ASKAP Monitoring and Control

PAST, PRESENT AND FUTURE

Malte Marquarding on behalf of the ASKAP M&C team

ICALEPCS 2015

What is it?

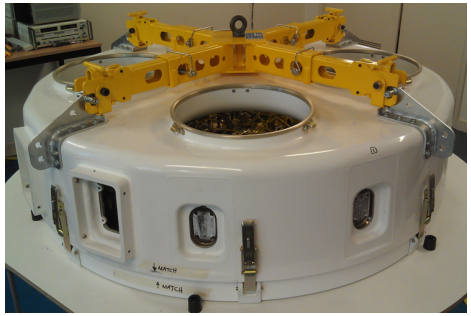
- Wide field of view radio telescope
  - 36 antenna interferometer
  - 12m diameter (3-axis)
  - Max baseline 6 km (distance between antennas)
  - 30 arcsec angular resolution
  - Frequency 0.7 - 1.8 GHz
  - 300 MHz bandwidth, 16k frequency channels
  - Phase Array Feeds (PAF) yielding **30 square degrees** field of view

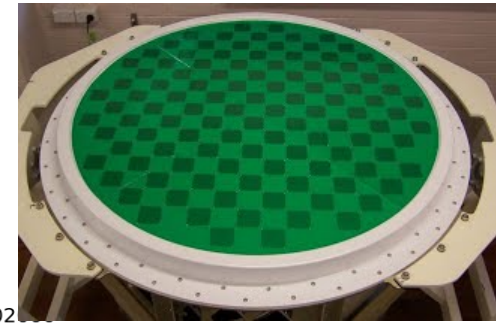
- Primarily a survey instrument
  - Driven by a few key survey science projects, e.g.
  - WALLABY and EMU (DINGO, POSSUM…)

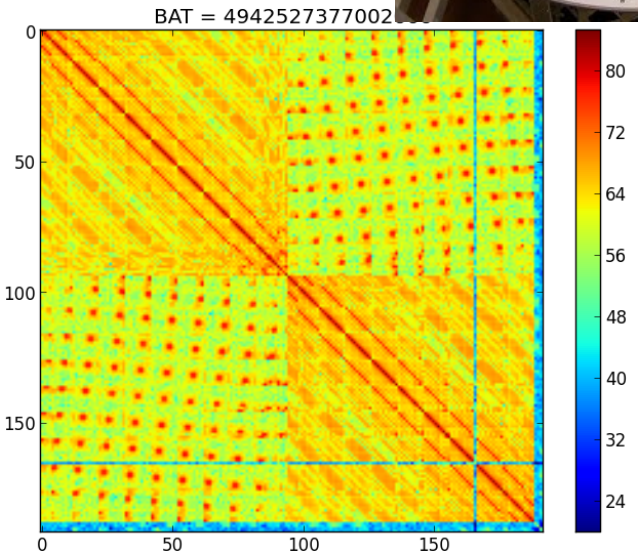
- Technical precursor of SKA
  - Demonstration of WA as SKA site
  - Phased Array Feed technologies
  - Computing
  - Distributed Operation

