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«Il nest rose sans espine» *[There is no rose without thorns]*
The coat of arms of the Antonio Pigafetta family has 5 roses and this motto.

"THE CURSE" BY MAGELLAN. COORDINATION OF CALENDARS OF OBJECTS MOVING ALONG CIRCULAR PATHS. THE STANDARD UNIFIED LINEAR LUNAR-TERRESTRIAL 13-MONTH CALENDAR OF THE UNIVERSE [LTC-CALENDAR]

Annotation. Why is flying to the USA from Europe across the Atlantic Ocean preferable to flying through the Bering Strait? The use of the unified reference standard for universal space time "lunar Greenwich" [LTC-calendar] in civil and military aviation, in space exploration, in railway, land and water transport to ensure uninterrupted navigation. Replacement of the Standard Time Act [Standard Time Act or Calder's Law or the "locomotive Law"], operating in three environments (in the atmosphere; on earth and on water), which was signed by Woodrow Wilson, the 28th President of the United States, on March 19, 1918, for a new Law on the "rocket" Unified Linear Universal Space Reference Standard Time of travel simultaneously in four environments (atmosphere; on earth; on water and in space).[5] Boeing uses a 13-month calendar to organize engine repairs and maintenance for all of its aircraft in the UK. The 13-month calendar was used by Eastman Kodak for his company's production work. The 13-month calendar has been the state calendar in the Asgardia space state since December 18, 2019 [Decree No. 38 On the Introduction of the Asgardia calendar dated December 16, Capricornus 0003 (December 18, 2019)].

Keywords. Unified reference standard of universal space time "lunar Greenwich" [LTC-calendar]; Bering Strait; Atlantic Ocean; Magellan's journey; Earth Greenwich; Unified linear Worldwide Transport Schedule; rail, land, air, space, water transport; Calder's "locomotive" Law in three environments [atmosphere; on earth; on water]; the "rocket" Law on the Unified Linear Universal Reference Standard Space Time based on coordinated lunar time [LTC-calendar] simultaneously in four environments [atmosphere; on earth; on water and in space]; the standard unified linear lunar-terrestrial 13-month calendar of the Universe [LTC-calendar].

The prologue. August 15, 2025, Anchorage, USA. Trump, the President of the United States is staying in Anchorage exactly according to the standard of US time according to "Earth Greenwich Mean Time" for a meeting with Russian President Putin. The Russian president was "delayed." Is the Russian president facing the "curse of Magellan"? What is it? In transit through the meridian of 180 ° longitude, separating the Western and Eastern hemispheres, passing through the Bering Strait. This meridian is called the boundary (line) of the date change. People crossing the Bering Strait from the Eastern Hemisphere to the Western Hemisphere have:

1) lag ("minus") one hour of your watch for every 15 degrees [15°] of longitude traveled, and a delay of a whole day when crossing the international date line along the meridian of 180 degrees longitude.

2) People traveling across this border in the opposite direction from the Western Hemisphere to the Eastern Hemisphere are ahead of the curve ("plus") one hour of your watch for every 15 degrees [15°] of longitude traveled, and a full day's advance when crossing the international date line along the meridian of 180 degrees longitude.

The international date line runs approximately along the meridian of 180° longitude, approximately in the middle of the Pacific Ocean, and halfway around the world from the original IERS meridian, the successor to the historic Greenwich Meridian zero, passing through the Royal Greenwich Observatory. All countries unilaterally determine their standard time zones, which are valid only on land and in adjacent territorial waters. In international waters, this rule is applied only by agreement between the parties concerned.

There is currently no single international standard in the international legal field (it has not been adopted). This date line can only be called de facto, since it is based not on international law, but on national laws. These national zones do not apply to international waters. Theoretically, ships should switch to the country's standard time if they are in its territorial waters within 12 nautical miles (14 mi; 22 km) from the coast, and then, as soon as they leave these waters, return to international time zones (longitude gradation by zones of 15°). In practice, courts use these time zones only for radio communications and similar purposes. For internal (on-ship) purposes, such as working hours and meal times, ships use the time zone of their choice.

No international organization or treaty between countries has legally fixed the boundaries of time zones established by cartographers in a scientific manner. The International Meridian Conference of 1884 explicitly refused to propose or coordinate any time zones, stating that it was beyond its competence. This conference decided that a World Day starting at midnight and ending at midnight Greenwich Mean Time (which is now defined and updated as Coordinated Universal Time, or UTC) "should not interfere with the use of local (local) standard time, if necessary" in cases where it concerns anysome kind of internal routine, such as the order of meals by the crew members on a submarine.

This implies the usefulness and importance of introducing UTC or "Z" ("Zulu") time: which allows using UTC as a single universal time reference system that is valid for all points of the globe at the same time. [7,8] But in space, the "curved terrestrial" UTC system is useless for solving navigation problems. It is locally useful only for the Earth. ***Navigation in space can be fully provided only by the Unified Linear Reference Standard Space System of Coordinated Lunar Time [LTC-calendar].***

The history of the issue. The medieval period of the XV-XVI centuries is called the "era of Great Geographical Discoveries" or the era of the discovery of colonies. The development of science, physics, metallurgy, mathematics, chemistry, astronomy, navigation, and manufacturing made it possible to build reliable ocean-going sailing caravels, which opened the way for civilization to the boundless waters of the world ocean, which covers 70% of the Globe's surface.

Portugal and Spain through the Vatican [under Pope Alexander VI Borgia (pontificate from 1492 to 1503) They divided the globe among themselves along the line of the "papal meridian". ***This was the "Treaty of Tordesillas" dated June 7, 1494***.

This treaty was finally approved [ratified] by a bull of Pope Julius II in 1506 [the pontificate of Pope Julius II lasted from 1503 to 1513]. *The Vatican played a crucial role in this process of dividing the global world between the world's two leading maritime metropolises, Spain and Portugal.*

King Manuel I the Happy of Portugal [1469-1521] refused in 1515 to support Magellan's plan to reach the Moluccas, or Spice Islands, across the Atlantic Ocean to the West around the American continent. This project seemed to him excessively risky and expensive. Magellan did not despair and proposed the same plan to King Charles I of Spain [1500-1561], the main opponent of the King of Portugal, who immediately approved this plan. Magellan received Spanish citizenship. In Seville, he married, became the father of two children, and with the active assistance of the King of Spain himself, organized his proposed expedition around the globe ("around the World").

