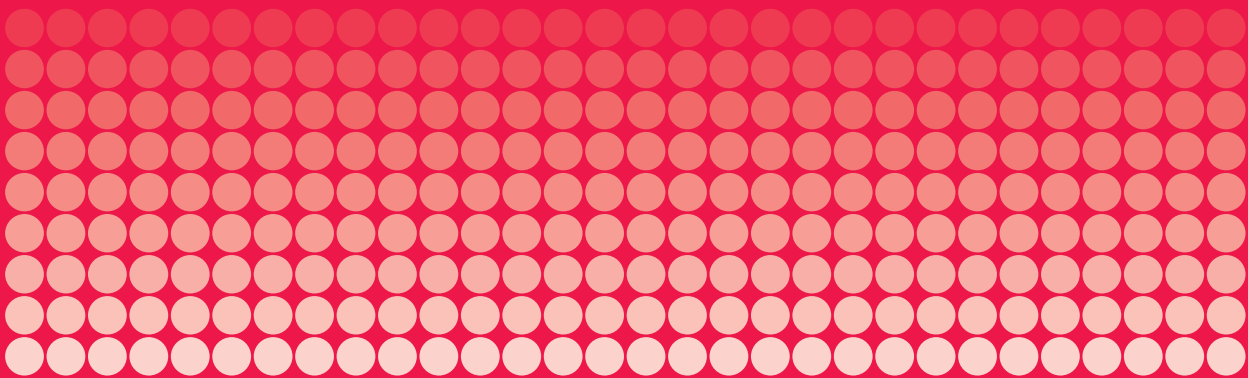


# SIPRI YEARBOOK 2023

Armaments,  
Disarmament and  
International  
Security

**Summary**



# STOCKHOLM INTERNATIONAL PEACE RESEARCH INSTITUTE

SIPRI is an independent international institute dedicated to research into conflict, armaments, arms control and disarmament. Established in 1966, SIPRI provides data, analysis and recommendations, based on open sources, to policymakers, researchers, media and the interested public.

## THE SIPRI YEARBOOK

*SIPRI Yearbook 2023* presents a combination of original data in areas such as world military expenditure, international arms transfers, arms production, nuclear forces, armed conflicts and multilateral peace operations with state-of-the-art analysis of important aspects of arms control, peace and international security.

This booklet summarizes the contents of *SIPRI Yearbook 2023* and provides samples of the data and analysis that it contains.

## CONTENTS

1. Introduction: International stability and human security in 2022	1
<b>Part I. Armed conflict and conflict management, 2022</b>	
2. Trends in armed conflicts	2
3. Multilateral peace operations	4
4. Private military and security companies in armed conflict	6
<b>Part II. Military spending and armaments, 2022</b>	
5. Military expenditure and arms production	8
6. International arms transfers	10
7. World nuclear forces	12
<b>Part III. Non-proliferation, arms control and disarmament, 2022</b>	
8. Nuclear disarmament, arms control and non-proliferation	14
9. Chemical, biological and health security threats	16
10. Conventional arms control and regulation of new weapon technologies	17
11. Space and cyberspace	18
12. Dual-use and arms trade controls	20
Annexes	22



# 1. INTRODUCTION: INTERNATIONAL STABILITY AND HUMAN SECURITY IN 2022

DAN SMITH, SIPRI DIRECTOR

Global security in 2022 showed a marked deterioration compared with a decade ago. Worldwide, there was more war, higher military spending and increased acute food insecurity. As a result of climate change, heatwaves, drought and flooding affected millions of people, with major human and economic costs. International stability was under pressure from the war in Ukraine and from intensifying confrontation between the great powers, which weakened arms control and made diplomacy less effective.

## Food insecurity and geopolitical tensions

The war in Ukraine exacerbated the problem of world hunger. Russia and Ukraine are major producers and exporters of staple foods; output and trade were both reduced by the war and sanctions against Russia. This came on the back of the Covid-19 pandemic, which generated a major spike in global food prices, and a pre-existing trend of steadily increasing world hunger since 2017.

Although the war in Ukraine stands out, Ukraine was only 1 of 56 countries that experienced armed conflict in 2022. The war has, however, played a significant role in corroding relations between the great powers, feeding the growing discordance in global politics that diminishes the capacity for managing and helping to resolve local and regional conflicts and disputes. North-east Asia is the frontline in an increasingly tense and risk-heavy relationship between China and the United States and its allies. The region is further troubled by tensions

stemming from the continuing missile development programme of the Democratic People's Republic of Korea, which conducted over 90 missile tests during the year.

## The war in Ukraine

Russia invaded Ukraine for a second time in February 2022 and full-scale war ensued. Russian forces have systematically attacked civilian targets, causing large-scale urban destruction and, if evidence collected by the United Nations is borne out, have committed abundant war crimes. By the end of 2022 neither side had a clear path towards victory, nor was there a clear path towards a negotiated peace, with the positions of Russia and Ukraine remaining far apart. Data on the scale of human suffering from the war is patchy and unreliable.

## Unanswered questions

As the international system reels under the impact of the war in Ukraine, is there space on the international agenda for action to address even the most shared of problems such as the unfolding environmental crisis? Can energy and a sense of direction in the UN compensate for the lack of global leadership from the great powers? At the end of 2022 these questions had no answer, but it is worth noting that many important international institutions were still functioning effectively for the common good. The new agreement to set up a 'loss and damage' fund for countries most vulnerable to the impact of climate change and the adoption of a new framework for action to halt biodiversity loss were promising outcomes in 2022. But generating the energy and collective action to implement these and other international commitments is particularly difficult in the current international setting. ●



## 2. TRENDS IN ARMED CONFLICTS

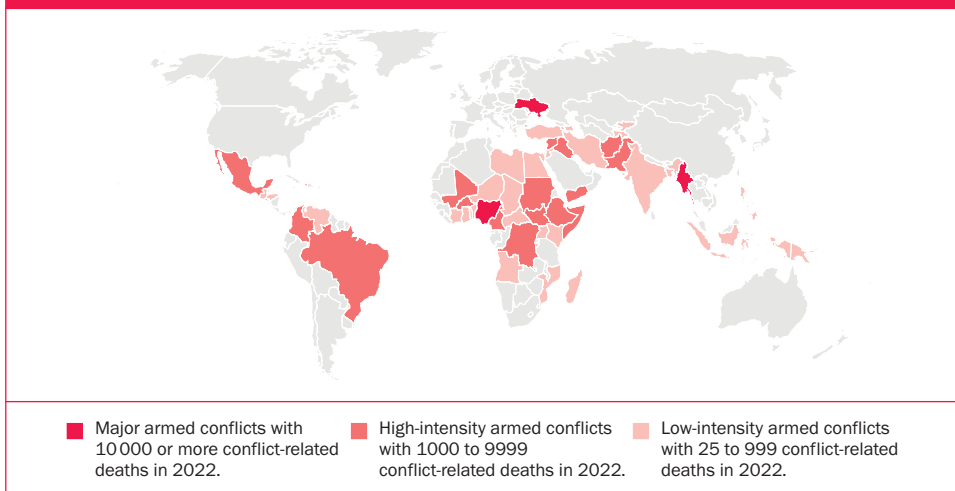
While 2022 was a year of widespread armed conflict globally, the variety and level of violence involved fluctuated significantly between regions. The situation in Ukraine dominated discussion of war and peace but it was the sole example of a major interstate war involving standing armies in the course of the year. Outside Europe, most wars continued to take place within states—or in clusters of states with porous borders—and to involve non-state armed groups ranging from transnational jihadist networks and criminal gangs to separatist forces and rebel groups.

The total number of states experiencing armed conflict was 56, which was 5 more than in 2021. Three of these armed conflicts (in Ukraine, Myanmar and Nigeria) were definitely classifiable as major conflicts involving 10 000 or more estimated conflict-related deaths. It is likely that the Ethiopian civil war also passed this threshold, as tens of thousands of deaths are widely believed to have taken place,

even though there is no firm data available. In addition, 16 further cases were intensive armed conflicts involving 1000–9999 such deaths. The total number of estimated conflict-related fatalities was 147 609, slightly below the 2021 figure. This however masks significant regional fluctuations in violence. The level of fatalities in some cases of persistent heavy armed conflict, such as Afghanistan and Yemen, dropped considerably. The number of recorded deaths leapt in Ukraine and fatalities almost doubled in Myanmar. Africa remained the region with the most armed conflicts, although many involved fewer than 1000 conflict-related deaths. There were also two successful coups d'état and three unsuccessful coup attempts in Africa in 2022, while there were none in any other region.

