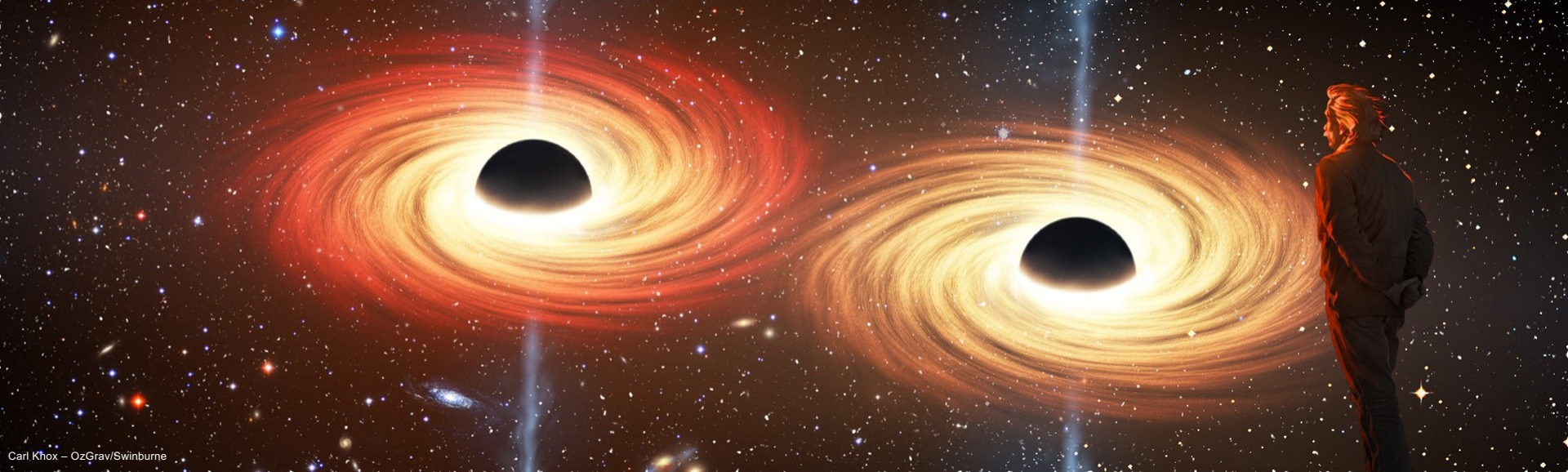




Carl Knox – OzGrav/Swinburne

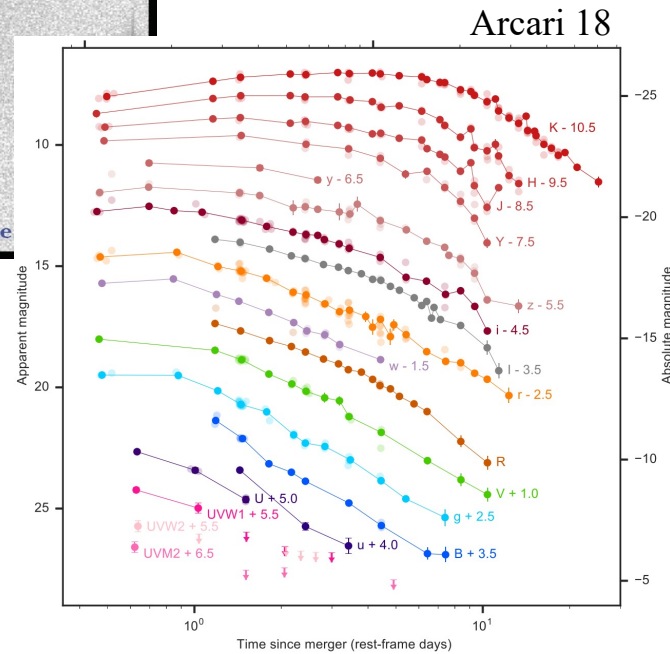
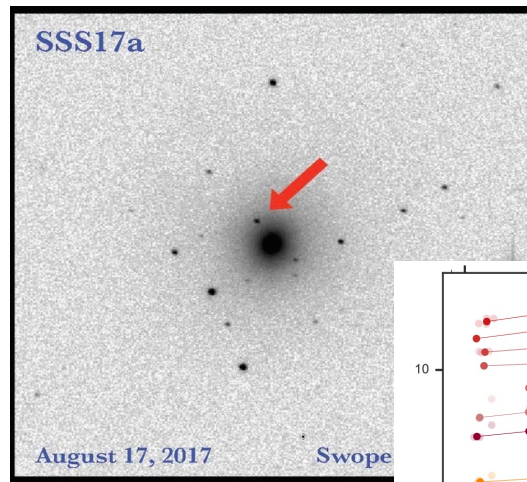
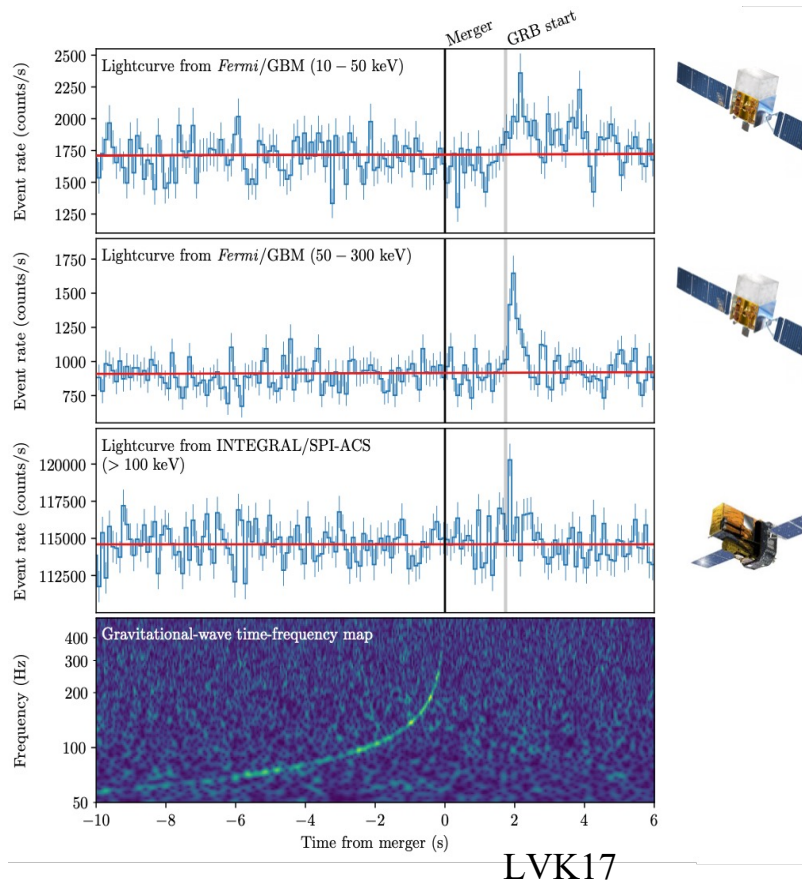
A Gravitational-wave Observatory in Australia

