PLANNING TO LIVE WITH A THINNER OZONE SHIELD

A proposal for an ultra-violet radiation warning system

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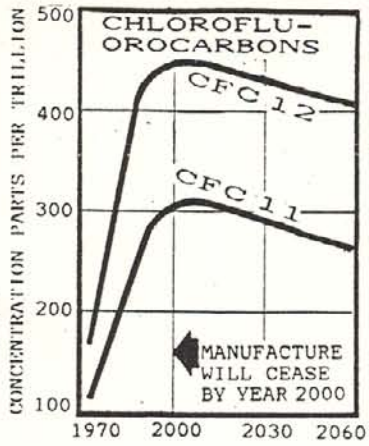
Human made gases called chlorofluorocarbons (CFCs) will continue to accumulate in the stratosphere until at least the year 2010, even with the agreements to stop their manufacture, as is shown on the graph of CFC concentrations in Figure 1. CFCs are progressively thinning out the protective ozone shield that absorbs ultra-violet radiation (UV-B) before it reaches the ground.

Figure 1



The annual dose of UV-B reaching ground level will increase for many years and not get back to 1970 levels for over 100 years. CFC gases stay in the atmosphere for a long time, with an average life of 110 years. In addition to the overall increase in UV-B, holes in the ozone layer will drift over Australia for a few days most years.

The invisible component of sunlight that causes most of the skin cancer and eye cataracts is UV-B. Figure 2 shows UV-A, UV-B, and visible light. Note that only a fraction of the UV-B gets to ground level currently, but a larger fraction will in future: some days the increase could be up to 50%. The sun won't seem any hotter but those invisible burning rays will be there. Unfortunately there is no national warning system planned to tell people of the presence of this menace.

Protection from UV-B is provided by skin creams, eye shades, spectacles with plastic lenses, glass lenses with protective UV coatings, wide brimmed hats, peaked caps, clothing, gloves, . . . and avoiding what 'mad dogs and englishmen' do (going out in the mid-day sun). People, particularly those who work outside or are on holiday, need a warning system like the EPA Smog Alert.

The growing problem of skin cancer

Australians have one of the highest skin cancer rates in the world, probably due to the skins of many inhabitants being genetically unsuited by origin to the Australian climate range. Figure 3 shows the UV-B doses by latitude and the annual incidences of skin cancer.

Levels of UV-B vary from month to month, as illustrated in Figure 4, showing theUV-B levels for January and July. In the sea-level capital cities in winter there is roughly one tenth the summer amounts of UV-B. Cloudy and clear days vary similarly. In Melbourne during the four hours in the middle of a January day when the sky is clear there is more UV-B than in Cairns during a whole clear July day.

The people most at risk of skin cancer are those who work outdoors for most of the day, for most of their working life, in the sunny north of Australia. 62% of Australian skin cancers are on the face and neck, which are the most exposed parts when working, with the highest rate in Queensland. In the long term, Victoria will receive as much UV-B as Queensland, so what can be expected in Victoria is known. Studies of watermen who work on Chesapeake Bay (USA), which is the same latitude as Port Phillip Bay (north instead of south), showed that those who worked outside the most and did not wear spectacles or a hat had three times the incidence of eye cataracts. It seems likely that the increase in eye cataracts will parallel that of skin cancers.

Avoiding future health risks

According to the American Environment Protection Agency (US EPA) the increase in skin cancer can be estimated for any decrease in ozone levels. Measurments show that a 1% decrease in ozone will produce a 2% increase in UV-B, and a 4.8% to 5.7% increase in skin cancers is expected as a result. Figure 5 shows (a) the UV-B doses in Australia, calculated by Dr. Barton, CSIRO, for the years to 1979 and (b) for a projected decrease of 10% in ozone. There has been a 4% decline in global upper ozone levels between 1979 and 1989, and it is probable that by 2030 there will have been a further 15% decline, making a total by then of a 20% reduction. Figure 5 also shows that a 10% decrease in ozone will produce, for example, in Hobart in June a 29% increase and in January a 22% increase in UV-B; while in Darwin there will be a 22% increase in June and a 20% increase in January. These increases are compatible with the US EPA data and are likely to produce an increase in skin cancer of between 48% and 75%, with a similar increase in eye cataracts.