Russia's invasion of Ukraine threatened to increase global instability in 2022, through the disruption of food and energy markets and the undermining of international conflict resolution mechanisms.

### ARMED CONFLICTS BY NUMBER OF ESTIMATED CONFLICT-RELATED DEATHS, 2022



Note: The boundaries used in this map do not imply any endorsement or acceptance by SIPRI.



However, the effects of the war were more muted than initially seemed likely. Nonetheless, economic uncertainty led to a wave of political unrest in many regions. Over 12 000 food- and fuel-related protests were recorded globally in 2022. While these frequently led to individual incidents of violence, they did not escalate into new civil or regional conflicts.

### **International conflict management**

Russia and the Western powers mostly managed to avoid allowing their worsening relations over Ukraine to block diplomacy at the United Nations with regard to other conflicts. The UN Security Council continued to produce mandates for peace operations, sanctions regimes and mediation efforts at a similar rate to 2021. In some cases, such as Afghanistan, Haiti and Myanmar, its resolutions broke new ground, suggesting that the major powers still see the body as a conduit for some cooperation. The Security Council and the UN system were, however, unable to find decisive solutions in a series of cases— notably a surge of jihadist violence in the Sahel, mounting violence in the Democratic Republic of the Congo and a breakdown of law and order in Haiti, where the UN already had a role in crisis management.

If the UN managed to muddle through 2022, it was more difficult for Russia's and Ukraine's allies to find space for compromise in the Organization for Security and Co-operation in Europe, while the European Union and the North Atlantic Treaty Organization (NATO) focused increasingly on Ukraine and territorial defence rather than conflict management. Outside Europe, the African Union and sub-regional African entities—including the

G5 Sahel and the Economic Community of West African States—struggled to deal with the parallel challenges of jihadist violence and coups d'état on the continent. Nonetheless, national and multinational forces did succeed in pushing back against jihadist groups in Somalia and Mozambique. In South East Asia, the Association of Southeast Asian Nations made little progress in its efforts at diplomacy over Myanmar.

### **Peace agreements**

Opportunities for peace-making were limited in 2022. The UN succeeded in arranging a truce in Yemen that lasted from April until October—apparently leading to a decline in fatality rates and improved access to aid, despite ongoing violence—while a combination of mediators from African states, Saudi Arabia, the UN and the United States fitfully nudged the military authorities in Sudan to agree a new framework for civilian government following military-civilian turmoil throughout 2021. A successful military drive by the Ethiopian military and its allies forced the Tigrayan People's Liberation Front to sue for a truce in November 2022, which was hurriedly worked out in Pretoria, South Africa, and held reasonably well into 2023. In Colombia, a new left-wing government worked on a peace initiative with a number of armed groups in late 2022, which had made uncertain progress by December. ●



### 3. MULTILATERAL PEACE OPERATIONS

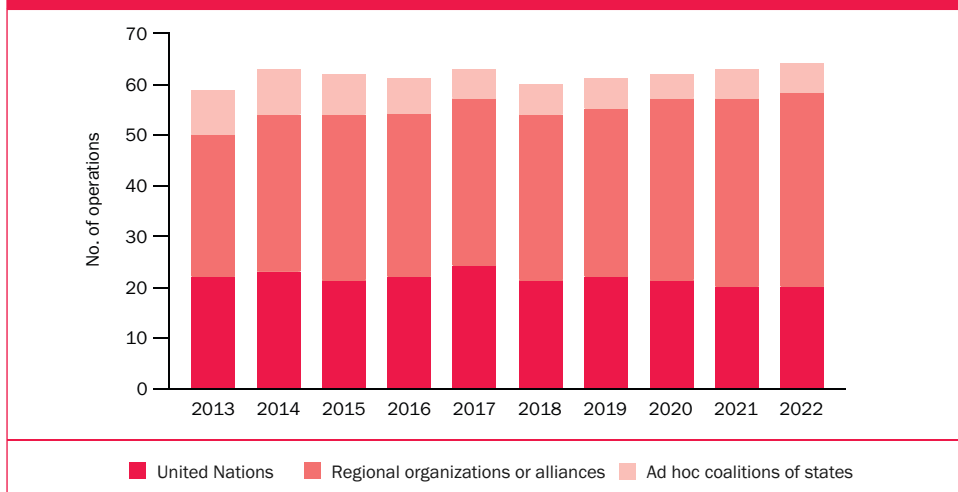
There were 64 active multilateral peace operations in 2022—an increase of one compared with the previous year. Five started in 2022: the Collective Security Treaty Organization (CSTO) Collective Peacekeeping Forces to Kazakhstan; the African Union Transition Mission in Somalia (ATMIS); the Economic Community of West African States Stabilisation Support Mission in Guinea-Bissau (SSMGB); the East African Community Regional Force in the Democratic Republic of the Congo (EACRF-DRC) and the African Union Monitoring, Verification and Compliance Mission in Ethiopia (AU-MVCM). Four ended in 2022: the CSTO Collective Peacekeeping Forces to Kazakhstan; the Organization for Security and Co-operation in Europe (OSCE) Special Monitoring Mission to Ukraine (SMM); the African Union Mission in Somalia (AMISOM); and the International Monitoring Team (IMT) in Mindanao.

The number of personnel deployed to multilateral peace operations globally increased in 2022, breaking a trend of declining personnel numbers between 2016 and 2021. The rise in 2022 mostly reflected variations in personnel deployments to operations in sub-Saharan Africa, which continued to host the most peace operations and personnel. Four of the five new operations in 2022 were launched in the region and all of them by regional organizations. These newly established missions illustrate the increasing regionalization of peace operations and the emphasis on the deployment of uniformed rather than civilian personnel.

#### Fatalities in UN peace operations

During 2022, 74 international personnel (53 military, 13 civilian and 8 police) and 27 local staff died while serving in United Nations peace operations, 21 fewer than in 2021. Even though the total number of fatalities in 2022 decreased, the number of

NUMBER OF MULTILATERAL PEACE OPERATIONS, BY TYPE OF CONDUCTING ORGANIZATION, 2013–22



**NUMBER OF MULTILATERAL PEACE OPERATIONS AND PERSONNEL  
DEPLOYED BY REGION AND TYPE OF ORGANIZATION, 2022**

Conducting organization	Americas	Asia and Oceania	Europe	Middle East and North Africa	Sub-Saharan Africa	World
<b>Operations</b>	<b>3</b>	<b>5</b>	<b>18</b>	<b>14</b>	<b>24</b>	<b>64</b>
United Nations	2	2	2	7	7	20
Regional organization or alliance	1	1	13	6	17	38
Ad hoc coalition	0	2	3	1	0	6
<b>Personnel</b>	<b>306</b>	<b>311</b>	<b>7 567</b>	<b>14 206</b>	<b>92 594</b>	<b>114 984</b>
United Nations	279	301	1 013	12 362	66 553	80 508
Regional organization or alliance	27	..	5 431	693	26 041	32 192
Ad hoc coalition	..	10	1 123	1 151	..	2 284

.. = not applicable.

Notes: Numbers of active operations cover the year 2022, including operations closed during the year. Personnel figures are as of 31 Dec. 2022.

hostile deaths—fatalities caused by malicious acts—increased from 24 in 2021 to 32 in 2022. The UN Multidimensional Integrated Stabilization Mission in Mali (MINUSMA) continued to be the deadliest mission for peacekeepers in 2022, with 25 fatalities registered, 10 fewer than in 2021. The deadliest event in the year occurred in March, when a helicopter assigned to the UN Organization Stabilization Mission in the Democratic Republic of the Congo (MONUSCO) crashed killing eight UN peacekeepers.

**Eroding relations with host governments and growing geopolitical rivalries**

The challenging relations between peace operations and host governments reached a new low in 2022, with the expulsion of UN personnel from the Democratic Republic of the Congo and Mali. The erosion of these relations was intensified by demonstrations in which protestors demanded the closure of UN peace-

keeping operations in both countries given their alleged ineffectiveness. In Mali and the Central African Republic, these difficult relationships were further complicated by the presence of the Wagner Group, a Russian private military and security company, which was accused of participating in human rights abuses and disinformation campaigns. Finally, the war in Ukraine exacerbated already mounting geopolitical rivalries, particularly between Western countries and Russia. This influenced the closure of the OSCE SMM, as well as difficult political dynamics within the UN Security Council. ●



## 4. PRIVATE MILITARY AND SECURITY COMPANIES IN ARMED CONFLICT

### Trends, actors and issues of concern

The past 20 years have witnessed the rapid growth of private military and security companies (PMSCs). There is no universally accepted, legally binding, standard definition of a PMSC and the sector often operates in a legal lacuna: the employees of PMSCs are not soldiers or civilians, nor can they usually be defined as mercenaries. The wars in Iraq (2003–11) and Afghanistan (2001–21) reshaped perceptions of the private military and security industry, with the massive deployment of contractors by the United States leading to new market opportunities across the globe. Factors contributing to the growth of PMSCs vary by region and state, but they mostly fit with cost-efficiency calculations, where the sector provides skills and services that states do not possess or that would be too costly for states to develop or perform themselves.

