



NIWA

Taihoru Nukurangi

NZRA

Production and application of a high-resolution regional reanalysis for Aotearoa New Zealand

Stuart Moore¹, Amir Pirooz², Trevor Carey-Smith¹, Richard Turner¹, Chun-Hsu Su³

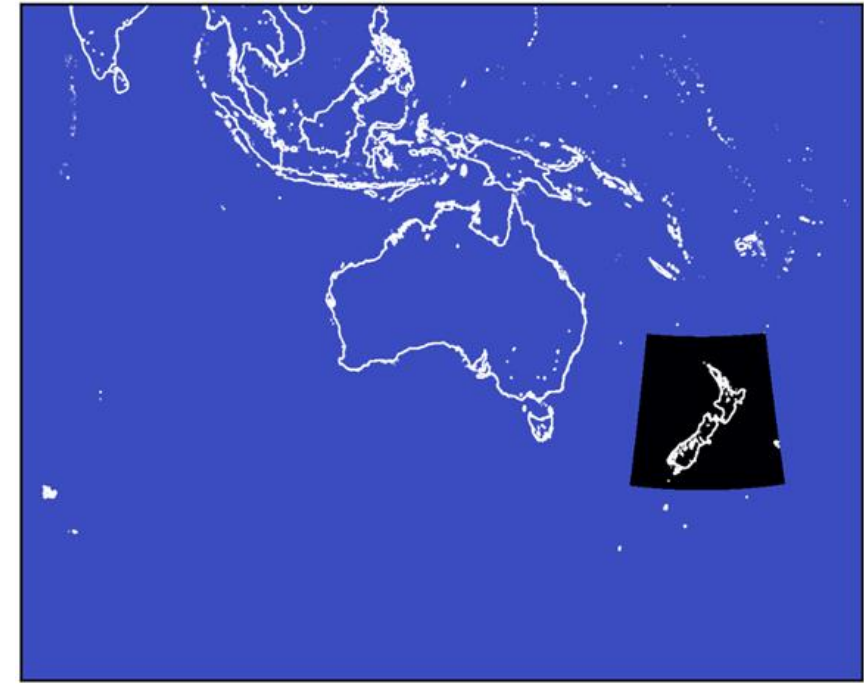
¹ NIWA Wellington, NZ, ² NIWA Auckland, NZ, ³ Bureau of Meteorology, Melbourne, Australia

A Reanalysis for NZ – what do we hope to use it for?

- Reanalysis outputs can be applied to cross-disciplinary research:
 - wildfire and hydrological models, land surface modelling,
 - sea-level, sea-state, inundation and wave models,
 - risk/loss models (risk to NZ's infrastructure etc from weather-related hazards)
 - fresh water management, horticulture and agriculture,
 - renewable energy, public health
- Climate & NWP & Data Science
 - Neural Weather Models
 - Downscaling
 - Bias Correction

NZRA

- NZRA is:
 - Downscaled regional reanalysis for 1990-2018
 - Driven by BoM BARRA-R regional reanalysis from ERA-Interim
 - 1.5km horizontal resolution over all of NZ (incl. coastal waters)
 - Local NZ obs included in upstream BARRA DA
 - Unified Model, RAL2-M convective-scale science
 - 30 min output comprises variables on:
 - surface
 - pressure level 1000 – 100 hPa (21 levels)
 - model levels surface – 40km (70 levels)



Evaluation of global and regional reanalyses performance over New Zealand

A.A.S. Pirooz¹, S. Moore¹, T. Carey-Smith¹, R. Turner¹, C.-H. Su²

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PIROOZ ET AL | THE NEW ZEALAND REANALYSIS (NZRA): DEVELOPMENT AND PRELIMINARY EVALUATION

