The 'waters above'

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The disks of gas, dust and debris recently observed with modern infrared and millimetre wave instruments in nearby star systems are considered to act as locators to large colliding bodies. These observations are problematic for the evolutionary nebula theory of the formation of planetary systems, but can be easily interpreted from a creationist worldview. I propose that these cratering bodies are analogues for the 'waters above', which in part were used by God during the Curse and the Flood. In this view, the 'waters above' would represent all the bodies, large and small, that lay beyond Neptune in our solar system, including all the cometary material, mostly made of water ice. The total amount today only equals about 0.43 $M_{\oplus}$ (Earth masses), but before the Curse it may have been as much as 100 times more. Some of these large colliders left their mark on the earth's surface as impact craters, as seen today from space. Some may even have triggered the Flood. Spectroscopic analysis of the Kuiper Belt Object (KBO) Quaoar reveals that its surface comprises crystalline water ice and ammonia hydrate ($NH_3.H_2O$). Both of these should have been destroyed by energetic particle irradiation over timescales of 10^7 years, so their existence is evidence *for* a young solar system and *against* a 5-billion-year timescale. In addition, Quaoar's spectrum, in the 1 to 2.5 μm band, is very similar to that of Charon, the moon of Pluto, which has long been suspected of being a captured KBO. Evidence is thus mounting that these objects may be the remains of a watery halo as in the 'waters above'.

'And God said, "Let there be an expanse between the waters to separate water from water." So God made the expanse and separated the water under the expanse from the water above it. And it was so. God called the expanse "sky". And there was evening, and there was morning—the second day' (Genesis 1:6–8).

'And God said, "Let there be lights in the expanse of the sky to separate the day from the night, and let them serve as signs to mark seasons and days and years, and let them be lights in the expanse of the sky to give light on the earth." And it was so. God made two great lights—the greater light to govern the day and the lesser light to govern the night. He also made the stars. God set them in the expanse of the sky to give light on the earth, to govern the day and the night, and to separate light from darkness. And God saw that it was good. And there was evening, and there was morning—the fourth day' (Genesis 1:14–19).

We see here the description of God's creative acts on Days 2 and 4 of Creation Week. But the question may well be asked, 'Where is the "water above"?' as Genesis 1:7 ends with the phrase 'from the water above it [the expanse]'. God calls the expanse sky and this is verified when we read in verse 20 that birds fly through it, but it must also include the space above the atmosphere because Genesis 1:14, 15 and 17, says the expanse contains at least the sun, the moon and the planets.

In 2 Peter we read:

'But they deliberately forget that long ago by God's word the heavens existed and the earth was formed out of water and by water. By these waters also the world of that time was deluged and destroyed. By the same word the present heavens and earth are reserved for fire, being kept for the day of judgment and destruction of ungodly men' (2 Peter 3:5–7).

In a previous paper[1] I suggested that the 'waters above' are in a halo around the solar system, locked up in the form of frozen ices, dirty comets and other large chunks of frozen material. This formed part of a Young Solar System (YSS) model. Clearly, from Genesis 1:2 and 2 Peter 3:5 both the earth and the 'waters above' are formed out of water. The majority of the floodwaters of Noah's Flood most likely came from the existing water created on and inside the earth, given their pre-eminence in Genesis 7:11. It is also feasible that the waters above, in the form of icy comets, were part of the 'windows of heaven', and even possibly triggered the Flood. The many impact craters on the earth, the moon and other planets suggest a period of cosmic bombardment, and their location in the sedimentary record indicates it occurred during the Flood. Cosmic bombardment also possibly took place when God cursed the universe, and the whole order of things changed. I further suggested that these objects might play a major part in the coming judgment of the ungodly in the Day of our Lord. In this paper, I speculate upon the possible position, size and composition of this halo. I will consider it in terms of both the present condition, as well as the size it may have been before the Curse and the Flood. I also present recent evidence that objects classified as KBOs by secular astronomy are the remnants of that halo.

