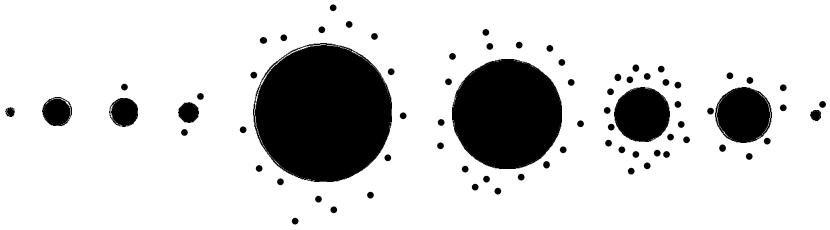
OUR SOLAR SYSTEM AND ITS ORIGIN

WAYNE R. SPENCER



Knowledge of our solar system has grown exponentially in recent years. Voyager, Clementine, Magellan, NEAR (Near Earth Asteroid Rendevous), Galileo, Mars Pathfinder, and the Mars Global Surveyor. These are names of NASA solar system missions over the past twenty years. Though not well known, the European Space Agency (ESA) has made significant contributions in solar system research over the past twenty years as well. The ESA also has missions planned for upcoming months and years that have great potential for significant scientific discoveries. The ESA mission Giotto was the first to take close up photos of a comet; the Giotto spacecraft flew by both comet Halley in 1986 and comet Grigg-Skjellerup in 1992. ESA operates three different missions currently that study the Sun and various solar phenomena that affect Earth. In 2005, after the Cassini spacecraft arrives at Saturn, a special probe built by the ESA called Huygens will be sent down into the atmosphere of Saturn's moon, Titan. Other possible future ESA missions include a mission to Mars, a mission to Mercury, one to the Moon to test a new solar-electric ion propulsion system, and a mission to orbit and land on a comet. Great resources in manpower and funding are required for all these missions, yet the science gleaned from these missions is biased by evolutionary presuppositions. However there are a few individuals with backgrounds in physics and astronomy who are young-age creationists interested in rethinking solar system issues from a creation perspective. What is a creation perspective on the solar system?

In the Bible, Romans 1:20 indicates that God's invisible qualities or attributes are evident to all people in the way things have been made. Much has been written regarding evidence for intelligent design in the living world. The complexity and purpose evident in living things points to an intelligent Creator. The attributes of the Creator are also evident from the non-living world. God's power, creativity, and purpose are evident in our solar system. Our solar system and our home planet are made to give us a safe stable existence. There has also been a great deal of research in recent years on the topic of extrasolar planets – planets orbiting other stars. Though a number of planets seem to exist around other stars, those solar systems are usually very different from our own (Spencer, 2001). In our solar system, not only has Earth been created so that it is an effective habitat for life, but there are other advantages to us on Earth from the way our solar system is arranged. For example, the size of our Moon and its distance from Earth are just right to allow for total eclipses of the Sun (Faulkner, 1998, p.23). Also, we now realize that Jupiter shields Earth from impacts from comets and asteroids because of where it is placed in our solar system.

Thus there are unique properties of our solar system that are for our benefit. Isaiah 45:18 in the NIV Bible says:

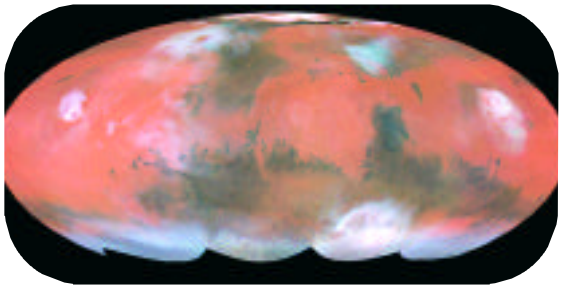
> "for this is what the LORD says—
>
> he who created the heavens,
>
> he is God;
>
> he who fashioned and made the earth,
>
> he founded it;
>
> he did not create it to be empty,
>
> but formed it to be inhabited".

