started to change. And we started to see signs that we were shifting into another age. The first sign was in 2007. We saw China blow up one of its own satellites in fairly high Low Earth Orbit; thousands of pieces of debris from that event are still on orbit that we're still tracking today. But I think the real kind of shifting point happened between 2015 and 2019. We saw shifts happening in nonlinear fashion across all of the sectors of space. Let's start with commercial shifts such as the first time that SpaceX landed a booster that was reusable, which came back and landed at LZ1 at Cape Canaveral. It was also the year that they announced that they were going to start building the Starlink constellation, which was a revolutionary, nonlinear change in satellite communications. We weren't doing communications only from geosynchronous anymore. It was going to be a constellation of proliferated satellites in Low Earth Orbit. And we saw an explosion.

We had seen an increase in the second space age, but starting just a few years ago, we saw an explosion in commercial imaging from space with multiple companies producing large numbers of satellites capable of producing imagery that the NRO would have been really jealous to have had in the 60s and 70s. Pretty, good stuff. That's the commercial sector change.

On the civil sector, we made the announcement that we're going back to the moon. Low earth orbit was kind of an intermezzo period with the International Space Station; we're going back to the moon and we're going to go back there permanently to stay, and then from there to Mars. And NASA made these announcements and announced these programs just within the last few years. That was a nonlinear change in civil space.

And then from a national security perspective, we realize now the Chinese could have done this after they did their test in 2007. They could have said, you know, this is a bad idea... this idea of space weapons could be a problem ... we're going to stop all of our space weapons programs. It could have been similar to something we kind of did back in the 1980s. We actually did blow up one of our own satellites using an F15 in 1985, and we saw all the debris that it caused—which is much lower orbit by the way, so it has long since come back. We said that's a bad idea. They didn't do that. They continued to develop counter space capabilities to come after our space capabilities. That drumbeat continued. Russia did the same thing ... continued to develop new and more diverse kinds of counter-space capabilities. And so, we came to the realization we're going to have to do something about this.

We stood up [what is now called] the National Space Defense Center in 2015 out at Schriever Space Force Base, in eastern Colorado Springs. And then in 2019, as you know, we stood up U.S. Space Force and U.S. Space Command. Now, we used to have a United States Space Command, from 1985 until 2002. It started in that first space age, continued into the second space age, but we actually stood it down in 2002, after 9-11 and the establishment of the Department of Homeland Defense and Northern Command. We moved those functions because it was [then] a benign domain. It could be managed a bit more easily; we moved those functions into U.S. Strategic Command.

Well, there was a realization that because of those events I've described to you, we needed to have a US Space Command again. We needed a combatant command focused on the space domain exclusively as its mission, day in and day out, there to protect and defend our capabilities in space and to make sure that we deliver those space capabilities to the terrestrial domains. So, we stood that up in 2019. And then we stood up a Space Force just a few months later.

The idea of a Space Force, by the way, was not new in 2019. It wasn't new in 2017 or 2016. It's been around for a long time. It really goes back almost to the beginning of the

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second space age and the end of the Cold War. The idea that we would have a separate branch of service or a corps that would be responsible for space...we just finally reached a tipping point in 2019 where we needed to do this because the threats were getting worse and our needs to be able to address those threats were growing. I'd suggest to you that the joint warfighter today relies more on space than she or he did yesterday and will rely more on space tomorrow than she or he does today.

And that curve does not seem to be changing its inflection anytime soon. We're getting better and better at using space capabilities across our joint force and, by the way, the same goes for our entire society. We're getting better and better and more dependent on space in our society writ large than we ever have before, and that doesn't show any signs of slowing down. It's for those very reasons that our adversaries have developed counter-space capabilities. Just imagine for a second, run a thought experiment. You're on the general staff in China or Russia and you're thinking, how do we beat the United States? You know they've got terrific technology. They've got the ability to project power across the planet. They have the best leaders. And the best personnel. Across the entire planet, when it comes to their military, by the way, I believe we do and that extends through all ranks...particularly our SNCO ranks, by the way, compared to the others. How do you beat the US?

