WORK-IN-PROGRESS (APRIL 1, 2015) PARALLEL CHART FOR

58:2 (“The Urantia Atmosphere”) and 58:5 (“The Continental Drift”)

Sources for 58:2 and 58:5

(1) Dr. Harlan True Stetson, “Solar Radiation and the State of the Atmosphere,” *The Scientific Monthly*, Vol. 54, No. 6 (June 1942)

(2) Charles Schuchert, *A Text-book of Geology, Part II: Historical Geology, Second, Revised Edition* (New York: John Wiley & Sons, Inc., 1924)

(3) Reginald Aldworth Daly, *Our Mobile Earth* (New York: Charles Scribner’s Sons, 1926)

(4) Thomas C. Chamberlin and Rollin D. Salisbury, *A College Text-book of Geology* (New York: Henry Holt and Company, 1909)

Key

(a) Green indicates where a source author first appears, or where he/she reappears.

(b) Yellow highlights most parallelisms.

(c) Tan highlights parallelisms not occurring on the same row, or parallelisms separated by yellowed parallelisms.

(d) An underlined word or words indicates where the source and the UB writer pointedly differ from each other.

(e) Blue indicates original (or “revealed”) information, or UB-specific terminology and concepts. (What to highlight in this regard is debatable; the highlights are tentative.)

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PAPER 58—LIFE ESTABLISHMENT ON URANTIA

2. THE URANTIA ATMOSPHERE

"SOLAR RADIATION AND THE STATE OF THE ATMOSPHERE" (Stetson 513)

Because of the relatively insignificant size of the earth, and also the great distance that separates us from the sun a distance of 93 million miles, our planet can intercept but

58:2.1 The planetary atmosphere filters through to the earth

about one two billionths of the total solar output (S 514).

about one two-billionths of the sun's total light emanation.

At a price of 1¾ cents per kilowatt hour, the annual budget that would have to be allowed for sunshine for the continental United States alone

If the light falling upon North America were paid for at the rate of two cents per kilowatt-hour, the annual light bill

would represent an expenditure of 327 quadrillion dollars (S 514).

would be upward of 800 quadrillion dollars.

If we change our picture to a more restricted one, we can say that the cost of sunshine for Greater New York at the above figure would amount to approximately 100 million dollars for the average day (S 514).

Chicago's bill for sunshine would amount to considerably over 100 million dollars a day.

SOURCE OR PARALLEL	URANTIA PAPER 58
If we analyze the radiation from the sun we discover that it covers a wide range of wave-lengths. Certain of these wave-lengths or frequencies produce their own special effects upon the earth and its atmosphere (S 514).	And it should be remembered that you receive from the sun other forms of energy—
	light is not the only solar contribution reaching your atmosphere.
[Outside the] so-called visible range to which the eye responds there is a vast scale of radiations both beyond the red end of the spectrum, which we call the infrared, and far down below the violet, which we call the ultra-violet (S 514).	Vast solar energies pour in upon Urantia embracing wave lengths ranging both above and below the recognition range of human vision.
Observations with the spectroscope indicate that there is much radiation at the extreme ultra-violet end of the spectrum to which the earth's atmosphere is completely opaque.	58:2.2 The earth's atmosphere is all but opaque to much of the solar radiation at the extreme ultraviolet end of the spectrum.
A great deal of the absorption of this region of the solar spectrum of very short wave-lengths is caused by	Most of these short wave lengths are absorbed by
a layer of ozone which exists at an average height of about 22 kilometers [*13.67 miles*],	a layer of ozone which exists throughout a level about ten miles above the surface of the earth,
but which probably occupies a region extending from 15 to 35 kilometers [*9.321 miles to 21.749 miles*].	and which extends spaceward for another ten miles.
If all the ozone in this region were to be brought to the standard conditions of temperature and pressure of our atmosphere at the earth's surface,	The ozone permeating this region, at conditions prevailing on the earth's surface,
it would represent a layer of only 2 to 3 millimeters in thickness. [*0.0788 to 0.1182 inches*]	would make a layer only one tenth of an inch thick;

