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## **IAF assesses how sleep deprivation hits fighter pilots**

New Delhi: The Indian Air Force is experimenting with the sleeping pattern of its fighter pilots to find out how fatigue affects flight performance in an unforgiving environment.

A sleep deprivation study conducted on 40 fighter pilots has revealed significant deviations in their performance and now the IAF will kick off field studies on a larger scale, officers familiar with the research told Hindustan Times.

Insufficient sleep can lead to increased error rates, decreased levels of alertness and lapses in judgment.

The experiment is being conducted by the IAF's Institute of Aerospace Medicine and Defence Institute of Physiology and Allied Sciences. Several international air forces including those of US, UK and Germany have conducted such studies to improve flight safety and come up with countermeasures for fatigue.

"Subjects are not allowed to sleep when they normally do and tested on various flight parameters. And then they are tested again in a well-rested state," said an IAF officer, involved in the study.

"We have observed noticeable deviation from optimal flight performance.

The IAF is using a monitoring system developed by IIT Kharagpur to assess how fatigue impairs performance.

The system is similar to psychomotor vigilance task monitor used globally for measuring reaction time of pilots under different stages of sleep deprivation, said an aviation medicine specialist.

"We want to develop a system that allows us to quickly assess if a pilot is fatigued during the morning briefing. Fighter pilots have to stay sharp at all times," said a senior IAF officer.

The scope of the IAF study will also cover the effects of "go pills" and "no-go pills" that Indian fighter pilots are authorised to use during training for specific combat missions.

The IAF allows its fighter pilots to use Modafinil, a "go pill" that helps them stay alert and focused during long sorties.

They can also pop Zolpidem, a "no-go pill" used to promote sleep after demanding day-night missions.

"The idea is to send a fully alert fighter pilot to the cockpit and be aware of his sleep pattern and the effects of pills on his performance," said Air Marshal Pawan Kapoor, who heads the IAF's medical wing.

## **THE ASIAN AGE**

## **After joint drill, Army Chief on 4-day China trip**

New Delhi, Nov. 20: Army chief Gen. Dalbir Singh Suhag left on Sunday on a four-day visit to China during which he will meet with top leadership there to pursue deeper cooperation even as India beefs up security on its northern border.

He is accompanied by a high-level military delegation.

During his visit from November 21-24, the delegation will be visiting important military installations and is scheduled to meet a number of high-ranking dignitaries of Peoples Liberation Army (PLA) and Central Military Commission (CMC).

"This visit is an opportunity to re-engage the PLA in field of defence cooperation and build upon existing mutual cooperation and trust between the two nations," a statement by the Army said. The delegation will also be visiting military installations including Infantry Division and Army Air Defence Brigades, it said.

The visit aims at engaging China on subjects of mutual concern and shared interest, which include terrorism, humanitarian assistance and peace keeping training, the Army said. The visit comes amidst growing economic and military ties between the emerging Asian giants and follows high-level diplomatic and military exchanges between the two neighbours. The visit also coincides with a joint military exercise, between two armies which is underway in Pune and will be followed by visit of General Zhao Zongqi, Commander, Western Theatre Command of PLA in the second week of December.



Mon, 21 Nov, 2016

## Army Gets Bulletproof Jackets after 8-Yr Wait

By Ajay Banerjee

### First Lot Of 20,000 Jackets Reaches Stores

- *The first lot of 20,000 bulletproof jackets has reached the Army stores. This is the first tranche of the part of the emergency order of 50,000 jackets placed in March for Rs 140 crore*
- *The Army needs 353,765 new jackets sanctioned as per a plan in 2009*
- *Of these, 1.86 lakh were to be supplied in the 11th plan (2007-2012) and another 1.67 lakh jackets were to be supplied during the 12th plan (2012-2017)*

After almost eight years of delay, the Army has started getting new bulletproof jackets for its troops posted in counter-insurgency and militancy-hit areas.

The first lot of 20,000 jackets has reached the Army stores and handed over to various formations. This is the first tranche of the part of the emergency order of 50,000 jackets placed in March for Rs 140 crore. Despite numerous efforts in the past decade, the Army faces a shortage of bulletproof jackets — a mandatory requirement to save lives in counter-insurgency operations. The Army needs 353,765 new jackets sanctioned as per a plan in 2009. Of these, 1.86 lakh were to be supplied in the 11th plan (2007-2012) and another 1.67 lakh jackets were to be supplied during the 12th plan (2012-2017).