Well, you know what? They're really reliant on space, and the further away from their homeland they have to operate, the more they need space to do what they need to do. Oh...and look! They don't seem to have built these satellites...these space capabilities...to be prepared for threats. We didn't. So, is it illogical, is it surprising to us that our adversaries would develop counter-space capabilities to come after us?

I'll give you a quick analogy. Really, our satellites that we have in Geosynchronous Orbit that we put up over the last thirty years are analogous to super tankers or mega container ships on the high seas. They're very capable, but they were built for efficiency, and they were built to deliver their effects, deliver their cargo across a benign domain to a far shore. That's how we built them. And they did that job very, very well. Who wants to be on the bridge of a super tanker when it comes under attack by torpedo or anti-ship missile?

Actually, you all are so smart, you could probably figure out some tactics to fool the enemy a little bit, but it probably is a losing venture in the long term. We've got to change our thinking, and that's what we're doing. How do we defend those capabilities and how do we actually change our architectures to be ones that are not those super tankers or mega container ships, that are fast freighters, and a lot of them. Probably, [this] is where we're headed.

So, that's why we have a Space Force; that's why we have a US Space Command; and that's in the national security sector. What's interesting, the most important dynamic for you to take away on this third space age is the conjunction of the space sectors. Now, I choose the

word conjunction deliberately. It's actually a great space word. Some of you were *Schoolhouse Rock* fans, so you're thinking of it a different way. But the word conjunction actually goes back to ancient Greek astronomy and describes when two objects in the night sky came close to one another, as in *Jupiter and Saturn are in conjunction*. The conjunction of the space sectors...they're closer and more interdependent in our society today than they have ever been.

Let me give you a few examples. One of them was in the headlines today, and I'm sure some of you talked about it in the Assembly [64<sup>th</sup> Academy Assembly]. It used to be [that] the commercial sector didn't need to worry much about being attacked by a potential adversary out there. They never thought about that. They were just going to operate and stay out of everybody's way in space. Well, it turns out that when that commercial capability is being operated, and the services for that commercial capability are running against your warfighting plans, that becomes a target. That's exactly what the Russians are looking to do against Starlink and some of the commercial imaging satellites that we see out there today.

Now, I can understand that. My counterparts...and, by the way, we should always be thinking about what our counterparts are thinking, right? That should be one of the first things you're doing in your profession is trying to get inside their head and understand what they're thinking. My counterparts in Russia do not like Starlink. They do not like Maxar. Because it's exposing them and showing not only Ukraine, but the world, what they're doing. It's not allowing them to maintain secrecy in their operations and it's exposing a lot of what they're doing. They don't like them. Those [systems] are going to come under threat. So, the commercial space sector now has to think about security. There's a conjunction in those sectors.

What about commercial and civil? Well, also a remarkable thing that happened near the beginning of the third space age was NASA giving contracts to commercial companies to take people into space. This was unthinkable just a decade ago. Why would we do that? We've never done that before. NASA builds its own rockets, its own capsules, and puts people into space. We're going to outsource this? We're going to contract this out? It looks to have been a brilliant move. It [has] actually freed NASA to really look at now getting back to the moon with Artemis and Orion and let SpaceX, and hopefully Boeing here soon with Starliner, be the ones to take astronauts to the space station, and it's having a spinoff effect as we're seeing in terms of space tourism too. It's having a spinoff effect into the commercial sector. So, there is a conjunction there between the civil and the commercial sectors.

And there is a conjunction between the national security sector and the civil sector. Actually, there always has been. It's just tighter and getting bigger than it ever [has been] before. At the very beginning of manned space flight, the Department of Defense was there. It



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wasn't a civilian naval craft that pulled Alan Shepard out of the water after Mercury. It wasn't civilian or contractor craft that pulled the Apollo astronauts out of the water. It was the Department of Defense. And what we've been doing even more recently through the entire second space age in the era of the shuttle and the space station is that the Department of Defense has been fulfilling the role of warning NASA if there's a conjunction between any of their craft in space and any debris or other satellite or other objects that are in orbit.