Today, PMSCs operate in almost every country in the world, for a broad variety of clients, assuming responsibilities for critical state and security functions. The main actors in the sector include both the host countries in which PMSCs are headquartered and key companies within those countries. A handful of home states host the majority of PMSCs: the USA, the United Kingdom, China and South Africa together are estimated to host about 70 per cent of the entire sector. Russia, while having a relatively small PMSC sector, has arguably used its contractors for combat more than other countries.

There are thousands of PMSCs around the world, most of which abide by the law, operate within their mandate and, in general, contribute to stabilization and security in the settings where they operate, often working closely with the United Nations and non-governmental organizations. In the past two decades, however, the rising prominence of several high-profile PMSCs in conflict areas and security settings has prompted increased public interest in the industry.

### Private military and security companies in sub-Saharan Africa

Recent trends concerning PMSC involvement in sub-Saharan Africa suggest that the ascendant actors have close, symbiotic links to home state interests as instruments of national policy and geopolitical competition. Russia and China appear to be driving the current expansion of PMSC activity in Africa, although earlier waves of activity were led by European former colonial powers or were part of cold war proxy rivalries. The current phase of growing PMSC involvement in Africa has occurred in a context of increased geopolitical rivalry and internationalized armed conflict. The control and extraction of natural resources is a common focal point.

Western PMSCs remain active in Africa, especially in various counter-terrorism initiatives, but not in direct combat roles. In contrast, Russian PMSCs, in particular the Wagner Group, engage directly in military operations, typically for governments (and currently juntas or military transition governments) threatened by rebels or insurgents, with payment often in high-value natural resources or mining concessions. The





## THE WAGNER GROUP

Russian private military and security companies have been deployed in combat roles in Libya, Syria and Ukraine, as well as in several conflicts across sub-Saharan Africa. Concerns have centred on the activities of the Wagner Group, effectively a Russian state proxy. The Wagner Group's activities have been linked with human rights abuses, violations of international humanitarian law, problematic and exploitative contracts, and election meddling. In Mali alone, over 450 civilians were killed in nine incidents linked to the Wagner Group in 2020–22. In Ukraine, the Wagner Group has been deployed en masse alongside Russian military units and it has redeployed operators from other conflicts and recruited nationals from Afghanistan, Libya and Syria.

Wagner Group has been the focus of numerous UN reports or investigations for alleged human rights abuses and violations of international humanitarian law in sub-Saharan Africa.

Chinese PMSCs have emerged more slowly and in a more restrained and circumscribed manner, but with a close connection to Chinese investment, infrastructure development and trade expansion. This may portend a more lasting engagement for Chinese interests and actors, including PMSCs, and a greater strategic impact on access to natural resources and, more broadly, sub-Saharan African political dynamics.

### **The current regulatory landscape**

While the use of PMSCs in armed conflicts and fragile environments appears to be growing, questions remain about the adequacy of existing international efforts and norms to regulate the sector. One of the key regulatory challenges is the use of PMSCs, particularly by Russia and

Türkiye, as proxy actors in armed conflicts. These deployments are often framed as lying outside the international legal definition of a mercenary, so some states have turned to counterterrorism approaches instead, for example, by seeking to impose terrorist designations on the Wagner Group or by sanctioning its leading personnel. Cases attempting to hold mercenaries and PMSC personnel to account under criminal justice regimes are rare.

Regulatory endeavours at the UN have been reinvigorated by the war in Ukraine and the activities of the Wagner Group. A UN intergovernmental working group process has been attempting to address the gaps between the international legal provisions addressing mercenaries and the softer regulatory approaches of multistakeholder initiatives addressing PMSCs, such as the Montreux Document and the International Code of Conduct for Private Security Providers. However, consensus on the necessity of a legally binding instrument, let alone substantive content, remains elusive. Several key issues arose in the working group discussions in 2022: states were still unable to agree on whether the instrument should be binding or non-binding and there was lack of consensus on its scope, human rights provisions and the content on accountability and remedies for victims. Discussions will continue at the UN in 2023, but whether they will translate into concrete and credible regulatory change remains to be seen. ●



## 5. MILITARY EXPENDITURE AND ARMS PRODUCTION

Global military expenditure rose for the eighth consecutive year in 2022 to reach an estimated \$2240 billion, the highest level ever recorded by SIPRI. Despite the 3.7 per cent year-on-year increase in spending, world military expenditure as a share of world gross domestic product (GDP)—the military burden—remained at 2.2 per cent because the global economy also grew in 2022. Governments around the world spent an average of 6.2 per cent of their budgets on the military, or \$282 per person.

### Impact of the Russia-Ukraine war

The war in Ukraine had a major effect on both global and regional military expenditure in 2022. Military expenditure in Europe grew by 13 per cent, with most Central and West European countries—some of which were already among the largest military spenders in the world—responding to the invasion with significant increases in military spending. They also made plans for future growth, with some increases stretching until 2033. This suggests that the war, and the ensuing rise in European military spending, will exacerbate the ongoing upward trend in global military expenditure. Most of these allocations are for modernizing military equipment and increasing troop numbers. Germany, for example, plans to make additional efforts to spend 2.0 per cent of its GDP on the military.

Military aid for Ukraine was another cause of the increase in military expenditure in Central and Western Europe and North America: most countries in these subregions either sent financial military aid to Ukraine or spent more to replenish dwindling stockpiles after sending military

### WORLD MILITARY SPENDING, 2022

Region	Spending (US\$ b.)	Change (%) 2021–22
Africa	39.4	-5.3
North Africa	(19.1)	-3.2
Sub-Saharan Africa	20.3	-7.3
Americas	961	0.3
Central America and the Caribbean	11.2	-6.2
North America	904	0.7
South America	46.1	-6.1
Asia and Oceania	575	2.7
Central Asia	1.4	-29
East Asia	397	3.5
Oceania	35.3	0.5
South Asia	98.3	4.0
South East Asia	43.1	-4.0
Europe	480	13
Central and Western Europe	345	3.6
Eastern Europe	135	58
Middle East	(184)	3.2
<b>World total</b>	<b>2 240</b>	<b>3.7</b>

( ) = uncertain estimate.

*Note:* Spending figures are in US dollars, at current prices and exchange rates. Changes are in real terms, based on constant (2021) US dollars.

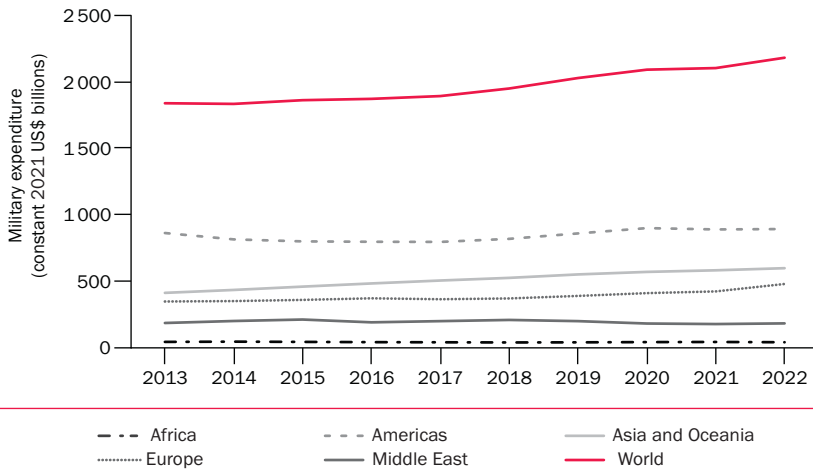
equipment. Ukraine's own military spending rose more than sevenfold, amounting to over one third of the country's economy. Russian military spending also increased, by 9.2 per cent, despite economic sanctions from Western countries.

### Other regional spending patterns

Estimated military spending in the Middle East rose for the first time in four years, by 3.2 per cent. Saudi Arabia is the region's largest military spender, and its 16 per cent increase was the main reason for the regional increase. In Israel, the second largest spender in the Middle East, military spending fell by 4.2 per cent.