In 1518, for his loyalty to the Spanish monarchy, Magellan was appointed admiral of the Spanish fleet and given command of an expedition consisting of the five-ship Moluccas Armada. He also became a commander of the Order of Santiago, one of the highest military ranks of the Spanish Empire.

Having received special powers and privileges from the king, he led his naval Armada from *Sanlucar de Barrameda* southwest across the Atlantic Ocean to the east coast of South America and further south to Patagonia. Despite a series of storms and mutinies, the expedition successfully passed through the strait, later called the

"Strait of Magellan", into the "South Sea", which Magellan then renamed the "Pacific Sea", or the "Pacific Ocean", as we all call it today.

The expedition landed on Guam after a difficult crossing of the Pacific Ocean, and then reached the Philippines. There, on April 27, 1521, *Magellan was killed in the Battle of Mactan by a poisoned arrow that hit him in the neck.*

Under the command of Captain Juan Sebastian Elcano, the expedition finally reached the Spice Islands. The two remaining ships of the fleet split up: one unsuccessfully tried to reach *New Spain, heading East across the Pacific Ocean.*

The other, «Victoria», under the command of Elkanah, sailed along the standard route *to the West, crossing the Indian Ocean, and through the African Cape of Good Hope passed further north along the Atlantic coast of Africa*.

He returned to Seville, Spain, on September 6, 1522, completing the first complete circumnavigation of the world. Thus, Magellan became the *"Gagarin of the Middle Ages."* Earlier in his youth, while still serving in the Kingdom of Portugal, Magellan had already reached the Malay Archipelago in Southeast Asia during his previous voyages to the East (from 1505 to 1511-1512). Now he has visited the same geographical region again, having sailed to it from the other side of the Earth. But now he wasn't moving East, but West.

For the first time in modern history, the Magellan expedition officially completed a full circumnavigation of the world during the era of the medieval Great Geographical Discoveries.

I. CROSSING THE LINE [BORDER] OF THE INTERNATIONAL DATE CHANGE IS A CRITICAL MOMENT IN NAVIGATION, WHICH REQUIRES THE USE OF *THE UNIFIED UNIVERSAL LINEAR REFERENCE SPACE STANDARD "LUNAR GREENWICH*"[LTC-CALENDAR]

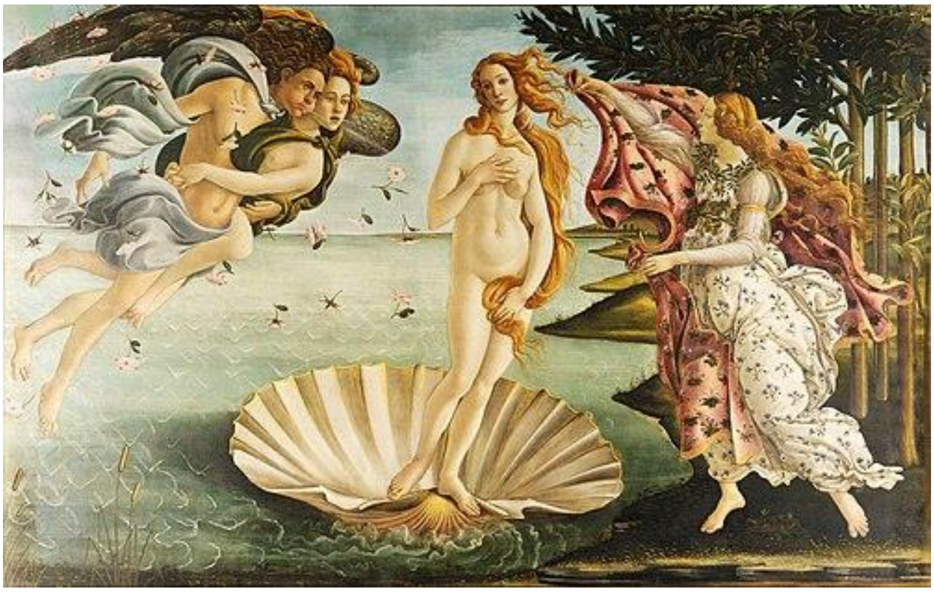
Fernand Magellan (1480-1521) was a Portuguese navigator who made the first ever circumnavigation of the world. He was a contemporary of Leonardo di ser Piero da Vinci (1452-1519), Christopher Columbus (1451-1506) and Amerigo Vespucci (1454-1512). It was a brilliant galaxy of outstanding figures of the Medieval Renaissance, Renaissance and Great Geographical Discoveries.

The symbol of this era of the Middle Ages and the Renaissance was *Simonetta Vespucci* (1453-1476), the wife of Marco Vespucci from Florence, the son of Amerigo Vespucci, and at the same time his cousin, whose beauty quietly drove the whole medieval Florence and the entire civilized medieval world crazy.

She was an analogue of *the Greek Helen the Beautiful*, because of whom the famous *Trojan War* took place. The artist Sandro Botticelli, (1445-1510) a friend of Leonardo da Vinci (they studied together in the workshop of Verrocchio), posthumously captured her image in the world-famous painting "*The Birth of Venus*".

The term "America" itself appeared as a result of the scientific description of the New World made by Amerigo Vespucci, a navigator and mariner, an active participant in the voyages of Columbus.

Amerigo Vespucci was a Senior Navigator at the School where Fernando Magellan was trained as a sailor in the Kingdom of Portugal in his youth.



Sandro Botticelli. The birth of Venus. 1482—1486.

The purpose of Magellan's expedition was to find a new route to the Indian Ocean through the West in order to provide Spain with large state profits from trade with the Moluccas (Spice Islands).

The price of these spices was such that the trip, upon its completion and the sale of the imported spices, repeatedly recouped all the costs of the Magellan expedition.

But this was only a side economic effect of this global expedition. The main purely scientific grandiose task was solved – the first circumnavigation of the world was successfully completed, which proved that the Earth is a cosmic sphere (sphere). The Vatican was a particularly interested party, since it was he who defined the boundaries of the metropolises in the oceans and had his share of all income received.