SOURCE OR PARALLEL	URANTIA PAPER 58
Yet this small amount of ozone	nevertheless, this relatively small and apparently insignificant amount of ozone
is the defense between us and extremely dangerous radiations in the ultra-violet region of the sun's light (S 516).	protects Urantia inhabitants from the excess of these dangerous and destructive ultraviolet radiations present in sunlight.
Were this absorption, however, of this region of the solar spectrum even a little greater than it is,	But were this ozone layer just a trifle thicker,
we should be deprived of that small amount of ultra-violet light filtering through our atmosphere that is so essential for health	you would be deprived of the highly important and health-giving ultraviolet rays which now reach the earth's surface,
and the production of our sunshine vitamin D (S 516).	and which are ancestral to one of the most essential of your vitamins.
	58:2.3 And yet some of the less imaginative of your mortal mechanists insist on viewing material creation and human evolution as an accident. The Urantia midwayers have assembled over fifty thousand facts of physics and chemistry which they deem to be incompatible with the laws of accidental chance, and which they contend unmistakably demonstrate the presence of intelligent purpose in the material creation. And all of this takes no account of their catalogue of more than one hundred thousand findings outside the domain of physics and chemistry which they maintain prove the presence of mind in the planning, creation, and maintenance of the material cosmos.
We can be confident, however, that it is a fortunate combination of the sun and our atmosphere that makes life on the earth possible. The sun not only radiates its health-giving sunshine, but it also emits literally death-dealing rays (S 516).	58:2.4 Your sun pours forth a veritable flood of death-dealing rays,

and your pleasant life on Urantia is due to the "fortuitous" influence of more than two-score apparently accidental protective operations similar to the action of this unique ozone layer.

[The atmosphere] is a sort of buffer state, the very top of which receives a violent bombardment of high frequency radiations from the sun, and the lower layers of which form a blanket that enables the earth to retain during the night much of the warmth generated by the sunshine that has penetrated through it, thus mitigating the extremes of temperature between night and day to which the earth would otherwise be subjected (S 516-17).

58:2.5 Were it not for the "blanketing" effect of the atmosphere at night, heat would be lost by radiation

so rapidly that life would be impossible of maintenance except by artificial provision.

[contd] If we look at a cross-section of the earth's atmosphere, it may for convenience be divided into three zones or layers in which the stratosphere occupies the middle ground. The region below the stratosphere is that which contacts our immediate surroundings and provides the winds and atmospheric currents, giving rise to all our weather. We call this lower region comprising perhaps the first 5 or 6 miles the troposphere.

58:2.6 The lower five or six miles of the earth's atmosphere is the troposphere; this is the region of winds and air currents which provide weather phenomena.

The region above the stratosphere is the ionosphere.

Above this region is the inner ionosphere

and next above is the stratosphere.

SOURCE OR PARALLEL	URANTIA PAPER 58
If we send a recording thermometer aloft, we find that while passing through the troposphere the temperature steadily falls until a height of 10 or 12 kilometers [*6.214 to 7.4568 miles*] is reached,	Ascending from the surface of the earth, the temperature steadily falls for six or eight miles,
when the temperature reaches the extremely low value of -55º C., or some 68º below zero Fahrenheit.	at which height it registers around 70 degrees below zero F.
Strangely enough, for the next 30 miles or so there appears to be little change in temperature.	This temperature range of from 65 to 70 degrees below zero F. is unchanged in the further ascent for forty miles;
This is the region of the stratosphere (S 517).	this realm of constant temperature is the stratosphere.
At a height of 60 kilometers or some 40 miles, the temperature would begin to rise again.	At a height of forty-five or fifty miles, the temperature begins to rise,
	and this increase continues until,
Recent investigations give some evidence that at extreme heights, up where the auroral fires play, temperatures of 1,000º C. [*1832º F.*] have to be postulated	at the level of the auroral displays, a tempera-ture of 1200° F. is attained,
to account for the presence of the ionized oxygen that is there.	and it is this intense heat that ionizes the oxygen.
The extremely rarefied condition of this upper atmosphere, however, calls for perhaps a quite different interpretation of temperature than that to which we are ordinary accustomed when determining temperatures by the thermometer at the earth's surface (S 517).	But temperature in such a rarefied atmosphere is hardly comparable with heat reckoning at the surface of the earth.