That's a mission being conducted today by a US Space Command unit out of Vandenberg Space Force Base. We have a squadron that's devoted to watching what's going on, cataloging everything that's in orbit and analyzing that to see if there are threats to the ISS or to other satellites. They issue out messages to potential owner-operators where they may be in danger of a conjunction and many of them will maneuver to avoid a possible collision. NASA just did this with the ISS this past week, just in the last few days, did another one.

So, that [has] always been there, but as NASA and our allies that have joined NASA go back to the moon, you can bet the Department of Defense is going to be part of that. We're already part of possible recovery of the astronauts for the commercial crew if there's a problem on launch or if they come back and don't land where they're supposed to. It's the Department of Defense that's going to go get them. As Artemis goes to the moon, they're going to need to know if there [are] any objects in their way in the entire cislunar environment, and we're going to be there to help them with that as well.

So, the question is, what aren't we thinking about in this conjunction of the space sectors? Where is there going to be continued synergy, continued need for partnership in ways that we've never done before, in tighter and tighter ways, in order to continue to do what we need in space and to stay ahead of our adversaries? If the space domain of the first space age was like the Arctic Ocean, fairly sparse, and the only kinds of things going on in the Arctic Ocean were probably national security related or a little bit of exploration, the space domain of today, at least the earth-moon gravity well, is like the Mediterranean.

There's a lot going on and a lot of different actors of a lot of different sizes. And yes, there can and will be mischief going on in that environment. Let's talk a little bit more now about what our job is at Space Command, day in and day out. You'll notice that I have behind me a picture of what we consider to be our relevant strategic space as it is right now. And it's kind of inverted from most pictures you will get. We're looking back from the moon, down back to the earth. The actual assignment to United States Space Command of what we're responsible for...and we do have an Area of Responsibility, by the way, it's the first one ever assigned to any military organization in military history that is not on the surface of the planet. It's not a geographic Area of Responsibility. It's an astrographic one, the first one ever. And

it's defined as starting at 100 kilometers above mean sea level and extending outward indefinitely. If you do the math, that is a very large Area of Responsibility. It is the entire universe minus the planet Earth and a little bit of atmosphere.

General Dickinson likes to remind Admiral Aquilino, who is the Commander of US Indo-Pacific Command, that he has the *second* largest AOR in the Department of Defense. But let's be a little realistic. We're not exactly looking at security issues around Alpha Centauri...yet. But we are interested in this strategic space here. You know, you can't treat the earth-moon gravity well as...you can't divide it up. It's a continuous astrographic feature. It doesn't have a bright line that says, all activity stops here, and you don't have to worry about anything beyond here. It's continuous. And there are actors operating within this entire gravity well. There are Chinese satellites on the far side of the moon providing communications to their rover that is on that far side of the Moon and back to Earth, orbiting the LaGrange point, a stability point in the earth-moon system. You can put a satellite in an orbit around that [point]. Folks, the earth-moon gravity well is our strategically relevant space to us, it's the one we're focused on at U.S. Space Command.

And the biggest challenge we have is understanding what is going on in that immense volume. Indo-Pacific Command talks about a tyranny of distance. We talk about a tyranny of volume. There's a lot of places you can hide in this space right here. And we need to understand what's going on to make it transparent, not only for national security reasons but also to incentivize economic development and to make safe the civil activities we're going to see as Artemis goes back to the moon. It's a pretty exciting time for all of us. So, I'll close my official remarks here and say when we look at the historical patterns we've seen, it's important to realize that in this new space age, we have to think about things a little bit differently, and it makes us think about the context, think about how the dynamics have changed, anticipate those dynamics, and find ways to take advantage of them and seize opportunities.

My career [of] military service started when I became a cadet here in July of 1986, at the tail end of the First Space Age. I've spent most of my career in the Second Space Age and only the last few years into the Third Space Age. Those of you, when you commission, and whether it's into the Space Force or the Air Force, space will be important to what you do and more important every day that you're in your job and in your career. I think it's pretty exciting to think you're going into the Third Space Age. You'll see what plays out in that, and who knows what comes after. In the words of the poet from Europe, we have "so many light years to go and things to be found." That's the Swedish rock band, *Europe*. "Final Countdown," 1986. Alright, with that, I hope that I gave you something to think about, and I really look forward to hearing what's on your minds.