The journey began on September 20, 1519, and ended *on September 6, 1522*, *according to the expedition's log, sealed with the royal state sealing wax seal*. All pages of the logbook were pre-numbered and stitched.

"On Saturday, *September 6, 1522*, we entered the Bay of San Lucar, with only eighteen crew members on board the Victoria, and most of them sick, that's what's left of the sixty people who left Molucca three years ago. Some of them died of starvation, some fled to Timor Island, others were sentenced to death for crimes (p. 156).

From the day we left this bay [San Lucar] until the day we returned to it, we traveled fourteen thousand four hundred and sixty leagues and thus made a journey around the world, ***sailing strictly from East to West***."[6]

But in Spain, there was a different date on the calendar - *September 7, 1522*. Therefore, the Catholic Church initially even accused the sailors from Magellan's crew of allegedly "falling into heresy" and reciting Christian Easter Sunday prayers on the "Jewish" Saturday.

"We have finally reached *the Cape Verde Islands*. On Wednesday, July 9, 1522, we reached the islands of St. James [Santiago] and immediately sent a boat to the shore for provisions. We instructed our people who went by boat to the shore to ask what day it was, and they found out that the Portuguese had **Thursday**, which surprised us very much, since we had **Wednesday,** and we could not understand why such a mistake could have happened."

"I felt good all the time and took notes every day without interruptions. As it turned out later, there was no mistake, because we were walking all the time in the direction of the west [behind the Sun] and returned to the same point from where the sun was moving, and thus gained twenty-four hours, of which there can be no doubt."[6].

The chronicler of the expedition was Catholic *Antonio Pigafetta*, who categorically denied in the Court of the Vatican Inquisition an error on his part in maintaining the logbook of the expedition, which for the first time officially legally documented crossed the date line, the existence of which the science of that time had no idea.

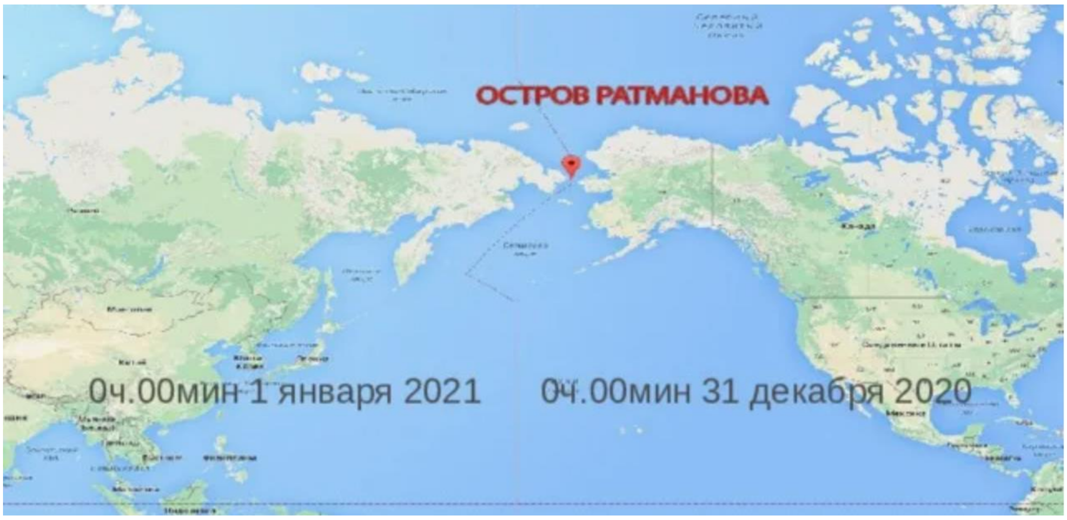
The boundary (line) of the date change runs through the entire globe and divides it in half into the Western and Eastern hemispheres along approximately 180° meridian longitude, which passes through the poles to 0° meridian longitude of Greenwich, closing a complete circle of these two opposing meridians.

For an observer at the North Pole, the Earth rotates from West to East. If a traveler moves *in the opposite direction*, towards the rotation of the Earth around its axis, that is, against the circular motion of the Earth, and moves from East to West, then at full rotation ("what is Magellan's circumnavigation of the world") *he "loses" one day.*

Therefore, ***one day*** (one complete revolution of the Earth, traveled by the ship ***in the opposite direction of the Earth's rotation***) is subtracted [the calendar counter is "twisted" for one day into a "minus"]; – there is a seemingly unnatural transition from "today" to "yesterday" [supposedly "into the past"]. ***There are not 365 days in a year, but only 364*** *[365-1=364].*

If the traveler moves in the direction of the Earth's rotation, that is, in the direction from West to East [for example, a flight from the USA to Europe], then at full rotation "performs a simulation of Magellan's return trip around the world", ***one day skipped*** in the opposite direction is added back [the calendar counter "***winds up***" for one day in "***plus***"] when crossing the now 0° meridian of Greenwich, there is a formal (apparent) transition from "**today**" to "**tomorrow**" [supposedly "into the future"]. ***In fact, the year is simply being restored to the standard: 364+1=365 days.***

There is an artificial calendar (apparent) journey into the "***Future***", then into the "***Past***" [a formal calendar "time machine"]. This is a side effect of the calendar accounting of circular planetary time and its fundamental inconvenience for use in space exploration.



In principle, there is no ***International Date Change Line in space***. In space, time definitely flows linearly from the Past to the Future through the Present, but not vice versa.

This is the realization of ***Rudolf Clausewitz-Ludwig Boltzmann's Second Law of Thermodynamics*** [the law of increasing the entropy of the Universe].