Position and size of debris disks

The regions where dust and debris are detected in other star systems may be a guide to the region of the 'waters above' in our solar system. This is in fact my premise in this paper, since we have now no access to the past state of

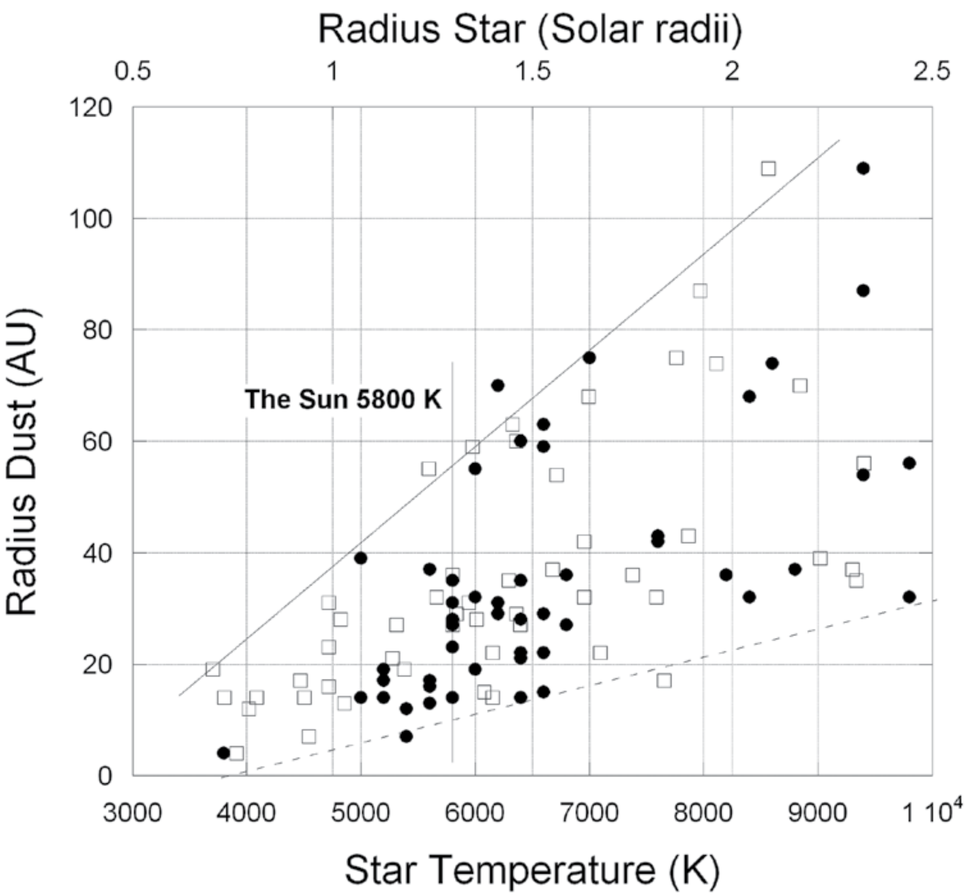


Figure 1. The characteristic radius of dust seen around many stars observed within 100 pc of Earth. Left axis is the characteristic radius to the dust from the parent star. The bottom axis is the temperature of the star (black circles) and the top axis is the radius of the star (open squares).

the watery halo that once was very significant around our outer solar system.

By looking at other star systems, astronomers have been able to analyze the size and extent of the associated disks of dust and debris around parent stars. Cool, dusty debris disks around main-sequence stars have been detected using specialised telescopes, which 'see' at wavelengths in the near-infrared and submillimetre bands. The technique involves the fact that the dust particles are illuminated by the radiation from the parent star and reradiate (as blackbodies) in the appropriate wavelengths.

The emissions, to some extent, penetrate the dust clouds and are detected by instruments on telescopes on Earth (such as the Submillimetre Common User Bolometer Array (SCUBA) camera at the James Clerk Maxwell Telescope[2] on Mauna Kea, Hawaii) and in orbit on the *IRAS* (Infrared Astronomy Satellite[3]) and *ISO* (Infrared Space Observatory[4]) satellites.

