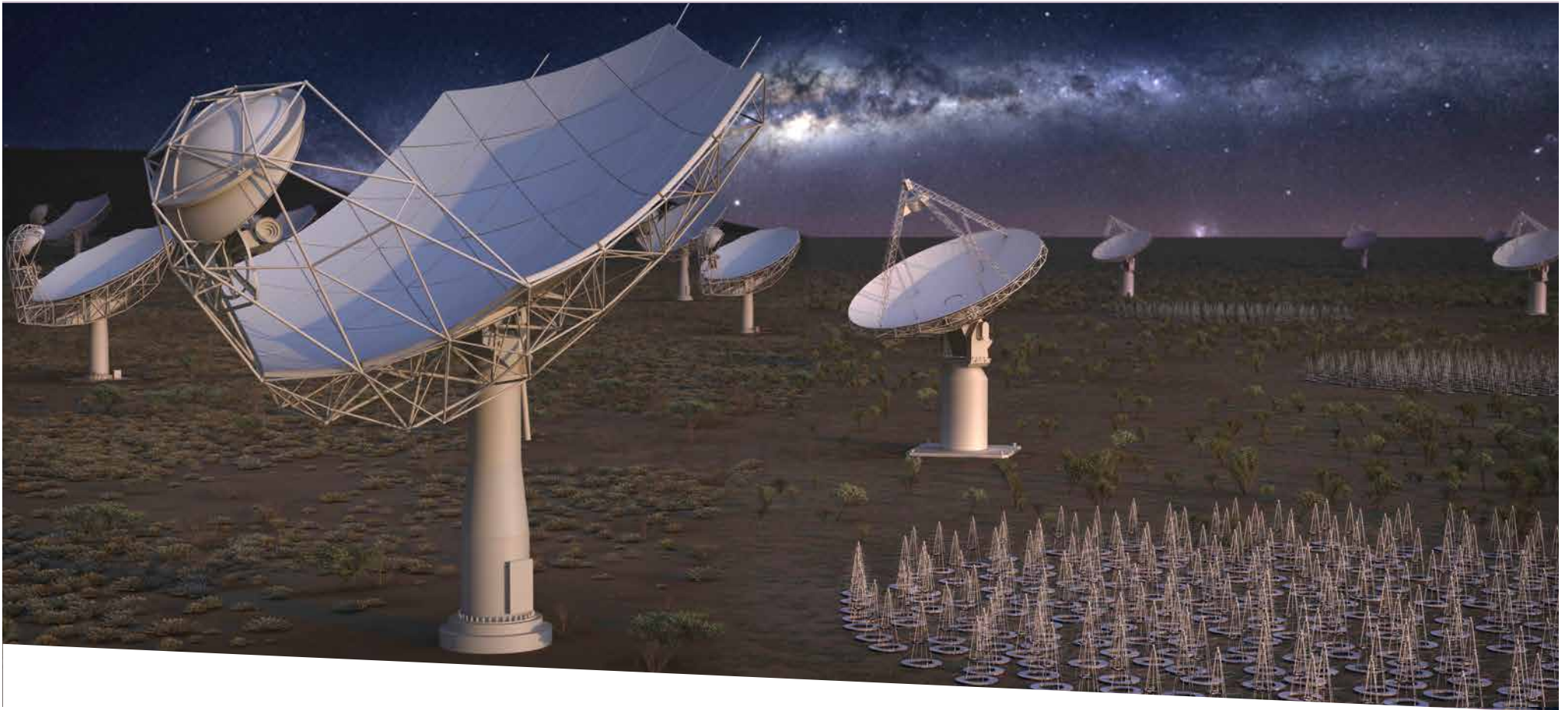


SKA SWG Update



SQUARE KILOMETRE ARRAY

Exploring the Universe with the world's largest radio telescope

Robert Braun, Science Director

19 June 2018

Agenda

- CDR Activities
- Some new overview slides
- Cosmic Dawn results
- Data Challenges (Anna)
- Community Updates
- 2019 SKA Science Meeting and KSP Workshop (Evan)

CDR Activity – Updates

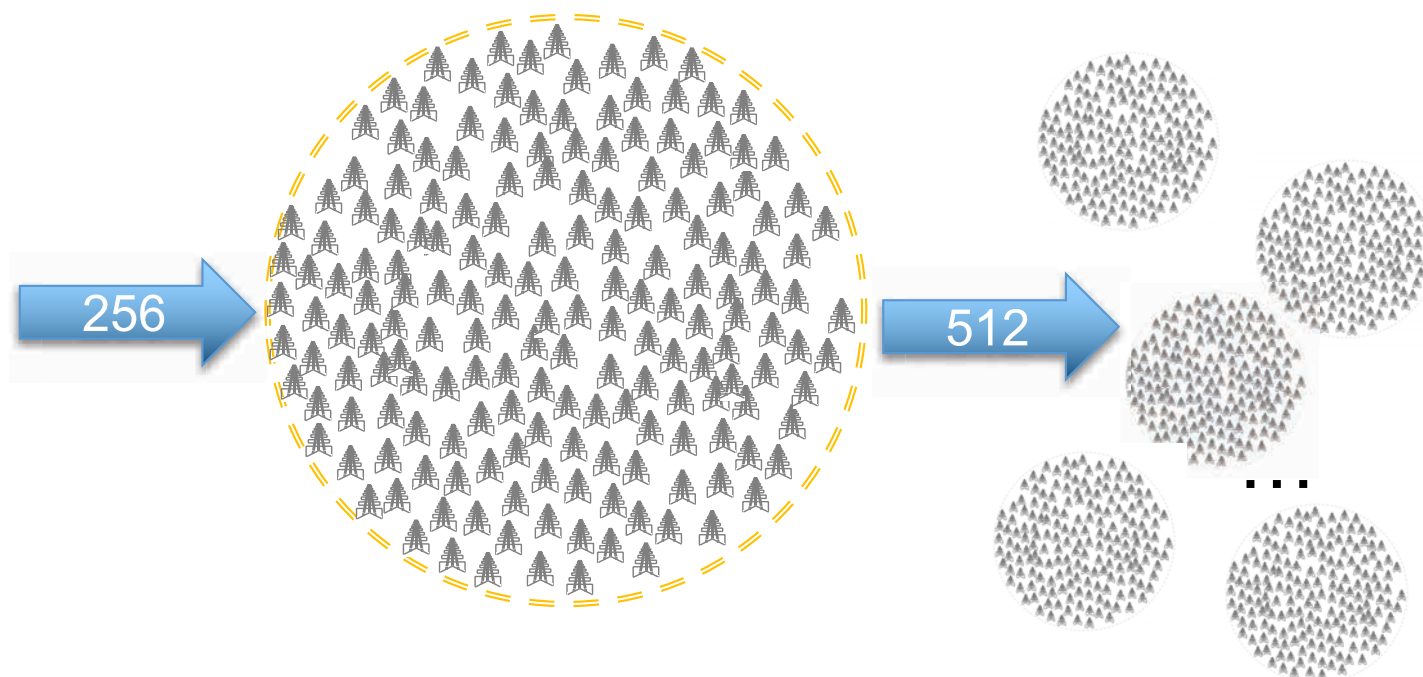
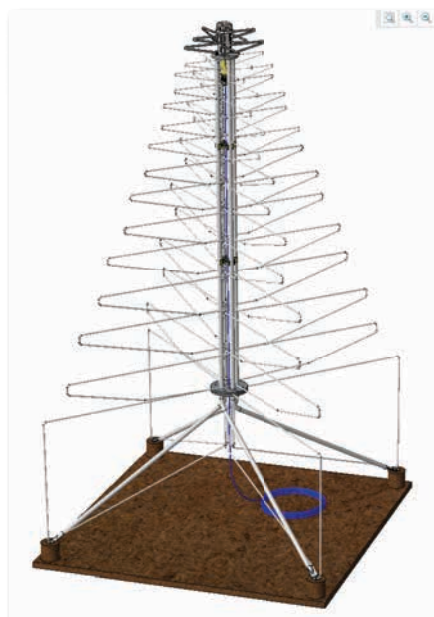
Element	RRN Submission	CDR Submission	CDR Meeting
TM	29 January 2018	28 February 2018	17-20 April 2018
SaDT & SAT	17 January 2018	28 February 2018	15-18 May 2018
INAU	19 March 2018	30 April 2018	27-29 June 2018
INSA	19 March 2018	30 April 2018	2-4 July 2018
CSP	18 May 2018 - PSS, PST, CBF-Low, CBF-Mid Sub-Element CDRs	<u>29 June 2018</u>	<u>25 – 28 September 2018</u>
SDP Pre-CDR SDP CDR	9 March 2018 17 September 2018	25 April 2018 31 October 2018	20 – 22 June 2018 <u>17 – 19 December 2018</u>
LFAA	<u>30 August 2018</u>	<u>11 October 2018</u>	<u>17 – 19 December 2018</u>
DSH Pre-CDR DSH CDR	<u>17 September 2018</u> May 2019 - Band 1, LMC Sub-CDR 20 Sept 2018 - <u>DSH Struct Sub-CDR 12 May 2019</u> - <u>Band 2 Sub-CDR 29 May 2019</u> - <u>Band 5 Sub-CDR 23 May 2019</u>	<u>31 October 2018</u> July 2019	<u>8 November 2018</u> TBD
AIV	September 2018 (proposed)	October 2018 (proposed)	December 2018 (proposed)
System			March 2019

