Characterising the Solar Resource with a Temporal Direct Normal Irradiance Topograph

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2nd Annual STERG SolarPACES Symposium
Stellenbosch University
July 2014

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Overview:

1. Solar furnaces
2. GSET solar furnace requirements
3. Assembling solar measurement data
4. Temporal Direct Normal Irradiance Topograph (TDT)
5. Applications of the TDT

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- **Solar furnaces concentrate solar energy to deliver high thermal fluxes onto a target area**
- **Harness direct normal irradiance (DNI)**
- **High temperature materials testing, evaluating CSP receiver technology, photochemistry experiments and solar fuels**

Paul Scherrer Institute Solar Furnace

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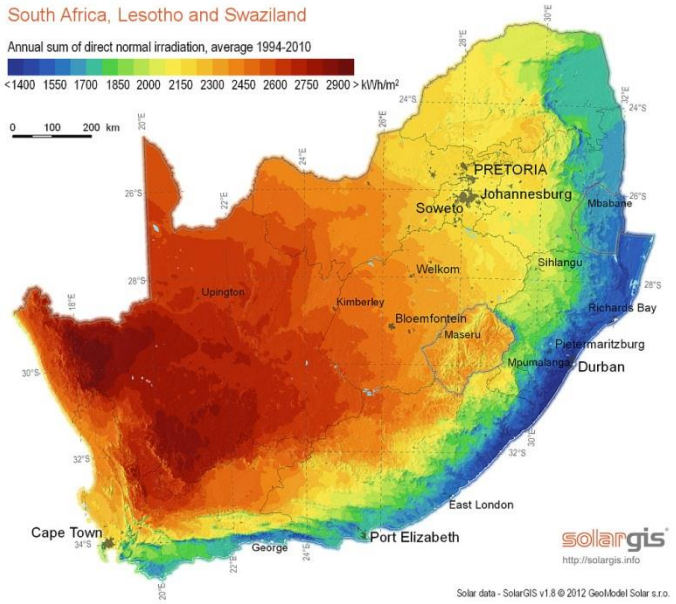
- **GSET to perform CSP equipment testing**
- **5-10 kW total power output requirement**
- **2.5 – 3 MW/m² peak flux**
- **Maintaining control over flux at the target area is a challenge**
- **Characterise the available solar resource for Durban**



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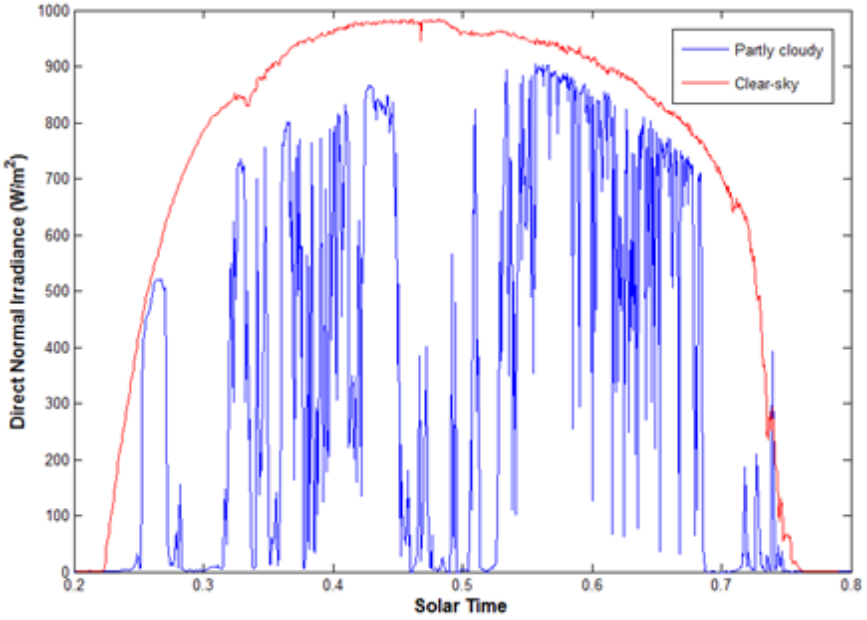
- **Collating DNI measurements for Durban and Stellenbosch**
- **SAURAN data**
- **Visual inspection method is used to extract clear-sky days**
- **Interested in seasonal and daily characteristics of clear-sky days only.**