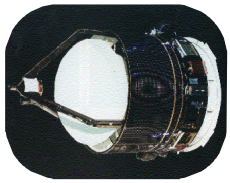
TABLE 1.
Numerical data for the planets. Masses and diameters are compared to Earth. Here A.U. refers to Astronomical Unit, the distance from Earth to the Sun, which is approximately 93 million miles.

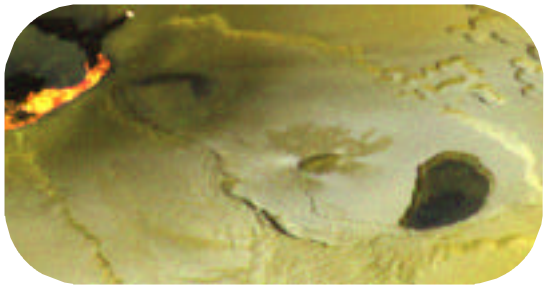
Name	Mass	Number of moons	Diameter	Distance from Sun in A.U.
Sun	333,266	-	109	-
Mercury	0.056	0	0.38	0.39
Venus	0.82	0	0.95	0.72
Earth	1	1	1	1
Mars	0.108	2	0.53	1.52
Jupiter	318	61	11.2	5.2
Saturn	95.1	31	9.41	9.5
Uranus	14.5	21	3.98	19.2
Neptune	17.2	11	3.81	30.1
Pluto	0.002	1	0.27	39.5

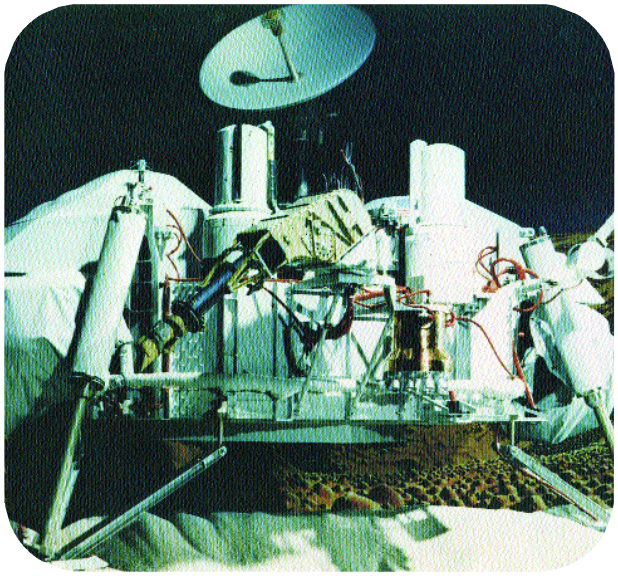
1 2 3
4 5
6

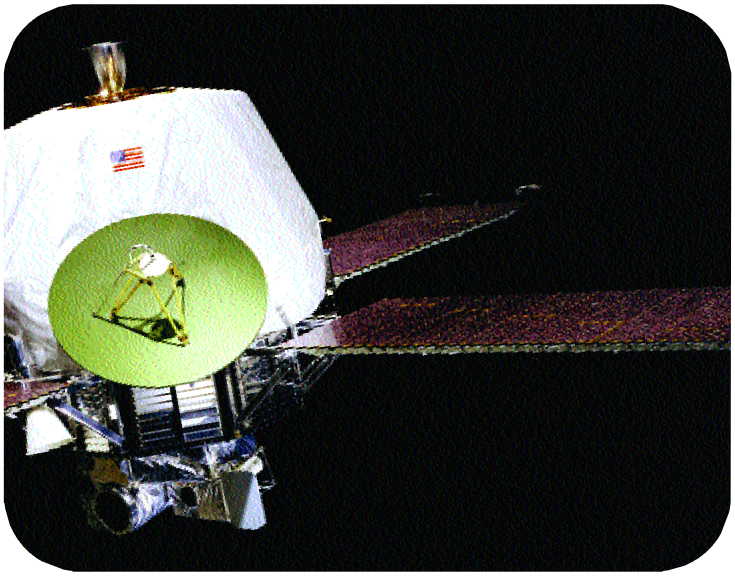
See inside back cover for image captions

