DOESN'T ALWAYS LIE

A trajectory simulation incorporating the above requirements is presented in reference 8. In addition to the above requirements, this simulation assumes a vehicle with six degrees of freedom and aerodynamic symmetry in roll and the missile position in space is computed relative to a flat nonrotating earth. This trajectory simulation was programmed on the IBM 704 electronic data processing machine and is the basis for all trajectory computations made in this paper.

On the ocean plane, the quasi-geoid coincides with the geoid but on continents the quasi-geoid can be taken, if necessary, as an approximate expression of the geoid shape.

We must consider, first of all, how to separate the irregular part in the shape of the earth, which we shall call "the height of the point of the surface of the earth with reference to the quasi-geoid," or, more briefly, the "reference /vspomogatel'niy, literally auxiliary/ height." It would be advisable to determine the reference heights so that they would be sufficiently close to the orthometric heights. However, the usual orthometric correction does not entirely do away with the dependence of the result of leveling between two fixed points on the position of the guide line connecting them, which must have an effect on the dissimilarity in the heights when polygons of high-precision leveling are formed. The reference heights can easily determined in a manner which will completely rid them of this defect.

B. Reference Heights

Let us consider the normal potential field U, formed by the "comparative earth" in which all masses are included inside the ellipsoidal surface of the

surface of the earth, and only on this surface; whereas it is not determinable at all other points of space without knowledge of the shape of the earth, and the density of the attracting masses, if it is a question of internal points.

Thus, we can also formulate an analytical expression for the disturbing potential $T = W - U$, but only for points of the physical surface of the earth. But since the shape of the earth is not known, the true coordinates of these points B^*, L^*, H^* are unknown to us. However, we can consider the approximate value of the coordinates B, L, H as known, whereby the magnitudes

$$\left.\begin{aligned} \Delta B &= B^* - B \\ \Delta L &= L^* - L \\ \zeta &= H^* - H \end{aligned}\right\}$$

are so small that their second powers and pro

For this reason, in all further calculations, der

relative to ΔB, ΔL, ζ are retained. With t xpand

the expression for the normal potential into the Taylor series:

$$T(B^*, L^*, H^*) = W(B^*, L^*, H^*) - U(B^*, H^*) =$$

$$= W_0 - \left[dH - U(B,H) - \frac{\partial U(B,H)}{\partial B} \right. \quad \frac{\partial U(B,H)}{\partial B} \Delta B \qquad (2)$$

FIRMAMENT IN DECLASSIFIED RUSSIAN DOCUMENT

SCIENTIFIC ABSTRACT PYASKO[illegible]YA[illegible]ESE[illegible]KO[illegible]YE[illegible]00

[illegible] years of study
The dissertation represents the [illegible] of the clear, daytime sky. The observations were carried out in twelve locations at various altitudes above the sea, various climatic, meteorological and synoptic conditions. The observations were carried out mainly during high-transparency of the atmosphere in the visual range of the spectrum in the absence of a snow cover. In the investigations two instruments, designed by V.G. Fesenkov were used; one of these was a visual photometer of the daytime sky intended for measuring the brightness of the firmament; the other was a photoelectric halo photometer for determining the brightness from

Card6/21

[illegible] sun z from 90 to 0°, the brightness of the sky [illegible] almucantar of the sun increases first, reaching a maximum for a certain value of z, and then decreases. A method is also proposed of determining the brightness of the clear daylight sky at any point based on measuring the brightness along the almucantar of the sun and of 5-6 points of the firmament located at various zenith distances. This method permits determination

Card7/21

Union under the supervision of Prof A. I. Lebedinskiy, was set up for photographing the aurora. Thirty four stations equipped with these cameras are located in the high geomagnetic latitudes: in the Antarctic and Arctic, Murmansk and Yakutsk, Verkhoyansk, and on Mys Chelyuskin, Mys Zhelaniya, and others (see Section IV of programs of the IGY in Byulleten' MGG, No 2, 1957). Unlike ordinary equipment, this camera, with 35-mm movie film, can automatically photograph the entire firmament down to the horizon. A convex aluminized mirror is used to reflect the sky.

"The wide-angle C-180 camera set up at the Murmansk Branch of the institute is represented in Figure one.