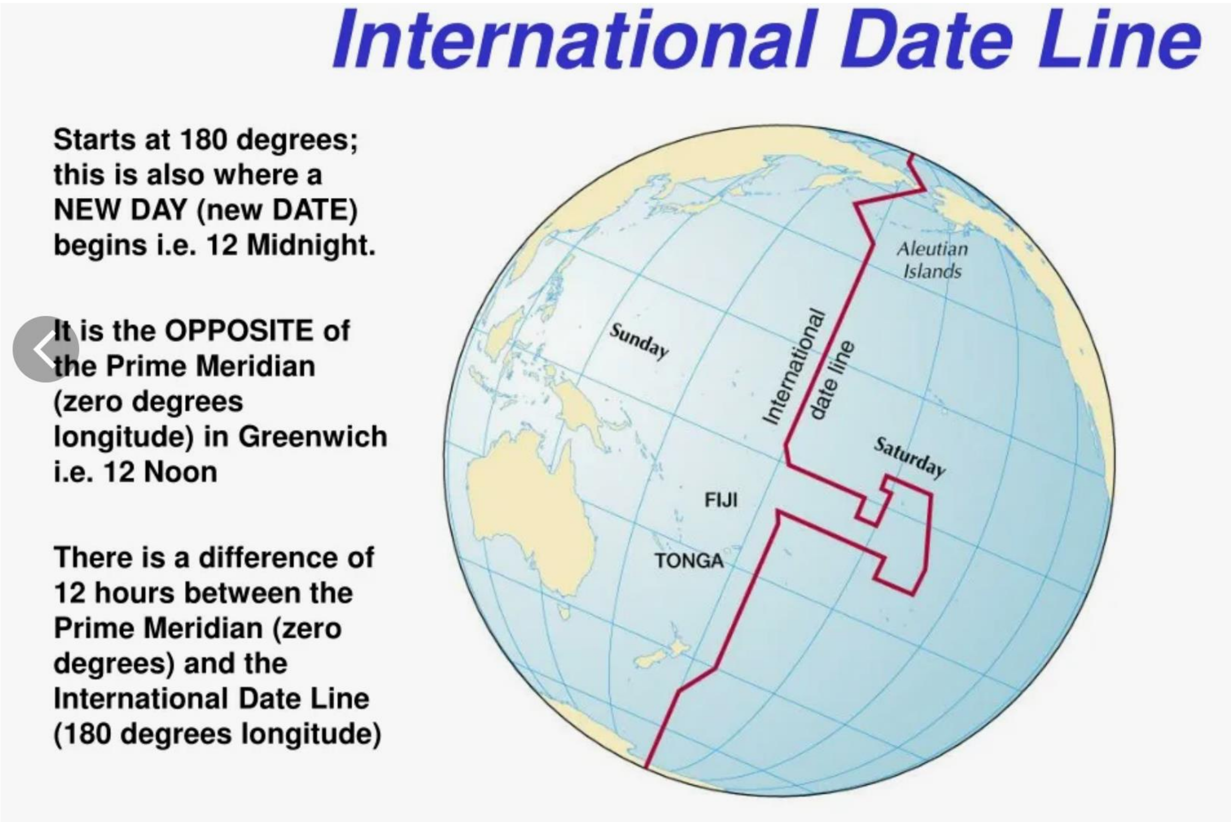
The calendar "time machine" is a purely calculated circular phenomenon of the Earth that has no real relation to physical cosmic time and its accounting in the universe.

The only correct instrument for space navigation is the proposed Unified Universal Linear Standard Reference "Lunar Greenwich" [LTC-calendar].

Economically, the most convenient flight on Earth is from the East [for example, from Europe] to the West through the *International Date Line at 180° meridian longitude,* actually to the American continent to North America through the Bering Strait to Alaska and further to Canada, through the USA to South America to the continent of Antarctica and further to the continents of Africa and Australia.

The passenger of the airliner reaches Europe and Asia without problems when making such a round-the-world trip, both from the African continent and from Australia or New Zealand on this route.

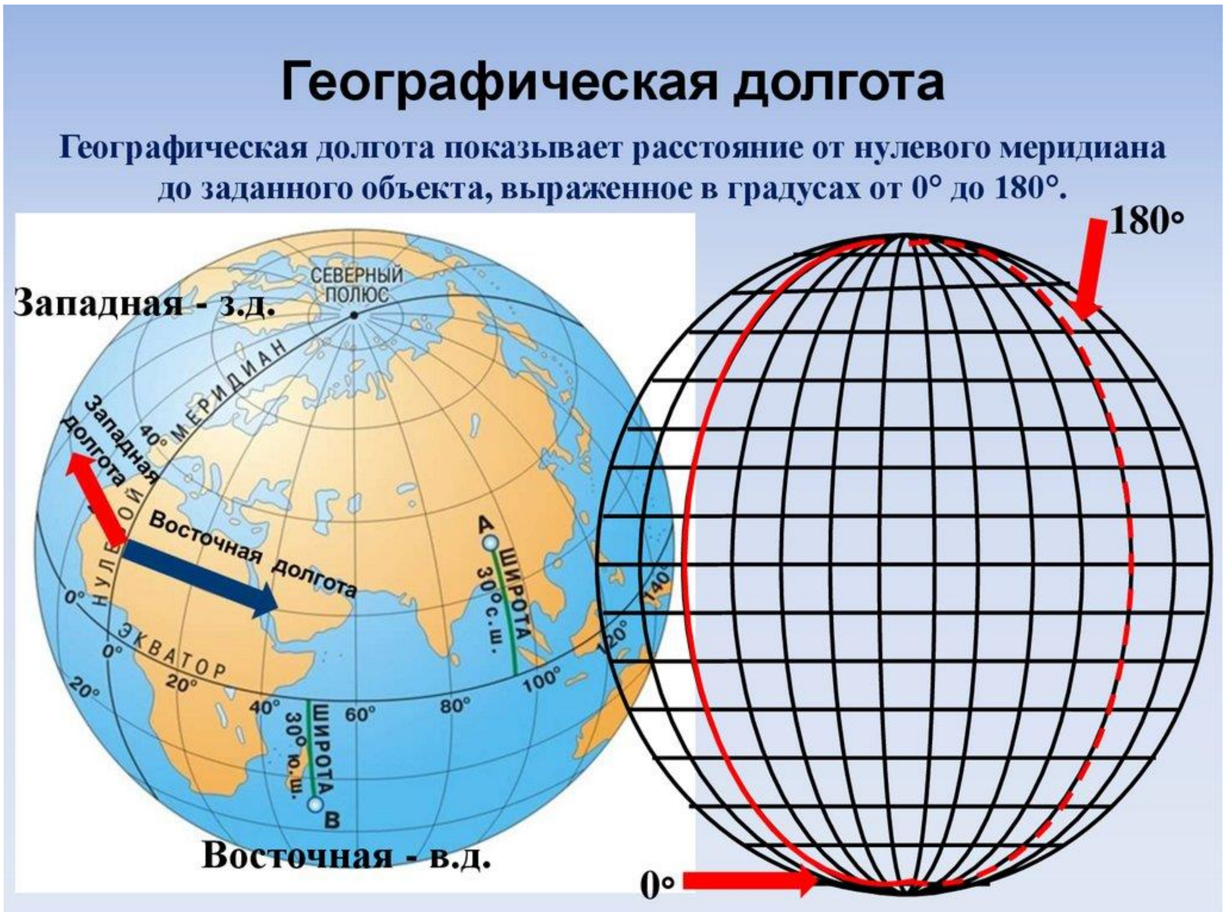
Date change line on the globe in the Western and Eastern hemispheres [*the unified global line consists of two meridians 0° (noon) and 180° (midnight) in the Western and Eastern Hemispheres, which connect to form the unified line (boundary) at the North and South Poles*].