Taking into account the recent 4% decrease in ozone since 1979, it will be about ten years before there is a 10% reduction in ozone worldwide. In Australia there will probably be a few days each year when the ozone is depleted far lower than this.

The ozone over Antarctica is getting increasingly thin each year. The hole (thin area) disperses in November and December, sometimes drifting over Australia. It is possible that on some of these early summer days, if there is little or no cloud, there could be an increase of 120% in the amount of UV-B reaching the ground in southern parts of Australia. In December 1987 we in Melbourne were fortunate that there was heavy cloud, which filtered out such levels of UV-B, and averted burnt skins on those who 'never burn and always tan', and inflamed eyes similar to snow blindness.

As we may well not be so lucky in future years, the Town & Country Planning Association has written to the Minister for Planning & Environment (Mr Roper) to suggest that an early warning system be set up, to be in place before November 1989.

Figure 2

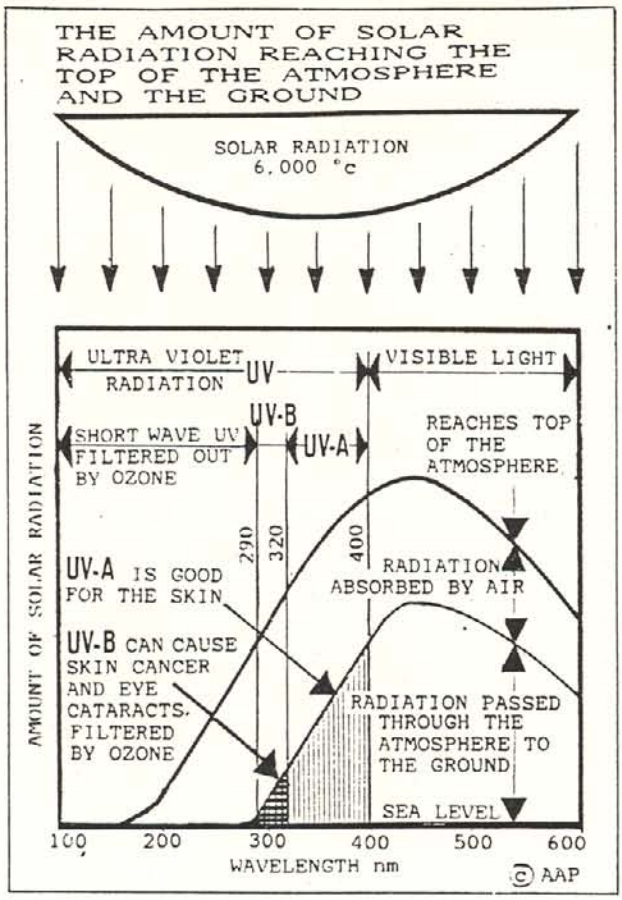


Figure 3

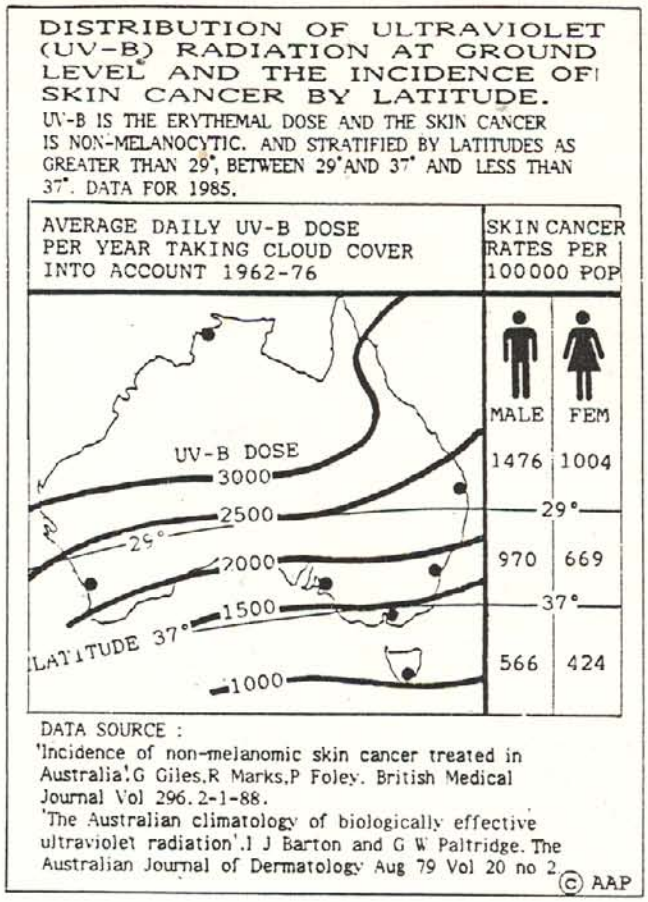


Figure 4

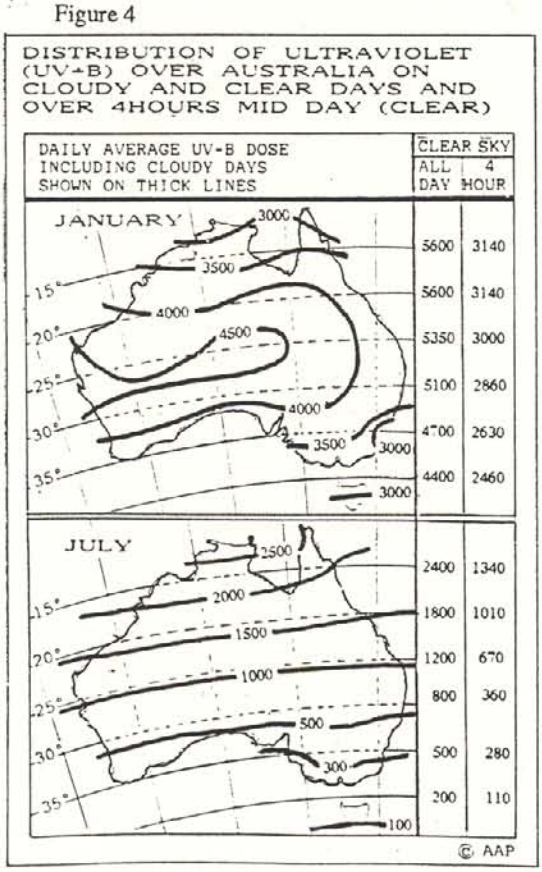


Figure 5(a)

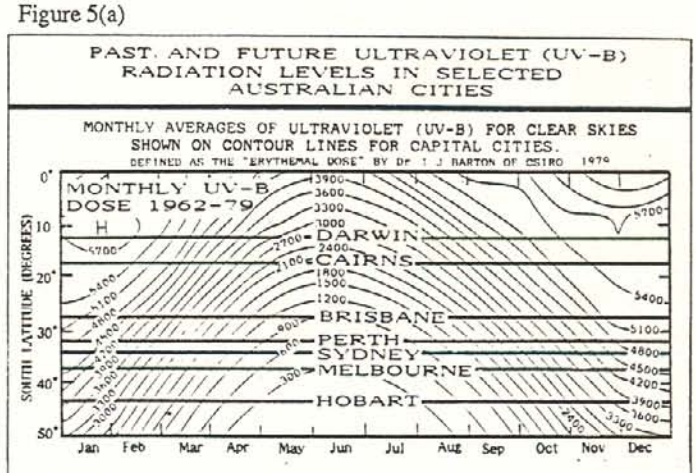


Figure 5(b)