

Exhibit Name

Masks of the Universe

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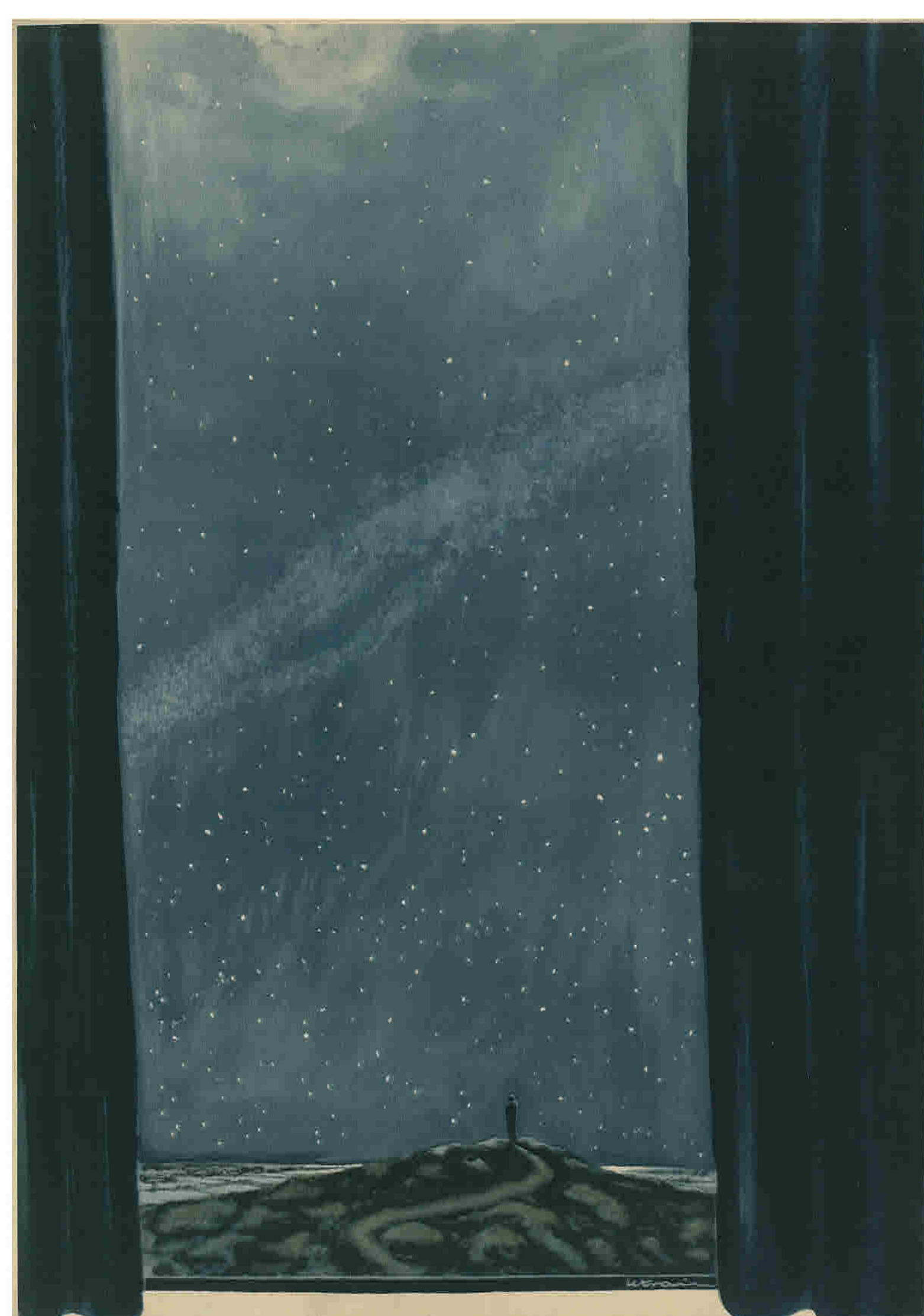
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Masks of the universe

reflections of changing ideas on outer space

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Left: German mourning-telegram (1938)



1.1.1 reflections of heaven



From times immemorial and all over the world mankind focuses on the upper world, the world of the gods. The basic plan of the 12th century Cambodian temples of Angkor reflects the constellation 'Dragon', sign of the Chinese Zodiac.



The Mexican city Teotihuacan has a comparable basic plan with the pyramids of the Sun and the Moon. In this city 'the way of the dead' reflects the stars of the Milky Way. The El Caracol observatory in Chichen Itza also shows an emphatic orientation on the stars.



Egypt under Turkish suzerainty 1866: watermark with star above pyramid



ASTROFISICO DE TONANZINTLA
INABURACION DEL OBSERVATORIO
CORREOS MEXICO
PIE-17 DE FEBRERO DE 1942

NO STAMP NEEDED TO MAIL THIS CARD

FREE FOR YOUR CHILDREN

This Beautiful New Color Booklet
75 Pictures.... Ten Pages in Color

There are children in my family who will be delighted to receive free of charge the handsome, interesting and instructive new color booklet containing 75 striking pictures taken directly from the wonderful NEW EDITION OF THE BOOK OF KNOWLEDGE.

Name

Home address

Firm name Position

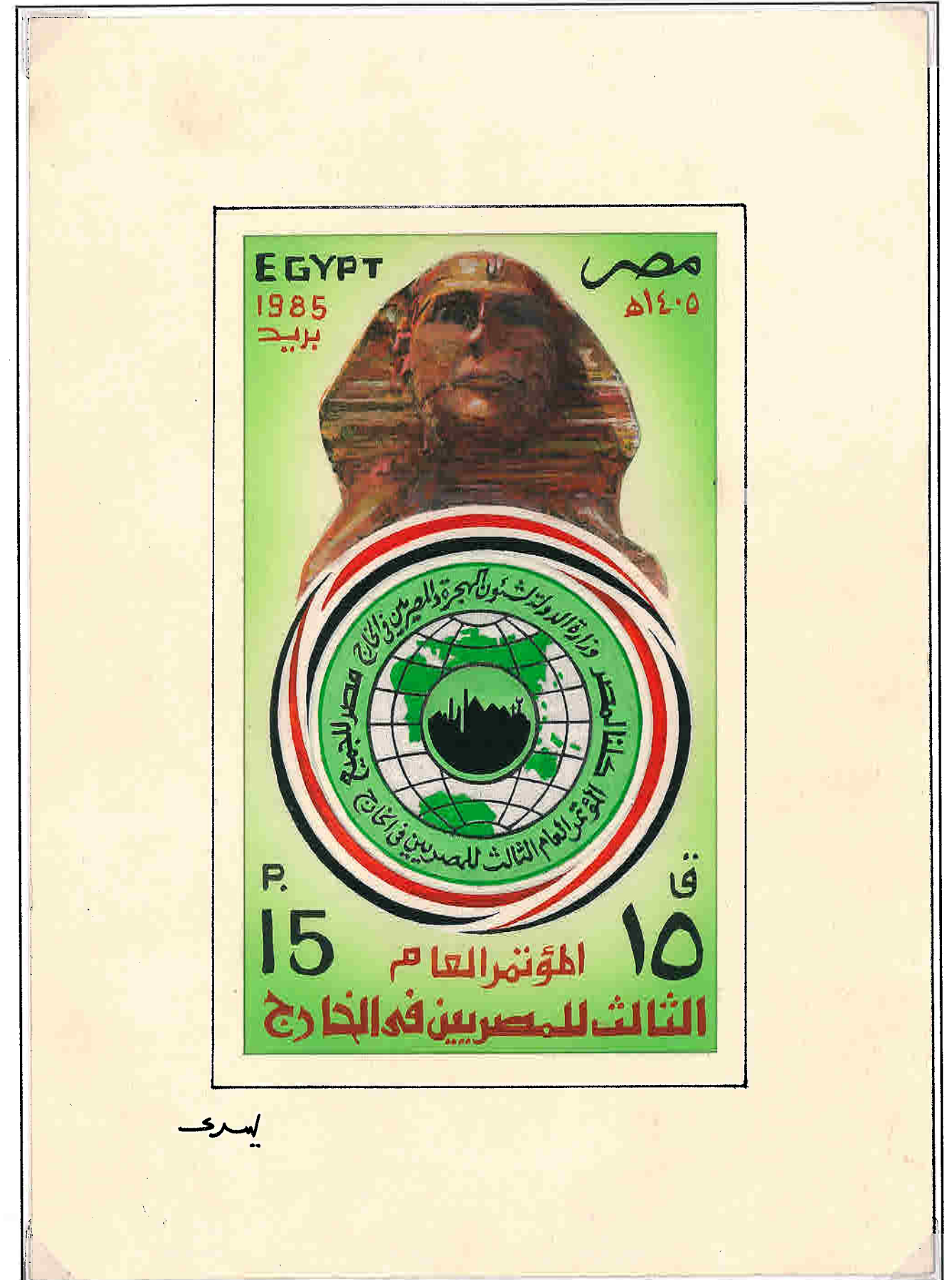
Business address City

If you already own The Book of Knowledge, please check and return card to correct our records.

NO BOOKLET CAN BE MAILED UNLESS CARD IS SIGNED BY A PARENT

The BOOK OF KNOWLEDGE
The Children's Encyclopaedia

The famous pyramids of Egypt and the Sphinx of Gizeh also have an astronomical basis. Their pattern reflects the stars of the belt of the Orion constellation of 10.500 B.C. Astronomical calculations are being used to estimate the age of the buildings.



This is a rejected design of Yousri of the 1985 issue to commemorate the '3rd Conference for Egyptian Emigrants'. It shows the Sphinx above earth. In the morning of the start of spring 10.500 B.C. the Sphinx points to the Lion constellation.

1.1.2 reaching for the stars



Copy of the front of the accompanying envelope.



Waterland

Singweis: Deutschland, Deutschland über alles!

Waterland, mit Herz und Munde
Weiß ich Dir mein ganzes Sein;
Waterland, zu jeder Stunde
Will ich preisen Dich allein!
Mögen dunkle Wolken ziehen
Über Deine Fluren hin,
Mag das Glück Dich neidisch stiehn,
Nach Dir steht mein Herz und Sinn.

Was die Mutter mir gesungen,
Was der Vater mich gelehrt,
Was des Mannes Herz bezwungen:
Waterland, so hoch und wert,
Waterland, des Wortes Klingen
Könt mir wie aus bess'rer Welt,
Wünsche und Gebete dringen
Heiß für Dich zum Sternenzelt.

Waterland, des Himmels Segen
Mög' Dir neu beschieden sein;
Seh' der Zukunft kühn entgegen,
Gott wird Mut und Kraft verleihn!
Waterland, und sollt' ich lassen,
Was ich bin und hab', für Dich,
Waterland, noch im Leblassen
Dir mein Alles weihe ich!

Johannes Redlin
Schauspieler des Deutschen Sängerbundes

Als Originalkomposition von Rudolf Sud-Füßingen gedruckt bei
E. G. Röder & Co. in Leipzig



Mankind is looking for the blessing from above (in his poem Redlin refers to this) and wants to rise to the upperworld (like the Ascension as shown on the mark d'ufficio of the archbishop of Morolo, 1866).

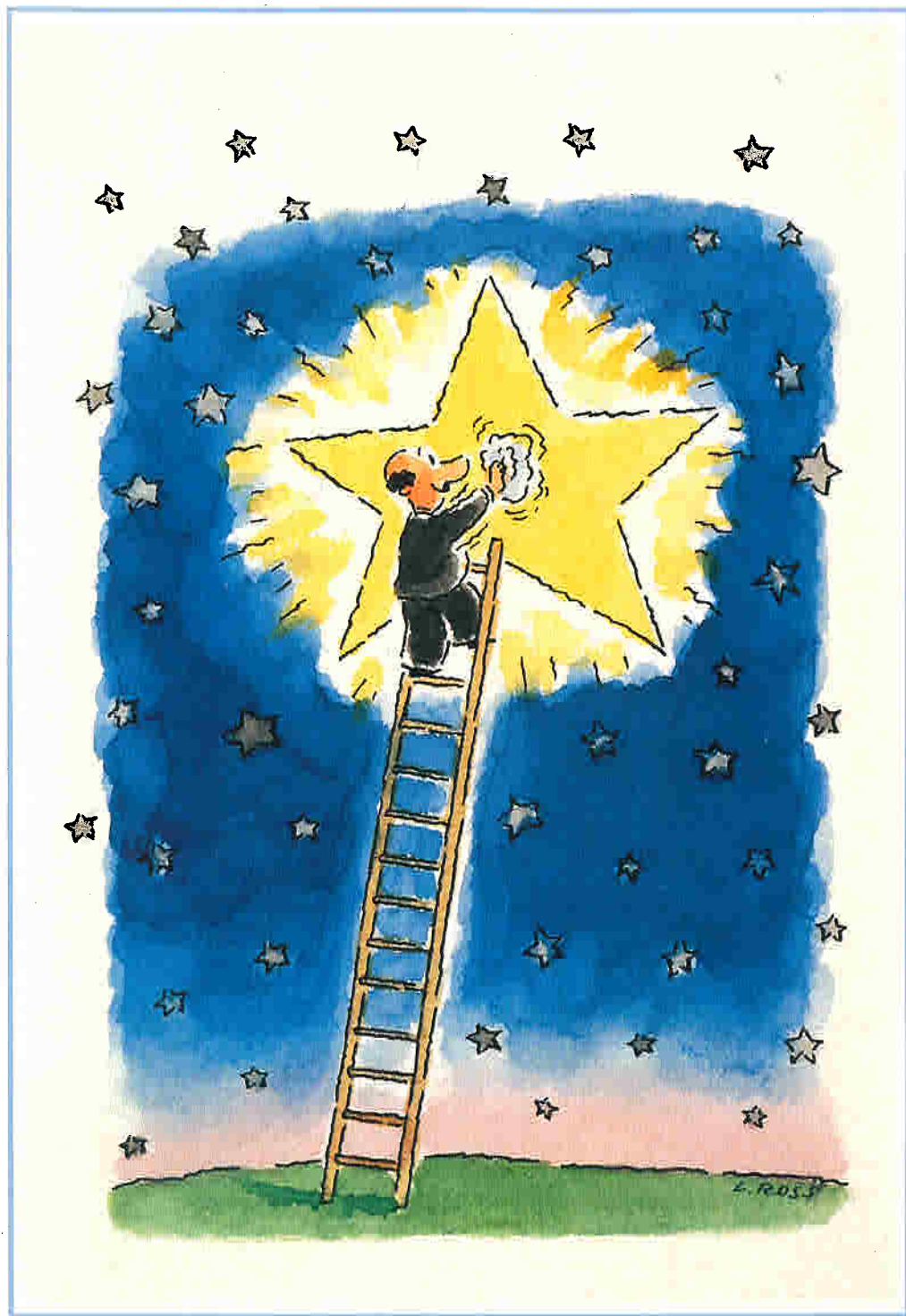
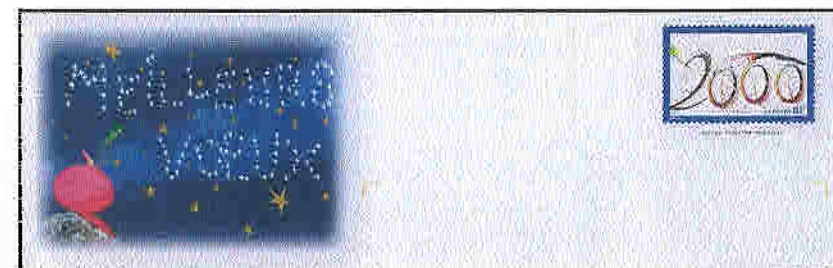


IMAGE BANK, L. ROSS



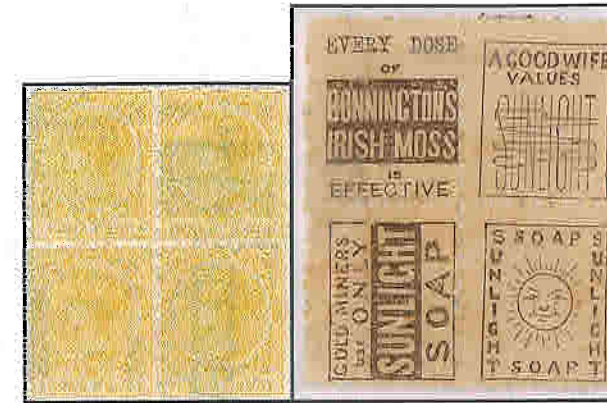
The way up is laborious. Unwieldy walking the stairs to stars millions of miles away. Postcard of a French prêt-a-poster postal stationery, issued to commemorate the turn of the millennium.

From Earth mankind is reaching for the upper world, the stars. The Belgium postogram shows respect for the upper world: the stars are being polished.

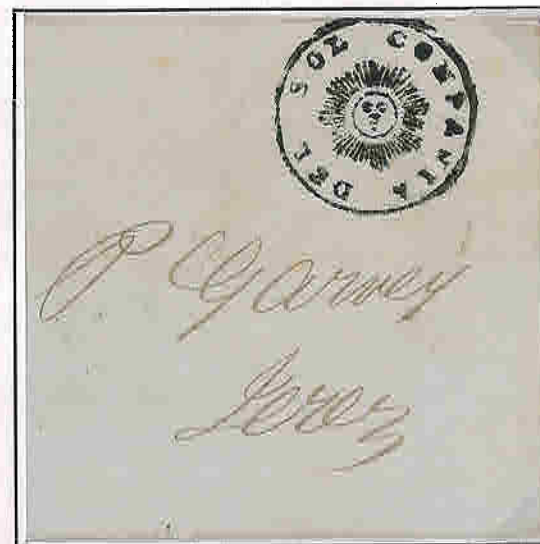
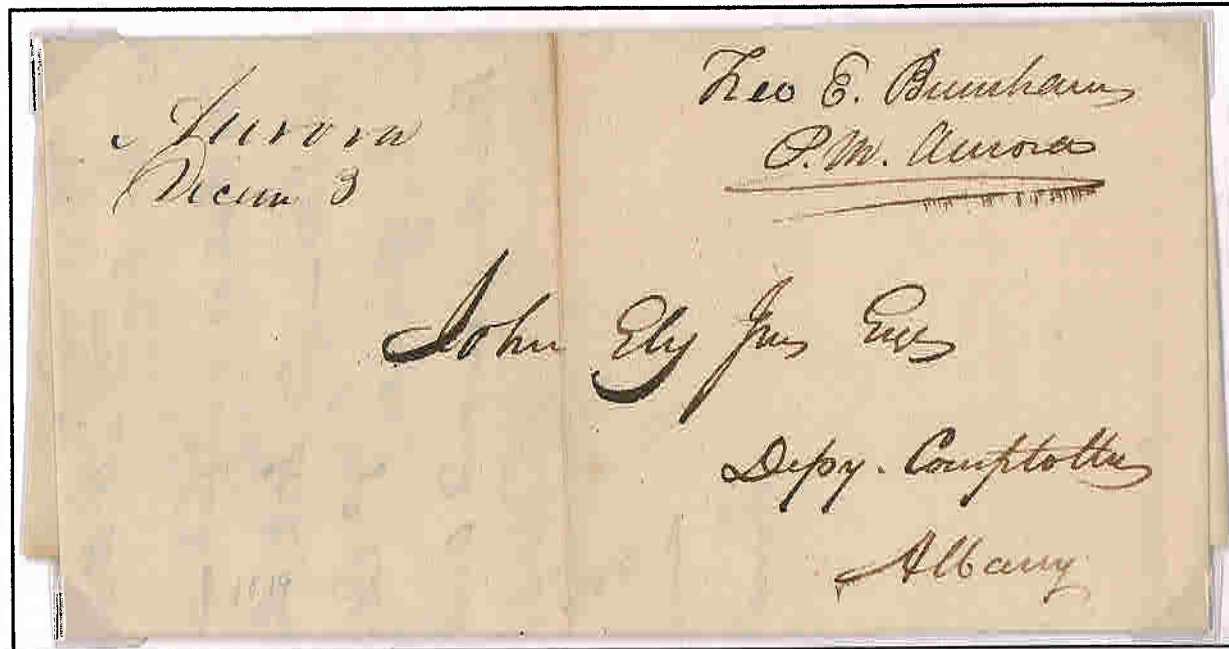
1.1.3 the gods of the upper world



The gods of the upper world are connected with the surrounding celestial bodies. The Sun (god) has a central position. Apollo is the Greek Sun god. Sometimes Helios replaces him. They travel with horse-drawn chariots. The Egyptian Sun god Ra travels by boat.



The producer of the brand 'sunlight soap' suggests celestial support for his product. Advertisements on the back of stamps of New Zealand, issued in 1893.



Aurora is the Roman goddess of the dawn. The celestial body of the Sun gets a face. Letter dated 29th Nov 1819, sent postage free by the postmaster of the city of Aurora, to forward a letter enclosed. Letter dated 9th Feb 1848, sent by Spanish local post 'Compania del Sol'



The celestial bodies near the Sun are gods as well. During early sunrise or late sunset a beautiful and clear wandering star can be seen: Venus, called after the goddess of love and beauty. The pentagram (see the fancy cancellation) is thought to trace its esoteric significance to an astronomical observance of the pattern of Venus' conjunctions with the Sun.



Viracocha - carved on the decorated "Gateway of the Sun" in the ancient (pre-Incan) city of Tiahuanaco (Bolivia) - is the Sun god of the Aymara indians. Like Apollo and Helios the Hindu Sun god Surya travels with a horse-drawn chariot.



Mercury is the messenger of the gods. The fast moving small planet near the Sun is called after him.

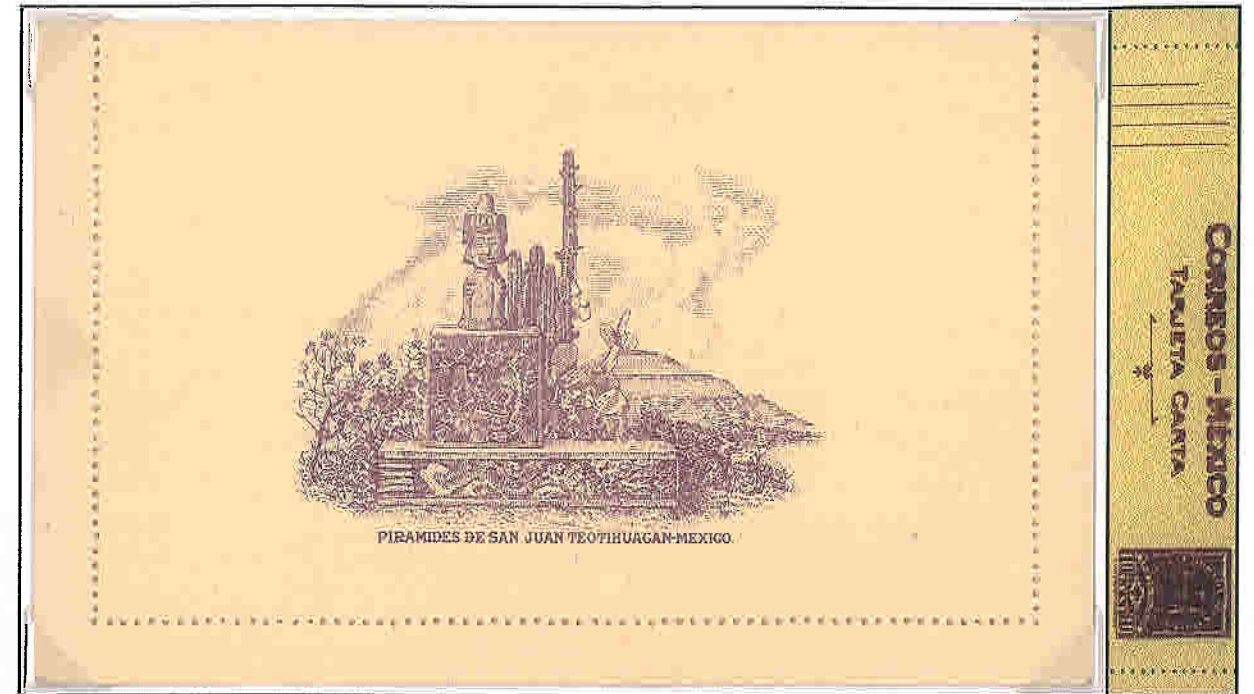
1.1.3 the gods of the upper world



Powerful institutions seek certification from the gods of the upper world. So church towers reach as high as possible in order to receive the blessing.



The church also refers to divine light for its celestial certification. The printer of the journal 'semaine catholique' uses stamps before printing to have an easy mass cancellation.



The Maya and Aztec Indians worship the moon and the sun gods (the Mexican stamp shows the moon god Coyolxauhqui). The pyramids of the Sun and the Moon in Teotihuacan are dedicated to the gods. The Aztec emperor Montezuma frequently makes pilgrimages to the pyramid of the Sun.



The moon god Tsukiyomi rules Japan. His temple in Kobe is the temple which, if visited on a certain day in the year, is equivalent to making 48000 pilgrimages.



The gate in Landau is built in honour of the sun king, Louis XIV. "Nec pluribus impar" ("None his equal") shows his overconfidence to be more powerful than the Sun, his celestial counterpart.

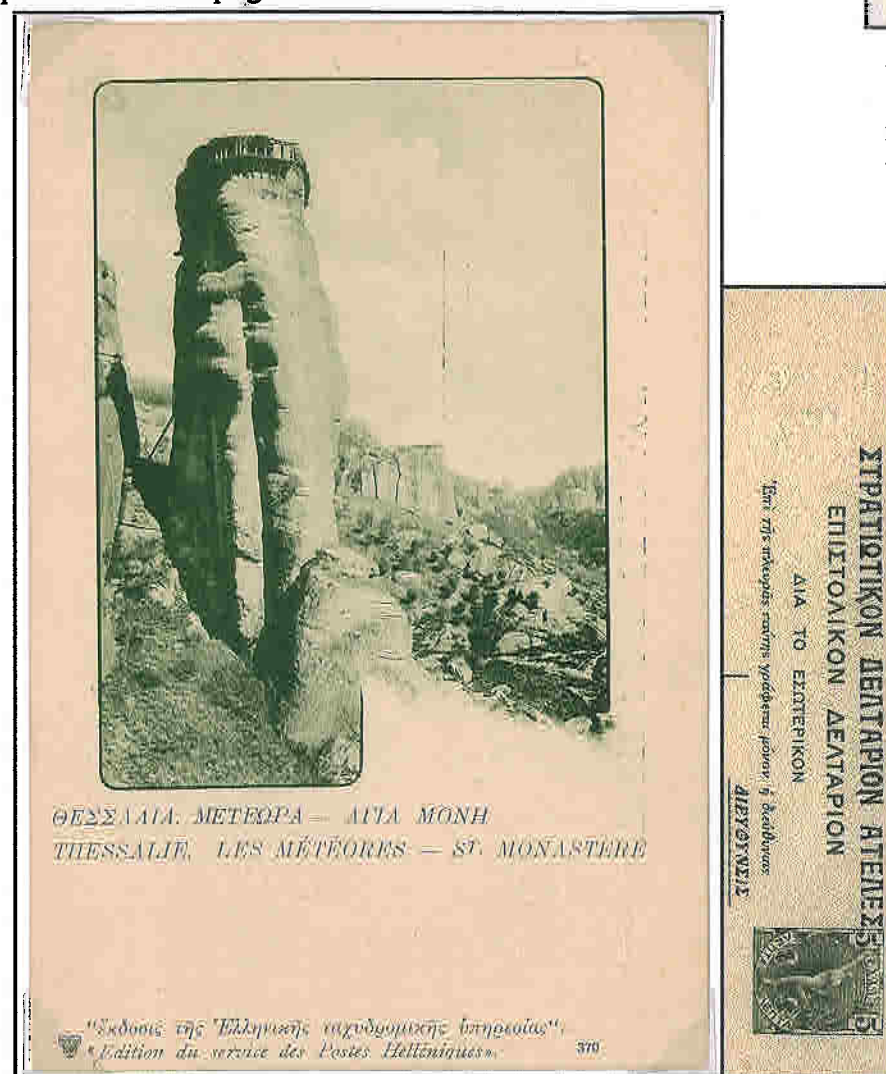
1.2.1 meteorites and comets



Meteorites are the most concrete signs of the gods. The Ensisheim meteorite (1492) is the oldest recorded and recovered fall. King Maximilian (of Austria) decides that the fall is a sign of God. He declares that the stone should be kept chained in the church to prevent a return to the upper world.



Tradition says the black stone in the wall of the Kaaba in Mecca was given to Abraham by the archangel Gabriel. Possibly it is a meteorite. The stone is of great importance for the pilgrims in Mecca.



Meteors are less concrete. They are shooting stars: trails of lights, fragments of material burning up in the atmosphere. They are signs of luck, as on the official proof of Tanzania (line perf. 11, issue has pin perf. 12x12.5). In central Greece the area 'Metora' is called after its columns of the sky, holy monks live on top of them: between heaven and earth.



Comets just pass by. They are signs of bad and good events. The Aztec Moctezuma II decides that the comet of 1517 is a sign of his coming defeat by the Spaniards. On the eve of deluge a comet also appears. In Sri Lanka the comet is a god, 'not an omen'.

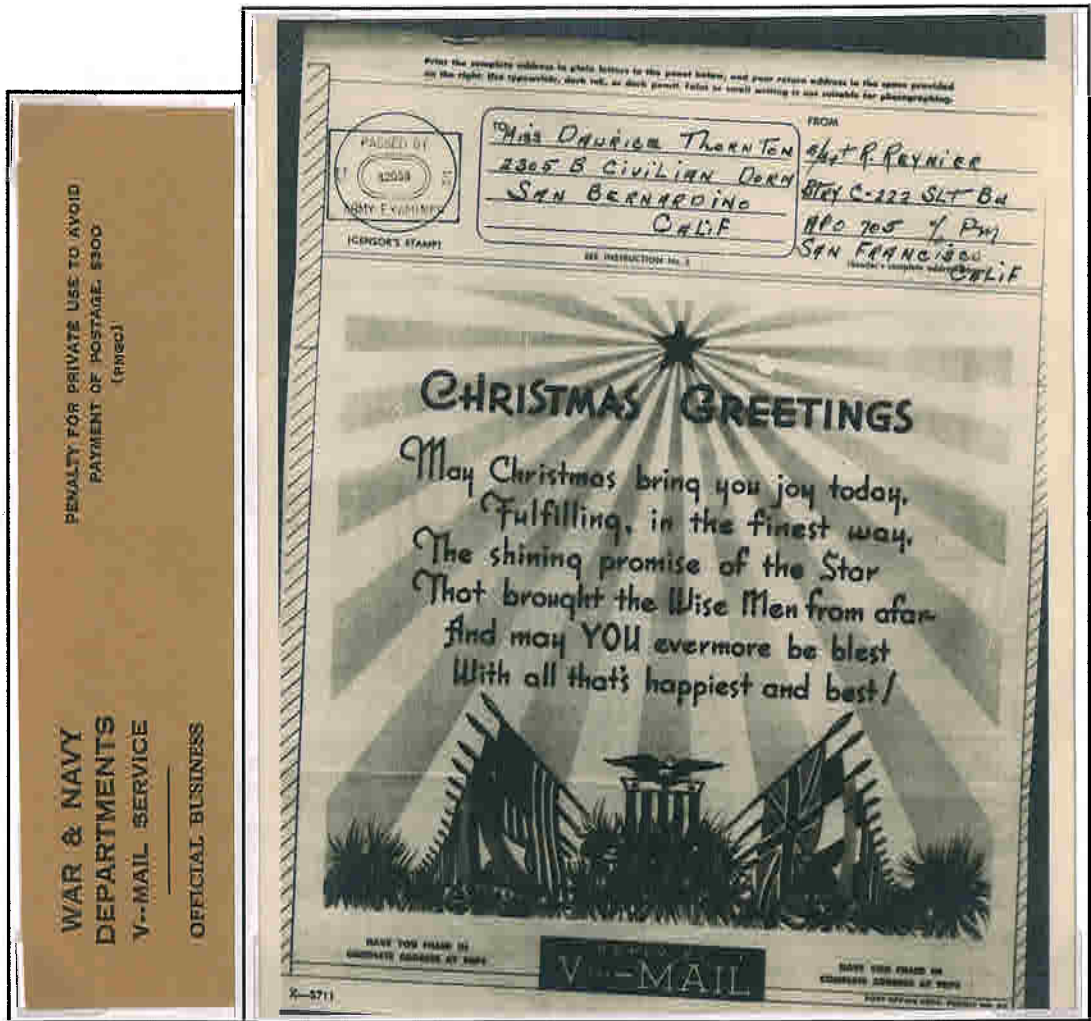


In the 16th century comets start to be seen as technical objects. In 1531 Apian discovers that a comet's tail always points away from the Sun. In 1705 Halley predicts the return of the 1682 comet in 1758 (part of printer plate next to original stamp). Sigüenza y Gongora fights the fears for comets with his "Philosophical treatise against comets" (1680).

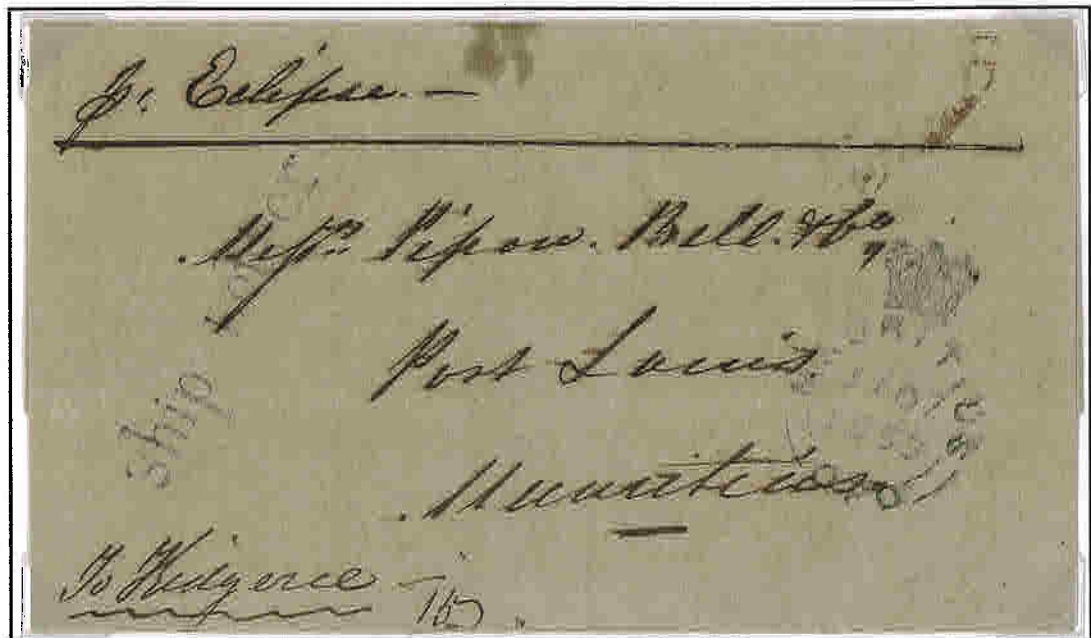


Halley's Comet is impressive, performing a good show every 76 years. The cross-gutter of a printer's sheet shows it as a sign of upcoming big events (such as the birth of Christ and the invasion of Great Britain by William the Conqueror) and as a study object of Halley.

1.2.2 supernovas and eclipses



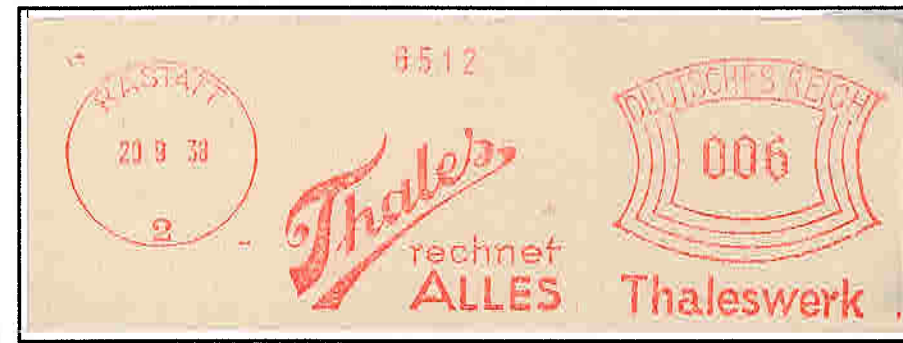
Matthew (Mt 2,1) describes the Star of Bethlehem as a sign of the birth of Jesus. One of the popular astronomical explanations of the star considers it as a supernova (exploding star). V-mail: postal enlargement of letter photographed on miniature film.



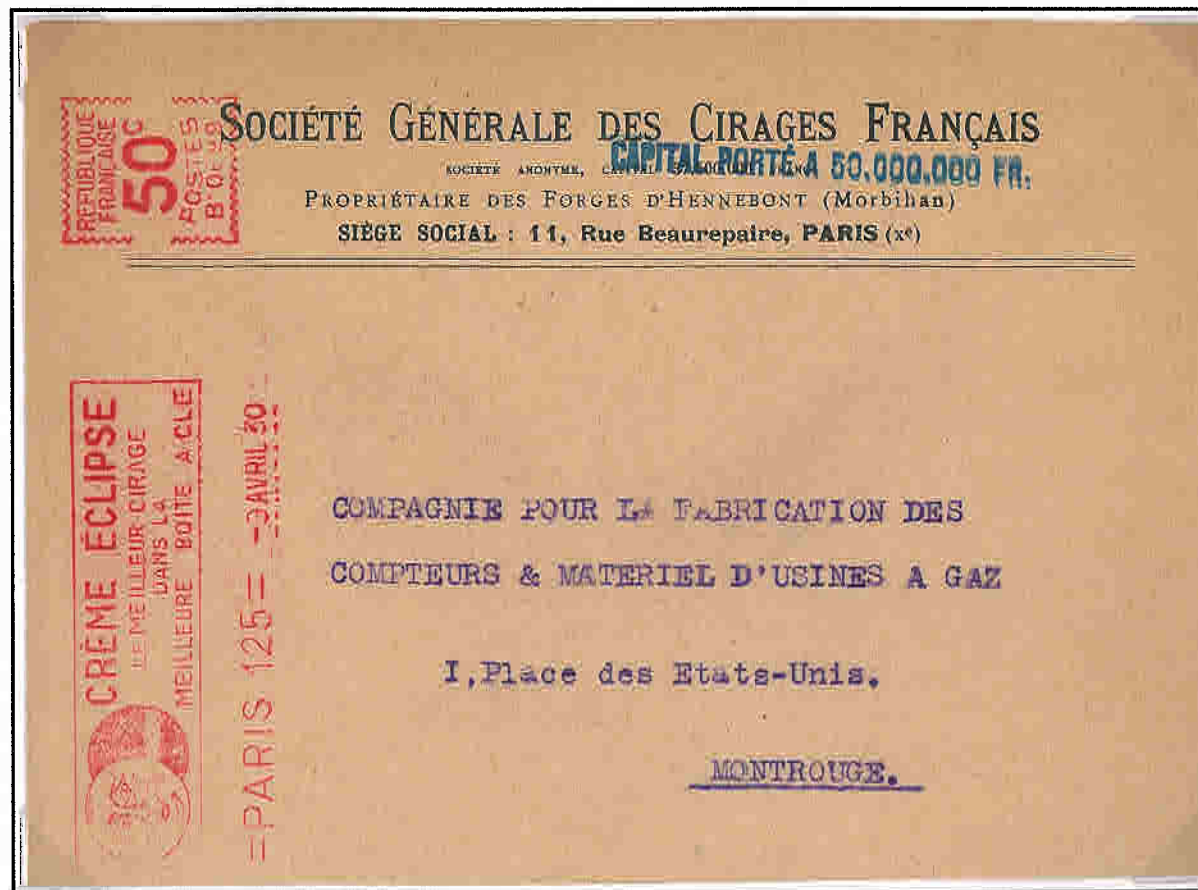
Total solar eclipses are also impressive. As sign of God as well as a natural phenomenon. Halfway the nineteenth century astronomers start describing the natural history of eclipses (Letter sent by the ship 'Eclipse' dd. 22/11/1852).



During eclipses sunlight (or moonlight) apparently suddenly disappears for a short duration. Eclipses are signs for big events, such as natural disasters and war (such as the defeat of Igor Svatoslavovitsch against the Kumans in 1185 (stamp on the right). In comics, eclipses frequently are lifesavers.



Thales of Miletus is the first who correctly calculates and predicts an eclipse (585 B.C.). The eclipse is for the Medes and the Lydians a sign to stop their war. Thales' fame is used by 'Thaleswerk GmbH', producer of calculators (see the meter mark).



Eclipses are divine affairs. With the French 'crème éclipse' all irregularities vanish magically. The Sun of Hove eclipses your best holidays, even though the Sun is not able to eclipse itself, or? (copies of advertisement and stamps inside booklet)



1.2.3 signs of the zodiac

LES PRESSES DE LA CITÉ **ECRIT dans le ciel**
 116, Rue du Bac - PARIS-VII^e
 le beau roman de GANN
 19 III 56 = PARIS - 80 =

TELEGRAM

1 + 64876 BUSKO ZDROJ 2 226 11/10 27 110

= XLT = LX = TARGALSKI WIECZORKA 39 BYTOM =

PRZYJĘTO DN. GM. Z. PÓDPIS.

PPTT 1017

Just as special events in heaven predict special events on Earth, the daily signs of the zodiac predict events of daily life. The future is 'written in heaven' (Ecrit dans le ciel).

双鱼座 Pisces 2月19日~3月20日

性格分析
 多愁敏感，爱作梦，幻想的星座。天生多情，使他们常为情字困扰，情海的波动起伏也摆脱不了关系；但他们生性柔弱，很喜欢奉献，也不会随意伤人。

守护星：海王星（象徵著高超的幻想力）
 守护神：希腊-波西顿
 幸运石：血石
 幸运数字：5
 幸运日：礼拜五
 幸运地点：海边或近水的城市
 幸运色：各种色系的蓝色

2000 冊 (P3) - 0107 (12-2)

60

330800

Besides the western signs of the zodiac the Chinese have their own zodiac. The Chinese zodiac is not based on stars. The Chinese postal stationery describes the western sign Pisces: on the left in red a character description, on the right in green the bringers of good news: favorite stone, colours, number etc.

Majoort Bosshardt
 Karin Bloemen
Het Sterrenboek
 Mart Smeets
 Willeke Alberti
 Reinout Oerlemans
 Erik van Muiswinkel
 Philip Freriks
 Aldith Hunkear
 Frits Barend
 Joop Braakhekke
 Yvonne Kroonenberg
 Gausje Nederhorst
 Hanneke Groenteman
 Carlo Boszhard

PTTPOST

Philip Freriks: sign of the zodiac lion.

Gabriel 27 JULI 1544 TE UTRECHT
 Sterrenbeeld: LEEUW

The book of the stars ('het sterrenboek') shows the status of someone's sign of the zodiac. At the end of each of 14 stories the date and place of birth and the zodiac sign of the author are mentioned. The Dutch booklet from 1999 contains three sheets of Christmas stars.

1.3.1 three kings



'Traffic lights' indicate displacements of colour. Nevertheless sheets escape from destruction. The fourth king (queen) is not placed correctly.



