

A better way to calculate solar radiation

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(Phys.org) —Research by Murdoch University, James Cook University and the University of Waterloo in Canada has revealed flaws in the way that the widely-used Ångström-Prescott equation links solar radiation to sunshine duration.

Ångström-Prescott equation is used extensively in providing radiation readings for agricultural, ecological, meteorological and hydrological models.

The new research is contained in a publication voted a Best Paper 2012-2013 by Solar Energy, regarded as the premiere solar and renewable [energy](#) journal in the world, and will be recognised at the [Solar World Congress 2013](#) in Cancun, Mexico in November.

Murdoch co-author Mr Ross Bowden said the research showed that the Ångström-Prescott equation overestimates [radiation levels](#) during overcast and clear periods, but underestimates during partly cloudy intervals.

"The Ångström-Prescott equation assumes that the [solar radiation](#) received on the earth's surface rises in direct proportion to the sunshine duration. However, we have found this is not the case." Mr Bowden said.

"Radiation is well below predicted levels during overcast periods due to clouds being thicker than at other times. The Ångström-Prescott equation assumes a constant cloud thickness.

"Scientists and engineers have noted inconsistencies in the past, but have attributed these to local variations. By putting a wealth of global data together, we've been able to show that this isn't the case."

The group analysed data from 670 sites all over the world as diverse as Nairobi, Vladivostok, Osaka and Miami.

Mr Bowden has worked for Western Power and Horizon Power and is currently a consultant in the energy industry while pursuing his PhD in Mathematics at Murdoch.

More information: Suehrcke, H., Bowden, R. & Hollands, T. Relationship between sunshine duration and solar radiation, *Solar Energy* Vol. 92, pp. 160-171, 2013. [www.sciencedirect.com/science/ ...
ii/S0038092X13000911](http://www.sciencedirect.com/science/.../S0038092X13000911)

Provided by Murdoch University

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