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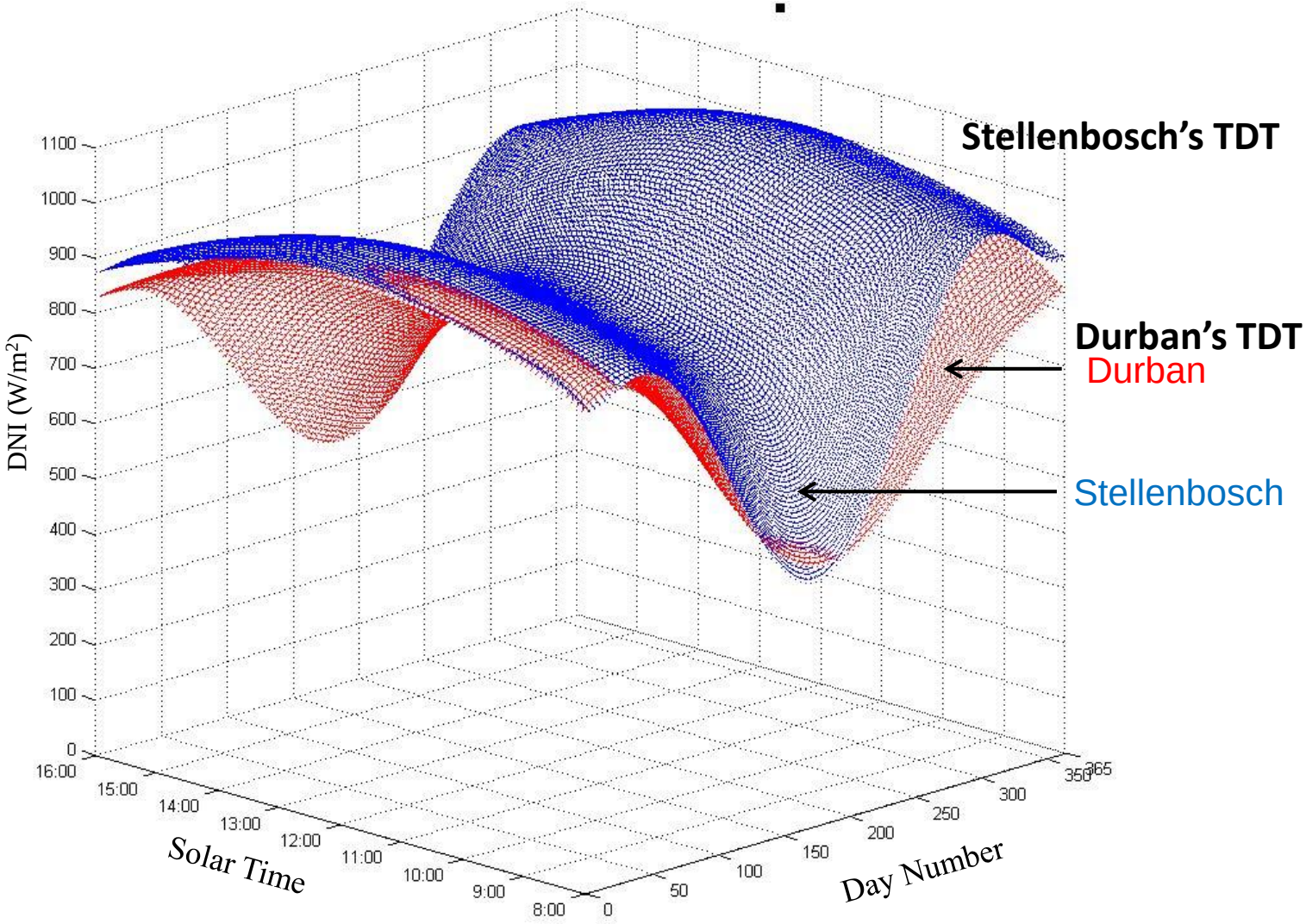
Superimposed TDT