Instrument status

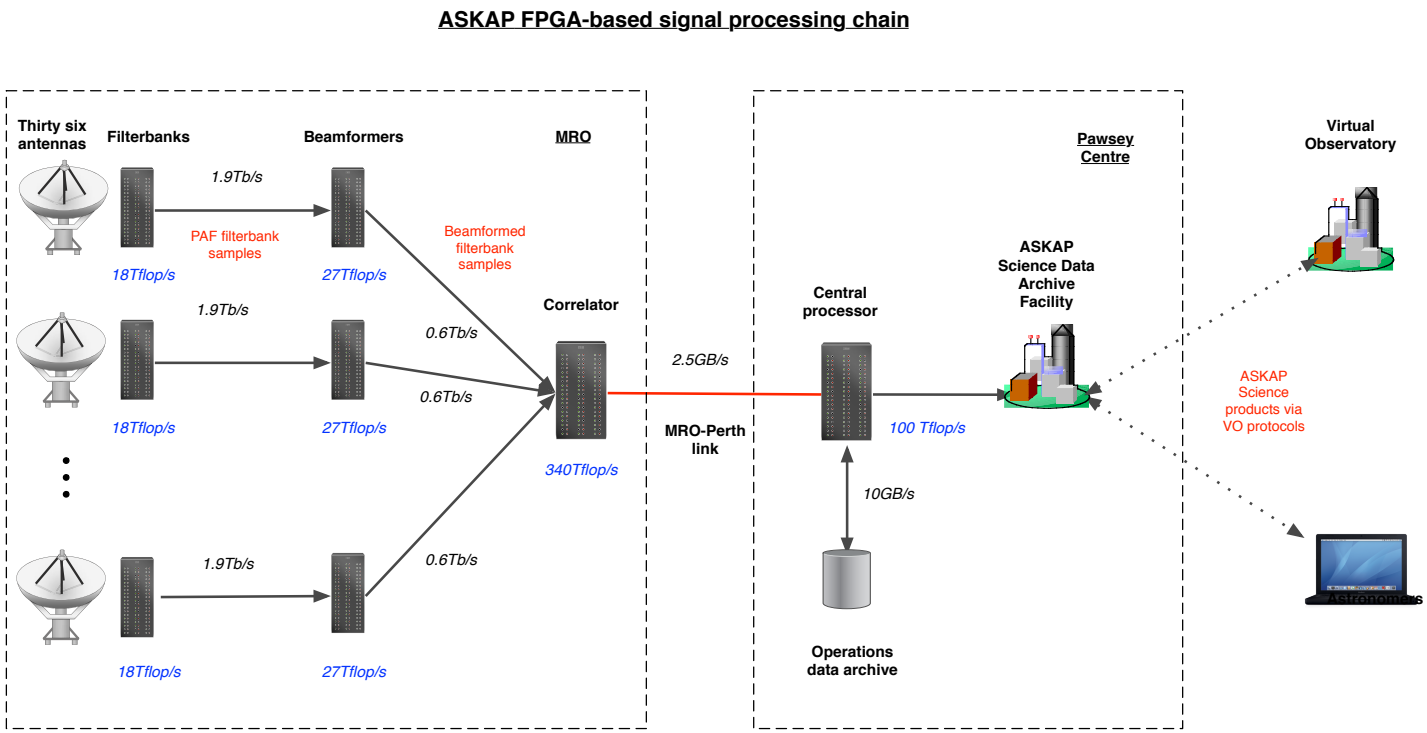
- Parkes 12m PAF prototype
  - Engineering research
  - PAF development
- BETA
  - Six Mark1 PAF on ASKAP antennas
  - Fully operational
  - Peer reviewed science publications
- **ASKAP (ADE)**
  - Design enhanced Mark 2 PAF
  - RF over fibre signal transport
  - 4 full antennas commissioned
  - Ongoing roll out of more systems
- Antenna 29
  - PAF Mark2 prototype
  - On-dish calibration system prototyping