The New Zealand Reanalysis (NZRA): development and preliminary evaluation

Amir Pirooz¹, Stuart Moore¹, Trevor Carey-Smith¹, Richard Turner¹, Chun-Hsu Su²

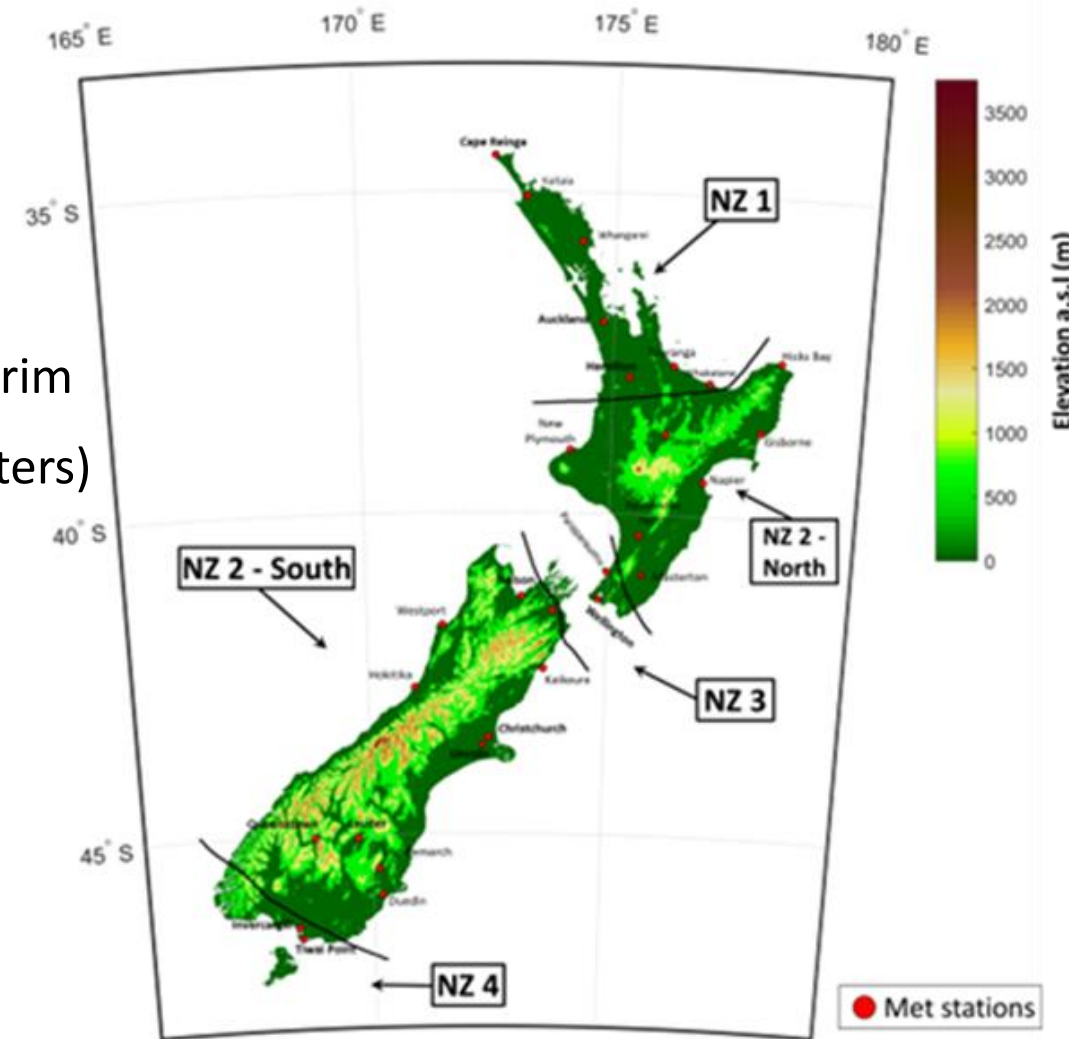
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Weather & Climate (42(1)) pp 58-74, 2023