## MILITARY EXPENDITURE BY REGION, 2013–22



Spending in Asia and Oceania rose by 2.7 per cent in 2022. China’s ongoing military modernization and increased spending by India and Japan have been major factors pushing up military spending in the region. Japan’s military burden surpassed 1.0 per cent for the third consecutive year and was at its highest level since 1960. Moreover, the government announced plans to increase its total security spending to 2.0 per cent of GDP by 2027. The shift in Japanese security policy is a result of growing regional tensions, especially with China and North Korea. Military spending by China, the world’s second largest spender, rose for the 28th consecutive year, by 4.2 per cent. This narrowed the gap between its spending and that of the United States.

While the USA remained by far the largest military spender in the world, exceptionally high levels of inflation transformed a nominal increase in military spending of 8.8 per cent into a 0.7 per cent real-terms increase. As a consequence, overall military spending in the Americas rose only slightly, by 0.3 per cent.

The only region in which military spending fell was Africa, down by 5.3 per cent. This was the region’s first decrease since 2018 and its largest since 2003. Poor economic performance and natural disasters in the region’s largest spenders led to the fall in military spending despite ongoing security challenges.

### The SIPRI Top 100

The arms sales of the 100 largest arms-producing and military services companies (the SIPRI Top 100) totalled \$592 billion in 2021 (the most recent year for which data is available), 1.9 per cent higher than in 2020 and continuing an upward trend since at least 2015. This growth came despite the continuing effects of the pandemic, most notably the disruption in supply chains, labour shortages and a lack of semi-conductors. The USA continued to dominate the ranking with 40 companies with total arms sales of \$299 billion. ●



## 6. INTERNATIONAL ARMS TRANSFERS

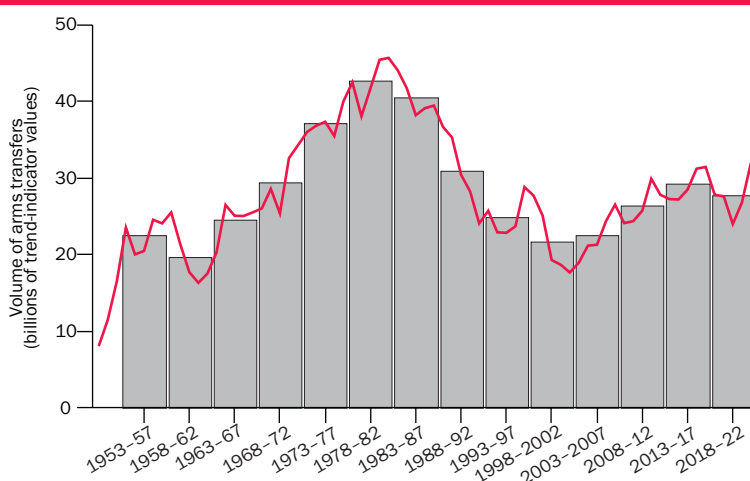
The volume of international transfers of major arms in the five-year period 2018–22 was 5.1 per cent lower than in 2013–17 and 3.9 per cent higher than in 2008–12. The volume of transfers in 2018–22 was among the highest since the end of the cold war, but was still around 35 per cent lower than the totals for 1978–82 and 1983–87, when arms transfers peaked. States’ arms acquisitions, often from foreign suppliers, are largely driven by armed conflict and political tensions. There are strong indications that tensions are increasing in many regions, most notably in Europe after Russia’s invasion of Ukraine, and it seems highly likely that there will be more demand for major arms in the coming years, much of which will be fulfilled by international transfers.

### Suppliers of major arms

SIPRI has identified 63 states as exporters of major arms in 2018–22, but most are minor exporters. The 25 largest suppliers accounted for 98 per cent of the total volume of exports, and the 5 largest suppliers in the period—the United States, Russia, France, China and Germany—accounted for 76 per cent of the total volume of exports.

Since 1950 the USA and Russia (or the Soviet Union before 1992) have consistently been by far the largest suppliers. However, in 2018–22 the USA consolidated its position as the world’s biggest arms supplier and the gap between it and Russia widened. In 2018–22 the USA’s arms exports were 14 per cent higher than in 2013–17 and its share of the global total increased from 33 to 40 per cent. In contrast, Russia’s arms exports decreased by 31 per cent and its share of the global total dropped from 22 to 16 per cent.

### THE TREND IN TRANSFERS OF MAJOR ARMS, 1955–2022



Note: The bar graph shows the average annual volume of arms transfers for 5-year periods and the line graph shows the annual totals.



**THE MAIN EXPORTERS AND IMPORTERS OF MAJOR ARMS, 2018–22**

Exporter	Global share (%)	Importer	Global share (%)
1 USA	40	1 India	11
2 Russia	16	2 Saudi Arabia	9.6
3 France	11	3 Qatar	6.4
4 China	5.2	4 Australia	4.7
5 Germany	4.2	5 China	4.6
6 Italy	3.8	6 Egypt	4.5
7 UK	3.2	7 South Korea	3.7
8 Spain	2.6	8 Pakistan	3.7
9 South Korea	2.4	9 Japan	3.5
10 Israel	2.3	10 USA	2.7

Known plans for future deliveries strongly indicate that the gap between the USA and Russia will increase and that, within a few years, Russia may no longer be the second largest supplier of major arms.

Arms exports by France, the third largest supplier, grew by 44 per cent between 2013–17 and 2018–22, while exports by China and Germany decreased by 23 per cent and 35 per cent respectively.

**Importers of major arms**

SIPRI has identified 167 states as importers of major arms in 2018–22. The five largest arms importers were India, Saudi Arabia, Qatar, Australia and China, which together accounted for 36 per cent of total arms imports. The region that received the largest volume of imports of major arms in 2018–22 was Asia and Oceania, accounting for 41 per cent of the global total, followed by the Middle East (31 per cent), Europe (16 per cent), the Americas (5.8 per cent) and Africa (5.0 per cent). Between 2013–17 and 2018–22, the flow of arms to Europe (+47 per cent) increased, while flows to Africa (–40 per cent), the Americas (–21 per

**IMPORTS OF MAJOR ARMS, BY REGION**

Recipient region	Global share (%), 2018–22	Change (%) in volume of imports from 2013–17 to 2018–22
Africa	5.0	–40
Americas	5.8	–21
Asia and Oceania	41	–7.5
Europe	16	47
Middle East	31	–8.8

cent), the Middle East (–8.8 per cent), and Asia and Oceania (–7.5 per cent) decreased. Many of the 167 importers are directly involved in armed conflict or in tensions with other states in which the imported major arms play an important role. Many of the exporters are direct stakeholders or participants in at least some of the conflicts and tensions, which partly explains why they are willing to supply arms, even when the supply seems to contradict their stated arms export policies.

**The financial value of states’ arms exports**

While SIPRI data on arms transfers does not represent their financial value, many arms-exporting states do publish figures on the financial value of their arms exports. Based on this data, SIPRI estimates that the total value of the global arms trade was at least \$127 billion in 2021 (the most recent year for which financial data is available), compared with \$95 billion (in constant 2021 US dollars) in 2012. The total value of the arms trade in 2021 was about 0.5 per cent of the total value of global international trade in 2021. ●



## 7. WORLD NUCLEAR FORCES

At the start of 2023, nine states—the United States, Russia, the United Kingdom, France, China, India, Pakistan, the Democratic People’s Republic of Korea (DPRK, or North Korea) and Israel—together possessed approximately 12 512 nuclear weapons, of which 9576 were considered to be potentially operationally available. An estimated 3844 of these warheads were deployed with operational forces, including about 2000 that were kept in a state of high operational alert—the same number as the previous year.

