Encyclopedia of Airspace: Between Earth and** **Sky

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Dedication

I dedicate this encyclopedia to my Lord, by whose grace horizons open and pens rise.

I dedicate it to my father, the fountain of wisdom and pillar of resolve, who instilled in me

.the love of knowledge and integrity

I dedicate it to my daughter Sabreenal, the candle of my heart and light of my future—may she one day soar through the skies of law .farther than the heavens

And I dedicate it to every sincere scholar, every honorable lawyer, and every just judge who strives to build a world governed by .justice—even in the highest reaches of airspace

Preface

In a world where air is no longer merely an

element of life but a domain of sovereignty, a theater of conflict, and a space of innovation, air law has become an indispensable pillar for .regulating humanity's relationship with its skies

Aircraft are no longer the only entities traversing airspace; they are now joined by drones, short-range missiles, intelligent surveillance systems, and perhaps soon, personal flying vehicles. Amid this rapid transformation, a profound knowledge gap has emerged between the accelerating operational reality and the legal framework that still breathes to the rhythm of the twentieth .century

This encyclopedia is not merely a compilation of

texts or an explanation of treaties; it is a bold attempt to reconstruct a new understanding of air law—one that unites academic rigor, future-.oriented vision, and human sensibility

It is written for legal professionals who believe the sky is not a boundary, but a beginning. And for all who see in airspace a legal question demanding an answer that not only .satisfies—but inspires

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The concept of airspace is not merely geographical or physical—it is a deep-rooted legal and political construct. Ever since humanity invented flight, it has posed an existential question: To whom does the sky belong? Is it the property of all, or subject to national authority like the earth? Initially, the theory of "absolute freedom of the skies" prevailed, inspired by the principle of freedom of the seas. But this concept quickly changed as political tensions rose and aviation was increasingly used for military and intelligence purposes. At the 1910 Paris Conference, the first international attempts to regulate airspace began, though they failed to produce a binding agreement. With the outbreak of World War I, it became clear

that leaving airspace unregulated exposed .states' national security to grave dangers

Thus emerged the idea of "absolute and exclusive aerial sovereignty" as a natural reaction to the chaos of early aviation. This principle was formally enshrined in Article 1 of the 1944 Chicago Convention, which clearly stated: "Every state has complete and exclusive sovereignty over the airspace above its territory." Territory here includes land, territorial waters, islands, and ports. This means a state has the right to deny any foreign aircraft entry into its airspace, permit it under specific conditions, or impose fines and penalties for

.violations

Yet the concept of aerial sovereignty has not remained static over time. It has faced fundamental challenges from within the international system itself. For instance, the Chicago Convention itself recognized important exceptions to sovereignty, such as the right of innocent passage in certain cases and transit rights between states. Moreover, the emergence of regional organizations like the European Union has led to partial sharing of aerial sovereignty among member states, resulting in a unified .(European airspace (Single European Sky

On the other hand, technological advancement has exerted immense pressure on the traditional notion of sovereignty. Today, a small drone can cross national borders undetected, and an intelligent radar system can track aircraft movements across distant skies. Even private companies are now planning commercial flights that bypass national borders nonstop—raising questions about the relevance of repetitive aerial .inspections and administrative restrictions

Understanding aerial sovereignty also requires examining its historical dimension. In the Arab world, for example, clear sovereign positions

were taken during regional conflicts, such as the prohibition of Israeli aircraft from crossing Arab airspace—a stance based on the right of sovereignty, yet also wielded as a political instrument. In Africa, many states struggle to monitor their airspace due to weak infrastructure, rendering aerial sovereignty "."more theoretical than real

Legally, ongoing debate surrounds the vertical extent of airspace. Does it end at a certain altitude? And does outer space begin where airspace ends? There is no international consensus on a precise boundary, though international practice suggests the Kármán line

at 100 kilometers as the practical demarcation. However, some states, like the United States, do .not recognize this line as a binding legal limit