With the 12th plan ending in March 2017, only 50,000 have been ordered from TATA Advanced Materials Limited, which in the past has supplied jackets to the Army. The fault lies with the “slow” decision making process. The Army has been looking for modern light weight modular bulletproof jackets that allow greater agility to troops while protecting the head, neck, chest, groin and sides of the infantry soldiers. The Army’s existing bulky bulletproof vests are near the end of their operational life.

The tender for purchase of 1.86 lakh modular jackets was scrapped in October 2015 as samples offered by six vendors failed to clear field trials as per the Army specified benchmarks. The Defence Research and Development Organization (DRDO) has also come up with a prototype bulletproof jacket, as per the newer technical specifications, using different state-of-the-art ballistic materials.



Mon, 21 Nov, 2016

## More, Mr Parrikar

*He is duty-bound to confound assessments of India’s nuclear deterrent.*

Deterrence is a mind game. Nuclear deterrence is even more psychologically weighted because at stake, quite literally, is a nation’s survival as a “social organism”, to use the words of the geopolitical theorist Halford Mackinder. What makes nuclear deterrence work is the ambiguity and opacity shrouding its every aspect.

These range from weapons/warheads, delivery systems, their deployment pattern, command and control system to details about storage, reaction time, and physical, electronic and cyber security schemes, the weapons production processes, the personnel involved and policies relating to all these elements. The more anything remotely connected with nuclear hardware and software, strategy, policies, plans and posture is a black hole, the greater is the uncertainty in the adversary's mind and the unpredictability attending on the deterrent. Moreover, pronouncements emanating from official quarters that obfuscate matters and generate unease, especially about India's nuclear weapons-use initiation and nuclear response calculi, enhance the sense of dread in the minds of adversary governments. Dread is at the heart of successful nuclear deterrence.

It is the responsibility of the Indian government to make the ambiguity-opacity-uncertainty-unpredictability matrix denser, not make it easier for adversaries to plumb its political will and to read its strategic intentions by clarifying nuclear issues. The adversaries one needs to keep in mind are as much the obvious ones — China and, to a lesser extent, Pakistan — as the “friendly” countries, such as the US. The US, in particular, was at the forefront of preventing India from crossing the nuclear weapons threshold, failing in which enterprise, it has done everything to ensure India stays stuck at the low-end of the nuclear weapons technology development curve. It insisted that India does not resume underground nuclear testing, or depart from the US understanding of limited nuclear deterrence. It may also be recalled that, for geopolitical reasons of containing India to the subcontinent during the Cold War, Washington disregarded its own proliferation concerns and watched China nuclear missile-arm Pakistan even as it preached responsible behaviour to New Delhi.

In this context, Defence Minister Manohar Parrikar's wondering why no-first-use (NFU) is assumed to be a restraint on the Indian nuclear forces is just the monkey wrench that needed to be thrown into the Western considerations of this country's nuclear security. American think-tanks help the US government to achieve its nuclear non-proliferation objectives, propagating, for instance, the hollow India-Pakistan “nuclear flashpoint” thesis that Washington has often used to pressure a usually diffident and malleable New Delhi. Pakistan naturally supports this thesis as a means of legitimating its fast-growing nuclear arsenal, as do many Indian analysts for their own reasons.

No surprise, then, that Parrikar's stray thoughts on NFU have shocked the large community of flashpoint believers and acted as bait for George Perkovich, one of the stalwart proponents of this idea, to rise to it. He uses the morality card — the loss of India's supposed “high ground” which has been sufficient by itself in the past to subdue the Indian government — and labels Parrikar's statements as “superficial, perhaps, dangerously so” (see his “Impolitic musings”, *The Indian Express*, November 15). The truth, however, is that Perkovich — and by extension, Washington — is worried that Parrikar has upended the US-qua-Western nuclear construct for South Asia.

But NFU is less of an issue for Perkovich than his desire to get Parrikar to explain “whether and how” India means to enlarge its nuclear forces and infrastructure and “revise its operational plans” contingent on New Delhi's apparent jettisoning of NFU. In this respect, it is pertinent to note that besides its intelligence agencies, Washington has always relied on American think-tankers and gullible Indians to help wrinkle out details of the Indian nuclear deterrent — Perkovich's primary intent. I recall that at a 1.5 track meet held under the US government's aegis in San Diego in December 1998 the hosts called in a surviving Manhattan Project biggie, Herbert York, to impress on the Indians there the dangers of the nuclear course India was embarked upon. They banked on an Indian patsy — the joint secretary (Americas), MEA — to repeatedly ask K. Subrahmanyam and me to speculate about what weapons strength constituted a “minimum” deterrent.