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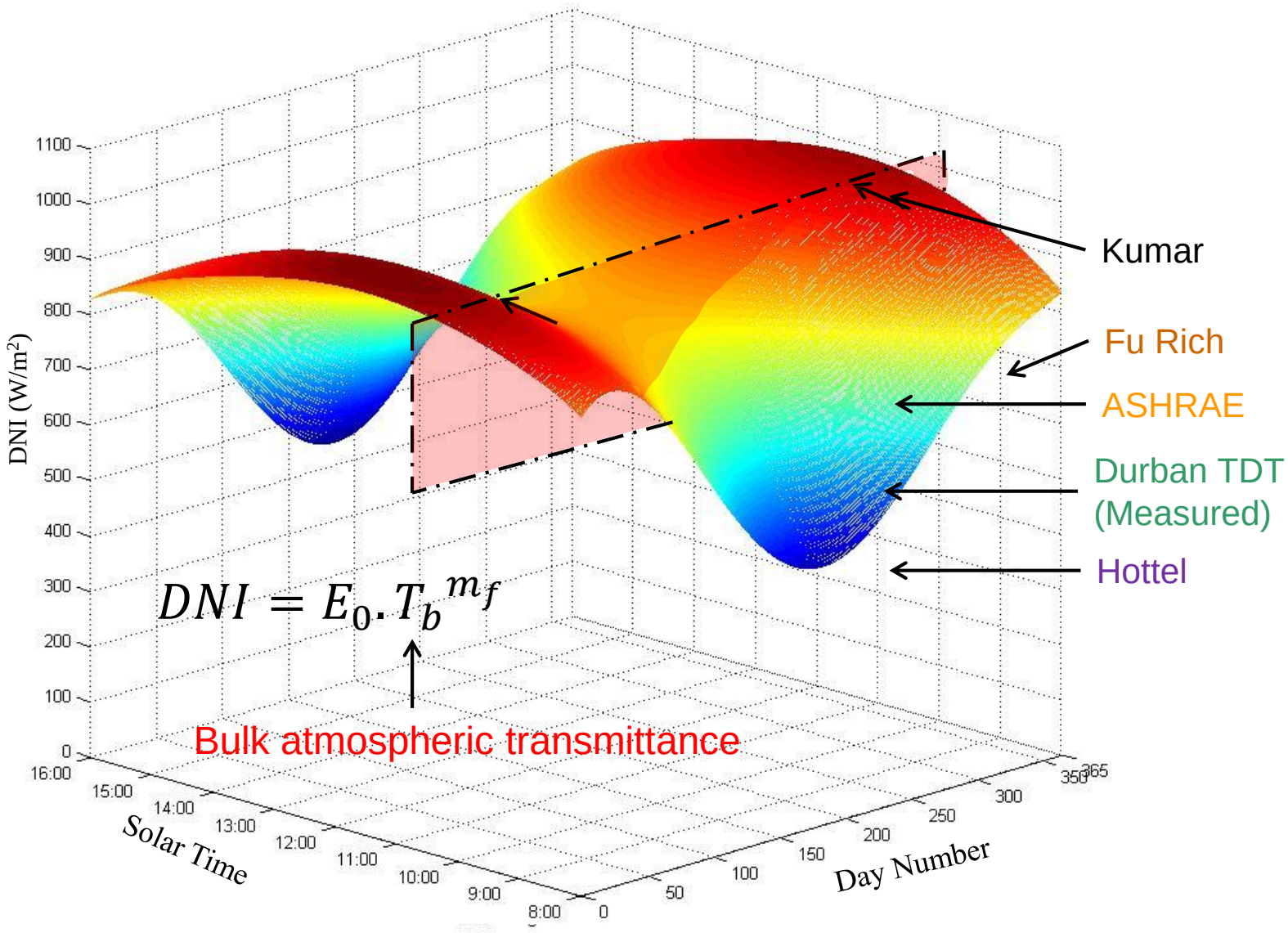