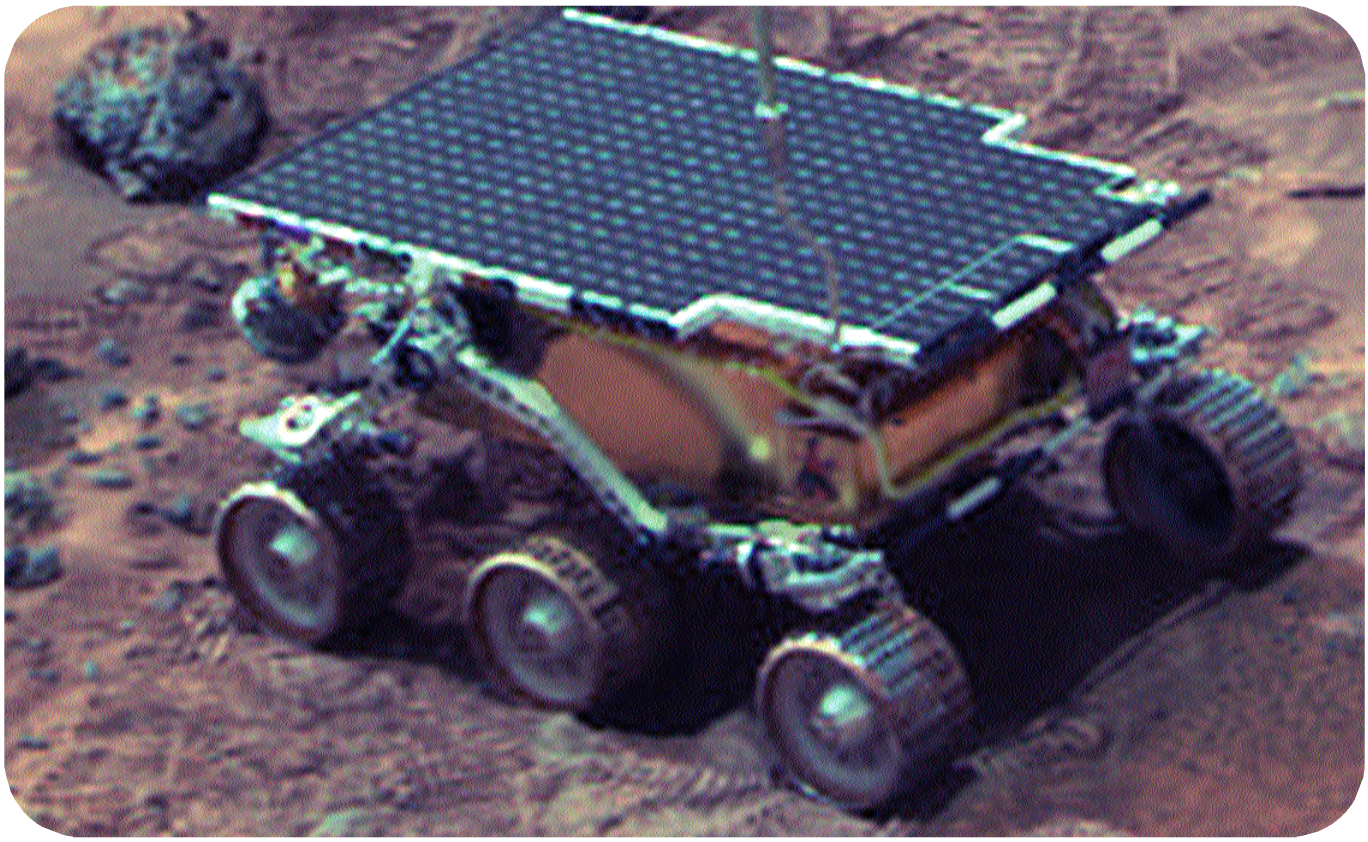












The Creator-God is not limited to the familiar environment we take for granted on Earth. He has made a variety in the planets and moons of our solar system, not to speak of the many thousands of smaller objects such as the asteroids, comets, and Kuiper Belt Objects found beyond Neptune. There are great extremes of conditions on these objects and features that have been very surprising to scientists. In today's accepted evolutionary approach to the origin of the solar system, all objects in the solar system are believed to have originally come from one cloud of gas and debris. Starting with this assumption leads to certain patterns being expected by planetary scientists when various solar system objects are studied. However, God is not limited to the naturalistic patterns predicted by evolutionary scientists.There have been many surprises as solar system missions have brought in the mountains of data. Many solar system origin problems have been researched for many years and yet there is still not a consensus on numerous issues, in spite of sophisticated modern methods.

