

carvings were saved when the valley was eventually deemed a park. Dorn has also dated petroglyphs in Australia.

From what is already known about the findings of the University of Arizona (UA) scientists who have co-authored the forthcoming **Science** paper with others, the omens are not good for this dating method. The UA team has twice previously presented at international conferences abstracts of their research, in which they say that *'unusual and potentially very important observations'* were found when examining samples of material Dorn submitted to date petroglyphs in the Petrified Forest region of north-eastern Arizona.

*'Microscopic examination of samples from these petroglyphs, collected by . . . Dorn, showed that the samples contained two types of black, carbon-rich materials. . . one type strongly resembles finely ground bituminous coal, whereas the*

*other strongly resembles ground pyrolyzed wood.'*

These two substances have *'widely differing radiocarbon ages. . . . We have been unable to find either of these two types of carbonaceous material in equivalent samples of these same petroglyphs when subsequently resampled independently.'*<sup>1</sup>

Dorn, of course, says that he doesn't understand what all the fuss is about, citing a 1961 article by a Russian scientist who is said to have observed *'a coal-black mineral substance'* trapped under desert varnish, and a 1986 doctoral thesis from a Texas university on US petroglyph surfaces.<sup>1</sup> Nevertheless, it seems too coincidental that Dorn's attorneys were involved last year in trying to prevent the UA scientists from publishing some of their findings not long after the first allegations were made, and while Dorn himself began seeking publication of papers questioning the interpretation of his

own dating in previous papers.

The jury may still be out, but already it is clear that, as was reported here two years ago, *'we have much reason to be skeptical of the techniques and the derived ages'*.<sup>2</sup>

## REFERENCES

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## Cosmological Principle Under Attack

The 'cosmological principle' (also known as the Copernican principle) is a fundamental assumption in modern 'Big Bang' cosmology. It assumes that, on a big enough scale, the universe is homogenous - that is, it is the same in every direction and every place. A team of scientists led by Sylos-Labini has statistically analysed a number of red-shift surveys (these try to map structures three-dimensionally using the red-shift to assess distance) to test this idea<sup>1</sup> (see Figure 1). As a consequence, they argue that the universe is not uniform at all, but has a never-ending hierarchical structure. Stars are grouped in galaxies, galaxies into clusters, clusters into superclusters, superclusters into even larger groupings, and so on. The grouping appears to be based on fractal mathematics.

CEN Tech. J., vol. 12, no. 2, 1998

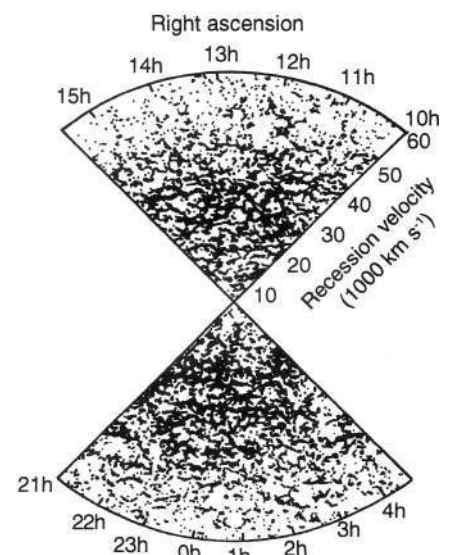
Their results are under attack — for one thing, their analysis of the largest such survey available seems to conflict with its visual appearance. Nevertheless, the consistency of their results is admitted to be *'impressive enough to raise doubts about the standard picture'*.

More studies are under way on an even bigger scale to try to answer the question more definitively. There is a great deal at stake, because the claims of Sylos-Labini *et al.* are *'completely at odds with the Cosmological Principle and therefore with the Friedmann models and the entire Big Bang theory'*.

## REFERENCE

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**Figure 1.** The Las Campanas red-shift survey, each dot marking a galaxy with a well-determined red-shift. The survey maps the Universe out to recession velocities of 60,000 km/sec, corresponding to distances of a few hundred million parsecs. No fractal structure on the largest scales is apparent (there are no clear voids or concentrations on the same scale as the whole map).