There are only 24 meridians with hourly gradation per day; the count is calculated from the "zero" meridian [0°] longitude in Greenwich (that is, from "noon").

On the reverse side of the globe, the "zero" meridian of longitude continues as the "twelfth" or "midnight" meridian [180°].


Гринвичский
меридиан
Лондон
Восточное
полушарие
Западное
полушарие
С
Ю


Географическая долгота
Географическая долгота показывает расстояние от нулевого меридиана
до заданного объекта, выраженное в градусах от 0° до 180°.
Западная - з.д.
СЕВЕРНЫЙ
ПОЛЮС
МЕРИДИАН
Западная
долгота
Восточная долгота
НУЛЕВОЙ
ЭКВАТОР
А
ШИРОТА
30° с.ш.
ШИРОТА
30° ю.ш.
В
Восточная - в.д.
180°
0°

A flight from Europe to Southeast Asia via Vladivostok is economically the most convenient (to China, Japan, Korea, Vietnam, India, Indonesia, Philippines, Australia, New Zealand, Polynesia).

The "**hour zones**" [or "time zone"] are indicated ***below*** by Roman numerals [I÷XXIV];
The «**time Meridians**» from 0°/24 to 180° [pass through the middle of the "time hour zones" (30min+30min)] are indicated ***above*** by Arabic numerals [1-24/0°].

The width of the Bering Strait between the continents is approximately 86 km at its narrowest point. The width of the Atlantic Ocean between the continents is 6,700 km in the north and 2,900 km at the equator.

The navigational feature of such a flight through the Bering Strait is that it is accompanied by crossing the date change line. There is confusion with the concepts of "Today", "Tomorrow" and "Yesterday", which is inconvenient.

For this reason, there were a large number of incidents during the transfer of aircraft from the USA to the USSR during WWII.

A flight from East to West [for example, from Russia to the USA] conditionally becomes a flight "***into yesterday***." A return flight from West to East [for example, from the USA to Russia] conditionally becomes a flight "***into tomorrow***."

In this case, the terms "before the middle of the day, that is, before 12 o'clock [ante meridiem or a.m.]" and "after the middle of the day, that is, after 12 o'clock [post meridiem or p.m.]" are used. The values of "10 a.m." and "10 p.m." differ by 12 hours.

The tendency to increase travel speeds using hypersonic vehicles makes this problem particularly significant in both civil and military aviation, as well as in space exploration.

The problem is becoming urgent due to the development of mass cosmonautics, the construction and operation of spaceports located in Southeast Asian countries: China, Korea, the United States, Japan, Australia, New Zealand, India, Indonesia, and the Russian Far East.

In cosmonautics, navigation is also associated with the problem of taking into account the line (boundary) of date changes and, to a greater or lesser extent, depends on the specific geographical location of a particular cosmodrome.

Navigation errors when using circular terrestrial coordinated time [UTC], or "terrestrial Greenwich", in navigation can be completely avoided if the linear time of the "lunar Greenwich Reference Standard" [LTC] is used.

The LTC-calendar navigation system uses the unified linear universal lunar-terrestrial 13-month calendar with zero average error relative to the length of the tropical Kepler year. [2,3]

The UTC system is based on the application of the 12-month Gregorian calendar, which has an error of 27 seconds per year lagging behind the length of the tropical year of Kepler. [5]

Therefore, a bivalent calendar is proposed with automatic recalculation of any dates from the 12-month Gregorian calendar to any date of the 13-month Keplerian calendar, and vice versa. All calculations are fully automated in both Russian and English [2,3].

II. SPEED MEASUREMENTS IN MACH UNITS IN AVIATION AND COSMONAUTICS [1].
DIFFERENCES BETWEEN THE JULIAN AND KEPLERIAN LIGHT-YEAR IN DETERMINING DISTANCES IN THE UNIVERSE

Режим	Числа Маха	км/ч	м/с
Дозвук	<1,0	<1230	<340
Трансзвук	0,8—1,2	980—1470	270—400
Сверхзвук	1,0—5,0	1230—6150	340—1710
Гиперзвук	5,0—10,0	6150—12300	1710—3415
Быстрый гиперзвук	10,0—25,0	12300—30740	3415—8465

Режим	Числа Маха	км/ч	м/с	Общие характеристики аппарата
Дозвук	<1,0	<1230	<340	Единственный диапазон скоростей для самолётов с воздушным винтом, прямые или скошенные крылья.
Трансзвук (русск.) (англ.)	0,8—1,2	980—1470	270—400	Воздухозаборники и слегка стреловидные крылья, сжимаемость воздуха становится заметной.
Сверхзвук	1,0—5,0	1230—6150	340—1710	Более острые края плоскостей, хвостовое оперение цельноповоротное.
Гиперзвук	5,0—10,0	6150—12300	1710—3415	Охлаждаемый никелево-титановый корпус, небольшие крылья. Пример: «*Кинжал*».
Быстрый гиперзвук	10,0—25,0	12300—30740	3415—8465	Кремниевые плитки для теплозащиты, несущий корпус аппарата вместо крыльев.
«Возвращение в плотные слои атмосферы»	>25,0	>30740	>8465	Аблятивный тепловой экран, нет крыльев, форма капсул.