In today's accepted naturalistic view of the origin of our solar system, supernatural creative activity by a Creator is not considered an option. Known processes of gravity, magnetism, chemistry, radioactivity are the primary processes involved in explaining how matter in a nebula in space could pull together to form our Sun, the planets, and all other objects in the solar system. This view is known as the Nebula Hypothesis. It is generally a very old idea but today there are many additions and modifications to the model to account for recent discoveries. Thus it could be called the Modified Nebula Hypothesis. However, there are some characteristics of solar system objects that do not lend well to them forming from a cloud of gas and dust.

A large nebula as observed in space is generally quite hot, hot enough to give off light, which is what allows us to see it. Such nebulae in space are much larger than our solar system and they are generally believed to have come from the explosion of stars (supernovae). As it cools, gravity would cause the nebula to contract and become more and more dense. In the Nebula Hypothesis, the nebula that is believed to have contracted to form our Sun is called the protosolar nebula. Such a cloud is rotating prior to its collapse, and as the cloud contracts by gravity, its spin would accelerate just like the spin of an Olympic ice skater pulling their arms in. As gravity continues to cause the cloud to contract, it would become a spinning disk of gas and dust. Matter is pulled to the centre and it is believed the gas in the centre would become dense enough for nuclear reactions to begin and then our Sun would begin generating energy as a star. As gravity pulls matter together, the gas begins to heat up, the rotation of the disk accelerates and this begins to push the material apart; magnetic forces can drive the material apart as well. Thus, one scientist, H. Reeves, referred to these as problems for explaining how the Sun and planets could form from the nebula. Reeves summarized the problems saying, "The clouds are too hot, too magnetic, and they rotate too rapidly" (Reeves, 1978, p.9). Many computer simulations of such processes have been done by physicists and astronomers. There are limitations of such models because the simulations either do not start with conditions like real nebulae or they do not model the entire process from a nebula in space to the complete formation of the Sun and planets. In the Nebula model, the gas eventually clears and you are left with a sheet of rocky and icy objects and dust. It is believed the dust and larger objects would stick together as they collided and this would lead to larger and larger objects forming over time. Large objects formed in this way would eventually become the planets. Though this type of scenario is widely accepted by scientists, there are reasons to suggest there is a limit to the size that objects could become by this process. So there are still unresolved issues about how planets could form by natural processes.

The Creator-God is not limited to the familiar environment we take for granted on earth

What are some of the difficulties with the Modified Nebula Hypothesis? One long-standing problem is with angular momentum. Any object in motion around the Sun has angular momentum and the spin of the object itself gives it additional angular momentum. If our Sun formed according to the Nebula Hypothesis, it would spin more and more rapidly as it contracted and the result would be a very rapidly spinning Sun. But, in our solar system we observe that the Sun spins very slowly and the planets move around the Sun relatively quickly. Our Sun makes one rotation on its axis, measured at its equator, in 24 days, 16 hours (Baugher, 1988, p.415). This slow rotation means the Sun possesses only about 2 percent of the total angular momentum of the solar system (Baugher, 1988, p.375). So the distribution of angular momentum doesn't fit the Nebula models well. In order to make it work, scientists have suggested magnetic processes that would slow down the Sun and accelerate the matter that became the planets. This is a very difficult problem for solar system theories. Since this problem has been worked on for years, one would think that it had been solved. But, a well known solar system scientist wrote that, "The ultimate origin of the angular momentum of the solar system remains obscure" (Taylor, 1992, p.53).