Originally, there is no agreement on the number of Persian astrologer-priests, it varies from two to twelve. Because of the displacement of the colours yellow and red on the telegram three as well as six astrologer-priests can be seen.

The Star of Bethlehem is one of the most special signs of heaven. Three eastern kings travel a long way to see the newborn child Jesus.



They are called also 'The three wise men from the East'. Accurate translations from the original passage describe them as Persian astrologer-priests. They worship the superterrestrial.



From the 7th century onwards the number is three: Casper, Melchior and Balthazar. They recognize the sign of the star. The star guides them to Bethlehem.

1.3.2 astrologers



In ancient cultures, such as the Aztecs, astrologers are important (see stamp in the middle). After a decline in the Middle Ages, Thomas Aquinas starts a European Renaissance of astrology. Early astronomers as Kepler often earn an additional income with predictions.



The Renaissance is based upon the heritage of Aristotle (influence of the planets) and of the Arabs as Albumazar (the book on the stamp of Yugoslavia distinguishes the influence of the stars from that of the planets), Avicenna and Al-Biruni (whose texts are popular during the Renaissance).

Unmittelbarer Wertzeichen Ausdruck gem. § 17, Abs. 1, REPUBLIK ÖSTERREICH 5g

REPUBLIK ÖSTERREICH 10g

REPUBLIK ÖSTERREICH 5g

REPUBLIK ÖSTERREICH 10g

10. BALLONPOSTFLUG

TH.B. PARACELSUS 1493-1541

WAISENKINDERDORF ROTTENMANN

OSTKINDERDORFERBEREINIGUNG-PRO-ADVENTURE

FÜR DAS PARACELSUSSHAUS

AUSWEIS FÜR GÖNNER

MIT BALLONPOST

MITGLIEDER 1953 · HALBJAHRSBEITRAG 1953 S 2-50

PO., gen. mit B. M. ZF. 43-218/1951 vom 29. Aug. 1951

Avicenna (980-1037) uses astrology within his medical practice. In Europe Paracelsus (1493-1541) envisions possibilities to use the stars to unravel the secrets of the human mind.



OFFICE DES CHEQUES - SERVICE DES POSTES - EXTRAIT DE COMPTE

BRUXELLES

LE SERVICE DES CHEQUES DES POSTES AUX

2364.98

Soc. an. pour la Fabric. des Engrais Azotés S.A. PUBLIA Houdeng-Gozzies HOUDENG

Handwritten signature

OU MENEZ-VOUS VOTRE BARQUE ?

A l'aventure. Vous allez dans la vie sans boussole, sans phare. Echecs, retards, revers en sont les conséquences. Vous pourriez agir à propos, savoir ce que signifient réussite et chance. Prenez l'astrologie pour guide, demandez aujourd'hui votre horoscope au professeur BÉNEDICT (service 296), rue de Richelieu, 13, à ROUBAIX. Envoyez nom, (Mr Mme ou Mlle), adresse, date de naissance et si vous le voulez, fr. 4.70 en timbres poste belges pour tous frais.

N'HÉSITEZ PAS C'EST GRATUIT

Astrological predictions may turn against their predictors. Because of an erroneous prediction, the observatory of Istanbul is destroyed around 1575. Ulugh Beg (1393-1449) banishes his son because according to the stars he could be a danger. The provoked son returns and kills his father. On the other hand the advertisement on the postal cheque envelope emphasises the positive aspects of knowing your (astrological) future.

Deutsche Reklamepostkarte D. R. G. M. 765-191

Trauringfabrik G. ALB. THAL / BERLIN C. Seidelstr. 5

Lieferung direkt an Private / Preisliste frei

Ihr Schicksal im Jahre 1921! Zukunft, Gegenwart und Vergangenheit deutet nach Angabe des Geburtsdatums gegen Vorinsendung von M. 20.- Graphologisches Büro ERICH KONKA, Berlin O 112, Friedrich-Karl-Straße 17. Fernspr. Alex. 5209.

Briefmarken

Ankauf - Verkauf. Gr. Ill. Katalog 2,50 Mark. Markenhaus Franke, Berlin W 8, U. d. Linden 17/18.

Fabrik für Kautschukstempel Carl Hoffmann

Berlin N. 31, Bernauer Straße 101

MOKO Alpaca

Das beste Feuerzeug

Imperator Metallwarenfabrik G. m. b. H. Berlin SW 68

Appr. Zahnarzt **H. C. FALKENSTEIN** Spezialverfahren (Pat. a.) f. Schmerzlosigkelt. Befestigen loser Zähne usw. Eigenes Laboratorium. **Charlottenstr. 53** hochpl. Sprechst. 11-7/9, Sonntg. 11-1

Kaufen Sie

Kaffeelöffel, Bestecks Weinkühler, Kaffeeservice Tablettis usw.

nur aus erster Quelle zu günstigen Preisen

Engros - Export

Max Schauerhammer jr.

BERLIN S 14

Telephon: Mörzplatz 5138

Postkarte

30 DEUTSCHES REICH

The German advertisement considers fate as fixed, it is available for 20 Marks. The inevitable also applies to the predictions of Nostradamus. Birendra anticipates his fate by postponing his coronation (1975) by a year.

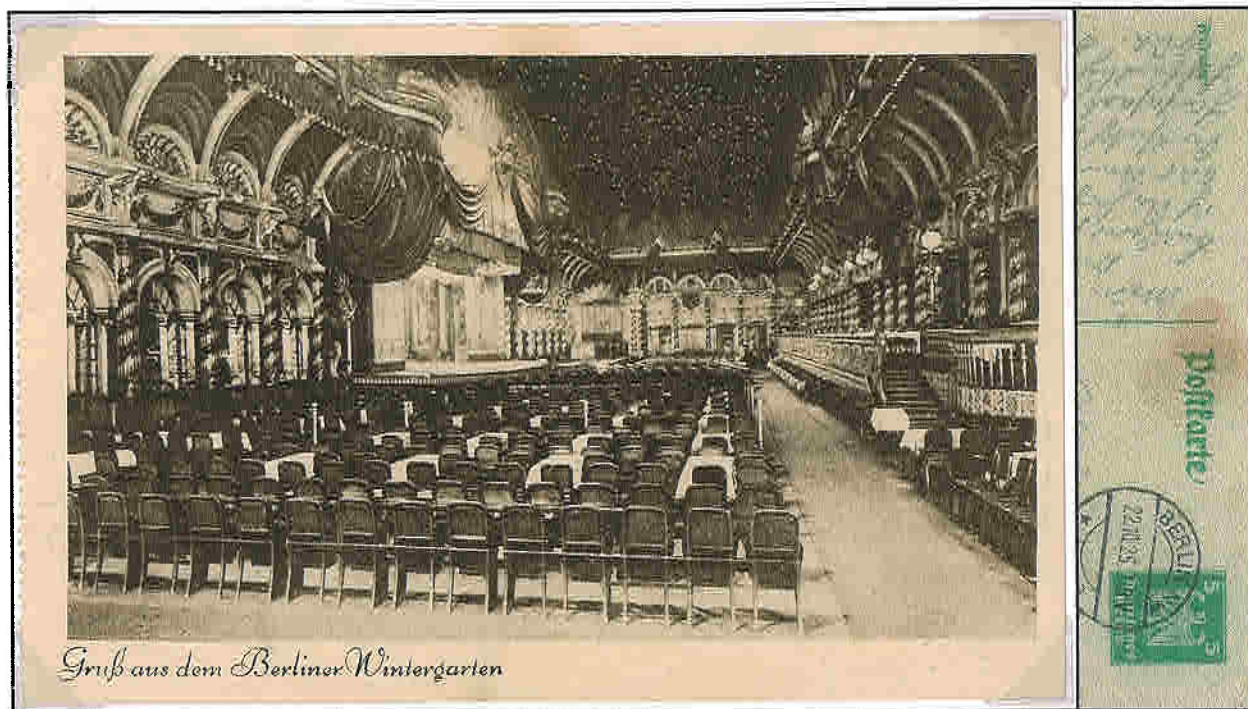


1.3.3 magicians

WAR & NAVY DEPARTMENTS V-MAIL SERVICE OFFICIAL BUSINESS



The powers of magicians often are superterrestrial. The stars around the fortune-teller on the V-mail (postal enlargement of letter photographed on miniature film) and the magician on the German telegram (on the right, issued in 1983) refer to this.



Theatres are stages to perform magic and fantastic arts. In 1900 in the Wintergarten theatre the famous starry sky is installed in the auditorium. Wintergarten is the best of the variety theatres in Berlin until 1944 (destroyed by bombings).

Fokuspokus...dreimal rote Nase...zieht man an der Schnur, wird aus dem Bart ein Flase!

So wird's gemacht: Man besorgt sich eine kleine Schere, eventuell ein Schneidmesser, Fellebstoff, zwei Mus tertütenklammern (die bekommt man im Schreibwarengeschäft), ein Stück Karton (etwa 1,5 mm stark), Bindfaden und einen Aufhänger. Zuerst schneidet man alle Teile sorgfältig aus. Die kleinen Ecken eventuell mit einem Schneidmesser. Die großen roten Punkte müssen so durchgestanzt werden, daß die Klammern locker durchpassen.

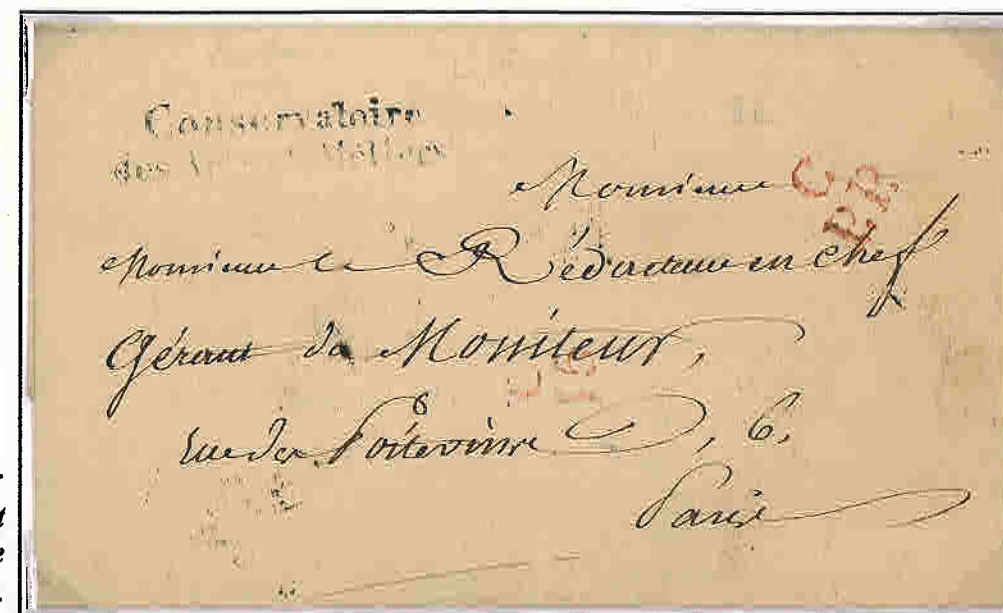
Durch die kleinen roten Punkte wird ein Stück Bindfaden geführt und an beiden Seiten verknotet. Und zwar so, daß der Bindfaden bei verschränkten Armen straff ist. Genau in der Mitte wird der Zugfaden verknotet (Figur 1). Auf die Oberarme werden kleine runde Kartonkreise geklebt. Auf Kreis A ein doppelter Kartonkreis. Damit die rechte Hand die linke Hand verdeckt (Figur 2), klebt man auch unter den rechten Unterarm einen einfachen Kartonkreis (Figur 1). Die Unterarme werden so auf die Kartonkreise geklebt, daß sie den Flasen verdecken (Figur 2). Viel Spaß beim Laubern!



2.1.1 the rotation of Earth and Moon

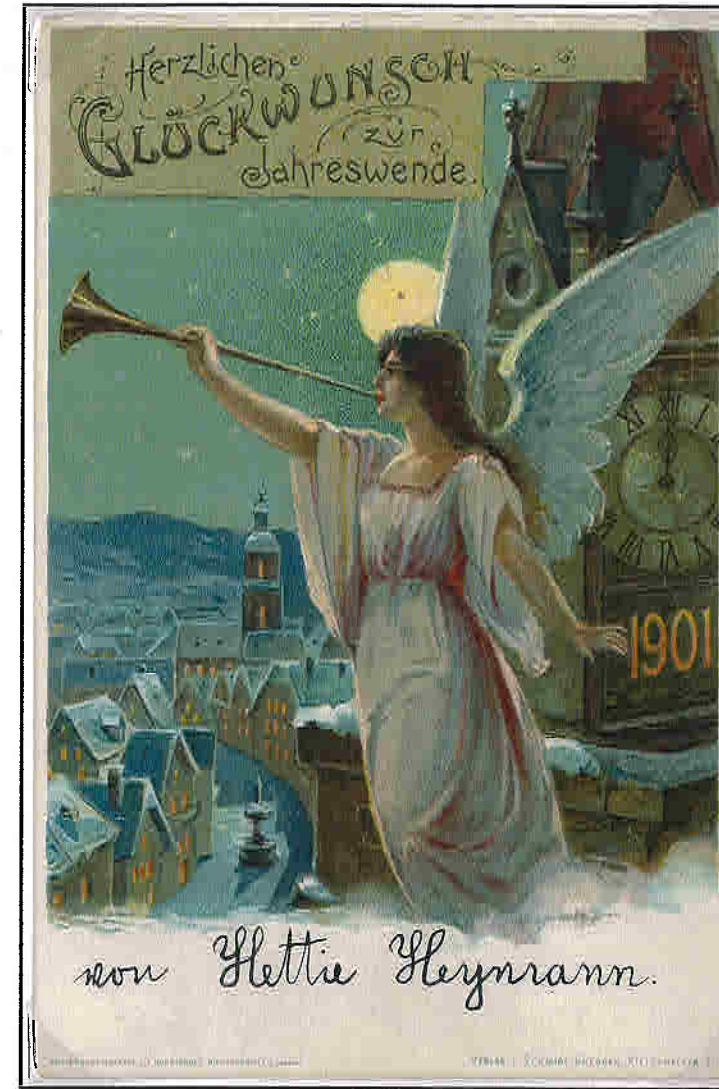


Hanns Anton Putz zu Adlersturn



Letter of 1834, with mark 'CPP': Cursive Port Payé. Indication that receiver should not pay postage. The sender is exempt from postage.

Three cycles are important to determine time. The pendulum of Foucault shows the rotation of Earth, the basis of the cycle of day and night. Swinging in the Panthéon the pendulum is a sensation at the Paris exhibition of 1851. In 1855 it is transferred to swing in the 'Conservatoire des Arts et Métiers'.



Seasons: autumn and spring.



The third cycle is the rotation of Earth around the Sun. Combined with the yearly cycle the inclined axis of Earth is the cause for the seasons and the changing length of days. Day and night lengths are equal on the equinoxes. At 'summer solstice' the day is at its longest.

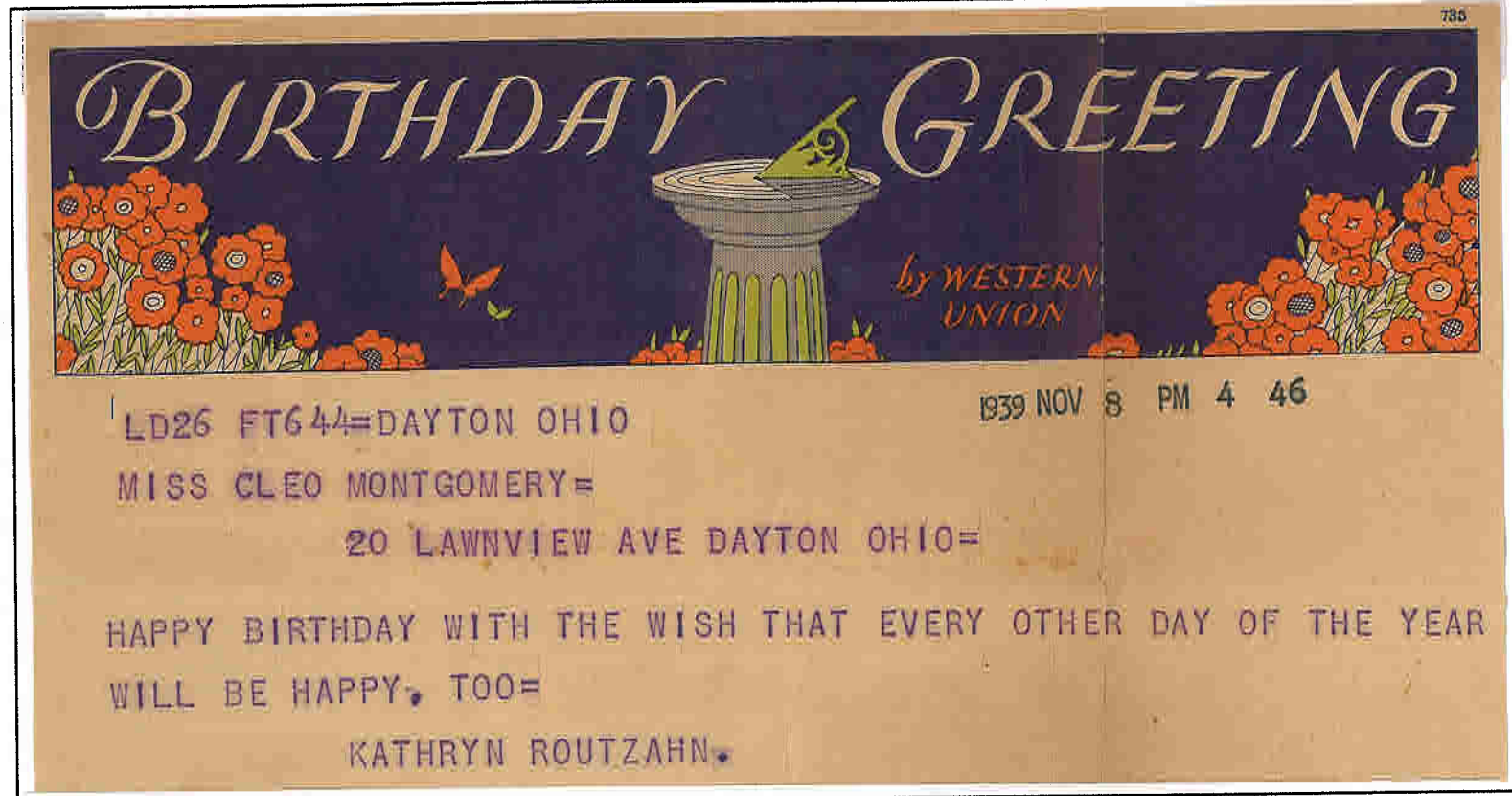


The second cycle is the rotation of the Moon around Earth. The phases of the Moon make it possible to follow the monthly cycle. The waxing Moon in the official stamp of the archives of Lunigiana ('area of the Moon') is a sign of power.



Sundances are important (American) Indian ceremonies during 'summer solstice'. At the end of the 19th century the city of Sundance is named after the Sundance mountain, a sacred place of worship for the Sioux. At the same time U.S. government forbids their celebrations.

2.1.2 the height of the Sun



Sun dials are used to follow the day (the shadows indicate the hours), they symbolize a timely delivery of congratulatory telegrams.

The key parameter in the Easter calculation is the time of return of the sun to the same equinox. During the 18th and 19th century in Italian and Belgium cathedrals Boskovic and Quetelet lay out meridian lines to measure this cycle. The 'Rue du Méridien' in St. Josse-ten-Noode refers to the meridian lines of Quetelet.



The moonlight is not suitable to follow the night. The name of the jeweller's shop 'the moon dial' (au cadran lunaire) indicates the following of romance. Because of the advertisement this carte-lettre was allowed to be sold for 5 instead of 15 centimes (ministerial order of 12th May 1887).



Not only sun light, but the shadows also can be watched. In 1276 in China Shoujing builds the tower of Zhou Gong to calculate the start of the seasons.

2.1.3 distribution of time



The 14th century sees the start of expensive mechanical clocks. They support the status of the secular and clerical administrators and help to regulate daily life. From 1410 onwards the city hall of Prague has a clock. It is based on the geocentric model of the universe.



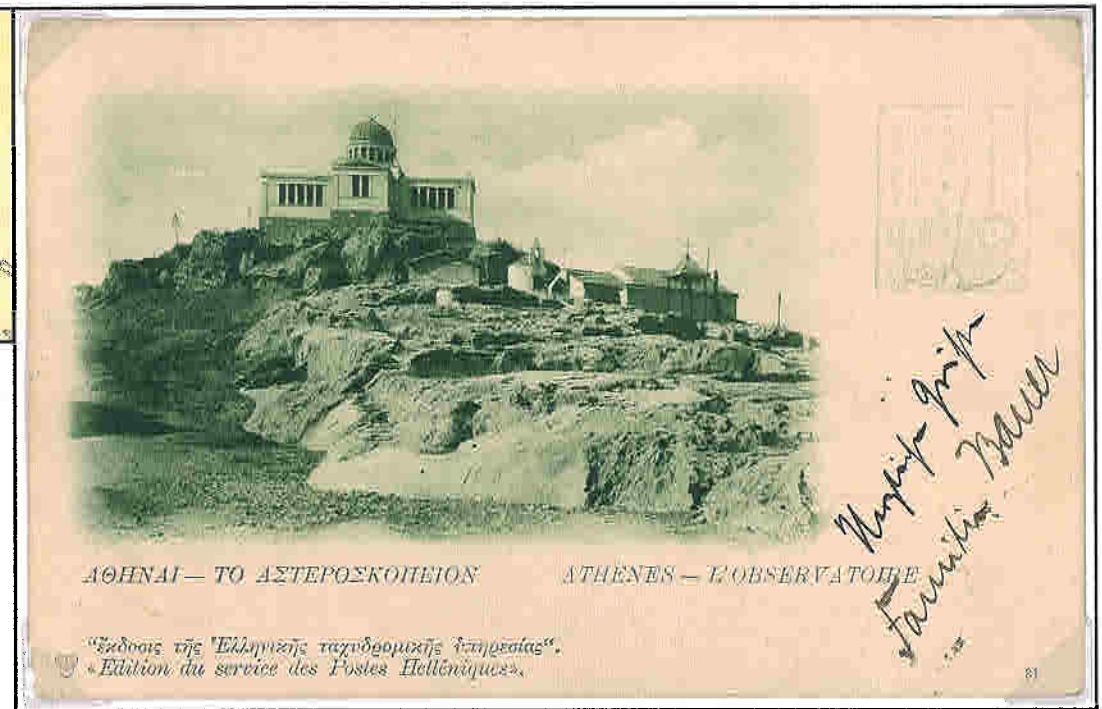
Next generations of astronomical clocks place the Sun in the center. The astronomical clock in the cathedral of Beauvais is built in 1865, it is based on the clock of Strassbourg cathedral of 1842. Both cathedrals already have their own astronomical clocks from the 14th century onwards.



The 17th century introduces portable watches. The first models have sundials to verify the time (the brand 'Zonnestand' refers to this). Mechanics improve quickly, in 1753 Harrison discovers his watches to be more reliable at sea than big clocks.

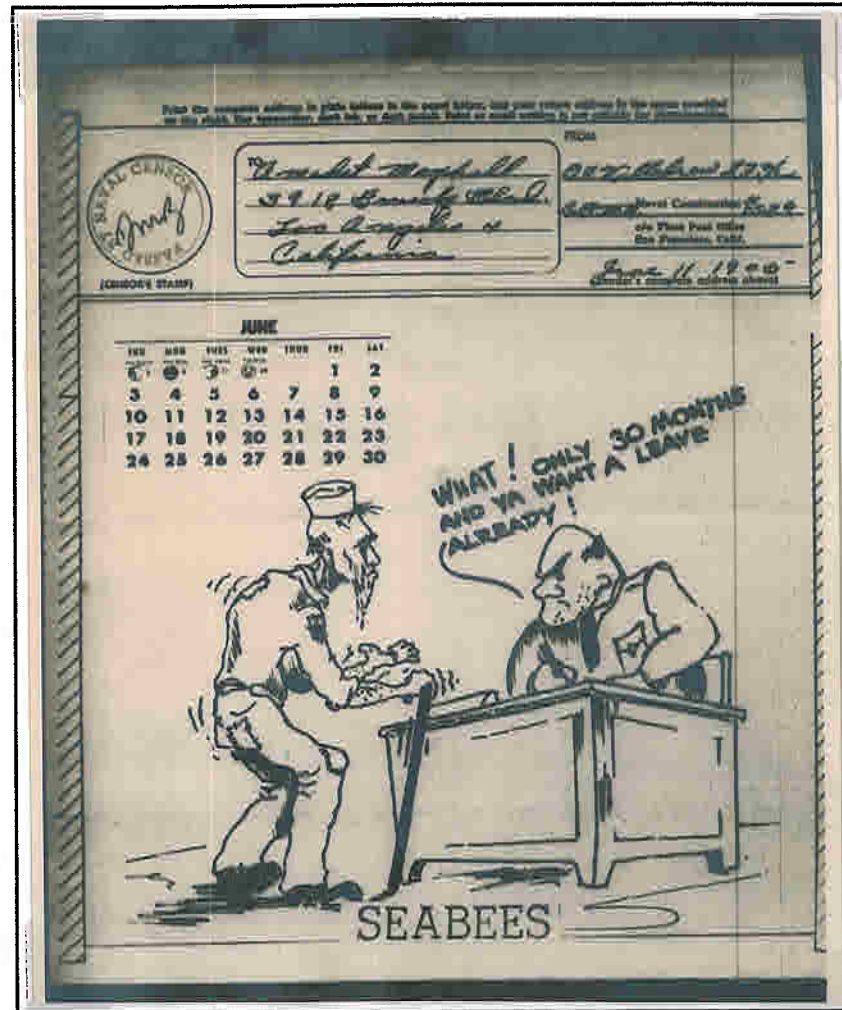


During the second half of the 19th century the watch becomes public property. Between 1867 and 1900 market leader Elgin increases its production from 30.000 to 100.000 watches.

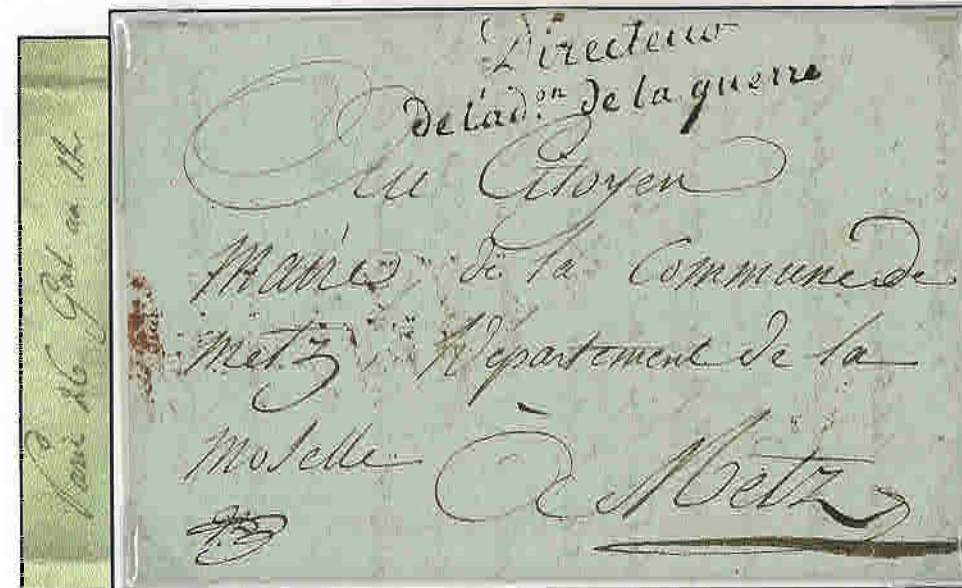
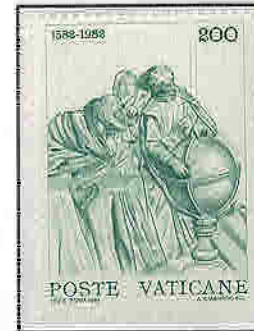


Time becomes essential for industrial society. In 1852 Greenwich observatory introduces the distribution of time signals for many watches and clocks. In 1864 Athens observatory predicts the duration of twilight to have efficient street lighting.

2.2.1 the Gregorian calendar



According to legend Romulus introduces a moon-calendar with 10 months. June is the fourth month. Later on January and February are being added and the months following June are being named after the emperors Julius and Augustus. The calendar becomes a real sun-calendar with a leap day: the Julian calendar.



In 1582 the Julian calendar is 10 days behind the seasons. Pape Gregory XIII adjusts the calendar by deleting 10 days in October 1582. Soon afterwards his Gregorian calendar is in use in the Roman Catholic world. This includes Mexico and France, despite the calendar stone of the Aztec and the French Republican calendar of 1793-1805. The letter has been sent on the 26th Germinal 12 (=16th april 1804)..

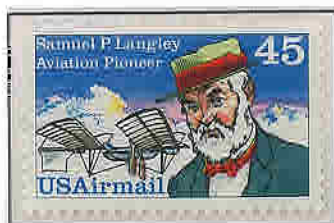


Astronomers try to align the calendars with the seasons. Thus Zhang Heng (78-139) reforms the Chinese calendar in 123. Around 1440 in Samarkand Ulugh Beg calculates the Earth to go round the Sun in 365.2425 days. The Julian calendar has a length of 365.25 days: every 128 years one day short.

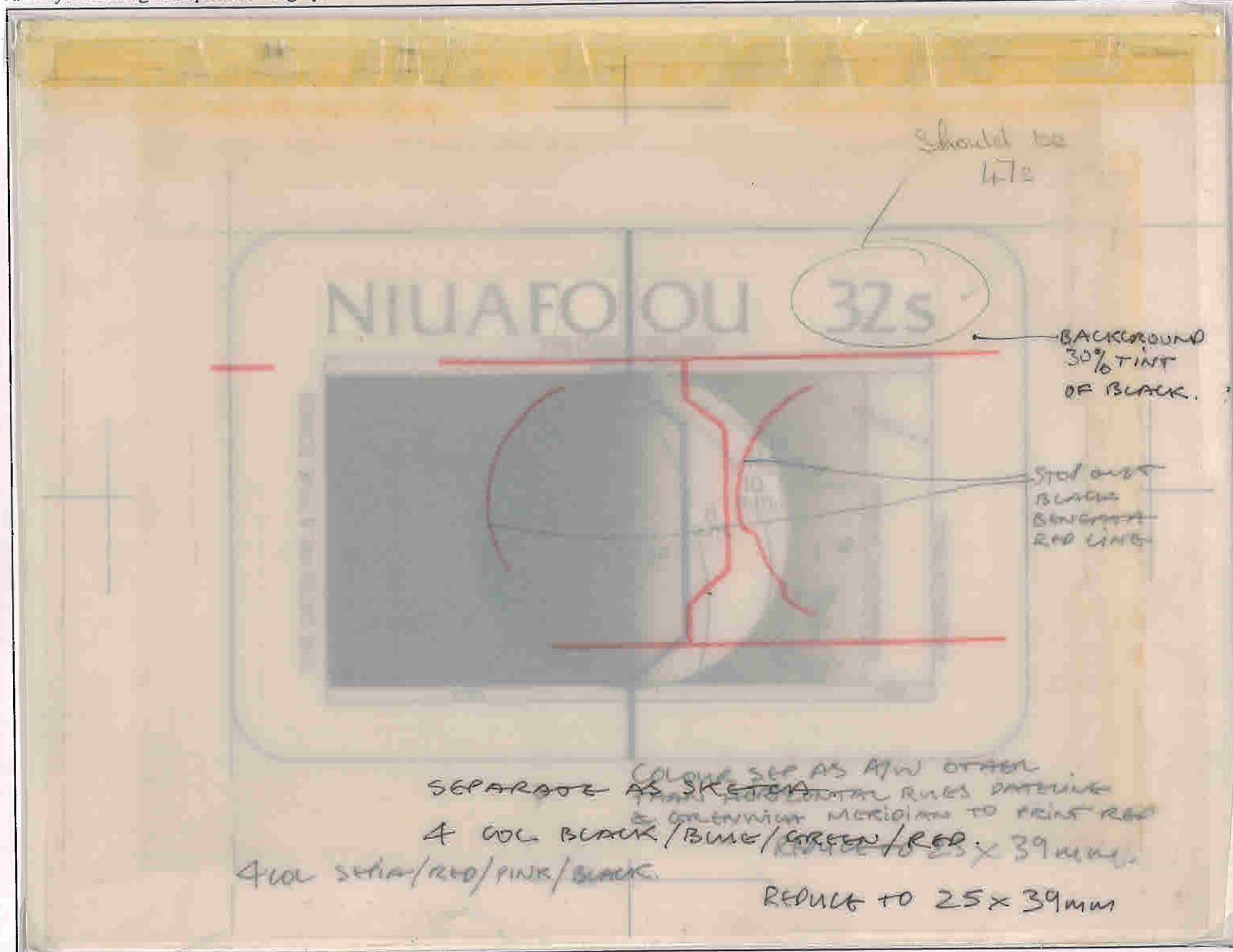


Gradually the calendar becomes standard: thus Leibniz promotes its introduction in Protestant Europe around 1700. Milankovic helps with the adjustment of the Russian calendar in 1917. In 1893 Russia lags 12 days behind. This card travels from Finland (23/11/93) via Russia (13/11/93) to North-America (7/12/93).

2.2.2 Greenwich Mean Time



Train traffic necessitates time zones and standard time. In 1869 Langley is the first to distribute standard time from the Pittsburgh observatory to the railways. Fleming extrapolates Langley's American model with 3 time zones to a model with 24 zones for the world. Each zone covers 1 hour of the day.



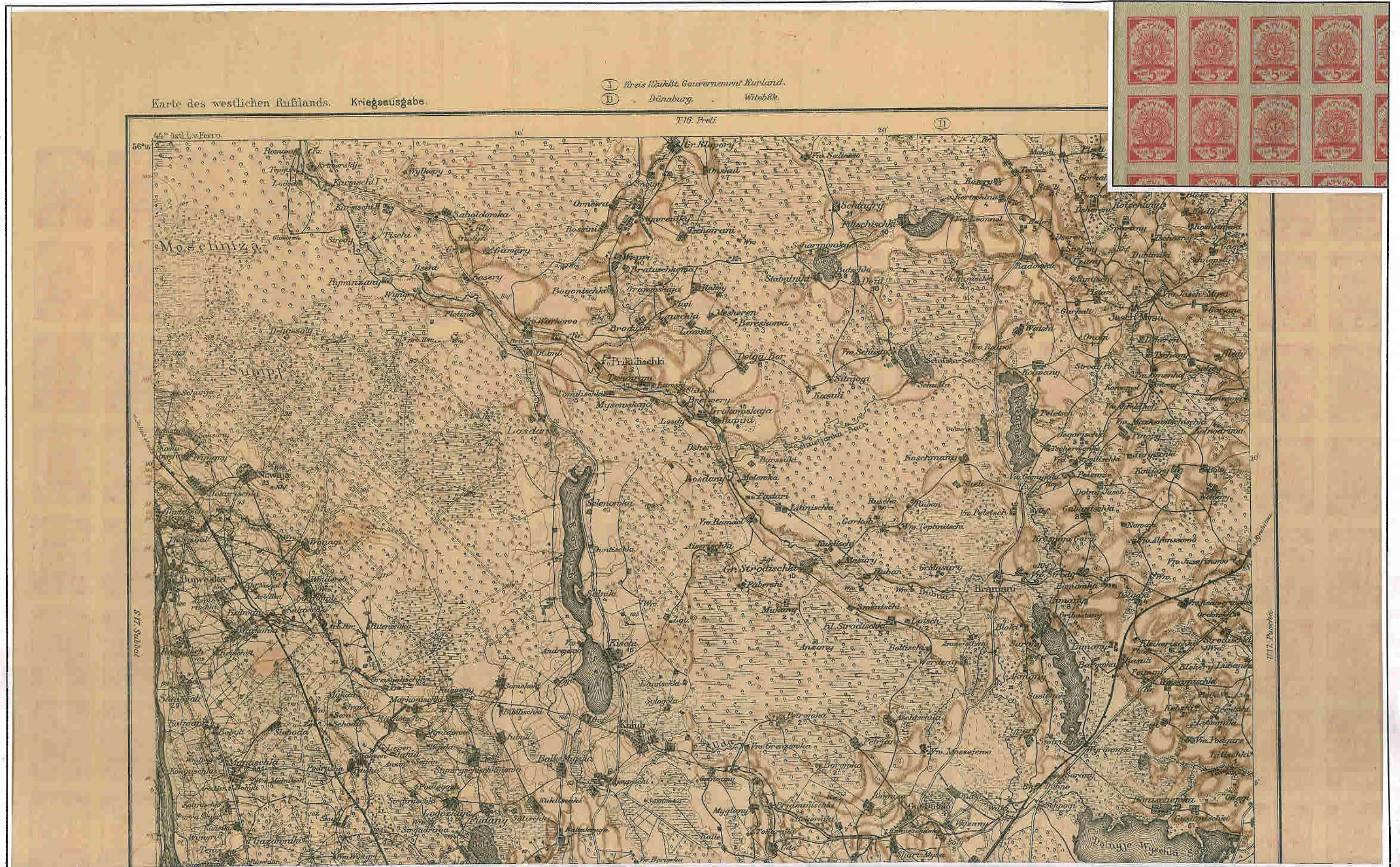
In the 17th century - under Louis XIV - French surveying prospers, owing to Cassini, director of the observatory of Paris. The meridian of Paris - based on the observatory - becomes very important. In 1883 it still is, however in 1884 it is being defeated by Greenwich to become the prime meridian.



In 1884 the model of Fleming becomes standard on the International Prime Meridian Conference of Washington. On the other side of the world, the international date line is determined to be near Tonga and Niuafo'ou. Above an adjusted design of a stamp, commemorating the conference of 1884.

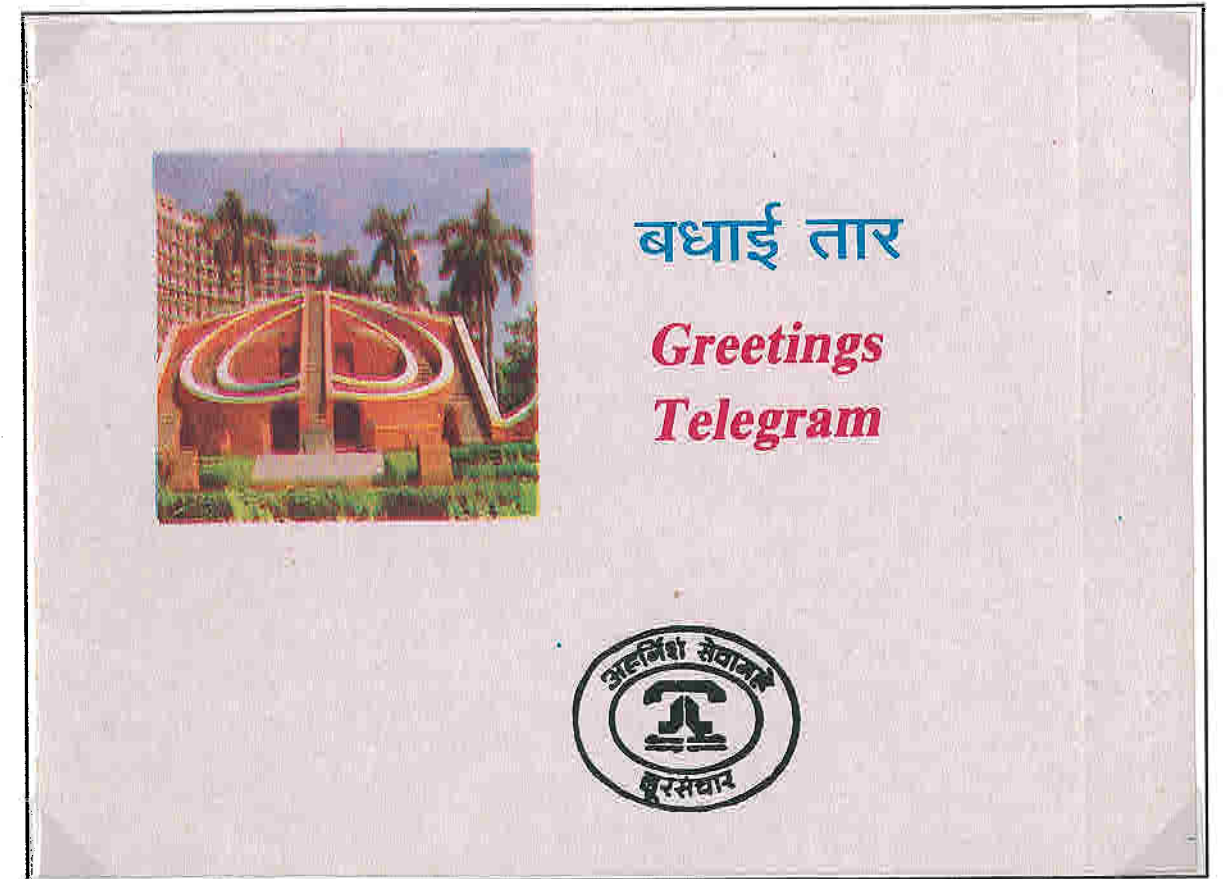
Because of the loss, the official time distributed in Paris in 1968 (D.E.H.O.: Distribution Electrique de l'Heure Officielle) is based on Greenwich Mean Time.