Indeed, far from being under any obligation to throw light on NFU or any other nuclear issue, Parrikar is almost duty-bound to air his “personal views” more frequently on the subject and thus keep confounding assessments regarding India's deterrent.

### INDIAN NAVY CONDUCTS FREE HEALTH CAMP

As a part of Navy week celebration, the Indian Navy has conducted a free health camp for the general public from November 19 to 21 at Amarpur village, Palwal district. During the health checkup programme the Indian Navy has spread the awareness in the general public about the role and task of the Navy and also to encourage youngsters to consider Navy as a career. The camp was inaugurated by Admiral Sunil Lanba, PVSM, AVSM, ADC, the Chief of the Naval Staff at Government Senior Secondary School, Amarpur. A medical team consisting of specialists, super-specialists and para-medical staff from the premiere naval hospital INHS Asvini at Mumbai have been instrumental in the conduct of the camp. The specialists will conduct out-patient consultation for medical, surgical, gynaecology, paediatric, eye, ENT, skin, cardiology and endocrinology ailments.

## MAIL TODAY

## US offers help to guard Indian coast

*US has the world's biggest coast guard force*

Amid increasing military and weapons cooperation with New Delhi, the US now also wants to partner with the Indian Coast Guard and has extended offer to help it in training for search and rescue and pollution control operations. The offer was extended on Friday to the Indian side in a meeting between director general of Coast Guard Rajendra Singh and American vice-admiral Joseph Rixey, who was on a visit to New Delhi last week, officials in the Defence ministry told Mail Today.

Rixey is the head of the American defence security cooperation agency, which deals with the sales of military equipment to foreign countries as well as the countries with which they want to have joint exercises. The United States has the world's biggest coast guard force and has more helicopters and planes than many advanced navies in the world. During the hour-long meeting between the two officers, the US Coast Guard offered to provide increased training facilities to Indian officers and also to mutually share expertise in pollution control and anti-narcotics operations.

### GUARDS LENT SUPPORT

- US wants to partner with Indian Coast Guard
- The offer was extended to India on Friday in a meeting between director general of Coast Guard Rajendra Singh and American vice-admiral Joseph Rixey, who was on a visit to New Delhi
- Indian Coast Guard is the main oil spill and coastal pollution fighting agency in the country
- Indian Coast Guard is also the in-charge of security of over 7,000 km long coastal line on two sea boards

This was the first high-level meeting between the Indian Coast Guard and the US officials and the two sides have decided to follow it up in future as well. Outgoing American defence secretary Ashton Carter is also likely to take up the issue of cooperation between the two coast guards in his meetings with Defence Minister Manohar Parrikar in his visit next month. The Indian Coast Guard profile has also been expanding quite considerably post 26/11 terror attacks on Mumbai in 2008.

The government has now decided to double the size of the force and it is getting at least four to five major ships every year from public sector Goa Shipyard Limited.

With 42 stations and 15 air conclaves planned by the year 2020, the Coast Guard has also emerged as the key force in fighting terrorism in coastal areas and also to plug the narcotics smuggling from US offers help to guard Indian coast Pakistan. In 2014, the Coast Guard had played a key role in stopping a suspected Pakistani terror boat from entering Indian waters which led to the boat setting itself on fire to escape apprehension by the Indian authorities. It has also apprehended narcotics worth over `700 crore in the western region in the last few years. The Indian Coast Guard has already held exercises with the Japanese and maritime agencies of South East Asian countries in the recent past. During the visit, the American vice-admiral also met defence ministry officials to review the foreign military sales projects of the US under which it sells its weapon platforms to India.

In the recent years, Americans have been able to sell equipments worth over USD25 billion, including the latest sale of M777 Ultra Light Howitzers to the Indian Army which would be inducting its first artillery gun in the last three decades. The two nations have also signed the Logistics Exchange Memorandum Of Agreement (LEMOA) under which they are planning to provide logistical support to each other's visiting military warships and planes.