Other issues with the Nebula concept have arisen over what you could call 'irregular' properties of otherwise 'regular' objects. In the solar system there is a normal direction for motion, which can be remembered by using the right hand. With the right thumb pointing the direction of the North Pole of the Earth, for instance, the fingers of the right hand will curl in the direction of Earth's spin. This is the normal right-handed direction for both spins and orbital motions in the solar system. This is referred to as the prograde direction. Objects that either spin

or revolve around the Sun in the opposite direction are referred to as moving retrograde. The rotation of the initial nebula dictates that the motions of all objects in the system would be in the prograde direction. But not all objects in the solar system move prograde. The planet Venus spins retrograde at a relatively slow rate, though its upper atmosphere spins very rapidly around the planet. Most of the planets have rotation axes that are not far from being perpendicular to the plane of their orbit. But Uranus and Pluto are exceptions as they both are oriented essentially on their side. Then there are many examples of moons in the solar system where either the orbital motion around the planet or the spin is retrograde. If an orbit is unusually elliptical it is considered 'irregular', as is an orbit where a moon moves retrograde around the planet. Various catastrophic and other scenarios have been suggested to explain the many examples of 'irregular' motion.

Orbital properties do not always reflect what planetary scientists assume from origins models. Triton, one of Neptune's moons, has a very circular orbit, which is considered very 'regular' but Triton orbits in the retrograde direction, which is 'irregular'. Because of this it is assumed that Triton did not originate where it is found now but was somehow captured by Neptune. Captured objects however must be captured into highly elliptical orbits. So, this raises questions about Triton's origin and history that have not been fully answered. From a creation perspective, Triton could have been created in a circular retrograde orbit. From the point of view of the Nebula Hypothesis, this is not possible. At Jupiter many new small moons have been discovered in the past few years due to new observational techniques. Most of them orbit in the retrograde direction and they tend to be grouped in certain regions depending on their orbit inclination and distance from Jupiter. This suggests there may have been larger objects orbiting Jupiter in the past that were broken up by collisions (Sheppard and Jewitt, 2003, pp.261-263).

Our solar system displays certain regular patterns though some facts suggest catastrophic events have altered what God originally created. For example, there is a general tendency for planets nearer to the Sun to be made of higher density materials and planets farther from the Sun to be of lower density, more volatile substances. But, again, there are exceptions to this rule, as **TABLE 2** shows. Saturn and Pluto do not follow this pattern. Naturalistic nebula models for the origin of the solar system treat this relationship as due to the higher temperatures near the Sun than farther out, as the gas and dust in the disk was beginning to form planets. However, seeing this pattern as being from intelligent design is just as reasonable. The higher density, less volatile elements are more appropriate for the region nearer the Sun where temperatures are higher. If volatile gases, such as methane for example were present on Mercury they would only escape into space anyway. Thus there may be a design for stability in the density pattern. But God did not follow this pattern in a rigid manner.

TABLE 2.
Densities of the planets

Planet	Average Density (g/cc)
Mercury	5.43
Venus	5.25
Earth	5.50
Mars	3.93
Jupiter	1.33
Saturn	0.71
Uranus	1.24
Neptune	1.67
Pluto	2.0

The surfaces of planets and moons in our solar system bear indications of a violent history in many cases. Mars has a particularly dramatic geological history apparently. Mars has remnants of very large volcanoes, as well as large impact craters. There are also canyon systems, including Valles Marineris, which is long enough to stretch all the way across the continental United States. There seems to be indications of flooding in the past on Mars. This continues to be an enigma even today because Mars' atmosphere and weak gravity would not allow it to hold an atmosphere that would sustain liquid water. If Mars had an atmosphere in the past, how did the atmosphere get there and how did it lose it? A large part of Mars' surface in roughly the southern hemisphere is heavily cratered and this region is of higher elevation. But much of the northern hemisphere is smoother with dramatically fewer craters and of lower elevation. This is known as the crustal dichotomy and this continues to be a challenging mystery even with all the new detailed information on Mars from recent NASA missions.

