Australian Radar Archive in the Cloud
Applications to Research and Industry

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ORCID

Why Open Data?

• Identified as a 'nationally significant' data collection as part of the Australian Research Data Services (RDS) project

• BoM radar network - one of the largest remote sensing assets in Australia

• Without data access there can be no science - *Securing Australia's Role in the International*

• Remove the $$, delay and data issues with current cost-recovery service
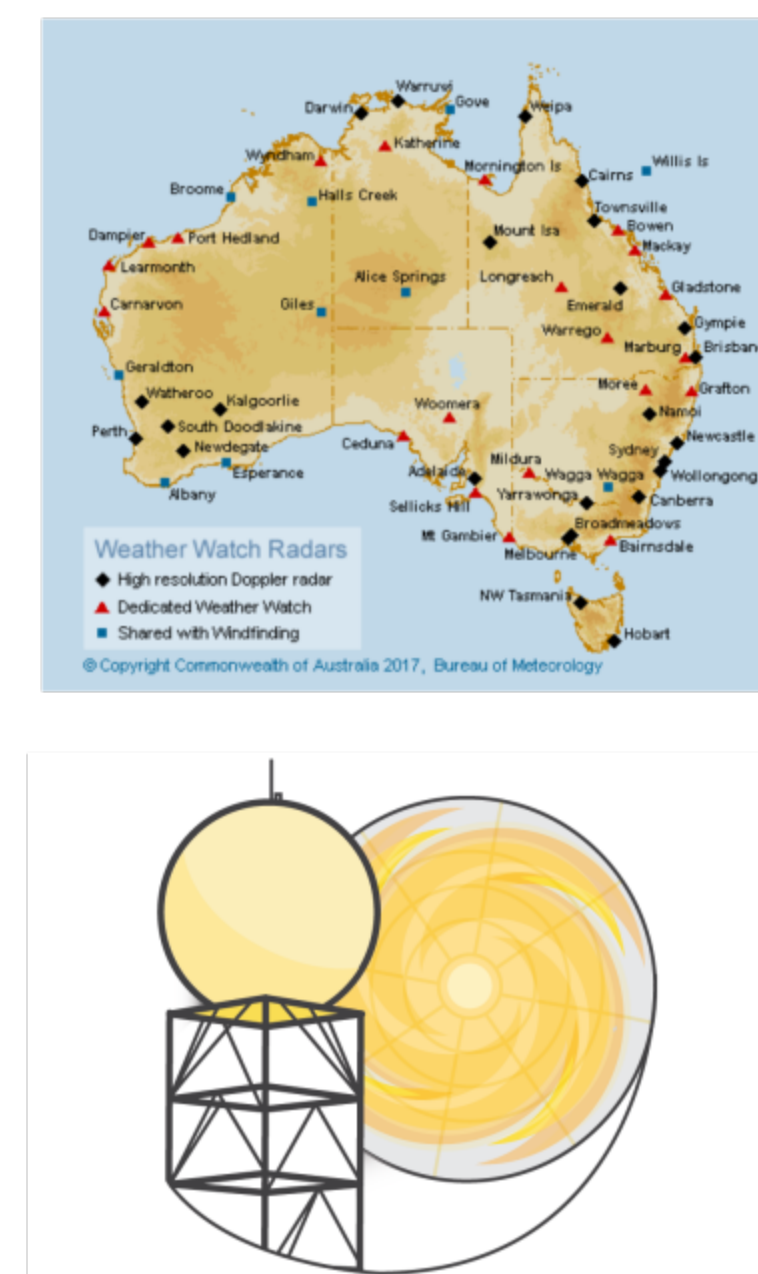
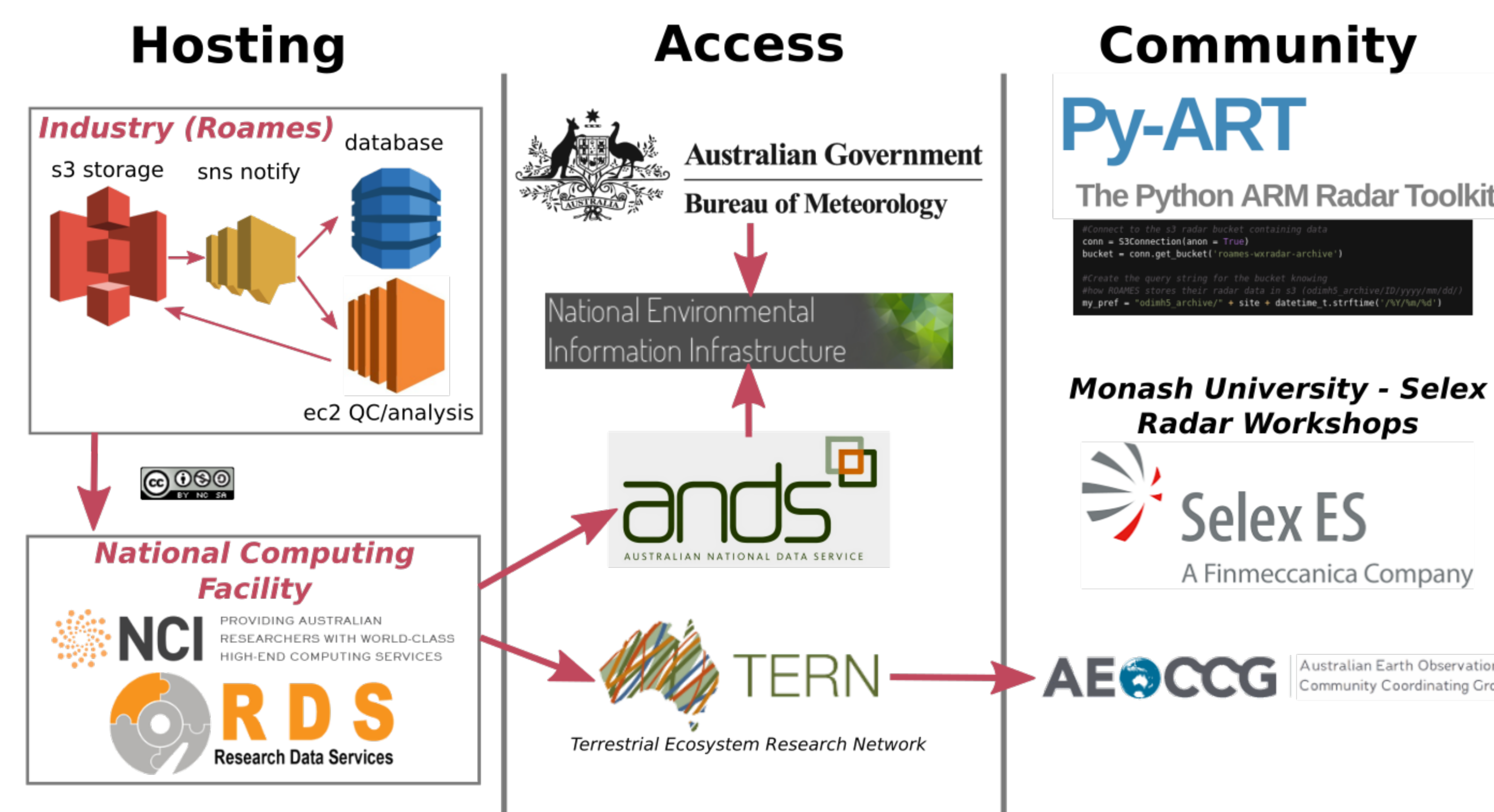**NOAA, Unidata & Amazon Success**