The Julian calendar has an error lag of 675 seconds per year from the length of the average tropical year of Kepler. The Gregorian calendar is 27 seconds per year. The lunar calendar [LTC-calendar] has no error with respect to the length of the average astronomical tropical year of Kepler.

The average error of the proposed LTC-calendar is "0" (zero). The earth has the longest parallel length along its equator – 40,075,017 km. The length of any terrestrial meridian is 40,000 km. The Earth is an almost perfect spheroid. At travel speeds of up to Mach 20 [6.8 km/sec – the first space speed or the speed of the Earth's satellite], the error of navigation calculations using the Gregorian and Julian calendars can be ignored.

But at speeds above Mach 20 and at distances over the length of the Earth's circumference (or the length of the meridian, which is practically the same thing), this error becomes significant and must be taken into account already when flying to the Moon and on the Moon.

Мах	Километры в секунду	Мах	Километры в секунду	Мах	Километры в секунду
0.0000Mach	0.0000km/s	20.000Mach	6.8058km/s	40.000Mach	13.612km/s
1.0000Mach	0.34029km/s	21.000Mach	7.1461km/s	41.000Mach	13.952km/s
2.0000Mach	0.68058km/s	22.000Mach	7.4864km/s	42.000Mach	14.292km/s
3.0000Mach	1.0209km/s	23.000Mach	7.8267km/s	43.000Mach	14.632km/s
4.0000Mach	1.3612km/s	24.000Mach	8.1670km/s	44.000Mach	14.973km/s
5.0000Mach	1.7014km/s	25.000Mach	8.5072km/s	45.000Mach	15.313km/s
6.0000Mach	2.0417km/s	26.000Mach	8.8475km/s	46.000Mach	15.653km/s
7.0000Mach	2.3820km/s	27.000Mach	9.1878km/s	47.000Mach	15.994km/s
8.0000Mach	2.7223km/s	28.000Mach	9.5281km/s	48.000Mach	16.334km/s
9.0000Mach	3.0626km/s	29.000Mach	9.8684km/s	49.000Mach	16.674km/s
10.000Mach	3.4029km/s	30.000Mach	10.209km/s	50.000Mach	17.014km/s
11.000Mach	3.7432km/s	31.000Mach	10.549km/s	51.000Mach	17.355km/s
12.000Mach	4.0835km/s	32.000Mach	10.889km/s	52.000Mach	17.695km/s
13.000Mach	4.4238km/s	33.000Mach	11.230km/s	53.000Mach	18.035km/s
14.000Mach	4.7641km/s	34.000Mach	11.570km/s	54.000Mach	18.376km/s
15.000Mach	5.1043km/s	35.000Mach	11.910km/s	55.000Mach	18.716km/s
16.000Mach	5.4446km/s	36.000Mach	12.250km/s	56.000Mach	19.056km/s
17.000Mach	5.7849km/s	37.000Mach	12.591km/s	57.000Mach	19.397km/s
18.000Mach	6.1252km/s	38.000Mach	12.931km/s	58.000Mach	19.737km/s
19.000Mach	6.4655km/s	39.000Mach	13.271km/s	59.000Mach	20.077km/s

A table for calculating speeds in Mach units.

As a rule, "Julian days" are used in navigation calculations, which have been used by astronomers since the time of William Herschel [1738-1822], the first president of the Royal Astronomical Society of Great Britain.

The Julian calendar is used, which has an integer number of days in terms of 100 years [365.25 days/year*100 years = 365.25 days]. This is convenient and quite correct for astronomy tasks.

It is convenient for astronomers to make calculations. For distances measured in parsecs [1 parsec =3.2 light years], the measurement error of the Julian calendar can be ignored.

The speed of light in a vacuum is 299,792,458 meters/second. In 675 seconds, the light passes through – 202 359 909 150 meters ≈***202.359909150*10^6 km***.

In one Keplerian calendar year, light passes through ["**Keplerian light year**" (KLY)] – 31,556,925 seconds/year*299,792,458 meters = 9,460,528,112,671,650 meters ≈ 9.46*10^15 meters = 9.46*10^12 km.

The annual error in determining the distance is insignificant and will amount to – (202*10^6)/(9,46*10^12) = [0,21*10^-6] *10^2=0,21*10^-4%≈0,0021%.

In one Keplerian parsecs, light travels a distance of 1 parsecs = 3.2 light years ≈3,2*9,46*10^12 = 30,272*10^12 km. In classical astronomy, the "Julian light year" is used with a calendar year duration of 365.25 days = 31,557,600 seconds/year.

In one Julian calendar year, light passes through ["**Julian light year**" (JLY)] – 31,557,600 seconds/year*299,792,458 meters =
9,460,730,472,580,800 meters.

Thus, the JLY is longer than the KLY by: 9 460 730 472 580 800 m - 9,460,528,112,671,650 m - = 202 359 909 150 m = ***202 359 909, 150 km***.

This error is greater than 1 AU (one astronomical unit), equal to the distance from the center of the Sun to the center of the Earth (more correctly, "to the center of its gravitational focus with the Moon"): 1 AE = 149 597 870 ± 2 km. ***This last difference is 52,762,039.15 km.***

For astronomy, in which distances are measured in parsecs, the difference between the values in the JLY and in the KLY is of no importance, since they are negligibly small ("infinitesimal" from the point of view of mathematics).

However, they can have a real, important, commensurate value at shorter distances, which often occur in real-world astrogation, and therefore, in this case, it is preferable to use the KLY value instead of the JLY. And the use of the terrestrial circular reference standard of coordinated time [UTC] with its artificial boundary (line) for changing dates (formal "twisting" of the calendar) is completely unsuitable.

Instead, it is necessary to use the Unified Linear lunar Reference Space Standard for Coordinated Lunar Time [LTC-calendar], which does not have a specified date boundary.

III. SOME ELEMENTS OF THE CALCULATIONS OF THE FLIGHT TO THE MOON

The distance to the Moon the light passes for:

1). 384,400,000 meters/299,792,458 meters/sec ≈1.282220 seconds.