Green: Successful phase

Blue: Updated from last report

Red: Potential schedule change

SKA1-Low: Array of Arrays



SKA1-Low
Antenna/Receptor

Antenna Beam

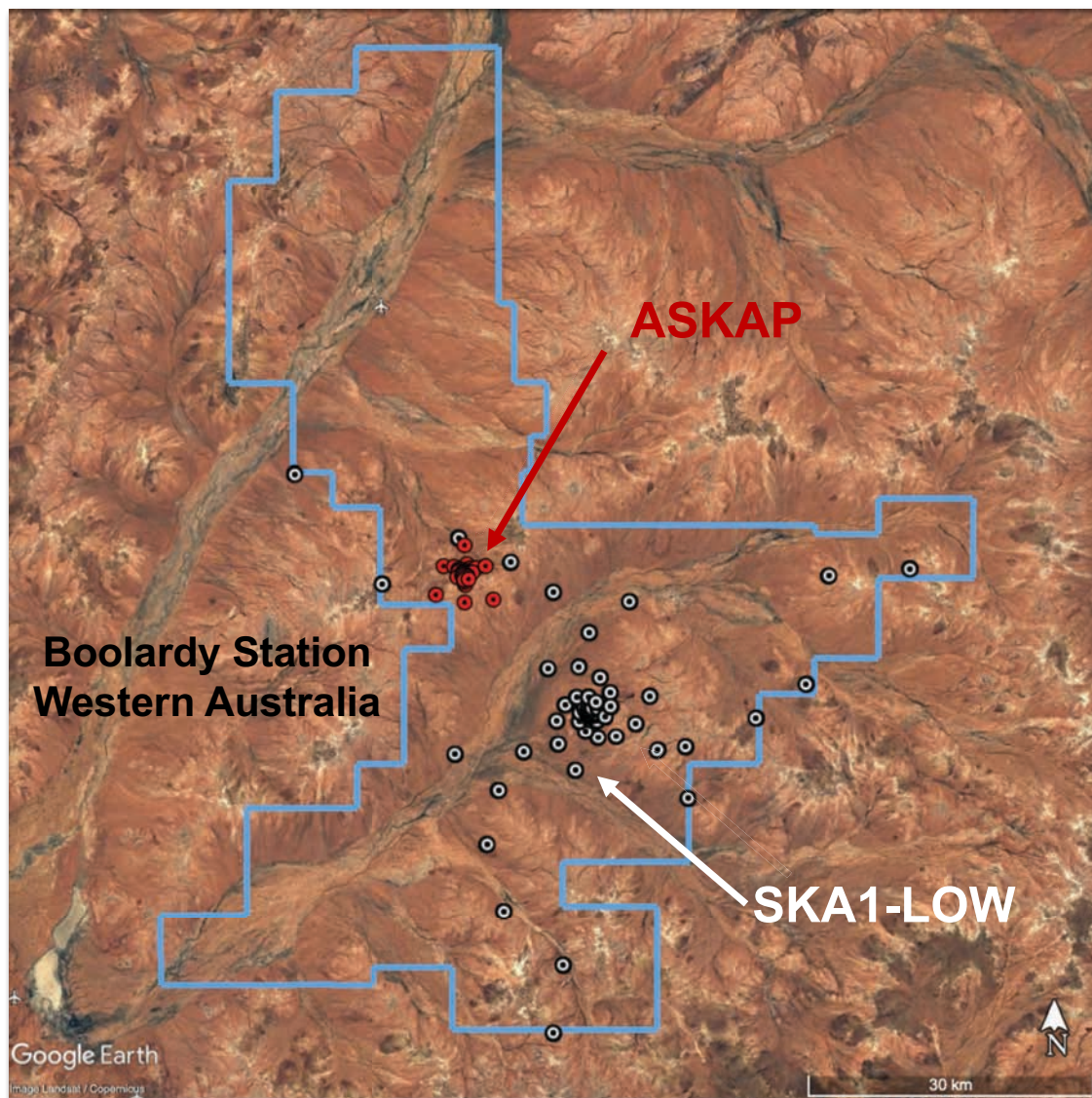
SKA1-Low
“Station”

Station Beam

SKA1-Low
“Array”