The real-time and full historical archive of (Level II) NEXRAD data, from 1991 to present, is now freely available on Amazon S3.

Integration with open source, radar user communities, and industry engagement.
aws.amazon.com/earth/
Ansari et. al 2017 (BAMS early release)

Environment

Hosting

Industry (Roames)
s3 storage   sns notify   database
ec2 QC/analysis

National Computing Facility
NCI PROVIDING AUSTRALIAN RESEARCHERS WITH WORLD-CLASS HIGH-END COMPUTING SERVICES
RDS Research Data Services

Access

Australian Government
Bureau of Meteorology

National Environmental Information Infrastructure

ands AUSTRALIAN NATIONAL DATA SERVICE

TERN Terrestrial Ecosystem Research Network

AEOCCG Australian Earth Observation Community Coordinating Group

Community

Py-ART
The Python ARM Radar Toolkit

Monash University - Selex Radar Workshops
Selex ES
A Finmeccanica Company
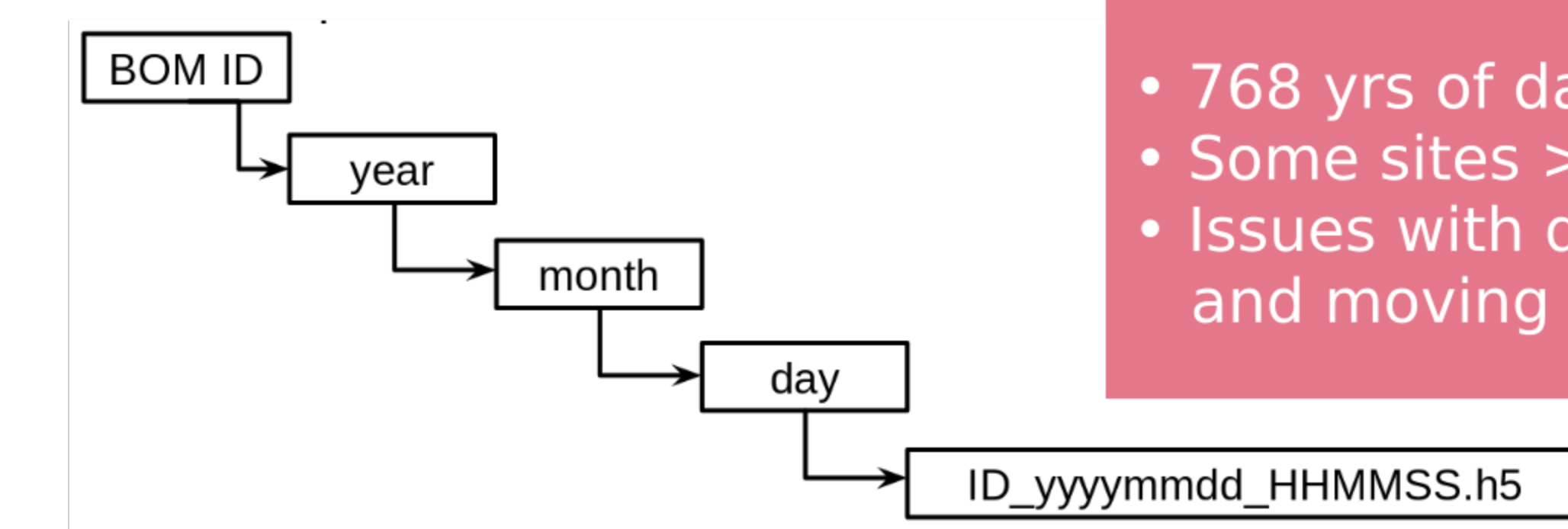
Leveraging from existing scientific infrastructure, portals and communtieis to deliver the Australia Radar Archive

Implementation

• Access through portals and API's (THREADDS/OpenDAP)
• Quality Controlled, ISO/IEC 11179 Standard for Metadata
• Uniform, predictable archive structure and names

BOM ID → year → month → day → ID_yyyymmdd_HHMMSS.h5

• 768 yrs of data (27 TB)
• Some sites > 20 year record
• Issues with diversity, outages and moving radars!

