all modern astronomy to its very foundations. If he is right, one of the pillars of modern astronomy and cosmology will come crashing down in a turmoil unparalleled since Copernicus dared to suggest that the sun, not the earth, was at the center of the solar system.[4]

James Waterhouse is thanked for bringing this unresolved 'anomaly' to our attention, and for providing the reproduction for Figure 1.

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Cosmic Snowballs Bombard the Earth?

Images from a NASA satellite suggest that the Earth is bombarded every day by thousands of 20 to 40 tonne house-size snowballs, a previously unknown type of interplanetary object.[1] These frozen missiles are believed to break up high above the Earth's surface and send down a gentle cosmic rain (Figure 1).

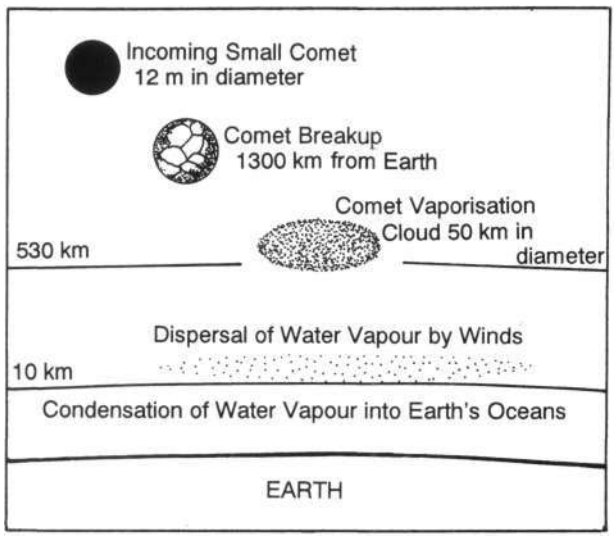

Figure 1. *The fate of hypothesised small comets entering the Earth's atmosphere.*

At the same time as NASA released pictures taken by its Polar satellite, Louis Frank of the University of Iowa announced the discovery.[2,3] This is the same Louis Frank who caused a furore in 1986 when he claimed that NASA's Dynamics Explorer satellite had spotted icy chunks plunging into the atmosphere at the rate of 20 a minute.[4] After vigorous scientific debate back then, virtually all other astronomers dismissed his claims as a misrepresentation of the satellite's observations.

Undaunted, Frank persevered with his research on these mini-comets or cometesimals, which Jerry Bergman reported here in the **Creation Ex Nihilo Technical Journal.**[5] And vindication has now apparently come. The Polar satellite carried a camera with sharper resolution and produced more detailed images of small dark holes in the ultraviolet (UV) emissions that radiate upwards from the Earth.[6] The holes, asserts Frank, are caused when the ice from the mini-comets melts, generating small clouds of water vapour that briefly block UV emissions from below. However, the mini-comets do not pose any threat to life on Earth because they melt while they are still hundreds or thousands of kilometres above the planet (see Figure 1).

Thomas Donahue of the University of Michigan at Ann Arbor, who has been one of Frank's most vocal critics in the past, says that Frank has now proved his case.

> *'My attitude has changed from one of very great scepticism to one of fascination. All in all, the observational evidence is overwhelming.'*[7,8]

Two separate instruments on the satellite, including one that Frank did not operate, registered the holes, and the ice chunks *'move as they should move'*, he says. Whereas on earlier images the dark spots were usually only the size of one pixel (picture element) and were thus mostly written off by sceptical colleagues, on the Polar satellite images the dark spots span clusters of pixels thus confirming their existence. Furthermore, Frank has images that appear to show the postulated snowballs hurtling towards the planet. When the UV and visible-light cameras looked just above the Earth's atmosphere, they detected long streaks of bright light which Frank interprets as sunlit clouds of water vapour and other gases coming off some of the snowballs as they near the Earth.[9]

So it was a science story the media could not resist — the detection of mini-comets up to 40 feet (12 m) or more across pelting the Earth at the rate of one every few seconds, each dumping tonnes of water on us. Around the world, newspapers and magazines carried the astonishing Polar satellite image of one such object breaking apart 15,000 km above the Atlantic.[10] But surely, said the critics, such large objects would be seen by even the most casual observer as 'shooting stars' tearing across the night sky.