Mon, 21 Nov, 2016

## Federation of US Scientists Warns of Pak Nuclear Threat

By DipanjanRoy Chaudhury

*Evolving Nuke Posture Islamabad Has Six Missile Units & Four Air Bases*

**'Pakistan has produced an estimated stockpile of 130-140 nuclear warheads'**

Pakistan has six missile units and four air bases with fighter bombers capable of launching nuclear attack on India, the Federation of American Scientists (FAS) has warned. FAS closely monitors worldwide developments in nuclear sphere and international security . According to its recently-released Nuclear Notebook, Pakistan has produced an estimated stockpile of 130140 nuclear warheads for delivery by shortand medium-range ballistic missiles, cruise missiles and fighterbombers. Over the past several years, commercial satellite pictures had brought into light several facilities that might form part of Pakistan's evolving nuclear weapons launcher posture, FAS claimed. This includes 10 facilities, including five missile garrisons (soon possibly six) as well two (possibly four) air bases with fighter-bombers. The nuclear war heads that would arm the launchers are thought to be stored at other secure facilities, FAS further claimed. Some of the missile garrisons are located close to the Indian border.

“This includes army garrisons at Akro (Petaro), Gujranwala, Khuzdar, Pano Aqil and Sargodha. A sixth base at Bahawalpur may be under construction,” said Hans M Kristensen, who has co-authored the Notebook along with Robert Noris.



Mon, 21 Nov, 2016

## After G-20 summit, China sees India as partner to shore up global economy

By Atul Aneja

*Many participants of two-day brainstorming exercise proposed a pervasive economic engagement between China and India.*

Taking the cue from the G-20 summit in Hangzhou, China is advocating greater participation of the Global South and the emerging countries in the world economy, including closer ties between Beijing and New Delhi.

At a major brainstorming exercise marshaled by the Communist Party of China (CPC)—China’s most influential core—several speakers recognised that western economies were avoiding structural reforms, which were necessary to revive an anemic global economy. The two-day exercise included invitees from major national and international think-tanks, as well as political parties across a wide cross-section of the globe.

Two separate sessions focused on Africa, and countries along the Mekong River, signaling China’s intent to include the Global South in its blueprint to lift the global economy.

Many participants proposed a pervasive economic engagement between China and India, to help bring about a global turnaround. “If you look at the economic perspective, China and India are complementary to each other. There is immense scope to enhance cooperation,” observed Lin Yifu, former Vice President of the World Bank.

Amar Bhattacharya, a senior fellow with the Brookings Institution also concurred. He told *The Hindu*, that once the no-go areas were clarified, there was immense scope for scaling up the India-China economic partnership. “Please do not forget the big picture that by 2050 they (China) will be the first and we (India) will be second largest economies of the world, with very complementary type of demographic and supply chain structures.”

But Dr. Bhattacharya stressed that India should insist on a long-haul relationship with China, focused on joint ventures, allowing India’s “smart engineers” to absorb advanced technology. “The biggest thing India can learn from China is in the arena of infrastructure. They (the Chinese) are a powerhouse of infrastructure.”

He added that construction and high speed railway should become flagships for tie-ups in the infra sector. “There are two countries to learn from in the construction industry—Turkey and China. South Korea has already moved to a higher league,” he observed.

The U.S. based academic highlighted that collaboration in high speed railways was promising as it would not be hampered by the availability of land—a chronic problem confronting foreign investors, seeking avenues in India’s manufacturing sector.

Dr. Bhattacharya stressed that India should build solid economic foundations with China that reinforced strong mutual interest. “That would also help us manage our differences. Pakistan as a factor in Sino-Indian ties would gradually recede to the background”.

Gopal Krishna Agarwal, a BJP national executive member, praised the integrated supply chain that China had established, based on seamless connectivity. “China has integrated its highways railways, metros and airways. The resulting fast supply chain is China’s strength from which we can learn,” he observed.

Aware of the headwinds, Mr. Lin was bearish about a quick revival of major western economies, citing their fear of structural reforms. “I am more on the pessimistic side. It is very hard for the major economies to carry out the necessary structural reforms because it means short-term constrictions, slowdown in the economy and increase in unemployment,” said the former multilateral banker.

Other participants, including Liu Yunshan, a member of powerful Politburo of CPC Standing Committee, diagnosed that geo-political and related factors were also dragging down the global economy. He cited the “refugee crisis, climate change and terrorism,” as some of the factors undermining growth.

Consequently, the Chongqing conclave called for re-defining the rules of economic governance, which should equally focus on non-economic factors hampering revival. “Usually, when we say global governance, we refer to global economic governance, which is also the focus of this dialogue. I believe, however, effective global governance can’t be founded on economics alone,” observed Song Tao, head of the International Department of the CPC. He added that the international system must now aim at “comprehensive governance” that focused on “cooperative and sustainable security,” that would yield lasting political stability.

