UV Workshop Overview

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Abstract. The aims and outcomes of the NIWA UV Workshop, held in Queenstown, New Zealand from 7-9 May 2010 are briefly discussed.

Introduction

UV radiation is by nature a crossroads between many disciplines, including atmospheric chemistry and physics, botany, zoology, materials science, health. policy, manufacturing, and education. Health promoters and the media also have an interest in UV radiation and its effects. Consequently, progress requires a multi-disciplinary approach. But these diverse groups rarely have a chance to interact.

The aim of the NIWA UV Workshop was to provide a forum for discussion among groups involved with all aspects of the causes and effects of changes in UV radiation. The workshop included panel discussions to identify future needs for research, policy advice, and health promotion in this area. It was organised along similar lines to the successful UV workshops held previously in 1993, 1997, 2002, and 2006, which were sponsored by the Royal Society of New Zealand, the National Science Strategy Committee on Climate Change, and the Cancer Society of New Zealand.

The range of possible topics included:

- UVR Variability and Causes
  - Ozone Depletion in New Zealand
  - Cloud and Aerosol Effects
  - Relationship between Ozone Depletion and Global Warming
  - Future Trends in Ozone/UV
  - UVR in New Zealand, and relationship to other Locations
- UVR Impacts on Human Health (both positive and negative)
  - Risks of excessive UVR (including skin cancer)
  - Risks of insufficient UVR (including insufficient vitamin D)
  - Dissemination of UVR Information to the Public
    - the Ultraviolet Index
    - balancing the risks and benefits of sun exposure
- UVR Impacts on Plants/Animals/Physical environment
  - Terrestrial Plants and Animals
  - Aquatic Plants and Animals (oceans and freshwater)
  - Ecosystems
  - Materials (e.g. paint, plastics, textiles)
  - Biogeochemical Cycles
- Atmospheric Chemistry

Papers were presented at the Workshop on most of these topics. Unfortunately, no papers were presented on UV damage to materials (e.g., building plastics, paints), despite this being an important issue in New Zealand.

The New Zealand Context

The main emphasis was on the New Zealand /Australia region, which has unique problems associated with UV radiation. Previous studies had shown that New Zealand's peak sunburning UV irradiances are not particularly high in a global context. The peak UV index (UVI) is approximately 13 in New Zealand compared with peak values of UVI=25, in the Altiplano region of Peru. Peak UVI values are higher than in New Zealand over more than half of the planet, and for close to 90% of the global population. However, our UVI values are relatively high for fair-skinned populations. Measurements of peak UVI values from the Lauder site (45°S, 170°E, alt 370m) are approximately 40% more than at corresponding latitudes in the Northern Hemisphere (McKenzie, et al. 2006). Mean UV values too are much higher than at comparable latitudes in Europe for example.(Seckmeyer et al. 2008) These hemispheric differences are attributable to seasonal changes in Sun-Earth separation (a 7% effect), lower ozone amounts and cleaner atmosphere.

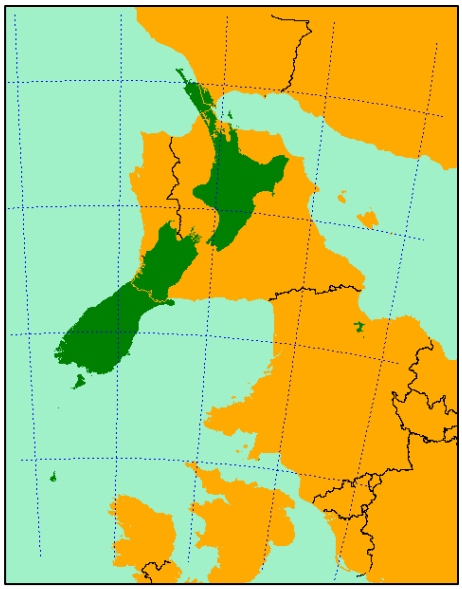

Figure 1. Map of New Zealand superimposed on its inverted antipodes (mainly Spain). Note that the latitudes of the UK are much higher, and that the north of New Zealand is at the same latitude as North Africa.