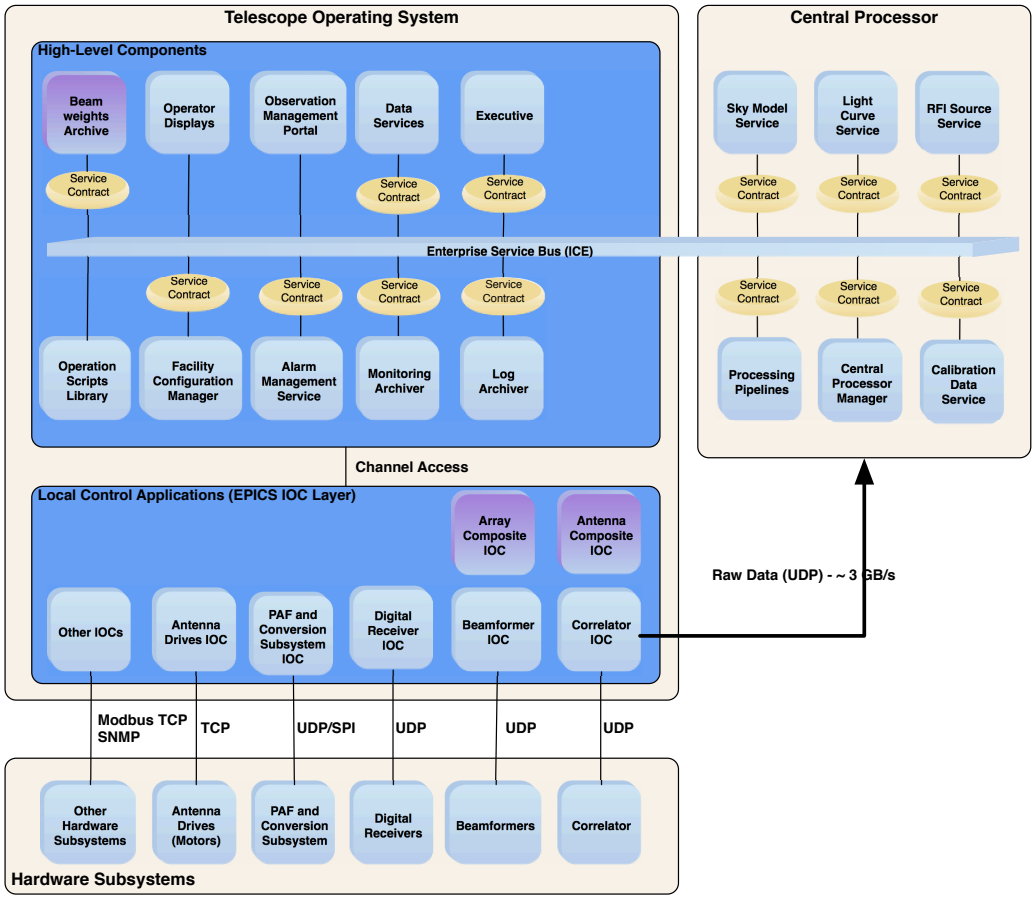


Data flow



T. Cornwell, Feb 22 2010

Architecture update



Technologies

JIRA

MoniCA

CSS control system studio

BOY BEAST

python™

Jenkins

rbuild

ZeroC ICE

EPICS v3

SUBVERSION

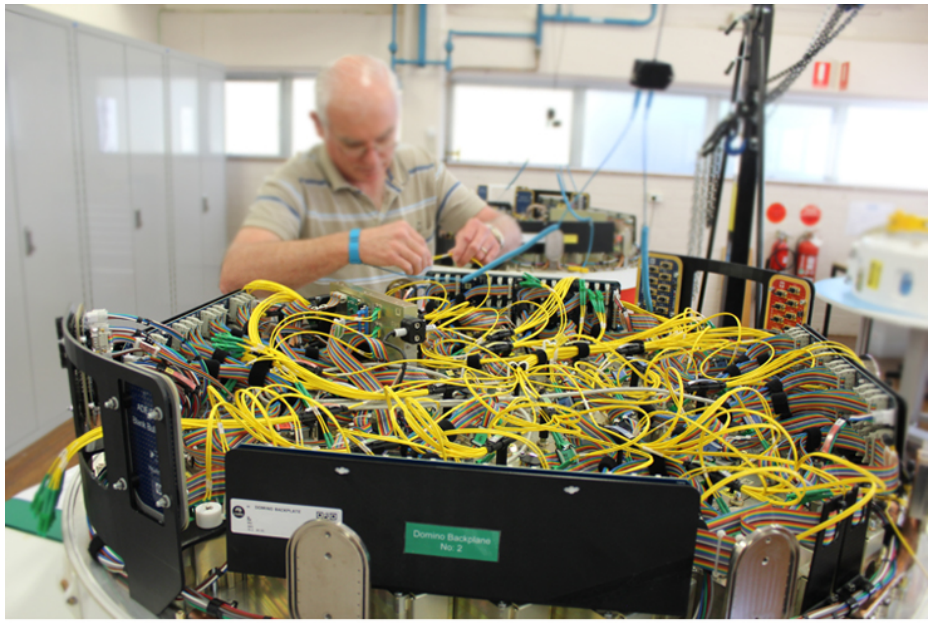
debian GNU/Linux

CSIRO

Monitoring and Control

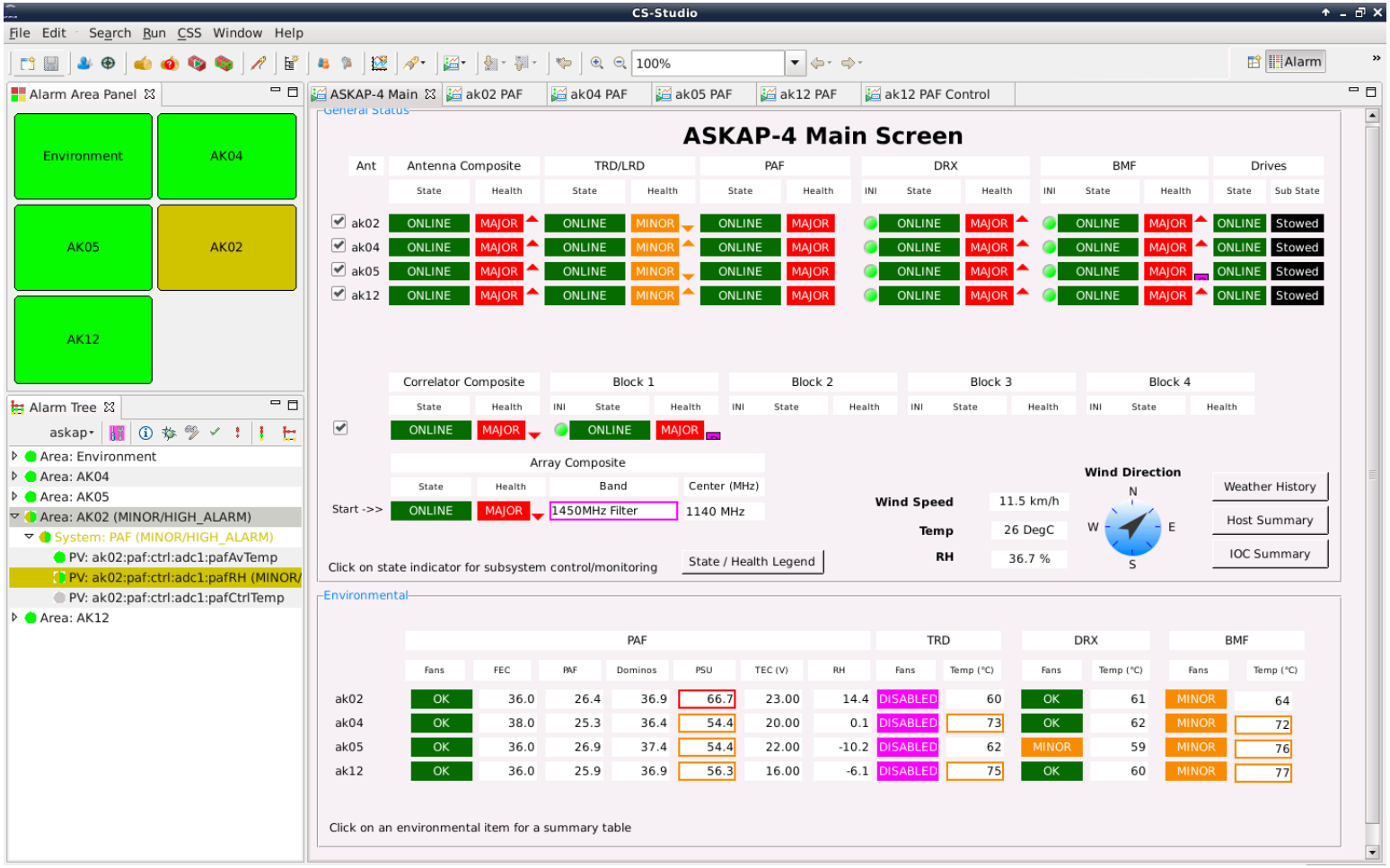
- 36 antennas
  - drive (motor) PLCs
  - digital backends
  - PAFs
  - Pedestal power
- correlator
- Weather station
- PDU > 40
- Metadata
- Delay calculation

# of records/points	> 800,000
# of soft IOCs	>300
# of linux hosts	13



Thousands of fibres are connected to the PAF electronics before as part of the assembly process.