Dozens of such stars within about 60 parsecs (pc) have been identified. Many have a non-axisymmetric structure, suggesting a planet in the disk region. The *COBE* satellite has also found that clumps of dust lead and trail the earth in its orbit around the sun in a similar fashion. In many of these cases, where a planet has been suspected, the distance to the possible planet is of the same order as the distance to Neptune in our solar system (about 30 AU[5]).

Zuckerman and Song provide a large amount of data for many stellar systems with dust clouds.[6] In figure 1, I have reproduced this data by plotting the characteristic orbital radii of the dust clouds (R_{dust}), as a function of the temperature (T_{star})[7] and radius (R_{star}) of the star. The radius of the dust cloud was calculated from the model $R_{dust} = (R_{star}/2)(T_{star}/T_{dust})^2$, where R_{star}, T_{star} and T_{dust} are all measured.[8] The size of the dust cloud shows a clear trend as either a function of the star's temperature or radius. Our sun's temperature (5,800 K) is marked by the solid line.

Reading off the graph (figure 1), the inner and outer characteristic radii for our solar system are 10 AU and 55 AU, respectively. A reasonable assumption is that these regions of dust also include the other (frozen) elements such as hydrocarbons, water and volatile molecules, that are often detected in spectra. This region is consistent with the Kuiper Belt, or more precisely with a region extending from the orbit of Neptune: 30 AU, to about 55 AU.

ε-Eridani

There has been little evidence of solar systems around any star of similar spectral type as our Sun.[9] However, ε-Eridani, which is relatively close at 3.22 pc, has some similar features.[10] Using the SCUBA camera at 850 μm wavelengths, studies of the dust ring around ε-Eridani indicate a peak density around 60 AU with much lower emission inside 30 AU. The mass of the ring is at least 0.01 $M_{\oplus}$ [11] (0.01 of the earth's mass), with an upper limit of 0.4 $M_{\oplus}$ in molecular gas from CO observations.

This total is comparable to the estimated amount of similar material in comets orbiting in our solar system (0.33 $M_{\oplus}$). Figure 2 shows the region of debris circling ε-Eridani. This may indicate the region in our own solar system where we should look for the 'waters above'.

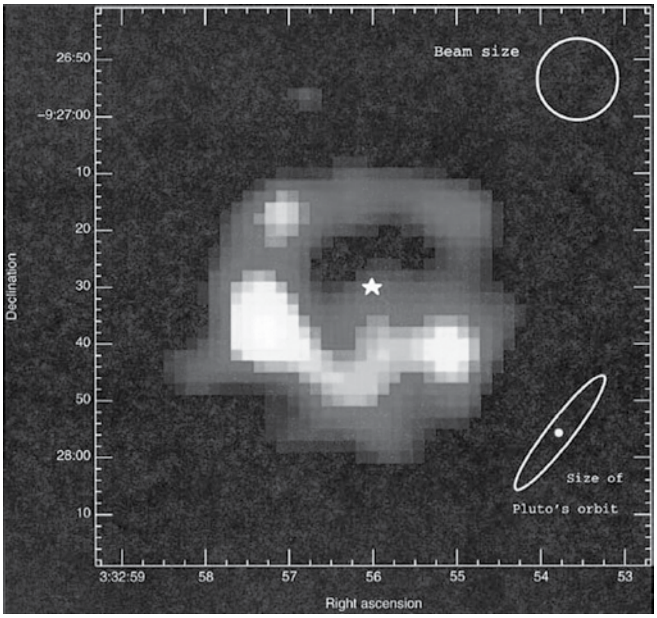


Figure 2. The dust emission around ε-Eridani at 850 μm wavelength reproduced from figure 1 in Greaves *et al.*[9] The star is marked by the star symbol. The system is believed to be seen almost pole on. The size of pluto's orbit is shown for reference.