Paul Lasky

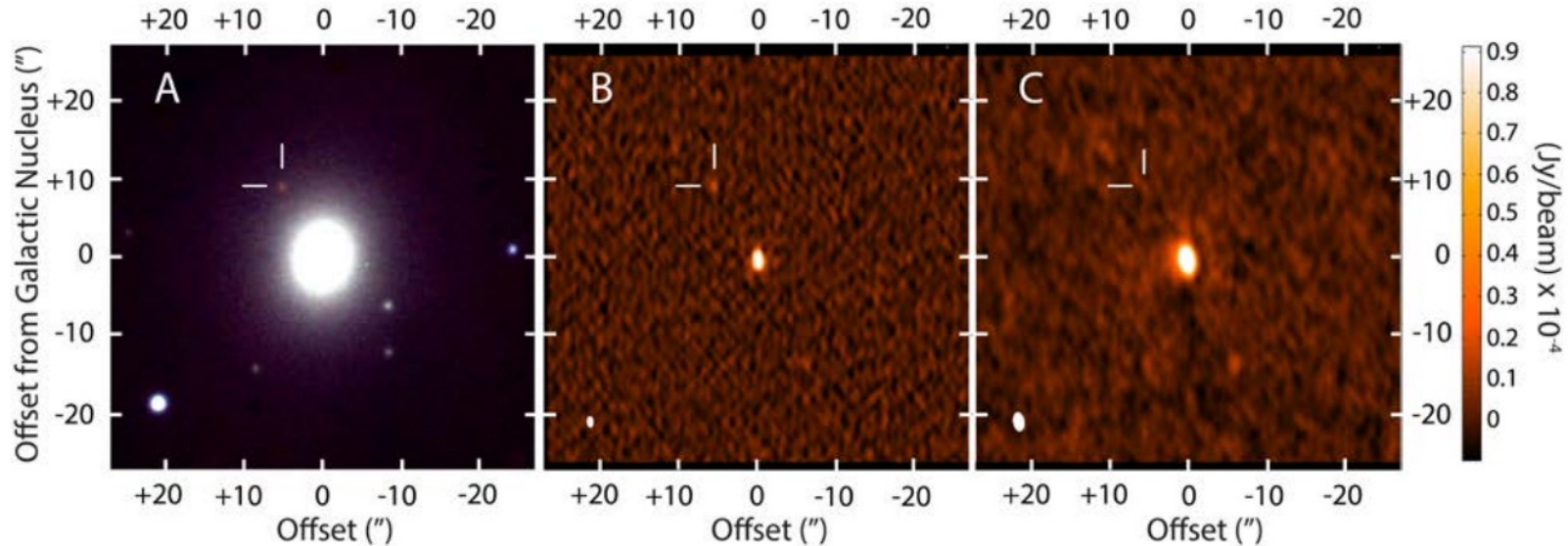


MONASH
University

2017 – peak multi-messenger astronomy!