In geology, young-age creationists often critique uniformitarianism, which holds that only presently observed processes are allowed for consideration in explaining Earth's geological past (i.e., 'the present is the key to the past'). However, since the Bible indicates there was a global Flood judgement on the Earth, catastrophic processes often explain Earth's geologic features better than normal slow gradual processes. Many planets and moons show many indications of geological catastrophes as well as effects of impacts from space. But, uniformitarianism is often an evolutionary presupposition in solar system studies as well. Nobel prize-winning astronomer Hannes Alfven put it this way:

> *"This 'actualistic principle' which emphasizes reliance on observed phenomena, is the basis for the modern approach to the geological evolution of the Earth; 'the present is the key to the past.' This principle should also be used in the study of the solar system." (Alfven, 1978, p.27).*

An example of where uniformitarian assumptions were very unsuccessful is the moon of Uranus known as Miranda. Miranda is a small moon less than 500 km in diameter. NASA mission planners were not particularly interested in Miranda because a small object cools off more rapidly and thus it was thought Miranda's surface would be uninteresting. It was thought there should not be energy to drive dramatic geological processes so far from the Sun in such a small moon. However, two well

known solar system scientists made the following comments about an unusual feature on Miranda known as the chevron (Chapman and Morrison, 1989, p.140):

> *"Even the earliest pictures of Miranda were enigmatic. From a distance, it looked as though some celestial giant had painted a big white checkmark on its surface, as if to say, 'Here's the answer!' Later called 'the chevron,' the immense check mark remains unexplained to this day."*

I prefer to call the "celestial giant" God. Miranda's surface has many strange surface forms, such as a cliff face which is nearly 10 miles in height! The solar system writers quoted above report a NASA scientist as making the following comment about Miranda's surface.

> *"If you can imagine taking all the bizarre geologic forms in the solar system and putting them on one object, you've got it in front of you." (Chapman and Morrison, 1989, p.140).*

There are various examples in the solar system of issues in which the challenge to the uniformitarian evolutionary approach is one of explaining how there could be energy for billions of years to drive processes we see evidence of. One type of example of this is in the very high speed winds measured in the gas giant planets, Jupiter, Saturn, and Neptune. The farther such a planet is from the Sun, the less energy is being input from the Sun to drive processes in the gases of the planet. So when wind speeds are found to be much higher than expected, it implies there is energy coming from the interior of the planet. This raises questions about the age of the planet and how there could be so much energy to drive such winds. If these planets are less than ten thousand years in age, it is easier to explain how there could still be energy for driving the winds today than if one assumes them to be billions of years in age.