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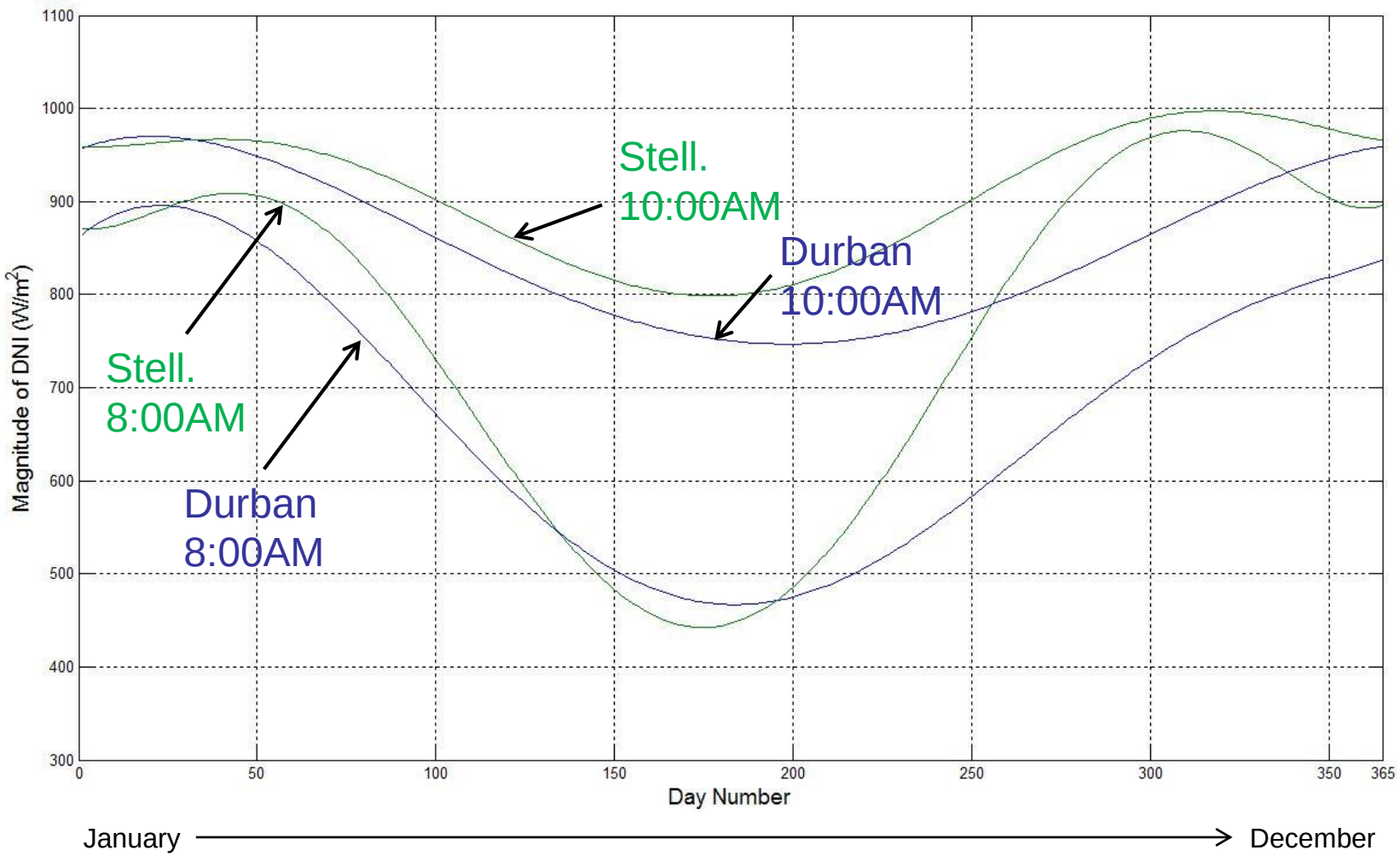