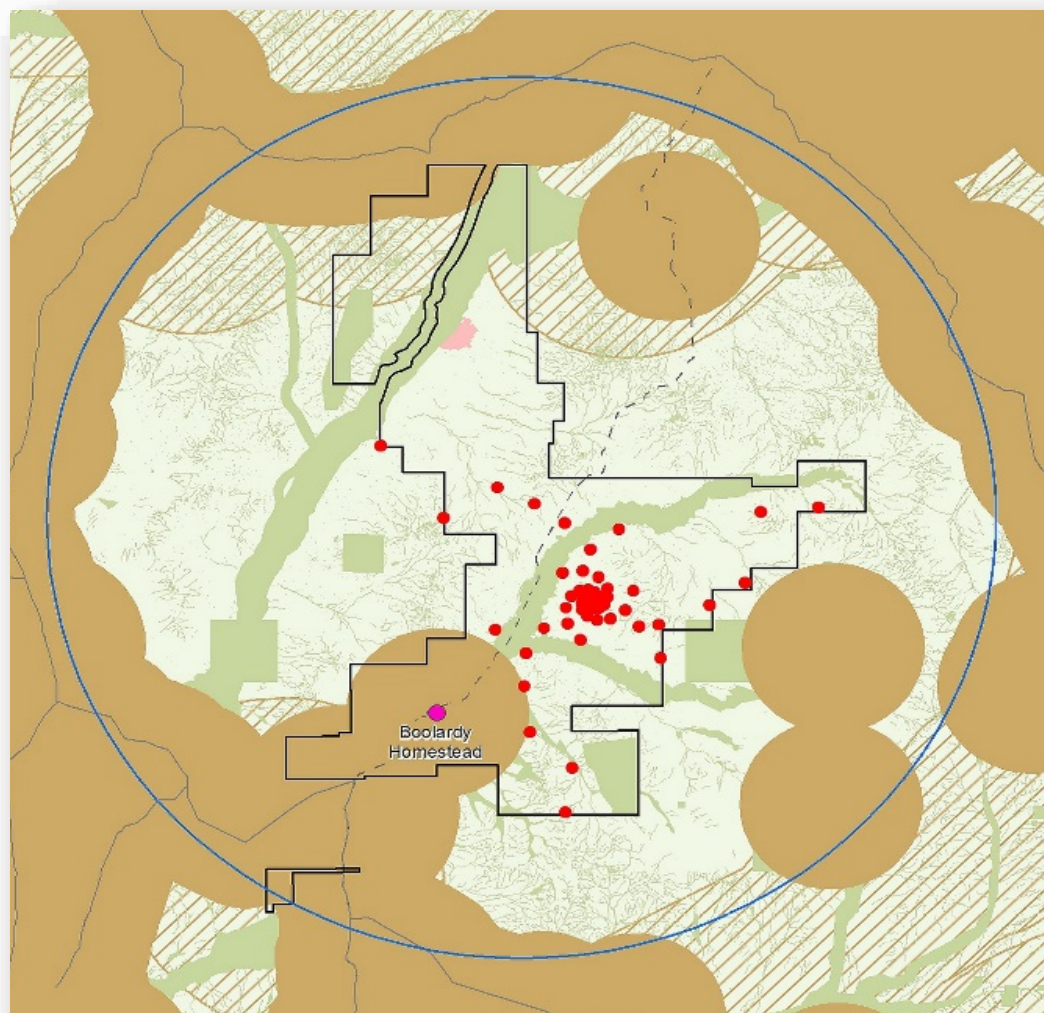
**Correlation and
Tied-array Beams**

SKA1 – Low: Layout



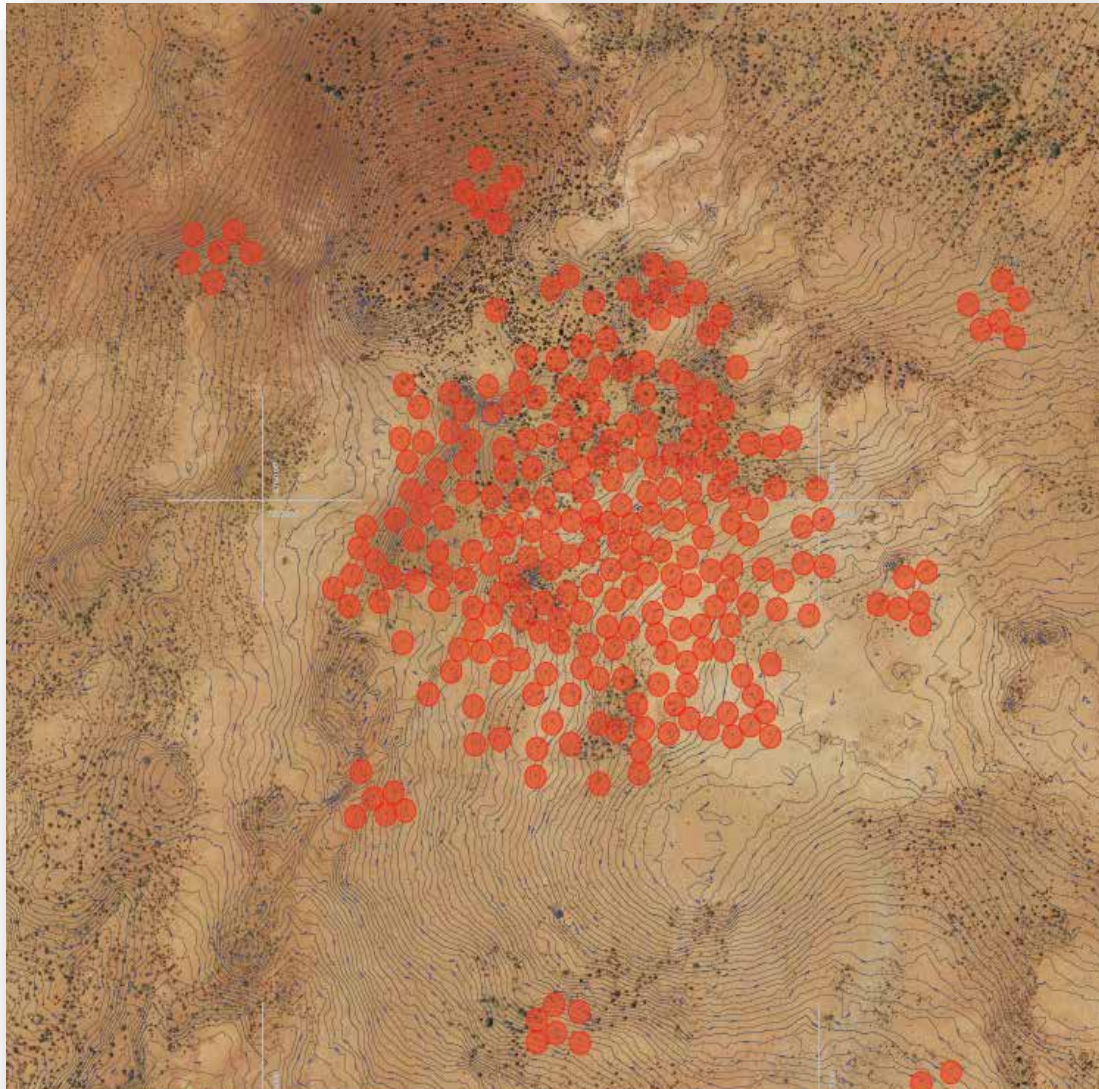
- 512 aperture array stations
- Maximum baseline 65 km
- 3 modified spiral arms