"An international test period for conducting observations of the aurora occurred in March of 1957, with the help of the C-180 camera. Taking into account the illuminations of diverse intensity, cloudy conditions, and other weather pecularities, still more than 3,000 pictures were taken with the C-180 camera for various programs (disregarding experimental and focusing shots). Synchronized experimental films of aurora and ionograms with exposures at minute intervals were obtained. The ionograms were developed at the automatic panoramic ionosphere station of the Murmansk Branch of the institute.

TITLE: Photographic observations of the spectral intensity of the firmament

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 5, 1961, 44-45, abstract 5 B 383. (Izv. Astrofiz. in-ta AN KazSSR, 1960, 10, 94-100 (English summary)

TEXT: The spectral brightness of the firmament along the almucantar of the sun was observed in the Pugachev and Alma-Ata regions by means of a spectrograph with a glass lens system. The sun served as the source of light, which light was weakened by a gray screen made of a mixture of coal and gypsum. Simultaneously, the illumination from the sun and from the corona in the vicinity of the sun were measured by an aureole photometer in order to determine the coefficient of transmittance of the atmosphere by the Buge method for 445, 546 and 636 mμ wavelengths and in order to estimate the stability of the atmosphere's optical properties. The data were processed by the methods of photographic photometry. The illumination

from the sky for fixed wavelengths was calculated from the measurement results. The author presents graphs of the spectral brightness of the sky and discusses the peculiarities of the state of the atmosphere that characterize the time and site of observations. The color temperature of the firmament amounts to 6,100 - 1,750°K.

V. Golikov

[Abstractor's note: Complete translation.]

Dissertations Defended in the Scientific Council of the Institute of Physics of the Earth, Institute of Physics of the Atmosphere and Institute of Applied Geophysics, Ac.Sc. USSR during the First Semester of 1957.

Declassified in 2000 published in 1953

near-sun halo and also from the sun on a surface perpendicular to these rays. The dissertation contains **a certain formula** of the brightness of the sky, taking into consideration only the brightness of the first order and derived on the assumption of a "flat" Earth and giving some conclusions derived on the basis of this formula. For a certain coefficient of transparency of the atmosphere, the brightness of the sky at any point is represented by derivation of two functions of which one is the function **of the diffusion of** light and the other is a function of the zenith distances of the sun and of the observed point of the sky. On changing of the zenith distances of the sun z from 90 to 0^{o}, the brightness of the sky on the almucantar of the sun increases first, reaching a maximum for a certain value of z, and then decreases. A method is also proposed of determining the brightness of the clear daylight sky at any point based on measuring the brightness along the almucantar of the sun and of 5-6 points of the firmament located at various zenith distances. This method permits determination

Flat Earth →

Firmament →

Table 1.

Absolute sky brightness (w·cm^{-2}·ct^{-1}·μ^{-1}) at λ 2.2 and λ 3.3 according to measurements made at Bol'shoye Almа-Atinskoye Lake (3060 m above sea level)

Date	λ, μ	angular distance from the sun (almucanthar of the sun)							Zenith	Zenithal distance of the Sun
		3°	6°	9°	9°	15°	35°	90°		
25 I 1964	2.2	$1.4 \cdot 10^{-4}$	$1.2 \cdot 10^{-4}$	—	—	—	$5 \cdot 10^{-4}$			
26 I 1964	2.2	$1.3 \cdot 10^{-4}$	$9 \cdot 10^{-4}$	—	$4 \cdot 10^{-4}$	—	—	$3 \cdot 10^{-4}$		60
27 I 1964	2.2	$1.1 \cdot 10^{-4}$	$8.4 \cdot 10^{-4}$	—	—	$6 \cdot 10^{-4}$	—			
29 I 1964	2.2	$\sim 10^{-4}$	$8 \cdot 10^{-4}$	$4 \cdot 10^{-4}$	$3 \cdot 10^{-4}$					
30 I 1964	3.3	$\sim 10^{-3}$	—	—	—	—	—	—	—	52
31 I 1964	2.2	$2 \cdot 10^{-4}$	$1.8 \cdot 10^{-4}$	$1.5 \cdot 10^{-4}$	$1.3 \cdot 10^{-4}$	$1.1 \cdot 10^{-4}$	$8 \cdot 10^{-4}$	3	3	

polar regions. It is reasonable to assume that the echoes could not arrive from large altitudes, also with respect to the effective magnitude of absorption. The visual observations of glows well as the analysis of photographs showed that the radar echoes also appeared at instants of absence of visible signs of glows in the angle of aperture of the directivity pattern of the radar antenna. Nevertheless, at this instant the glows were observed in another section of the firmament. As a rule, the echoes did not appear when visible forms of glow were absent on the firmament. A comparison of the variations in the amplitude of radioechoes with the variations in the integral brightness of glows in the same sky region showed that they do not coincide in time. It is but remarked that the maximum of the radioecho amplitude more or less regularly lags in time behind the maximum of the integral brightness. The lag time fluctuates within the limits from 5 to 20 min.