SOURCE OR PARALLEL	URANTIA PAPER 58
	Bear in mind that
[contd] Ascending through the cross-sections of the atmosphere, we find there is a rapid decrease in the amount of atmospheric pressure. Within the first 3 miles from the earth's surface, half the total amount of oxygen and nitrogen, the principal atmospheric ingredients, are included.	one half of all your atmosphere is to be found in the first three miles.
The limiting height to which the thinning atmosphere extends is somewhat difficult to fix. Perhaps we should place it at 200 to 300 miles, although recently Dr. Carl Störmer has observed auroral streamers reaching to heights of 600 kilometers [*372.84 miles*] or more. Where the auroral streamers go, some of the thin atmosphere must extend (S 517).	The height of the earth's atmosphere is indicated by the highest auroral streamers—about four hundred miles.
[contd] If we make a chart of the numbers and occurrences of aurorae we find there seems to be a curious connection between the frequency and brightness of auroral displays and the state of the sun as marked by the appearance of sunspots (S 517).	58:2.7 Auroral phenomena are directly related to sunspots,
It was in 1908 that the late Dr. George Ellery Hale, the founder and director of the Mount Wilson Observatory, first observed that sunspots were giant cyclones in the sun's atmosphere (S 518).	those solar cyclones
To carry the analogy still further, spots north of the sun's equator are in general whirling in one direction while corresponding spots south of the equator whirl in the opposite direction. If the rotation of the one is clockwise, that of the other is counter-clockwise.	which whirl in opposite directions above and below the solar equator,

SOURCE OR PARALLEL	URANTIA PAPER 58
This again is characteristic of the differences of rotation of tropical hurricanes on the earth originating in the northern and southern hemispheres, respectively (S 518).	even as do the terrestrial tropical hurricanes.
	Such atmospheric disturbances whirl in opposite directions when occurring above or below the equator.
When the Mount Wilson observers first examined and actually measured the frequency of light coming from the centers of sunspots, it was found to have changed frequency in exactly the way that light waves are distorted in the laboratory when a powerful electromagnet is placed around the source of light being examined (S 519).	58:2.8 The power of sunspots to alter light frequencies
Thus came the startling revelation that sunspots were not only terrific hurricanes but every center was in itself a powerful magnet (S 519).	shows that these solar storm centers function as enormous magnets.
Since a magnetic field may exert a repulsing effect upon swiftly moving electrons, we see some reason that charged electric particles can be actually hurled from sunspot centers at velocities which may carry them through space into the earth's atmosphere,	Such magnetic fields are able to hurl charged particles from the sunspot craters out through space to the earth's outer atmosphere,
thus ionizing the upper regions of the air in a way that would produce auroral displays.	where their ionizing influence produces such spectacular auroral displays.
In the light of such a mechanism, therefore, we see a possible reason why aurorae occur in greater numbers and at greater brilliance at times when these solar storms occur most frequently (S 519-20).	Therefore do you have the greatest auroral phenomena when sunspots are at their height—

SOURCE OR PARALLEL	URANTIA PAPER 58
There is, I believe, a good reason for the fact that the maximum in the auroral displays occurs a year or two after the year of most sunspots.	or soon thereafter—
As sunspots begin to wane in numbers, they are nevertheless occurring in regions progressively nearer the solar equator, and as the sun's equator is inclined but slightly to the plane of the earth's orbit, we may draw the inference that sunspots are most effectively associated with the aurorae when, other things being equal, they are most nearly in the geometrical plane that the earth travels in its journey around the sun (S 517-18).	at which time the spots are more generally equatorially situated.
	58:2.9 Even the compass needle is responsive to this solar influence
When the sun rises in the east, the north end of the compass needle turns slightly toward that direction (S 520-21).	since it turns slightly to the east as the sun rises
Then in the afternoon as the sun wanders and sets in the west, the compass needle wanders likewise to the west,	and slightly to the west as the sun nears setting.
coming back again to its normal position about midnight when the sun is below the northern horizon.	
This goes on day after day, month after month—	This happens every day,
but during the years when sunspots are most numerous these daily excursions of the compass needle will on the average be twice as great as during the years when the sunspots are lacking.	but during the height of sunspot cycles this variation of the compass is twice as great.