Participants also implicitly rejected inclusion of ideologically driven agendas such as democracy and human rights, as part of the new governance rule book. Mr. Song underscored that global economic governance can prosper only when participating countries are allowed to “follow their own paths,” and actively pursue their political choices.

## **China says terrorism, fake news impel greater global internet curbs**

China's ambitions to tighten regulation of the Internet have found a second wind in old fears - terrorism and fake news. Chinese officials and business leaders, speaking at the third World Internet Conference held in Wuzhen last week, called for more rigid cyber governance, pointing to the ability of militants to organise online and the spread of false news items during the recent U.S. election as signs cyberspace had become dangerous and unwieldy. Ren Xianling, the vice minister of China's top Internet authority, said on Thursday that the process was akin to "installing brakes on a car before driving on the road". Ren, number two at the Cyberspace Administration of China, recommended using identification systems for netizens who post fake news and rumours, so they could "reward and punish" them. — Reuters

## **THE ASIAN AGE**

## **China seeks talks over sea**

Beijing, Nov. 20: China's President Xi Jinping, in separate meetings with the leaders of the Philippines and Vietnam, said disputes over the South China Sea should be resolved bilaterally, state media reported on Sunday.

The comments underscore Beijing's opposition to involving other countries or international organisations in the maritime territorial dispute, where claimants to the waters also include Malaysia, Brunei and Taiwan.

Experts say China prefers a 'divide and conquer' tactic over allowing its opponents to group together.

Beijing has also repeatedly blamed the United States for stirring up trouble in the South China Sea, and opposes an arbitration tribunal's July ruling in favour of the Philippines, rejecting China's claims to economic rights across large swathes of the waters.

During a meeting in Peru, Mr Xi told Philippines President Rodrigo Duterte "to actively mull maritime cooperation and promote positive interaction on the sea," turning the South China Sea into "an opportunity for bilateral friendly cooperation," said the official Xinhua news agency.

That sentiment was echoed by Mr Duterte, Xinhua reported.

The Philippines President has overseen a rapid improvement of previously frosty relations between the two countries since taking office in June. The Philippines "is willing to properly address maritime issues with China through dialogue and consultation," said Xinhua.

Mr Xi made similar overtures to Vietnam President Tran Dai Quang while attending a summit of Asia-Pacific countries in Lima.

The Chinese president said the two countries should "solve disputes through bilateral consultations and dialogues, adhere to a cooperative path of 'shelving differences and engaging in joint development', and properly address problems in order to maintain regional peace and tranquillity," Xinhua said.

The Chinese news agency did not say whether Quang also addressed the South China Sea.

## China, Russia call for closer ties on sidelines of economic meet

Lima (Peru), Nov. 20: Chinese President Xi Jinping met his Russian counterpart Vladimir Putin and stressed that Beijing was ready to work with Moscow to continue high-level close contact, enhance mutual support and consolidate political and strategic mutual trust.

The two leaders met on the sidelines of the annual Asia-Pacific Economic Cooperation Economic Leaders' Meeting, reports Xinhua.

The meeting called for joint efforts by China and Russia to push forward the process of the Free Trade Area of the AsiaPacific.

Mr Xi told Mr Putin that both sides should fully implement the consensus reached at the 2014 APEC Beijing meeting and other meetings in recent years.

The FTAAP process was launched at the 2014 Beijing meeting and a roadmap was endorsed. A collective strategic study on the FTAAP was conducted subsequently, as agreed by the APEC members, and the result should be reported to the economic leaders by the end of 2016.

During the meeting with Mr Putin, Mr Xi underlined the need for China-Russia cooperation under the APEC framework in a bid to promote the bloc to contribute more to regional and global economic growth.

For his part, Mr Putin said Russia and China should strengthen coordination and collaboration in APEC and other multilateral mechanisms. He said that the high-level relationship between Russia and China was very significant for global peace and stability, noting both sides should maintain close contact. The Chinese President called on the two neighboring nations to enhance synergy of their national development strategies, and further integrate the construction of the Belt and Road Initiative and the Eurasian Economic Union.

## 'Super Earth' seen orbiting nearby star

*During the research, a cycle of magnetic activity similar to that of the Sun has been observed, but with a shorter period, three years.*

**London:** Scientists have discovered a new 'super Earth' planet with a mass around 5.4 times that of the Earth, orbiting a very bright star near to our Sun. The exoplanet, GJ 536 b, is not within the star's habitable zone, but its short orbital period of 8.7 days and the luminosity of its star make it an attractive candidate for investigating its atmospheric composition, researchers said.