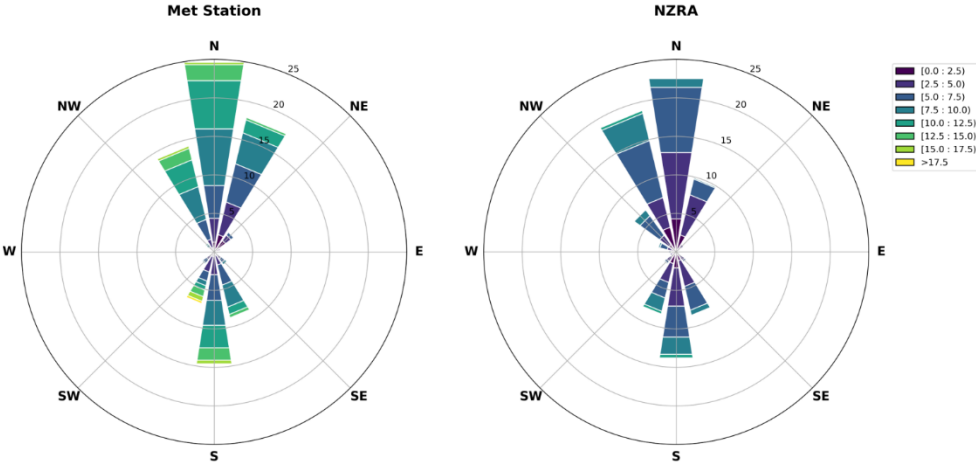
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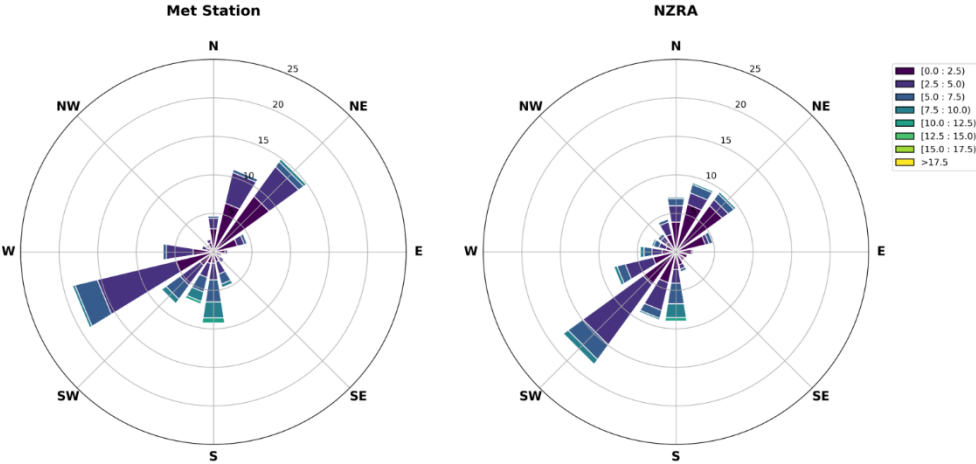


NZRA Validation (2014-2018)

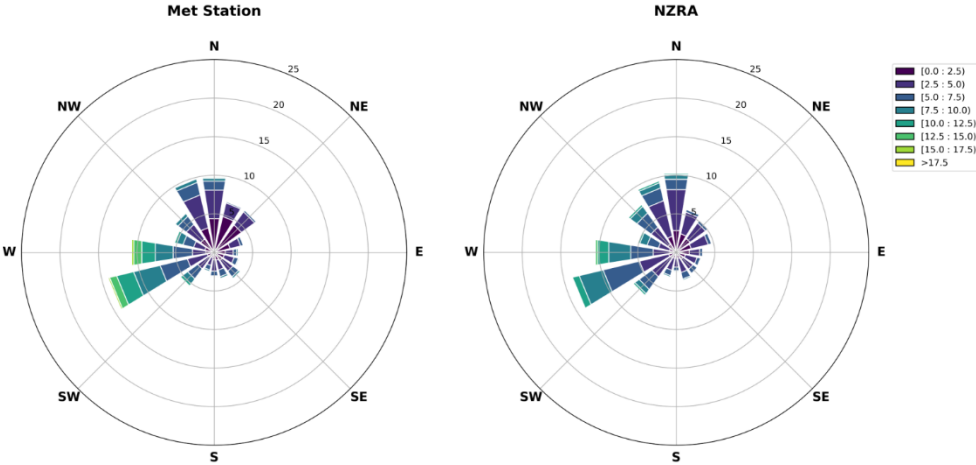
Wind rose plots (histogram %) for: Wellington



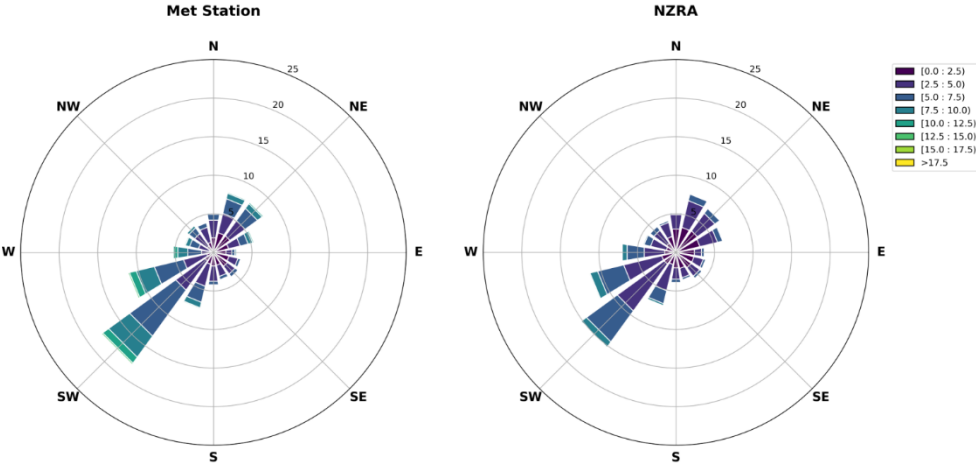
Wind rose plots (histogram %) for: Queenstown