SKA1 – Low: Layout

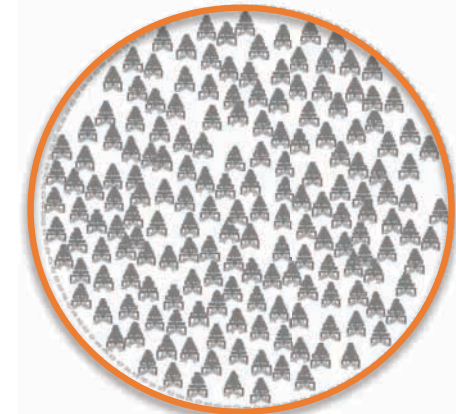


- 512 aperture array stations
- Maximum baseline 65 km
- 3 modified spiral arms
- Respect site constraints

SKA1 – LOW: Layout

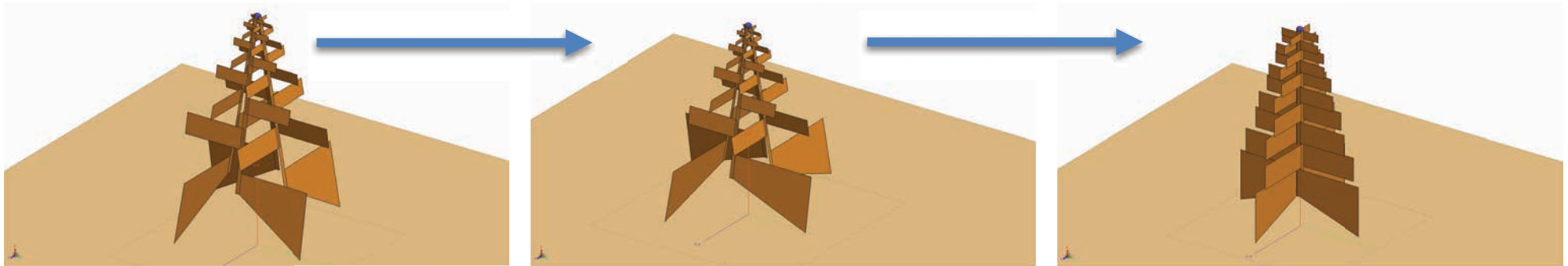


- 512 aperture array stations
- Maximum baseline 65 km
- 3 modified spiral arms
- Respect site constraints
- ~ 50% within ~1 km randomly distributed
- Others in clusters of 6 stations arranged randomly over an area 100 to 150 m in diameter



- 256 antennas per station
- 38m station diameter

SKA1-Low Antenna Development

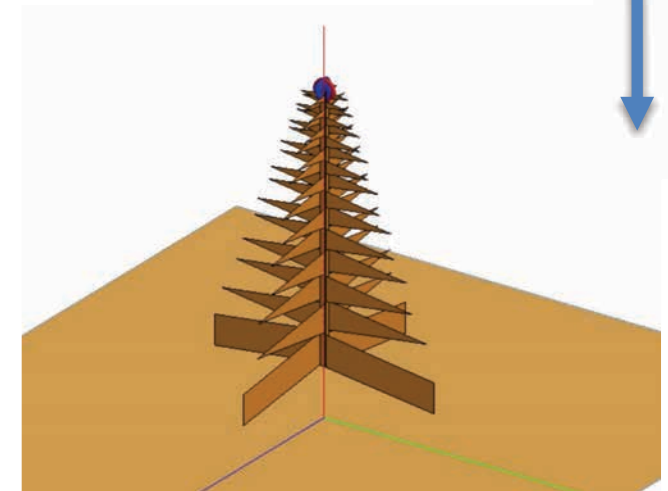
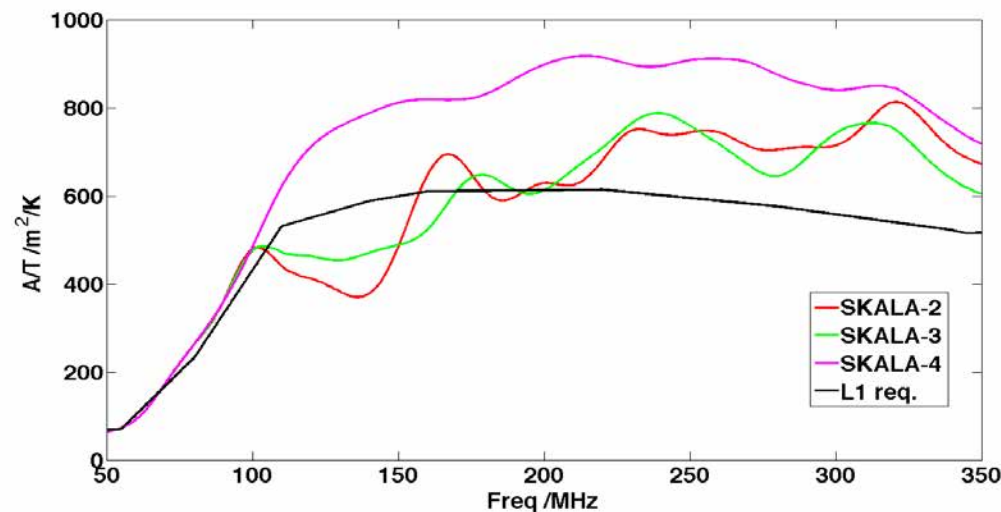