Our solar system

The Kuiper Belt extends roughly from the orbit of Neptune (30 AU) to about 50 AU.[12] As of 2004, more than 700 large objects of up to approximately 1,000 km in diameter have been identified. I suggest this is currently the region holding most of the remaining 'waters above'.

The trans-Neptunian objects include both Pluto and its moon Charon, which is about 12% the mass of Pluto. Pluto's mass is 0.002 $M_\oplus$ and has a surface temperature of about 35–45 K. Water is solid at this temperature, and other gases are either condensed as a liquid or frozen. Both Pluto (diameter 2,274 km) and Charon (diameter 1,172 km) have measured densities slightly higher than water ice, consistent with other KBOs,[13] which are composed of mostly ice and some rock.

Other large KBOs are now being discovered in the Kuiper Belt, such as Quaoar[14] and Sedna[15] that are believed to be mostly ice. Quaoar (diameter about 1,250 km), at 43.6 AU, is composed mostly of low-density ices mixed with rock, not unlike the makeup of a comet.[14] Sedna (diameter estimated at 1,700 km) ranges from 76 AU to 1,000 AU in a highly elliptical orbit.[16] Both have masses about one third of the asteroid belt, or about $10^{-4}M_\oplus$.

Due to our proximity to the sun, direct measurement of the dust in the Kuiper Belt is difficult. However, the indirect detection of dust is probably a marker to clouds of larger grains and clumps of frozen material in the region beyond Neptune.

If we sum the estimates of Pluto ($2 \times 10^{-3}M_\oplus$) and Charon ($2.4 \times 10^{-4}M_\oplus$) with an estimate for all KBOs (0.1 $M_\oplus$) and the cometary material (diameters less than 10 km), we get a figure close to 0.43 $M_\oplus$.[17]

Composition of the 'waters above'

It is well known that comets are essentially dirty balls of ice,[18] ranging in diameter up to 10 km (Halley's for example). I suggest that the term 'waters above' does not strictly limit our thinking to H_2O—though there is a lot of that in the solar system. We should also include other forms of ices, such as solid hydrogen (H) and oxygen (O_2), both of which may be derived from water.

Recent data[19] from spectral analysis of the surface of Quaoar in 1 to 2.5 μm band indicates Quaoar's surface is at least covered with crystalline (as opposed to amorphous) water ice and ammonia hydrate, both of which contain water. This is consistent with the composition originally being part of the water that was separated from the 'waters below'. Moreover, it has been stated that both of these types of crystals should be destroyed by energetic particle irradiation over timescales of 10^7 years.[19] These crystals still being present, though consistent with a young solar system, is evidence against a 5 billion-year-old solar system. To counter this, the authors, thinking within the evolutionary long-age mindset, concluded that Quaoar must have recently been resurfaced by impacts or cryovolcanic outgassing.

In addition Quaoar's spectrum, in the 1 to 2.5 μm band, is very similar to that of Charon, which has long been suspected of being a captured KBO. Therefore, it too contains a lot of water as well as other ices like ammonia hydrate. Evidence is then mounting that these objects may be the remains of a watery halo as in the 'waters above'.

It is also worth noting that both Uranus at 19 AU from the sun and Neptune at 30 AU are both composed mostly of hydrogen (85%) and to a lesser extent helium, with small amounts of methane and other gases. Neptune is roughly 17 $M_\oplus$ and Uranus is about 14.5 $M_\oplus$. However, I have not included them in the 'waters above' in this analysis, even though they both lie within the 10–55 AU range of typical debris disks for other Sun-like stars in figure 1. It is likely that they were created for another purpose, as they are part of the four Jovian planets. They appear to be located where they are—outside the orbit of the inner planets, including Earth—to prevent potentially damaging large objects from hitting Earth. Jupiter particularly (containing more mass than all the other planets combined) acts as a cosmic vacuum cleaner, attracting stray comets to crash into it rather than travelling to the inner solar system.