Wind rose plots (histogram %) for: Invercargill

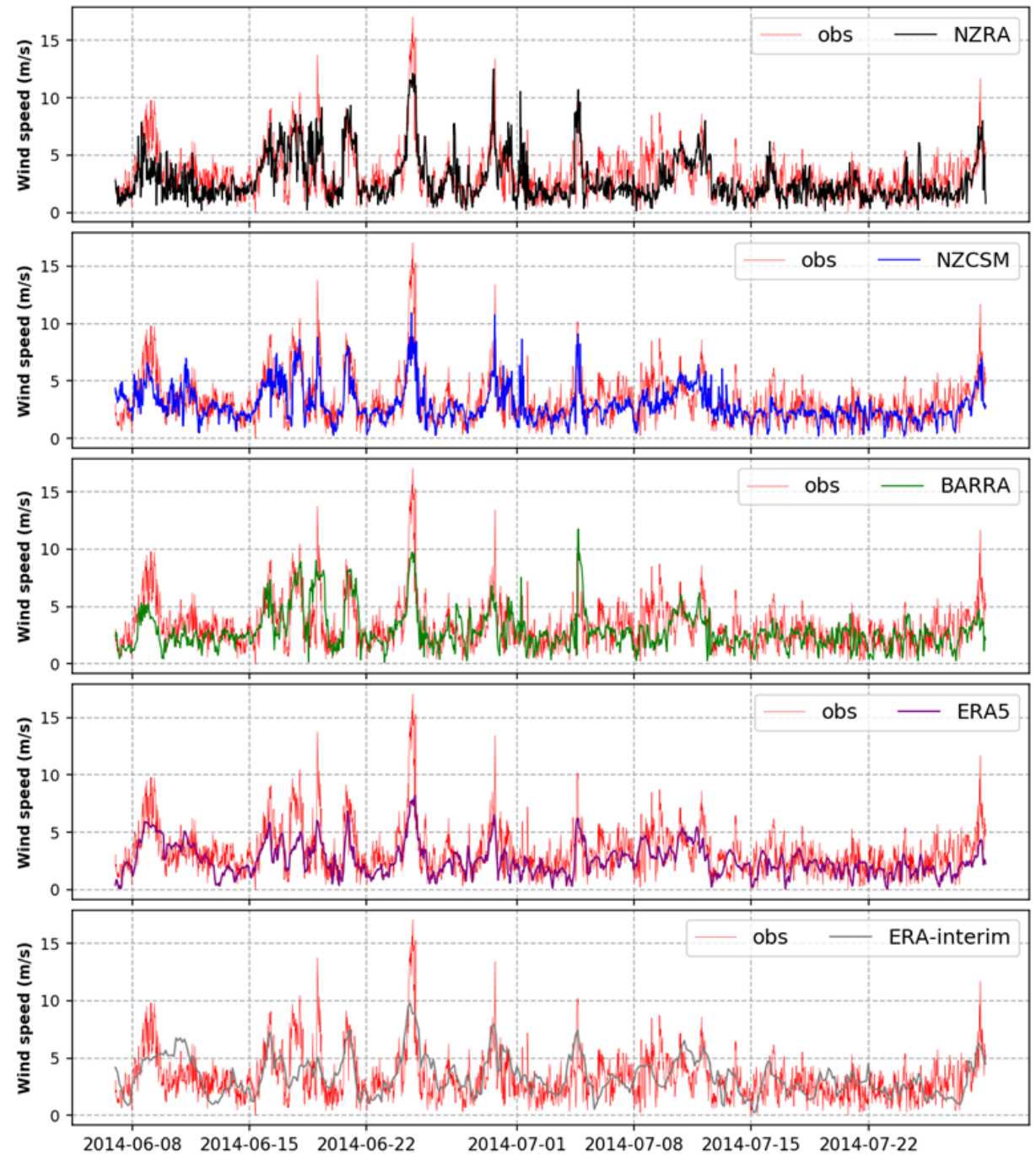
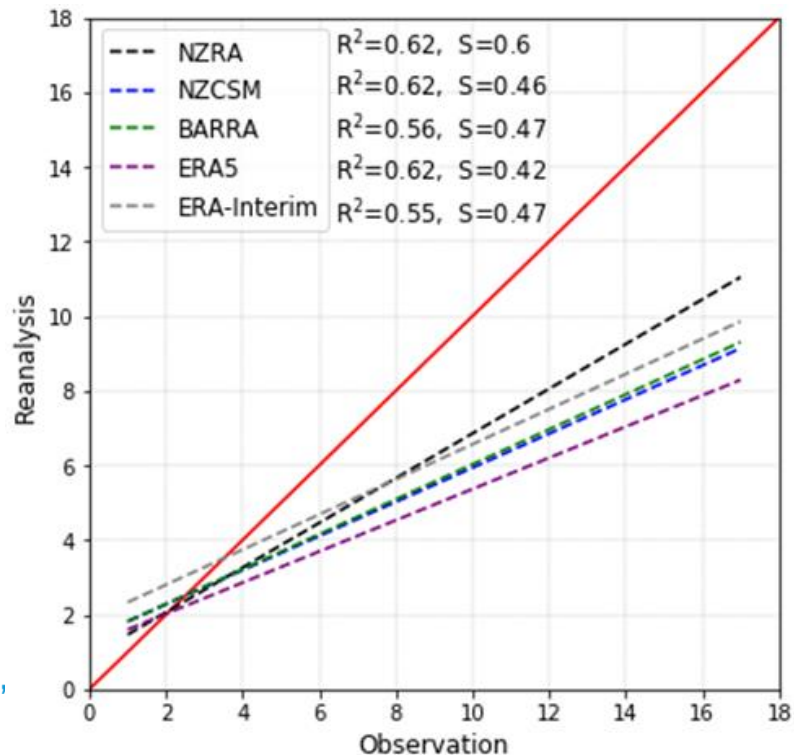