2.2.2 Greenwich Mean Time

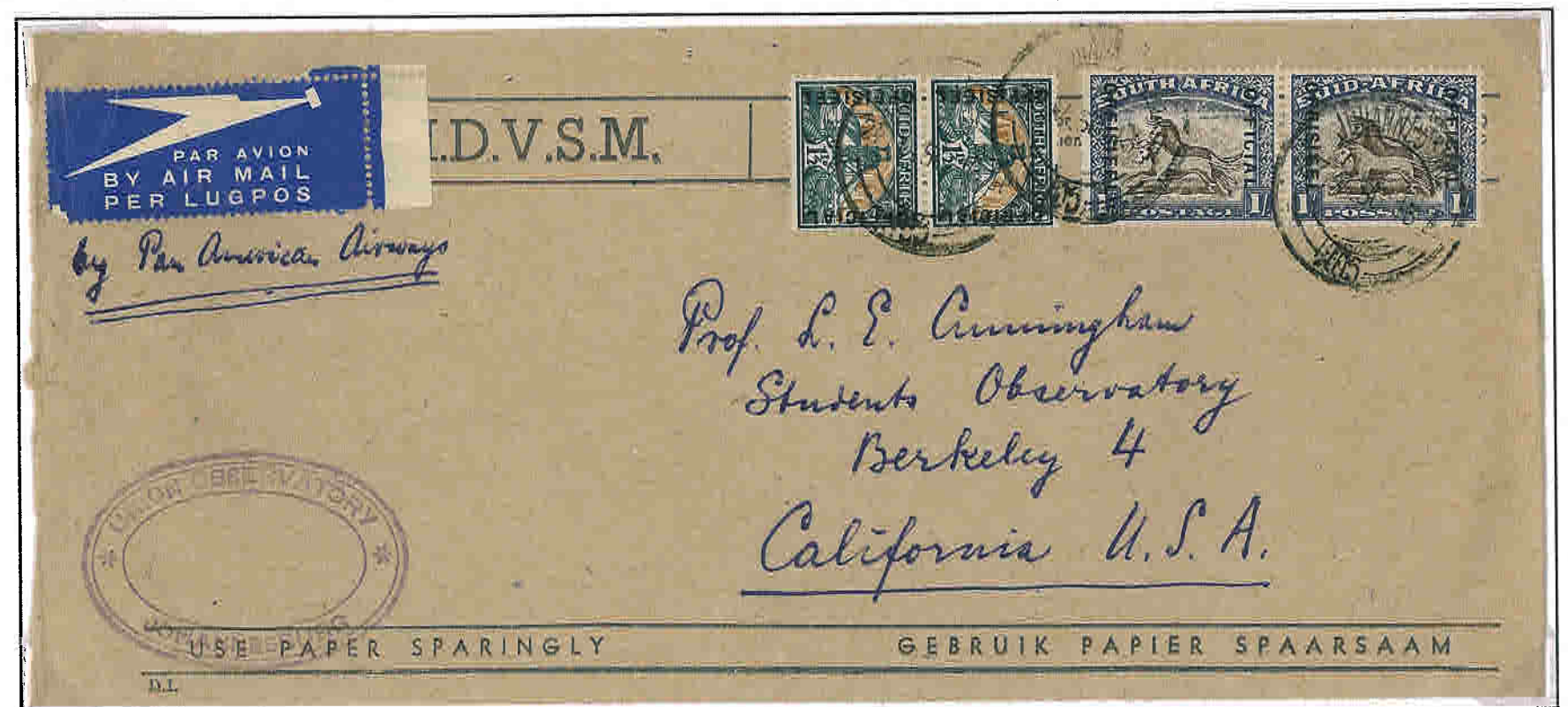


In 1634, France decides that the meridian of Ferro (island of the Canaries) is the reference on maps as the most western position of the Old World and also thought to be exactly 20 degrees west of Paris. While in 1884 Greenwich defeats Paris to become the prime meridian, in 1917 the meridian of Ferro still is the reference on maps of e.g. Germany and Russia (top left). In 1918 the new Latvian government orders for 3,000,000 postage stamps, to be printed on the backs of German infantry maps. Although there is a shortage of paper, there is a surplus of maps with excellent paper quality. The stamps are printed on the unprinted backs of unfinished maps.

2.2.2 Greenwich Mean Time



In the British Commonwealth Greenwich is a standard. The Misra Yantra is an Indian observatory, built in 1724. It combines five astronomical instruments. At the front one of the half circular walls runs parallel with the meridian plan of Greenwich.



From 1892 onwards Dutch telegraphic time is based on Greenwich. The text on the telegram of 1902 refers to Greenwich: "De tijd..... naar den meridiaan van Greenwich". Between 1909 and 1940 Greenwich time is replaced by the local time of the Westertoren in Amsterdam.

In 1903 the Union observatory of Johannesburg is founded for weather forecasts and a time service. Director Van den Bos (1941-1956) improves the time services, it earns the observatory the epithet 'Greenwich of South-Africa'. Also here Greenwich is a standard.

2.3.1 evolution of solar systems



In the 18th century Kant and Laplace assume that planets come into being from nebulae around the sun. For this purpose Laplace uses the nebula-observations of Herschel.



DESCARTES.

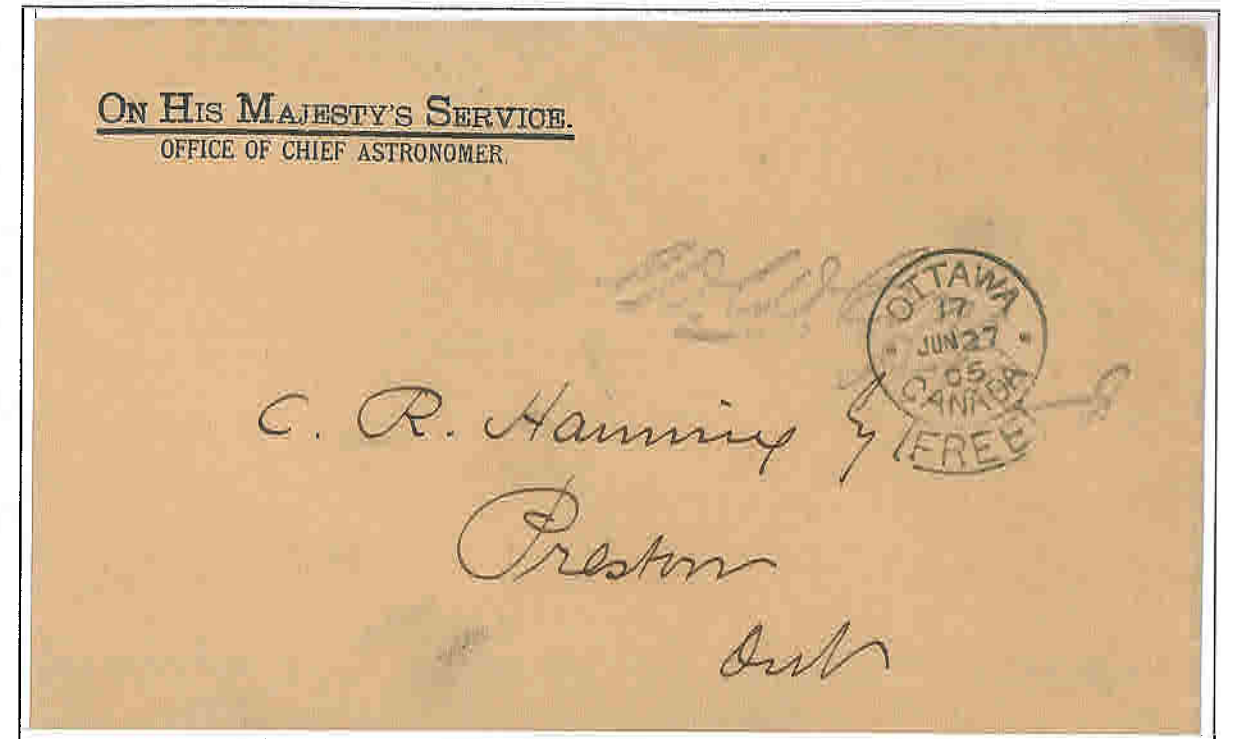
(Reproduction d'une gravure ancienne)

René DESCARTES, sieur du Perron, est né à La Haye, en Touraine, le 31 Mars 1596. Son acte de baptême daté du 1^{er} Avril, est ainsi rédigé: « Le mesme jour a esté baptisé René, fils de noble Joachyn Descartes, conseiller du roy en son parlement de Bretagne damoyelle Jeanne Brochard. Ses parrins, noble Michel et de Ferrand, conseiller du roi et lieutenant général à Chastellerault, et noble René Brochard, conseiller du roi, juge-magistrat à Pötver et dame Jeanne Prout, femme de monss^r Sain, contrôleur des tailles pour le roy à Chastellerault. »

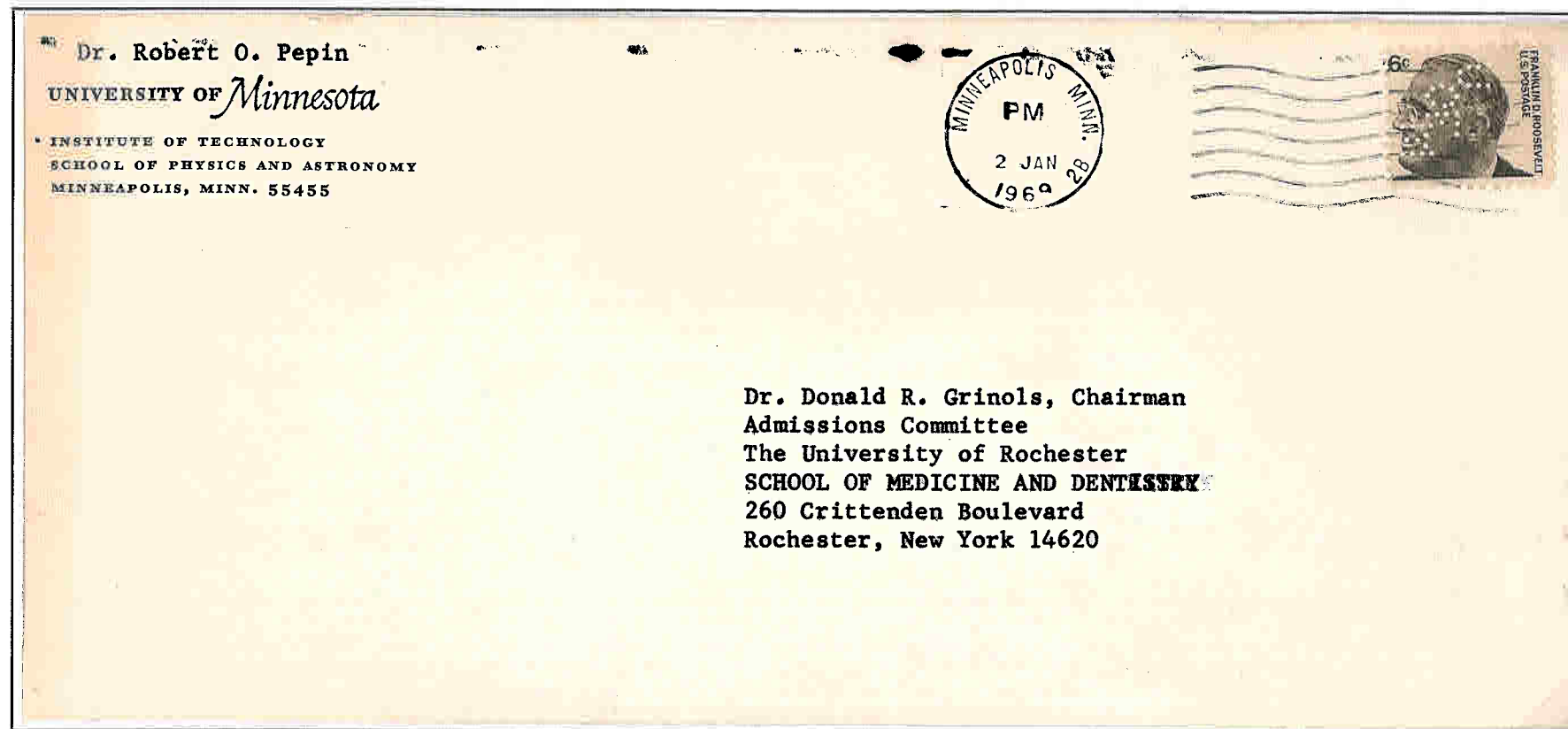
René Descartes ayant perdu ses parents en bas âge, vécut quelque temps à Châtellerault, sous la tutelle de M. Ferraud, frère de son aïeul. Il fit ses études au collège de La Flèche, qu'il quitta en Août 1612, à l'âge de 16 ans. S'étant enrôlé en 1617 sous le drapeau du prince Orange, il servit dans plusieurs armées et parcourut différents états d'Europe. Après s'être illustré par ses importants travaux, il mourut à Stockholm, le 11 Février 1650. Seize ans après, son corps fut transféré à Paris et déposé solennellement dans l'église S^{te} Geneviève, le 24 Juin 1667. — L. R.



Egg Nebula
 NASA's Hubble Space Telescope provided this view of the last gasps of the sun-like star in the Egg Nebula. The intriguing "searchlight" beams are emerging from the dying star, hidden behind the dark central dust band.



At the end of the 18th century Herschel discovers planetary nebulae (such as the ring nebula in Lyra). However, the nebulae are stars with a solar mass of between 0.1 and 1.4, in their last stage emitting gasses. Heavier stars explode at the end, possibly leaving a pulsar behind (as in the egg nebula). So, the mass of stars determines their evolution. During the initial period of the observatory of Ottawa (founded in 1905) double stars are being followed by spectroscopy in order to estimate their masses.



Dr. Donald R. Grinols, Chairman
 Admissions Committee
 The University of Rochester
 SCHOOL OF MEDICINE AND DENTISTRY
 260 Crittenden Boulevard
 Rochester, New York 14620



A century earlier Descartes has written the basis for this. His main work is 'Discours de la méthode' (not 'sur la méthode' as on the first issue of the French stamp).

Analysis of orbits of double stars provides the only way to determine the masses of stars directly. Alongside the spectroscopic research of Ottawa, the university of Minnesota follows double stars discovered by their proper motion (*perforation U OF M*), while the Bosscha observatory studies visual double stars (*printer's waste shown below the regular stamp*). The first systematic research of double stars dates back to 1837 (performed in the observatory of Dorpat (Tartu)).

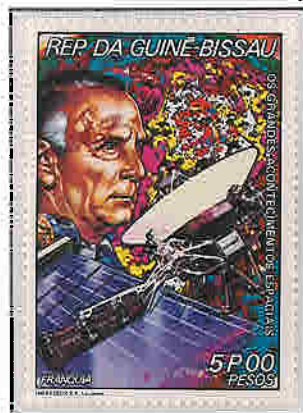
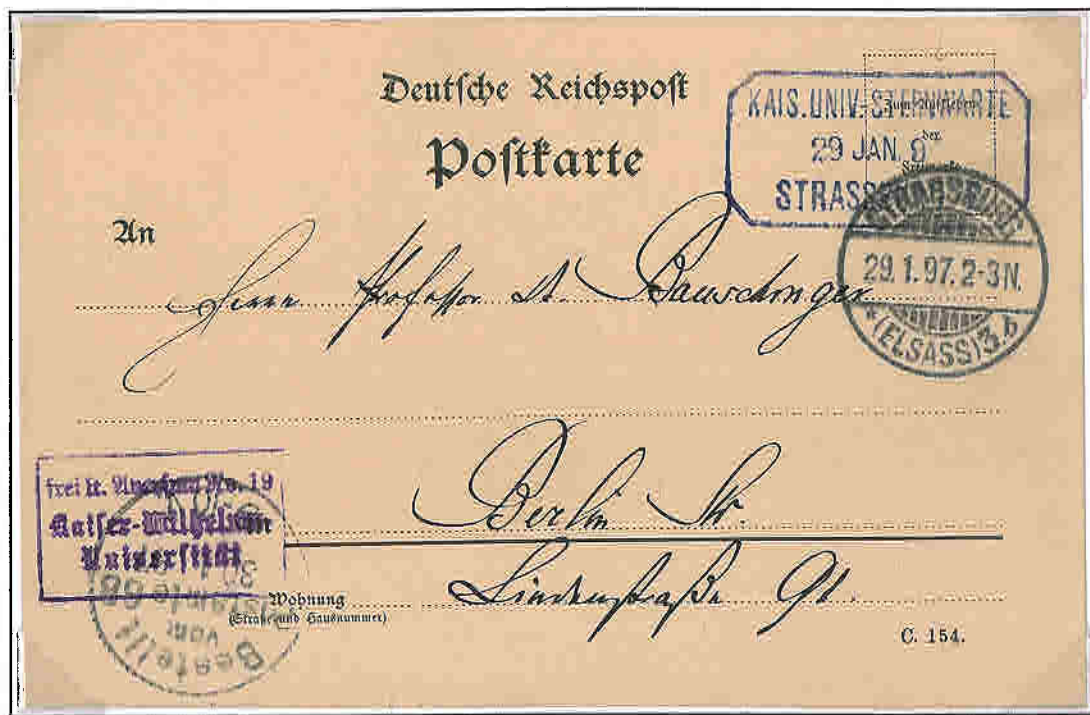
2.3.2 evolution of star systems



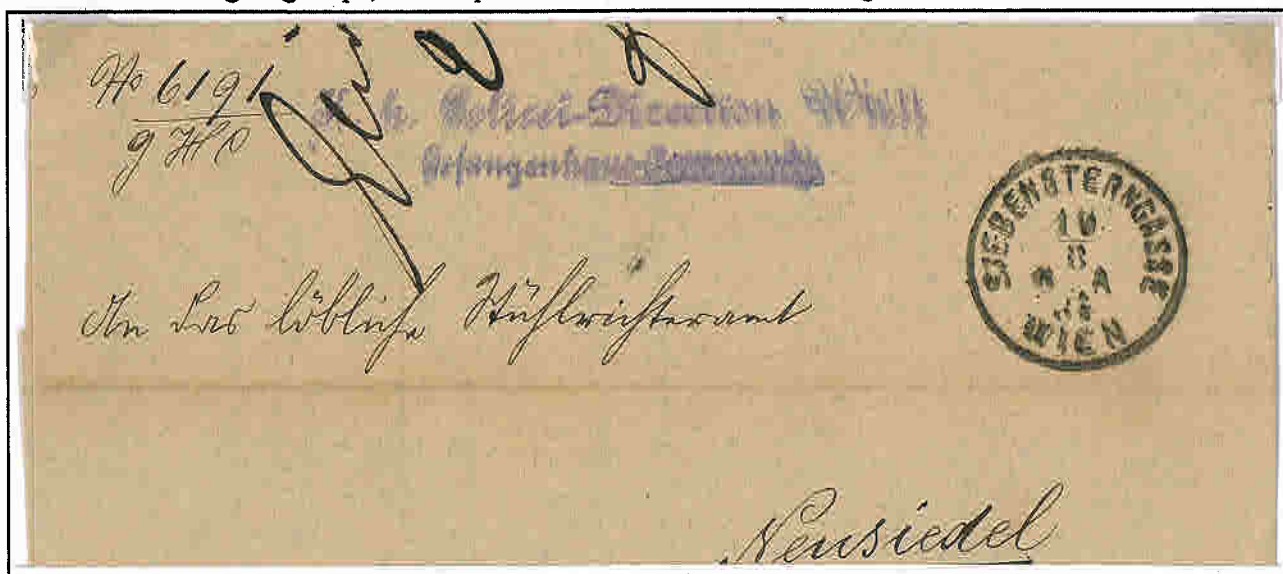
In the 19th century spiral arms are discovered in one of the nebulae of Herschel: in the Whirlpool galaxy (NGC 5194).



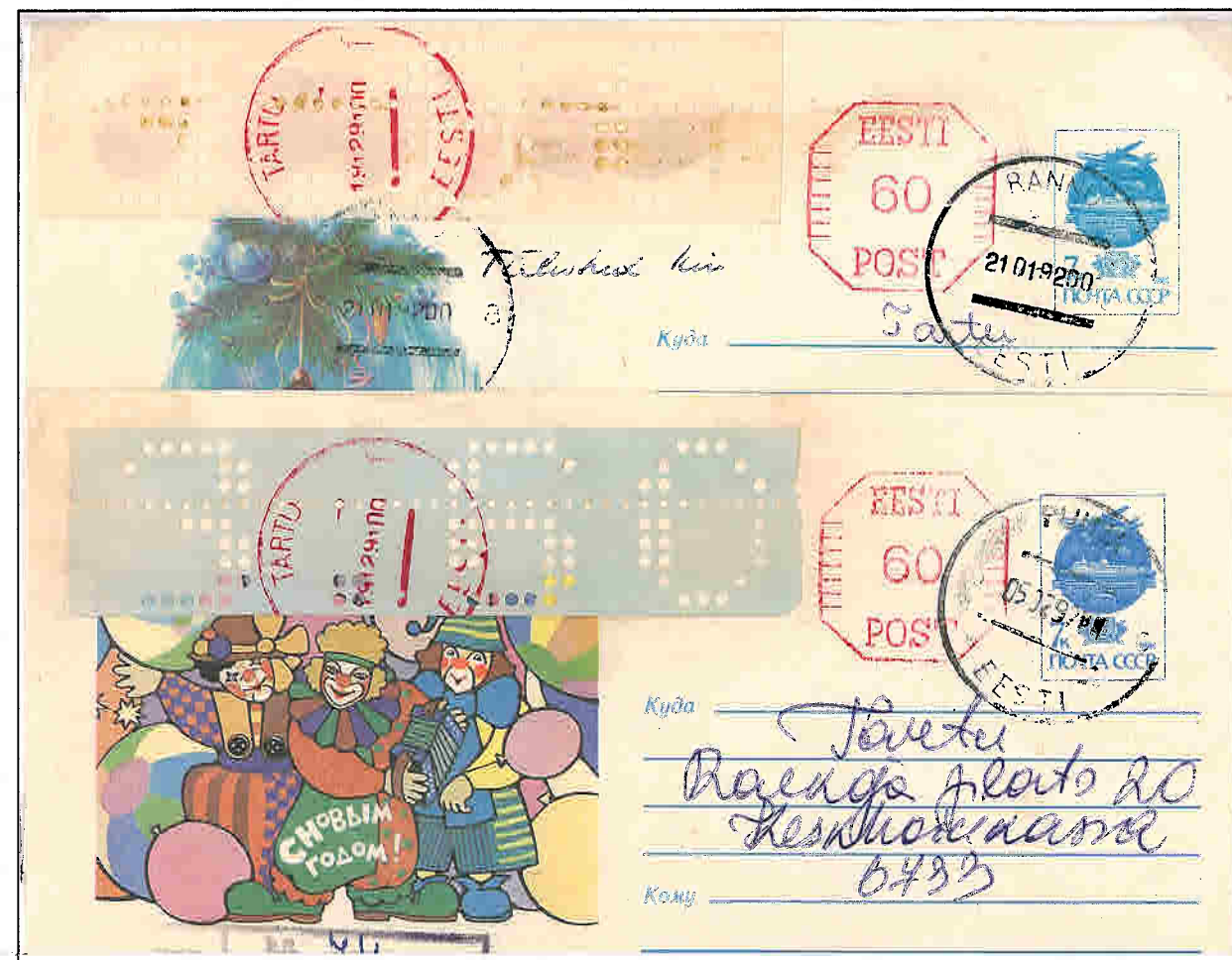
30% of star systems have a spiral structure. At the end of the 19th century Kobold, astronomer of the Strassbourg observatory, discovers the preferred directions of stars in our Milky Way. Our own galaxy also has a spiral structure.



The Andromeda spiral nebula also is a galaxy. In 1923 Hubble shows that it is outside our Milky Way. Not all nebulae are galaxies. Some - as the Eagle nebula and the Orion nebula - are starforming regions for stars in our Milky Way. The stars come into being in groups, in complexes of nebulae of dust and gases.



The Seven Sisters (the Pleiades) is a famous open star cluster (without binoculars: seven stars) that also indicates the creation of stars in groups. As time goes by open star clusters dissolve in the Milky Way. Their numerous presence is an indication for the relative youth of our Milky Way and the universe.



Due to a lack of postage stamps in 1991 in Estonia Tartu post office issues 16 different value 'stamps' - perfostrips made from white, light blue and dark blue paper - with a Tartu postmark of 19-12-1991. The tapes have been produced with a computer of Tartu observatory.



At Tartu Observatory specific software has been developed to support analysis of irregularly spaced time series of observations. The analyses provide more insight into the evolution of stars, star systems and the universe.

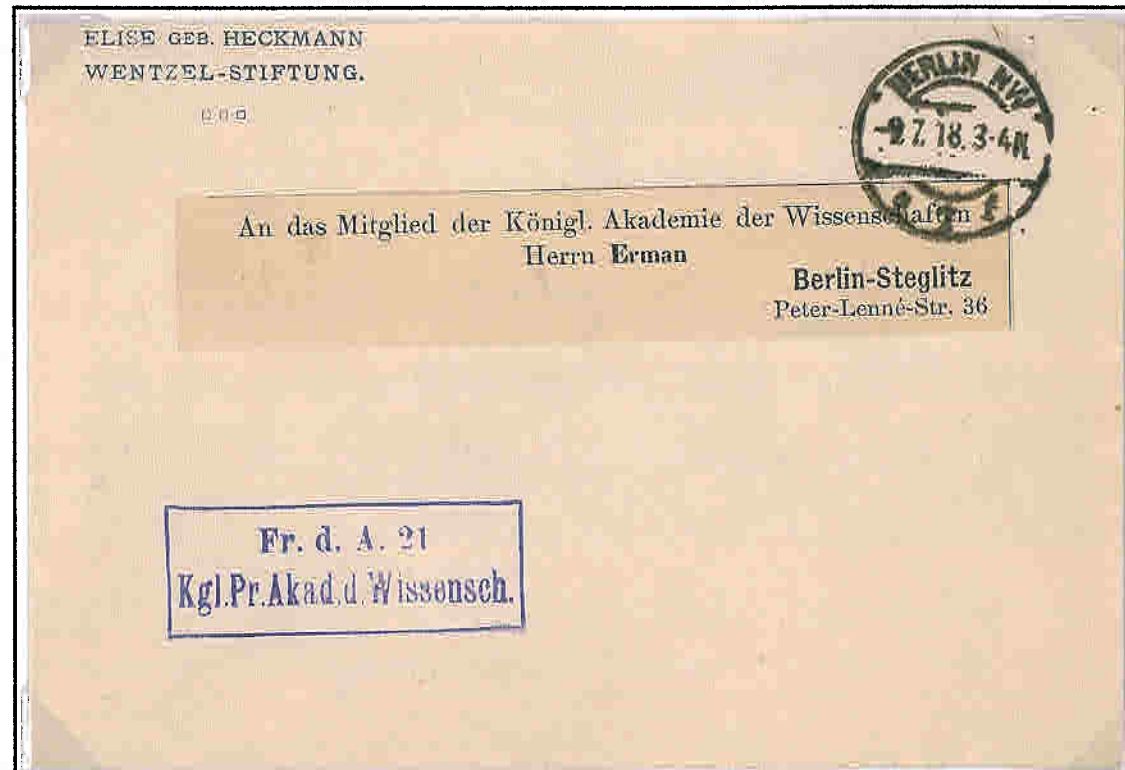
2.3.3 evolution of the universe



In 1842 Doppler predicts a decrease of frequency of star light of sources receding from Earth: the red shift (*see misprint*). From 1868 onwards Huggins and Secchi try in vain to observe the red shift by studying the spectra of stars. Around 1890 efforts are successful.



In 1912 the first big red shift has been found: of the galaxy NGC 4594. Lemaître combines this with Einstein's Theory of Relativity to formulate his Big Bang theory of an expanding universe. Subsequently Hubble discovers the relation between redshift and distance of galaxies.



As member of the Royal Prussian Academy of Sciences Einstein completes his Theory of Relativity in 1916. Astronomical observations (e.g. in Berlin) confirm the theory in 1918 and 1919.



första

Uppräckslistor som är av betydelse för grundämnenas uppkomst. Frimärket illustrerar uppbyggnaden av tunga atomkärnor där neutroner samlas samman med något lättare kärnor.

Universum utvidgar sig. Expansionen började med den "stora smällen" (Big Bang) för ca 16 miljarder år sedan. Luften var utsluttningslös och den dominerades av en intensiv värme. Men utvidgning kylde och därmed har strålningen idag svalnat till en temperatur av ca 3 grader Kelvin (vilket motsvarar ca -273°C). Penzias och Wilson upptäckte denna kosmiska bakgrundsstrålning år 1965.

Inom radioastronomin måste teleskopet vara större för att man ska få en hög upplösning av ett avlägset objekt. Det finns dock begränsningar för hur stort man kan bygga. Flytt utvecklad sportutrustning där man använder flera teleskop för att i praktiken nå samma resultat som med ett enda mycket stort teleskop. Tekniken symboliseras på frimärket av två radioteleskop som samtidigt mottar strålningen från en iadagalax.

Torsten Elfvig

2.90-2.90-2.90-2.90-2.90-2.90

Nobelpristagare Astrofysik

VALÖR KR 2.90 PRIS 14:50

In 1965 Penzias and Wilson discover cosmic background radiation, the remnant heat left over from the Big Bang (see also the text on the back of the booklet). During the Big Bang hydrogen and helium are the heaviest elements. Fowler studies the formation of heavier elements in nuclear reactions in stars.

REPOBLIKA DEMOKRATIKA MALAGASY

REPOBLIKA DEMOKRATIKA MALAGASY 500

REPOBLIKA DEMOKRATIKA MALAGASY 500

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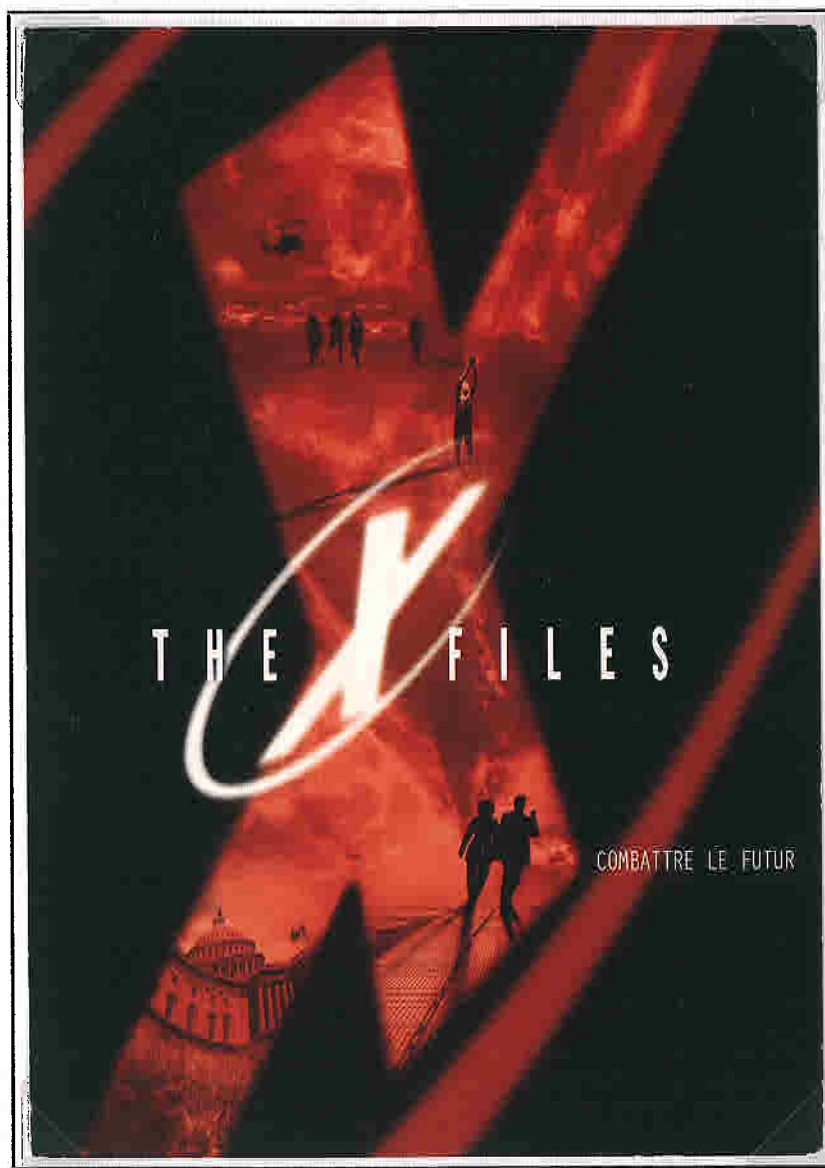
500 TIMBRES PERF. NEUFS ADM X 16 T.

When Einstein publishes his theory, he takes a static universe for granted. To keep the universe static, he introduces a 'cosmological constant' in his equations. Later he 'annuls' this unnecessary factor (*The stamps have been used to indicate the contents of the package, they bear the perforation 'Annulé'*).

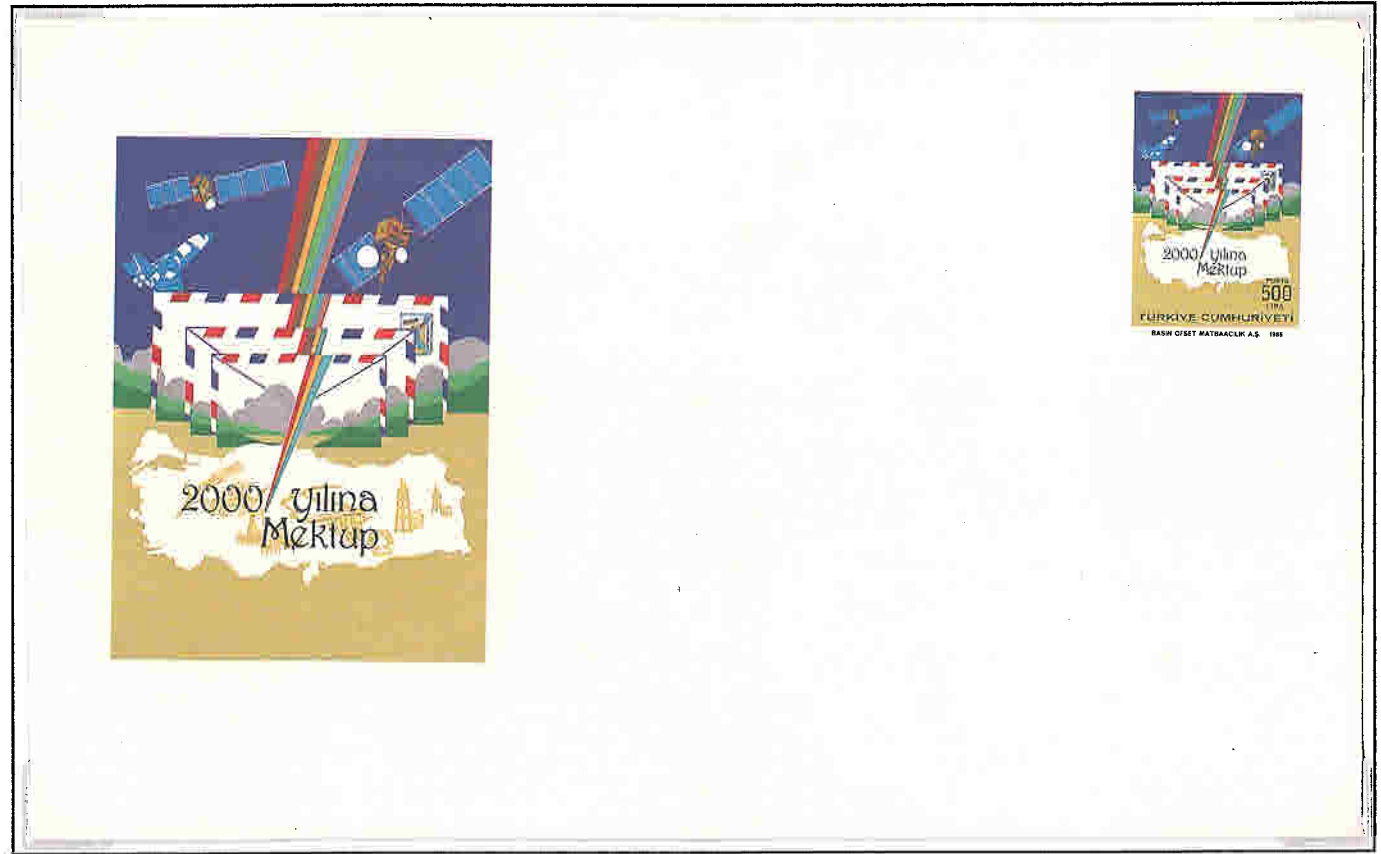
2.3.4 time travelling



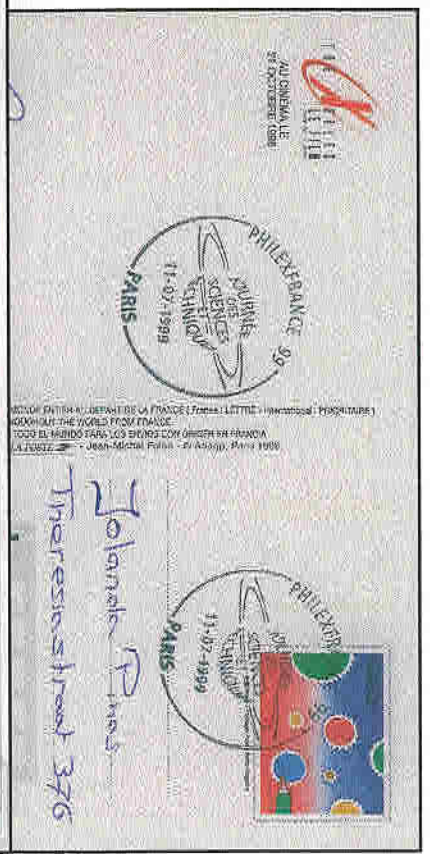
In 1985 Sagan tries to find a better foundation for time travel in one of his SF-stories. He starts the discovery that Einstein's Theory does not exclude time travel through black holes. An alternative way uses millisecond pulsars, rapidly rotating neutron stars found by Hewish in 1957. Fantasy (time machines) is the easiest way, as Doctor Who uses the 'Tardis' to meet the Daleks.



While in the sixties Doctor Who is time travelling himself, in the nineties Mulder and Scully of the X-files meet the future. What future time travelling entities will pay us a visit?



On the occasion of the turn of the millennium, the Turkish post issues a special postal envelope to write letters to the future. While writing, the author is time travelling.

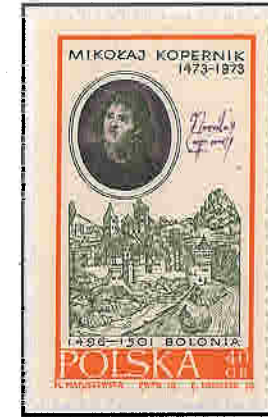


KEO is a satellite to be scheduled to be launched carrying a diversity of messages of the present to the future. KEO also is called 'the archeological bird of the future'.

3.1.1 center of the universe



The great thinker Aristotle (384-322 B.C.) puts Earth in the center of a perfect universe., with smooth celestial bodies moving in circles. The astronomer Ptolemy (ca. 100-180) grounds his model with his standard work 'Almagest'. By exception Aristarchus of Samos (310-230 B.C.) puts the Sun in the center.



The young Pole Copernicus (1473-1543) studies in Bologna (1496-1501) and experiences the Italian Renaissance. Back in Poland he writes - after a lot of study - a 'second Almagest', in which the Sun replaces the Earth as center of the universe (400 years later Camp Woldenberg honours his work).



The Islamic astronomers al-Khwarizmi (ca. 780-850) and al-Biruni (973-1048) - left on the stamp with the misperforation - criticizes Ptolemy who seems to have chosen 'fitting' observations only. The standard of the Almagest starts to shift. Al-Haitham (965-1040) writes his 'Doubts on Ptolemy'.



Copernicus bases on Islamic observations and theory. In the 11th and 13th century in Moorish Spain observations are being recorded in the Toledan (al-Zarqali, 1028-1087) and Alfonsine (King Alfonso X, 1221-1284) tables respectively. The theory probably is al-Tusi's (1201-1274), translated by Postel in 1536.



While in the Islamic world the Almagest loses ground, it maintains its prominent position in the Dark Ages of Christian Europe. The Europeans do not have such advanced instruments as the sextant of 40m of Ulugh Beg. His death in 1449 marks the end of the development of Islamic astronomy.



The limited practical surplus value and the expected opposition of the Protestants - the Reformation has begun - restrains Copernicus from publishing his work "De revolutionibus orbium coelestium" till 1543, just before his death.

3.1.1 center of the universe



The work of Copernicus is not an immediate success. Brahe (1546-1601) understands the advantages of the heliocentric model. However, as a Lutheran he cannot accept a moving Earth, so he introduces a compromise in his own model. In 1573 he sees a stellar nova, a phenomenon that does not fit in the stable universe of Aristotle.



In 1601 Shakespeare - convinced that the Sun does move - writes in Hamlet: "Doubt thou the stars are fire; Doubt that the Sun does move". The Copernican theory has not yet attracted many supporters. This is about to change.

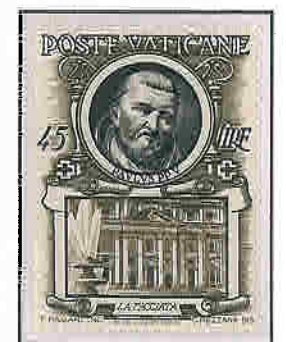
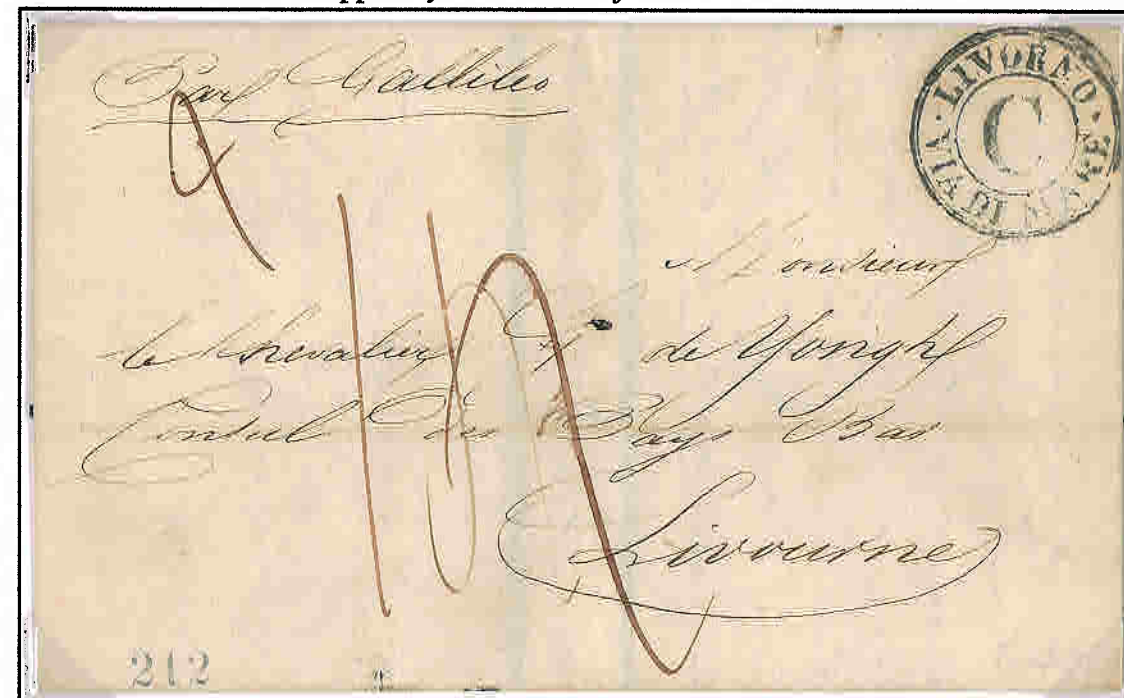


A century later the "Sun fire insurance office" does not doubt the stars are fire, but considers the Sun as a certainty in the skies. The support of Galileo for Copernican theory forces this change. In Padua he gives public lectures during the appearance of the supernova of 1604, attacking the Aristotelian idea of the immutability of the heavens.



In 1609 he constructs the first astronomical telescope. His observations confirm Copernican theory. The doctrine of Aristotle becomes out of date: Jupiter has moons (not everything circles around Earth), the Sun has spots, the Moon has craters (imperfect celestial bodies) and Venus has phases (does not circle around Earth).

In 1852 this letter is shipped by the 'Galileo' from Genova to Livorno.