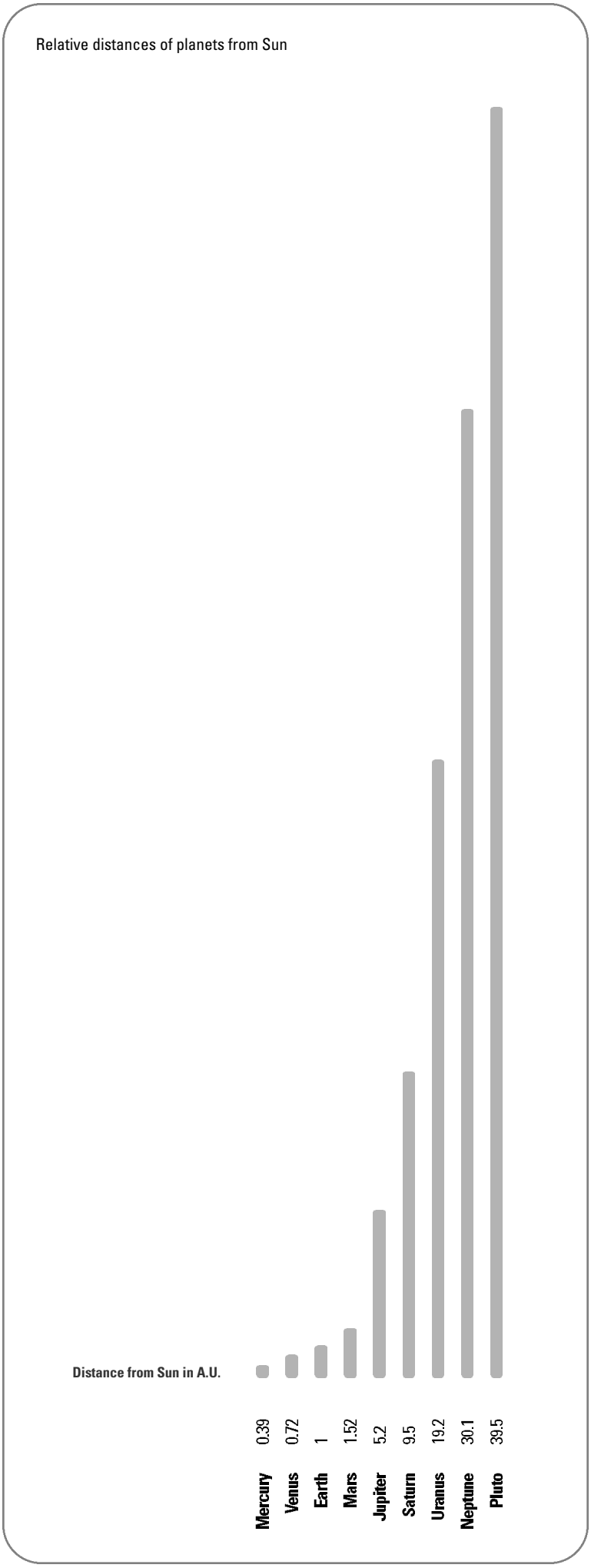
Another example of a similar problem is Jupiter's volcanic moon Io. Io has several active volcanoes erupting at any given moment. These volcanoes are of a variety of types, some causing great explosions of sulphur compounds that soar high above the surface, and some eruptions generating very hot lava that flows out onto the surface. There are large amounts of heat radiating from the surface of Io; the rate would be approximately 100 million million Watts. Planetary scientists have experienced difficulty explaining how a small moon about the size of our moon could give off so much energy. It is known that Jupiter's gravity strongly heats Io from tidal forces flexing Io's shape similar to squeezing a rubber ball. But even this mechanism, known as tidal dissipation, is not an adequate source of heat. A young-age creationary approach simplifies the problem and suggests that heat is still left in Io from creation or possibly from a radioactive heating event in the past (Spencer, 2003).

Another area of research in which a young-age creationist approach has clear advantages over an evolutionary approach is regarding magnetic fields of planets and moons. Evolutionary scientists developed theories of what is called a dynamo to explain Earth's magnetic field. The dynamo theory has it that complicated motions of molten metal in Earth's core have sustained the magnetic field for Earth's alleged 4.6 billion years of history. Also, by the dynamo theory, Earth's magnetic field has undergone many long cycles of reversing polarity in Earth's history and the location of magnetic North has shifted significantly in the past. The dynamo model for Earth's magnetic field requires changes in the motion of the molten metal in the core that have not been adequately explained and there are various other difficulties with Earth dynamo theories. When planetary scientists have attempted to apply Earth-like dynamo models to other objects in the solar system, problems have been encountered (Parker, 1983, pp.44, 51-52).

Creationist physicist Dr. D. Russell Humphreys put forward a model of planetary magnetic fields that works well for both Earth and other objects in the solar system. Humphreys' theory is more flexible than dynamo models and can explain a wider range of types of planets and moons than can the dynamo model, which is based on evolutionary assumptions. Humphreys' approach assumed an age of roughly 6,000 years for Earth and the other planets. Humphreys suggested (1984) that there should be evidence on Mars of there having been a magnetic field there in the past from magnetized rock. In 1994 information was published from the Mars Global Surveyor mission indicating there were stripes of magnetized rock on Mars, even though Mars currently does not have a magnetic field (Connerney *et al*, 1994). There were other confirmations of Humphreys' magnetic field theories when the Voyager spacecrafts measured the magnetic fields of Uranus and Neptune. Both of these planets have odd magnetic fields that are tilted at least 50 degrees compared to the orientation of the planet. Humphreys' theory for planetary magnetic fields accurately predicted the approximate magnetic field strength of both Uranus and Neptune before the Voyager spacecrafts arrived at these planets (Humphreys, 1986; 1990). This is highly significant because dynamo theories require that there be molten metal in the core of an object and that the magnetic field be related to the object's rotation. In Humphreys' approach, the magnetic field could come from a solid metal core, not just a molten core. It also allows for a magnetic field to be in a very different orientation than the rotation axis of the planet.