Problems for evolutionary models

Planetary disks, or the disks around stars that are thought to evolve into planetary systems, have not shown any strong trend with their supposed evolutionary age.[20] Secular cosmologists had expected that as a star ages its associated disk would also evolve towards solar systems like ours. The

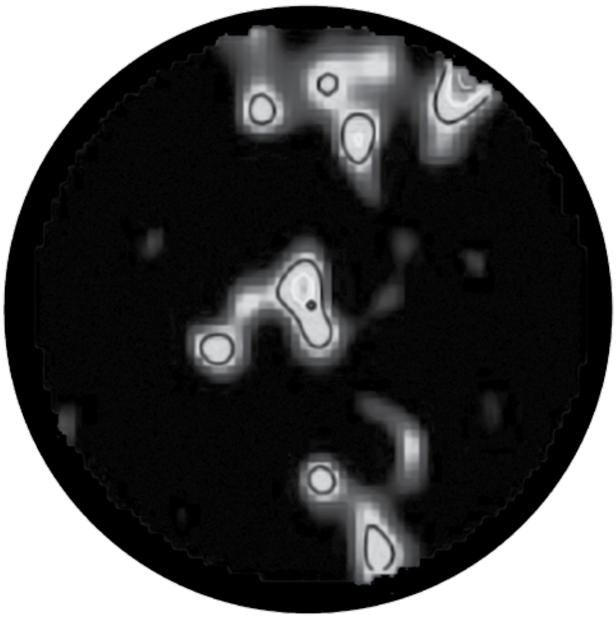


Figure 3. 850-μm image of τ-Ceti after figure 1 in Greaves.[21] The central diamond indicates the star's position. The surrounding peanut shaped region is believed to be the disk of debris seen almost end on.

amount of gas should decrease with time as planetesimals form and eventually become planets. One study of six T-Tauri stars is quoted as saying:

> 'The lack of strong evolutionary trends is somewhat surprising, given that the stars were chosen as an age sequence over the era up to ~ 15 Myr after which the gas is believed to disappear. Also, the initial conditions should have been similar, given that the targets lie in a single star-formation region. It might therefore be expected that the discs would change systematically with time, even in the limited-size sample studied here.'[21]

It seems a substantial reservoir of gas remains during the 1–10 Myr phase of the T-Tauri systems, if we are to believe that these systems are indicative of an evolutionary change. This is a surprise to Greaves, the author of the study, who went on to declare:

> 'Thus the expected evolutionary trends have not been confirmed … . The dense gas discs are generally similar in size regardless of age … and a cleared cavity is confirmed only for the oldest star.'[21]

Greaves is in the mindset that evolution of these stellar systems must take place. But why should that be the case? Ultimately, naturalistic thinking drives these lines of thought. Could it be that stars and star systems do not evolve along expected lines? The nebula hypothesis is at best very poorly constructed and has many problems as a cosmogony. Greaves notes that only one of the studied stars shows a region in the inner solar system that is depleted of dust as expected in the model (as the proto-disk evolves the inner region is cleared out as the star blows out the gas and dust, and the larger planets suck it in etc.).

But if the creation model I suggested earlier is correct, then it is possible that the nearby stars are very similar to their created forms (i.e. they have not changed significantly).[1] As the study cited by Greaves was for stars in a region in Taurus about 140 pc distant, this region was possibly near the edge of the region of space I proposed experienced a massive time-dilation event.[22] That event was primarily on our solar system but included regions in the surrounding space.

So a better explanation for the observed nearby systems of gas and dust is that they are little changed from the way God created them. If so, then it is valid to make comparisons to build an idea of the location and size of the 'waters above'. In the study cited, the gaseous regions extended variously from a few tens of AU to 100–200 AU and sometimes more, depending on the model used to fit the data.