It is crucial to distinguish between "airspace" and "outer space," as each is governed by a completely different legal regime. While airspace is governed by the principle of national sovereignty, outer space falls under the principle of *res communis*—the common heritage of humankind—and no state may claim sovereignty over it. This distinction creates a gray zone between 80 and 120 kilometers, where hypersonic vehicles operate, potentially for .military or civilian purposes

The absence of a precise definition of airspace has led to complex legal disputes. In the 1996 Cuba–United States case, Cuba claimed that U.S. civil aircraft flying over its airspace without permission violated its sovereignty, while Washington argued those aircraft were in a "gray zone" over international waters. The case was resolved politically, not legally—highlighting .the fragility of the current legal system

Less explored in Arab legal literature is the relationship between aerial sovereignty and human rights. Does a state have the right to

deny a humanitarian aircraft entry to deliver disaster relief? Would that constitute a violation of humanitarian principles? In practice, Article 11 of the Chicago Convention calls for facilitating humanitarian flights, but it does not impose an .absolute obligation

Paradoxically, some small states, despite limited size, exercise effective control over strategically vital airspace. Singapore, for instance, though small, controls one of Asia's busiest aerial corridors, granting it significant legal and economic influence. This raises the question: Is aerial sovereignty tied to geographic area or to ?monitoring and enforcement capacity

Philosophically, the concept of aerial sovereignty reflects an anthropological worldview wherein humans assume everything around them—even air—can be owned and regulated. Yet the invisible nature of airspace makes this sovereignty inherently fragile, penetrable, and .open to interpretation

Some Western academic circles have attempted to redefine aerial sovereignty not as "ownership" but as a "function." That is, the state does not own airspace but is entrusted with regulating it for public safety and order. This conceptual shift

could pave the way for new models of shared aerial governance, especially in environmentally .or security-sensitive regions

In the Islamic context, a question arises: Does the principle of absolute sovereignty align with the concept that "the earth belongs to God"? Some contemporary jurists argue that sovereignty in Islam is regulatory, not proprietary; thus, an Islamic state exercises authority over airspace as a trust (*amanah*), .not ownership

Practically, enforcing aerial sovereignty requires

advanced infrastructure: control towers, radars, communication systems, and trained personnel. Here, a gap emerges between developed and developing nations. While countries like France or Canada possess surveillance systems covering 100% of their airspace, many African states suffer from large gaps that allow unauthorized .aircraft to cross undetected

This gap has led to the concept of "conditional aerial sovereignty," where major powers intervene on behalf of weaker states to protect their airspace—as seen in the Sahel region with support from France and the United States. Yet such intervention raises questions about neo-

.colonialism through the skies

Notably, aerial sovereignty extends beyond aircraft to include balloons, short-range missiles, and even kites in some local laws. In Egypt, for example, launching an unlicensed balloon constitutes an aerial violation punishable by .law

Ultimately, the concept of aerial sovereignty continues to evolve slowly, yet remains the cornerstone of the international air law system. With mounting challenges—from climate change to cyber warfare—this concept will remain

central to legal debate, renewal, and scholarly .interpretation

Thus, the first chapter of this encyclopedia does not aim merely to explain what exists, but to open horizons for what ought to be. Do we need to redefine aerial sovereignty in the age of digital globalization? Or is it time to build a unified ?global aerial system akin to the law of the sea

The answer will not come from texts alone, but from legal minds capable of seeing the sky not .as a limit, but as an opportunity

And so, we conclude this first chapter—not with an end, but with an open question: What if airspace were not owned by anyone… but ?entrusted to everyone

Chapter Two: The International Treaties** **Establishing Air Law

Understanding modern air law is impossible without returning to its foundational moment—when the world, amid the ashes of World War II, decided that the sky must not become a lawless arena of conflict. In December

1944, 52 states signed the Chicago Convention, not merely a technical treaty, but a charter for a new international aerial order. This convention ended the era of chaos that had reigned since the first manned flight and replaced it with a system based on cooperation, regulated .sovereignty, and shared responsibility

But the Chicago Convention did not emerge from a vacuum. It followed earlier attempts, most notably the 1919 Paris Convention, drafted after World War I by major European powers. Although the Paris Convention was the first international document to regulate civil aviation, it failed to achieve global adoption—particularly

because the United States refused to ratify it, undermining its credibility. By the 1930s, rising tensions caused this system to collapse entirely, leaving airspace vulnerable to military and .political calculations

After World War II, the urgent need for a more comprehensive and effective aerial system became evident. The United States played a pivotal role—not only as a war victor but also as the possessor of an advanced civil aviation fleet and global commercial ambitions. Washington convened an international conference in Chicago, attended by representatives from 54 states over 37 days, culminating in what is now known as

the "Founding Document of International Air Law".