SKALA1-2: Open boom, 9 dipoles

SKALA3: Open boom, 9 dipoles

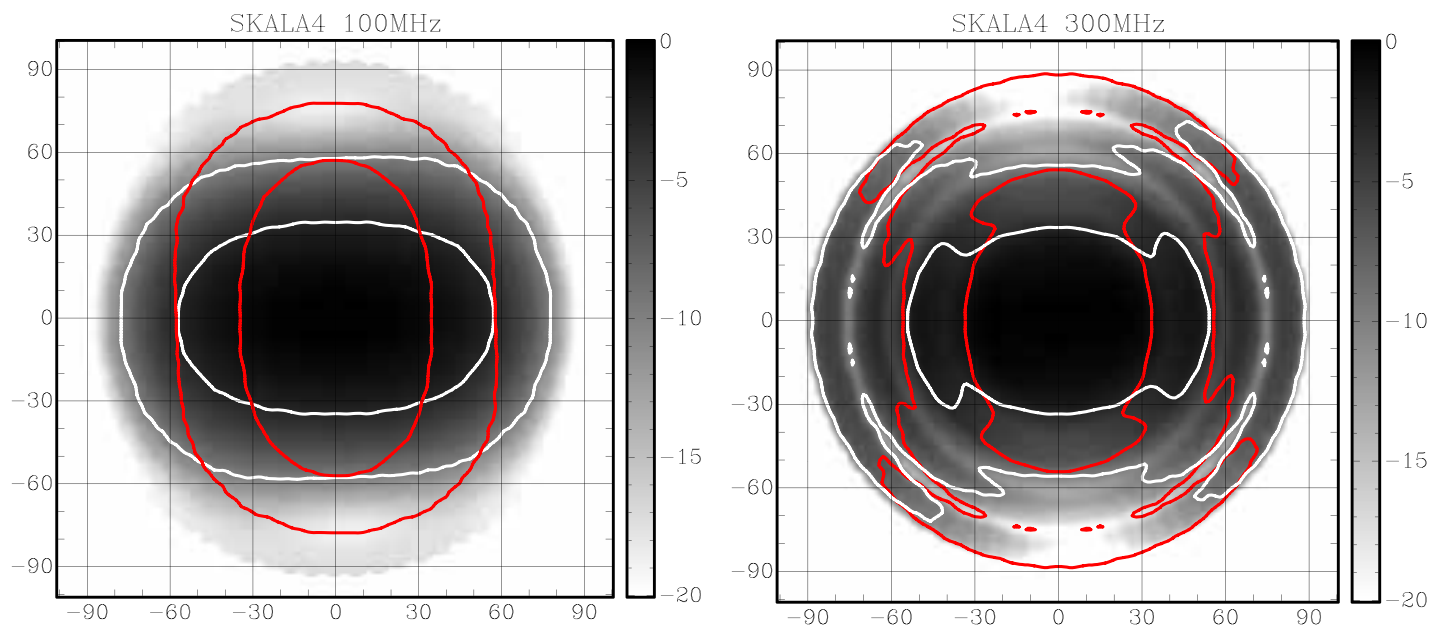
SKALA4: Closed boom, 11 – 18 dipoles

- SKALA4 design for SKA1-Low antenna
 - Improved: sensitivity, smoothness, polarisation purity, beam shape