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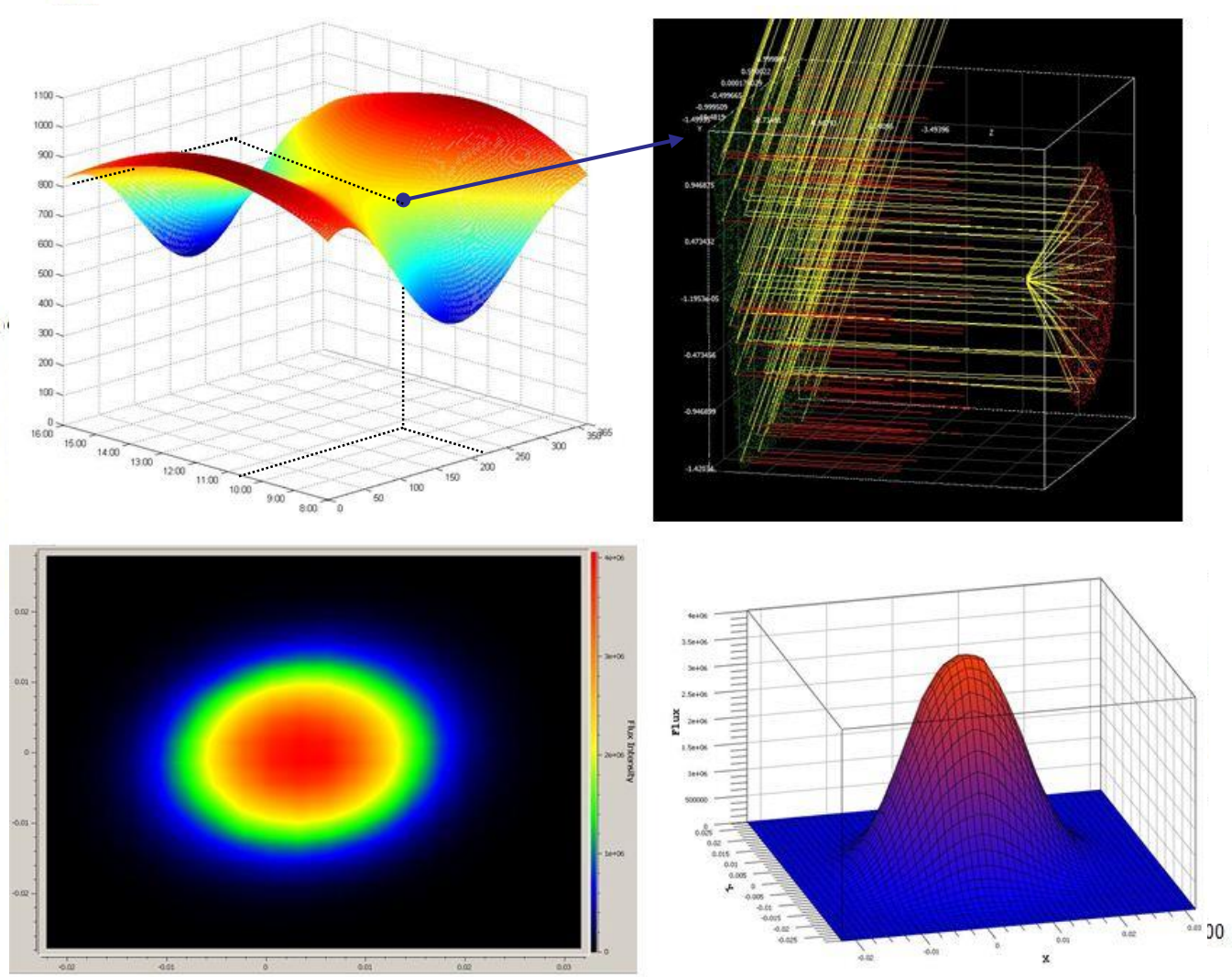

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Future Work

- **Expanding total number of clear-sky days used in generating the TDT.**
- **Improve the clear-sky detection method.**

Conclusion

- **The TDT is a time-based, empirically derived map of DNI with a high temporal resolution of 1 minute.**
- **Aid in the design and site suitability analyses for installation of CSP technologies.**

Acknowledgments

- Eskom Tertiary Education Support Programme (TESP)
- Stellenbosch University – Solar Thermal Energy Research Group (STERG)
- National Research Foundation (NRF)