• Open data format (odimh5)
   - Support in many programming languages
   - Radar toolkits (wradlib, baltrad, py-art)
   - Self describing data format (HDF5)
   - Developed by EUMETNET (31 European Countries)
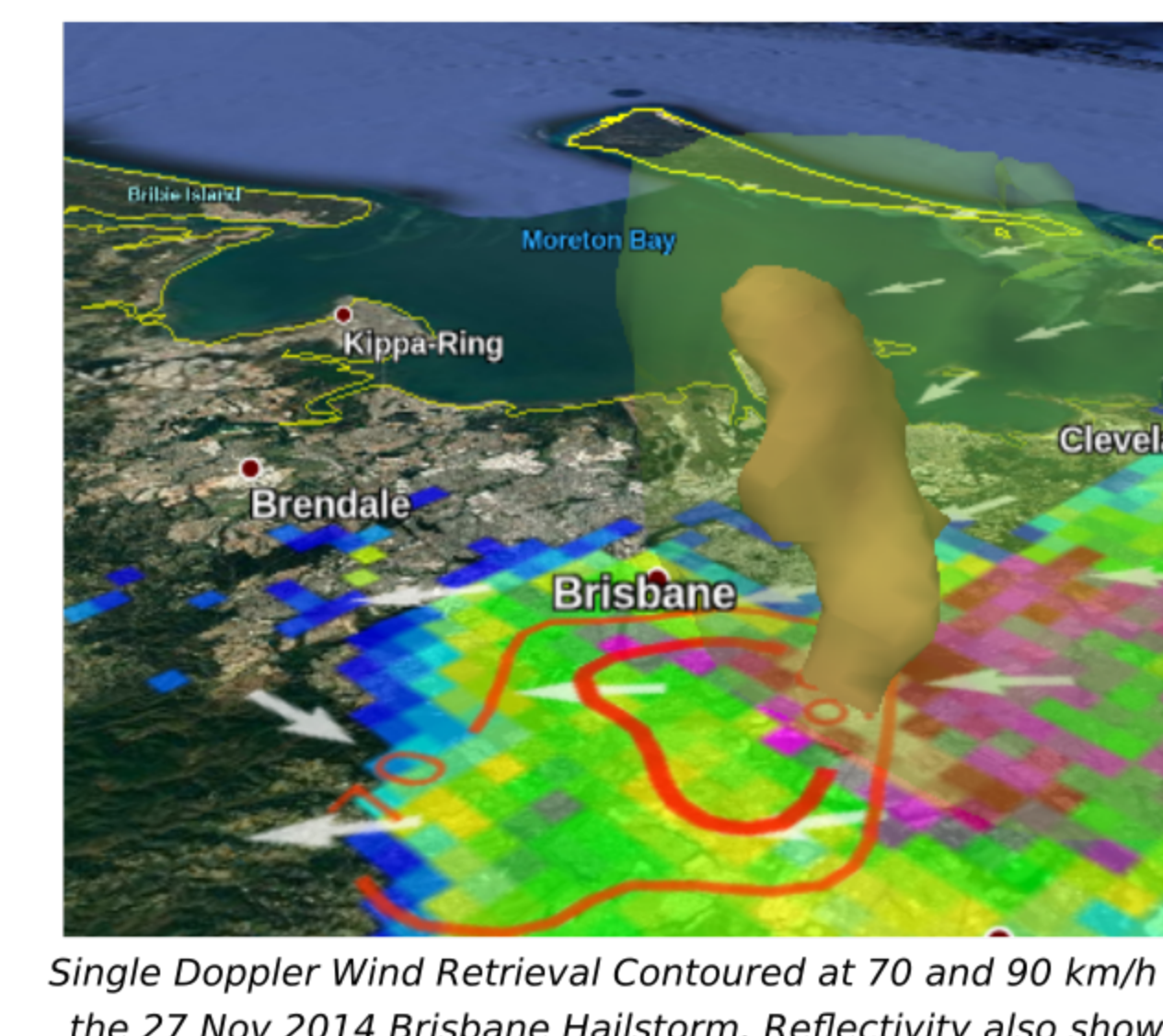