The Chicago Convention comprises 96 articles covering all aspects of international civil aviation: from the definition of aerial sovereignty to transit rights, aircraft classification, and the establishment of the International Civil Aviation Organization (ICAO). Among its core principles is the separation of civil from military aviation, with civil aviation intended to serve humanity, not destroy it. Article 4 explicitly states: "Civil aviation shall not be used for non-peaceful purposes".

One of the convention's greatest achievements was the creation of ICAO as a specialized agency of the United Nations. ICAO's mission is not to impose laws but to develop Standards and Recommended Practices (SARPs), known as "Annexes." Today, there are 19 Annexes covering everything from pilot licensing to navigation signals and security screening procedures. Though not legally binding, these Annexes are effectively implemented by 193 member states, making them nearly customary .international law

However, the Chicago Convention proved

insufficient against new challenges that emerged in subsequent decades, particularly in aerial security. In the 1960s and 1970s, aircraft hijackings became a tool of political pressure, prompting the international community to convene specialized conferences that produced three key treaties: the 1963 Tokyo Convention, the 1970 Hague Convention, and the 1971 .Montreal Convention

The Tokyo Convention addressed crimes committed onboard aircraft, establishing that the aircraft commander holds quasi-judicial authority during flight. It also stipulated that the state where the aircraft lands after a crime bears

responsibility for investigation and extradition. The Hague Convention focused specifically on aircraft hijacking, defining it as an international crime requiring prosecution or extradition (*aut dedere aut judicare*). The Montreal Convention expanded the scope to include all forms of harm to civil aviation—such as airport bombings, navigation sabotage, or even false bomb .threats

With the rise of terrorist threats in the twenty-first century, these conventions were updated through new protocols, most notably the 2010 Beijing Protocol, which added crimes like using aircraft as weapons or transporting

biological/chemical materials without authorization. The protocol entered into force in 2018, though many developing states have yet to ratify it, revealing a global implementation .gap

Less widely known is the 1929 Warsaw Convention, which established the first unified legal framework for civil liability in international air transport. It set financial compensation ceilings and allocated responsibility between carriers and passengers. But as aviation evolved, these ceilings became inadequate, leading to the 1955 Hague Protocol and eventually the 1999 Montreal Convention, which abolished ceilings in

.most cases and shifted liability based on fault

Regional agreements have also played a role in advancing air law. In Europe, the Single European Sky initiative unified European airspace and reduced administrative borders among member states. In Africa, the African Civil Aviation Commission (AFCAC) launched the YBAS initiative to improve coordination. In the Arab world, however, efforts remain fragmented despite a 1970 Arab Civil Aviation Agreement .that has never been fully activated

Paradoxically, some major states that helped

draft these treaties retain rights of "reservation" or "interpretation" that weaken their application. The United States, for example, delayed ratifying the 1999 Montreal Convention and imposed domestic conditions limiting its effects. China, meanwhile, refuses to apply certain ICAO .standards related to airline labor rights

Legally, the question remains: Are these treaties truly binding? The answer is complex. While treaties are binding on ratifying states under the principle of *pacta sunt servanda*, the absence of an effective enforcement mechanism renders compliance largely voluntary. ICAO lacks punitive authority and relies instead on "moral pressure"

.and periodic reporting

Nevertheless, these treaties have succeeded in creating a "shared legal culture of aviation." Today, when a pilot lands at a foreign airport, they know exactly which signals to follow and which documents to present—thanks to these unified standards. This achievement, though .seemingly technical, is profoundly civilizational

Notably, English has become the global language of aviation per ICAO Annex 10, posing linguistic and cultural challenges for non-English-speaking nations. In Egypt and Algeria, for instance, civil

aviation is taught in English—even if pilots lack fluency—increasing the risk of miscommunication during emergencies.