In 1616 pope Paul V declares the Copernican idea of heliocentrism heretical and in 1632 Galileo is forced to recant his heliocentric views. It takes until the 19th century for the Holy Office to tolerate publications about the movement of the earth. In 1993 pope Paul II formally acquits Galileo of heretical support for Copernicus's heliocentrism.

3.1.2 a planet in a solar system

Monsi^r de Marca en sa s^{te} garde, Paris
 le xij^e Juillet 1645
 Depuis votre lettre écrite ayant eu aduix que le fort de mardik
 s'est rendu a mon oncle le Duc d'Orléans après cinq jours
 de siège de puis l'ouverture de la tranchée d'aujourd'hui ce moi pour
 vous en donner par ce vous dire que mon intention est que
 vous publiez à Paris vallons par de la l'importance de ce succès
 en tout grand led. son couraige m'heureux la rade a le Port ou
 de son tout le change. et de change. pour d'aujourd'hui de
 le Port de mon oncle a pu m'acquiesce d'utile. aux ennemis le vous
 sçavez que au lecul de m'acquiesce faire cela en tout la coste
 de flandres entre guayam laissez votre fort avec a la vue de
 le vo armée qui est en loge a la porte du canon de la mine & mon
 oncle l'ayant prouvé si m'heureux. quelle son rendue comme d'aujourd'hui
 par arrivés luy ayant laissé son tout le canon a quitter le canon
 le canon de deux flandres en demourant du monde aucun de
 honte qui de plus /

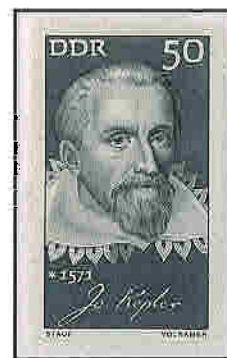
Copy of part of text inside, signed 'Louis'.

Letter dated 12th July 1645 of a young 'Sun king' Louis XIV, sent from Paris to State Councillor Pierre de Marca, inspector general in Catalonia (Spain).



Entre du Roy sur la prise de
 La motte le fort de mardik
 et les deux batteries gagnées
 par m. le Comte d'Arcoant
 du 12. Juillet 1645.
 Monsi^r de Marca con-
 ordinaire en mon on. de
 visitaux general de
 Catalogne

Mid 17th century the Copernican revolution is essentially complete. As a youngster Louis XIV receives his nick name 'Sun king' when he plays a rising Sun in the "Ballet de Nuit". As 'Sun king' he is the center of the universe.



PAR BALLON MONTE
 Madame
 griez si magnif. les compagnons
 par Meridon
 cordialement

During the siege of Paris the balloon 'Le Kepler' flies to Montigné-le-Brillant (near Laval) on the 11th January 1871.

Kepler (1571-1630) - between 1600 and 1601 assistant of Brahe - is committed to heliocentrism, as a divine harmonic system. Earth is a planet. Kepler shows the nature of the planetary orbits not to be circular (as Aristotle states), but elliptical.



Though Kepler's model fits, he is unable to explain it. In 'Principia' (1687) Newton provides with his law of universal gravitation an explanation. Combining Newton's law with observed deviations in the orbit of Uranus, Le Verrier calculates a new planet (Neptune) and guides its discovery in 1846.

His Excellency
 William Struve Esquire
 Director of the Imperial Observatory
 Pulkova
 Academy of Sciences
 St. Petersburg.

Letter from 1852, sent from London, via Ostend and Aachen to Struve in St. Petersburg. Prepaid for Ostend: 1s11d. Credit to Prussia 1s3d. Credit to Russia 6s.g.



Round 1839 Struve measures demonstrably the stellar parallax, empirical proof of heliocentrism. In 1839 Struve becomes director of the new Pulkova observatory in St. Petersburg. As member of the Russian Academy of Sciences he is exempt from postage within Russia.

3.2.1 the Earth is round



At first man sees the universe as a disc. From Greece a new image develops - with the stars orbiting around Earth at a fixed distance - as shown by the Arabic celestial globe from 1279 and the oldest celestial globe of the Farnese Atlas.



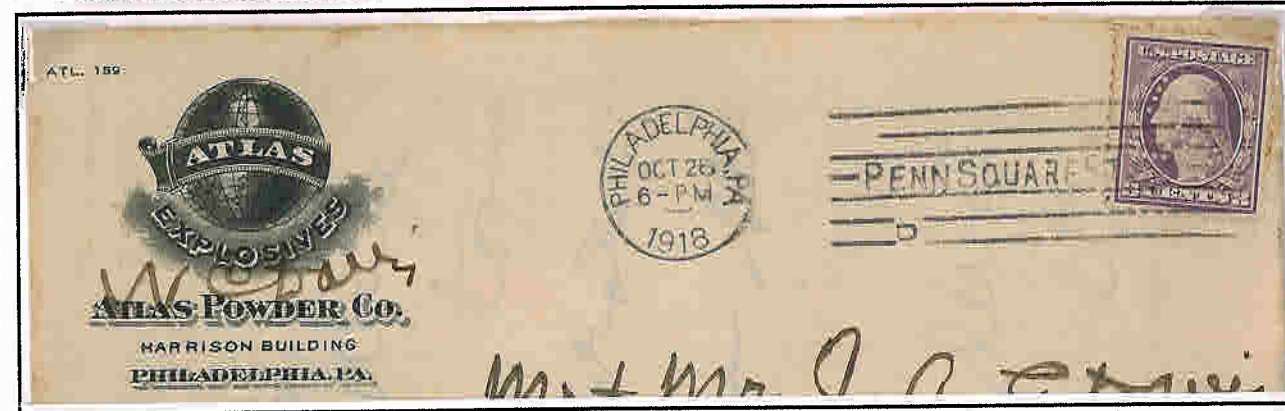
The Greek also discover that Earth is a globe: walking along the north-south axis the constellations turn over. The stamps in the middle show Orion from the north and the south. The Apollo 8 mission confirms the spherical shape of Earth.



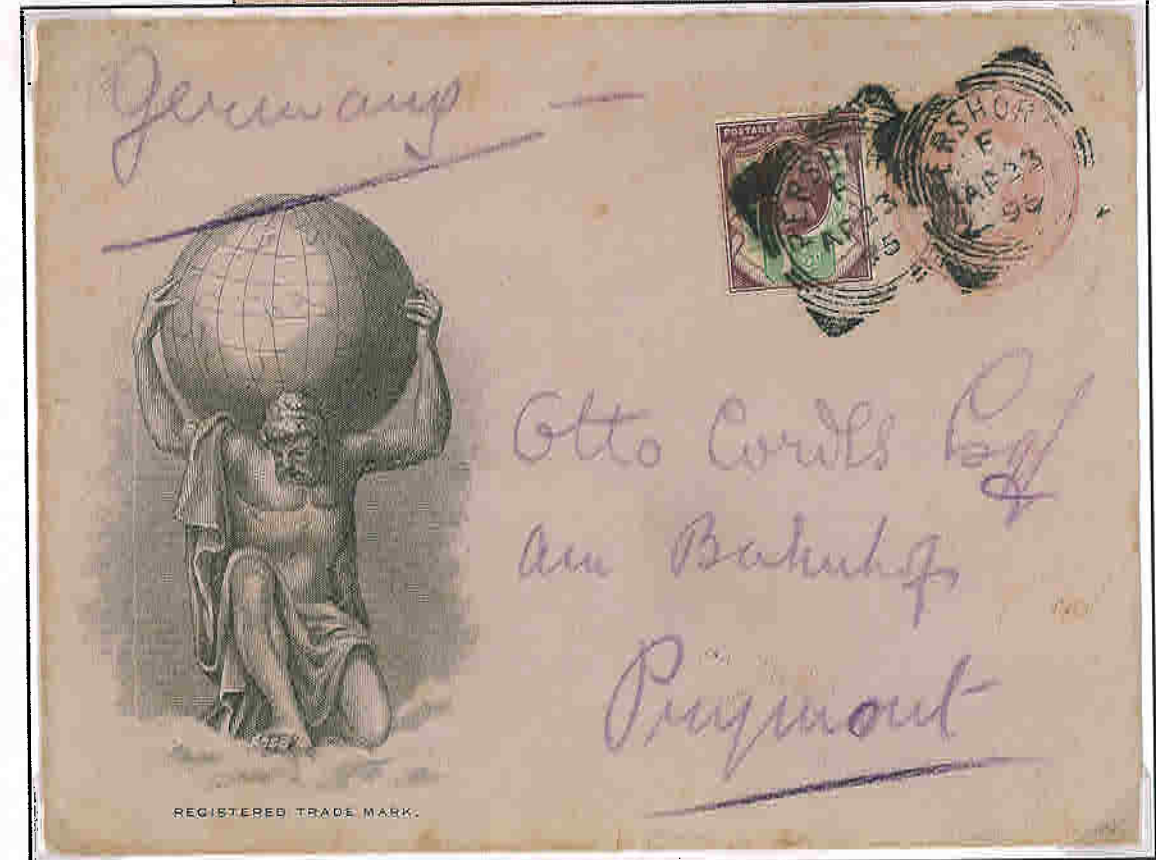
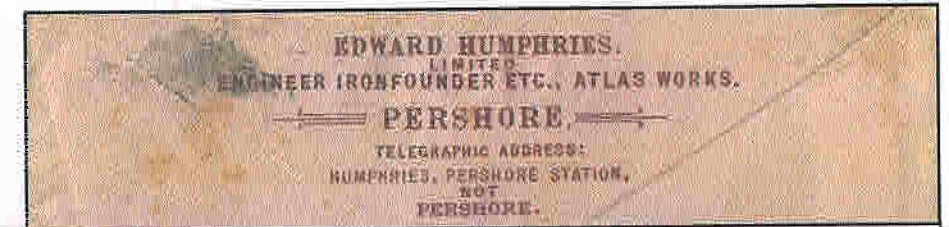
The turning over of the constellation of the giant and great hunter Orion inspires a Viennese shoe shop (postal stationery printed to private order)



Aristarchus of Samos manages to estimate the size of the moon. With Camels (to measure a long distance) and shadows Erasthenus measures the size of the Earth. In the Renaissance the size of the Earth is 25% less than the actual size.



The God Atlas is the bearer of the universe. At first he bears the globe of the whole universe, later the globe of it's center, Earth, only. Atlas represents power (perfin ATLAS of 'Atlas Powder Co' and postal stationery printed to private order 'Atlas Works').



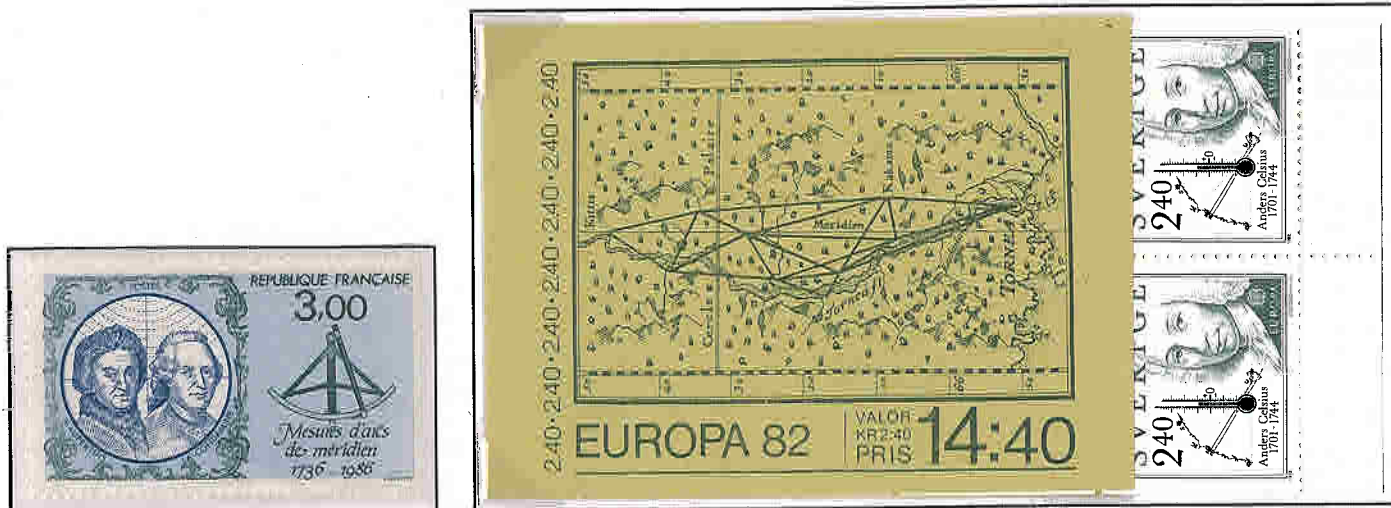
3.2.2 the Earth is oblate



In 1683 King Louis XIV and minister Colbert support Cassini to try to demonstrate the round shape of the Earth. After his measurement of an arc of the meridian between the northern and southern borders of France he proposes a terrestrial spheroid elongated at the poles.



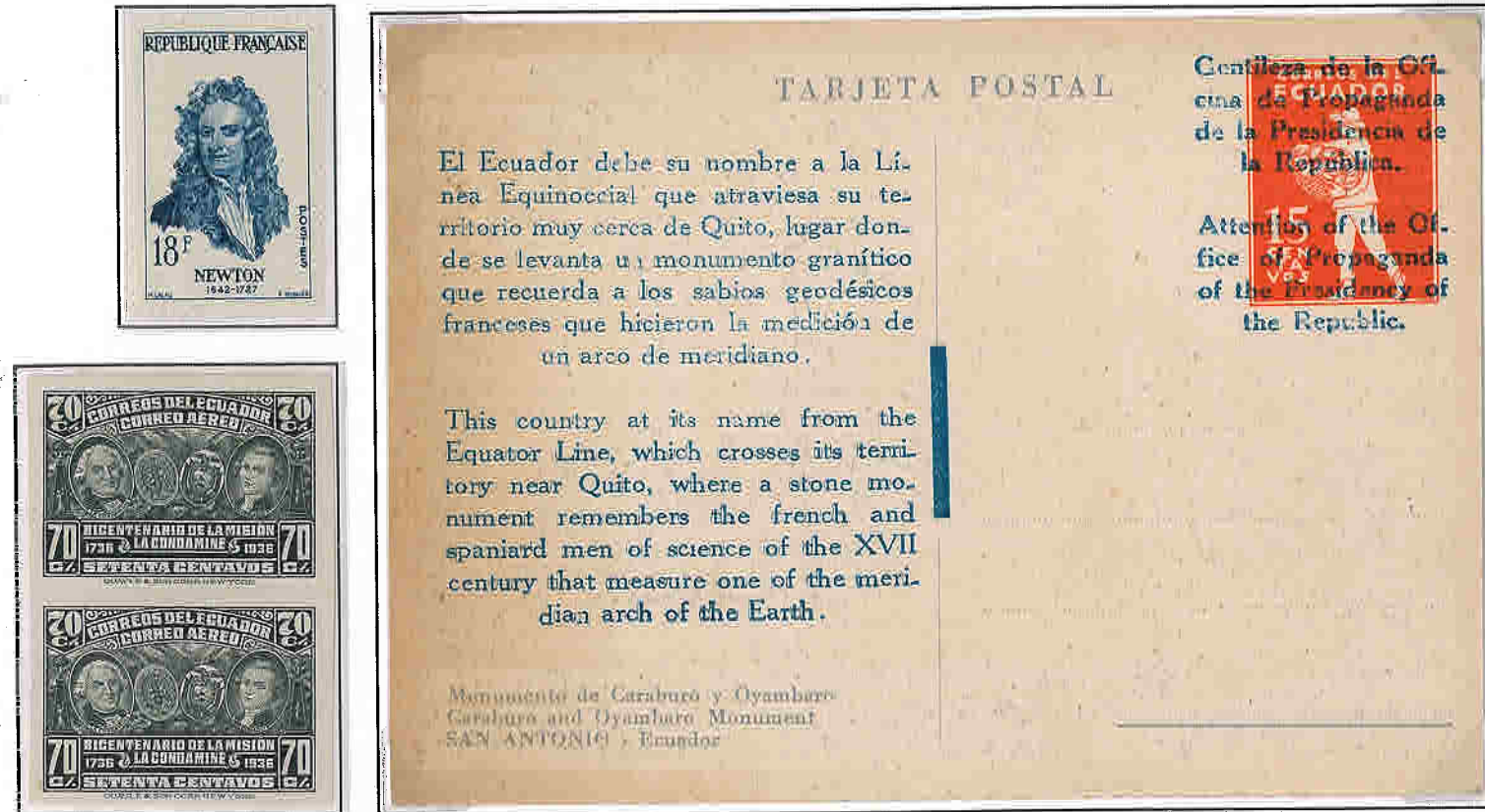
For centuries geographers - as al-Biruni (600 places, 9th century) - calculate a fixed latitude of places. In 1765 Euler predicts variations of the latitude, because of a movement of the axis of the Earth.



In 1736 two expeditions lead by La Condamine and Maupertuis correct the results of Cassini: the Earth is **oblate** (at the poles). Together with Celsius, Maupertuis measures the arc of a meridian in Lapland. The booklet shows the map of Lapland with the triangulations of Maupertuis.



This movement shows that the Earth is not a perfect sphere. From the end of the 19th century five observatories register this movement particularly. Since 1899 in Carloforte (Italy) and Mizusawa (Japan).



In Ecuador La Condamine also measures an arc of a meridian (*proofs of a commemorative issue from 1936*). The results of the two expeditions confirm the assumptions of Newton about the shape of the Earth. A monument on the equator commemorates the La Condamine expedition (*promotional postal stationery of Ecuador*).

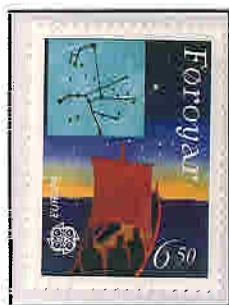


At the start of the 20th century the highland of Ecuador is being measured for a second time. The astronomical observatory of Quito, in use since 1877, supports this '2nd Mision Geodesica'.

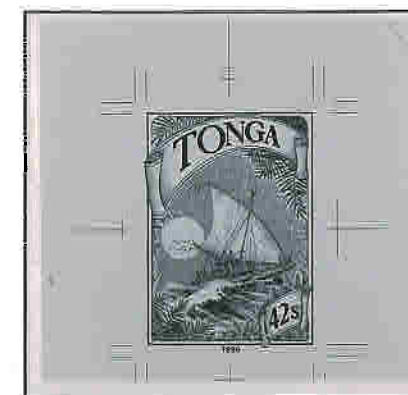
3.3.1 orientation at sea



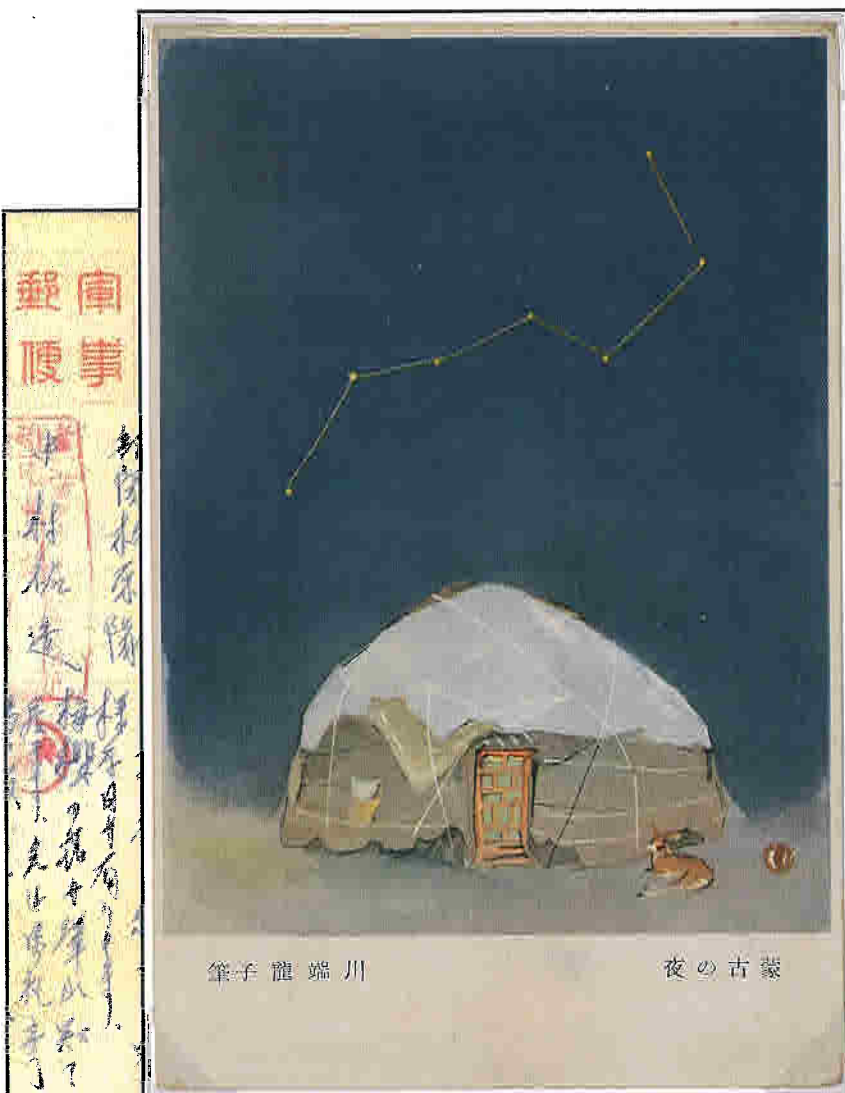
At first Europeans use the constellations Ursa Major and Ursa Minor for navigation. Phoenicians introduce the Polar Star for navigation. This star - also named the Phoenician Star - is a certainty in the sky: it marks the North.



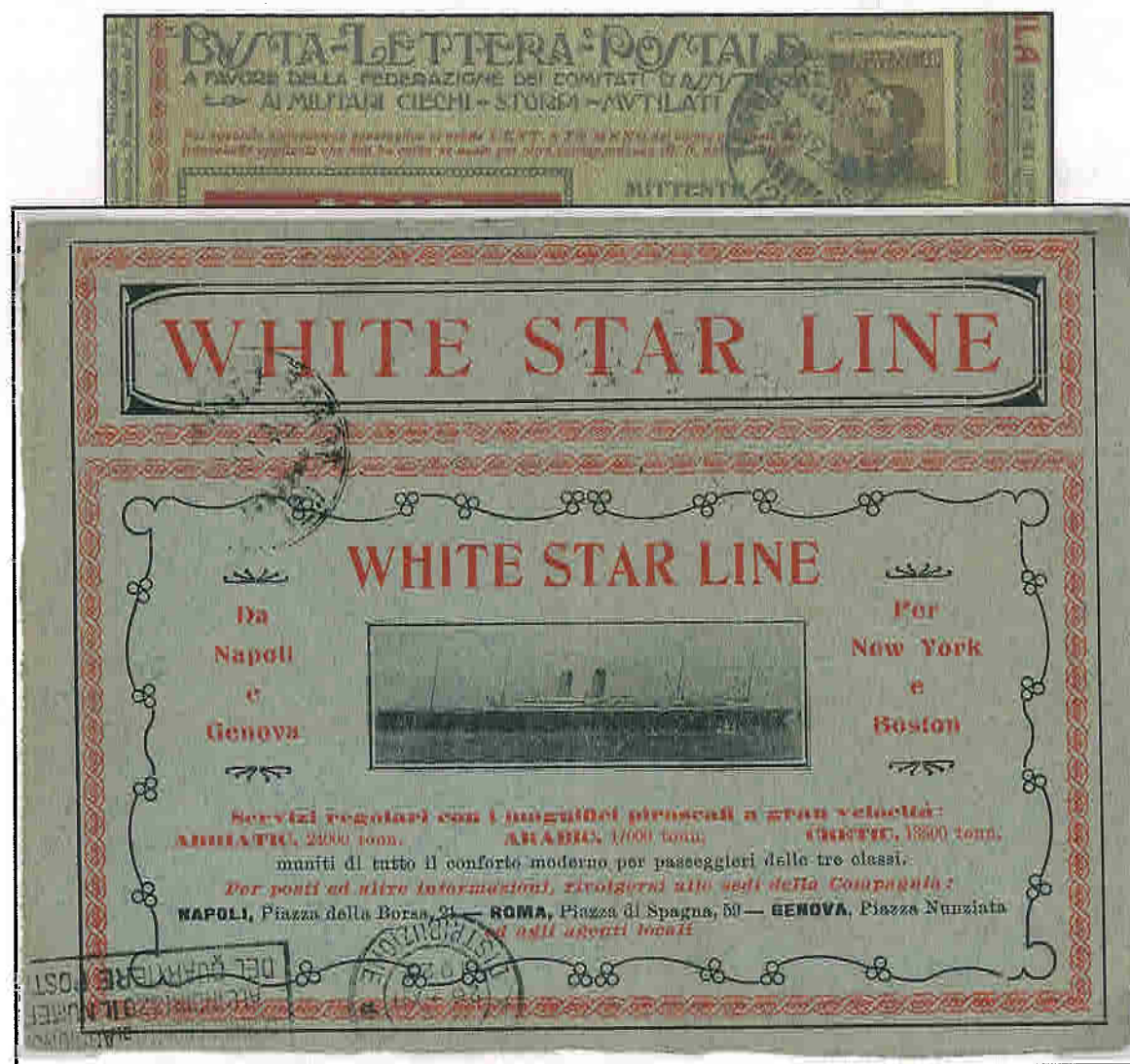
The white star Sirius is the brightest star in the sky (constellation Canis Major) and has a white dwarf as companion. Names of ships refer to this star, that is important for navigation.



Navigation by the stars (*printing proof of Tonga*) is a big test on the journeys in the Pacific in the 15th century. The saying is that the sailor follows the stars.



Visually Ursa Major is not far from the Polar Star. The two highest stars on the Japanese fieldpost card point to the Polar Star (not on the card). So, the Polar Star can be found.



The 'White Star Line' also refers to Sirius. Since 1870 the shipping company sails transatlantic. In 1934 a merger with 'Cunard' takes place: *the perfin CWS Ltd refers to Cunard White Star Limited.*



In the same period European sailors use the cross-staff, quadrant or astrolabe (*on the back of the Spanish booklet*) to determine latitude.

3.3.2 search for the longitude



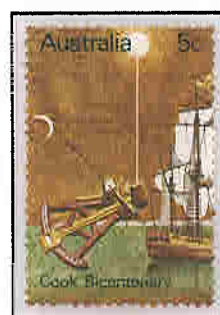
Too many ships go down because they get lost. In 1598 Philip III of Spain offers a prize to find the longitude at sea. Ten years before the Spanish Armada fails to find longitude, sails into the rocky coast of Scotland/Ireland and is defeated by the British. To find longitude, time is essential. In search of a 'celestial clockwork', Charles II founds Greenwich in 1674



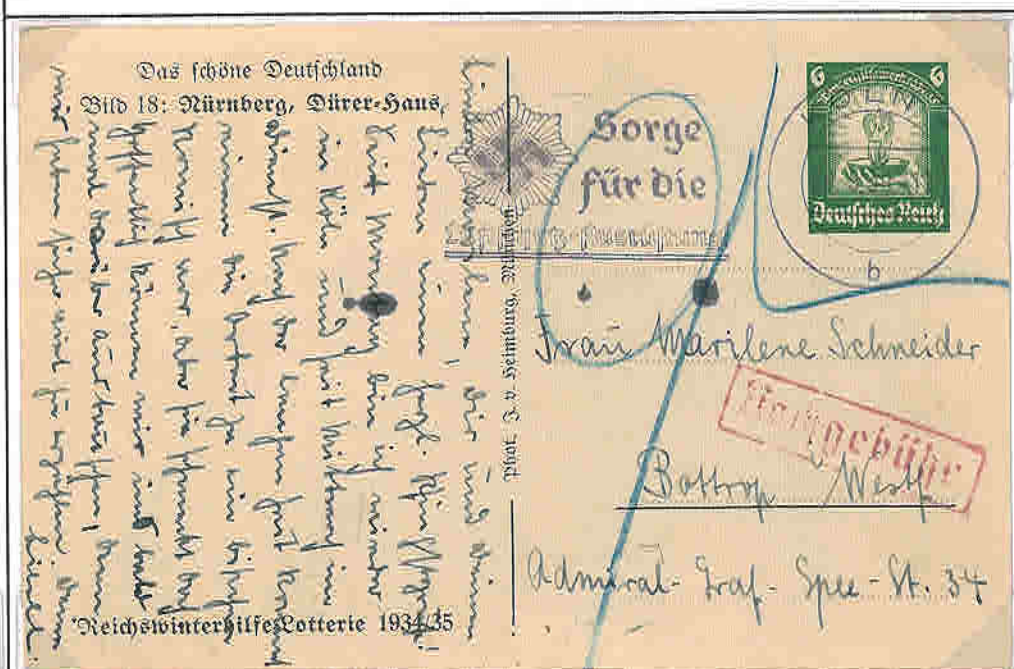
Galileo (portrait based on etching of Ottavio Leoni) explores an other way to determine longitude. He uses the moons of Jupiter as a celestial clock, they are too difficult to observe however.



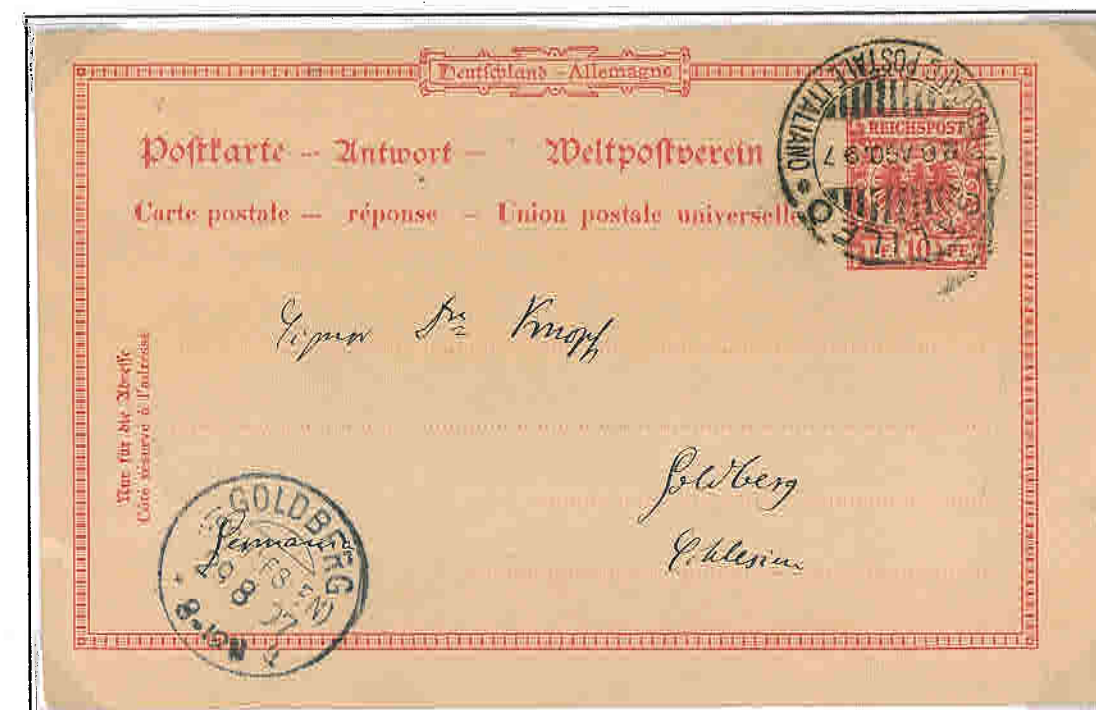
The pendulum clock of Huygens - designed in 1657 - is not reliable at a stormy sea. From 1730 onwards Halley (astronomer of Greenwich) supports Harrison's development of a reliable sea clock, tested by Cook (specimen of Hungary) on his journey around the world.



The card is taxed because the postage was valid only during the Reichswinterhilfe Lotterie 1934/5.



In 1472 Regiomontanus introduces the method of lunar distance (based on the Moon, eclipsing parts of the zodiac) to determine longitude. He works in what is now called the Dürerhaus in Nürnberg (the earliest European observatory). The method is unsuccessful, but still in use when watches are expensive.

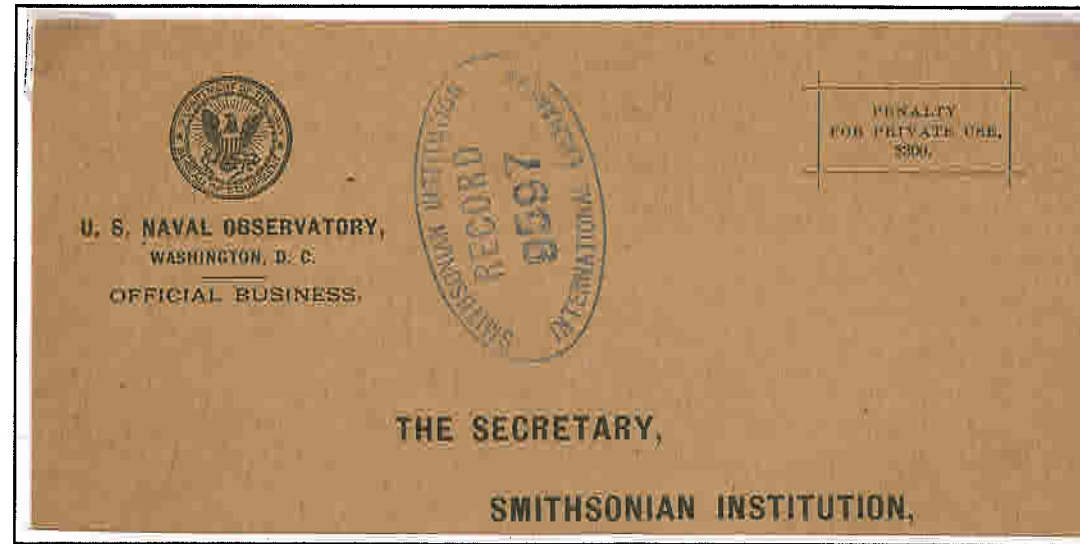


Shipnames honour his attempts to support navigation at sea. Above a letter sent in 1863 by the steamship 'Jupiter' (cancel KDOPA: Königliches Dänisches Oberpost Amt Hamburg), below a letter of 1897, with the postmark of the steamship 'Galileo'.

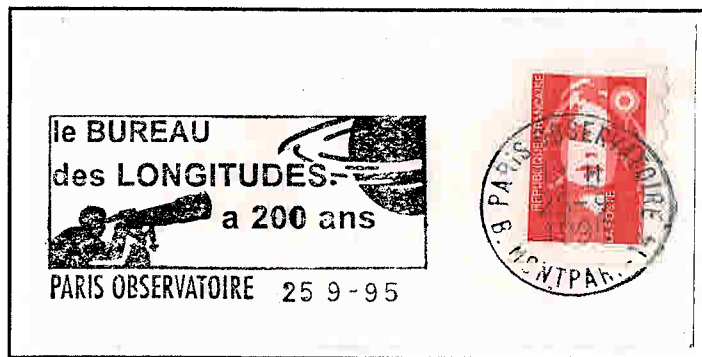
3.3.2 search for the longitude



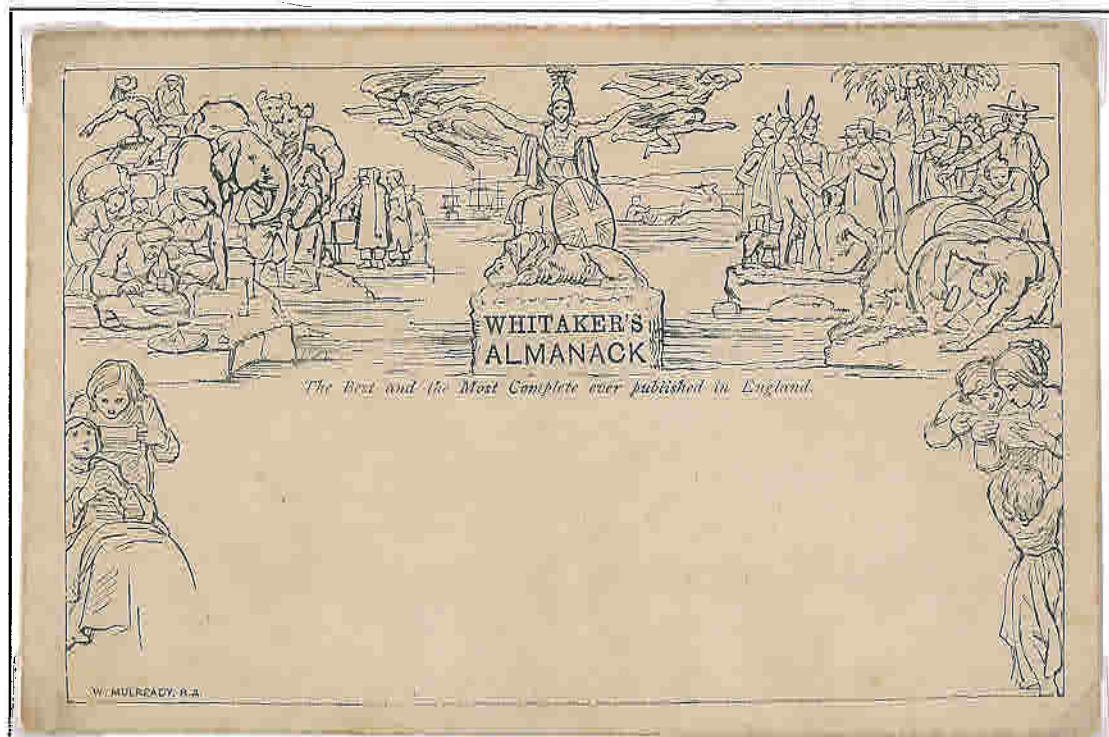
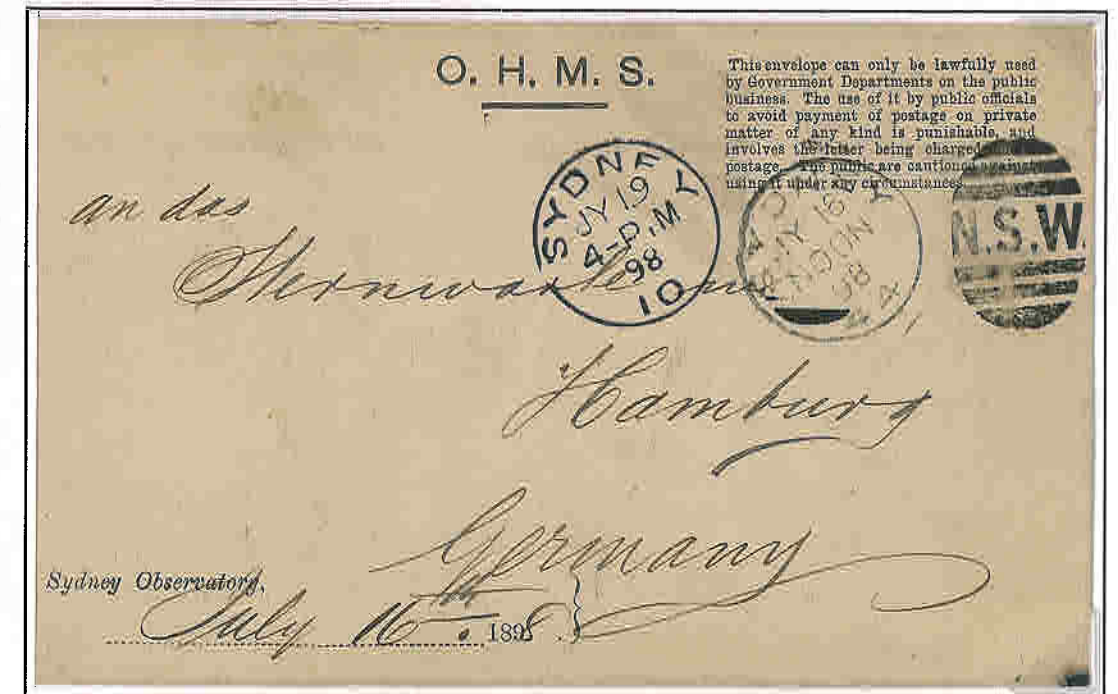
In 1642 the colonial naval power Denmark founds the first national observatory to determine longitude at sea. Many ships go down because they get lost, such as the 'Batavia' before the coast of Western Australia. The ship was not able to find longitude.



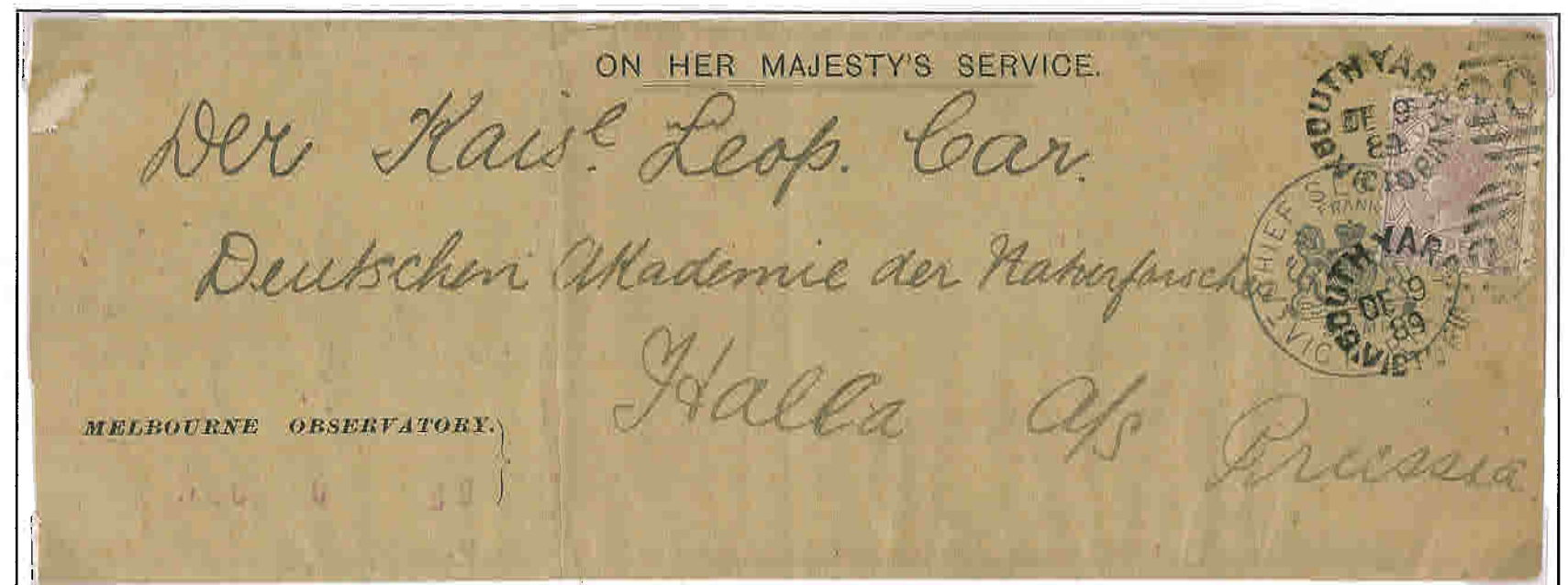
In 1830 the U.S. Naval Observatory is instituted for purely navigational reasons. The chronometer is coming into widespread use, navigational instruments and charts need a centralized location for calibration, repair and distribution.