### Nuclear arsenals

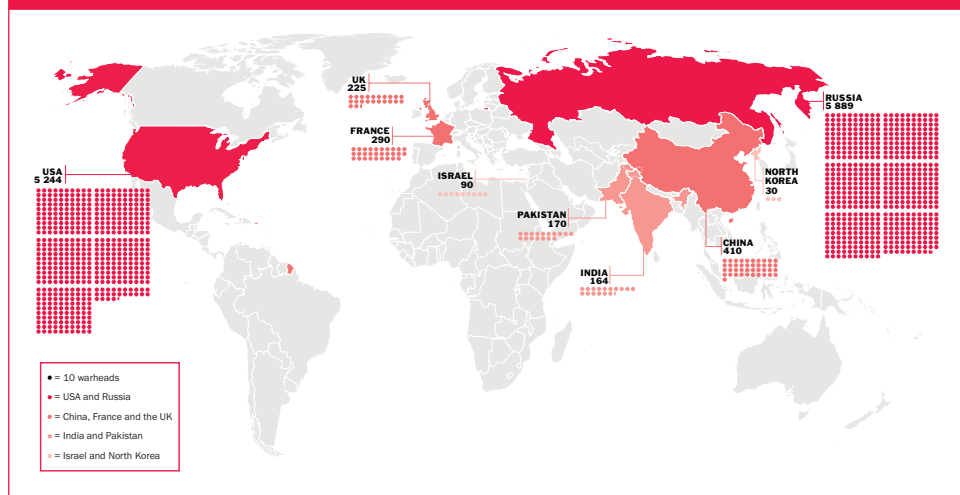
Overall, the number of nuclear warheads in the world continues to decline. However, this is primarily due to the USA and Russia dismantling retired warheads. Global reductions of operational warheads appear to have stalled, and their numbers are rising again. At the same time, both the USA and Russia have extensive and expensive programmes under way to replace and

modernize their nuclear warheads, their missile, aircraft and submarine delivery systems, and their nuclear weapon production facilities.

China is in the middle of a significant modernization and expansion of its nuclear arsenal. Its nuclear stockpile is expected to continue growing over the coming decade and some projections suggest that it will deploy at least as many intercontinental ballistic missiles (ICBMs) as either Russia or the USA in that period. However, China’s overall nuclear warhead stockpile is still expected to remain smaller than that of either of those states.

The nuclear arsenals of the other nuclear-armed states are even smaller, but all are either developing or deploying new weapon systems or have announced their intention to do so. India and Pakistan also appear to be increasing the size of their nuclear weapon inventories, and the UK has announced plans to increase its stockpile. North Korea’s military nuclear programme remains central to its national security strategy and it may have assembled up to

### GLOBAL NUCLEAR WEAPON INVENTORIES, JANUARY 2023



Note: The boundaries used in this map do not imply any endorsement or acceptance by SIPRI.



## GLOBAL STOCKS OF FISSILE MATERIALS, 2022

The raw material for nuclear weapons is fissile material, either highly enriched uranium (HEU) or separated plutonium. China, France, Russia, Pakistan, the UK and the USA have produced both HEU and plutonium for use in their nuclear weapons; and India and Israel have produced mainly plutonium. North Korea has produced plutonium for use in nuclear weapons but is believed to be producing HEU for nuclear weapons as well. All states with a civilian nuclear industry are capable of producing fissile materials.

The International Panel on Fissile Materials compiles information on global stocks of fissile materials.

### Global stocks (tonnes), 2022

<i>Highly enriched uranium</i>	1 245
In or available for weapons	1 100
Not directly available for weapons	
Unsafeguarded	140
Safeguarded/monitored	10
<i>Separated plutonium</i>	
In or available for weapons	550
Not directly available for weapons	140
Unsafeguarded	260
Safeguarded/monitored	150

*Note:* Figures are rounded and may not add up to the given totals.

30 nuclear weapons and could produce more. North Korea conducted more than 90 ballistic missile tests during 2022—the highest number it has ever undertaken in a single year. Israel continues to maintain its long-standing policy of nuclear ambiguity, leaving significant uncertainty about the number and characteristics of its nuclear weapons.

### Low levels of transparency

The availability of reliable information on the status of the nuclear arsenals and capabilities of the nuclear-armed states

## WORLD NUCLEAR FORCES, JANUARY 2023

Country	Warhead stockpile <sup>a</sup>		Total inventory <sup>c</sup>
	Deployed <sup>b</sup>	Total	
USA	1 770	3 708	5 244
Russia	1 674	4 489	5 889
UK	120	225	225
France	280	290	290
China	–	410	410
India	–	164	164
Pakistan	–	170	170
North Korea	–	30	30
Israel	–	90	90
<b>Total</b>	<b>3 844</b>	<b>9 576</b>	<b>12 512</b>

– = nil or a negligible value.

*Notes:* All estimates are approximate. SIPRI revises its world nuclear forces data each year based on new information and updates to earlier assessments. Countries are ordered by date of first known nuclear test. There is no conclusive open-source evidence that Israel has tested its nuclear weapons.

<sup>a</sup> ‘Warhead stockpile’ refers to all deployed warheads as well as warheads in central storage that could potentially be deployed after some preparation.

<sup>b</sup> ‘Deployed warheads’ are those placed on missiles or located on bases with operational forces. The deployed figures for Russia and the USA do not necessarily correspond to those in their 2010 Treaty on Measures for the Further Reduction and Limitation of Strategic Offensive Arms (New START) declarations because of the treaty’s counting rules.

<sup>c</sup> ‘Total inventory’ includes stockpiled warheads as well as retired warheads awaiting dismantlement.

varies considerably. In some cases, estimates can be based on the amount of fissile material—plutonium and highly enriched uranium (HEU)—that a country is believed to have produced and on observations of missile forces. ●



## 8. NUCLEAR DISARMAMENT, ARMS CONTROL AND NON-PROLIFERATION

The importance of arms control agreements and commitments was underlined early in 2022 by a joint statement by the leaders of the five permanent members of the United Nations Security Council (China, France, Russia, the United Kingdom and the United States; the P5) on ‘Preventing nuclear war and avoiding arms races’. However, the full-scale invasion in February 2022 by one of these nuclear weapon states—Russia—of a neighbouring non-nuclear weapon state—Ukraine—led to significant setbacks in bilateral and multilateral engagement on nuclear arms control throughout the rest of the year. By the end of 2022 even the P5 dialogue had been put on hold, with the process reportedly limited to expert-level engagement. Unless diplomatic trends reverse, a new and more dangerous phase in arms control is on the horizon.

### Attacks on Ukrainian nuclear sites

The war presented unprecedented nuclear safety, security and safeguards challenges for the International Atomic Energy Agency (IAEA), the Ukrainian authorities and the personnel of nuclear installations in Ukraine. Never before had operating nuclear power plants been attacked by shelling or missile strikes by state militaries, nor occupied by military forces. The IAEA undertook multiple missions of technical experts to Ukraine in 2022, and subsequently established a permanent presence at all four nuclear power plants there. The IAEA also put forward a conceptual framework—the ‘seven indispensable pillars of nuclear safety and security’—for addressing threats to nuclear installations in wartime.

### Strategic security dialogues

Even though bilateral talks between Russia and the USA continued in early 2022, they found differences between their positions on several key issues to be intractable. The invasion in February prompted the USA to suspend the dialogue, and there was subsequently only limited bilateral engagement between the two countries. The broader situation also affected the implementation of their 2010 Treaty on Measures for the Further Reduction and Limitation of Strategic Offensive Arms (New START) commitments and negotiations related to a potential follow-on framework. Although Russia and the USA continued to implement most elements of New START in 2022, in August Russia notified the USA that it was not ready to resume on-site inspections of its nuclear weapon-related sites. Suspension of the strategic stability dialogue also meant there were no talks on an arms control framework to succeed New START on its expiry in 2026.

In the case of proposed bilateral strategic stability dialogue between China and the USA, there was no movement. China remained unwilling to engage in arms control talks without preconditions.

### Iran and the JCPOA

Iran’s military support to Russia meant that the war in Ukraine even overshadowed the talks on reviving the Joint Comprehensive Plan of Action (JCPOA) on the Iranian nuclear programme. The talks that had started in Vienna in April 2021 continued in 2022, without leading to a solution. The talks were further complicated by an IAEA investigation into Iran’s past nuclear activities and a government crackdown on protests in the country. Even though it is hard to see any alternative that would address





**RUSSIAN AND UNITED STATES AGGREGATE NUMBERS OF STRATEGIC OFFENSIVE ARMS UNDER NEW START, AS OF 5 FEBRUARY 2011 AND 1 SEPTEMBER 2022**

Category	Treaty limit <sup>a</sup>	Russia			United States		
		Feb. 2011	Sep. 2022	Change	Feb. 2011	Sep. 2022	Change
Deployed ICBMs, SLBMs and heavy bombers	700	521	540	+19	882	659	-223
Nuclear warheads on deployed ICBMs, SLBMs and heavy bombers <sup>b</sup>	1 550	1 537	1 549	+12	1 800	1 420	-380
Deployed and non-deployed launchers of ICBMs, SLBMs and heavy bombers	800	865	759	-106	1 124	800	-324

ICBM = intercontinental ballistic missile; SLBM = submarine-launched ballistic missile.

<sup>a</sup> The treaty entered into force on 5 Feb. 2011. The treaty limits had to be reached by 5 Feb. 2018.