New Zealand and Australia share the dubious honour of having the world's highest mortality rates for melanoma. The high UVI values in the Southern Hemisphere compared with the Northern Hemisphere at the corresponding latitudes are undoubtedly a contributing factor. Furthermore, many New Zealanders and Australians are descended from the British Isles, which are

located at a much higher northern latitude (see Figure 1), where UVI values are much lower, and where one would expect the population to be less well adapted to high UV irradiances. In the British Isles the UVI rarely exceeds UVI=8. Other factors include the outdoor lifestyle of many New Zealanders, and the relatively low air temperatures which are conducive to sun bathing. UV irradiances in New Zealand are significantly lower than in Australia, so it remains a puzzle why the skin cancer rates should be so similar. Possible candidates are: better education, darker skin tones, since a larger proportion of the European population in Australia are from Southern Europe. Higher temperatures in Australia may also be important, as they discourage exposure to direct sunlight. However, there are indications of linkages between increasing UV, increasing temperature and increasing rates of skin cancer in Australia.

Themes

A recurrent theme throughout the workshop was the dichotomy between the harmful effects of UV radiation: (e.g., from sunburn and skin cancer), compared with the beneficial health effects through the production of vitamin D (McKenzie, et al. 2009). Because of the success of the Montreal Protocol on protection of the ozone layer, we have probably now passed the period where UV irradiances are highest. However, even after a full recovery of the ozone layer, which is now expected late in the century (UNEP 2010), summertime UV irradiances in New Zealand will remain high compared with at corresponding latitudes in the northern hemisphere. Thus, protection against the damaging effects of summertime UV will be required for the foreseeable future. On the other hand, winter UV amounts are already very low, especially in the south of the country, and contribute to the low vitamin D status of many New Zealanders. These winter values may decrease further in the future as ozone recovers and the effects cloud cover and aerosols respond to climate change. Thus the problem of low vitamin D status in winter may become worse, especially if the trend toward indoor living continues.

A direct result of the previous UV Workshop, in 2006, was the setting up of a collaborative project between researchers at NIWA and the Universities of Auckland, Otago, and Canterbury, to investigate the relationship between UV radiation and vitamin D status among the New Zealand population. The project is funded by New Zealand's Health Research Council (HRC), and preliminary results from it were presented in several papers. Some of this new research involved the use of newly developed electronic personal UV dosimeter badges. These were invented in New Zealand, and are now becoming widely sought-after in other international studies. There were also several papers discussing UV radiation and its health effects from sunbeds.

The latter stages of the workshop discussed the effects of UV radiation on human health, with a strong focus on how to best convey UV information to the public to optimise health outcomes. In both New Zealand and Australia.

Concluding Remarks

As for the previous two UV Workshops, PDF versions of the papers presented are freely available on NIWA's interne site (http://www.niwa.co.nz/our-services/online-services/uv-and-ozone/workshops), and are also published by the Royal Society of New Zealand. A detailed summary of the workshop highlights and its outcomes is in preparation at the time of writing, and will be published elsewhere (McKenzie, et al. 2010, submitted). Already there a new collaborative projects flowing on from the contacts made at the workshop.

I would like to close by thanking everybody involved for making the event a success. Firstly, the sponsors: NIWA, the Royal Society of New Zealand, The Cancer Society and the Health Sponsorship Council (SunSmart), and The Department of Health. Secondly, a big thank-you to my co-convenors: Assistant Prof Dr Robert Scragg (University of Auckland), Dr Judith Galtry (Cancer Society), and Graeme Strang (NIWA). Finally, I'd like to thank all of the participants for their contributions. I look forward to meeting again at the next UV Workshop.

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