There is so much new information about our solar system today that it will keep scientists busy for a long time to come as they try to unravel the meaning of it all. There are many problems in solar system studies that will be challenging for creationists as well as evolutionists. There has been significant discussion among creationists about the question of cratering in the solar system. When were the craters produced in our solar system? In the Creation Week, at the Fall of Man, at the time of Noah's Flood, or multiple of the above? This continues to be debated among creationists (Faulkner, 1999; Faulkner and Spencer, 2000; Froede, 2002; Froede and DeYoung, 1996; Spencer 2002). As Christians it is important to realize there are options to be explored for

rethinking and re-explaining the science of origins in the light of new discoveries. We do not have to compromise on our biblical convictions.



REFERENCES

Alfven, H. (1978). Origin of the solar system, in: Dermott, S.F., (ed.), The Origin of the Solar System. *John Wiley & Sons, New York.*

Baugher, J. (1988). The Space-Age Solar System. *John Wiley & Sons, New York.*

Chapman, C.R., Morrison, D. (1989). Cosmic Catastrophes. *Plenum Press, New York.*

Connerney, J.E.P., Acuña, M.H., Wasilewski, P.J., Ness, N.F., Rème, H., Mazelle, C., Vignes, D., Lin, R.P., Mitchell, D.L., Cloutier, P.A. (1994). Magnetic lineations in the ancient crust of Mars. Science, *284(5415):794-798.*

Faulkner, D. (1998). The angular size of the Moon and other planetary satellites – an argument for design. Creation Research Society Quarterly, *35:23-26.*

Faulkner, D. (1999). A biblically-based cratering theory. Creation Ex Nihilo Technical Journal, *13(1):100-104.*

Faulkner, D., Spencer, W. (2000). Reply to Biblically-based cratering theory. Creation Ex Nihilo Technical Journal, *14(3): 75-77.*

Froede, C.R., Jr. (2002). Extraterrestrial bombardment of the inner solar system: a review with questions and comments based on new information. Creation Research Society Quarterly, *38:209-212.*

Froede, C.R., Jr., DeYoung, D.B. (1996). Impact events within the young-earth Flood model. Creation Research Society Quarterly, *33:23-34.*

Humphreys, D.R. (1984). The creation of planetary magnetic fields. Creation Research Society Quarterly, *21:140-149.*

Humphreys, D.R. (1986). The magnetic field of Uranus. Creation Research Society Quarterly, *23:115.*

Humphreys, D.R. (1990). Good news from Neptune: the Voyager 2 magnetic measurements. Creation Research Society Quarterly, *26:15-17.*

Parker, E.N. (1983). Magnetic fields in the cosmos. Scientific American, *249(2):44-54.*

Reeves, H. (1978). The origin of the solar system, in: Dermott, S.F., (ed.), The Origin of the Solar System. *John Wiley & Sons, New York.*

Sheppard, S.S., Jewitt, D.C. (2003). An abundant population of irregular satellites around Jupiter. Nature, *423: 261-263.*

Spencer, W.R. (1994). The origin and history of the solar system, pp. 513-523 in: Walsh, R.E., (ed.), Proceedings of the Third International Conference on Creationism. *Creation Science Fellowship, Inc., Pittsburgh, PA.*

Spencer, W.R. (2001). The existence and origin of extrasolar planets. TJ, *15(1):17-25.*

Spencer, W.R. (2002). Response to Carl Froede on extraterrestrial bombardment. Creation Research Society Quarterly, *39:142-145.*

Spencer, W.R. (2003). Tidal dissipation and the age of Io, pp. 585-595 in: Walsh, R.E., (ed.), Proceedings of the Fifth International Conference on Creationism. *Creation Science Fellowship, Inc., Pittsburgh, PA.*

Taylor, S.R. (1992). Solar System Evolution: A New Perspective. *Cambridge University Press.*