2). The error of the Julian calendar in relation to the Keplerian calendar will be: 675 seconds/ 365.2421875 days = 1.848 seconds /day.

3). The navigation error was: 1.848 seconds/ day * 1.41 days = 2.60 seconds, which would have given an error in determining the distance, at least (approach speed to the Moon ≈2.0 km/sec): ≈***2 km/sec*2.60 sec =5.2 km***.

This error significantly changes the situation and needs to be corrected when landing on the Moon, as well as when determining the operating time of the booster stage engine at the time of launch and when correcting the flight to the Moon from the reference orbit.

4). The Luna-1 station was launched on January 2, 1959 and flew past the Moon on January 4, 1959.

The «Luna-1» station traveled to the Moon in a "straight" trajectory for

≈34 hours = 1.41 days = 122,400 seconds.

It left the Earth's reference orbit at the Second Cosmic Velocity of ≈11.2 km/sec [Mach 33].

5). The «Luna-1» station was launched on January 2, 1959 and flew past the Moon on January 4, 1959.

It reached the second cosmic velocity at launch from a reference trajectory around the Earth, equal to 11,200,000 m/s [≈33 Mach] and overcame ≈384,400,000 meters of distance to the Moon.

She flew to the Moon with an average effective (apparent) speed: 384,400 km/34 h = 11,305.88 km/h ≈ 3.2 km/sec, [≈9.0 Mach]. (The check in seconds matches: 384,400 km/122,400 sec = 3,140 km/sec = [Mach 9.0])

6). ***The actual error of the station's flight past the Moon above its surface was ≈ 6,000 km***

7). The American Pioneer-4 station was launched to the Moon on March 3, 1959 from the Cape Canaveral cosmodrome by a Jupiter-2 launch vehicle.

On March 4, 1959, at 17:25, the spacecraft flew at a distance of ≈60,000 km from the Moon at a speed of 7,230 km/h [≈6.0 Mach].

It was the first American spacecraft to reach the Second Space Speed [Mach 33 – 11.2 km/sec] and overcome the Earth's gravity [2 months after the Soviet «Luna-1»].

This was the first successful attempt out of 12 total attempts. The mission duration is *3 days, 10 hours and 29 minutes*. Launch date: March 3, 1959, 05:10:56 GMT.

The Moon's flyby took place on March 4, 1959, at 22:25 GMT, at a distance of 58,983 km (36,650 mi) from its surface. In total, the flight lasted **41 hours, 14 minutes, 35 seconds = 148,475 seconds.**

The approach to the Moon occurred on March 4, 1959 at 22:25 GMT at a speed of 7,230 km/h = 2.00 km/sec [≈6.0 Mach].

The approximate verification calculation in seconds is within the acceptable error range, assuming an average distance to the Moon of ≈384,400 km: 384,400 km/148,475 sec = 2,589 km/sec [≈7 Mach].

V. THREE REASONS WHY A CIVILIZATION SHOULD EXPLORE OUTER SPACE AS ITS KEY STRATEGIC OBJECTIVE
COLONIZATION OF THE MOON HAS ***THE CATEGORICAL PRIORITY***. THEREFORE, IT IS IMPORTANT TO USE *THE UNIFIED UNIVERSAL COORDINATED LUNAR STANDARD TIME* [LTC-CALENDAR]

I. Mathematical formulas of the scientific Apocalypse calculated by V.V. Alexandrov: three scenarios [4].

The first one is "nuclear winter".
The second one is "volcanic winter".
The third one is "asteroid winter".

The last two "winters" will differ only in the absence of radioactivity [in the cases of "Volcanic Winter" and "Asteroid Winter"].

The volcanic winter locally in the permafrost region on the territory of modern Russia probably destroyed almost ***all mammoths***. Hence the expression, "Russia is the birthplace of elephants."

The number of dead mammoths is huge. Perhaps it was a super-powerful stratospheric eruption of ash from the mouth of a volcano in Iceland.

An asteroid winter may have cost the lives of ***all dinosaurs*** around the globe 65 million years ago.

A thermonuclear explosion, equal in maximum power to A. Sakharov's thermonuclear «Tsar bomb», can cause a deadly global effect.

Sakharov forbade Khrushchev to test his bomb at its full capacity of 100 megatons of TNT and thereby saved the world from certain death?

The explosion was half-powerful, but it also caused a partial detonation of the Earth's atmosphere, which *died out spontaneously for a long time*.

But even in this case, the height of the explosion of the nuclear mushroom cloud almost reached outer space along the ***Karman line*** [which theoretically begins at an altitude of 83.8 km and can reach an altitude of up to 100-122 km].

The Sakharov bomb, due to the autogeneration of the Earth's atmosphere, developed a capacity of 58.6 megatons of TNT, calculated together at 50 megatons.

Civilization was on the verge of self-destruction on October 30, 1961, on the day of the AN-602 «Tsar bomb» test at the Sukhoi Nos nuclear test site on Novaya Zemlya Island.

The exact calculation was made by nuclear physicist ***Vladimir Valentinovich Alexandrov*** [born January 1, 1938]. He made a presentation in October 1983 in Washington at a conference on the consequences of nuclear war.

The bomb with a capacity of 100 megatons of TNT ***will trigger an irreversible positive feedback process (chain reaction) of burning atmospheric oxygen.***

The entire atmosphere of the Earth will be involved in a single explosion and will completely burn up. *All living things will just suffocate*.

The fire tornadoes that will rage over cities will not just burn them to the ground — they will suck in millions of tons of asphalt, plastic, concrete and people, turning it all into 200 million tons of sticky soot.

This soot will rise into the stratosphere and, like a shroud, will cover the planet. The Sun will disappear.

Between the 30th and 60th parallels — from Cairo to Oslo, from New Orleans to Anchorage — there will be an eternal night that will last more than a month.

The temperature on land will collapse by 50 degrees. Even in Saudi Arabia, frosts will strike, and the rainforests will turn into an icy desert.

Stopping photosynthesis will kill plants. Animals will starve to death after them. The ocean, poisoned by burning products, will cease to be the cradle of life.