<sup>b</sup> Each heavy bomber, whether equipped with cruise missiles or gravity bombs, is counted as carrying only one warhead, even though the aircraft can carry larger weapon payloads.

the key concerns of both Iran and the USA as effectively as the JCPOA, voices on both sides continued to question the long-term benefits of reviving it. Instead, the parties seem willing to live with the status quo despite the costs and risks.

**NPT review conference**

The international community came close but failed to reach agreement at the 10th review conference of the 1968 Treaty on the Non-Proliferation of Nuclear Weapons (NPT) in August 2022. Nearly all states parties were willing to reach consensus on a substantive outcome. A compromise text was produced despite disagreement over issues that have been obstacles at past review conferences (e.g. the 1995 Middle East Resolution) or had been expected to be obstacles at this conference (e.g. the 2021 trilateral security pact between Australia, the UK and the USA, known as AUKUS, and the relationship between the NPT and the 2017 Treaty on the Prohibition of Nuclear Weapons, TPNW). The lack of consensus was largely attributed to Russia. With two consecutive

review conferences now having ended without a consensus substantive outcome or recommendations, the parties agreed to establish a working group on further strengthening the NPT’s review process in advance of the 2026 review conference.

**Treaty on the Prohibition of Nuclear Weapons**

The first Meeting of States Parties to the TPNW reached agreement on several key issues. As well as establishing a Scientific Advisory Group, the parties unanimously adopted a political declaration and an action plan. The latter contains 50 specific actions, including actions on universalization; victim assistance, environmental remediation and international cooperation and assistance; scientific and technical advice in support of implementation; supporting the wider nuclear disarmament and non-proliferation regime; inclusion; and implementation of the treaty’s gender provisions. However, since all the nuclear-armed states remain non-parties, the challenges for the treaty’s core objective—nuclear disarmament—remain formidable. ●



## 9. CHEMICAL, BIOLOGICAL AND HEALTH SECURITY THREATS

In 2022 the coronavirus causing Covid-19 remained widespread but was significantly less fatal than it was in 2020–21; in most countries, it spurred only limited changes in public behaviour. However, the origins of the pandemic continued to be a politically divisive subject and remained unresolved at the end of 2022. In addition, an escalating global mpox outbreak was declared a public health emergency of international concern in July 2022. Negotiations continued in 2022 towards a new international treaty to strengthen pandemic prevention, preparedness and response.

### Biological arms control

Russia's long-standing campaign about what it considers nefarious activities at Western 'biolabs' significantly escalated in 2022. It led to a formal consultative meeting under Article V of the 1972 Biological and Toxin Weapons Convention (BWC) in September 2022 and to several rounds of discussions in the United Nations Security Council, culminating in an unprecedented request from Russia in October 2022 for an investigation into 'military biological activities in Ukraine'. Security Council members did not find Russia's evidence convincing and voted against Russia's proposal.

Key biological disarmament and non-proliferation activities in 2022 were carried out in connection with the BWC preparatory committee, the First Committee of the UN General Assembly, and the ninth review conference (RevCon9) of the BWC. Despite the current geopolitical challenges, the long-standing BWC logjam and Russia's allegations, the year ended

with modest success for RevCon9: agreement on an intersessional programme of work for 2023–26 and the establishment of a working group on strengthening the BWC.

### Chemical arms control and disarmament

There were several disagreements among states parties to the 1993 Chemical Weapons Convention (CWC) during 2022, including those related to the alleged use of chemical weapons and the work of investigation teams within the Organisation for the Prohibition of Chemical Weapons (OPCW). The investigations into alleged chemical weapons use in Syria continued and, although no new instances of chemical weapons use were reported in 2022, the number of confirmed cases rose to 20 from a total of 71 cases investigated by the Fact-Finding Mission since 2014. The OPCW assessed at the end of 2022 that Syria's declaration of its chemical weapons programme 'still cannot be considered accurate and complete'.

Outside of Syria, during 2022 there were also some largely inconclusive follow-up actions in relation to the poisoning of Russian citizen Alexei Navalny with a novichok nerve agent in 2020, as well as multiple but unproved allegations of illegal chemical activities during the war in Ukraine.

The United States is the only declared possessor state party to the CWC with chemical weapons yet to be destroyed. It is expected to complete its remaining destruction activities according to schedule by the end of 2023. ●



## 10. CONVENTIONAL ARMS CONTROL AND REGULATION OF NEW WEAPON TECHNOLOGIES

### Conventional arms control in Europe

Europe is the only region that has created an integrated conventional arms control architecture. However, geopolitical divisions between Russia and most of the rest of Europe have resulted in its erosion to the point of collapse or irrelevance. For example, while the 2011 Vienna Document, which sets out several European confidence- and security-building measures, made it possible to draw critical attention to Russia's military build-up on the border with Ukraine, it did not prevent the full-scale Russian invasion in February 2022. The existing conventional arms control instruments also appear to have little relevance to conflict management in other long-standing, simmering conflicts in Europe, and rebuilding a new order containing supporting elements of arms control will be extremely difficult.

### The use of inhumane weapons in the Russia-Ukraine war

Many of the contemporary debates on conventional arms control are shaped by the concept of 'humanitarian disarmament'. The need for strong and effective humanitarian disarmament law has been underscored by Russia's invasion of Ukraine and the use there of cluster munitions, anti-personnel mines (APMs) and explosive weapons with wide-area effects in populated areas (EWIPA). These attacks resulted in large numbers of civilian casualties, but also generated international condemnation precisely because they involved weapons banned or restricted under humanitarian disarmament treaties and norms.

## AUTONOMOUS WEAPON SYSTEMS

Since 2017 a group of governmental experts has been leading efforts to regulate autonomous weapon systems (AWS). During the discussions in 2022, most states agreed that the 'normative and operational framework' governing AWS needed to be developed further and that one possible way to proceed was through a two-tiered approach: prohibiting certain AWS, while placing specific limits and requirements on the development and use of all other AWS. However, a handful of states continued to oppose even this approach.

### Regulating inhumane weapons

A small number of states that have chosen to retain, develop or use weapons seen as inhumane by others have repeatedly vetoed or stalled progress on strengthening the main multilateral treaties for regulating such weapons. Nonetheless, there were four positive developments in 2022. First, a separate process led by Ireland resulted in the adoption in November 2022 of a political declaration on EWIPA by 83 states. Second, the United Nations General Assembly adopted by consensus the Principles on the Protection of the Environment in Relation to Armed Conflicts in December 2022. Third, in June 2022 the United States announced a new policy on APMs, effectively banning their transfer, development, production or acquisition. Finally, states agreed to consider discussing the impact of technological developments on small arms and light weapons (SALW) manufacturing, continued to acknowledge the gender-related impact of illicit SALW and started working on the development of a new global framework for ammunition management. ●



## 11. SPACE AND CYBERSPACE

Space systems and other critical infrastructure have been the target of persistent cyberattacks during the war in Ukraine, demonstrating the growing significance and confluence of the space and cyberspace domains. A cyberattack on the ground terminals of a commercial satellite communications company, for example, caused ripple effects across Europe. Cyberattacks were also directed against key Ukrainian government departments, such as the defence ministry and the armed forces. In addition, cyberattacks targeted organizations in the agricultural, financial and information technology sectors, and disrupted Ukrainian telecommunications networks and power facilities. With some of the attacks blurring the line between cybercrime and cyberwarfare and affecting both military and civilian sectors across state borders, the war in Ukraine underscores the issues that must be addressed by international space and cyber governance.

These attacks at the nexus of the space and cyber domains disrupt or deny essential services, either temporarily or permanently. Because it is difficult to attribute responsibility for such cyberattacks, discussions in multilateral forums for the governance of space and of cyberspace have highlighted the need for further measures to clarify state accountability and prevent or mitigate impact on civilians.

### **Space governance**

In terms of space governance, a small but significant step towards new measures was the successful adoption of a resolution banning destructive, debris-

## THE SPACE-CYBER NEXUS

The overlap between the domains of space and cyberspace—the space-cyber nexus—has at least three main aspects. First, there is scope for cyberattacks to be directed against space systems, in particular the digital components on which they rely to transmit data. Second, the two domains share similar challenges with respect to international governance due to the difficulty in attributing the source of attacks and in establishing state accountability. Third, international law, including international humanitarian law, applies to both the space and cyberspace domains, yet because their systems are often dual-use—serving both civilian and military functions—and used by multiple states, there are questions regarding lawful targeting of such systems.

generating, direct-ascent anti-satellite (DA-ASAT) missile tests by a majority of states at the United Nations General Assembly. Destructive DA-ASAT tests were among the threats to space systems discussed at the UN open-ended working group (OEWG) on reducing space threats, which convened under Resolution 76/231 for the first and second sessions in 2022. However, in the light of the continuing hostilities in Ukraine and differing views on priorities for space governance, achieving consensus on future measures through multilateral deliberations will be challenging.