L. Yerasova

Translator's note: This is the full translation of the original Russian abstract.

https://www.cia.gov/library/readingroom/docs/CIA-RDP82-00141R000200690001-7.pdf

narrow windows, is directed toward the hurricane-force northeast winds.

About 100 meters from the laboratory building is a massive metal tripod, supporting the original S-180 instrument, i.e., a system of mirrors with an automatic camera. The S-180, an invention by Prof A. I. Lebedinskiy of Moscow State University, photographs the whole firmament at the same time on a sensitive motion-picture film. Yuliy Nadubovich, graduate of Kiev University, operates this instrument.

On the elevated shore of a small lake there is another, no less original, instrument of Soviet design -- a high-dispersion, diffraction spectrograph. With the help of this instrument, Petr Sukhoivanenko studies the spectral composition of auroras.

https://www.cia.gov/library/readingroom/docs/CIA-RDP82-00141R000200690001-7.pdf

Antarctica has been called the land of ice and storms. However, it may also be called the land of sun. At an elevation of about 4,000 meters above sea level, on the ice cupola of Antarctica, the intensity of solar radiation is 1.81 calories per square centimeter per minute. This is the greatest intensity recorded anywhere on the Earth. By comparison, it may be noted that in the temperate zones the intensity is only a little over one calorie per square centimeter per minute. However, the sun does not produce heat, since its rays hit the surface at an acute angle.

Ultraviolet radiation is also very high in Antarctica, because the air is clear and there are many sunny days.

Forecasting Weather at Sea (Cont.) 958

Shape of the firmament
Rings around the Sun and the
Aureoles
Twinkling of stars
Rainbows
Refraction. Distortion of t
horizon. Mirages
Twilight
Sound phenomena
Sound audibility
Thunder
"Voice of the Sea"
Smoke 61
Waves at sea 62
Animal, bird and insect behavior 62
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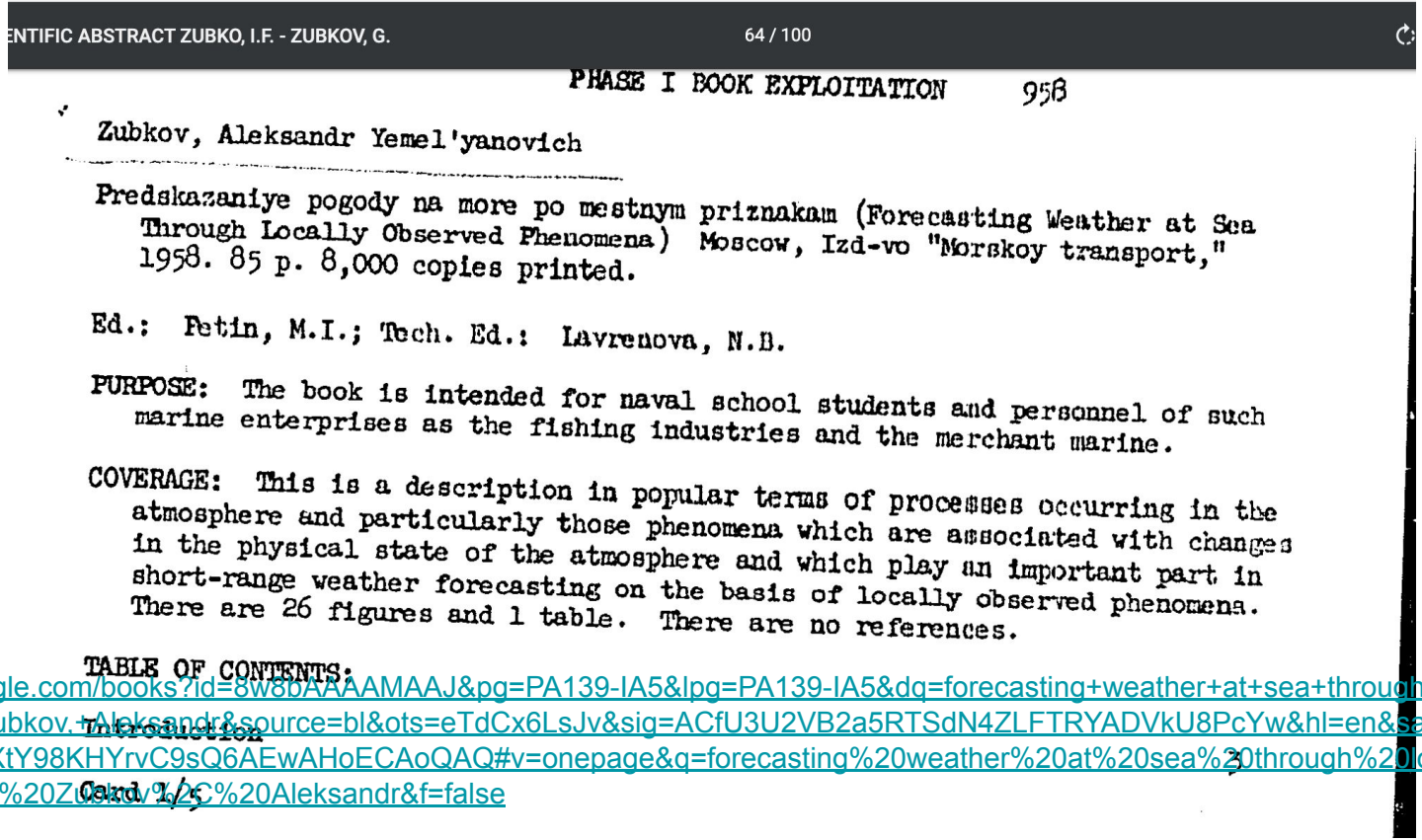
3. Tropical Cyclones, Indications of Their Approach and Rules for Avoiding Them 67