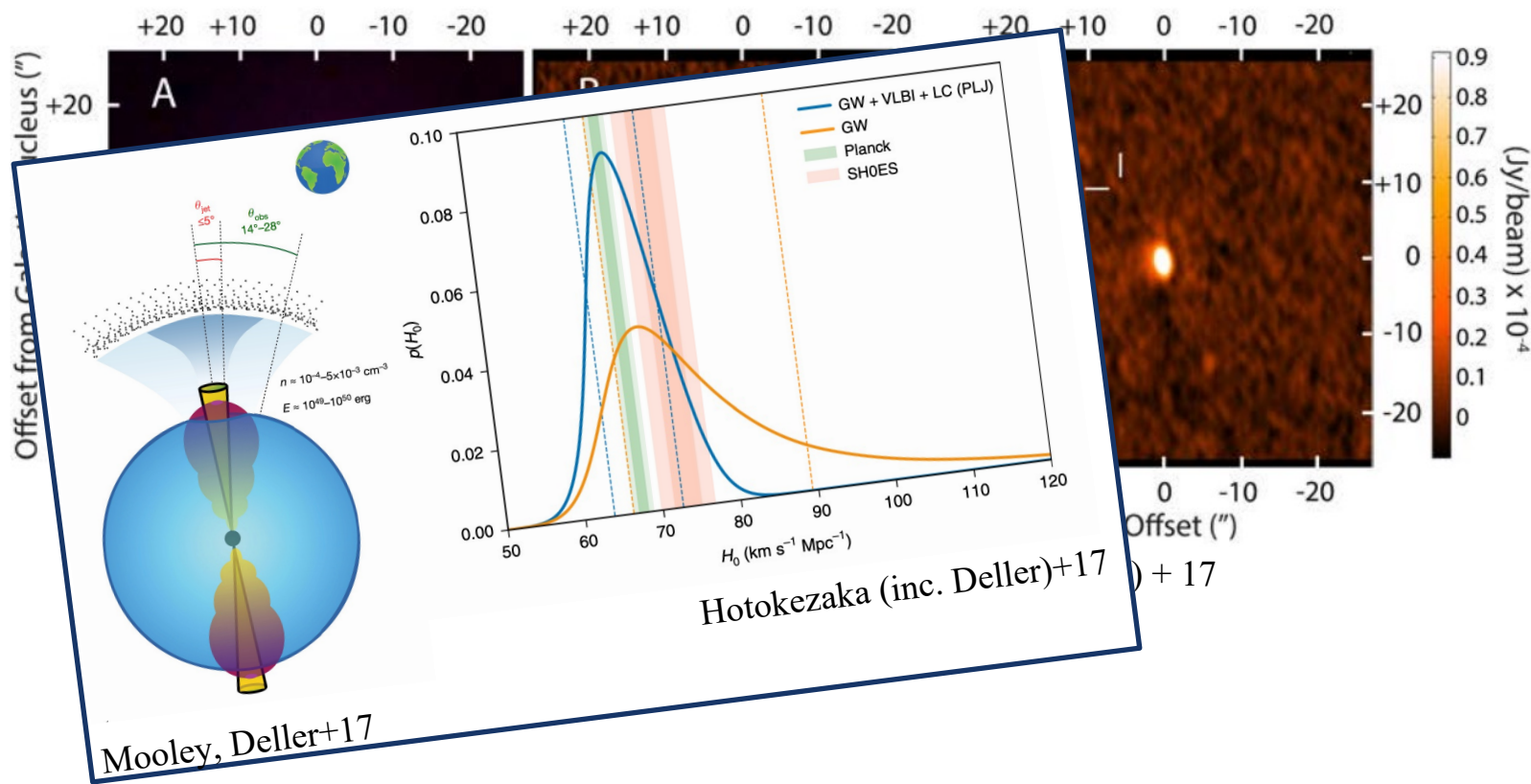


GW + radio = maximised science!



Hallinan (inc. Murphy, Dobie, Bannister, Lenc, Peters, Sadler) + 17

GW + radio = maximised science!



Offset from Galactic nucleus (")

$\theta_{\text{obs}} \sim 55^\circ$
 $\theta_{\text{spl}} \sim 14^\circ - 28^\circ$