### **Cyber governance**

With regard to cyber governance, the second OEWG on ‘security of and in the use of information and communications technology 2021–2025’ continued its work in the face of the challenging geopolitical environment. The First Committee of the UN General Assembly



welcomed a proposal for a programme of action (POA) to continue as a permanent, inclusive, action-oriented mechanism after the conclusion of the current OEWG. Nevertheless, this proposal remains contentious, as does participation in these UN meetings by the private sector and non-governmental organizations. Further, the ongoing cyberattacks on civilian critical infrastructure—allegedly conducted by both Russian and Ukrainian state and non-state actors before and during the Ukraine conflict—demonstrate the difficulty in enforcing the voluntary norms formulated during the ongoing UN process.

The activities and mechanisms required to enforce cyberspace norms are far from dormant, however. Cyber capacity- and confidence-building measures have been established under the second OEWG, including the development of a points of contact directory. In addition, international policing collaboration in apprehending cybercriminals has been evolving, not only with Ukraine but even between Russia and the United States. The 2022 international summit of the Counter Ransomware Initiative provided an action plan against ransomware, which is being leveraged for cyberwarfare as well as cybercrime aims. Cooperation with industry has also been expanding, as shown by a request by the US government for Microsoft to provide the code of the FoxBlade malware to European countries to help them combat cyberattacks.

### **The regulatory role of non-state actors**

Government collaboration with the private sector in cyberspace mirrors the space domain, where commercial actors are increasingly engaged to support

### **SOME TYPES OF MALWARE USED IN CYBERATTACKS**

#### *Backdoor*

A backdoor allows access to a computer system or encrypted data through bypassing the system's security mechanisms.

#### *Ransomware*

Ransomware threatens to publish the victim's data or permanently block access to it unless a ransom is paid.

#### *Trojan*

A trojan downloads malware disguised as a legitimate programme onto a computer.

#### *Wiper*

A wiper erases user data and partition information from attached drives, making the system inoperable and unrecoverable.

military services. In particular, Russian statements regarding the possible targeting of commercial space assets that support Ukrainian military services imply potential escalation and impacts on governance. However, some states' objections to the involvement of non-state actors in UN processes governing space and cyberspace pose longer-term challenges in engaging both governments and the private sector in not just the creation of norms, but also their enforcement. ●



## 12. DUAL-USE AND ARMS TRADE CONTROLS

Global, multilateral and regional efforts continued in 2022 to strengthen controls on the trade in military items and in dual-use items relevant for conventional, chemical, biological and nuclear weapons and their delivery systems. However, Russia's invasion of Ukraine in February 2022 significantly disrupted or affected states' efforts in the field of coordinated export measures.

### The Arms Trade Treaty

The eighth conference of states parties to the 2013 Arms Trade Treaty (ATT) in August 2022 focused on post-shipment controls and convened the Diversion Information Exchange Forum for the first time. As in previous years, levels of reporting declined. Despite the steady but slow growth in the number of states parties, significant gaps in membership remain, particularly among states in Asia and the Middle East.

### Multilateral arms embargoes

During 2022, 14 United Nations embargoes, 22 European Union (EU) embargoes and 1 League of Arab States embargo were in force. A UN partial arms embargo imposed on Haiti, initially proposed by China, was the only new multilateral arms embargo in 2022 and the first new UN arms embargo since 2018. The level of international consensus around decisions to lift or extend UN arms embargoes deteriorated in 2022, with disagreements between, on the one hand, China, Russia and several like-minded African states, and mainly Western powers on the other. This was evident in discussions about extending the systems of notification and authorization for arms transfers to governmental forces that are attached to the

## MULTILATERAL ARMS EMBARGOES IN FORCE, 2022

### *United Nations (14 embargoes)*

• Afghanistan (NGF, Taliban) • Central African Republic (partial; NGF) • Democratic Republic of the Congo (partial; NGF) • Haiti (NGF) • Iran (partial) • Iraq (NGF) • ISIL (Da'esh), al-Qaeda and associated individuals and entities • Korea, North • Lebanon (NGF) • Libya (partial; NGF) • Somalia (partial; NGF) • South Sudan • Sudan (Darfur) (partial) • Yemen (NGF)

### *European Union (22 embargoes)*

Implementations of UN embargoes (11):  
• Afghanistan (NGF, Taliban) • Central African Republic (partial; NGF) • Democratic Republic of the Congo (partial; NGF) • Haiti (NGF) • Iraq (NGF) • ISIL (Da'esh), al-Qaeda and associated individuals and entities • Korea, North • Lebanon (NGF) • Libya (partial; NGF) • Somalia (partial; NGF) • Yemen (NGF)

EU arms embargoes with broader coverage than their UN counterparts (3):

• Iran • South Sudan • Sudan

Embargoes with no UN counterpart (8):

• Belarus • China • Egypt • Myanmar • Russia • Syria • Venezuela • Zimbabwe

### *League of Arab States (1 embargo)*

• Syria

ISIL = Islamic State in Iraq and the Levant; NGF = non-governmental forces; partial = embargo allows transfers of arms to the government of the target state provided that certain conditions have been met.

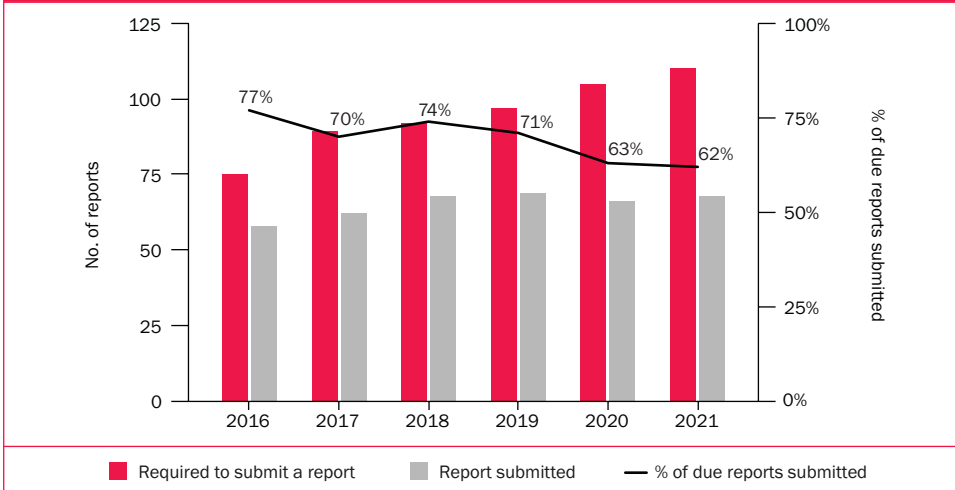
UN arms embargoes on several states in sub-Saharan Africa.

### Trade restrictions on Russia and Belarus

Together with the United States and 10 like-minded states, the EU put in place a set of security-focused trade restrictions on Russia and Belarus—implemented via member states' domestic export control



**NUMBER OF ARMS TRADE TREATY STATES PARTIES SUBMITTING ANNUAL REPORTS, 2016–21**



systems—that were the most significant and wide-ranging ever imposed on a major industrialized state in the post-cold war period. The restrictions clearly disrupted the flow of parts and components to Russia’s defence industry. Nonetheless, there were indications that Russia continued to acquire many of these items from states that are not part of the group that adopted these controls, raising questions about the effectiveness of these measures.

**Export control regimes**

The increased geopolitical tensions precipitated by Russia’s invasion of Ukraine significantly affected the work of the four multilateral export control regimes—the Australia Group (on chemical and biological weapons), the Missile Technology Control Regime (MTCR), the Nuclear Suppliers Group (NSG), and the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-use Goods and Technologies (WA)—but the nature and extent of the disruption varied. Despite these challenges, the regimes all returned

to holding in-person plenary meetings, exchanged experiences and good practices, adopted small numbers of changes to their respective control lists and continued their technical deliberations.