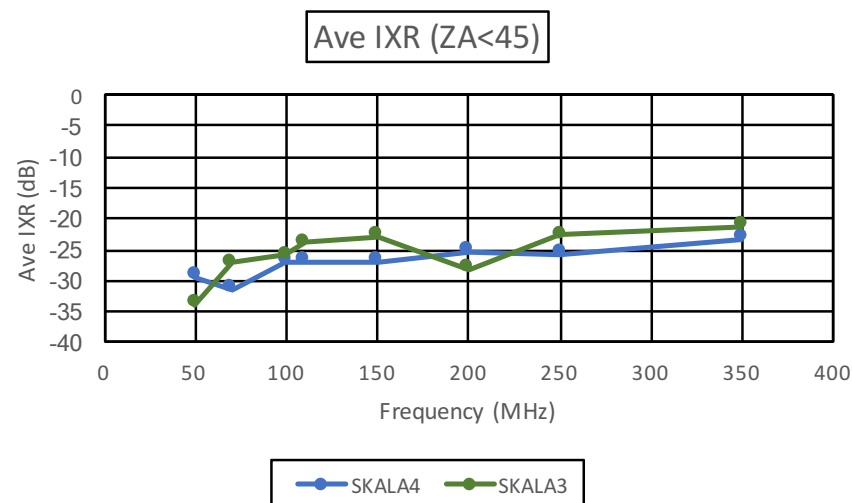


SKALA4: Closed boom, optimised

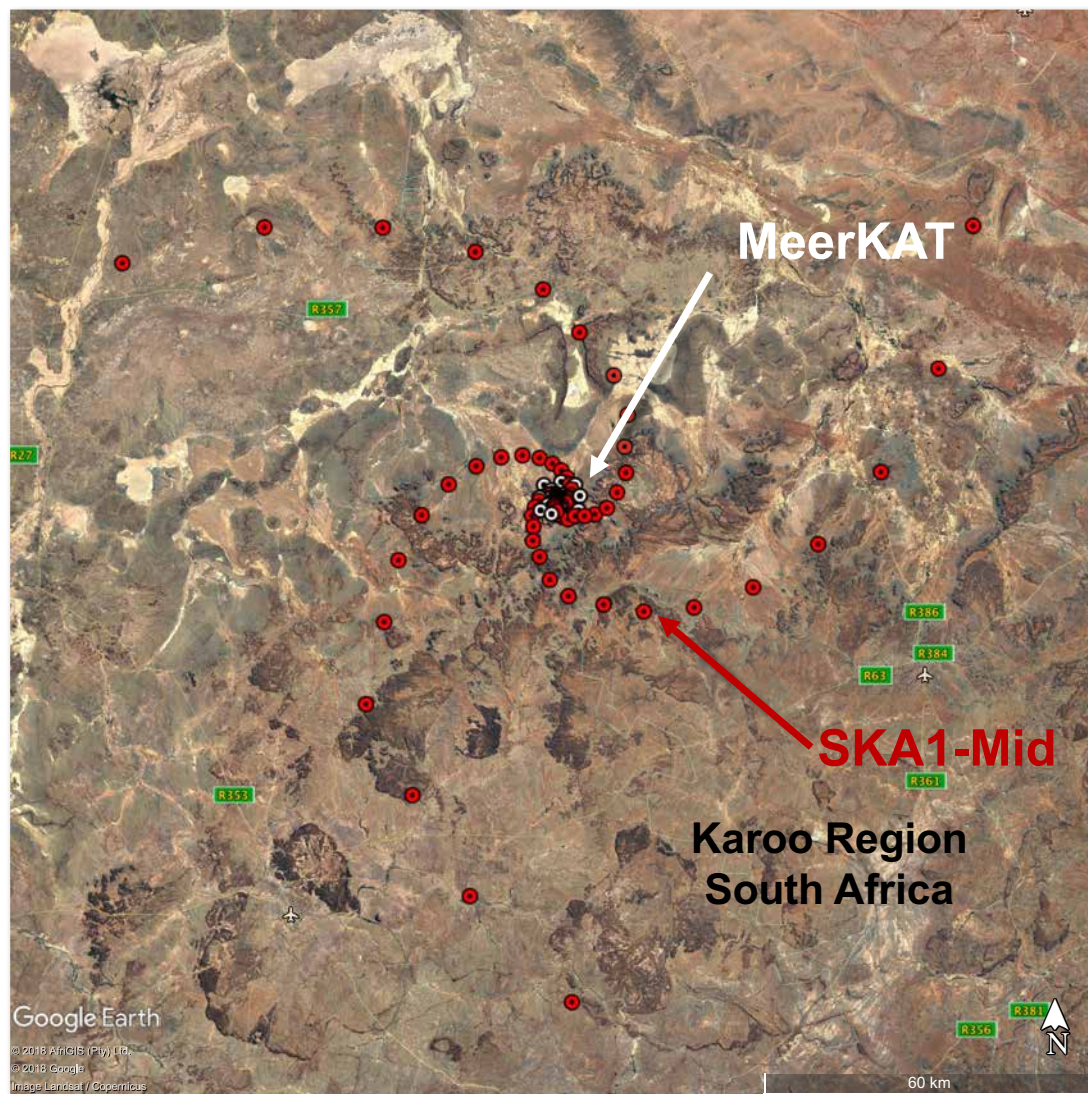
SKALA4 Antenna Patterns



- Improved polarisation performance over full scan range



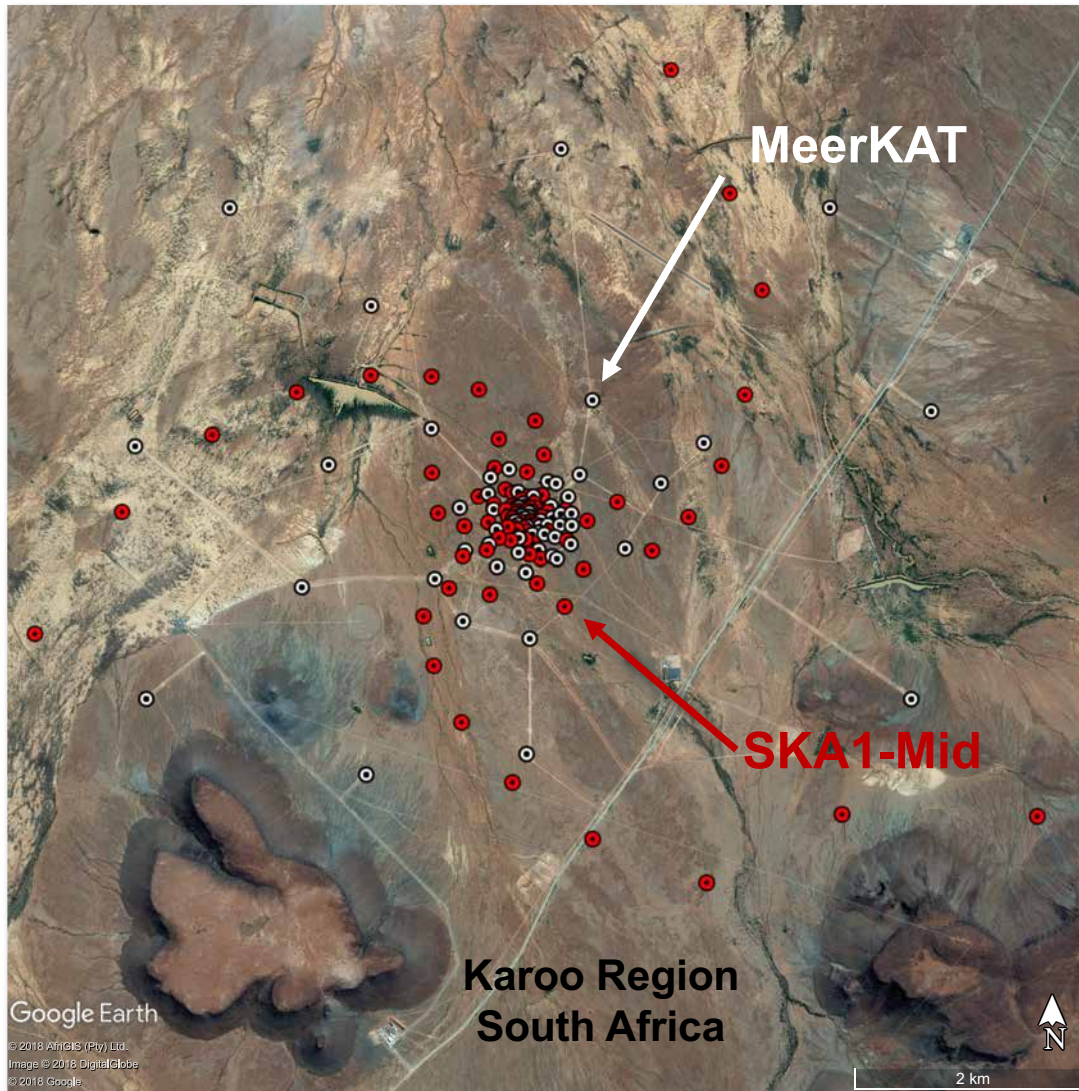
SKA1 –Mid: Layout



- 133 SKA 15m dishes
- 64 MeerKAT 13.5m dishes
- Maximum baseline 150 km
- 3 logarithmic spiral arms



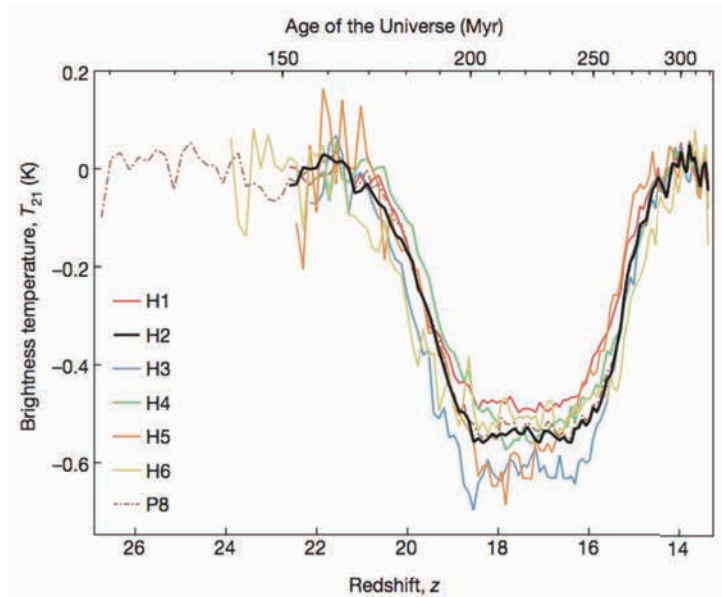
SKA1 –Mid: Layout



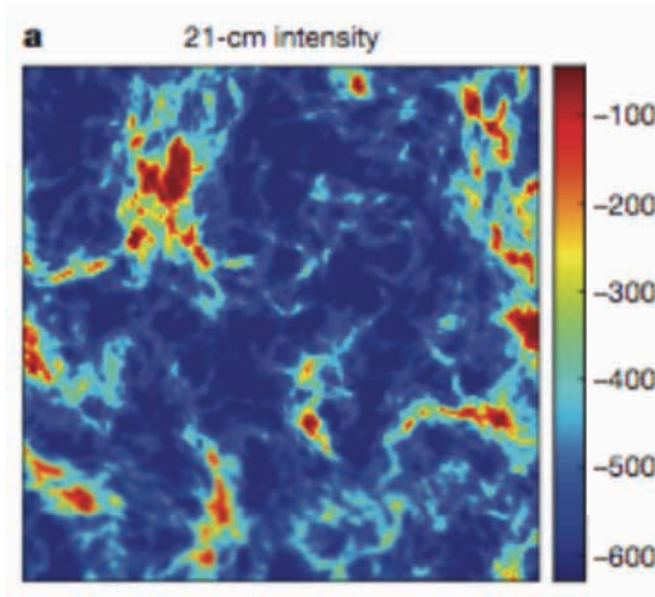
- 133 SKA 15m dishes
- 64 MeerKAT 13.5m dishes
- Maximum baseline 150 km
- 3 logarithmic spiral arms
- ~ 50% within ~2 km randomly distributed