Wind rose plots (histogram %) for: Auckland



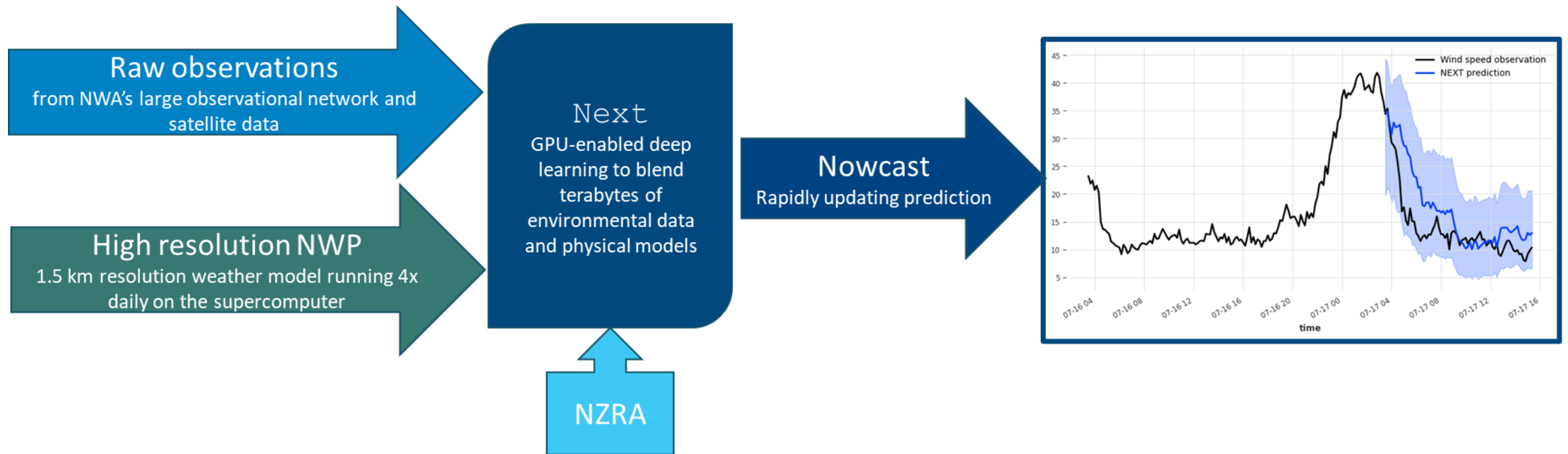
NZRA Validation

- **10m surface wind speed**
- c.f. ERA products, BARRA-R and NIWA's operational (at the time) 1.5km NZCSM NWP system



NIWA NEXT

- Rapid updates - 30 to 60 minutes
- 24-hour nowcasts for wind and solar energy
- Probabilistic forecast for risk assessment
- Prediction blends AI and physical models



Acknowledgements

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Thank you

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Climate, Freshwater & Ocean Science