 $n \approx 10^{-4} - 5 \times 10^{-3} \text{ cm}^{-3}$
 $E \approx 10^{49} - 10^{50} \text{ erg}$

$p(H_0)$

$H_0 \text{ (km s}^{-1} \text{ Mpc}^{-1}\text{)}$

GW + VLBI + LC (PLJ)
 GW
 Planck
 SH0ES

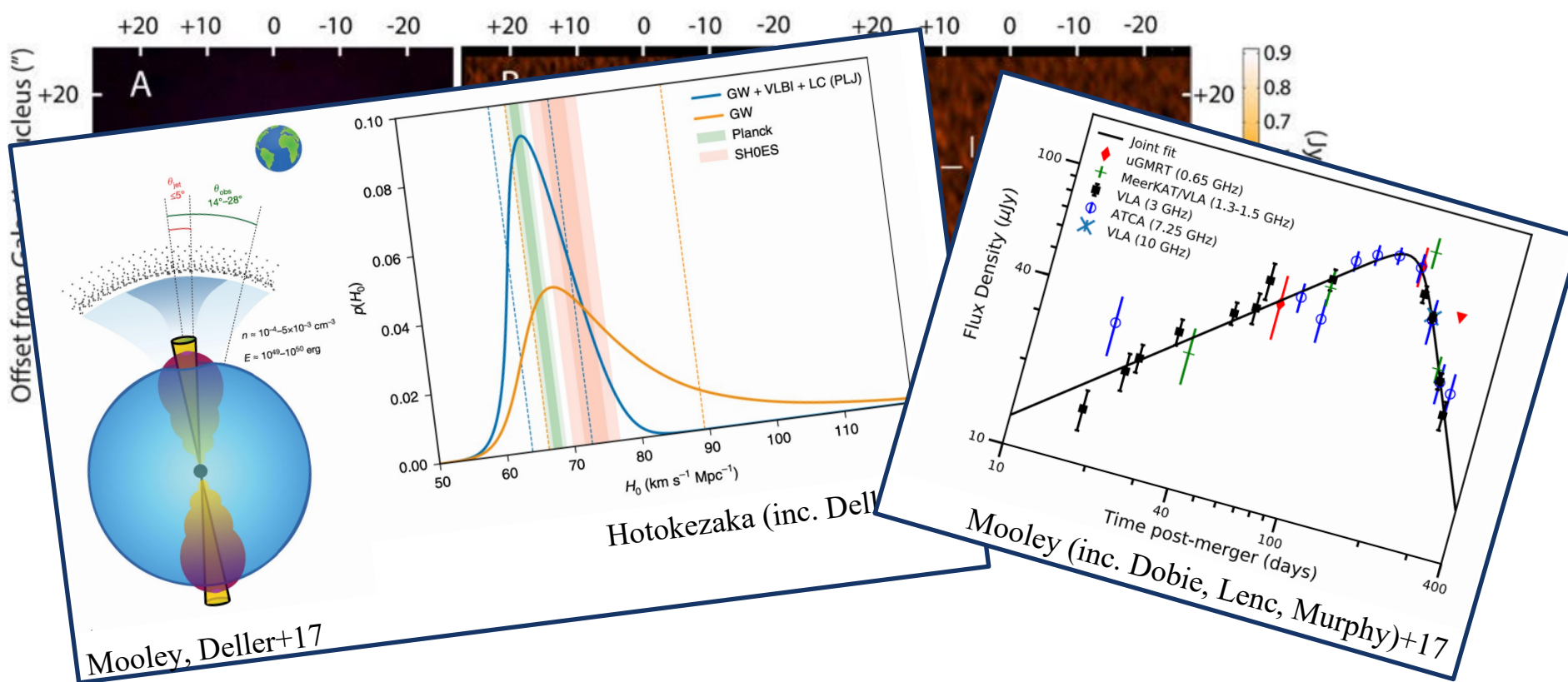
Flux Density (μJy)