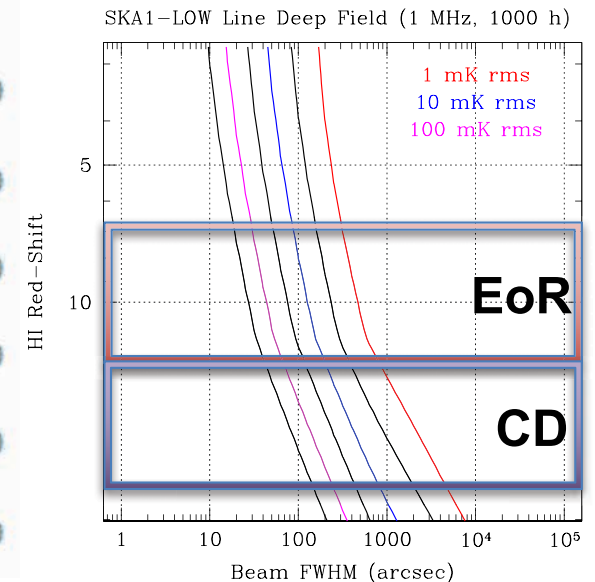
SKA1 surveys of the EoR & Cosmic-Dawn



(Bowman et al 2018)



(Barkana 2018)

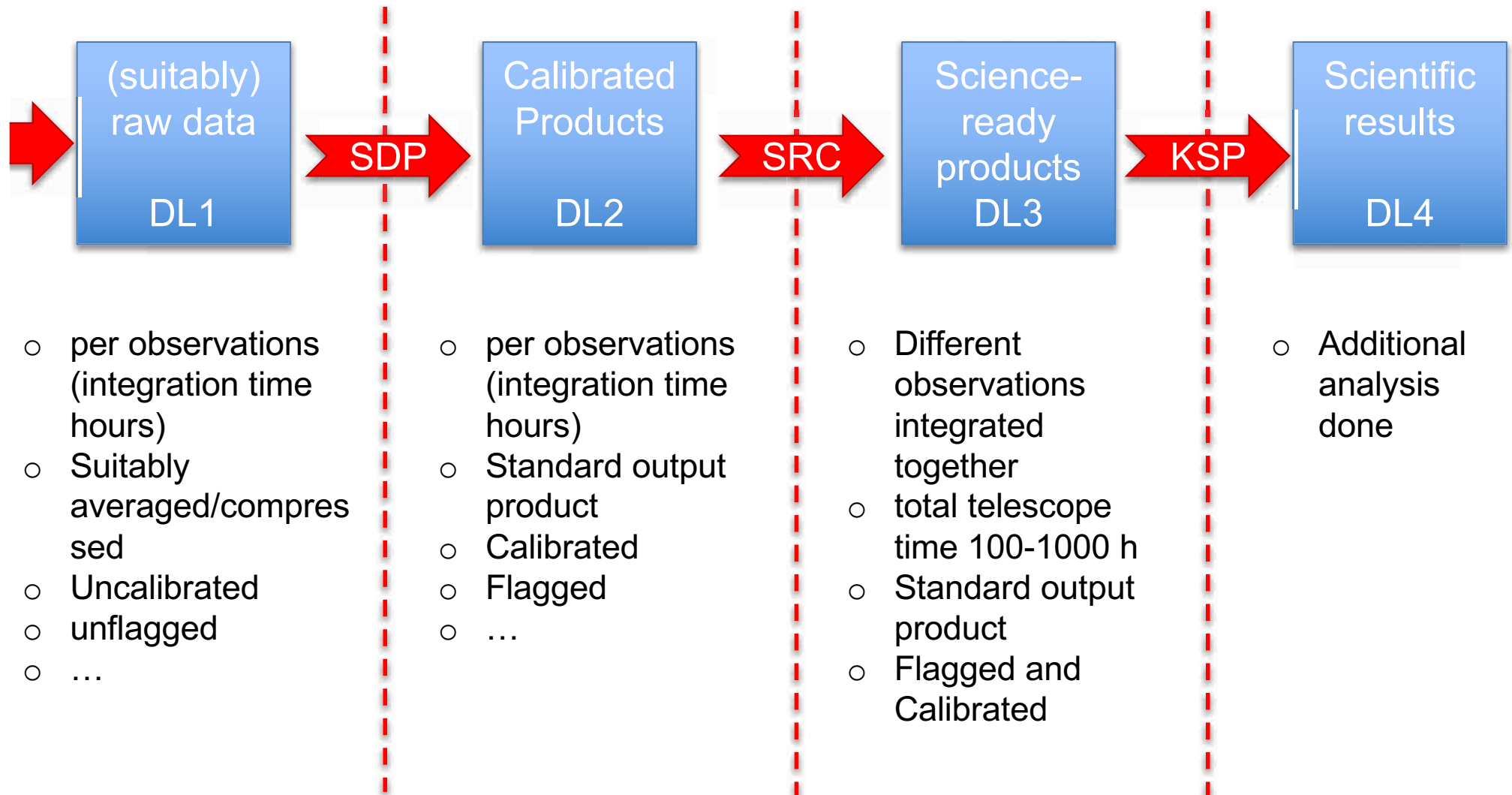


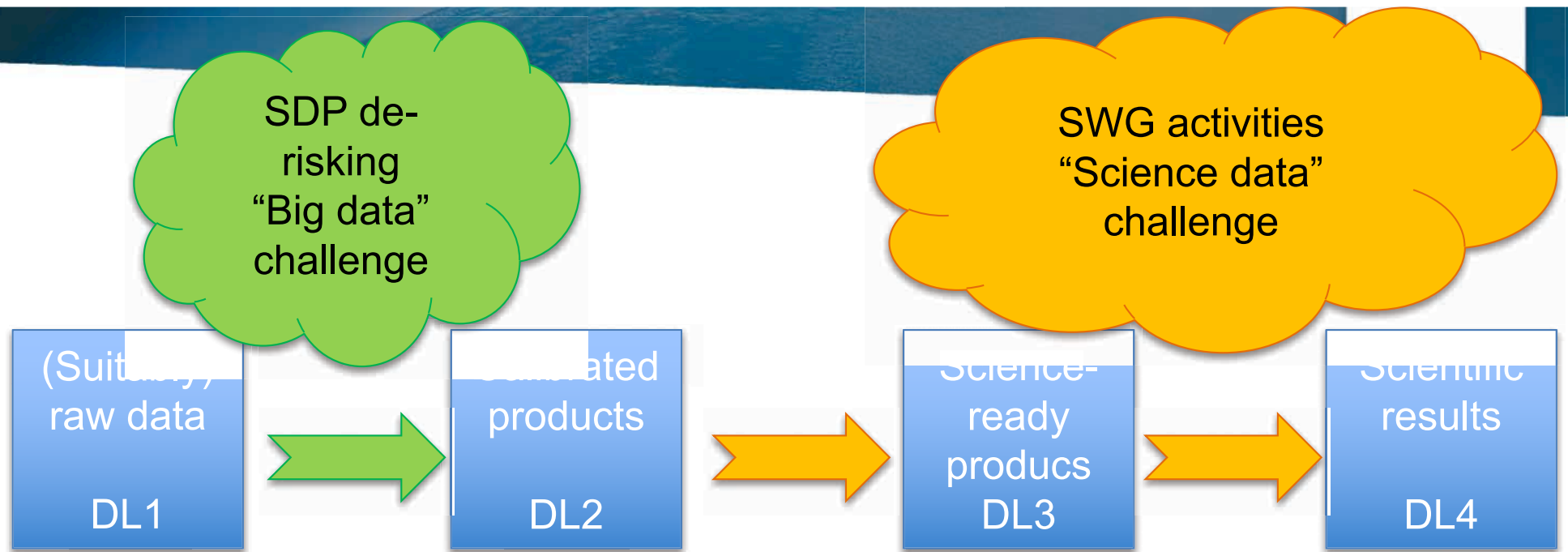
- Possible detection by Bowman et al (2018) of global Cosmic Dawn signature centred at 78 MHz
- If surprising depth is confirmed, then fluctuations also large:
140 mK RMS @ 10s of arcmin predicted by Barkana (2018)
- Deep SKA integrations (3 mK RMS @ 10s of arcmin) may permit direct CD imaging: localisation in 3D of first post-big-bang heat sources