SOURCE OR PARALLEL	URANTIA PAPER 58
These diurnal wanderings of the compass needle can now be roughly explained as due to the effects of ionization of the upper atmosphere	These diurnal wanderings of the compass are in response to the increased ionization of the upper atmosphere,
by sunlight (S 521).	which is produced by the sunlight.
	58:2.10 It is the presence of two different levels of electrified conducting regions
[The lower electrified conducting region, *i.e.* the Kennelly-Heaviside layer, also designated as the E layer] lies far above the stratosphere and generally above the region that is usually regarded as that where ozone is manufactured.	in the superstratosphere
	that accounts for the long-distance transmission of
This E layer is particularly favorable for reflecting or turning back radio waves of the frequencies which are most generally used for commercial broadcasting in connection with our entertainment programs [*i.e.* medium wave]. Radio waves of much shorter wave-lengths or of higher frequencies penetrate and actually traverse through this region until they reach what appears to be another ionized region called the F layer, originally postulated by Professor Appleton in England (S 522).	your long- and short-wave radio-broadcasts.
During the last few years of sunspot activity, there have been occasions when remarkable fadeouts have occurred in radio communication (S 523).	Your broadcasting is sometimes disturbed
Could we visualize the ethereal substance of the ionosphere as we visualize the surface of the ocean, we should find times when terrific storms were raging in this ionosphere (S 524).	by the terrific storms which occasionally rage in the realms of these outer ionospheres.

5. THE CONTINENTAL DRIFT

58:5.1 The continental land drift continued.

IX: THE EARTH BEFORE GEOLOGIC TIME (Schuchert 127)

[*Preamble*] (Schuchert 127)

The earth as a whole is very rigid, as dense and rigid as is armor steel, or glass (S 129).

The earth's core had become as dense and rigid as steel,

III: THE EARTH'S INTERIOR (Daly 90)

The pressure increases with depth, so that at the earth's center it amounts to the inconceivable 45,000,000 pounds, or about 22,000 tons, to the square inch (D 104).

being subjected to a pressure of almost 25,000 tons to the square inch,

and owing to the enormous gravity pressure, it was and still is very hot in the deep interior.

We have reviewed new data showing the rate at which the temperature increases with depth below the surface.

The temperature increases from the surface downward

The temperatures of the deep interior probably surpass the surface temperature of the sun, about 6,000 degrees, or four times the temperature of vivid white-heat (D 126).

until at the center it is slightly above the surface temperature of the sun.

2. An outer shell, about 1,000 miles thick, and occupying nearly six tenths of the whole volume, is essentially composed of silicate material, the substance of ordinary rocks (D 107).

58:5.2 The outer one thousand miles of the earth's mass consists principally of different kinds of rock.

SOURCE OR PARALLEL	URANTIA PAPER 58
1. The earth's core, in volume about one-sixth of the whole planet, is composed of metallic iron, alloyed with a small portion of nickel and other metals, which appear in iron meteorites (D 107).	Underneath are the denser and heavier metallic elements.
According to [the tidal-disruption theory, first announced by Chamberlin] thus modified [by Jeans and Jeffreys], the earth was once fluid.	Throughout the early and preatmospheric ages the world was so nearly fluid in its molten and highly heated state
When fluid, much of its denser material must have sunk toward the center; much of the less dense material must have risen toward the surface (D 104).	that the heavier metals sank deep into the interior.
	Those found near the surface today represent the exudate of ancient volcanoes, later and extensive lava flows, and the more recent meteoric deposits.
[T]he crust is about 40 miles thick (D 91).	58:5.3 The outer crust was about forty miles thick.
[*See* Fig. 56. DIAGRAMMATIC SECTION SHOWING DISTRIBUTION OF DENSITIES IN THE EARTH'S CRUST AND BELOW IT. (D 100)]	This outer shell was supported by, and rested directly upon, a molten sea of basalt of varying thickness,
[*Compare:* The substratum is white-hot. Nevertheless, it is not highly mobile, ... for the great pressure makes it rigid—even more rigid than plate glass at the temperature of a room (D 114).]	a mobile layer of molten lava held under high pressure
Now, it is found that, under ... differential stresses, the subcrustal material has flowed so as very nearly to restore the original state of internal pressure (D 114-15).	but always tending to flow hither and yon in equalization of shifting planetary pressures,
	thereby tending to stabilize the earth's crust.