In fact, they have been observed, but mainly by those who have been

looking for them. However, like ordinary comets, the mini-comets are pitch black, and can only be seen when they lie outside the Earth's shadow, just before sunrise and just after sunset.[11] Australian astronomer Duncan Steel points out that over the past century the scientific literature has carried many reports of unexplained 'dark objects' crossing the face of the Sun, and according to Frank's data anyone observing the Sun for an hour has a 1 in 1000 chance of seeing a mini-comet passing in front of it.

Then there is the question of where all that water goes to — on Frank's estimates, a million tonnes of it every day. The water level in the stratosphere is well accounted for and the influx from these 'comets' would be greatly noticed, says one NASA astronomer.[12] But Frank insists that the comets break up over 10,000 km above the Earth, and therefore the amount of water they add to the lower atmosphere is pretty low — perhaps enough water to provide an extra one-thousandth of a millimetre of rainfall each year.

However, the biggest criticisms of the mini-comet hypothesis centre on the Moon. There a mini-comet should strike once or twice each minute, and with masses of around 30 tonnes impacting at a speed of 30,000 km/hour, the explosive punches equivalent to 250 tonnes of TNT should be easily detected by the seismometers placed on the Moon by the Apollo astronauts.[13] Yet those instruments detect only about 2,000 impacts per year, which is but a fraction of the number expected for mini-comets. However, this is assuming the mini-comets hit like rocks, whereas they appear to behave like fluffy snowballs. Thus the lunar seismometers lack the sensitivity to record their gentler impacts. But what about all the water that should then be on the Moon? Frank points out that the lunar gravity is so low that practically all the water vapour from the impact of small comets would simply fly off into space.

Now further potential confirmation of Frank's mini-comet hypothesis has come from another source. New analyses of the data from the Upper Atmosphere Research Satellite indicate that the atmosphere has a relatively wet layer 70 to 80 km up.[14] According to the standard picture of the atmosphere, water vapour is trapped below 12 km or so by a moisture barrier at the bottom of the stratosphere, supposedly keeping the mesosphere (the region between 50 and 90 km) almost bone dry. Yet the satellite instrument has detected signs of as much as 50 per cent more water vapour at those altitudes than predicted by conventional theory. Of course, Frank has been quick to suggest an explanation — mini-comets pummelling the outer reaches of the atmosphere 20 times a minute, releasing water that ultimately ends up in the mesosphere.

'You have to give the man credit for predicting something we 're now seeing', says Robert Conway of the Naval Research Laboratory in Washington D.C.[15] And as Donahue says:

> *'It's exciting that a guy who was pretty badly pilloried is going to be vindicated, at least as far as the observations are concerned.'*[16]
>
> *'The vigorous, sometimes acrimonious debate over mini-comets highlights the problems facing any scientist with unorthodox ideas*'!,

says Robert Matthews.[17]

There are, of course, obvious implications if Frank is correct regarding mini-comets. Bombardment of the Earth at the suggested rate over the Earth's claimed 4.5 billion year history would have delivered an incredibly large amount of extraterrestrial water. At 0.001 mm of extra rainfall per year (according to Frank[18]), over 4.5 billion years some 4,500 m (or 4.5 km) of water would be added to the Earth's surface, far more than in today's oceans. That's probably why Duncan Steel has suggested *'the phenomenon could be episodic'.* Otherwise, the Earth might not be so old after all!

The ramifications of Frank's discovery could thus force scientists to revise long-held beliefs about the origin of the Earth and the Solar System, how the oceans formed, how the building blocks of life first arose, and whether fluxes in the cosmic rain could have caused the Ice 'Ages' and mass extinctions.[19] Other planets, such as Mars, would also have been bathed in the same extraterrestrial drizzle. But don't expect many scientists to turn to the Biblical truth about origins. Frank himself has said:

> *'This relatively gentle cosmic rain — which possibly contains organic compounds — may well have nurtured the development of life on our planet'.*[20]

We are indebted to Jerry Bergman for bringing the case of the cometesimals (mini-comets) to our attention.

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