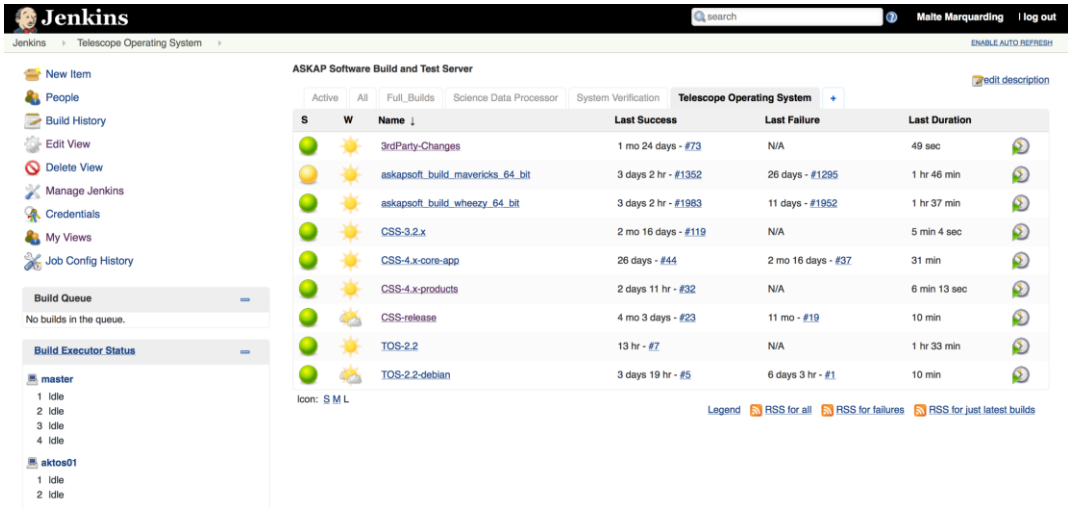
cs-studio, BOY and BEAST



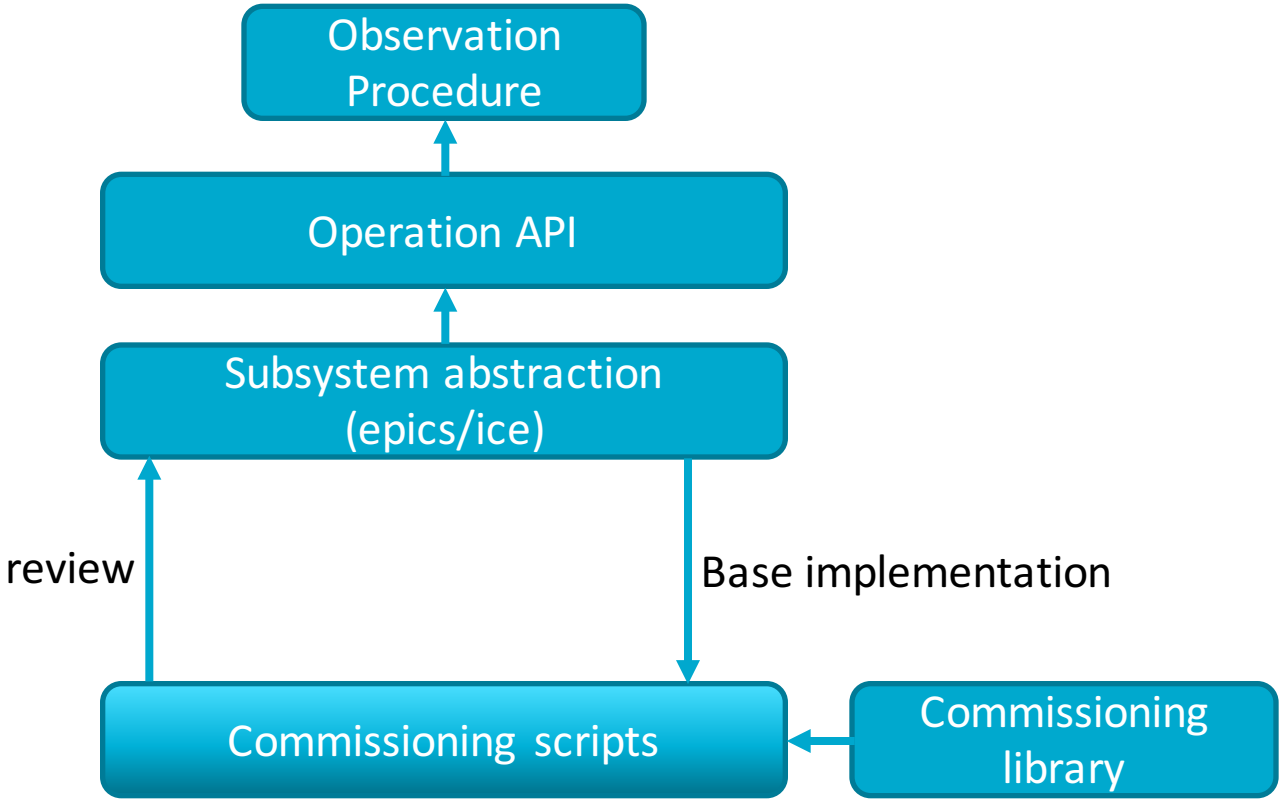
Software status

- Scalability
  - Hierarchical IOCs
  - FITS to HDF5 for ACM storage
- Completeness
  - Almost all IOCs implemented
  - cs-studio fully integrated
  - Scheduled Observations
- Testing/Reproducibility
  - ICD to common library
  - Better testing coverage
  - Emulators for most subsystems
  - BETA operation
  - Automated release process

