SKA SWG Update 21 June 2022

SWG Chairs: John Ilee, Mark Sargent, Valentina Vacca, Aris Karastergiou, Paolo Serra, Patrick Woudt, Cormac Reynolds, Anna Nelles, Ingallinera, Tessa Vernstrom, Barbara Catinella, Abhirup Datta, Eduard Kontar, Andrei Mesinger, Nathasha Hurley-Walker

Other Guests: Fernando Camilo

SKAO Science Team: Robert Braun, Philippa Hartley, Simon Purser, Tyler Bourke (notes)

Apologies: Stefano Camera, Francoise Combes

New SWG Chairs
CoL: John Ilee recently took over from Josep-Miguel Girart.   Cherry Ng now takes over from Laurent Lamy
HI: Betsy Adams takes over from Paola Serra (July)

SDC Updates - Philippa
SDC2 results paper is in preparation (MNRAS) and is close to submission.
12 finalist teams from over 40 institutions participated.
SDC2 S/N analysis, expressing the results in terms of S/N values.
Challenging to define meaningful integrated S/N description
Instead defining peak S/N based on smoothed signal
While the application of a matched filter would usually maximise peak S/N, in the case of SKA images rms noise remains about constant for resolution 0.4 - 100" at 1.2 GHz; a simpler, sufficiently large smoothing kernel can therefore be used to maximise signal without resulting in increased noise.
Source finders might exploit this property of the noise
(see SDC2 paper for discussion)

NHW: Do the noise properties include confusion?
RB: The SDC2 data product was an HI spectral line experiment, so was continuum subtracted, but yes, more than the thermal noise was included in the simulation, such as residual calibration errors, simulated RFI, etc.

SDC3 will consist of two tiers.
SDC3a "Foregrounds", start date October 2022 (target).
SDC3b "Inference", in 2023 after the conclusion of SDC3a.
Working with EoR team on development of both of these.
Website for SDC3 in the works.

SDC3a summary.
Data products are reaching maturity.
3 Gb image cube

1 Tb visibility set

Foregrounds dataset for SDC3a.
Feedback from EoR SWG greatly appreciated, several issues identified and improvements underway (e.g random seed generators, DD calibration errors, residual gain errors).
Likely to go through one more round of feedback, following implementation of the improvements.
Slide 8 shows the raw power spectrum from measurement set, and from the image cube.
Issues still exists and as noted are being worked on.

FARM (Foreground All-scale Radio Modeller) - Simon P.
Foreground creations using a generalised python script that is modular, reusable and extensible to CLI or GUI based foreground simulation tool.
Different telescopes possible, can switch on/off components, can specify calibration errors, can generate components from scratch or use models. Used configuration files.
To be available on GitHub/Lab.

Map of SDC simulations framework shown (slide 10), from catalogues to sky models to telescope sim to data products. Aim bring all SKAO sims into same software ecosystem to make more user friendly.

SDC computational support model.
SDC2 received invaluable support from international HPC facilities
SDC3 will receive similar support, but with new registration and time allocation model (streamlined)

We expect some participants to make use of the image-based dataset, and others to use the visibility data. We are currently estimating the computational cost of both approaches and we thank members of the EoR SWG for their help with this.

SDC3a Image cube estimate:
< 100 CPUh, < 64 GB RAM, so ~3 hours on 30 core VM
Visibility estimate:
< 10k CPUh, < 128 GB RAM (rest of slide ...)

SDC3a Registration opens soon
Will require a short proposal, to match teams to HPC facilities
Teams will be asked to conduct a mock run on their allocated server in month 1, then given longer term account for remainder of the challenge.

The Science Data Challenges provide the opportunity to engage with SKA Regional Centre prototyping activities. No major prototyping planned for SDC3a but there is the possibility of testing aspects by participants, e.g. CARTA (image viewer provided on servers).

Investigating possibility to include reproducibility awards and environmental awards (EA) alongside the main challenge (optional). EA suggested by the HPC centres.

Andrei: I like this idea (EA).   The EA might be difficult to structure.   Simple approaches are cheapest but not necessarily sufficiently realistic, need to consider carefully.
Would be good if teams can report the resources they used to achieve their results.
Mark S: Would be good to get a conceptual discussion going on trade-offs we are willing to accept.
Brief discussion on what metrics might be used, will discuss at a future time.

Mark S: User experience on the HPCs. For SDC2 did the chosen HPC have any impact on the experience of the teams?   Some teams want to always work with a certain HPC. Is this a good approach, should it be more randomised?
PH: Nothing to suggest results were affected, but not looked at in any detail. Some HPCs will become part of SRC networks, which users will access as a single "centre". SDC3 we will match teams with facilities which may result in some shuffling.

Banners
Updated SWG banners for all groups have been received. GW (new banner) still working on theirs. Actual banners (2m tall) beginning to appear at SKAO. They are included on the landing page for each SWG and will be downloadable.

Upcoming Meetings
(please see the slide)
New addition: Coordinated Surveys of the Southern Sky, 10-14 October, Garching (ESO) (ESO-SKA initiative). SOC being assembled.
Open meeting plus focused workshop

EoR SWG meeting - Bologna last week in September
MWA project meeting - dates?
SPARCS meeting November - dates/venue TBC
Continuum/HI workshop - September (TBC)?

AOB
NHW awarded Anne Green award from ASA for mid-career researchers. Congrats!

Aris. Pulsar hardware/software going through review, participation welcome. In particular developing Science Use cases. Contact Aris if interested and not already involved.

Fernando: MeerKAT proposals closed in May. 133 proposals from 19 country PIs. 4900 hrs requested for the year, 40% more than last call. Factor of about 3 over-subscription.