Navigators need time and an almanac with reference-observations, as the yearly issue of the 'Bureau des Longitudes' (1795). Others exist (e.g, an almanac from Bogota, 1860) with variable references. The variations cause miscalculations as with the perforation.



In 1884 Greenwich-meridian becomes the standard reference. Whitaker's first almanack is published in 1868. It contains astronomical reference data provided by Greenwich observatory. Early type of Mulready facsimile envelope (of the 1860's), no postage is included.

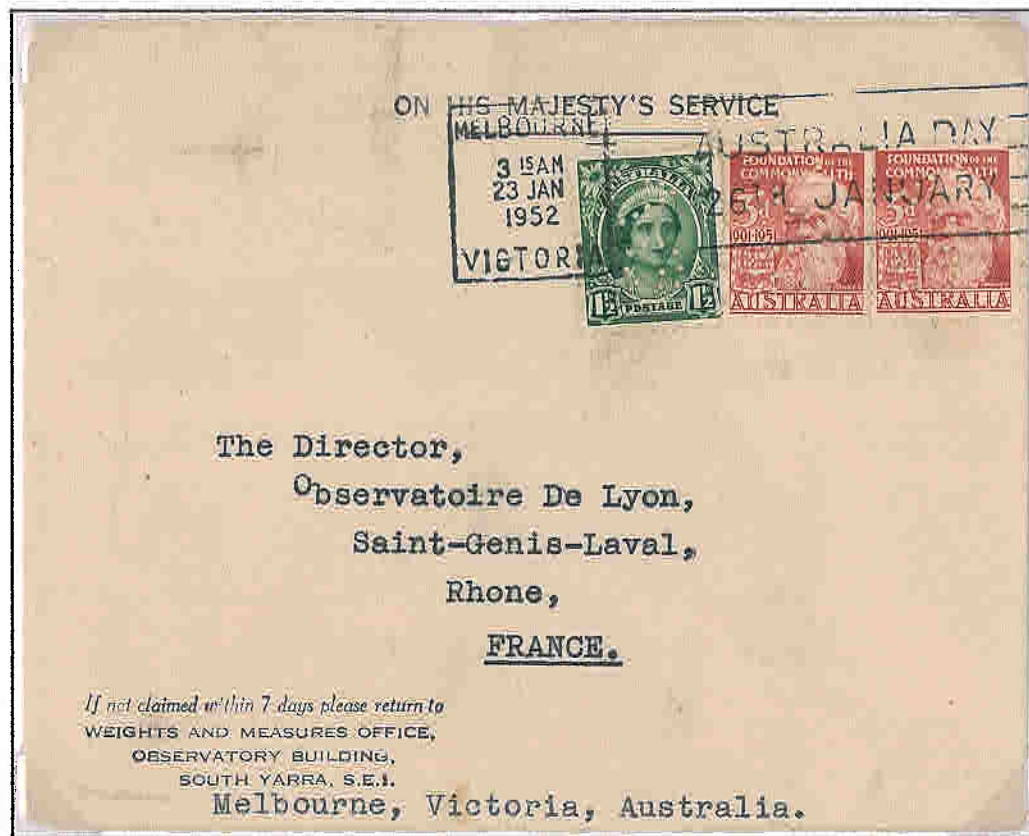


During the second half of the 19th century Australian observatories are established to provide accurate time for ship's chronometers. Melbourne and Sydney are the first. Time balls (as in Greenwich) are used to tell the ships the correct time. Disasters as with the Batavia must be prevented.

3.3.3 the mapped Earth



In 1582 Stevin introduces the decimal system of notating fractions: basis for the success of the decimal system. After the revolution of 1789 the French introduce the decimal system for distance: the meter. The meter equals 1/10.000.000 of a quarter of a meridian. The convention of 1875 makes it an international standard.



Local offices for 'weights and measures' ensure that a uniform and accurate system of weights and measures is used, e.g. by calibration of instruments. Official stamps with perforation 'V.G.'!




Surveys require the deployment of astronomical instruments. Sextants of e.g. the Freiberger Präzisionsmechanik are needed for orientation. Special German units (39496N=Astron.Mess Truppen 721-725) use sextants for astronomical orientation in the Sahara.

Joseph Meess
Ferd. Prinz Nachfolger
Grossherzogl. Hoflieferant
29 Erbprinzenstr. 29
Telephon 1222 — Gegr. 1857
empfiehlt sein grosses Lager von
Bade-Einrichtungen,
Badewannen, Eisschränken,
Fliegenschränken, Gaskoch-
apparaten, Gasbügeleisen,
Bidets, Zimmer-Klosetts,
Petroleumöfen, Petroleum- u.
Spiritus-Apparaten,
Gaslustres, Suspensionen,
Ampeln für Gas u. Elektrizität,
Petroleumlampen aller Arten,
Vogelkäfige,
Vogelkäfigständer, Aquarien,
Terrarien, Froschhäuser etc.
Küchen- u. Haushaltungs-
einrichtungen.
Mitglied des Rabatt-Spar-Vereins.

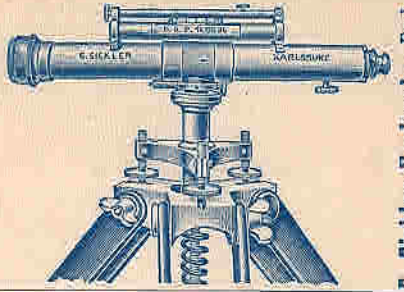
Patentbrief

An


DEUTSCHES REICH

Wohnung
(Strasse und Hausnummer.)
Serie III Karlsruhe I B.

Brauerei Fr. Hoepfner
Lager- u. Versand-Biere
hell und dunkel.

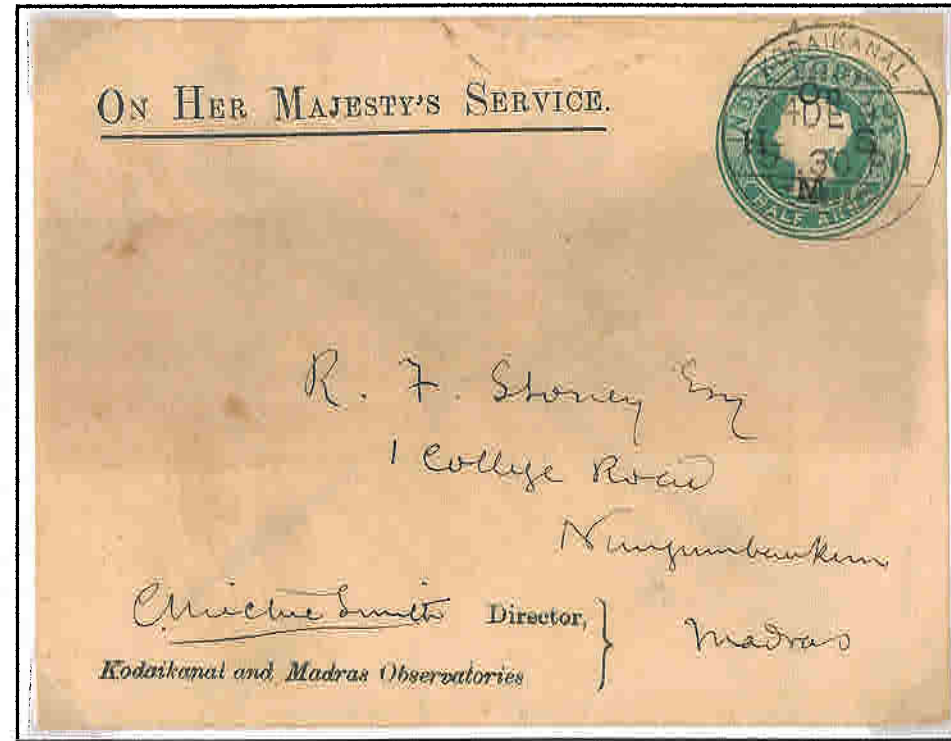

C. Sickler, Karlsruhe, Bad.
Spez.: Fabrikation von Ver-
messungsinstrumenten a. Art.

Hirt & Sick Nachf.
Feine Damen-Konfektion.
Seidenstoffe.
Spezialhaus I. Ranges.

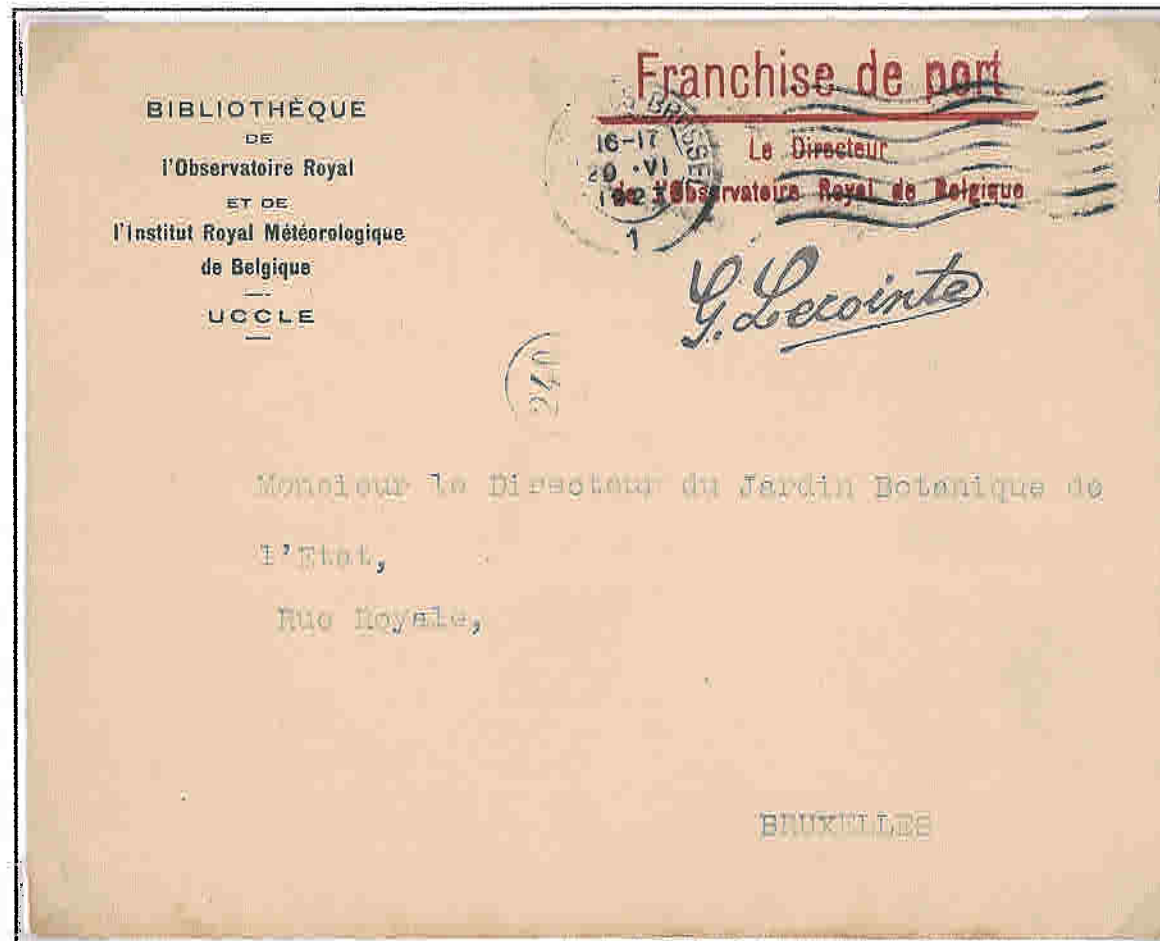
Kofferfabrik Eduard Müller, Hoff.
KARLSRUHE
Waldstrasse 49. — Telephon 2165.
Reisekoffer, Reisetaschen, feine Leder-
waren, Jagd-Touristen-, Hoch-Touristen-,
Fussball-, Tennis-, Wintersport-Artikel.
Reparaturen sofort.

For geodetic work as mapping and triangulations the German firm Sickler produces astronomical theodolites and level instruments. Sickler theodolites are used by the railways in Baden (Germany).

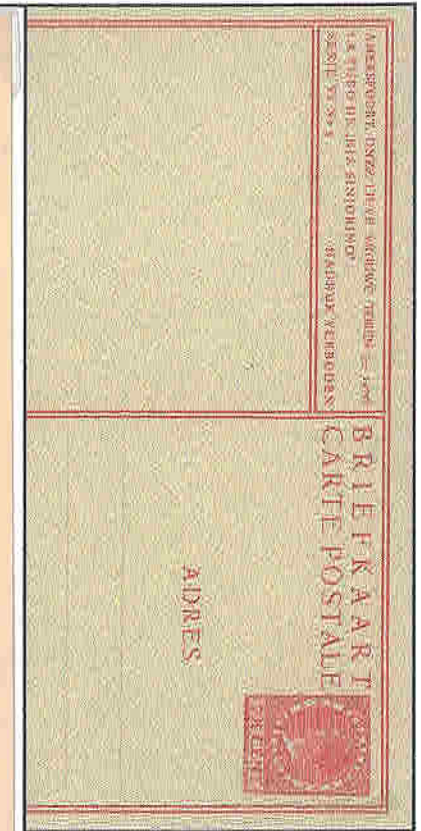
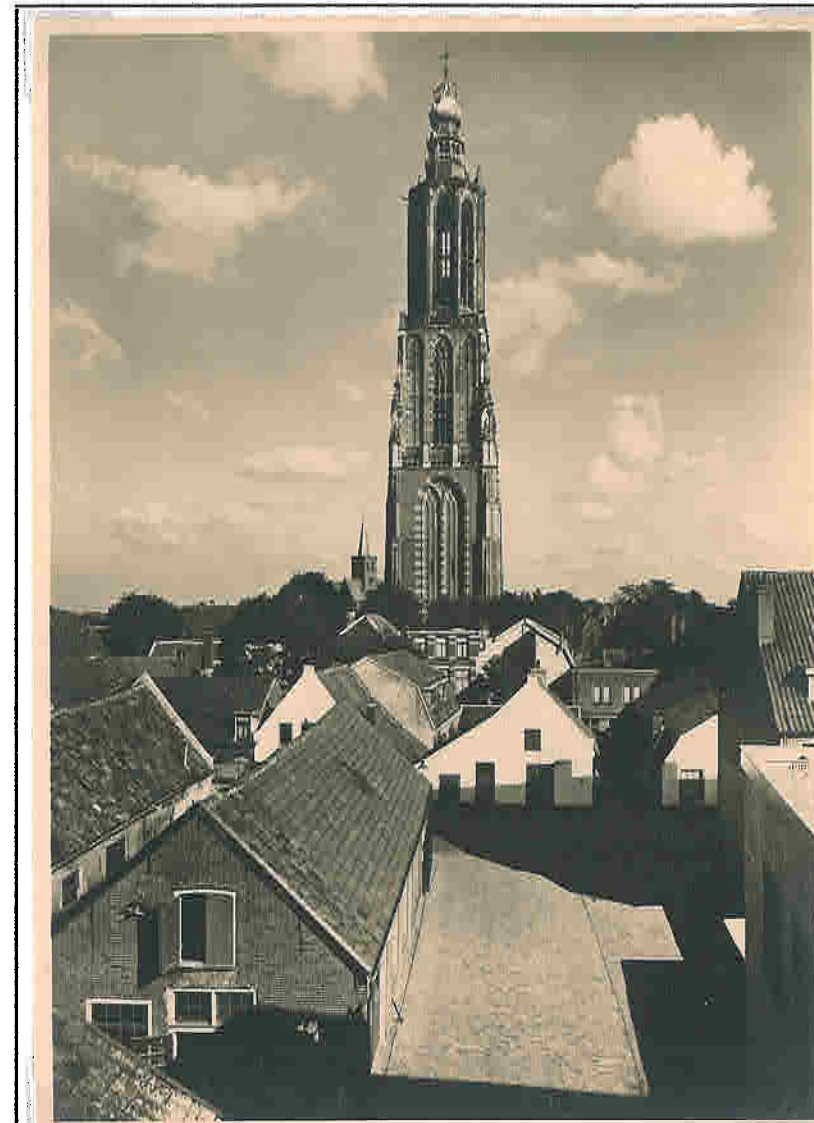
3.3.3 the mapped Earth



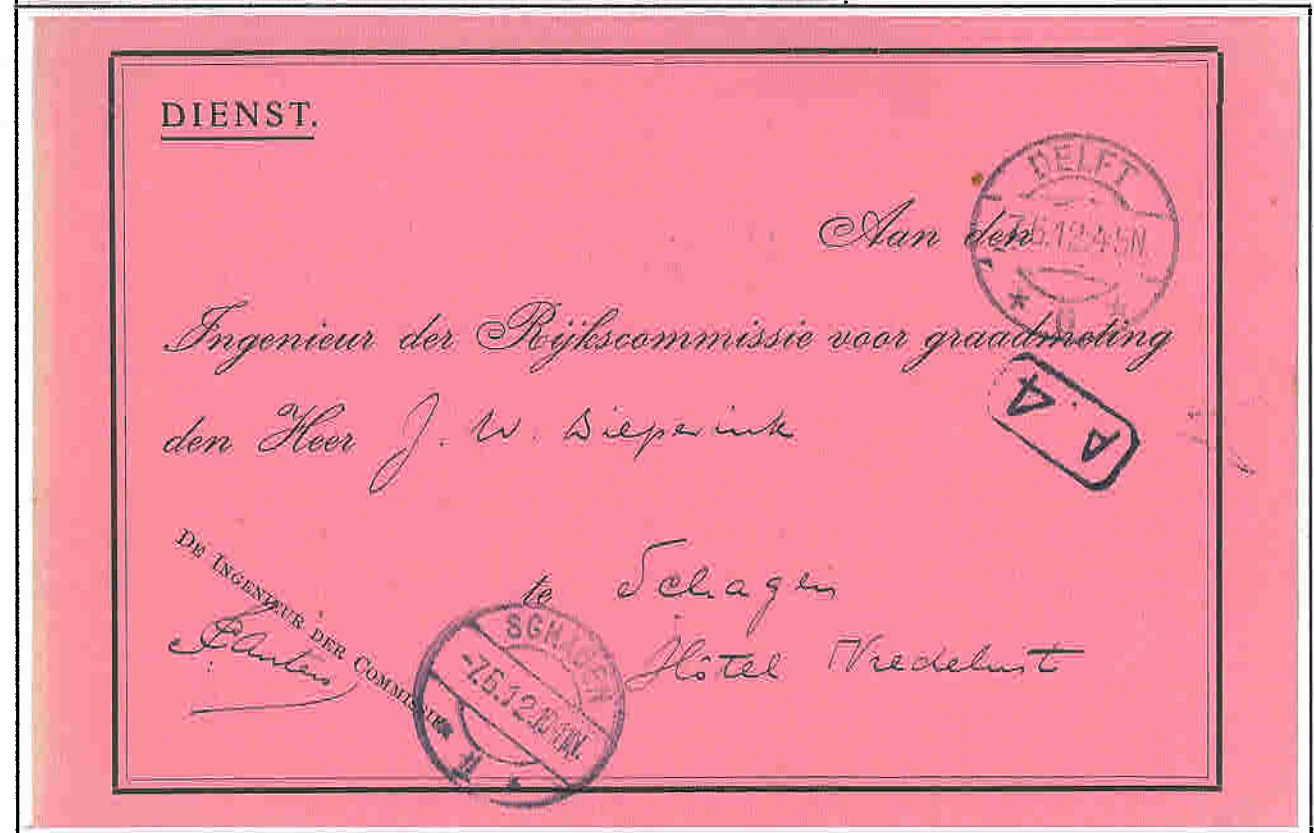
During the 18th century the world gets mapped. The astronomer/surveyor Banneker (*see misperforation*) is mapping parts of the USA from 1791 onwards. Great Indian surveys start in 1767. In 1802 the Madras observatory becomes point of reference for the triangulation of the surveys.



At the end of the 19th century Antarctica is the last continent to be mapped. The Belgica expedition of Adrien de Gerlache maps in 1897-9 a part of it. Georges Lecoq, second in command on the Belgica, makes the geophysical observations (*Letter sent postage free by Lecoq, after the expedition director of the royal observatory in Ukkel*).



In the 19th century the Dutch have regional maps with no matching coordinates. A national map is needed. The 'Onze Lieve Vrouwe toren' in Amersfoort forms the basis for the national triangulation that starts in 1885.



The triangulation is done by the 'Rijkscommissie voor graadmeting' and lasts till 1928. The commission needs astronomers to calculate the astronomical latitude and azimuth on fourteen reference positions (*Letter sent postage free by a member of the commission*).

4.1.1 focusing on celestial bodies



Directional observation of celestial bodies is the basis for the calculation of their orbits. In the classical antiquity observers as Hipparchus and Ptolemy produce important catalogues of stars with their positions. The mechanistic universe of the age of reason solves the riddle of their orbits. A poster of the Munich 1908 exhibition shows the mechanistic universe: the Milky Way as a wheel of industry.



With the equatorial of Gou Shoujing (1270) the orbit of a celestial body can be followed. It is a 'equatorially mounted' armillary ring, needing one rotation (from east to west) to follow the curved paths of the stars, permitting more precise observations to be made.



The movements of celestial bodies ask for explanation. In the 17th century Von Guericke suggests magnetism as the force of the celestial mechanism. Kepler formulates three laws for the movements of the planets: he discovers the elliptical nature of planetary orbits.



At the start of the twentieth century man has more control over nature and cosmos. Progress is a victory of the technical ratio. The publisher Franckh'sche Verlagshandlung (*perfin FV*) issues the scientific magazine 'Kosmos' from 1903 onwards.

4.1.2 zooming in at celestial bodies



In 1609 Galileo is the first to zoom in at celestial bodies with a telescope. The lenses of his telescope refract the light: a refractor. In 1611 Kepler adjusts the lenses to have a larger view and greater magnification, but gets chromatic aberration as well.



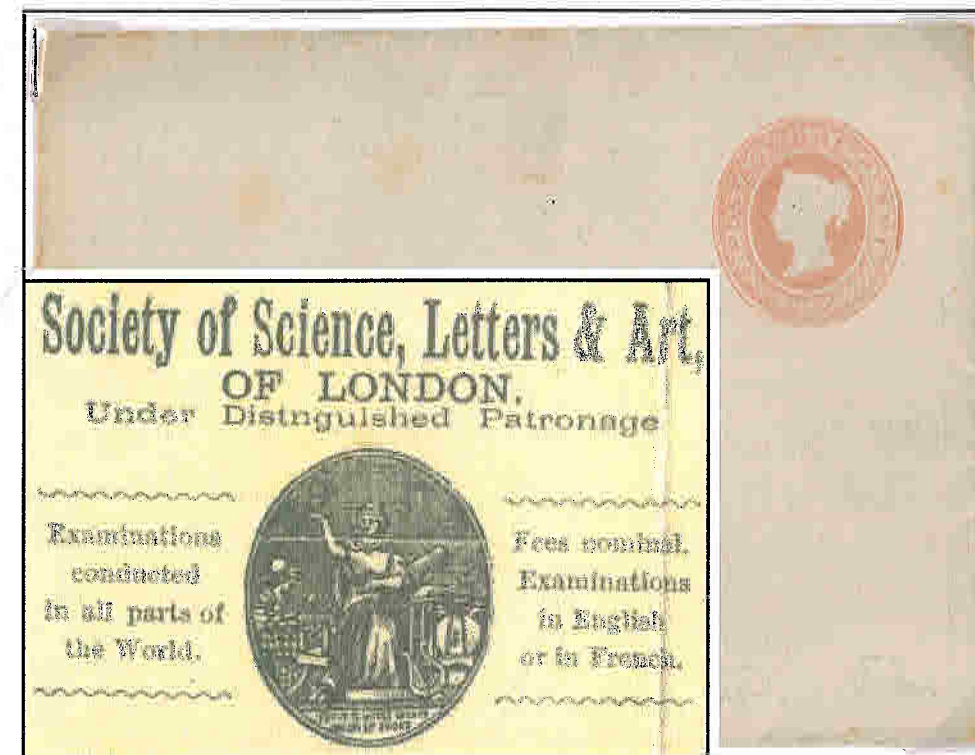
In 1672 Newton introduces a telescope that reflects the light: a reflector. It stands the proof of colour (see colour proof of Tonga) and is especially suitable for the study of faint objects. So, in 1781 Herschel discovers Uranus and in 1845 Lord Rosse spiral galaxies.



At the start of the 19th century Fraunhofer manages to minimize chromatic aberration in refractors. The German optical industry (with others: Carl Zeiss (perfin CZ) with astronomer Abbe) is at a height.



The success of the refractor is international and continues through halfway the 19th century (Enlarged advertisement of Harris achromatic telescopes from Mulready 'The envelope select advertiser', No. 1 30th May 1840, sold at a reduced price of 8d per dozen).



Enlarged advertisement with a reflector in the emblem, from postal stationery with advertisements 'The Anglo-Colonial Letter Company, 12th London Issue, Nov 21st 1889'.



The second half of the 19th century sees a come-back of the reflector. In the 20th century the reflectors become bigger and bigger, for more light. Between 1917 and 1948 the reflector of Mount Wilson (254cm) is the largest. In 1948 the Hale-telescope on Mount Palomar (508cm) sees first light.



In 1960 a Russian 266cm-reflector sees first light in the Crimea (the observatory has its own post office). In the USA Cerro Tololo (400cm) and Keck (multiple mirrors, aperture 900cm) start in 1974 and 1990 respectively. The Zelenchukskaja reflector in the Caucasus is the largest with a traditional single mirror (1976, 600cm).

4.1.3 recording of celestial bodies

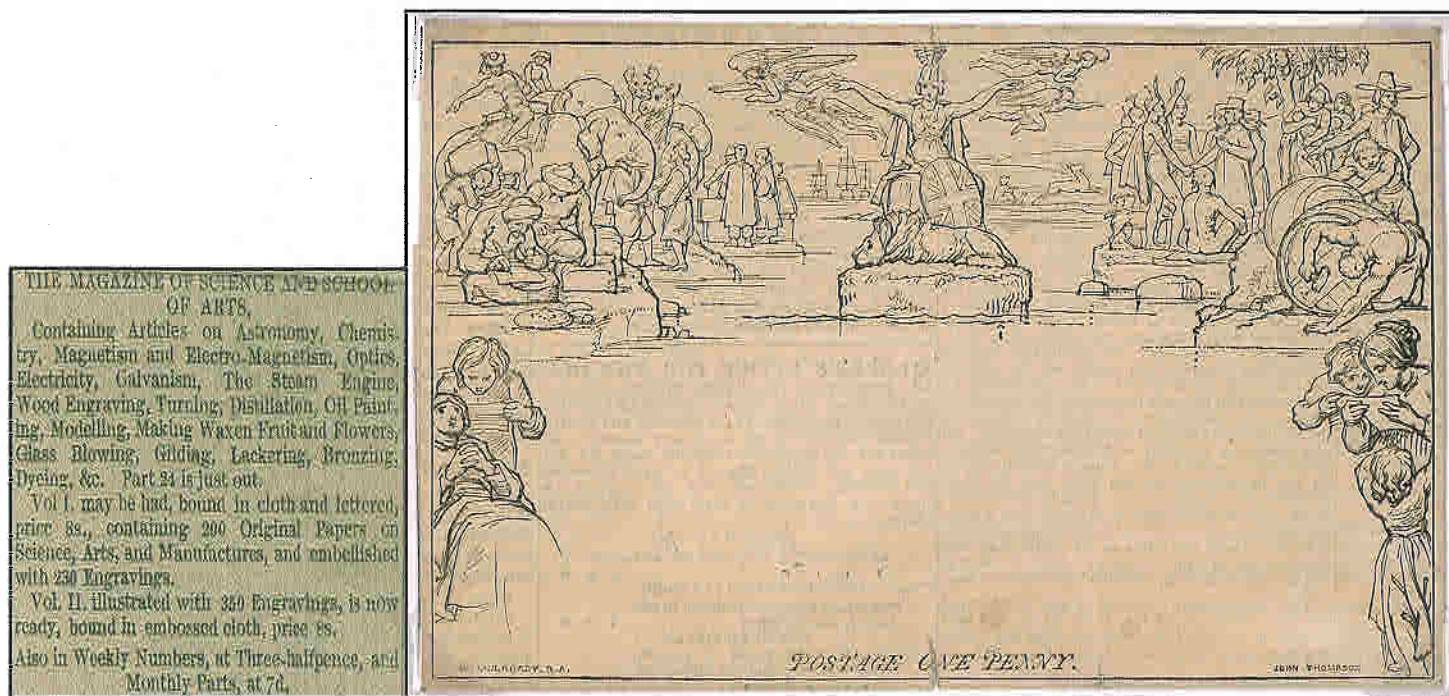


The 16th century sees the start of recording celestial bodies in printed atlases. On the work of De Vecchi and Copernicus Lyra (near Swan) is printed on Eagle. In 1801 Eagle has been left out in Bode's atlas. Bode's atlas is the first to show all stars - observable with the naked eye - in 99 constellations.

During the siege of Paris in 1870/71 the Prussians shoot the 28th balloon - Le Daguerre - down, but the crew manages to keep one postal bag out of their hands. The letters receive an arrival postmark of the end of November 1870 (copy of back).



Bode is the last to group stars in constellations. They have become too numerous. In 1839 photography brings relief. Arago presents the camera of Daguerre - the daguerrotype - to the academy of sciences.



Volume II of the 'Magazine of science and school of arts' contains a good illustrated two-part article "Process of the daguerrotype". One of the first articles on the subject. (Enlarged advertisement from Mulready 'Sloper's Commercial Postage Advertiser' No. 5 May 1841, sold at a reduced price of 10d per dozen).



In 1860 this letter is sent by the 'Arago' to France. The merchant steamship is built in 1855, two years after the death of Arago. It keeps the name until around 1863.



Even though the first picture of the Moon is no success, Arago - director of the observatory of Paris - recognizes it's value for astronomy. In 1845 Foucault produces the first daguerrotype of the Sun.

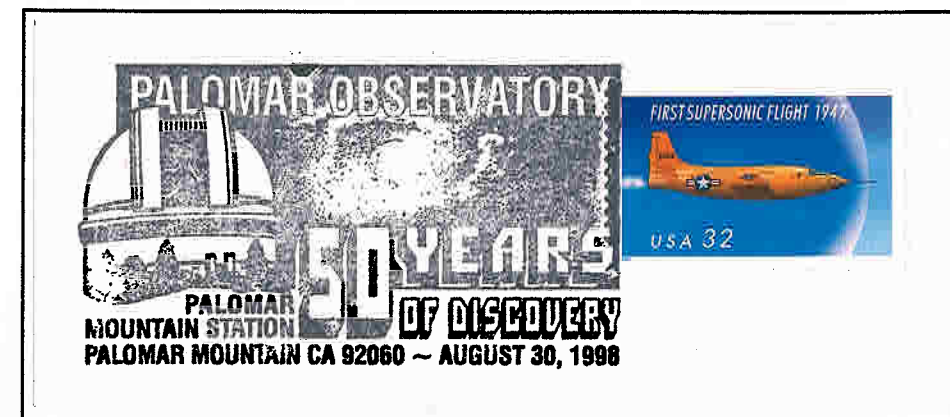


In line with this Paris becomes in 1887 headquarters of a world wide project to photograph the starry sky with 18 observatories: the Carte du Ciel. Every observatory has to make 22.000 photographs.



David Gill (official mail of Gill as Her Majesty's Astronomer at the Cape of Good Hope), is initiator of the project. Gill is a leader in the use of photography in the preparation of star catalogs and produces a photographic survey of the Southern Hemisphere. In 1877 he is on Ascension Island to measure the solar parallax.

4.1.3 recording of celestial bodies



In the fifties the production of Schmidt-cameras increases, e.g. for Uccle (Belgium, 1958, the stamp shows the camera). From 1960 onwards the biggest is in service in Tautenburg.

After Tautenburg, Palomar has the biggest Schmidt-camera. Between 1949 and 1956 the sky is being photographed and mapped with this camera.



Zeiss is one of the producers of the standard astrograph of the Carte du Ciel-project. With a multiple apochromatic lens chromatic aberration is almost eliminated. The Tessar-camera of Zeiss consists of four lenses, as can be seen in the eye of the eagle. In the thirties the Schmidt-camera supersedes the astrograph. The stamps have been perforated with the initials of Carl Zeiss.



The Schmidt-camera is capable of photographing big parts of the universe. It is developed by Bernard Schmidt, first photo is made in 1930.

In the same year a big Schmidt-camera is also being installed in the observatory of Elisabethville (Belgium Congo).

Telescopes not only are capable of photographing bigger parts of the sky, they also become faster. From 1947 onwards the observatory of Haute-Provence photographs variable stars with an electronic telescope.

4.2.1 the Sun and the Moon



In 1770 Euler calculates the distance to the Sun, center of the mechanism of our solar system: more than 151 million km. This is the first result within the current boundaries of 147 and 152 million km. In 1931 Spencer Jones, director of Cape observatory between 1923 and 1933, uses the parallax of Eros for a result of 149,6 million km.



Study of the Sun leads to the discovery of the sunspot cycles of eleven years (by Von Humboldt in 1851). The observatory of Zürich is known for its sunspot number or Wolf number, named after its director. In 1980 the observatory stops service, since then the observatory of Brussels determines the sunspot number.



Research of the corona (Mexican booklet with postal tax stamps of 1930) of the Sun reveals its composition and temperature. During eclipses with the Moon a red line emerges, a sign of hydrogen. Tacchini sets up an observation network for daily spectroscopic monitoring of the Sun.



Moon research has its revivals with new technology. In 1609 Galilei (portrait based on etching of Ottavio Leoni) discovers craters with a telescope and in 1647 Hevelius gives them names. In 1839 Bessel (*specimen*) uses an a-chromatic refractor for the first measurements of its formations.

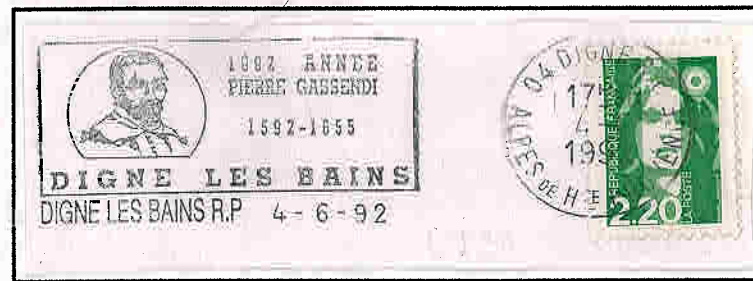


Director Schmidt of the in 1842 founded observatory of Athens also uses an a-chromatic refractor of Fraunhofer. He publishes an atlas of the Moon. In 1866 he reports the first serious observation of a later reputed change on the Moon.

4.2.2 inner planets



The inner planets Mercury and Venus orbit near the Sun. Based on the 18th century observations from the observatory of Vilnius - misperforation because of a crease in paper - the orbit of Mercury has been calculated. A century before her phases have been discovered and the transit before the Sun in 1631 has been predicted by Kepler. Gassendi observes the transit.



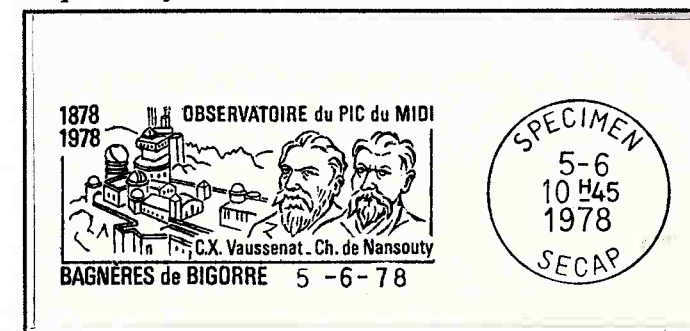
Venus is known for her beauty. During her transit of 1761 the Russian astronomer Lomonosov discovers the atmosphere of Venus. The atmosphere merely consists of vitriol.



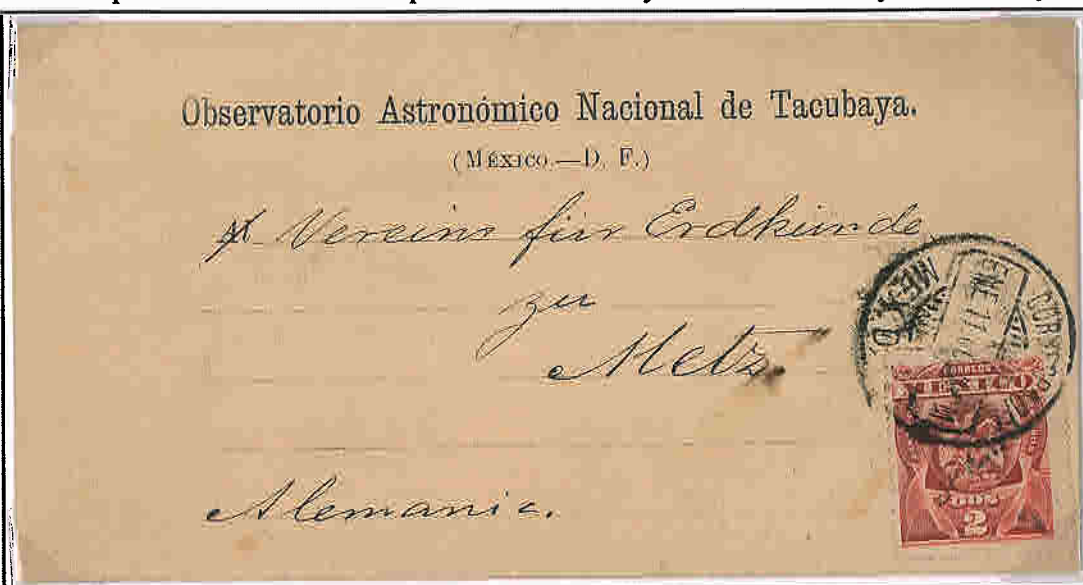
Her scarce transits (4 in 243 years) are used to measure the distance to the Sun by measuring the parallax. In 1769 Cook and Hell travel for their observations to the Pacific and the polar circle respectively. Euler observes the transit from Russia. The result: 151 million km.



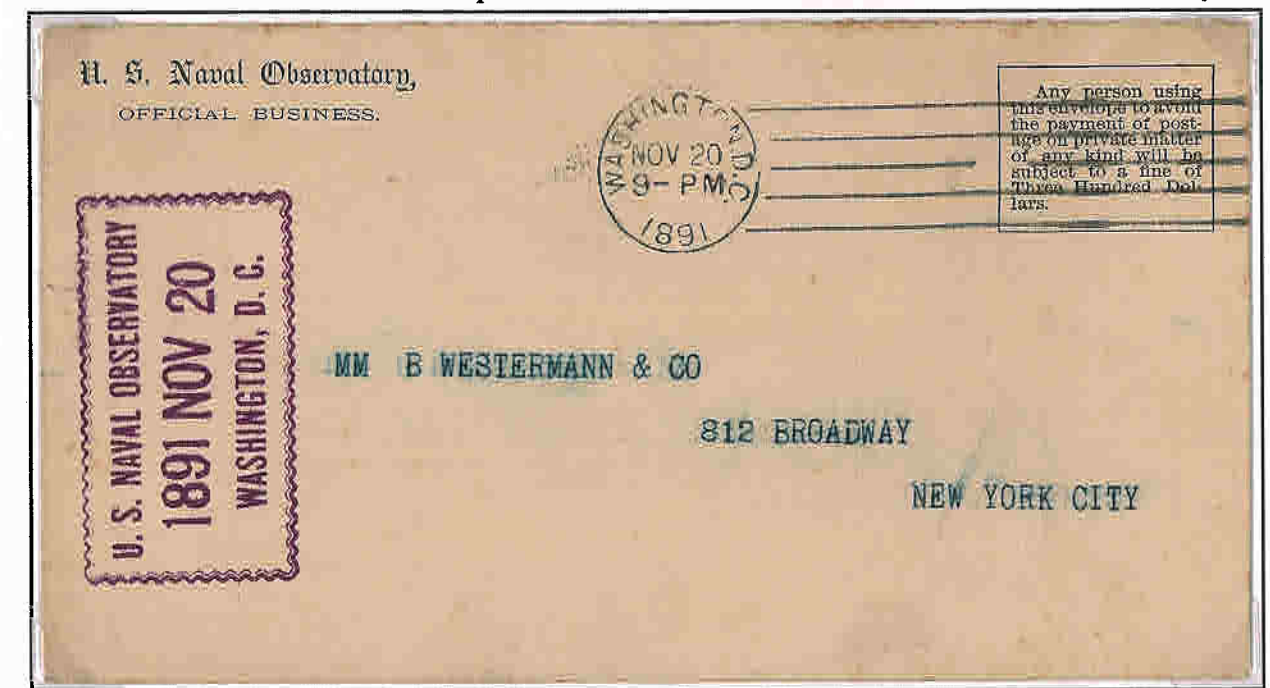
In the 19th century Le Verrier supposes a third inner planet, Vulcanus, because of discrepancies in the orbit of Mercury. Around 1930 the surface of Mercury is being mapped by Meudon, the rotation period is estimated at 88 days. Einstein has a new explanation for the discrepancies in Mercury's orbit: the theory of relativity. Vulcanus does not exist.



In 1878 the high location of the observatory of Pic du Midi is being selected for the favourable weather. However, it is the weather that prevents the observation of the Venus transit of 1882. Later the rotation period of Venus is determined from Pic du Midi: 243 days.



The first task of the national observatory of Mexico - that uses official stamps for the mail - is the observation of a Mercury transit in 1878, to be followed by a Venus transit in 1882. The Mercury transit of 1986 is the twelfth of the 20th century.

