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Solar and Coincident Weather Data for Large Scale Solar Deployment in Australasia

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Introduction

Updating the
Australian Solar Radiation Data Handbook (ASRDH)
and the computer program
AUSOLRAD (AUStralian SOLar RADiation)

During the progress of updating the ASRDH to its 4th edition, an associated project to update and enhance the Australian Climate Data Bank (ACDB) was initiated. Opportunities to further enhance the ASRDH as a result of that work are now canvassed. Subsequently the New Zealand Climate Data Bank (NZCDB) has been created presenting further opportunities for enhancement into a broadly based ANZSRDH.

A modified approach whereby representative data may be selected for a targeted purpose has also been suggested. The data is converted to a format appropriate to the simulation under consideration, checked for errors, data omissions "filled" and applied to the model.

Geographic Scope

Recent publication of satellite data allows 14 year solar histories of virtually anywhere in Australia. The current edition (4th) of the Australian Solar Radiation Data Handbook (ASRDH) and 2nd edition of AUSOLRAD have data for only 28 sites (see Figure 1 for a single one-off image on 3rd September 4PM Adelaide Time)
By contrast, the Australian and New Zealand Climate Data Banks now contain 80 Australian sites (Lee and Snow, 2008 and Energy Partners, 2008) and 16 New Zealand sites (after NIWA, Liley et al, 2007) - Figures 2 an d 3 respectively. This represents a huge potential improvement in the spatial accuracy of the solar data. With selected extra sites targeting those of high solar potential a set of 100 sites is envisaged.

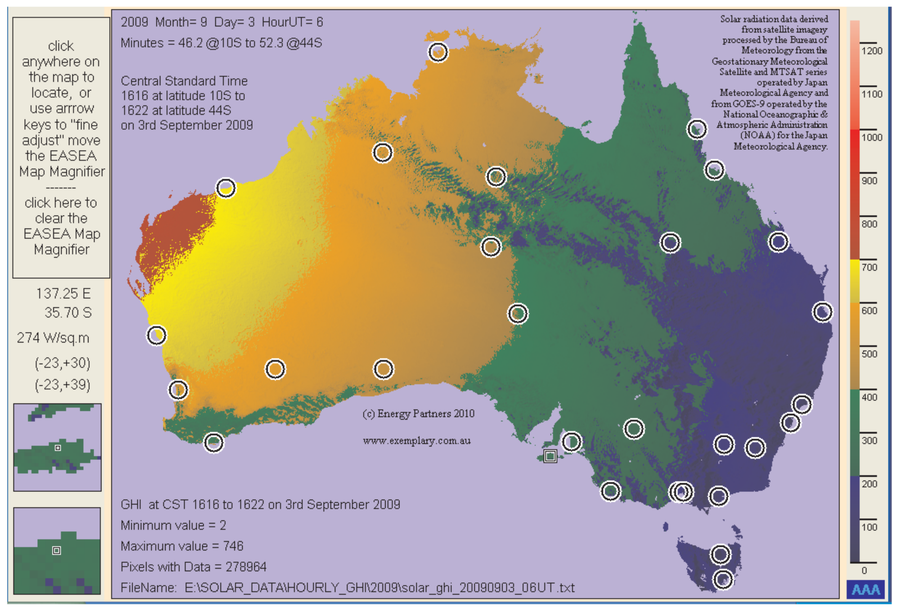

Figure 1: EASEA screenshot on 3rd September at 4PM Adelaide Time.

Australian Solar Radiation Data Handbook

Portrayal of Typical Years

The currently available graphical portrayal of 28 solar energy climates can now be applied to almost 100 sites across Australasia (Figure 4).

Analysis of Atypical Years

Including data from the ACDB and NZCDB into the ASRDH allows for the analysis of atypical years such as a typical El Nino year or even the sunniest year ever (in up to 43 years) to cite just two examples. Any targeted selection of data that is possible for the full climate data sets is capable of generating equivalent solar data tabulation.

Ersatz Future Climates

RMY data sets for future climate scenarios can be produced by combining CSIRO climate projections with baseline data representative of current climate (Ferrari and Lee, 2008). Such work can now be adapted to produce Ersatz Future Irradiation data based on these same forecasts.