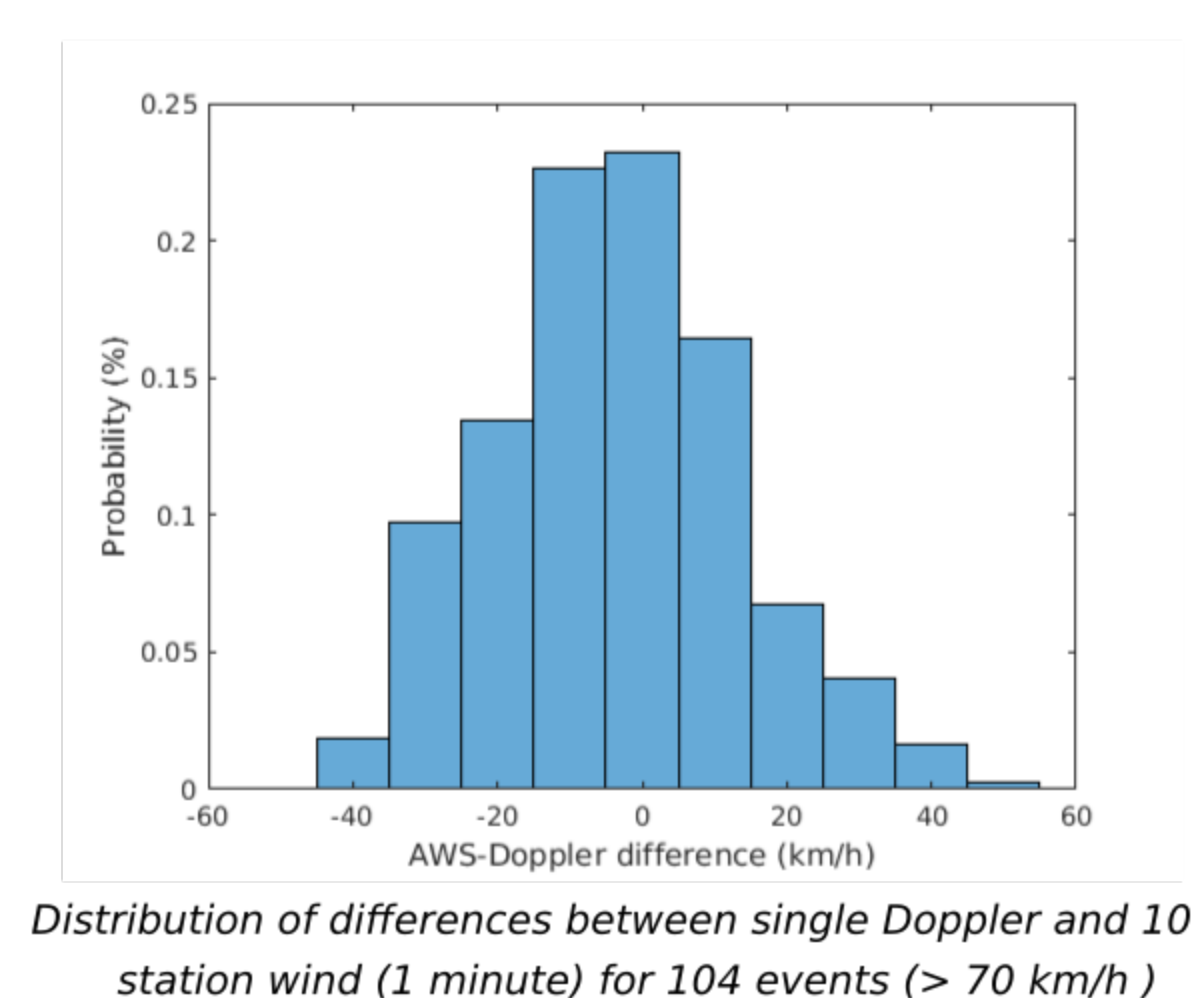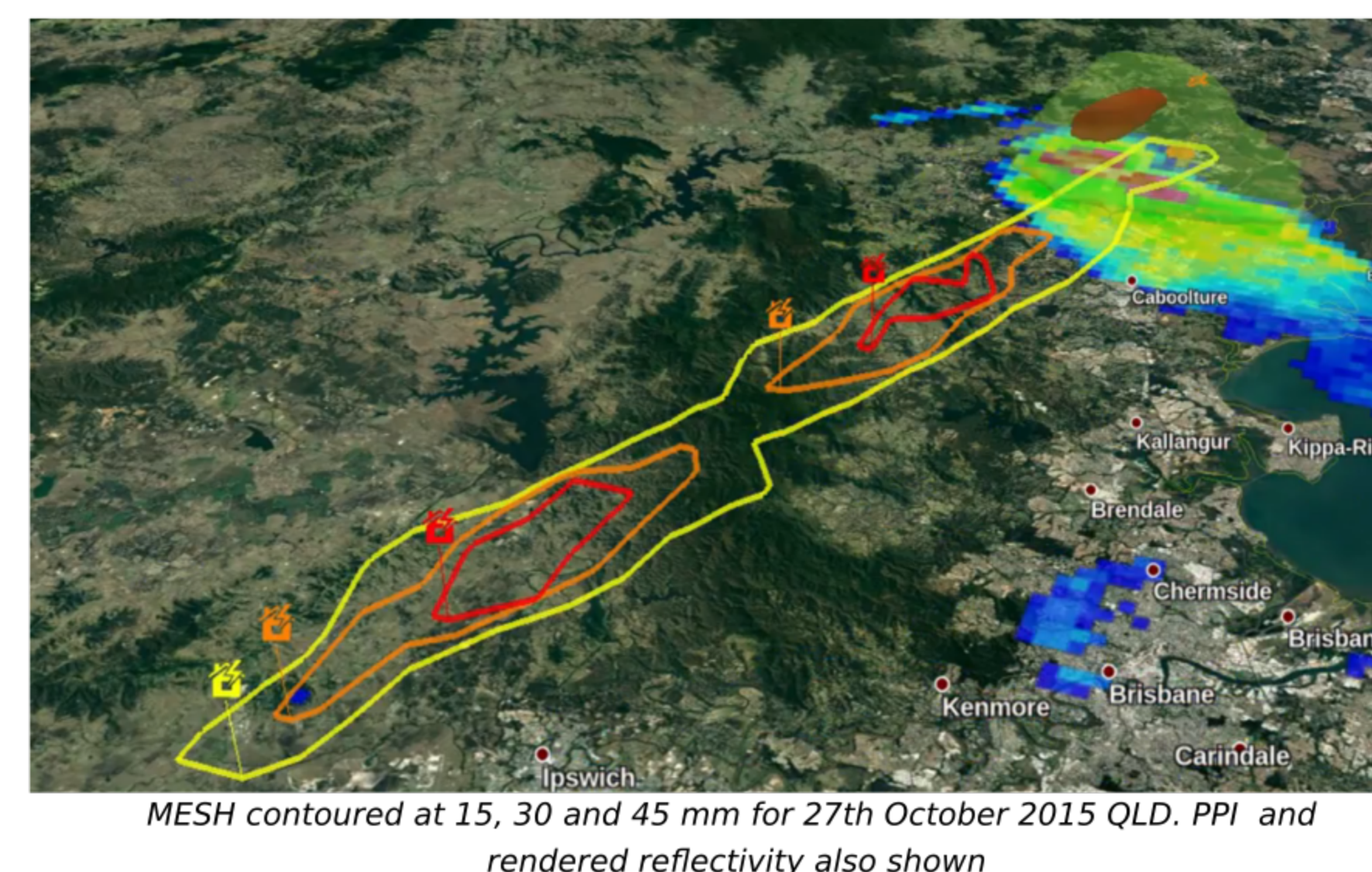   - Replacing BoM rapic format

