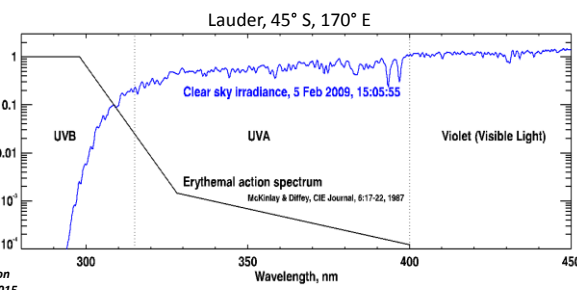


Measurement and Analysis of Spectral UV over 25 Years

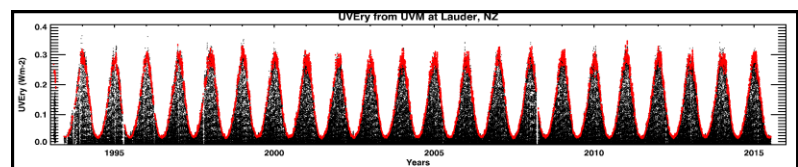
Michael Kotkamp, Richard McKenzie, J Ben Liley
 NIWA, Lauder, Central Otago, New Zealand



Steve Rhodes
 Bureau of Meteorology
 Absolute intensity $\pm 5\%$ to NDACC standards
 Traceable to NIST
 Alignment and stability confirmed ~weekly
 Archived with NDACC



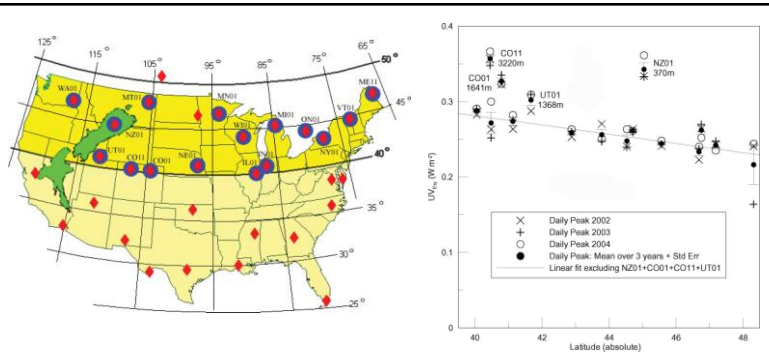
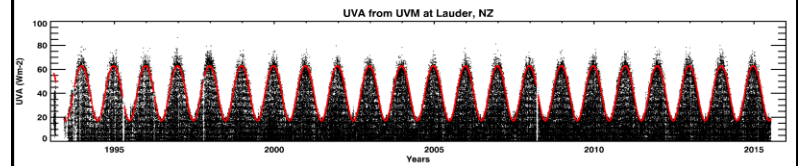
3rd International Conference on UV & Skin Cancer Prevention Melbourne, 7-11 December, 2015



The long time-series of spectral UV have been used to explore effects, on different wavelengths, of cloud, ground albedo (occasional winter snowfall), ozone, volcanic eruptions and Australian bushfires.

Models reproduce clear-sky values within measurement error, and ozone values inferred from UV spectra agree with other measures at the site.

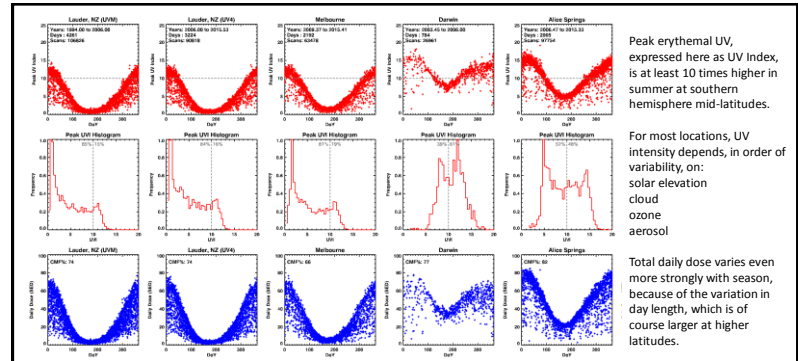
Cloud enhancement (unobscured sun, bright cloud) can be up to 30% in UVA, but rarely exceeds 20% in UVB or erythemal weightings, calling into question some claims of extreme UV measurements.



Peak UVI values at Lauder can be 40% greater than at corresponding latitude and altitude in the Northern Hemisphere, as illustrated here for North America.

Similar results were found previously in comparison with Europe.

The difference arises partly from differences in ozone, air-clarity, and seasonal changes in Earth-Sun separation, but half (~20%) remains insufficiently explained.



Peak erythemal UV, expressed here as UV Index, is at least 10 times higher in summer at southern hemisphere mid-latitudes.

For most locations, UV intensity depends, in order of variability, on: solar elevation, cloud, ozone, aerosol

Total daily dose varies even more strongly with season, because of the variation in day length, which is of course larger at higher latitudes.

The change from UVM (pre-2006) to UVA (2006-present) as NDACC instrument shows no change shows consistency in data distributions.

Melbourne (38° S) shows similar seasonal UV to Lauder, with cloud and aerosol compensating for lower latitude.

Darwin (12° S) has frequent cloud in the summer wet season, so that UV is similar throughout the year.

Alice Springs (24° S) has ~30% more UV in summer than does Lauder or Melbourne, but ~3 times as much in winter.