Shape of the firmament
Rings around the Sun and
Aureoles
Twinkling of stars
Rainbows

Book about shape of firmament



ENTIFIC ABSTRACT ZUBKO, I.F. - ZUBKOV, G. 64 / 100

PHASE I BOOK EXPLOITATION 958

Zubkov, Aleksandr Yemel'yanovich

Predskazaniye pogody na more po mestnym priznakam (Forecasting Weather at Sea Through Locally Observed Phenomena) Moscow, Izd-vo "Morskoy transport," 1958. 85 p. 8,000 copies printed.

Ed.: Petin, M.I.; Tech. Ed.: Lavrenova, N.B.

PURPOSE: The book is intended for naval school students and personnel of such marine enterprises as the fishing industries and the merchant marine.

COVERAGE: This is a description in popular terms of processes occurring in the atmosphere and particularly those phenomena which are associated with changes in the physical state of the atmosphere and which play an important part in short-range weather forecasting on the basis of locally observed phenomena. There are 26 figures and 1 table. There are no references.

TABLE OF CONTENTS:

Introduction

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https://books.google.com/books?id=8W8bAAAAMAAJ&pg=PA139-IA5&lpg=PA139-IA5&dq=forecasting+weather+at+sea+through+locally+observe+phenomena+Zubkov,+Aleksandr&source=bl&ots=eTdCx6LsJv&sig=ACfU3U2VB2a5RTSdN4ZLFTRYADVkU8PcYw&hl=en&sa=X&ved=2ahUKwj4ycry3cTpAhXtY98KHYrvC9sQ6AEwAHoECAoQAQ#v=onepage&q=forecasting%20weather%20at%20sea%20through%20locally%20observe%20phenomena%20Zubkov%2C%20Aleksandr&f=false

location of the receiving antenna according to a preset program, observations can be conducted on any portion of the southern hemisphere of the sky. By increasing the number of panels and completing the circle, the entire firmament could be covered.