SKA data challenges: Data Layers (DL)



DL0=raw data out of CSP

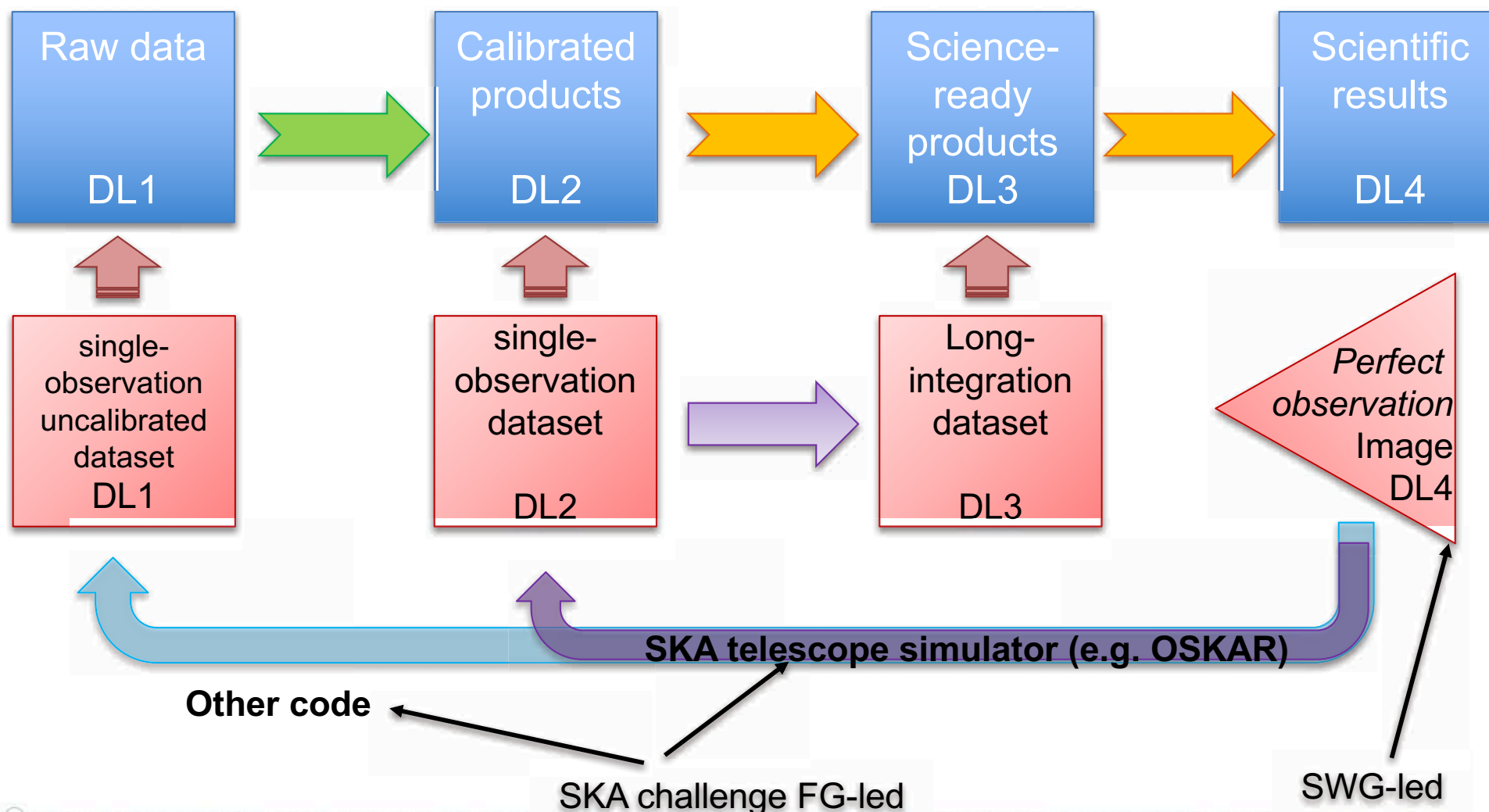




- Focus on efficiency/scalability
- Calibration strategy and implementation
- Data size 10-100 TBs

- Focus on algorithm development
- Data co-addition between observing epochs
- Proposal-Specific processing
- Data size few TBs

SKA data challenges: simulations



Proposal for our first challenge

- Simulated data
 - Not too complex
 - Not too challenging data sizes
-
- SDP-like “image cube” standard product
 - Mid, continuum
 - Source finding, identification, characterization etc.
 - Results to be compared with “truth table”
 - WG-specific analyses optionally done on the identified sources

Community Updates

- Upcoming SWG/FG Meetings?
 - Our Galaxy: July 2018 Sicily
 - ???
- Updates from participating SWG/FG Chairs
 - ????

SKA Science meeting 8 – 12 April 2019

- Venue: HQ2 approaching handover, outfitting must then begin
- Format: 3 days of science meeting, 2 days of KSP workshops
- Parallel KSP sessions: 3 rooms in HQ1, 5 rooms in HQ2 + Council chamber + many smaller rooms
- Science meeting: No invited talks (like Goa), focus on new techniques, instruments, methods, pathfinders, ongoing work, early career
- Poster session + competition
- Abstract submissions: mid to late September for SOC assessment, lead time for visas
- Talk/poster allocation: early January
- Meeting website + poster ready to go. Will go 'live' in mid July
- Brexit (which happens at 23 UTC 29/3/19) advisory will be on website
- Final budget and thus registration fee being finalised
- Child care will be available and included in registration

IAU – GA, 20 – 31 August 2018

- Coordination of SKA-related presence/activities
- If attending, organising sessions, etc., please contact:
skao-outreach@skatelescope.org
- SKA Booth will provide work and discussion area
- SWG members welcome to assist with answering SKA queries, distributing SKA goodies, etc.

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www.skatelescope.org