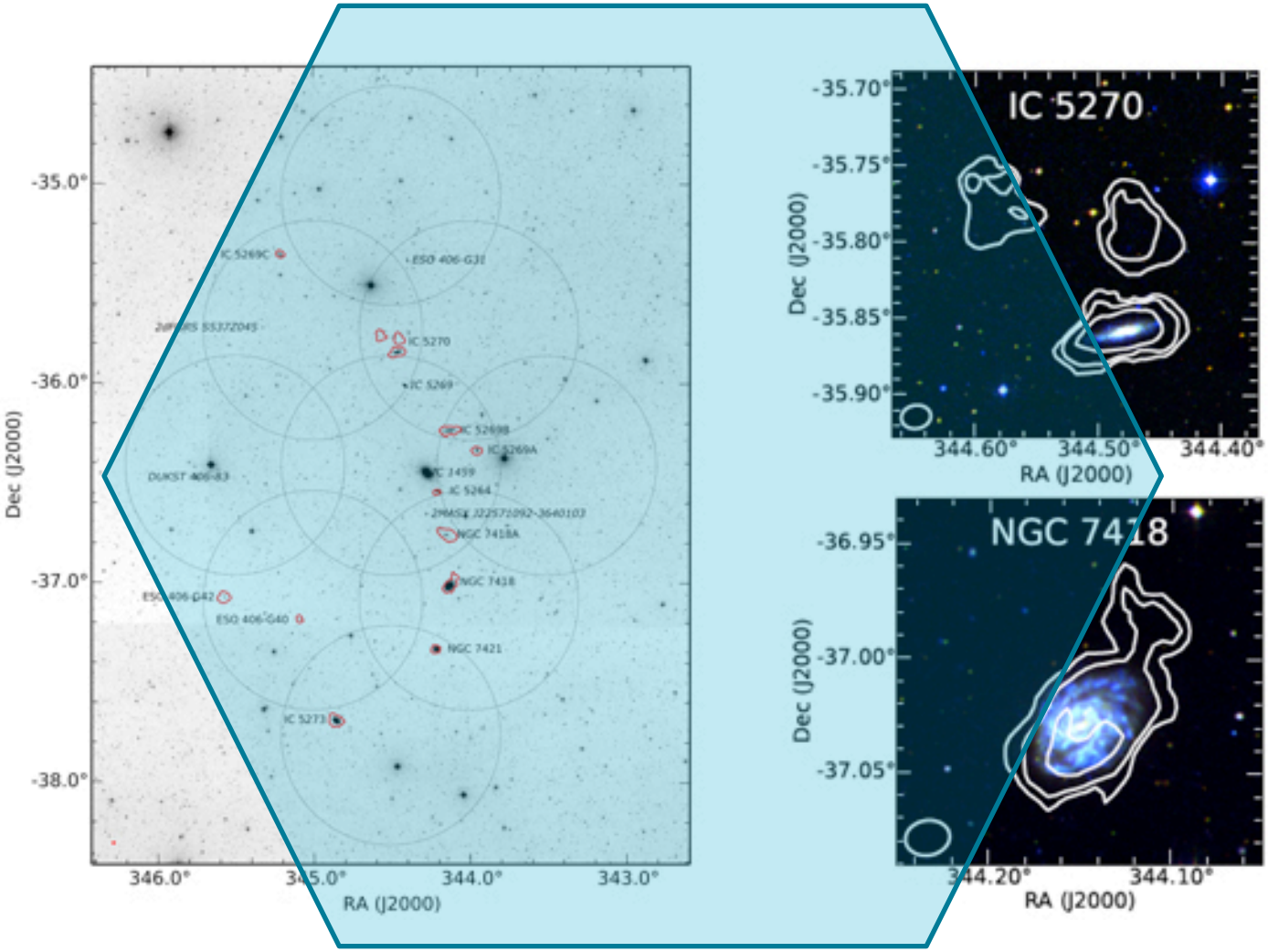
```python
import askap.opl.init


from askap.opl.script import Observation


with Observation() as obs:
    obs.initialise()
    # get default set of antennas
    all_antennas = obs.make_array()
    targets = obs.parameters["common.targets"]
    # get the number of times to repeat
    for target in targets:
        with obs.new_scan() as scan_id:
            all_antennas.set_target(target, offsets=offset)
            all_antennas.wait_until_ready()
            if obs.get_target_parameter(target, "acm_capture", False):
                obs.start_datacapture(scan_id)