https://www.cia.gov/library/readingroom/docs/CIA-RDP82-00141R000200820001-2.pdf

the changes of Eros brightness in the years 1930/31 in Kraków and Poznań. In conclusion, the author describes the presumable appearance and properties of this miniature world. On Eros, a person would have an average weight of 20 g. A jump from 2000 m altitude would take 16 min and cause the jumper no injury. A stone thrown up would not fall back, but be subject to the gravitational force of the Sun. At the Eros firmament, the passage of the Sun is almost five times quicker. Day passes immediately over into night. The contrasts between light and shadow are as pronounced as on the moon. At a vertical incidence of the sunlight ($z = 0^{o}$), some rocks reach a temperature of up to $+90^{o}C$ in the perihelium and up to $+20^{o}C$ in the aphelium. At an oblique incidence of the sunlight the absolute temperature drops proportionally to $\sqrt{\cos z}$. Thus, a thermal erosion is effective. The Sun appears in an aurecle of corona and zodiacal light. The stars are visible also during daytime. Meteors falling down to Eros cause dust-clouds which do not settle again, but remain in space as interplanetary dust. Fig. 2 shows the probable appearance of Eros. I: When i is greatest and the amplitude of brightness has reached its lowest value; O: Center of the asteroid mass; II illustrates the position when i is smallest ($i = 0^{o}$) and the amplitude of brightness has reached its maximum ($2^{m}.0$); 1: The permanent brightness;

Card 2/4

EROS= Ancient Greek god of love, identified by the Romans with Cupid.

A winged figure of a child representing love or the power of love

https://www.learnreligions.com/creation-myths-117867

Void first; then Eros and Earth

An earlier (7-8th century B.C.) version of the story (referred to above) comes from Hesiod, author of *Theogony* and *Works and Days*. In *Theogony* the Void or Chaos existed before anything else. Then came Earth (Gaia) and Eros (god of love or desire). Out of the Void or Chaos came Darkness (Erebus) and Night (Nyx); from Night, Light and Day. Earth produced the Sky (Uranus) to cover herself. Then, by coupling, they produced an enormous brood, including Oceanus (Ocean), Themis (Law), Mnemosyne (Memory), Phoebe, Cronus, the Cyclopes/Cyclops (producers of Zeus' thunderbolt) and the 50-headed monsters, Cottus, Briareus, and Gyes (the Hecatoncheires).

Jul 48

USSR/Physics
Radio Waves - Propagation
Solar Phenomena

"Radio Emission of the Galaxy and Sun," I. S. Shklovskiy, Cand Physicomath Sci, 8 pp

"Nauka i Zhizn'" No 7

Discusses radio emission in the universe, in the galaxy, and from the sun, and problems in radio emission by celestial bodies. Shows Reber's apparatus for observing radio emission and his isophotographs of the firmament. Shows a time record of intensity changes in radio emission of

33/49T102

[redacted]

Jul 48

USSR/Physics (Contd)

parts of the Milky Way adjoining the sun as a function of the latter's yearly movement.

USSR/Corona, Solar
Solar Phenomena

May 1946

"Some of the Results Obtained at the Sternberg State Astronomical Institute in Studying Solar Corona and Chromosphere," E. I. Bugoslavskaya, V. N. Pariyskiy, I. S. Shklovskiy, 23 pp

"Izv Ak Nauk Ser Fiz" Vol X, No 5/6

Table showing the concentration of ionic Fe and Ni in the corona. Table showing the wave-lengths and spectral terms of iron ions. Schema of the solar corona of 21 Sep 1941. Graph showing the deviation from the normal of the coronal radiation with position on the solar surface. Many sketches of the chromosphere for various years. Two diagrams showing various isographs around the sun for intensity of radiation for various elements (Fe, Ni, etc.).

PA 12T76

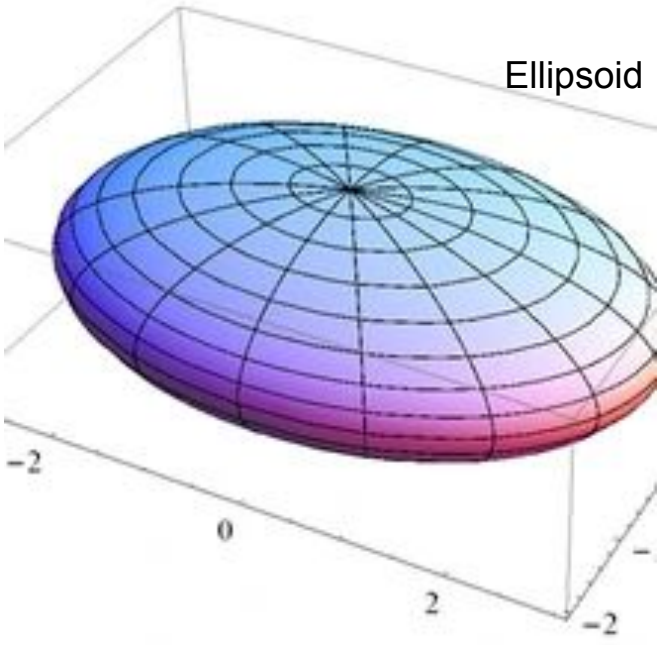
http://adsabs.harvard.edu/full/1970SSRv...11..341S

