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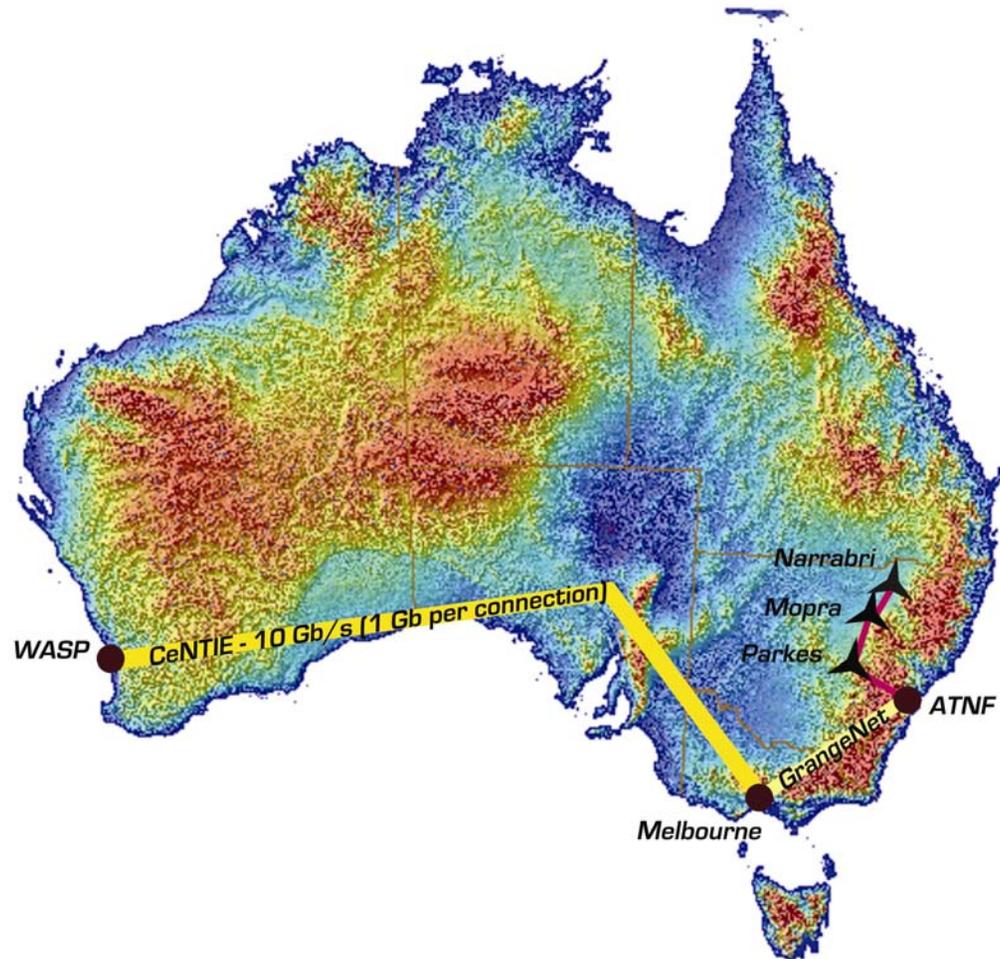
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Initial Areas of Research

- **Astrophysics**
- **Computational Biology and Biochemistry**
- **Computational Chemistry**
- **Genetic Epidemiology**
- **Geoscience**
- **Physics and Quantum Mechanics**
- **Water Research**

Electronic Very Long Baseline Interferometry (e-VLBI)



The Square Kilometer Array

- A collecting area of one million square meters
- A software radio telescope
- Specific challenges to be overcome include:
 - Techniques for active interference mitigation and suppression to minimize the effect of unwanted signals from terrestrial transmitters
 - Capable computers and programmable digital processing engines
 - New algorithms for data reduction and visualisation to yield radio images of the sky
 - Correlation of 8-bit data streams from 2500 inputs requires PB/sec ops

Next Generation Modeling

- Cross whole system Modeling
 - How does global climate change affect biological systems
 - Is there a magnetic pole shift occurring?
- More refined systems
 - Femto to Yotta models
- Real time data processing of PB/s
 - Includes real time acquisition/processing/storage/access of data

Concerns with Data Intensive I/O

- Gross Data Collections
 - Data access
 - Data curation
 - Extract knowledge from data
- Cost and time consuming
 - Limit any one nation's ability to support exceptional facilities on their own
- Security
 - Some folks just won't let us have their data because they don't trust the next work
- Scientists growing weary of the next-best-thing
 - Get tired of new and improved techniques on an annual basis