            obs.wait(target)
```



Development cycle

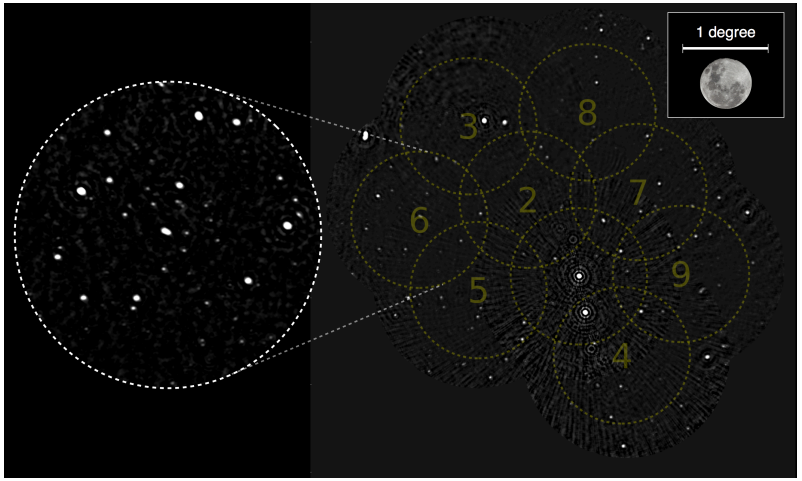


First Science Paper - *Serra et al. 2015*



Future

- End-to-end operational testing – 12 dishes
  - TOS – CP – CASDA
- Observation Management Portal
- Beam weights management
- Configuration management
- Further investigation of EPICS v4
- Git
- Partial container deployment?
- Moving towards full operations



Thank you

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Are you familiar with EPICS?
Interested in spending six months in Australia (Perth)?
Want to meet these guys?

Talk to us!