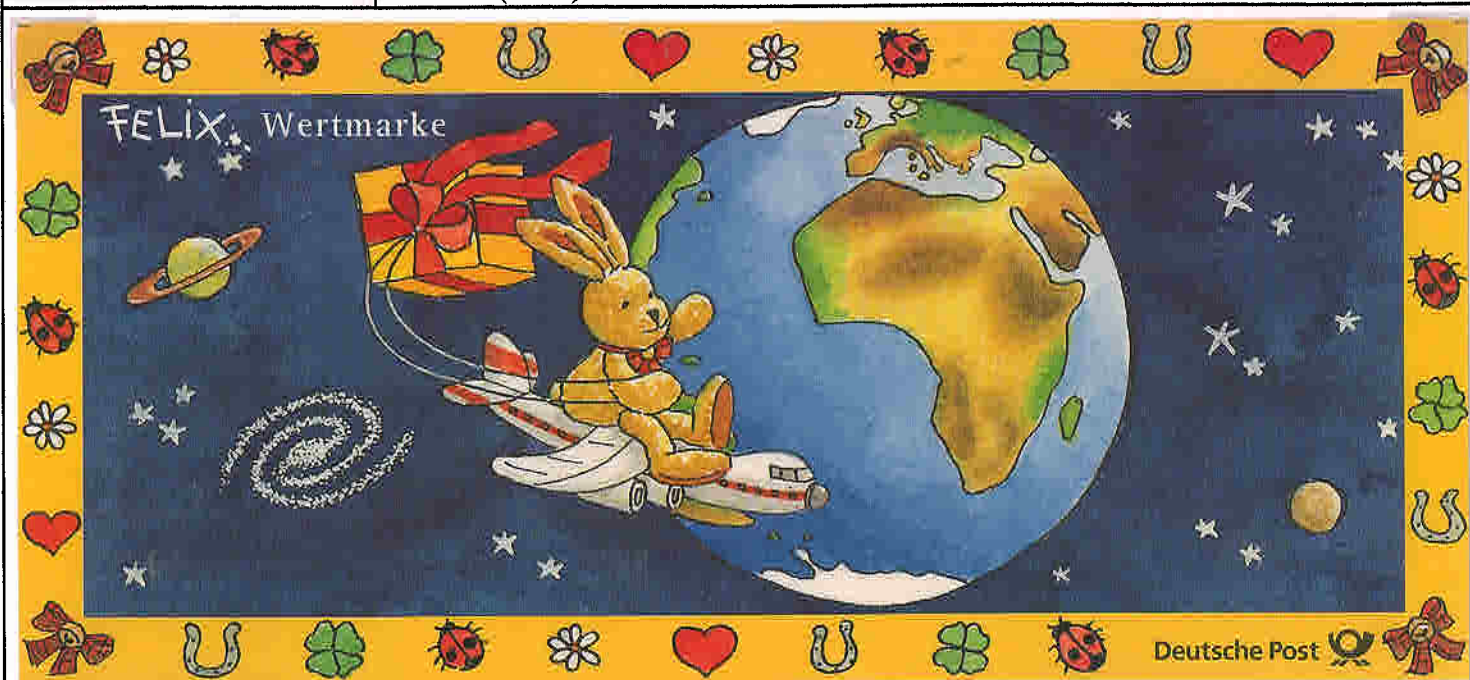


In 1874 and 1882 the U.S. Naval Observatory organizes expeditions to time the transit of Venus to determine the scale of the solar system. It watches the more common transits of Mercury (1868, 1878, 1881, 1891) as well, but the planet is too close to the Sun to measure the parallax.

4.2.3 outer planets



The outer planets stand further away from the Sun than Earth does. Mars, Jupiter and Saturn are known from times immemorial. From the 17th century onwards the telescope brings more details to light: Jupiter has four moons (1610), Saturn rings (1656) and the red planet Mars two moons (1877).



DOUANE/ZOLL CN 22
Peut être ouvert d'office (ancien/truher C-1)
Kann amtlich geöffnet werden

Bitte unbedingt ausfüllen!

Designation de la liasse du contenu
Genauere Bezeichnung des Inhalts

Valeur au douane
Zollwert
(préciser la monnaie)
(Währung angeben)

Poids net/Nettogewicht
Valeur totale
Gesamtwert

Caution
Geschänk

Echantillon commercial
Warenmuster

Je certifie que cet envoi ne contient aucun objet dangereux interdit par la réglementation postale. Signature
Ich versichere, daß diese Sendung keinen gefährlichen Gegenstand enthält, der nach den Postvorschriften verboten ist. Unterschrift

Höchstgewicht
2 kg

WELT

LUFTPOST
PAR AVION
PRIORITAIRE

Entgelt bezahlt
Port payé
Allemagne

Absender/Expéditeur

Empfänger/Destataire

Deutschland/Allemagne

Bestimmungsland/Pays de destination

Wertmarke für den Versand weltweit bitte hier abziehen und auf das dazugehörige PackSet kleben.

4 021777 014706

912-439-000

Because of its rings Saturn is the most striking planet of our solar system. As the most beautiful planet it can be found on many drawings of the universe, as on this German parcel stamp.



In 1846 Neptune is discovered because of discrepancies in the orbit of Uranus, the planet found by Herschel in 1781. Smaller bodies as planetoids, asteroids and comets also are discovered. The bloc has been used to indicate the contents of the package. It is annulated with a perforation.



Even though the observatory of Brussels (in 1890 moved to Uccle) has a tradition in discovering small celestial bodies, Pluto has not been recognized on a picture from 1927. Tombaugh recognizes the new planet in 1930. In the 'Planets Suite' of Gustav Holst from 1916 Pluto is not yet present.

4.3.1 mechanical planetariums



Around 250 B.C. Archimedes makes the first orrery, with moving Sun, Moon and planets. During the siege of Paris by the Prussians the balloon 'Archimedes' flies with 220 kg mail to Breda on the 21st November 1870.



Until the Renaissance a celestial globe composed of rings, an armillary sphere, is popular. Big armillaries, as Brahe's, are being used for observatories. Independently, the instrument is being developed in China as well.



In the 13th Century small educational armillaries become popular. Henry the Navigator (1394-1460) founds a research facility for navigation, including an observatory at Sagres. The armillary symbolises the importance of astronomical navigation.



In 1682 Christiaan Huygens designs an orrery. By applying the mathematical principles of continued fractions he is able to imitate the movements of the planets. Modern planetariums still apply this principle.



Almost a century later the Frisian Eisinga builds a huge clockwork - connected to the ceiling of the living room - to move the six planets in their elliptical orbits. The planets move in "realtime", Saturn for example goes in 29.5 years round the Sun.

So, nun wollen wir ins erste Stockwerk. Dieser erste Saal gilt der Astronomie, deswegen alle diese Planetarien, diese Modelle der Weltsysteme des Ptolemäus und Kopernikus. Uebersieht mir vor allem dieses Wunderwerk der modernen Mechanik nicht, das unser Mitbürger Christian Reithmann geschaffen: die astronomische Weltuhr! Und hier in den Nachbarsälen mögt ihr ein andermal länger verweilen, heute wollen wir durch diese Räume, wo die Instrumente der Geodäsie, Mechanik, Mathematik und Optik aufgestellt sind,

copy of part of advertisement (100%) reduced copy

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J. F. F. F. F.
Kostlose ärztliche Augen-Untersuchung in der Anstalt selbst.
Brillen od. Zwicker mit Gläsern schon von Mk. 1.- an.
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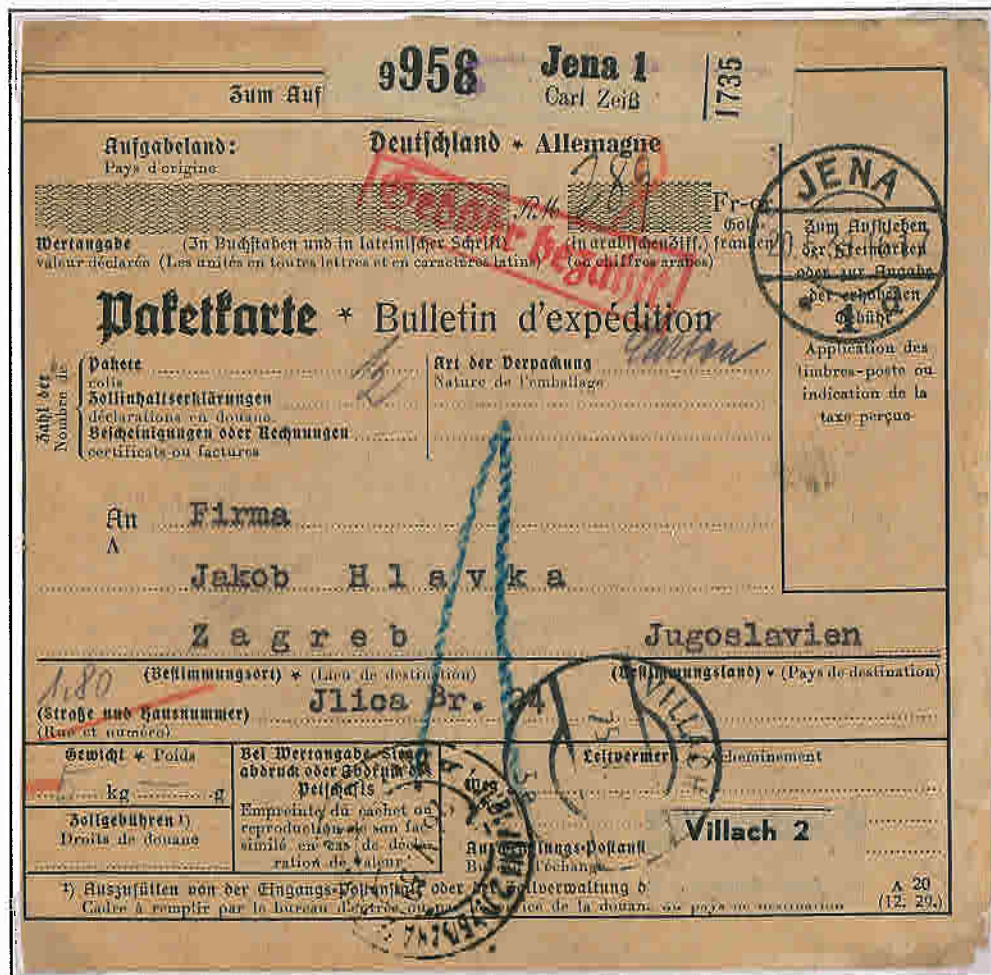
Kartenbrief
Für auswärts eine 5 Pfg.-Marke beikleben
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Edler Tyroler Kanzler-Feigen-Kaffee In das feinste Kaffee-verbesserungsmittel.
Rieschel's „Clack“ mit Rieschel's Original-Anastigmaten.
Auch bei trübem Licht brillante Bilder.
R. H. Rieschel, G. m. b. H., Optische Fabrik, München

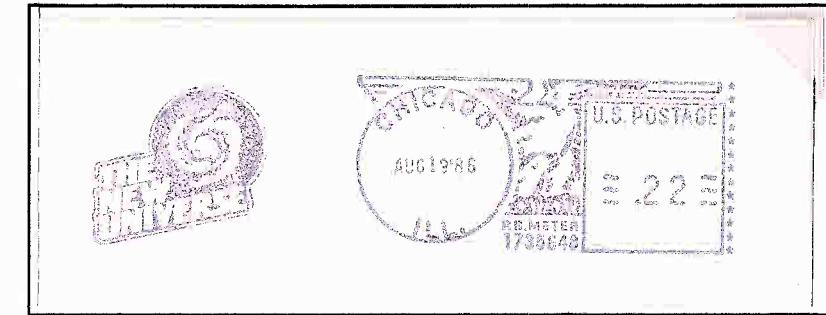
Im Deutschen Museum.
Wer geht mit ins Deutsche Museum? Wer hat Lust, die Meisterwerke der Naturwissenschaft und Technik zu betrachten? ...
So, nun wollen wir ins erste Stockwerk. Dieser erste Saal gilt der Astronomie, deswegen alle diese Planetarien, diese Modelle der Weltsysteme des Ptolemäus und Kopernikus. Uebersieht mir vor allem dieses Wunderwerk der modernen Mechanik nicht, das unser Mitbürger Christian Reithmann geschaffen: die astronomische Weltuhr! Und hier in den Nachbarsälen mögt ihr ein andermal länger verweilen, heute wollen wir durch diese Räume, wo die Instrumente der Geodäsie, Mechanik, Mathematik und Optik aufgestellt sind, ...

Around 1908 in the German museum in Munich (advertisement on Kartenbrief VIII, Munich) planetariums imitate the movements in the universal systems of Ptolemy and Copernicus. Around 1920 Zeiss builds the last big mechanical planetarium for the museum, to be followed by the first temporary projection planetarium.

4.3.2 electronic planetariums



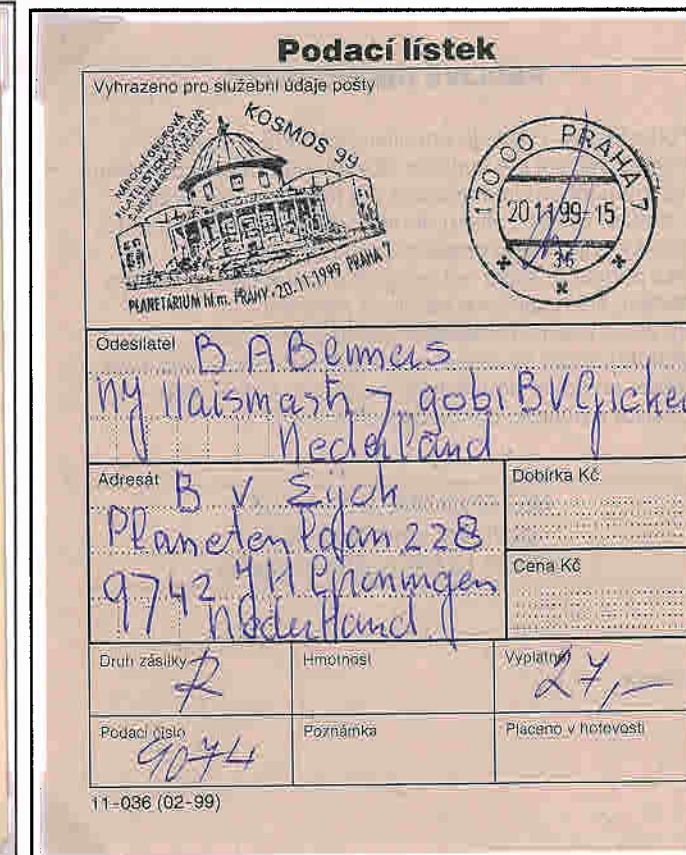
Carl Zeiss founds the optical works at Jena (*Selbstbucher-Paketzettel*). He becomes leader in the production of astronomical instruments and planetariums.



During the twenties many German cities want a Zeiss planetarium. Stuttgart opens in 1928, the twelfth German city. Two years later the first American city has a Zeiss-planetarium: the Adler-planetarium in Chicago.



In 1933 the Fels planetarium is the second American. In 1936 Spitz starts to work at the Fels planetarium and develops educational applications. He develops a simple and low-cost planetarium for schools: the Spitz Model A-1. Later he makes a bigger Model B, e.g. in use in the planetarium of Montevideo from 1955 onwards.



After the opening of the first projection planetarium of Zeiss in Munich in 1923 it returns to Jena for more testing. It is in use until 1926, to be replaced by Jena's permanent planetarium (*perfin CZ: Carl Zeiss*).

During the second world war many Zeiss planetariums are lost. After the war the Moscow planetarium from 1929 is the biggest (dome diameter 25m). The planetarium of Prague, open since 1960, is with a dome of 23.5 meter one of the biggest as well.

5.1.1 dreaming of cosmic flights



Gebruiksaanwijzing

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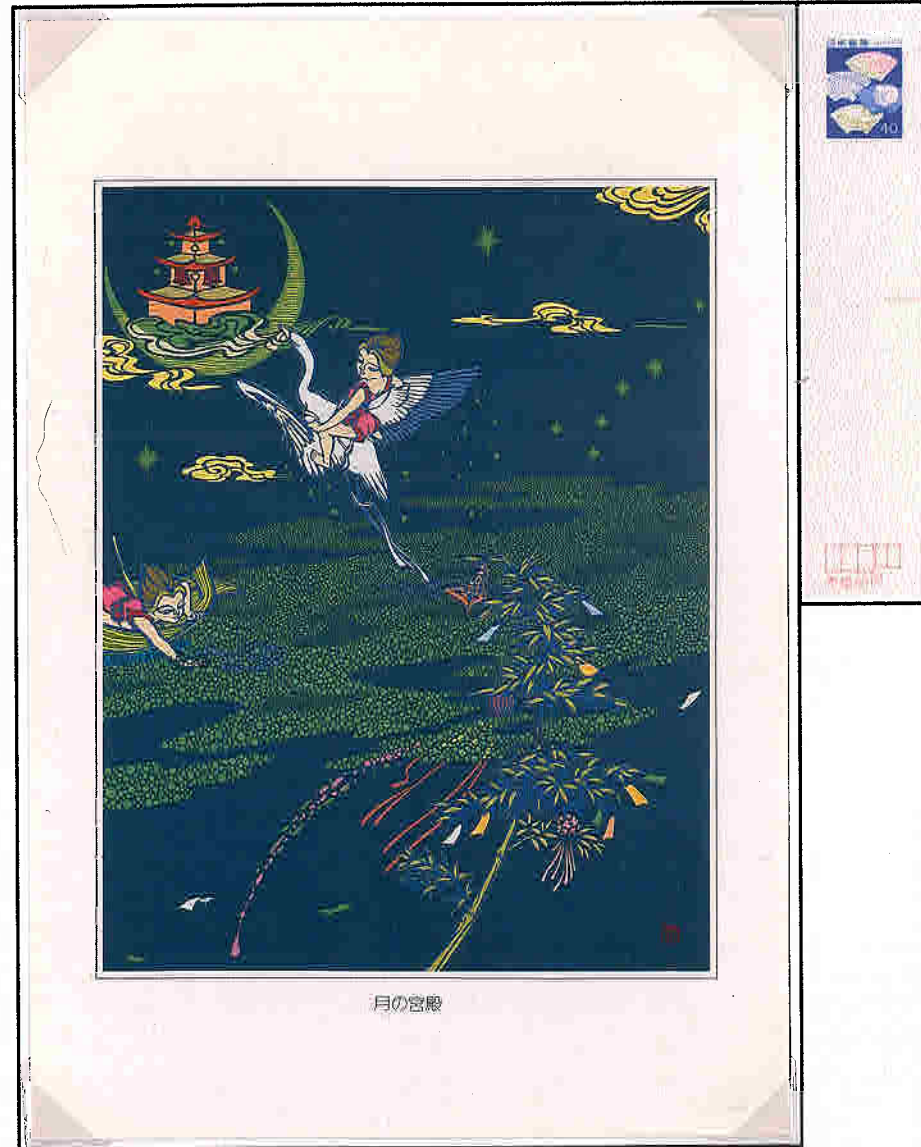
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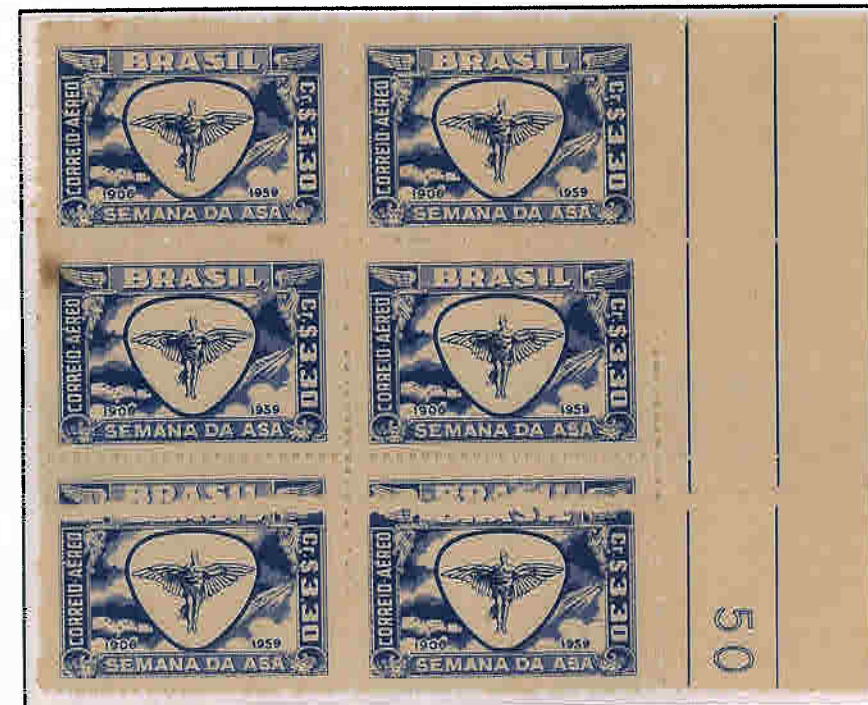
Binnen 3 weken ontvangt u de Aladdin-litho thuis

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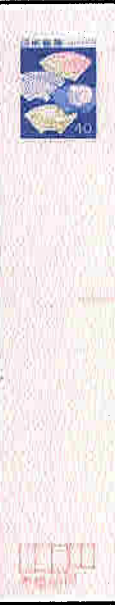
Deze aanbieding is geldig tot 30 april 1995.



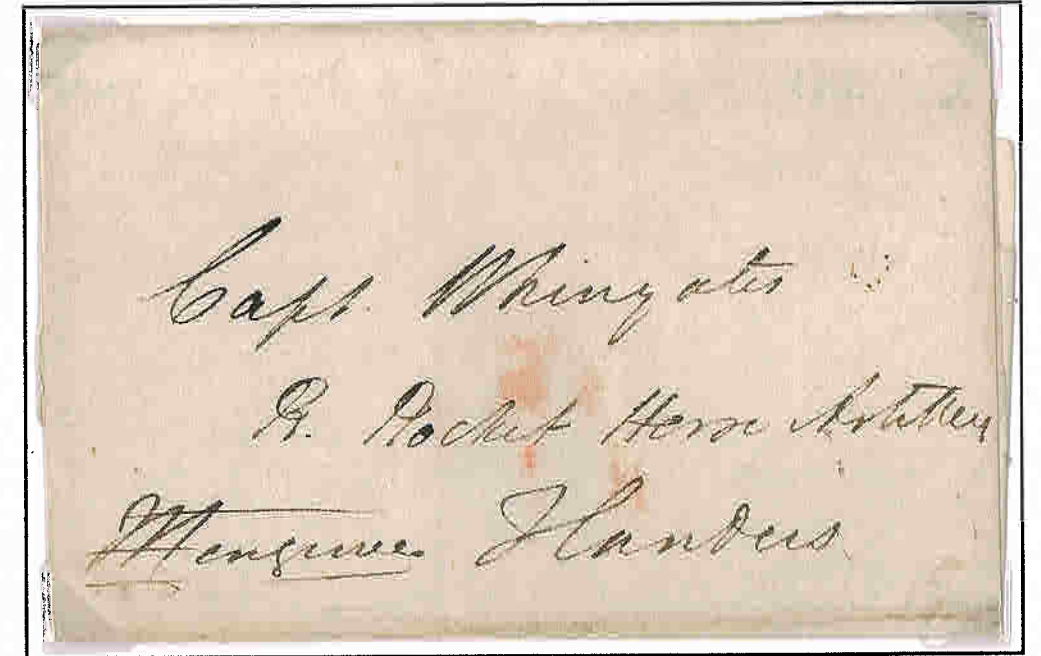
The wish to fly reflects the wish to go to the upper world. In Japan's oldest story Taketori-Monogatari princess Kaguya flies on a common crane back to the palace on the Moon.



In Greek mythology Icarus flies to the Sun by his own strength, but falls back to Earth when his stuck-on feathers (see the stuck-on paper transition) come loose because of the heat of the Sun.



A few decades after the first balloonflight (1783) Cayley defines the principles of mechanical flight, but the (steam)engine itself is too heavy. Between 1806 and 1817 Degen tries in vain to fly with a flapping machine, driven by human power.



Around 1800 - based on rockets developed in China from 1232 onwards - the British colonel Congreve makes rockets of 12kg with a reach of 2 km. He sends this letter, probably transported by an acquaintance, to the Royal Rocket Horse Artillery during flights in Flanders.



Around 1828-1840 'Golightly'-cartoons are published with horsemen on rocket flying machines. Such a cartoon is copied by the artist of this caricature Mulready (correctly taxed), issued by Mason. In 1898 Tsiolkovsky lays the foundation of his rocket theory.



Witches and magicians are the first humans who can withstand gravity. Their flying with broomstick and carpets shows their supposed great powers.

5.1.2 development of the military rocket



During the thirties in Germany development of rockets becomes a military affair. Between the artillery ranges of the testing ground at Kummersdorf the army secretly develops rockets. In 1936 lack of space and secrecy forces a move to Peenemünde.



Fear for bombings causes the production of the rocket to go underground (in the Harz mountains). Prisoners assemble the V-2 in Dora, part of camp Buchenwald. For secrecy their mail goes via Sangerhausen.



Von Braun is director of the research program that leaks out during the war. In 1943 the RAF bombs Peenemünde. Covered by the ruins the research program continues. The mail gets a pseudonym in the 'Briefstempel': Heimat Artillerie Park 11.



From the end of 1943 the V-2's are being tested operationally in Poland, out of reach of the British bombers. Ballistic tests take place at the Heidelager/Blizna SS-range.

5.1.2 development of the military rocket



Parallel to the V-2 the Germans also develop a flying bomb with a rocket engine: the V-1. In June 1944 the 155th Flakregiment 'Wachtel' starts the V-1 offensive against London. From 27 January 1944 onwards Briefstempel L49503 is being used by Kommando Wachtel.



The sound of the Argus As 109-014 engine gives the V-1 the nickname Buzz-bomb. Contrary to the V-2, the V-1 can be intercepted during the flight.



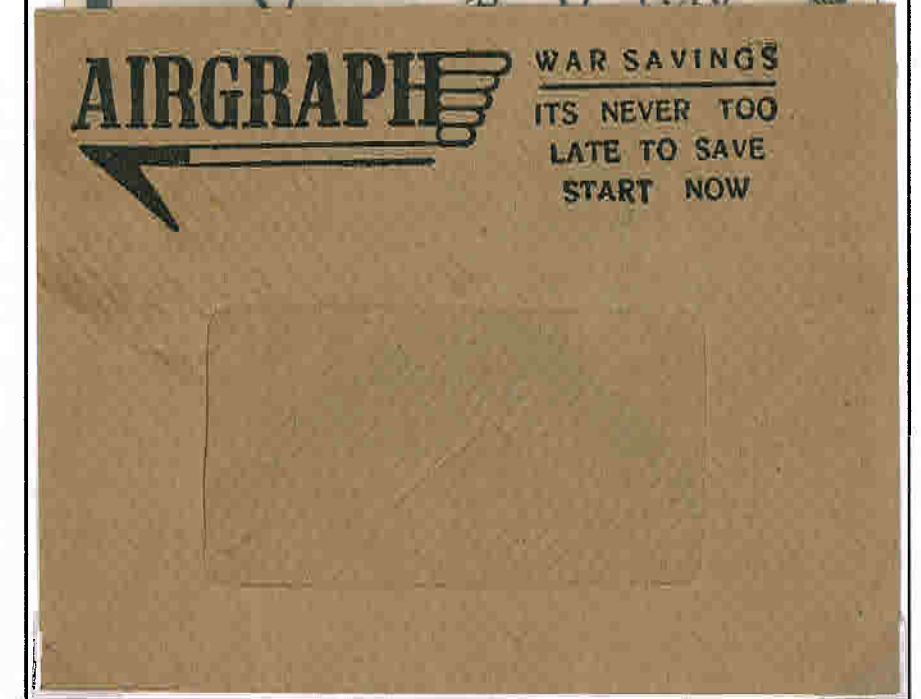
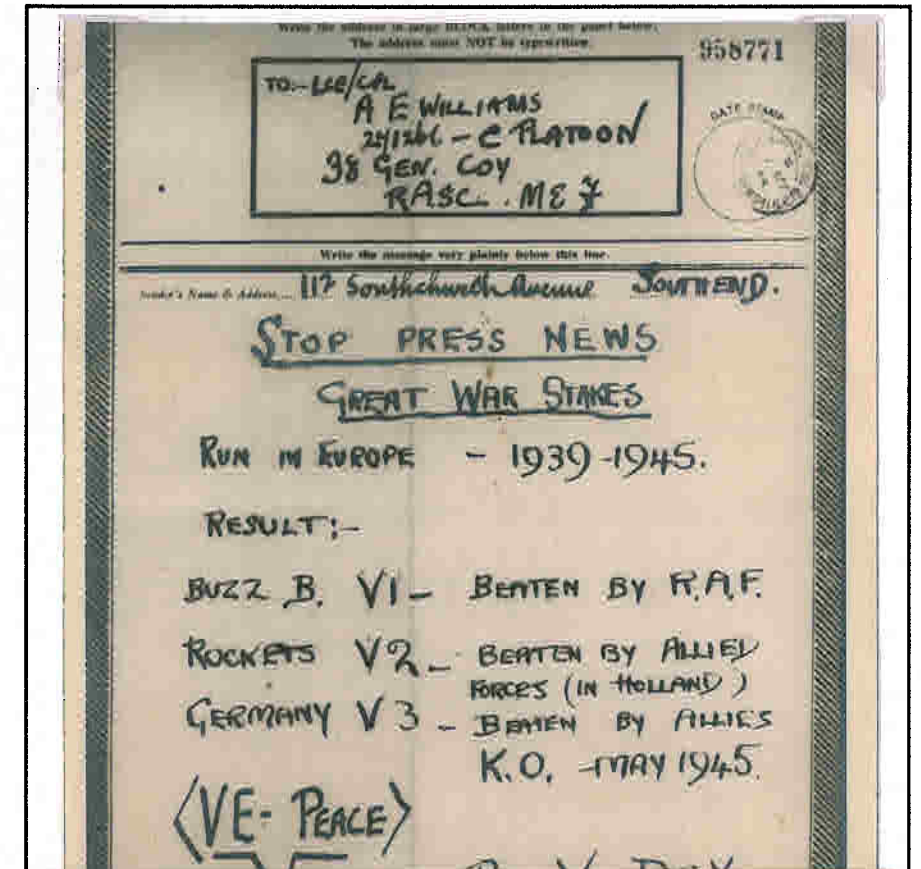
The attacks with the V-1 and V-2 cause a lot of terror and pain, but cannot defeat the allies.



On the 8th march 1945 a V-1 hits the "8 Base Army Post Office" in Antwerp and probably damages the newly installed (on the 10th of February) stampmachine. On the 29th of March the machine is taken out of service.



At Marquise another V-weapon is being developed: the V-3 "the London Cannon". In April and May 1944 Marquise is heavily hit by RAF-bombers. The cannon will never be used.



At the end of the war the weapons have been defeated. Both the American and the Russian forces now focus on the available scientific research material of the German rocket scientists.

5.1.3 flying into space



After the second world war the leader of the Russian rocket development Korolev studies the German V-2's. He designs the combustion engine for the Sputnik-rocket. To have more power the engines are being combined as with the Proton-rocket (20 RD107-engines).



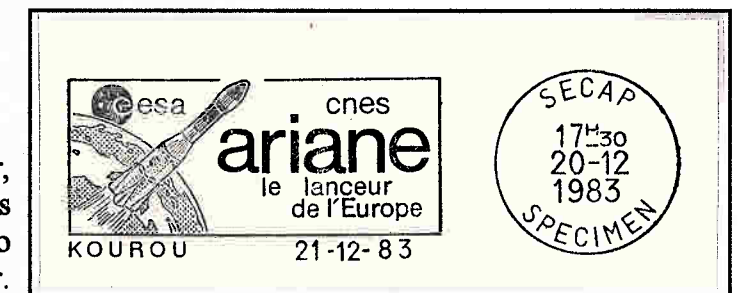
The Americans test the V-2's extensively at Fort Bliss. To have more power they not only combine powerful engines, they also try atomic propulsion in the sixties. This works for satellites, e.g. the SNAP-ionengine, but does not for boosters.



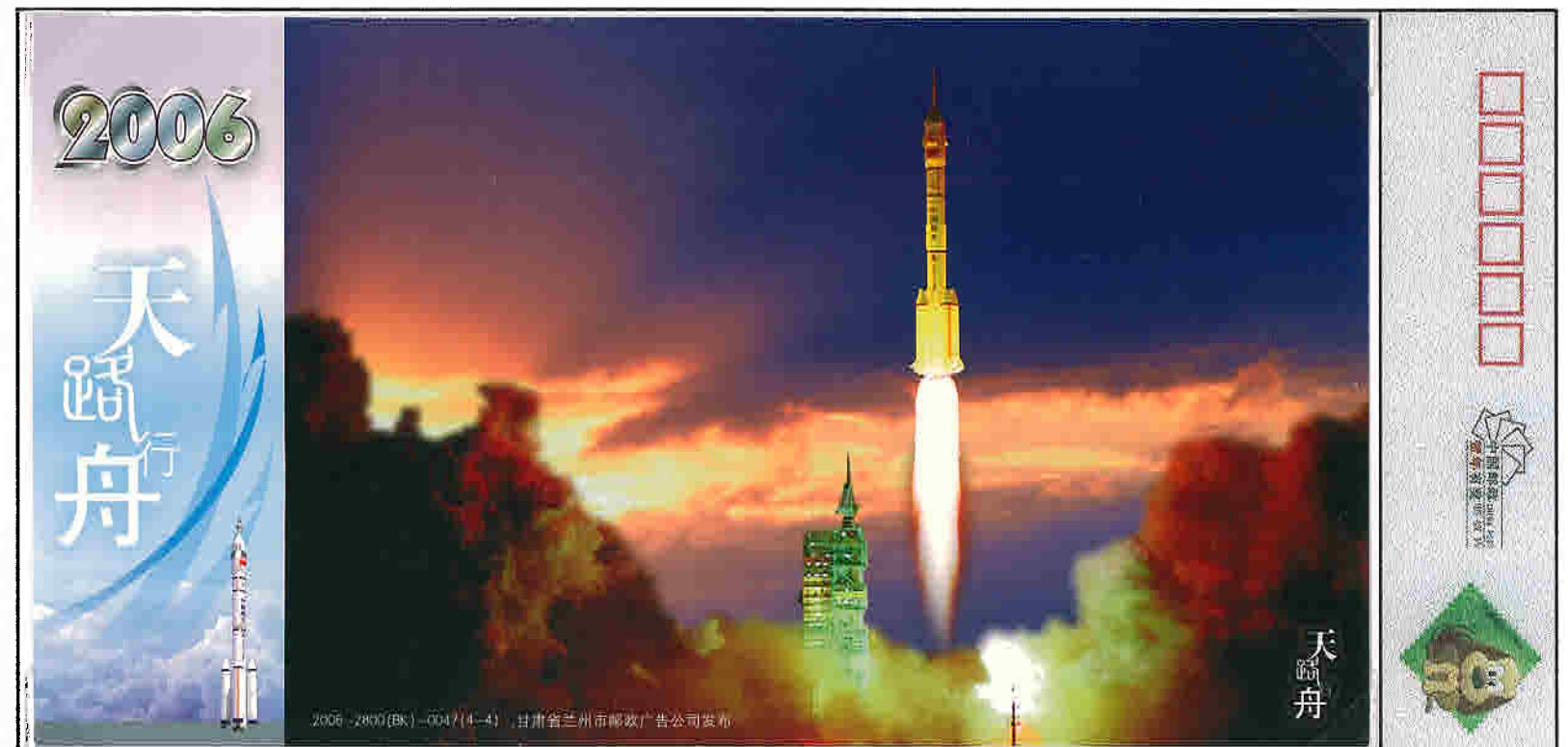
The Germans are forced to stop their rocket development. But the rockets have made a huge impact and symbolize innovation. The fountain pen 'Rakete' looks like a rocket and goes along with 'Columbus' (postal cheque envelope with advertisement on the back, 1947).



The French use bases in Algeria for their rocket development of Véronique rockets. In 1955, the C.I.E.E.S. is already testing at Colomb-Bechar for eight years. In 1963 a Véronique rocket launches the first cat into space. Félix returns by parachute.

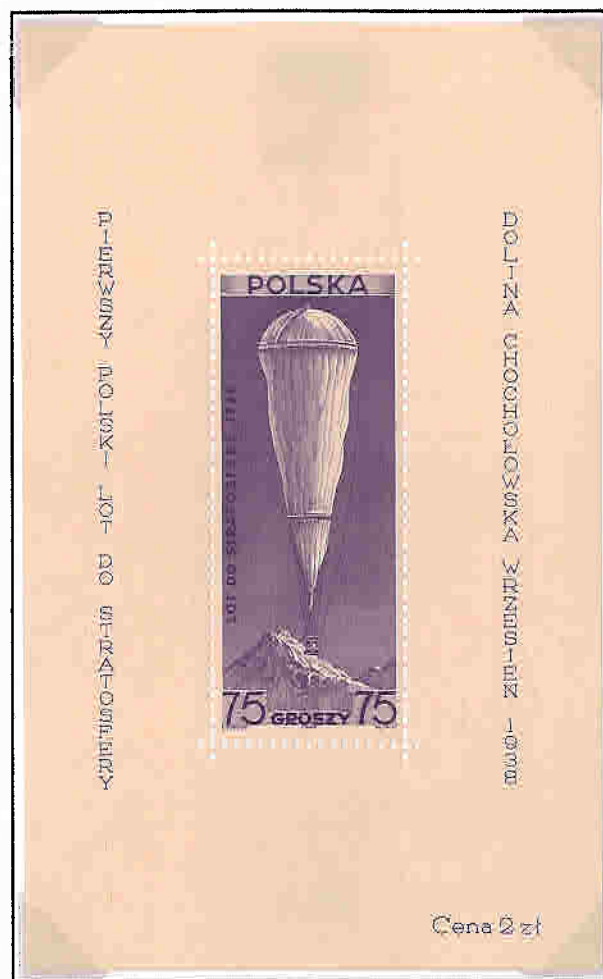
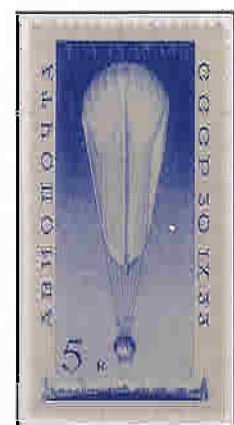


The French experience is used for the first European booster, launched in 1979: Ariane (specimen-postmark). The rocket takes off from Kourou (French Guyana) because it costs less energy to enter space from around the equator.



The Chinese space program uses Long March boosters. In 1992 the Shenzhou program, the second Chinese manned space program, starts. In 2003 and 2005: the Shenzhou 5 and 6 complete the first Chinese manned space missions.

5.2.1 past the filter of the atmosphere



This Polish bloc has been sold with a surcharge of 166% on behalf of the first Polish stratosphere flight.



Unhindered by the atmosphere the Hubble Space Telescope (HST) peers further into space than ever before. So, HST has photographed the aftermath of a 100 million year old cosmic collision of the NGC 1316 with a smaller galaxy. HST helps us to understand the past.



Stamp from 'hanging booklet'.

In 1931 Piccard measures cosmic radiation in the stratosphere for the first time at a height of 16 km. In 1933, after the SSR-1 rises to 19 km, the Americans study at 22 km with the Explorer II. In 1938 Poland follows, the German invasion prevents a second Polish flight in 1939.



After 1945, research continues with rockets and satellites. In 1958 Explorer I measures a lot of energy in the outer layers of the atmosphere: the Van Allen-belts. In the sixties the ionosphere is studied for the transmission of low frequency waves (FR1, reproduced on the colour proof with rings) and high frequency waves (official mail of German headquarters for telecommunication).

hoogtepunten uit de 20e eeuw

Een kaart of brief kunt u sturen om allerlei redenen. Maar ook zomaar. Om uw brief of kaart te laten opvallen zijn deze postzegels met afbeeldingen van de hoogtepunten uit de 20e eeuw bijzonder geschikt. Onderwerpen zoals de Afsluitdijk (1932), de Bevrijding (1945) maar ook het EK-voetbal (1988) zijn hoogtepunten die deze eeuw kenmerken.

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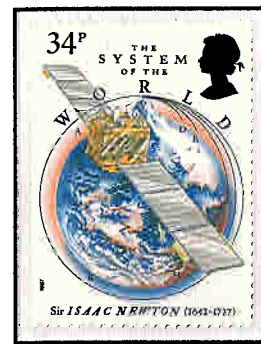
Heeft u regelmatig veel postzegels nodig? Dan kunt u ze ook thuis laten bezorgen. Bel voor meer informatie PTT Post Klantenservice Particulieren, 0800-0417 (gratis). Voor andere vragen over postzaken kunt u ook dit gratis nummer bellen.

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In 1983 Exosat locates cosmic sources of X-ray radiation. The radiation is unable to penetrate the atmosphere to reach earth. In 1974 ANS uses a UV-telescope and two X-ray sensors to study young hot stars.

5.2.2 investigation of space



Following Newton's introduction of an artificial moon (in Principia, 1687) to explain the orbit of the real moon, Hale describes it in 'The Brick Moon' (1869). The 'Brick Moon' supports navigation at sea. Hale does not describe how he gets his moon into orbit.



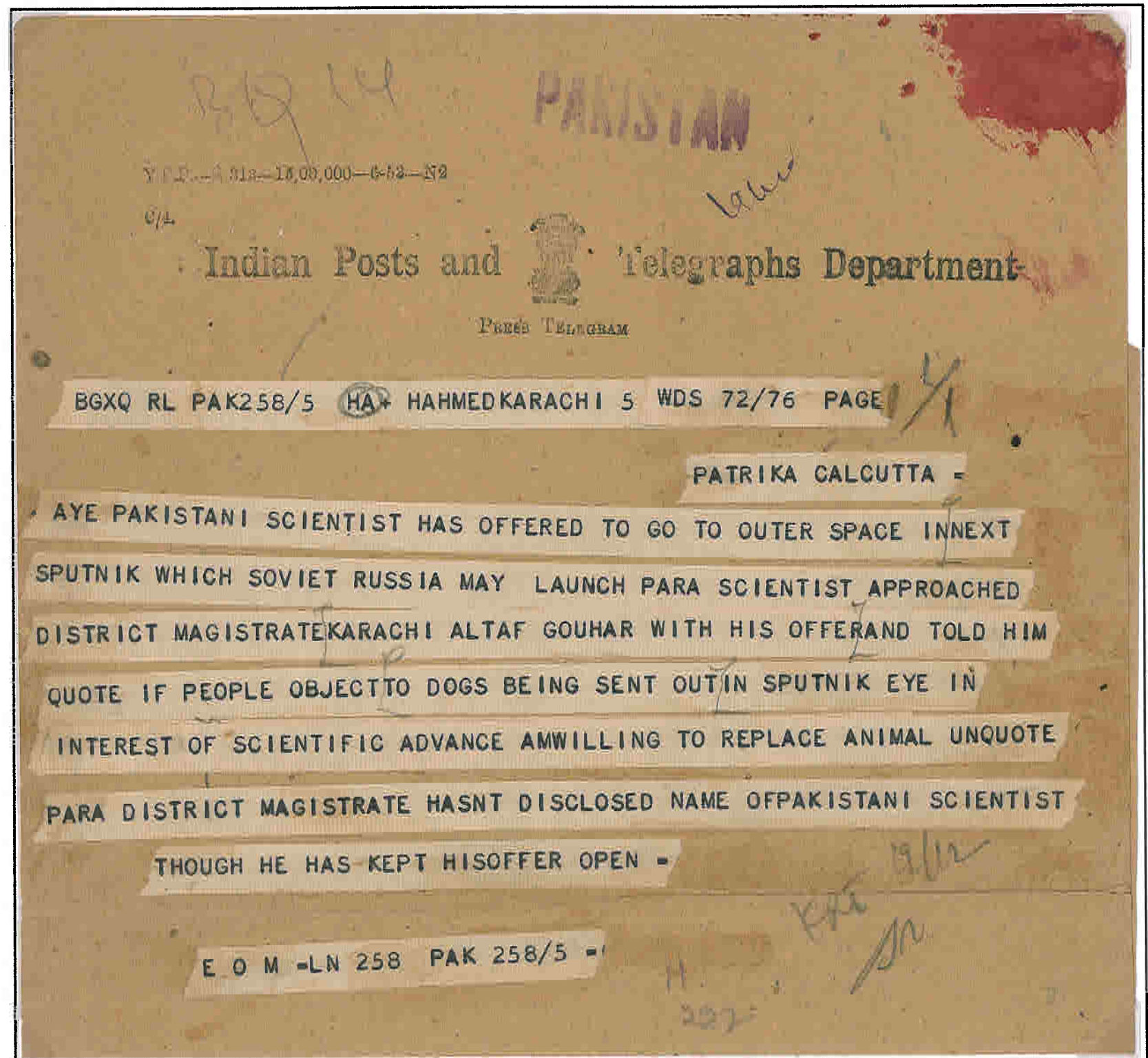
In 1911 Tsiolkovsky describes how a rocket becomes a satellite. Although rockets have sufficient power in 1957, there is no Russian first rocket launch on 17th September (100th birthday of Tsiolkovsky). Till then the Americans think they are 'first in rocket power'.



