

Keynote: Recent developments in cave and karst science

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The collapse of the Soviet bloc and the emergence of democratic governance in central Europe in the 1990s promoted the development of new ideas in the traditional homes of cave science. Coupled with better communication and ease of international collaboration this made the late 1990s and makes the early 21st century an exciting time in cave and karst science. I will illustrate these developments with reference to seven areas of change and controversy, four (2,3,4 & 5) are directly relevant to eastern Australian caves and two (6 & 7) may be relevant to studies of sandstone landforms in the Sydney Basin.

1. Polje were long regarded as solutional karst landforms. During the 1990s some Slovenians suggested that these were principally tectonic features, which sure got the Yanks upset.
2. The recognition and study of unroofed caves. The great Cvijić and the old geography texts were wrong, and there was karst in the past and stalagmites can outlast the caves they formed in.
3. Detailed study of caves: this may sound strange, but it was only in the 1990s that people started to study caves in significant detail, or *look up!* The results have been dramatic.
4. The hydrogen (or per ascentum) revolution: the traditional view is that caves form by surface water sinking into the rock. From about 1996 the idea that caves can form from the bottom up became popular and remains controversial. This explains a lot of what we see in eastern Australian caves, many of which have no fluvial features and are isolated from the surface hydrology.
5. The recognition of ancient cave sediments and ancient caves, not palaeokarst, but accessible caves surviving for hundreds of millions of years. This is quite a radical idea, but cave sediments millions of years old are now being identified in Europe and we have Carboniferous cave sediments at Jenolan.
6. Phantom or ghost rock, the recognition that internal weathering fronts may mimic the shape of caves so that when the weathered material is removed a cave is left behind emerged in Belgium in the late 1990s. This strange idea is applicable to caves in impure carbonates and non carbonate rocks.
7. Martian bacteria: NASA is funding work on “extremophile” bacteria in caves. This work is not only important for extra-terrestrial life, the bugs are up to other things in caves on Earth and all is not what it seems.