Applications

National Convective Storm Climatology

• Ground truth for long-term environmental climatologies (e.g., calibrating parameters)

• Finescale hazard modelling (Applications for insurance)

• Energy Distribution
- Clearance vs Risk
   - Maintenance cycle
   - Assessment of new corridors

• Develop an understanding thunderstorm drivers
- local (e.g., terrin, sea breeze)
   - synoptic (e.g., fronts, wind regimes)
   - climate scale (ENSO forcing)

Hailstorm frequency 2000 - 2017 (MESH > 20mm)
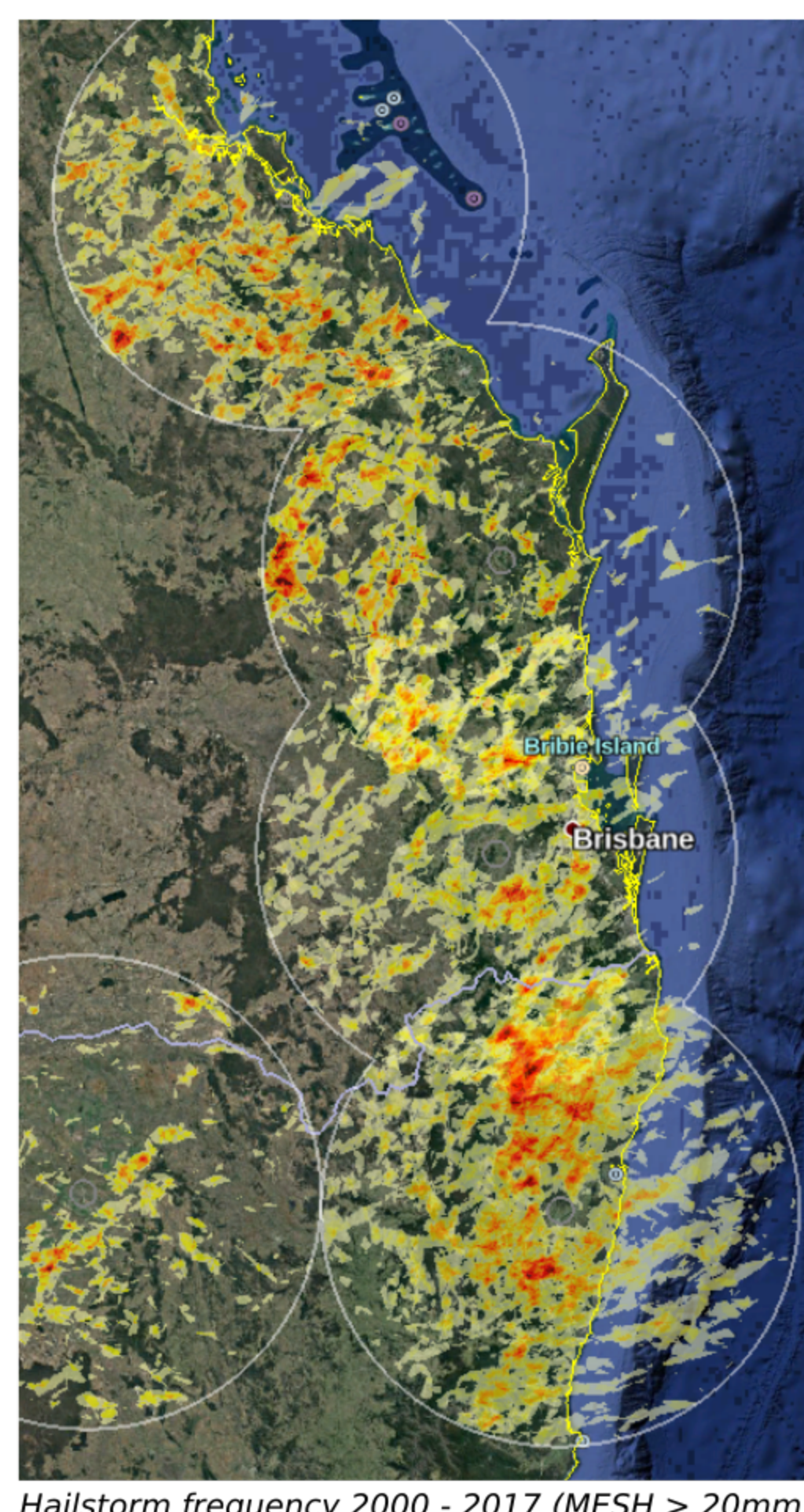
Hail and Wind Nowcasting for Industry

• The presence of large hail can provide a proxy for damaging winds -> gridded swaths radar-derived estimates of hail can provide a powerful tool to assessing likely impact
• Doppler winds is often difficult to interpret. Single Doppler derived winds (Xu et. al 2006) provids a technique for estimating potential near surface wind gusts that can be readily integrated into asset management.

Distribution of differences between single Doppler and 10 m station wind (1 minute) for 104 events (> 70 km/h)

MESH contoured at 15, 30 and 45 mm for 27th October 2015 QLD. PPI and rendered reflectivity also shown

Single Doppler Wind Retrieval Contoured at 70 and 90 km/h for the 27 Nov 2014 Brisbane Hailstorm. Reflectivity also shown.

Future

• Delivery of realtime volumetric data from the Australian Radar Network and radar-derived hazard product.

• Transition to CfRadial 2.0 improve data accessibility and interchangability with international communities

• South East Queensland Hazard Analysis and Verification Testbed (SEQ-HAVT) to refine hazard nowcasting and climatology products

• Integration of hazard products with industry asset geospatial datasets to automate mitigation and risk assessment during severe thunderstorm events

• Open access for Australian field campaign datasets, including the UQ-XPOL mobile radar

ROAMES™ FUGRO

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

Made using Py-ART (Collis, S et. al) and NASA Single Dop (T. Lang)