Self-purification of the atmosphere, according to his calculations, will take at least 150 years. Humanity, which survived the first blows, will simply die of hunger and cold.

"The biosphere of the Earth will change so much that it will exclude the possibility of human life, animals, birds, insects and higher plants."

Volcanic eruptions also burn out the atmosphere and fill it with a huge amount of carbon dioxide [CO2], but not to the same extent as a nuclear explosion, the burning temperature of which is much higher *at the epicenter and is millions of degrees burning Kelvin (and Celsius).*

Plus, volcanoes do not produce radioactive contamination, unlike the products of nuclear and thermonuclear explosions.

Humanity will perish along with the entire noosphere of the Earth from just one single "Tsar bomb" by A. Sakharov. *Sakharov was well aware of the effect of burning all atmospheric oxygen.*

Science fiction writer Alexander Belyaev described a similar situation in his book "The Seller of Air". [9].

Therefore, Sakharov demanded a ban on all nuclear tests in the Earth's atmosphere and in its oceans and seas. *Only underground atomic explosions of relatively low power were relatively safe.*

But if nuclear war is a controlled thing and depends on the degree of mental abilities of certain people, then volcanic activity does not obey a person in any way and periodically leads to Ice Ages, during which *almost all living things by more than 95% sometimes die completely.*

There are about ***200 volcanoes in Russia***: in Kamchatka (117); on Sakhalin (1); on the Kuril Islands (51); in Transbaikalia, in Yakutia (Momsky district), on the border with Mongolia (on the Azas plateau).

There are "dormant" volcanoes in the Caucasus (for example, the Elbrus stratovolcano, which is home to about 10 million people along the Kuban and Terek rivers, which originate from the giant glaciers of Elbrus. These glaciers will melt during a volcanic eruption and become sources of huge multi-meter tsunamis that carry everything in their path into the sea.

There have already been at least 5 such Glacial periods in the geochronological history of the Earth. *The sixth period will come naturally*. *But no one knows its exact date yet.* A similar effect of a volcanic winter can be produced by a large asteroid, which also fall on the Earth's surface from time to time. The Earth has several characteristic damages from such disasters.

The calculations of nuclear physicist Alexandrov were not just formulas. It was a mathematically verified scenario of possible apocalypse scenarios [4].

Alexandrov V.V. proved that just one thermonuclear bomb with a capacity of only 100 megatons of TNT is enough to start this irreversible process of self-destruction of civilization.

The fiery tornadoes that will rage over the planet will burn the Earth to the ground along with its entire noosphere, flora and fauna.

Therefore, a civilization must have the opportunity. The exodus from Earth and the settlement of mankind in the vastness of both the solar system and in the vastness of our entire Galaxy, and in the future in the vastness of other Galaxies.

Nuclear physicist Vladimir Valentinovich Alexandrov
[born January 1, 1938]. The scientist disappeared without a trace on April 1, 1985 in Spain during a business trip to an international conference on physics.

V. FRAMEWORK ASSESSMENT OF THE ECONOMIC COSTS OF SPACE INDUSTRIALIZATION

Elon Musk estimated that 1 million tickets to Mars at a price of $200,000 per ticket would amount to $200 billion. This is an estimated order of business volumes in space. How was it calculated?

Alexander Olegovich Mayboroda (Facebook, August 29, 2025) provides the following considerations on this issue in his article: "Elon Musk's Geocosmic Transport Systems."

The Starfactory is expected to produce 100 rockets per year. In the future, production will be expanded to 1,000 Starship rockets.

What does this mean for astronautics? A fleet of 100 rockets can launch into low orbit: 100 tons/rocket*100 launches/rockets*100 rockets = 1 million tons. This is the maximum possible tonnage.

And based on the realistic 30 launches per rocket already achieved, a total of 0.3 million tons will be delivered to LEO (low Earth orbit).

Elon Musk plans to deliver *1 million tons* of cargo to Mars. To do this, 12 million tons or more of rocket fuel alone must be withdrawn to the LEO.

A fleet of 4,000 rockets will launch *12 million tons* of fuel into orbit over 4 years of operation. The time for full delivery will be approximately 30 years.

During this period, 14 launches to Mars will take place. Up to *1 million tons* of fuel will need to be put into orbit during each launch window. *This will be the cost order.*

VI. WHAT SHOULD HUMANITY DO?

Spontaneous volcanic activity, which is not yet scientifically predictable, poses a critical danger to the biological world on Earth.

But it defines such a phenomenon as periodically occurring glacial periods, which are detrimental to all living things.

Today, human civilization is objectively located between the fifth and sixth ice ages.

She must manage to build caravans from fleets of spacecraft, colonize the "inner" solar system, that is, the Moon and Mars, as well as the satellites of gas planets in the "far" space of the Solar system.

To realize the idea of saving civilization in space, humanity needs the ***"sixth socio-economic formation" of K.E. Tsiolkovsky,*** *which will develop on the basis of the traditional values of the leading sciences of civilization.*

Such sciences include, in particular, Mendel-Vavilov genetics, Wiener-Glushkov-von Neumann cybernetics, Planck-Einstein-Lemaitre-Bartini astrophysics of the Universe, Kantorovich economic theory, Tsiolkovsky-Mendeleev cosmonautics.

The most important direction is the development of the ideas of Vernadsky's noosphere, as well as the modern theological theory of Catholic Lemaitre, which combines faith, religion and science.

Max Planck believed that new revolutionary ideas win only when the opponents of these new revolutionary ideas physically die out. And Igor Ashurbeyli is right about this with his progressive idea of the First Space state of "Asgardia" [2016].

"Nothing is new under the Moon" was written by King Solomon (970-930 B.C.).

King Solomon built the First Temple in Jerusalem in 950 B.C. and under him the first (Babylonian or Chaldean in origin) solar-lunar calendar, which still exists in Israel, became the state calendar.

The lunar synodic Jewish "*molad interval*" between two identical phases of the Moon was first astronomically correctly calculated under King Solomon.

Today, this has crystallized into a space navigation system based on the Unified Universal Linear Space Coordinated Lunar Time (LTC-calendar), which uses a 13-month calendar with zero error relative to the tropical year. [2,3,5]

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