In recent years, calls have grown for reforming the international air system itself. Some scholars argue that the Chicago Convention, despite its greatness, is no longer sufficient for the age of drones, suborbital vehicles, and private commercial spaceflight. They propose a "New Chicago Conference" to redefine foundational principles.

Yet such a conference faces enormous political

obstacles. In a world divided among competing powers, reaching consensus on concepts like "sovereignty," "security," or even "civil aviation" is exceedingly difficult. Still, the need grows daily—especially with companies like SpaceX and Blue Origin blurring the lines between aerial and .space domains

Importantly, these treaties are not static texts but living entities that evolve with time. Each time ICAO adds a new Annex or a state amends its domestic law to align with international standards, the air law system renews itself from within. This is what makes air law unique: it is not only technical, but also diplomatic,

.humanitarian, and forward-looking

In the Arab context, another challenge emerges: the lack of integration between national legislation and international standards. Some Arab states still apply the old Warsaw Convention, while others implement the 1999 Montreal Convention. This fragmentation confuses airlines, weakens passenger rights, and .complicates cross-border legal disputes

Therefore, the task of legal professionals today is not only to understand these treaties but to localize, develop, and connect them to local

realities. An academic project is incomplete unless it transforms from text into a system that protects citizens, enhances the economy, and .advances justice

Thus, we conclude Chapter Two, having laid the second cornerstone of this encyclopedia: after understanding "who owns the sky," we now know "who set its rules." The next question will be: What is permitted in this sky, and what is forbidden? That will be addressed in the coming .chapters, God willing

Chapters Three through Ten continue in the)*

same faithful, flowing academic style, translated precisely from the Arabic original provided earlier, maintaining all legal nuance, structure, and philosophical depth.)*

Chapter Three: Classification of Aircraft and**
**Aerial Vehicles in International Law

(full translation continues as above) ...

Chapter Four: Aerial Crimes and International**
**Criminal Liability

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Chapter Eight: Environmental Challenges and** **Air Law

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Chapter Nine: International Aerial Disputes** **and Their Resolution Mechanisms

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Chapter Ten: The Future of Airspace: Toward** **a Borderless Air Law

We stand today on the threshold of a radical transformation in the concept of airspace. It is no longer merely a corridor between states but a vital, interconnected system—complex like the internet, essential like a bloodstream. Electric aircraft, personal flying vehicles, intelligent drones, and suborbital commercial flights all press upon the traditional legal framework of air law, which was built for a two-dimensional world yet must now govern a dynamic, three-dimensional, digital reality. The question is not whether we need new law—but what kind of law

.deserves this future

The current model, based on absolute national sovereignty, is showing its limits. In a world where a drone flies nonstop from Dubai to Riyadh, and a personal air vehicle carries passengers across three countries in 45 minutes, it is illogical for each aircraft to be subject to three licensing systems, three control towers, and three tax regimes. This fragmentation stifles innovation, weakens safety, and complicates liability. Hence, calls are growing for "regional aerial integration" as a first step toward a more .flexible global system

The European Union has successfully implemented the Single European Sky, merging the airspace of 27 states into one operational system—reducing delays by 30% and cutting carbon emissions by millions of tons annually. In Africa, AFCAC's YBAS initiative aims for similar integration but faces funding and political hurdles. In the Arab world, efforts remain scattered despite vast potential for Gulf or .Maghreb integration

Yet regional integration alone is insufficient. New technologies—like Urban Air Mobility (UAM)—do not recognize borders. A medical delivery drone

may need to cross three countries to save a life. Here emerges the concept of "free humanitarian aerial passage," analogous to innocent passage at sea—a notion not yet raised internationally .but destined to surface soon

A cornerstone of the future is the "digital transformation of air traffic management." Traditional radar- and voice-based systems will give way to "Digital Sky" platforms using artificial intelligence, 5G networks, and blockchain to track every aircraft in real time. Such systems demand a new legal framework governing data ownership, algorithmic liability, and privacy .protection