The star, GJ 536, is a red dwarf which is quite cool and near to our Sun, they said. During the research, a cycle of magnetic activity similar to that of the Sun has been observed, but with a shorter period, three years.

"So far, the only planet we have found is GJ 536 b, but we are continuing to monitor the star to see if we can find other companions," said Alejandro Suarez Mascareno from Instituto de Astrofisica de Canarias and University of La Laguna in Spain. "Rocky planets are usually found in groups, especially around stars of this type, and we are sure that we can find other low-mass planets in orbits further from the star, with periods from 100 days up to a few years," he said.

"We are preparing a programme of monitoring for transits of new exoplanet to determine its radius and mean density," he said.

## Scientists tweak photosynthesis to boost crop yield

**Washington:** Scientists have successfully tweaked the process of photosynthesis to make it more efficient and increase plant productivity by raising the level of three proteins involved in the process.

Many years of computational analysis and laboratory and field experiments led to the selection of the proteins targeted in the study. Researchers used tobacco plants as it can be easily modified.

“We do not know for certain this approach will work in other crops, but because we are targeting a universal process that is the same in all crops, we are pretty sure it will,” said Stephen Long, professor at the University of Illinois at Urbana-Champaign in the US. The researchers targeted a process plants use to shield themselves from excessive solar energy.

“Crop leaves exposed to full sunlight absorb more light than they can use. If they can not get rid of this extra energy, it will actually bleach the leaf,” said Long.

Plants protect themselves by making changes within the leaf that dissipate the excess energy as heat, he said. This process is called nonphotochemical quenching (NPQ).

“However, when a cloud crosses the sun, or a leaf goes into the shade of another, it can take up to half an hour for that NPQ process to relax. In the shade, the lack of light limits photosynthesis, and NPQ is also wasting light as heat,” Long said.

Researchers used a supercomputer to predict how much the slow recovery from NPQ reduces crop productivity over the course of a day. These calculations showed “surprisingly high losses” of 7.5 per cent to 30 per cent, depending on the plant type and prevailing temperature, Long said. Researchers suggested that boosting levels of three proteins might speed up the recovery process. To test this concept, they inserted a “cassette” of the three genes — taken from the model plant *Arabidopsis* — into tobacco.

“The objective was simply to boost the level of three proteins already present in tobacco,” Long said.

The researchers grew seedlings from multiple experiments, then tested how quickly the engineered plants responded to changes in available light. A fluorescence imaging technique allowed the team to determine which of the transformed plants recovered more quickly upon transfer to shade. The researchers selected the three best performers and tested them in several field plots alongside plots of the unchanged tobacco.

Two of the modified plant lines consistently showed 20 per cent higher productivity and the third was 14 per cent higher than the unaltered tobacco plants.



## Next gen weather satellite lifts off

**Washington:** Nasa has successfully launched the first in a series of highly advanced weather satellites on Sunday, that will lead to more accurate and timely forecasts, watches and warnings.

The National Oceanic and Atmospheric Administration's (NOAA) Geostationary Operational Environmental Satellite-R (GOES-R) lifted off from Florida in the US.

"The launch of GOES-R represents a major step forward in terms of our ability to provide more timely and accurate information that is critical for life-saving weather forecasts and warnings," said Thomas Zurbuchen, associate administrator for NASA's Science Mission Directorate in Washington.

After it reaches its final designated orbit in the next two weeks, GOES-R will be renamed GOES-16.

The new satellite will become operational within a year, after undergoing a checkout and validation of its six new instruments, including the first operational lightning mapper in geostationary orbit.

"The next generation of weather satellites is finally here. GOES-R will strengthen NOAA's ability to issue life-saving forecasts and warnings and make the US an even stronger, more resilient weather-ready nation," said NOAA Administrator Kathryn Sullivan.

Forecasters will use the lightning mapper to hone in on storms that represent the greatest threats.

The satellite's primary instrument, the Advanced Baseline Imager, will provide images of Earth's weather, oceans and environment with 16 different spectral bands, including two visible channels, four near-infrared channels and 10 infrared channels.

Improved space weather sensors on GOES-R will monitor the sun and relay crucial information to forecasters so they can issue space weather alerts and warnings.

In all, data from GOES-R will result in 34 new or improved meteorological, solar and space weather products.