τ-Ceti star system

Available information indicates τ-Ceti is the most similar star to our sun. It has a disk of debris surrounding it; and it is considered a 'massive analogue' to the Kuiper Belt.[23]

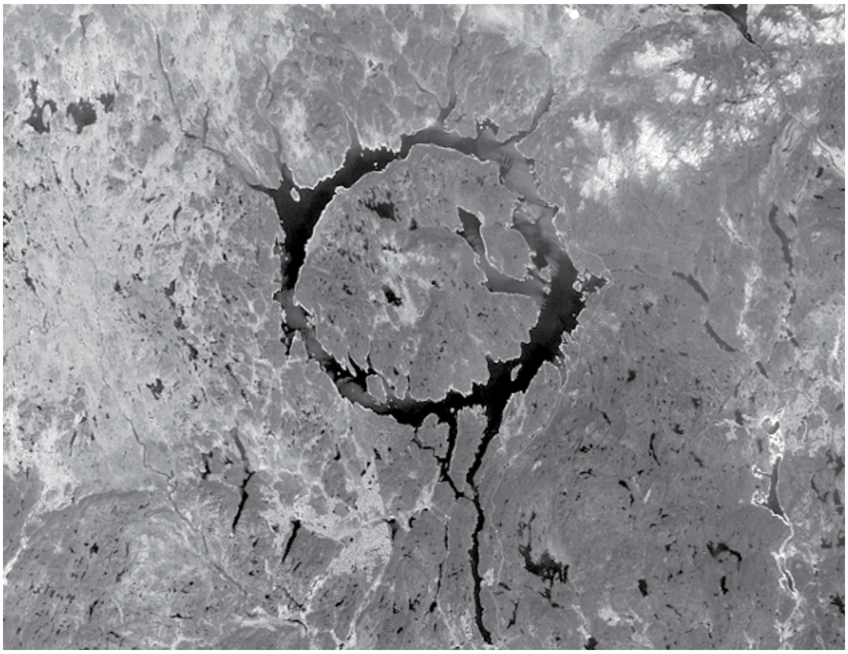
The τ-Ceti star is classified as a G8 V star and is located about 3.65 pc from the sun. Its debris disk extends out to about 55 AU, according to studies of far-infrared emission using the 850 μm wavelength in the SCUBA camera. Modelling has shown, however, that based on evolutionary assumptions there must be a population of colliding bodies (10 km to 50 km in diameter) constantly regenerating the dust and debris. Certainly in terms of the evolutionary model, this is no place for life to develop, as pointed out by Justin Taylor.[24]

In the standard models of planetary formation, as the nebula proto-disk evolves it flattens, and larger bodies form due to accretion. Development of bodies far from the star is slower, so at distances such as Pluto's the populations of large bodies should be very sparse and therefore difficult to detect. However, particles can be continually regenerated by collisions of kilometre-sized planetesimals, which is one of the more detectable phenomena around stars. Nevertheless, Greaves says the evolution of debris is poorly understood.

Among the stars, τ-Ceti, ε-Eridani and the sun, our sun has the least dust and debris, hence the smallest 'Kuiper Belt'. This makes the situation in our solar system the most conducive to life, with only a few bombardments by asteroids and comets.

Solar analogues

The sum of the colliding masses in the τ-Ceti system is about 1.2 $M_\oplus$ compared with the estimates for the Kuiper Belt of 0.1 $M_\oplus$. The system is however claimed to be 10 Gyr old—twice that of our solar system. The ε-Eridani system



The 'waters above' mentioned in Genesis 1:7 may have included comets, which are mostly made up of water ice. Large bodies, such as comets, are known to have collided with the earth in the past. We can still see craters today such as the one in Manicougan, Quebec, Canada (pictured) which has a diameter of more than 70 km and is one of the largest and best exposed craters on the planet.

is claimed to be 0.73 Gyr old and an analogue of the early history of our solar system (according to the evolutionary model). Assuming that these systems are not as old as claimed, we can use them as analogues of our solar system at different stages of its history, both pre- and post- the Curse and/or the Flood.