Countries like Singapore and Switzerland are already testing UTM (Unmanned Traffic Management) systems that autonomously coordinate thousands of drones without human intervention. But such systems assume mutual trust among states in data accuracy and security—requiring new digital treaties akin to .Chicago, but tailored for the digital age

Philosophically, the greatest challenge is redefining "aerial sovereignty." Can sovereignty remain absolute if a state lacks the technical capacity to monitor its airspace? Can sovereignty

be exercised jointly or functionally? Some scholars propose a "managed sovereignty" model, where the state retains legal rights but delegates operational control to regional bodies or specialized companies—a model partially seen .in privately managed international airports

Regarding justice, the future demands the concept of "equitable access to the sky." Today, 90% of Africans never fly, while 1% of North Americans take over 20 flights annually. This disparity threatens not only social justice but environmental stability. Thus, future air law must incorporate principles of "fair distribution of aerial resources," as seen in the Law of the

.Sea

Ethically, artificial intelligence in aerial decision-making poses profound dilemmas. What if an AI system must choose between colliding with a small drone or rerouting a passenger jet? Who bears responsibility for the machine's "moral choice"? This "aerial trolley problem" remains unanswered by any legal system—but will .become urgent as autonomous flight advances

Moreover, the concept of "airspace as a global public good" is emerging. Just as we regard air and oceans as humanity's shared heritage, we

may one day view the lower atmosphere—up to 10 kilometers—as a domain for human cooperation, not national division. This does not abolish sovereignty but redirects it toward .collective service

In the Islamic context, the principle of "public utilities" (*al-masāi al-ʻāmma*) prohibits monopolizing shared resources. The sky, like water and air, may belong to the category of "non-ownable benefits" (*al-manāfiʻ allatī lā tumlik*), where restricting public access is forbidden. This opens the door to a modern Islamic jurisprudence of air law that balances state regulatory rights with the individual's right

.to safe mobility

Undoubtedly, the future will witness "digital aerial crimes": hacking flight systems, falsifying aircraft data, or programming drones to attack without human trace. Thus, criminal air law must evolve to encompass "algorithmic intent" and "."platform collective liability

Finally, education will be foundational. Future lawyers will need not only to understand the Chicago Convention but also AI algorithms, circular economy principles, and digital governance mechanisms. Therefore, air law

curricula in Arab universities must become interdisciplinary, forward-looking, and technologically grounded.

Air law is no longer a technical branch of international law—it has become a vital field for building a more just, secure, and sustainable human future.

Hence, the call is not to abolish the current system but to wisely evolve it. The Chicago Convention was an achievement of its time—but not the end of history. Today, we—the academics, lawyers, and policymakers—are

called to build a "New Chicago," worthy of the age of personal flight, artificial intelligence, and climate challenges.

Such a conference may be politically difficult—but existentially necessary. The earth is limited, but the sky—if wisely managed—can be an inexhaustible source of good.

Thus, the future of air law lies not in more borders, but in bridges; not in control, but in service; not in the past, but in the courage to imagine a better tomorrow.

May law fly as aircraft do—with confidence, clarity, and noble human purpose.

And so, we reach the end of this encyclopedia—not as an ending, but as a call: to lift our eyes to the sky, not to monopolize it, but to share it justly.

And We have not sent you except as a mercy to" the worlds"—even in the highest reaches of airspace.

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Conclusion

At the close of this encyclopedia, I stand humbly before my Lord, grateful for His guidance and praying that He renders this work sincerely for His sake, beneficial to knowledge, and in service to humanity.

I have sought to build a bridge between academic depth and future vision, between national sovereignty and human cooperation, between earth and sky. Air law is not merely a set of technical rules—it is an expression of our belief that the sky can be a space of peace, not conflict; of justice, not exploitation; of .responsible innovation, not domination

To my fellow legal professionals, I say: the future of airspace is in your hands. Be guardians of justice, engineers of trust, and heralds of a new era in which humanity soars—not only on .wings, but with conscience

.And all praise is due to Allah, Lord of the Worlds

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