**EU controls**

To implement the four export control regimes in its single market, the EU has established a common legal basis for controls on the export, brokering, transit and trans-shipment of dual-use items, software and technology and some military items. During 2022 the EU took steps to implement a new version of the dual-use regulation that entered into force in 2021. The EU and its member states also reported on steps taken to implement the Foreign Direct Investment screening regulation and continued to expand its coordination with the USA via the work of the Trade and Technology Council established in 2021. In addition, the EU began work on a review of the common position and discussed how exports of military materiel funded by the European Peace Facility will be managed. ●



### Arms control and disarmament agreements in force, 1 January 2023

- 1925 Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare (1925 Geneva Protocol)
- 1948 Convention on the Prevention and Punishment of the Crime of Genocide (Genocide Convention)
- 1949 Geneva Convention (IV) Relative to the Protection of Civilian Persons in Time of War; and 1977 Protocols I and II Relating to the Protection of Victims of International and Non-International Armed Conflicts
- 1959 Antarctic Treaty
- 1963 Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water (Partial Test-Ban Treaty, PTBT)
- 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (Outer Space Treaty)
- 1967 Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (Treaty of Tlatelolco)
- 1968 Treaty on the Non-Proliferation of Nuclear Weapons (Non-Proliferation Treaty, NPT)
- 1971 Treaty on the Prohibition of the Emplacement of Nuclear Weapons and other Weapons of Mass Destruction on the Seabed and the Ocean Floor and in the Subsoil thereof (Seabed Treaty)
- 1972 Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction (Biological and Toxin Weapons Convention, BWC)
- 1974 Treaty on the Limitation of Underground Nuclear Weapon Tests (Threshold Test-Ban Treaty, TTBT)
- 1976 Treaty on Underground Nuclear Explosions for Peaceful Purposes (Peaceful Nuclear Explosions Treaty, PNET)
- 1977 Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (Enmod Convention)
- 1980 Convention on the Physical Protection of Nuclear Material and Nuclear Facilities
- 1981 Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which may be Deemed to be Excessively Injurious or to have Indiscriminate Effects (CCW Convention, or 'Inhumane Weapons' Convention)
- 1985 South Pacific Nuclear Free Zone Treaty (Treaty of Rarotonga)
- 1990 Treaty on Conventional Armed Forces in Europe (CFE Treaty)
- 1992 Treaty on Open Skies
- 1993 Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (Chemical Weapons Convention, CWC)
- 1995 Treaty on the Southeast Asia Nuclear Weapon-Free Zone (Treaty of Bangkok)
- 1996 African Nuclear-Weapon-Free Zone Treaty (Treaty of Pelindaba)
- 1996 Agreement on Sub-Regional Arms Control (Florence Agreement)
- 1997 Inter-American Convention Against the Illicit Manufacturing of and Trafficking in Firearms, Ammunition, Explosives, and Other Related Materials (CIFTA)
- 1997 Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction (APM Convention)
- 1999 Inter-American Convention on Transparency in Conventional Weapons Acquisitions
- 2001 Protocol on the Control of Firearms, Ammunition and other related Materials in the Southern African Development Community (SADC) Region





- 2004 Nairobi Protocol for the Prevention, Control and Reduction of Small Arms and Light Weapons in the Great Lakes Region and the Horn of Africa
- 2006 ECOWAS Convention on Small Arms and Light Weapons, their Ammunition and Other Related Materials
- 2006 Treaty on a Nuclear-Weapon-Free Zone in Central Asia (Treaty of Semipalatinsk)
- 2008 Convention on Cluster Munitions
- 2010 Treaty on Measures for the Further Reduction and Limitation of Strategic Offensive Arms (New START)
- 2010 Central African Convention for the Control of Small Arms and Light Weapons, Their Ammunition and All Parts and Components That Can Be Used for Their Manufacture, Repair and Assembly (Kinshasa Convention)
- 2011 Vienna Document 2011 on Confidence- and Security-Building Measures
- 2013 Arms Trade Treaty (ATT)
- 2017 Treaty on the Prohibition of Nuclear Weapons (TPNW)

**Agreements not yet in force,  
1 January 2023**

- 1996 Comprehensive Nuclear-Test-Ban Treaty (CTBT)
- 1999 Agreement on Adaptation of the CFE Treaty

**Security cooperation bodies**

Developments in 2022 included the following: Russia was expelled from the Council of Europe; Gabon and Tonga became members of the Commonwealth of Nations; Saint Kitts and Nevis and Tonga became members of the International Atomic Energy Agency; and Burkina Faso was suspended from the African Union following a military coup. ●

**CHRONOLOGY 2022, SELECTED  
EVENTS**

- 3 Jan. The five permanent members (P5) of the United Nations Security Council issue a joint statement on the need to prevent nuclear war.
- 24 Feb. Russia launches a full-scale invasion of Ukraine.
- 29 Mar. Russia announces it is withdrawing its forces from around Ukraine’s capital, Kyiv.
- 2 Apr. A UN-mediated ceasefire is agreed between the Houthis and the internationally recognized Yemeni government.
- 23 May The United States, together with 13 other states, launches the Indo-Pacific Economic Framework.
- 27–30 June The North Atlantic Treaty Organization (NATO) agrees a new Strategic Concept and membership invitations for Finland and Sweden.
- 22 July Russia and Ukraine sign a deal to resume exports of Ukrainian grain through the Black Sea.
- 17 Aug. China issues its highest red alert heat warning for at least 138 cities and counties.
- 26 Sep. Two Nord Stream pipelines delivering Russian gas to Europe are sabotaged by explosions in Danish and Swedish waters.
- 6 Oct. US President Joe Biden warns of ‘Armageddon’ if Russia uses a nuclear weapon in Ukraine.
- 2 Nov. The Ethiopian government and Tigrayan leaders sign a peace deal ending two years of civil war.
- 13 Dec. The International Atomic Energy Agency and Ukraine agree to establish a ‘continuous presence of nuclear safety and security experts’ at its four nuclear power plants.



## SIPRI DATABASES

### **SIPRI Military Expenditure Database**

Gives the annual military spending of countries since 1949, allowing comparison of countries' military spending in local currency at current prices; in US dollars at current prices; in US dollars at constant prices and exchange rates; and as a share of gross domestic product.

### **SIPRI Arms Industry Database**

Contains annual data on total revenue and revenue from arms sales and military services since 2002 for the 100 companies with the highest arms sales in the world. Data for Chinese companies is included for the years from 2015 onwards.

### **SIPRI Arms Transfers Database**

Shows all international transfers of major conventional arms since 1950. It is the most comprehensive publicly available source of information on international arms transfers.

### **SIPRI Arms Embargoes Database**

Gives information on all arms embargoes that have been implemented by an international organization, such as the European Union or the United Nations, or by a group of nations. All embargoes that are in force, or have been in force since 1998, are included.

### **SIPRI National Reports Database**

Provides links to all publicly accessible national reports on arms exports and is constantly updated to include links to newly published national reports on arms exports.

### **SIPRI Multilateral Peace Operations Database**

Offers information on all UN and non-UN peace operations conducted since 2000, including location, dates of deployment and operation, mandate, participating countries, number of personnel, budgets and fatalities.

The SIPRI databases can be accessed at the SIPRI website. ●



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# SIPRI YEARBOOK 2023

## Armaments, Disarmament and International Security

The SIPRI Yearbook is an authoritative and independent source of data and analysis on armaments, disarmament and international security. It provides an overview of developments in international security, weapons and technology, military expenditure, arms production and the arms trade, and armed conflicts and conflict management, as well as efforts to control conventional, nuclear, chemical and biological weapons.

This booklet summarizes the 54th edition of the SIPRI Yearbook, which covers developments during 2022, including

- *Armed conflict and conflict management*, with an overview of global and regional trends in armed conflicts, peace processes and peace operations, as well as a focus on the role of private military and security companies
- *The war in Ukraine*, including its impact on military spending and European arms control, the role of space and cyber domains, and efforts to impose international trade restrictions on Russia
- *Military expenditure, international arms transfers and developments in arms production*
- *World nuclear forces*, with an overview of each of the nine nuclear-armed states and their nuclear modernization programmes
- *Nuclear arms control*, featuring developments in the Russian–United States strategic dialogue and multilateral nuclear arms control and disarmament treaties, as well as the response to attacks on Ukrainian nuclear power plants
- *Chemical, biological and health security threats*, including the investigation of allegations of chemical and biological weapon use and developments in the international legal instruments against chemical and biological warfare
- *Conventional arms control and regulation of new weapon technologies*, with a focus on inhumane weapons and other conventional weapons of humanitarian concern, including efforts to regulate autonomous weapon systems
- *Dual-use and arms trade controls*, including developments in the Arms Trade Treaty, multilateral arms embargoes and export control regimes, and the legal framework of the European Union for such controls.

It also contains annexes listing arms control and disarmament agreements, international security cooperation bodies, and key events in 2022.