The Future of Computing for ATNF and ASKAP

Positioning ATNF for the Next Era of Radio Astronomy

Steve Ord | 18 Feb 2026

Computing Futures for ATNF & ASKAP – The Next Era

Our systems and software must align with industry-scale trends in accelerators, workflows, and tooling.

The next decade is about sustainable, reproducible, orchestrated compute

Global radio astronomy partners (SKAO, ASTRON, SARAO, NRAO) are converging on shared approaches for pipelines, modular workflows, and industry-aligned tools.

ASKAP's real long-term asset is the archive

Surveys end around 2030, but science continues for decades. Archive sustainability, accessibility, and usability become essential.

Storage pressure requires science-preserving data compression

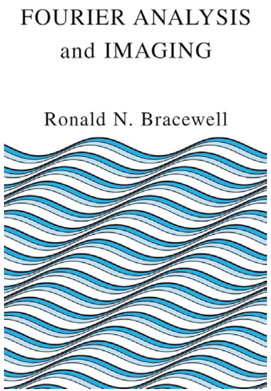
CASDA cannot grow indefinitely; compression becomes mandatory for long-term viability.

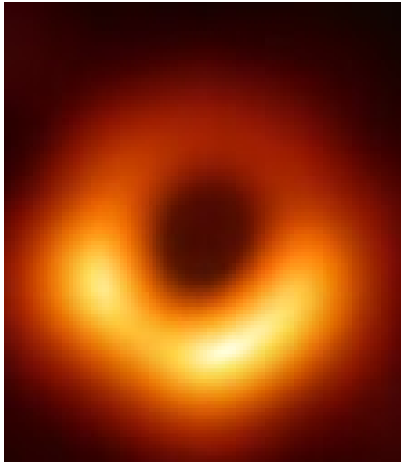
We must modernise to accelerators (e.g. GPUs) and many-core architectures

Future HPC is heterogeneous; our algorithms, pipelines, and staff capability must adapt.

Astronomy has a legacy of computing

Astronomy once led advances in scientific computing
(e.g., custom operating systems for pulsar timing)
Interferometry and early radio astronomy pushed algorithmic innovation
(e.g., FFT-driven imaging and signal processing)
Our field traditionally built bespoke software and hardware systems to extract new science





The world is changing – AI and Big Data now drive HPC

Global compute architectures now evolve to support AI and massive data workflows
(Our HPC requirements are much larger that we can provide ourselves.)
Industry-scale investment dwarfs traditional scientific computing
(AI/ML drives hardware, software, and data-model innovation.)
Astronomy must align with these trends to stay efficient and sustainable

How to Adapt - A Converging Global Vision for Radio Astronomy Software

Global partners (NRAO, SKAO, SARAO, LOFAR) share a common direction.
(Develop common resources. Exploit industry standard tools)
Workflows moving toward modular, orchestrated, reproducible pipelines
(ASKAP already has one of the only real-time astronomy pipelines generating science ready data products)
New pipelines are leveraging Prefect and Dask
(Tim Galvin and Alec Thompson’s FLINT work is strongly aligned.)

Adopt Accelerated many-core algorithms

HPC cycles are now driven by accelerators (e.g. GPUs) and many-core processors
ATNF Software and Scientific Computing currently develops primarily for CPU-centric systems
We must shift skills, tooling, and algorithms to exploit new architectures

2030 – Surveys End … Science Doesn't

ASKAP surveys complete around 2030 — but data use will continue for decades

The archive becomes the critical long-term scientific product
(Science impact depends on accessibility, sustainability, and usability.)

Long term data storage is expensive. We need a sustainable plan for long term archive survival
The long-term value of the archive will depend less on what we observed – but on how accessible the archive is

CASDA Storage Pressure: Compression Is Now Essential

CASDA Storage requirements will exceed the available disk and tape allocations. Expanding the storage allocation is expensive
(Long term viability requires reducing data volume)

Astronomy already accepts many forms of loss in signal processing
(Averaging, bandwidth smearing, correlation losses)

Proposing we just add compression losses to that list
(We need automated, science preserving compression for long-term viability)

What must we be delivering 2030+

Accelerator-ready modernised software and workflows
(Develop new capabilities in ATNF and shift away from CPU only development to exploit new technologies)

Sustainable, orchestrated pipelines aligned with global best practice
(Work with partners SKA, ASTRON, SARAO, NRAO to combine effort)

Science preserving data compression to reduce CASDA storage requirements by at least 50%
(Essential for long term viability of the survey archives)