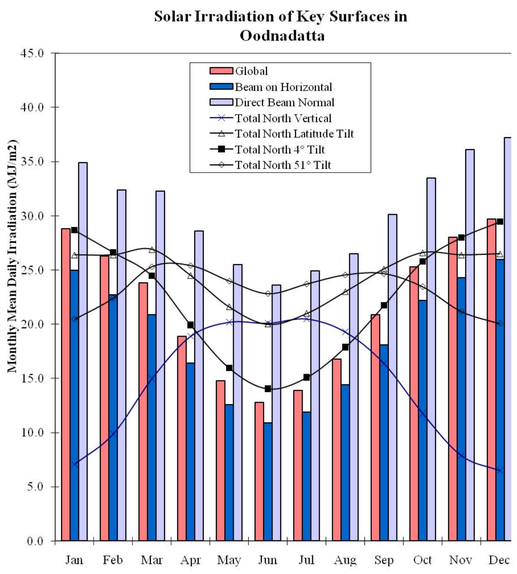

Figure 4: Sample Graphical Summary from ASRDH Edition 4

Real-time Data

Real-time data can be applied to create real-year-to-date and other actual-year data sets which can be applied to:

- Model calibration using real time weather data coincident with other empirical measures like solar system output or building energy consumption or temperature (especially if unconditioned);
- Building or system monitoring for underperformance to indicate early restorative action; or
- Adjustment of actual output or consumption in a real year to reflect reasonably anticipated outcomes in the actual year relative to the RMY.

Exemplary Australian Solar Energy Atlas

Currently a work in progress, a complete overhaul of the ASRDH (4th edition) is expected to take the form of a completely electronic and graphical climate data delivery system. In contrast to the original 28 sites in the ASRDH, the tentatively named Exemplary Australian Solar Energy Atlas (EASEA) is expected to contain solar radiation data for 10,000 times more sites than its predecessor (Figure 5).

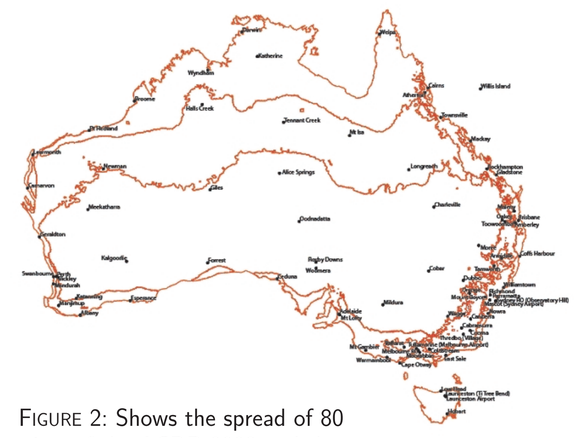

Figure 2: Shows the spread of 80 sites of the ACDB 2008 and the extent of the 8 BCA climate zones before harmonisation with state and local government boundaries.

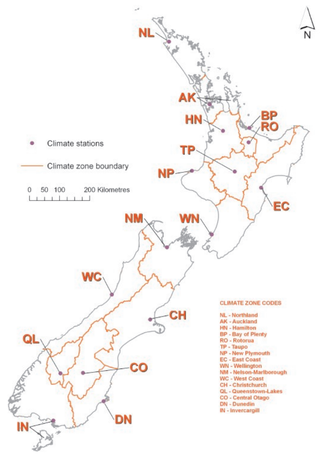

Figure 3: Shows the spread of the 16 sites of the NZCDB 2007 (NIWA, 2007).

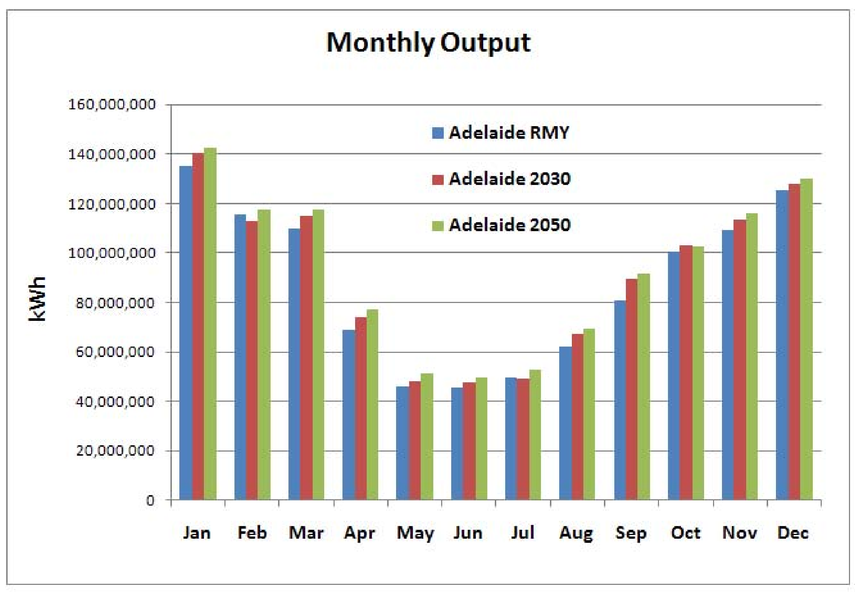

Figure 5: Solargenix energy outputs in three climate scenarios from SAM

Conclusion

The 2008 update to the Australian Climate Data Bank (ACDB) and the 2007 creation of the New Zealand Climate Data Bank (NZCDB) presents an unprecedented opportunity for enhancing the accuracy and pertinence of solar radiation data available to researchers, educators and practitioners alike.