SOURCE OR PARALLEL	URANTIA PAPER 58
[T]he crystallized, basaltic earth shell below each ocean basin and, as well, each of the high-floating continents are underlain by a deep, continuous layer of non-crystallized, glassy, eruptible basalt (D 100).	58:5.4 Even today the continents continue to float upon this noncrystallized cushiony sea of molten basalt.
[?]	Were it not for this protective condition, the more severe earthquakes would literally shake the world to pieces.
[But the ordinary earthquake is not the effect of volcanic action. Both quake and volcano are effects of a common cause, the sudden fracture of a strained crust (D 78-79).]	Earthquakes are caused by sliding and shifting of the solid outer crust and not by volcanoes.
[See D 95.]	58:5.5 The lava layers of the earth's crust, when cooled, form granite.
The best value [of the earth's mean density] is 5.52, water having the density of 1.0 (D 103).	The average density of Urantia is a little more than five and one-half times that of water;
The average density of [the rocks constituting the continents] is close to 2.70; that is, on the average, they weigh 2.70 times as much as an equal volume of water. This is nearly the density of typical granite, and in fact the principal continental rock *is* granite (D 94).	the density of granite is less than three times that of water.
At the center the density approaches 11.6, or one and one half times that of iron at zero pressure (D 107).	The earth's core is twelve times as dense as water.
	58:5.6 The sea bottoms are more dense than the land masses,
[The continents] project above the ocean floor because they are made of rocks lighter than the rocks beneath the deep sea (D 91).	and this is what keeps the continents above water.

SOURCE OR PARALLEL	URANTIA PAPER 58
	When the sea bottoms are extruded above the sea level,
The deep-sea islands are chiefly made of basalt, a rock with the density of about 3.0,	they are found to consist largely of basalt,
and therefore heavier than granite (D 97).	a form of lava considerably heavier than the granite of the land masses.
If the density of the rocks beneath the oceans, from the sea bottom down and level for level, were identical with the density of the rocks beneath the continental surface,	Again, if the continents were not lighter than the ocean beds,
then the continents would represent excess of matter at the earth's surface. The gravitational attraction of each of these great masses of excess matter would pull up the sea water on the continents (D 99).	gravity would draw the edges of the oceans up onto the land,
But geodetic and other methods show that the sea-level is not so distorted by anything like the amount expected on the hypothesis (D 99).	but such phenomena are not observable.
	58:5.7 The weight of the oceans is also a factor in the increase of pressure on the sea beds.
At the depth of 40 miles, or one per cent of the earth's radius, the combined weight of the ocean and the suboceanic rock	The lower but comparatively heavier ocean beds, plus the weight of the overlying water,
is almost exactly equal to the weight of the continental rock at the same level. The continents are thus kept essentially in flotation and tend to be stable (D 99).	approximate the weight of the higher but much lighter continents.

SOURCE OR PARALLEL | URANTIA PAPER 58

XVI: THE CAMBRIAN PERIOD (Chamberlin & Salisbury 476)

FORMATIONS AND PHYSICAL HISTORY (Chamberlin & Salisbury 476)

The Subdivisions of the Cambrian and their Distribution (Chamberlin & Salisbury 476)

1. **Lateral spread or continental creep.** (Chamberlin & Salisbury 480)

But all continents tend to creep into the oceans.

[contd] The continents stand about 15,000 feet above the ocean bottom. Their weight causes a pressure of 15,000 to 20,000 pounds to the square inch on their bases (C&S 480).

The continental pressure at ocean-bottom levels is about 20,000 pounds to the square inch.

That is, this would be the pressure of a continental mass standing 15,000 feet above the ocean floor.

Spreading is opposed by the hydrostatic pressure of the oceans against the sides of the continental platforms. This is some 5,000 pounds per square inch at the bottom, so that there remains an unbalanced pressure of 10,000 to 15,000 pounds per square inch, tending to cause creep (C&S 480).

The ocean-floor water pressure is only about 5,000 pounds to the square inch.

This pressure tends to cause the continents to spread by creep into the ocean basins, on the same principle that a great body of ice, such as an ice-sheet, spreads (C&S 480).

These differential pressures tend to cause the continents to slide toward the ocean beds.

[See 57:8.5 and compare D 310.]

58:5.8 Depression of the ocean bottom during the prelife ages had upthrust a solitary continental land mass

to such a height that its lateral pressure tended to cause the eastern, western, and southern fringes to slide downhill, over the underlying semiviscous lava beds, into the waters of the surrounding Pacific Ocean. This so fully compensated the continental pressure that a wide break did not occur on the eastern shore of this ancient Asiatic continent, but ever since

[?]

has that eastern coast line hovered over the precipice of its adjoining oceanic depths, threatening to slide into a watery grave.