17 days later the first satellite, the Sputnik, is launched. Immediately the Sputnik, a ball of 83 kg, becomes symbol of Russian technological superiority. During three months this first explorer in space orbits around earth, until it burns in the atmosphere.



For the International Geophysical Year (1957-8) a first launch of a satellite is expected from 1955 onwards. Italy even issues a stamp in 1956. However, the Sputnik surprises, possibly because the booster is transported at the last moment.

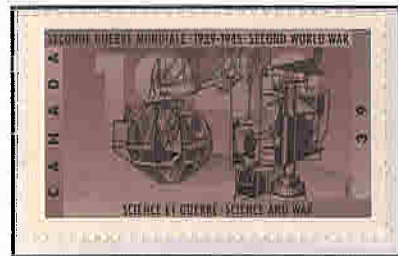


After the Sputnik the next step of exploration is the launching of a vertebrate. The telegram contains a news item concerning an offer from a Pakistani scientist: "If people object to dogs being sent out in Sputnik, I in interest of scientific advance am willing to replace animal".

5.2.2 investigation of space



Shortly after the Sputnik a second launch follows with the dog Laika (as laboratory animal). The flight shows that a vertebrate can stand weightlessness. Another worry for human space travel is the effect of cosmic radiation, and solar radiation particularly.



Cosmonauts receive a lot of medical attention: before (the simulation of pressure in a centrifuge), during (measurements during long weightlessness) and after the flight (cosmonaut Tereshkova with her baby Jelena).



In the 17th century Kepler discovers the first obstacle for space flight: space has no atmosphere. In dream flights to the upperworld - as the flight of Icarus (to the sun) and Faustus (failed flight to heaven in the 16th century) - the obstacle is not present yet.

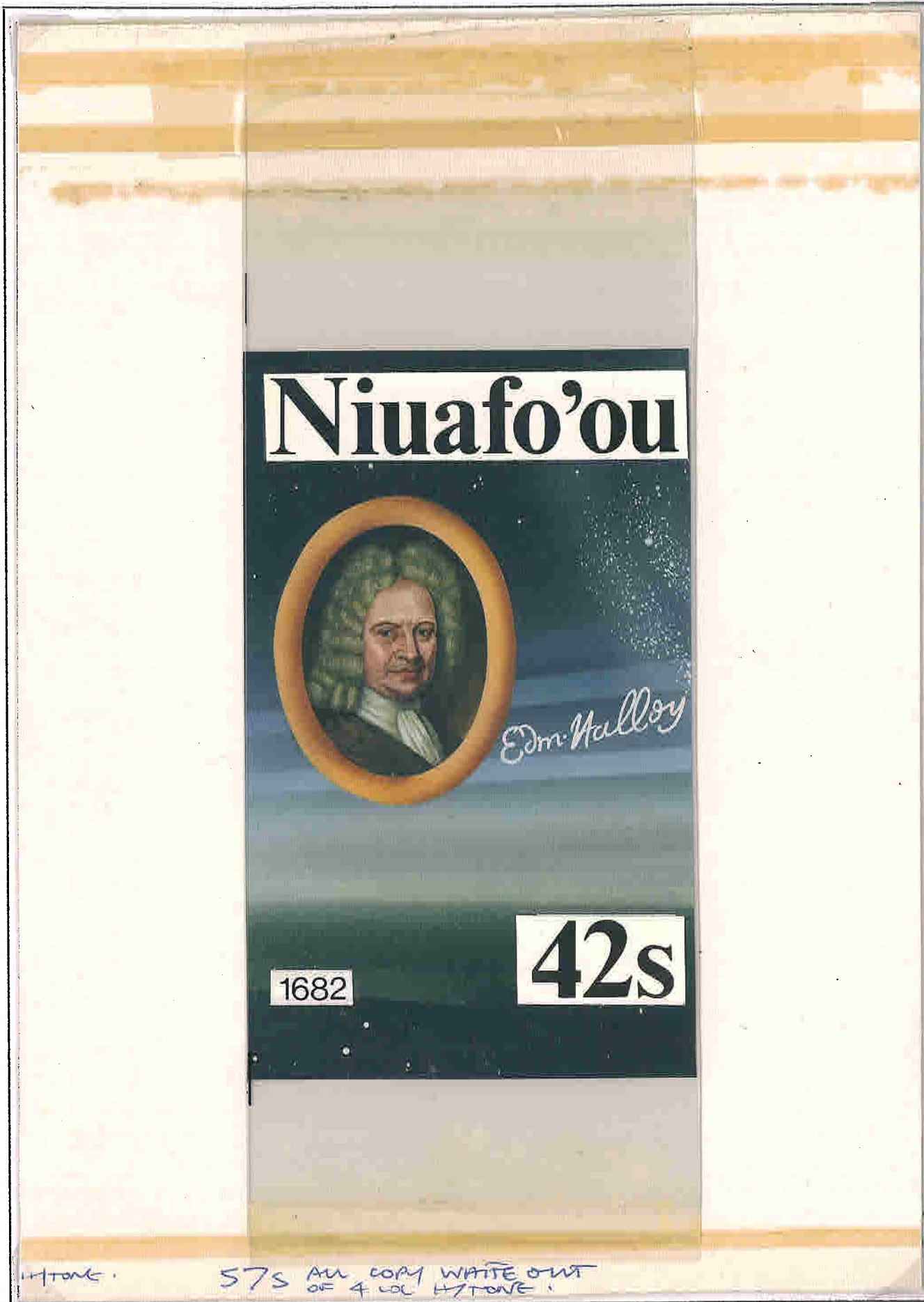


The name of the first space traveller (missing portrait on Bulgarian proof) is revealed after the flight: Gagarin. He is the first person - apart from heads of state - to be pictured on stamps during his life time. In 1961 he makes the first space flight (Rumanian postal stationery, sold for 1 Lei with card inside, 1961). Tereshkova is the first woman in space.



Cosmonauts receive a lot of mail because of their fame. In the Soviet-Union a separate unit of the ministry of defense prepares their answers. The franking machine K-160 is of the ministry of defense.

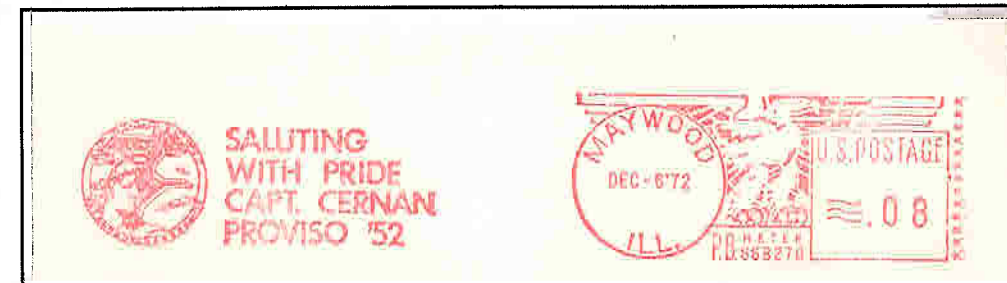
5.2.3 visiting celestial bodies



One of the most famous celestial bodies has been named after Edmund Halley (1656-1743). In 1682 he discovers a comet (*the stamp design refers to this*) and predicts its return in 1758. Halley's comet is being heated by the sun once in 76 years only, so it is a body in a very original state.



In 1986 the comet can be visited in space for the first time. Space probe Giotto (*also on the color proof on the right*) takes color pictures of its nucleus. Spectral analysis is used to identify the chemical elements and processes, to have a better understanding of the creation of our solar system.



In 1969, during the first visit to the moon 22 kilogram of material has been collected for research. Only at the last visit so far (the Apollo 17, 11th December 1972) the first geologist, Schmidt, goes along. On the moon he finds - supported by Cernan - orange dust of 3.7 billion years old.



The Russian Luna 2 is the first man-made object to reach another planet in 1959. Mars 3 lands on Mars in 1971 to send the first information from its surface. Three years later the American Mariner 10 is the first to visit Mercury, using a gravity assist from Venus. Voyager 2 takes off in 1977 to fly by Jupiter (1979), Saturn (1981), Uranus (1986), and Neptune (1989).

5.3.1 stationary satellites



Viewed from Earth geostationary satellites do not move. In 1929 Potocnik is the first to describe such a satellite. In 1945 Clarke describes worldwide communication using three geostationary satellites.



Syncom II is the first geostationary communication satellite. As on the French omnibus-series: it hovers continuously over one position on the surface. Later, Intelsat-satellites realize - hanging above the three oceans - Clark's network.

Gebruiksaanwijzing

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Antwoordnummer 3283, 3000 WB Rotterdam.

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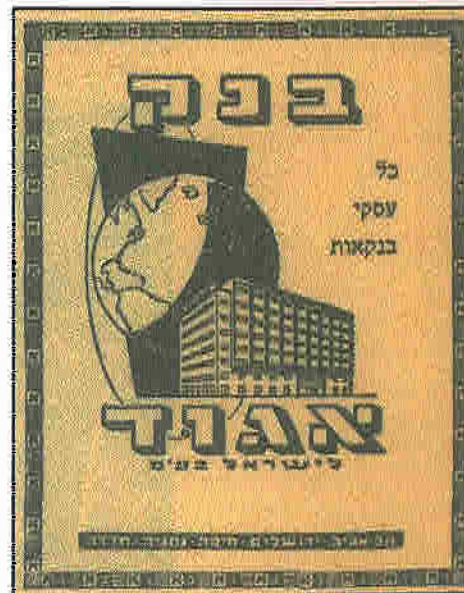
AANTAL PERSONEN: _____

NIET GELDIG IN KOMBINATIE MET ANDERE KORTINGSAKTIES

Na ontvangst van uw betaling zenden wij u de toegangsbewijzen en een informatiefolder.

De door u bestelde kaarten zijn geldig t/m 30 juni 1996.

Euromast-Rotterdam - Parkade - tel. 010 - 436 48 11



A geostationary satellite has an orbit of 36.000km high. The lower stationary orbit in the Euromast of Rotterdam (launching at 110m high, orbit at 185m, advertisement on the back of Dutch parcel stamp) is an exception.



מכיל: 10 גלויות במחיר 50 פרוטה בל אחת



Predecessors of the Intelsats are Echo (1960: reflection of signals) and Telstar (first transatlantic video-connection in 1962). Low flying satellites as Telstar are in view of satellite tracking stations for a few minutes only. Cross-gutter from a printer's sheet.

The impact of the satellites is big. They symbolize progress, their communications become more and more important. The United Bank of Israel uses this in an advertisement in an Israeli postal stationery booklet.

5.3.1 stationary satellites

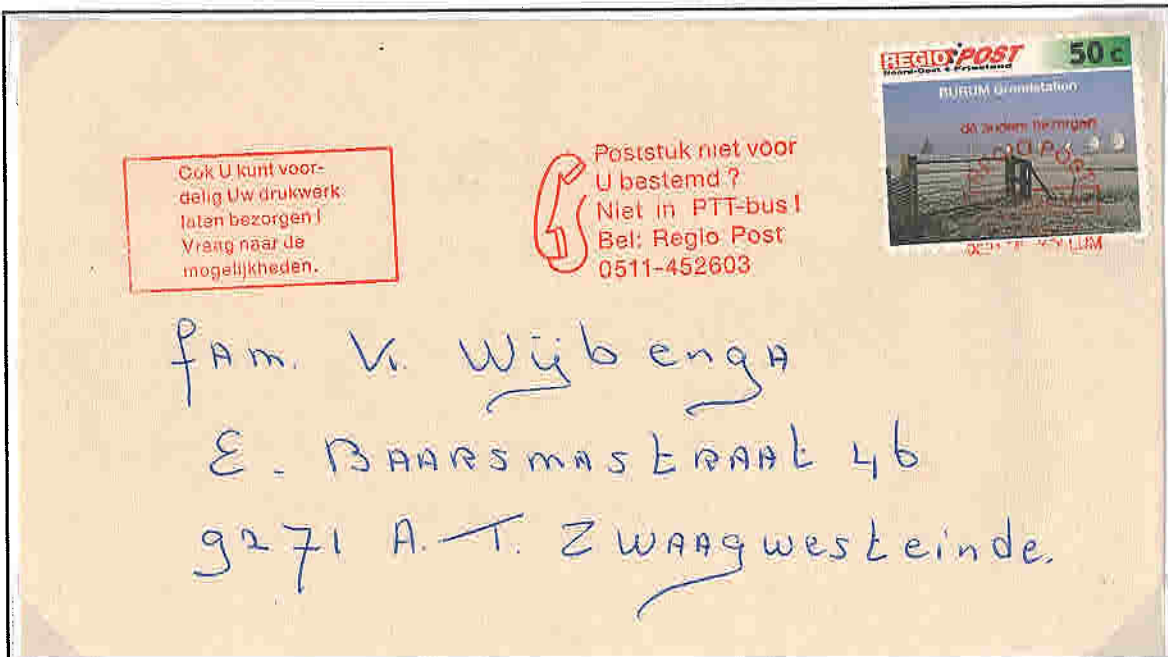


SOCIETE EUROPEENNE DES SATELLITES S.A.

L-6815 Château de Betzdorf, G.-D. of Luxembourg



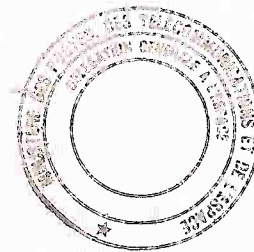
The public concern of communication satellites is such that in France space and communications are part of the same ministerial portfolio (see the letter on the right). However, the commerce advances. In 1962/1963 already the Telstars are sponsored (by AT&T). The Astra's (1988) even are completely private property.



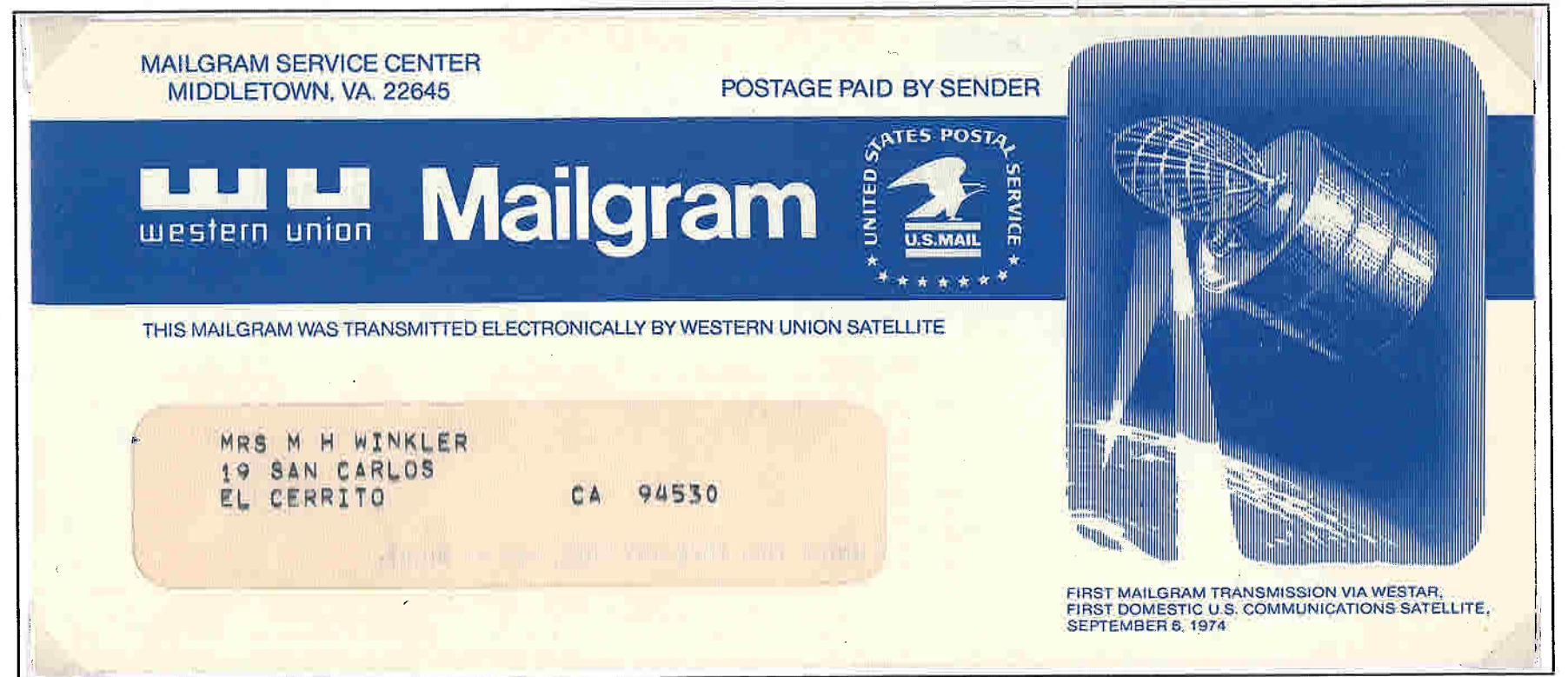
In 1980 Inmarsat starts as an intergovernmental organization for communication at sea. In 1999 four satellites provide the connections for the (by then) private enterprise. The groundstation Burum (KPN) communicates with three of them.

MINISTÈRE DES POSTES,
DES TÉLÉCOMMUNICATIONS ET DE L'ESPACE

Le Ministre

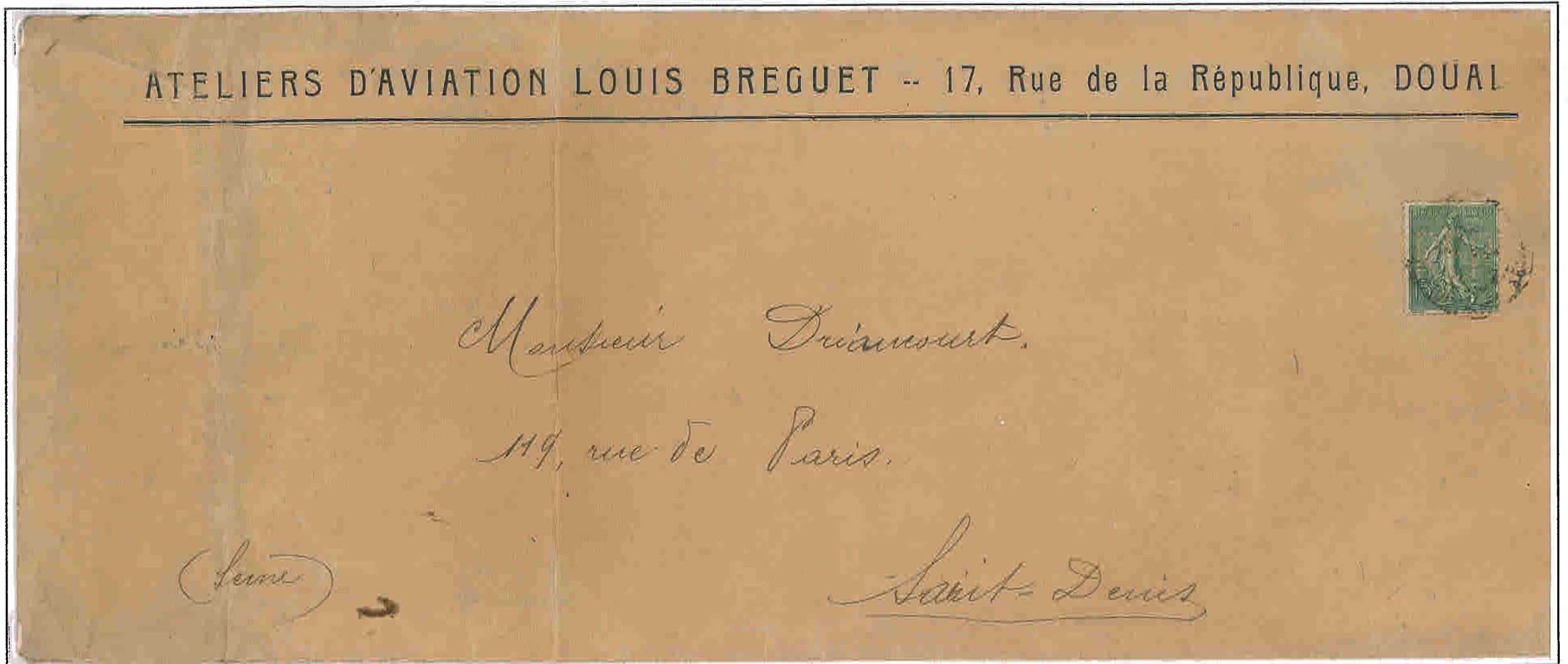
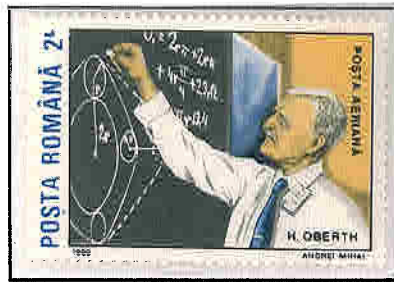


Monsieur Jean-Louis LAFON
BERTIN
B.P. 3
78373 PLAISIR CEDEX



The first completely private satellite is the Westar 1. In 1974 this satellite of Western Union starts to provide connections on the American continent. *Electronic mailgrams can be sent.*

5.3.2 space stations for a longer stay



In 1929 Potocnik creates the first detailed technical drawings of a space station. He elaborates the concept of a 'space station', introduced by Oberth six years before. Oberth suggests rotation to produce an artificial gravity, so many stations have a wheelshaped design. In 1927 he receives the REP-Hirsch-prize for his pioneer work on space travel. REP are the initials of Robert Esnault Pelterie, a french aviation pioneer (see *perfin REP* on cover of aviation pioneer Breguet), who begins work on the theoretical aspects of spaceflight as early as 1907.

Astro Sales

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and the Universe Can Be Yours



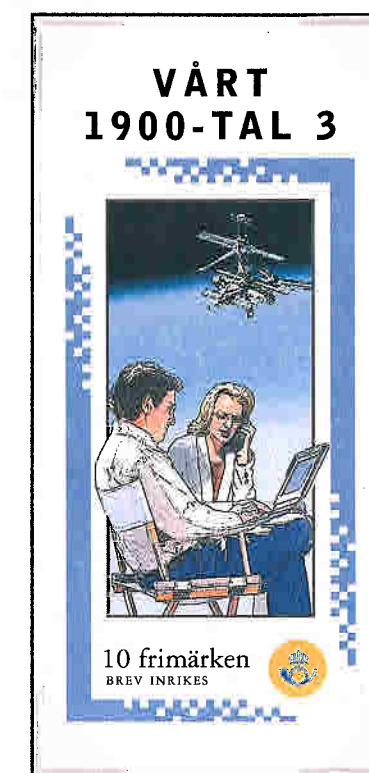
The hologram shows a utopian wheelshaped space station, visited by a space shuttle. The idea to go to the stars with space ships, launched from space stations is utopian still. The text 'Reach for the Stars and the Universe Can be Yours' is printed by the U.S. postal services on request of Astro Sales. The Russians are first to develop a real space station.

First step is docking (Soyuz-3 with the Soyuz-2). Next is transfer (from the Soyuz-5 to the Soyuz-4). In 1971 the first real space station (Salyut-6) is in space. In 1978 the Salyut-6 (launched in 1977) is used by the crews of the Soyuz 26 and 27 - to return in each other's spacecraft.

5.3.2 space stations for a longer stay



In 1973-1974 Skylab - the American answer to the Salyut space stations - orbits Earth. Budget cuts and the defeat of U.S. technology in Viet-Nam stop a follow-up. Only a space shuttle can be developed. The Russians go on and launch the MIR in 1986. It looks like the Salyut-6, with six ports to dock modules. The Mir receives many international visitors. In 1999 the Slovak Bella is one of the last.



The advantage of the Space Shuttle is its possibility to be launched more than once. In 1981-1984 the transport- and landing system of the 'Columbia' is tested and approved four times before it carries the first satellites on 11th November 1982. *On this part of the printer's sheet the printer has given his approval.* In 1998 the combination of Russian and American knowledge and budgets results in the launching of the International Space Station (I.S.S.). Old spare parts of the MIR are being used in the I.S.S.

6.1.1 development of astrophysics



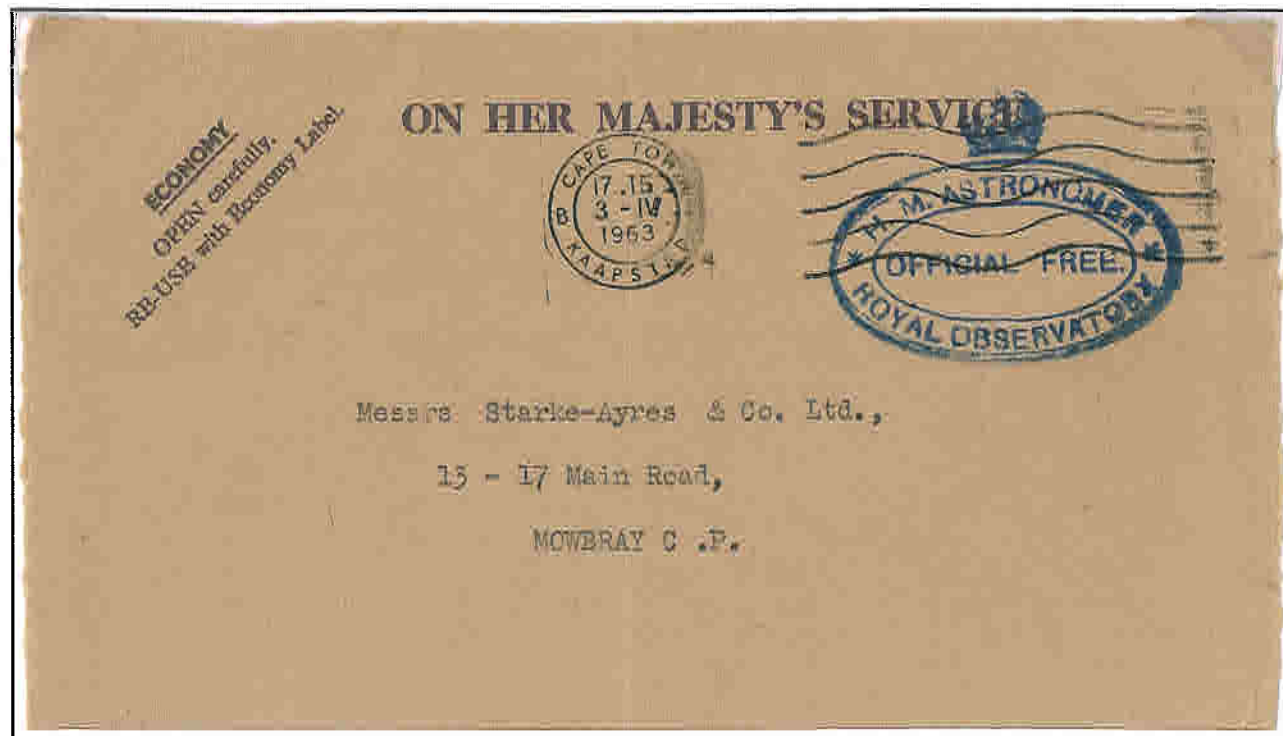
Astrophysics studies the constitution of celestial bodies. In 1860 Kirchhoff executes his first spectral analysis.



Subsequently Secchi classifies 4000 stars and discovers carbon stars in 1868. Half a century later Saha and Russell apply the quantum theory in the astrophysics and discover that the nature of the solar spectrum and the nature of the stars are being determined by temperature/pressure and mass/chemical composition respectively.



William Herschel's idea about the composition of the Sun make him a predecessor for the field of astrophysics. His son John calculates a measure for solar radiation. Between 1834 and 1838 he discovers 1279 new nebulae.



Richard Stoy is H.M. Astronomer in South Africa between 1950 and 1968. Using photometry he measures colour and luminosity of as many as 70.000 stars. These data are being used to determine age and chemical composition of stars. So photometry supports astrophysics.



After the second world war radio astronomy is developing and stimulates astronomy in clouded Great Britain. For a long time the disc of Jodrell Bank is the biggest in the world. Astronomical radio sources are searched for.



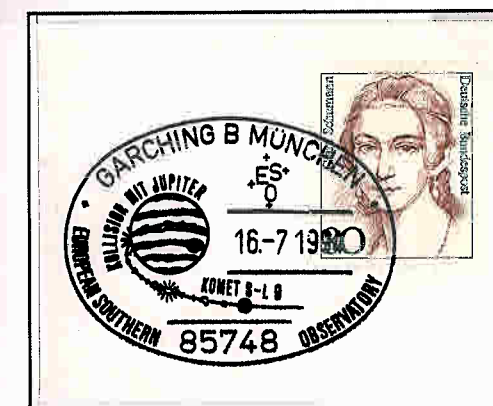
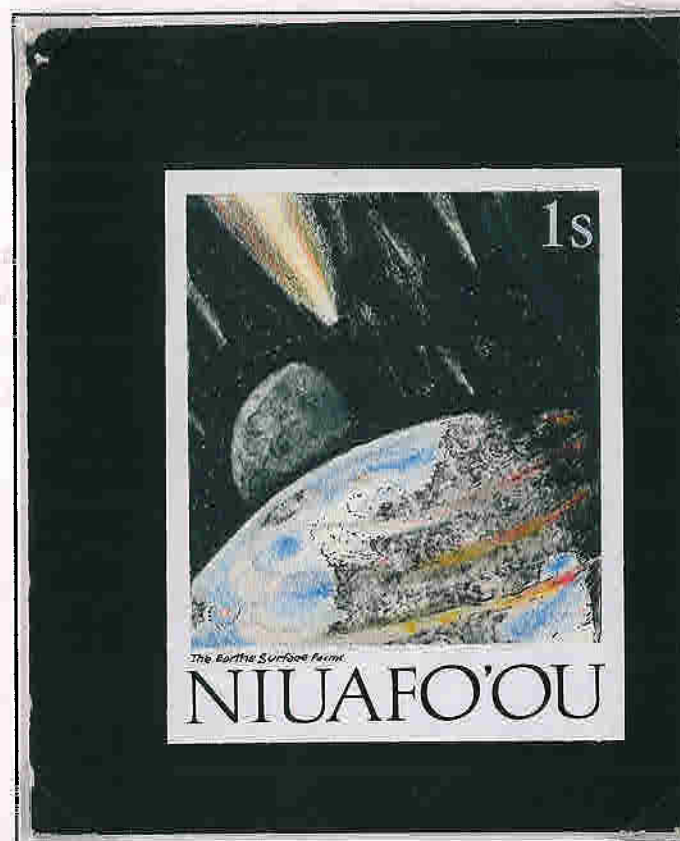
During the second world war Ryle helps to develop British radar. The British suspect the Germans of jamming their radar, but there also is noise from outer space. The Germans work on radar development as well. Flakartillerieschule III is a German radar facility north of Berlin.

6.1.2 visitors from outer space

Where do comets come from and what are they made of? In the 17th and 18th century Descartes and Kant suppose they come into being from...



.....dead stars and from primitive material respectively. In 1940 Primus gives the impression that they are heated pieces of material, coming from planets.



The surface of earth also has been formed by a bombing of about 4.5-3.9 billion years ago. A collision with a comet causes the death of the dinosaurs, 65 million years ago. Another collision, as in the movie 'Armageddon' is possible. In 1994 the big 'Shoemaker-Levy-9'-comet hits Jupiter.



As professor-director of the observatory of Leiden, Oort states that the comets come from a cloud of comets (the Oort cloud, 190 billion comets), about 1 light-year from the Sun. In 1956 Oort founds the world's biggest radio telescope in Dwingeloo.



Fortunately most comets keep flying around. This is not the case for three aircraft of the type De Havilland 'Comet', the first commercial jet plane. On the 2nd May 1953 the first aircraft crashes near Calcutta. The cause is a phenomenon unknown by then: metal fatigue.

6.1.3 stones from outer space



Comets leave fragments of material in space, that produce flashes of light when they burn up in the atmosphere. So the Eta Aquarids and Orionids possibly are related to Halley's comet.



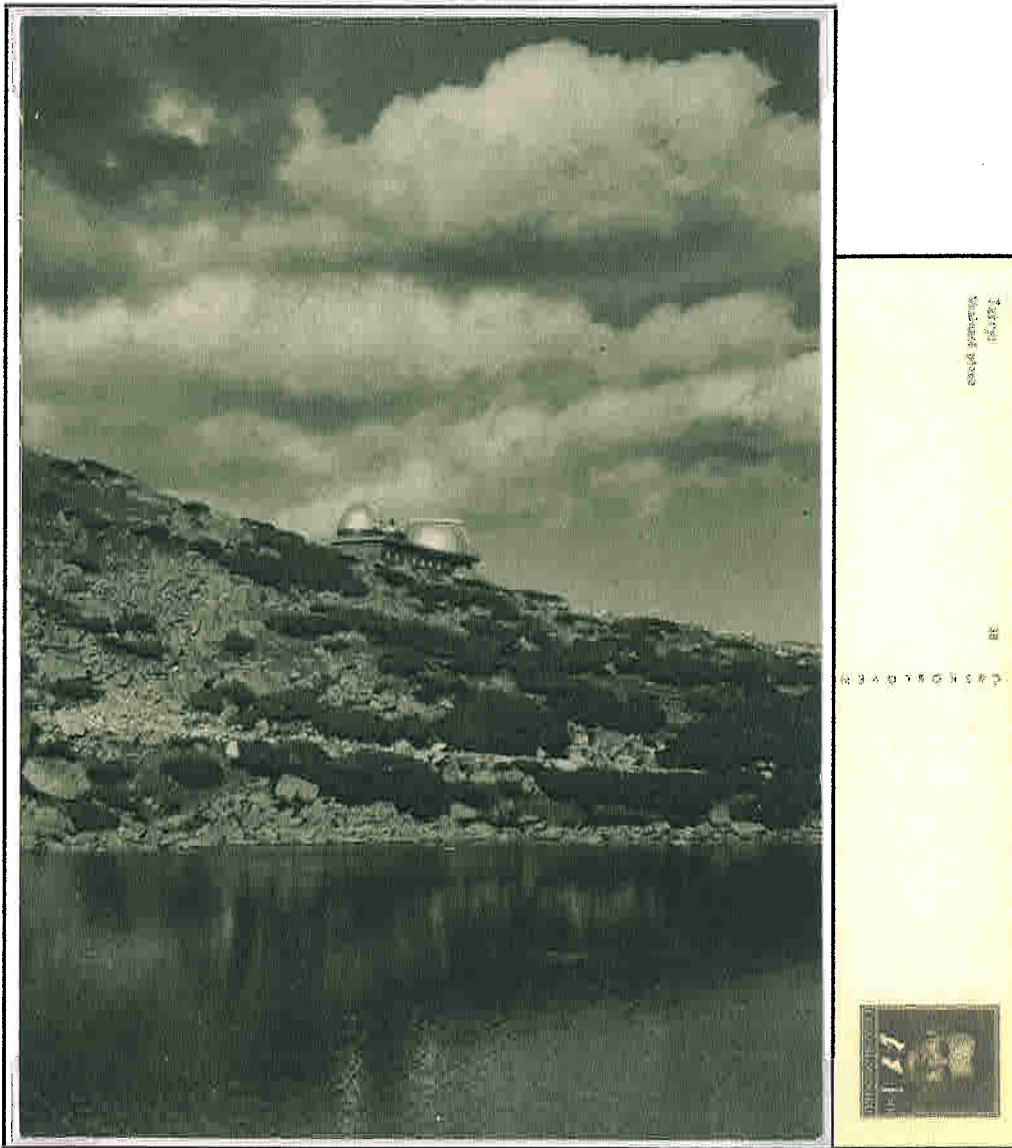
In 1913 Adelaide observatory looks to confirm an observed unknown comet (1913I), with an orbit similar to the meteor shower 'Come Berenicids'. Official perforation S.A. (South Australia).



Enlarged advertisement at the inside.



The flashes of light inspire producers of lamps to use the name 'meteor'. Belgium postal stationery, sold at 50% because of the advertisements.



From 1943 till 1950 Becvar is director of the Skalnaté Pleso observatory. In 1945 his observation of the Ursids causes a renewed interest in this meteor shower of the comet Tuttle.



Meteorites are the fragments of material that do not burn up. A crater in Arizona with a diameter of 1200m is the result of the impact of a meteorite. The postmark 'Meteor, Ariz.' is in use between 1906 and 1912.



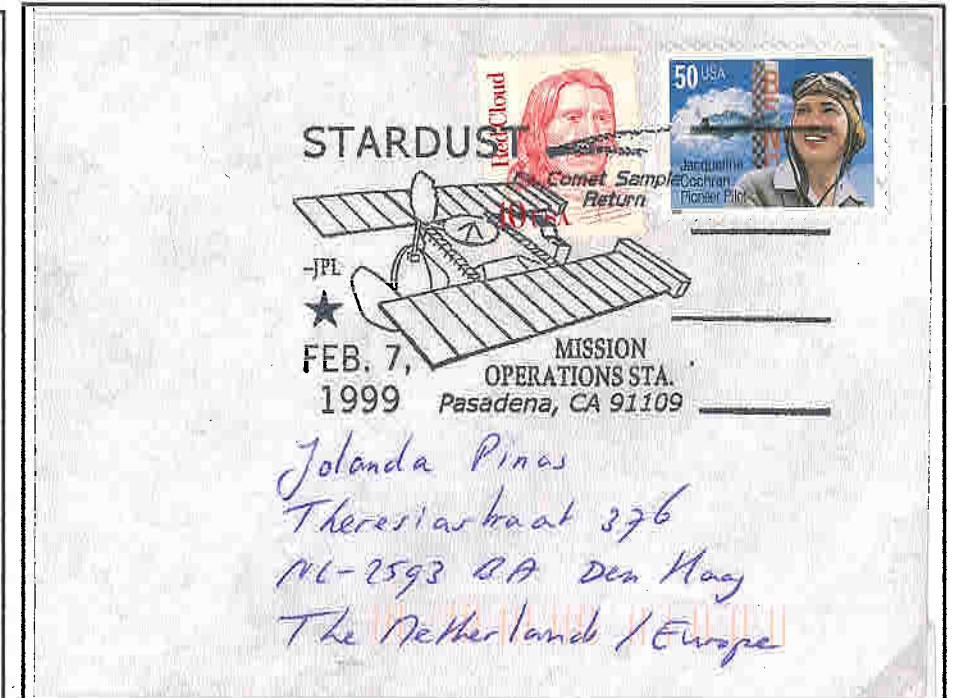
The oldest known meteorite is a stone that has fallen near Ensisheim in 1492. In 1947 in Siberia the Sikhote-Alin meteorite causes the most craters: 106.



The two biggest meteorites are the irons of Hoba West (60 ton) and Ahnighoto (30 ton). The most famous explosion is in Siberia, at a distance of 600 km the meteorite is more blazing than the Sun.

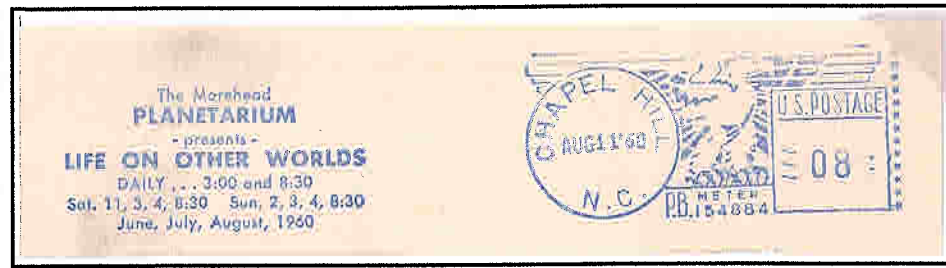


In 1912 Von Laue use X-rays to distinguish crystalline structures of meteorites. During the last few decades meteorites are visited in space. The Giotto satellite watches in 1986 Halley's comet.



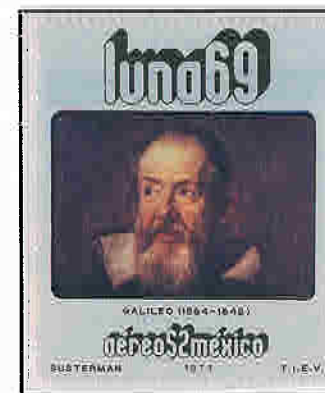
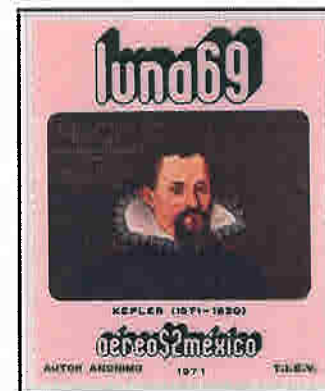
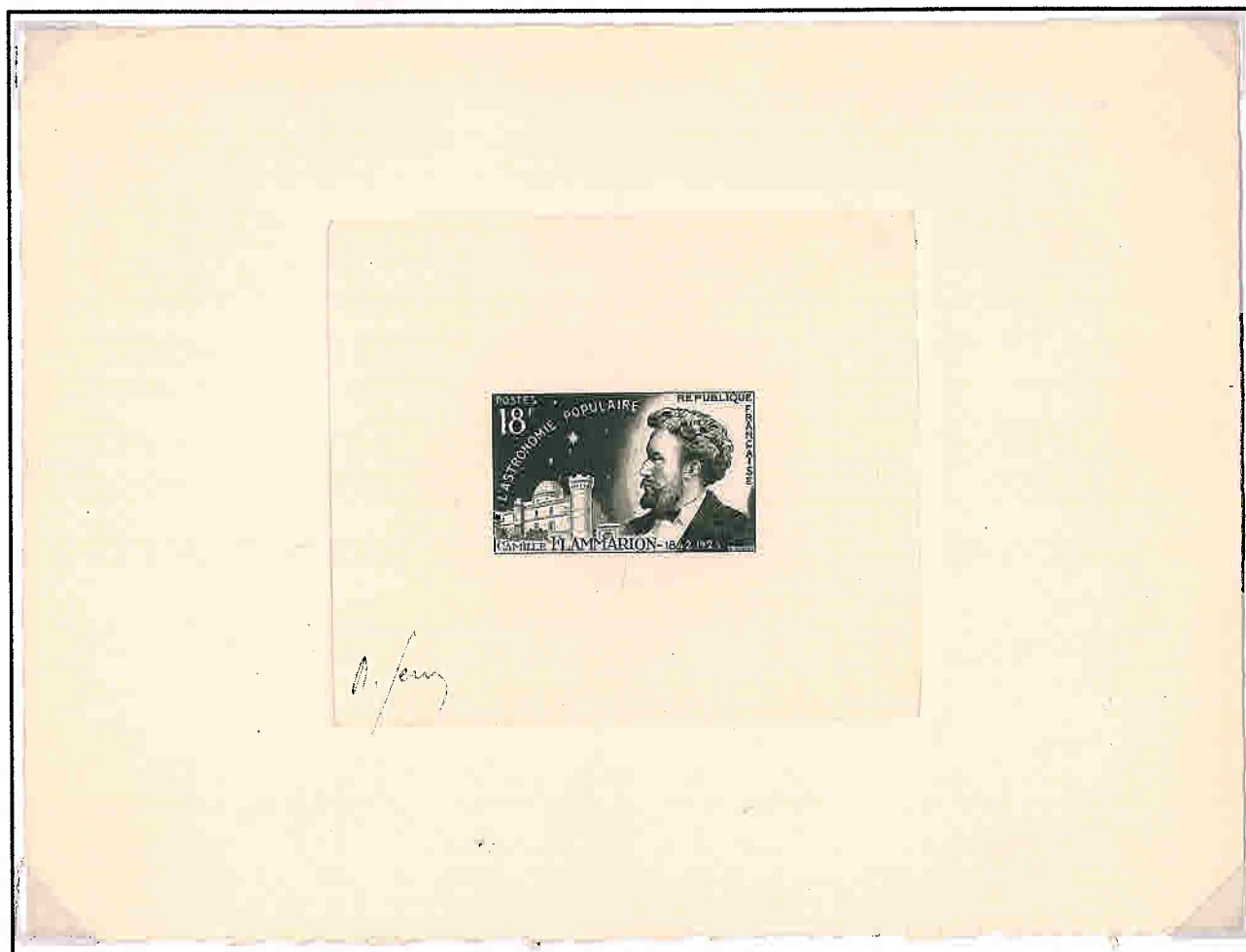
In 2004 Stardust collects primitive material within 140 miles of the nucleus of the comet Wild-2.