Air glow article about firmament

Explaining the dome

https://www.cia.gov/library/readingroom/docs/CIA-RDP96-00788R001400450001-8.pdf

Ellipsoid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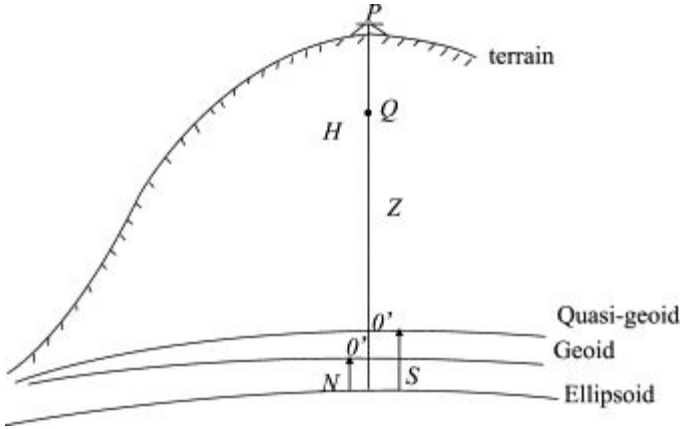
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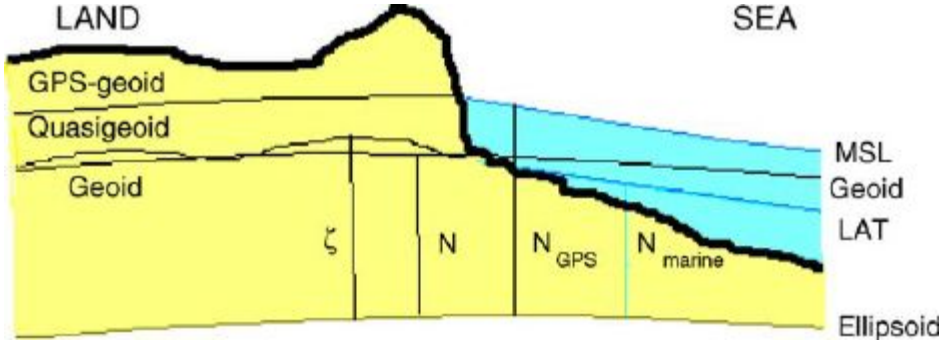
Geoid
N
S
Ellipsoid


LAND
SEA
GPS-geoid
Quasigeoid
Geoid
MSL
Geoid
LAT
ζ
N
N GPS
N marine
Ellipsoid

then I will show these signs: the books shall be opened before the face of the firmament, and all shall see my judgment] together.

2 Esdras 6

Again, on the second day, you created the spirit of the firmament, and commanded it to divide and separate the waters, so that one part might move upward and the other part remain beneath.

2 Esdras 6:41

He has confined the sea in the midst of the waters; and by his word he has suspended the earth over the water. He has spread out the heaven like a dome and made it secure upon the waters;

2 Esdras 16:58-59

And thy heaven that is over thy head shall be **brass**, and the earth that is under thee shall be iron.
Deuteronomy 28:23

And the likeness of the firmament upon the heads of the living creature was as the colour of the terrible crystal, stretched forth over their heads above.

23 And under the firmament were their wings straight, the one toward the other: every one had two, which covered on this side, and every one had two, which covered on that side, their bodies.

24 And when they went, I heard the noise of their wings, like the noise of great waters, as the voice of the Almighty, the voice of speech, as the noise of an host: when they stood, they let down their wings.

25 And there was a voice from the firmament that was over their heads, when they stood, and had let down their wings.

26 And above the firmament that was over their heads was the likeness of a throne, as the appearance of a sapphire stone: and upon the likeness of the throne was the likeness as the appearance of a man above upon it.

https://www.youtube.com/watch?v=30oZVtUEyUg&t=14s

https://www.newscientist.com/article/dn27803-slo-mo-reveals-how-enigmatic-sprites-explode-in-the-atmosphere/