The debris around τ-Ceti is located in a region similar to the Kuiper Belt, with most of the detected bodies orbiting at 35–50 AU (figure 3). In this region in our solar system, cometary-type objects are found mostly as large bodies, tens of kilometres in size. τ-Ceti may be an analogue for the pre-Flood world, with a much higher concentration of this type of cometary material. But it was the sustaining power of God that kept the debris halo in the region beyond Neptune until it was necessary for the judgment in Noah's time. In the post-Flood solar system, the density is much lower, and impacts with Earth are now rare.

Size and collision rate are implied in the assumptions of evolutionary age. The star τ-Ceti is assumed 10 Gyr old based on spectroscopic analysis, the Main Sequence Diagram and the evolutionary model of stellar development. What is actually observed is a blackbody spectrum for dust grains near 60 K. The dust mass is then estimated from the 850 μm flux, 60 K temperature and the assumed opacity of the cloud. It comes to about 20 times that in our solar system, but remains uncertain.

In one paper Greaves states:

> '… the Kuiper Belt is itself enigmatic because as much as 99 per cent of the material seems to be "missing", if the density of the primordial disc needed to form the planets is extrapolated out to ~ 50 AU.'[25]

Disregarding the evolutionary presuppositions, the pre-Curse/pre-Flood solar system may have had a much higher density of large cometary bodies, which have since cleared out of the solar system or impacted the planets and the sun. When God separated the 'waters above', it is likely that He created a large halo of cometary material that was subsequently dissipated (possibly by as much as 99%) during the Curse and again during the Flood.[26] This halo of cometary material, I contend, is what God created when He separated the 'waters above'.

Conclusion

Recent observations of the near-infrared spectra of the Kuiper Belt Object, Quaoar and the suspected Kuiper Belt Object, Charon, indicate both contain crystalline water ice and ammonia hydrate. This watery material cannot be much older than 10 million years, which is consistent with a young solar system, not one that is 5 billion years old. These are quantitative results that, when added to what we already know about comets and other trans-Neptunian bodies, are exciting evidence for a young earth model.

If we start with a creationist worldview, the recent observations of a few nearby star systems containing significant dust and debris can give us clues to the structure of our solar system in the past. These observations lead me to propose the present 'waters above' (the trans-Neptunian objects) are only a small remnant of the pre-Curse/pre-Flood 'waters above'. Most of this material remains in frozen ices of one kind or another. Therefore, this model predicts that more trans-Neptunian objects and cometary type material comprised mostly of water ices will be found.

The pre-Curse/pre-Flood 'waters above' may have comprised as much as 100 times the amount of material that now exists beyond Neptune. If this was the case, then it comprised as much as 43 Earth masses, which would certainly have been a significant envelope of water surrounding our solar system. A lot of this water may have been absorbed by the Jovian planets as the 'waters above' was disrupted during the Curse and the Flood. Of course, some (to a much smaller extent) can be found on Earth. This really gives a different significance to the separation of the waters on Day 2 of Creation Week. I have suggested in another paper another purpose for this halo of the 'waters above' besides those mentioned here, namely to protect the

Earth from deadly radiation during Creation week resulting from the rapid expansion of the cosmos.[27]

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10. The comparison to our solar system is not totally valid as ε-Eridani is a so-called 'young' star of K2 V class, with about 0.8 solar masses.
11. This is standard notation for an Earth mass unit.
12. Worraker, B.J., Missing: a source of short period comets, *Journal of Creation* **18**:121–127, 2004.
13. From this data set, we determined the Charon/Pluto mass ratio to be 0.122 ± 0.005, which implies a density of 1.8 to 2.0 g/cm^3 for Pluto and 1.6 to 1.8 g/cm^3 for Charon. The resulting rock-ice fraction is in the range expected for bodies that form in a solar nebula (such as Kuiper Belt Objects); <www.aas.org/publications/baas/v32n3/dps2000/259.htm>, 23 May 2005.
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