6.2.1 life on the Moon, our neighbour



The idea of 'life on other worlds' is old and stimulates imagination. In the second century Lukian writes 'Vera Historia', a satire describing a war between the Moon and the Sun. More than 1200 years thereafter, Kues and Magnus write about life on other suns and the Moon respectively. In 1901 Wells puts 'Selenites' on the Moon

In 1647 however, Hevelius describes in his Selenographia the rarity of the air on the Moon. The portrait on the postal stationery has been derived from Selenographia, page 2.



In 1862 the French astronomer-writer Flammarion (*on the epreuve d'artiste*) writes about more inhabited worlds. Before this, in 1634 Kepler's 'Somnium' arouses serious interest in this moon-world. Kepler is being stimulated by the round craters, discovered by Galilei.



In 1833 refractor observations of the prominent astronomer Bessel confirm the discovery of Hevelius. There is no atmosphere on the Moon, so there is no oxygen for life such as on Earth.

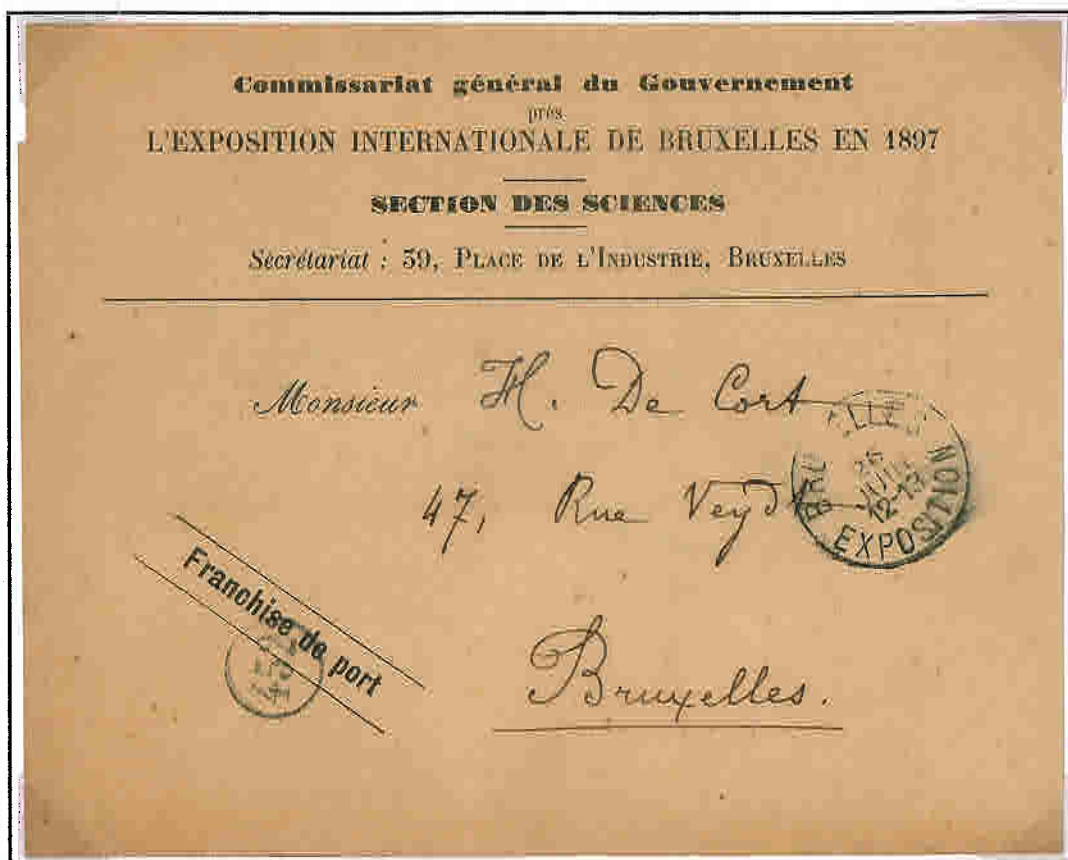
6.2.2 life on Mars, our older brother



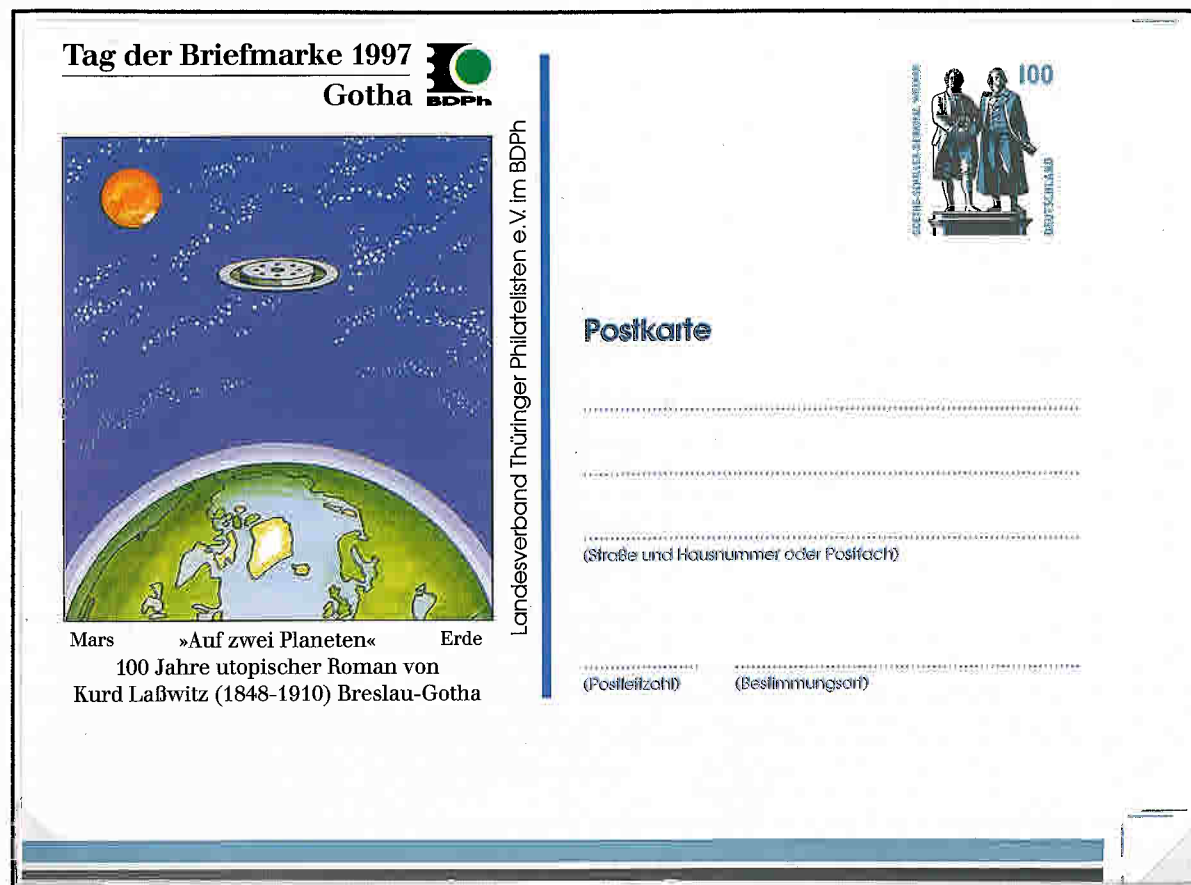
Around 1880 Mars replaces the Moon in theories about extraterrestrial life. Schiaparelli observes 'canali' on Mars in 1877. Based on these and his own observations (from 1894 till 1908) Lowell states that the planet is inhabited.



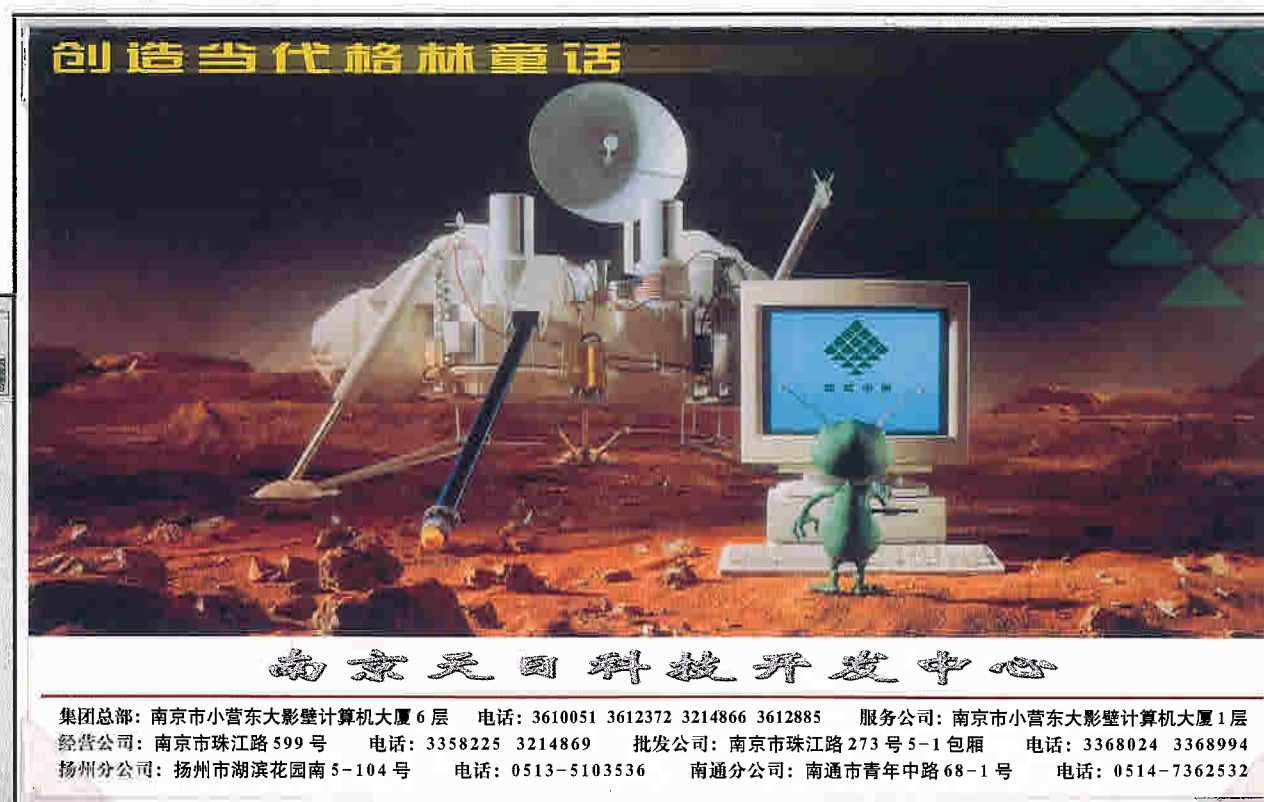
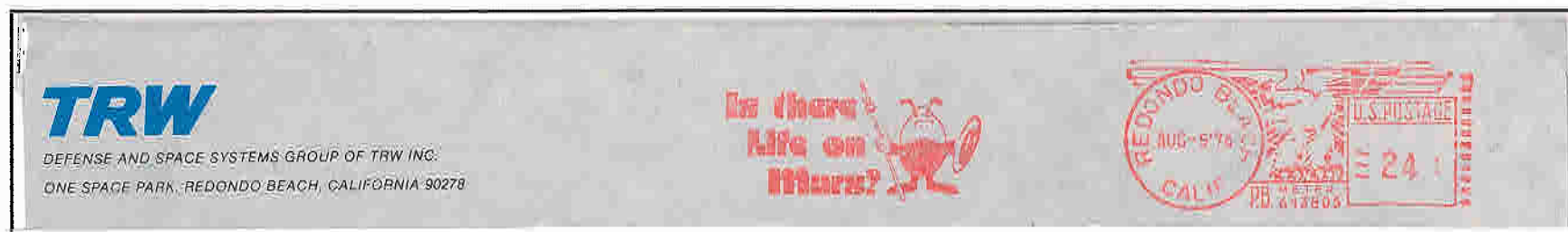
A combination of three theories results in the idea of 'superior life on Mars'. Darwin states: older species probably are more intelligent. The Kant-Laplace hypothesis says Mars is older than Earth. And finally Kirchhoff proves that planets consist of the same substances. In 'Uranie' (1889) Flammarion describes superior life on Mars.



At the end of the 19th century science is occupied with life on Mars. At the international exhibition of Brussels of 1897 Meunier shows photographs of the 'canali of Mars'.



Mars »Auf zwei Planeten« Erde
100 Jahre utopischer Roman von
Kurd Laßwitz (1848-1910) Breslau-Gotha



集团总部：南京市小营东大影壁计算机大厦6层 电话：3610051 3612372 3214866 3612885 服务公司：南京市小营东大影壁计算机大厦1层
经营公司：南京市珠江路599号 电话：3358225 3214869 批发公司：南京市珠江路273号5-1包厢 电话：3368024 3368994
扬州分公司：扬州市湖滨花园南5-104号 电话：0513-5103536 南通分公司：南通市青年中路68-1号 电话：0514-7362532

In 1971 Mars 2 is the first human artifact to touch down on Mars (stamp of USSR), but it crashes. Five years later the Viking 1 lander makes a soft landing, to return pictures and data until 1982. Everyone is occupied with the question: 'Is there life on Mars?', but there is no sign of life, or of intelligent little green men.



In the same year Lasswitz elaborates the idea of the older Mars-race in 'Auf zwei Planeten'. The inventors on Mars are ahead of their colleagues on Earth. So it is more likely that Mars will visit Earth first. Part of a rejected printer's sheet. In 'War of the Worlds' (1898) the time has come: Wells describes how the Martians invade Earth.



6.3.1 extraterrestrial visits expected



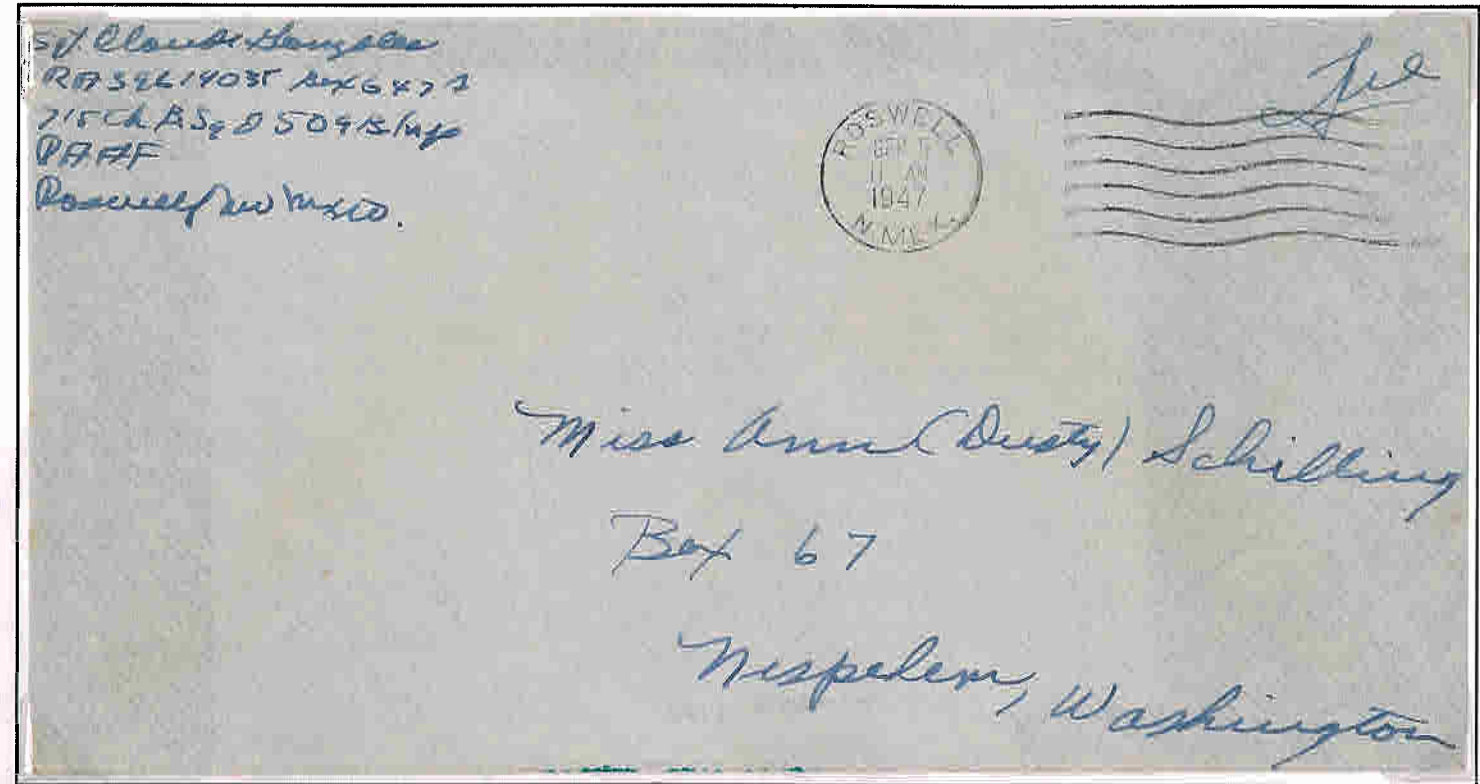
The Copernican system changes Earth into a planet and the stars into other suns. At the end of the 16th century Bruno adds extraterrestrial life to the system. A century later Fontenelle writes about 'more worlds'. In contrast with Bruno, he does not have to face prosecution by the catholic church.



In the 18th century the scientists Swedenborg and Voltaire write about men of the stars and of men of Saturn and Sirius respectively. In 1860 Pasteur searches for life in the Orgueil-meteorite. In 1908 Nobelprizewinner Arrhenius supposes that life on earth has started with spores from space.



In 1947 an American pilot observes a UFO, later described in newspapers as a 'flying saucer'. Flying saucers become vehicles of visitors from outer space. Children learn to recognize them as such (part of sheet of eight Swedish postal stationery cards).



The International UFO Museum & Research Center
 400 North Main at Roswell
 P. O. Box 2221
 Roswell, NM 88202-2221

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 PO BOX 500
 WILLIAMSBURG PA 16693-0500

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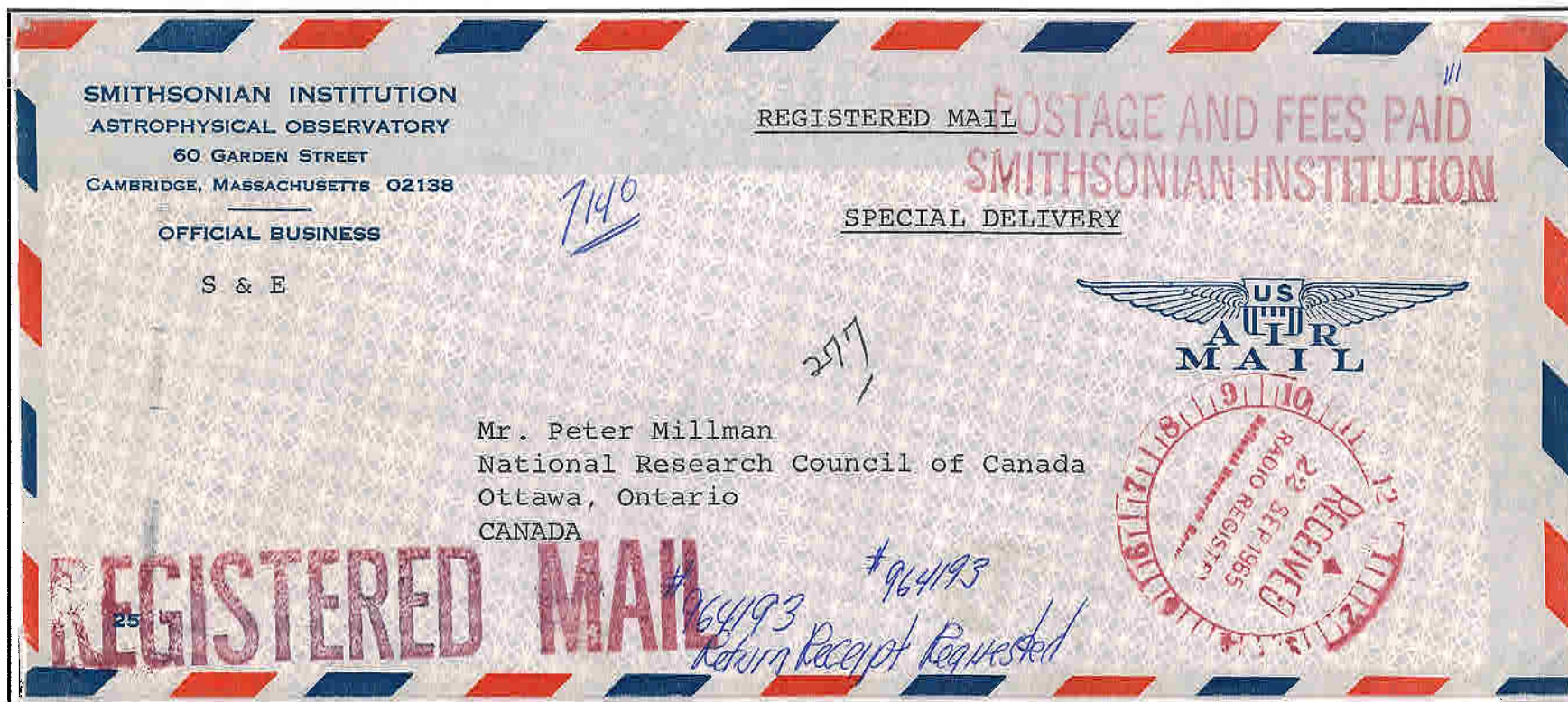
Reissued at the **29-Cent Postage Rate**, attention-getting Space Hologram envelopes can be printed with your name, address, advertisement/message, and/or telephone number.
 (The 29-cent Space Hologram is printed in green on a style 10 envelope.)

ORDER YOUR PERSONALIZED ENVELOPES NOW

Sold in affordable boxes of 50 or 500. See order card for information about the Space Hologram.

In July 1947 near Roswell (USA) a flying saucer (?) crashes and is being recovered by the 509th bomber group. After years the incident attracts a lot of attention. In Roswell the 'International UFO Museum & Research Center' is even being established. The postal stationery has been printed by private order.

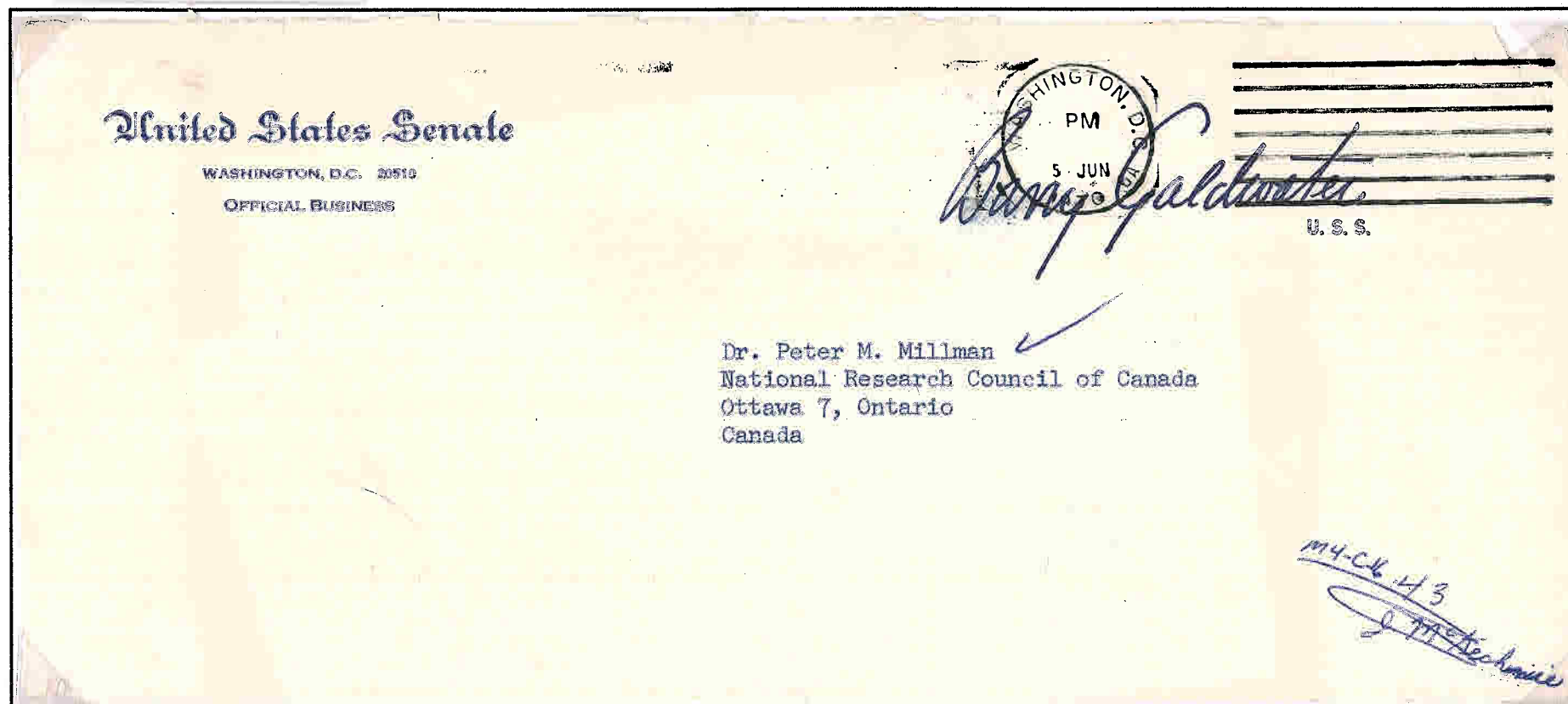
6.3.2 extraterrestrial visits investigated



From 1962 till 1968 Carl Sagan, specialist on the fields of planetary atmospheres and possible extraterrestrial life, works at the Smithsonian Astrophysical Observatory. The letter from 1965 has been sent to the former chairman of the in 1955 closed Canadian UFO-research project 'Second Storey'.



In 1987-1988 UFO's are observed around Hakui in Japan. The front of the Japanese booklet is the combination of two pictures: a temple of Hakui and a UFO-photo, taken near Kyoto. Radio telescopes support the search for life in outer space (reduced copy of inside).

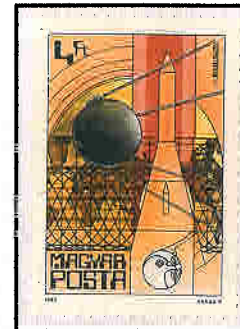


Secrecy hampers the research. Supposed remainders of the flying saucer of Roswell have been transported to Wright-Patterson air base. The American senator Barry Goldwater tries in vain to get access to this base. In 1970 he writes to the same chairman of the Canadian research project.



From 1992 special congresses are being held in San Marino. The research does not concern UFO's only. As well the map of Reis (ca. 1470-1554) as the Nazca lines raise the question "Were our ancestors/gods astronauts?"

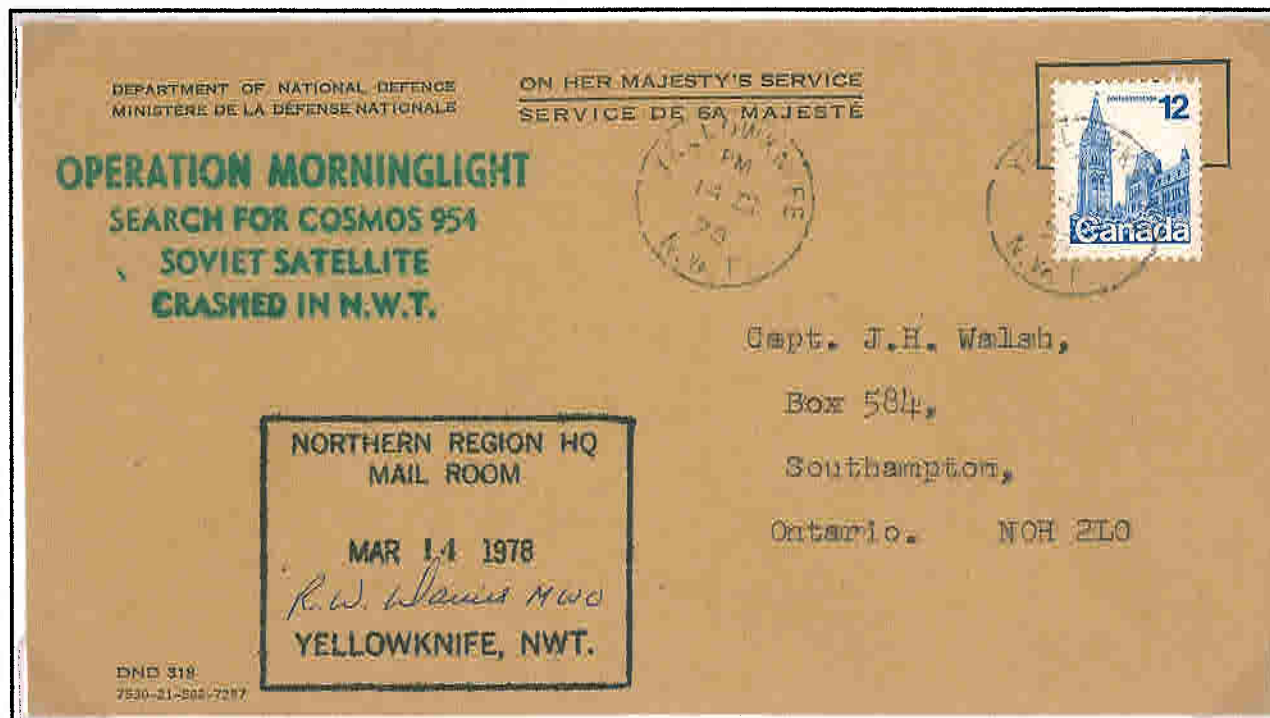
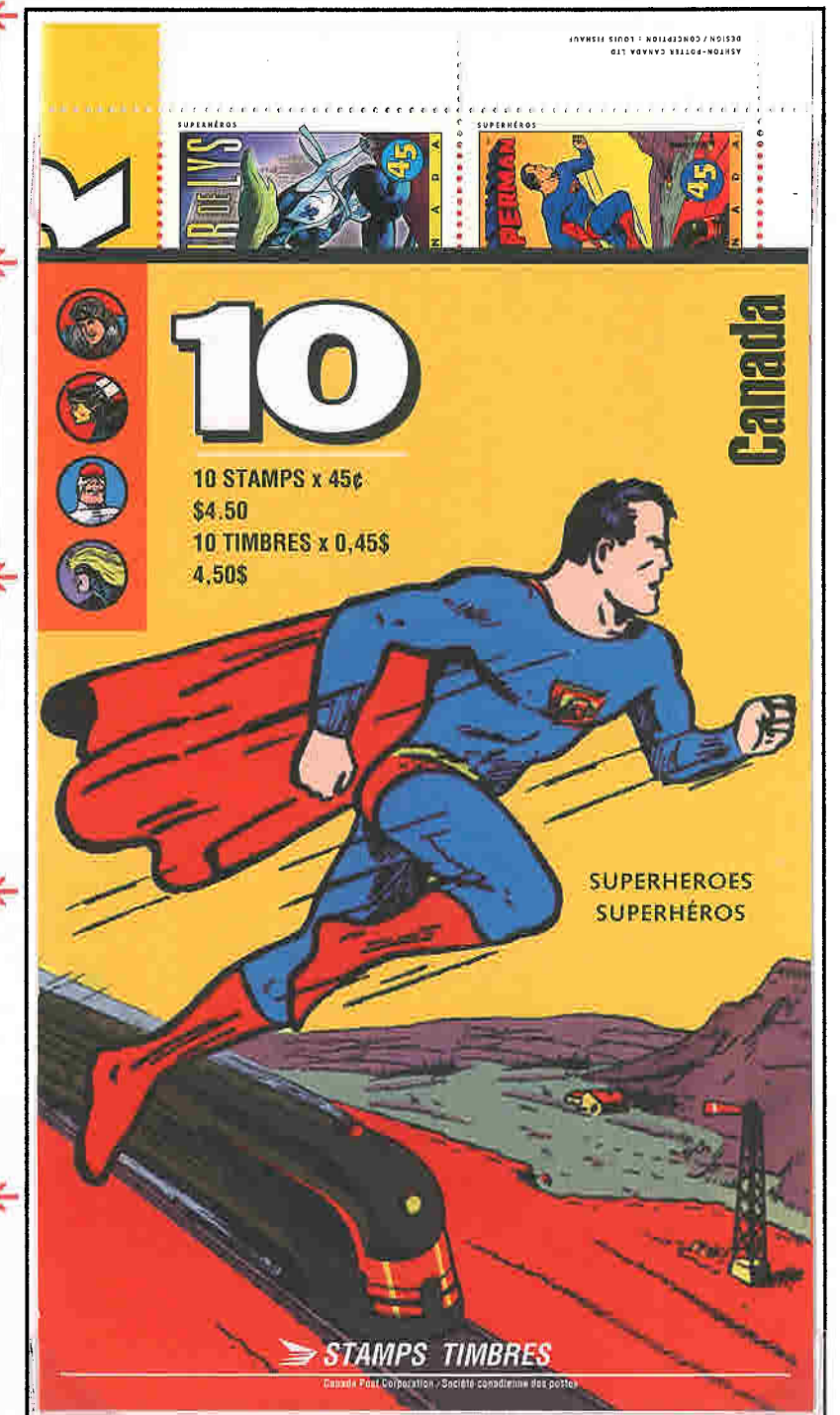
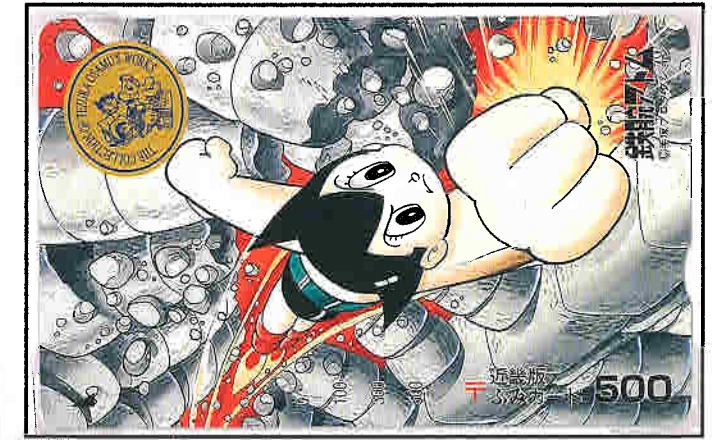
6.3.3 extraterrestrial visits invented



On the 25th July 1957 the Russian air defense reports to have fired at UFO's. It is camouflage for their tests with the SS-6 intercontinental missiles from lake Aral. The missiles fly towards Kamchatka near the Pacific. A major flight center near Petropavlovsk (on the card at the left) tracks them. A few months later the missiles are being used for the surprising launchings of the first Sputniks.



Fumi card, valid to buy stamps from stamp machines.



Satellites cause UFO-reports as well. From 1962 onwards the USSR launches Cosmos-satellites as the C3 (April 1962) and the C186-188 (October 1967). In January 1978 the Cosmos 954 crashes (with reactor). After ten months of looking for nuclear materials the Canadian government has only found 10%. Extraterrestrials or mutants?

In New Zealand a UFO is seen in 1951. One of their plate flaws is known as 'UFO-variety'. The UFO moves on the stamp (right column). In comics alien visits are invented quite often. In Japan Tezuka's Astroboy is famous. In 1938 already Canada has an extraterrestrial visitor: Superman.

6.3.4 extraterrestrial energy: the Sun



copy



The Sun is an extraterrestrial source of energy for life on Earth. The 'Sun Life Insurance Company' uses the perforation 'El Sol' in Cuba, 'Sun Life' in Canada.



copy



In the thirties already, sun lamps are available to take care of shortages of real sun light. During the 20th century the importance of solar energy increases. The stamp at the left is a forgery against the post (perforation 10.5), at the right an original example (perforation 13, with watermark).

Print the complete address in plain block letters in the panel below, and your return address in the space provided. Use typewriter, dark ink, or pencil. Write plainly. Very small writing is not suitable.

Albert T. Tousigneh T. C. M.
(Sender's name)
USS Tanager A.V. 8.
(Sender's address)
% Fleet Post Office
San Francisco, Cal.
Dec 3 1942
(Date)

Mr & Mrs. Arthur Tousigneh & Family
901 West Hughitt St.
Iron Mountain
Mich

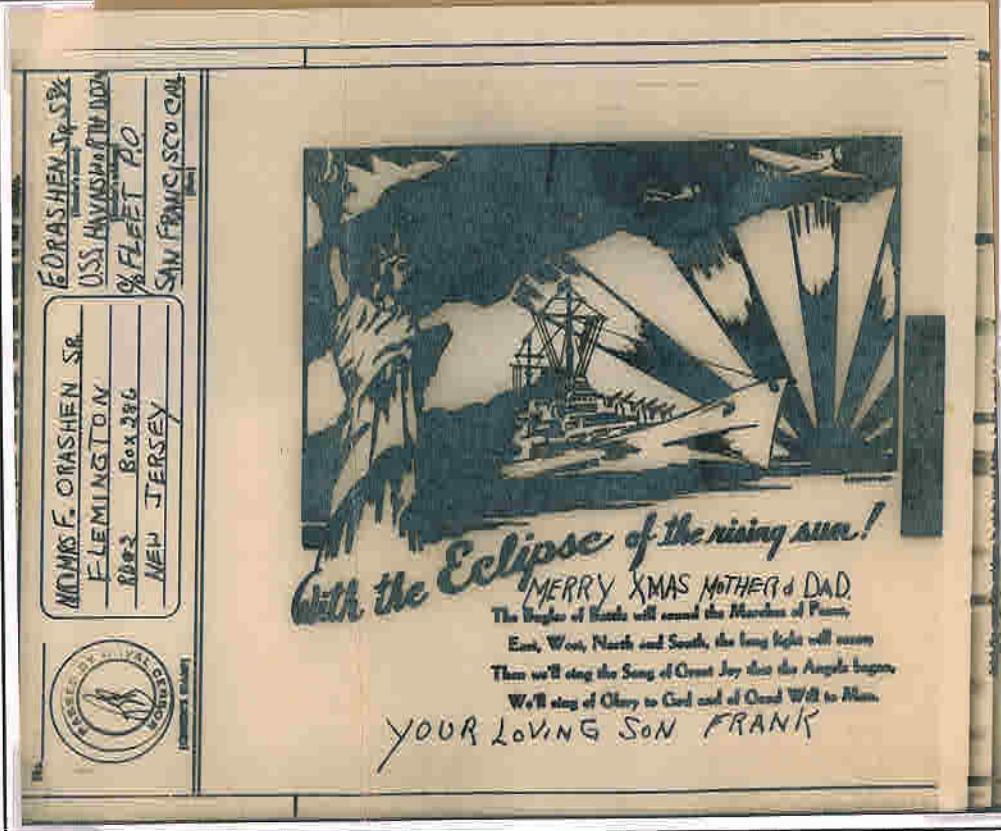
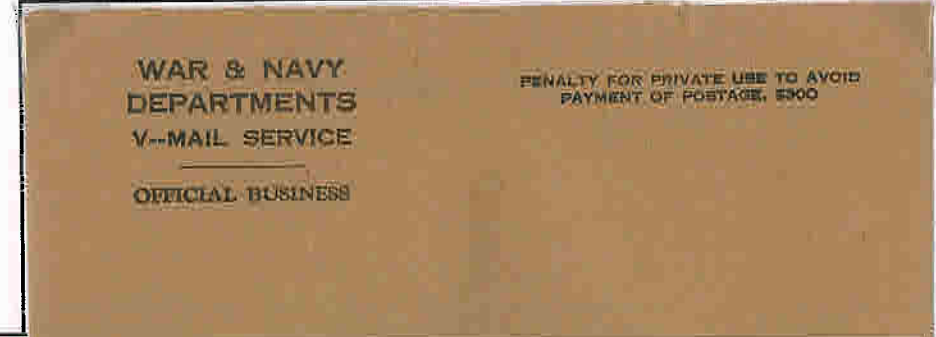


(CENSOR'S STAMP)



With the Eclipse of the rising sun!

The Bugles of Battle will sound the Marches of Peace,
East, West, North and South, the long fight will cease;
Then we'll sing the Song of Great Joy that the Angels began,
We'll sing of Glory to God and of Good Will to Man.



A solar eclipse is an impressive event, that attracts lots of watchers. In the case that the Sun would stay behind the Moon, this would mean the end of life on Earth. The 'eclipse of the rising sun' refers to the defeat of Japan in the second world war. The big V-mail-form has been prepared to be put on microfilm, but has been sent and delivered by ordinary mail. The reduction is the result of a similar form that has been put on microfilm. The micro film has been sent by air, upon arrival the photo has been enlarged and delivered.