Time post-merger (days)

Joint fit
 uGMRT (0.65 GHz)
 MeerKAT/VLA (1.3-1.5 GHz)
 VLA (3 GHz)
 ATCA (7.25 GHz)
 VLA (10 GHz)

Hotokezaka (inc. Deller)

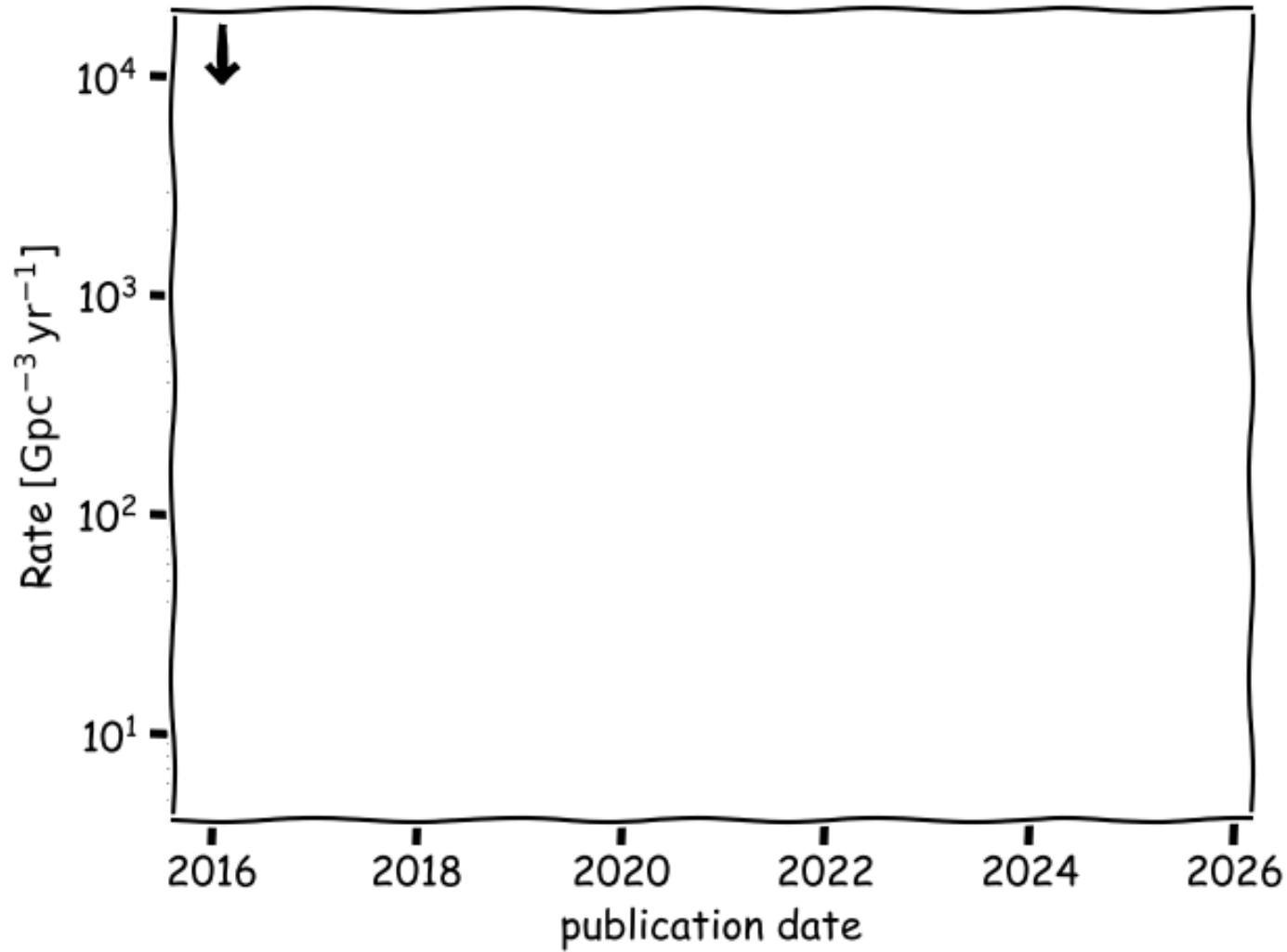
Mooley (inc. Dobie, Lenc, Murphy)+17

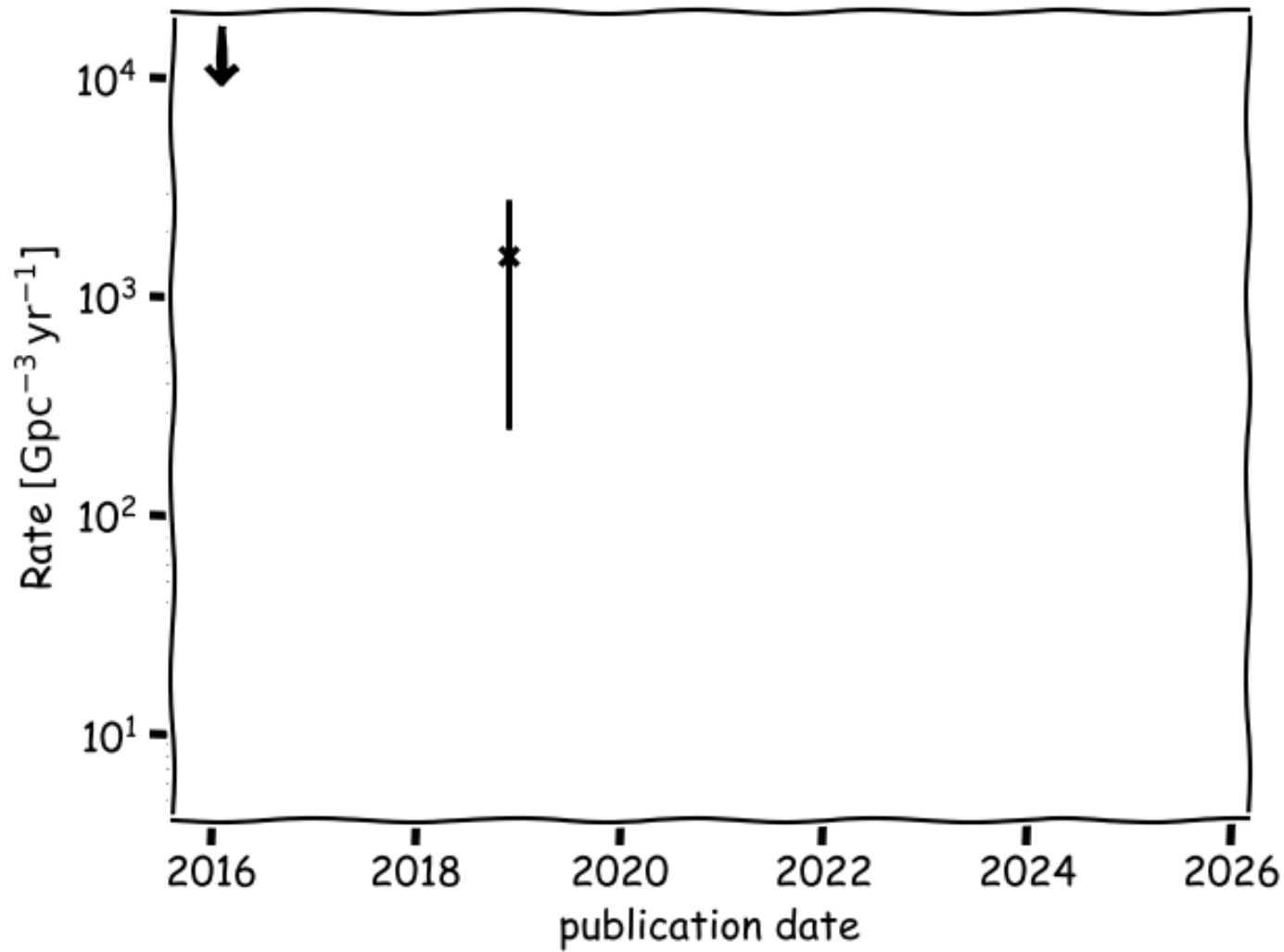


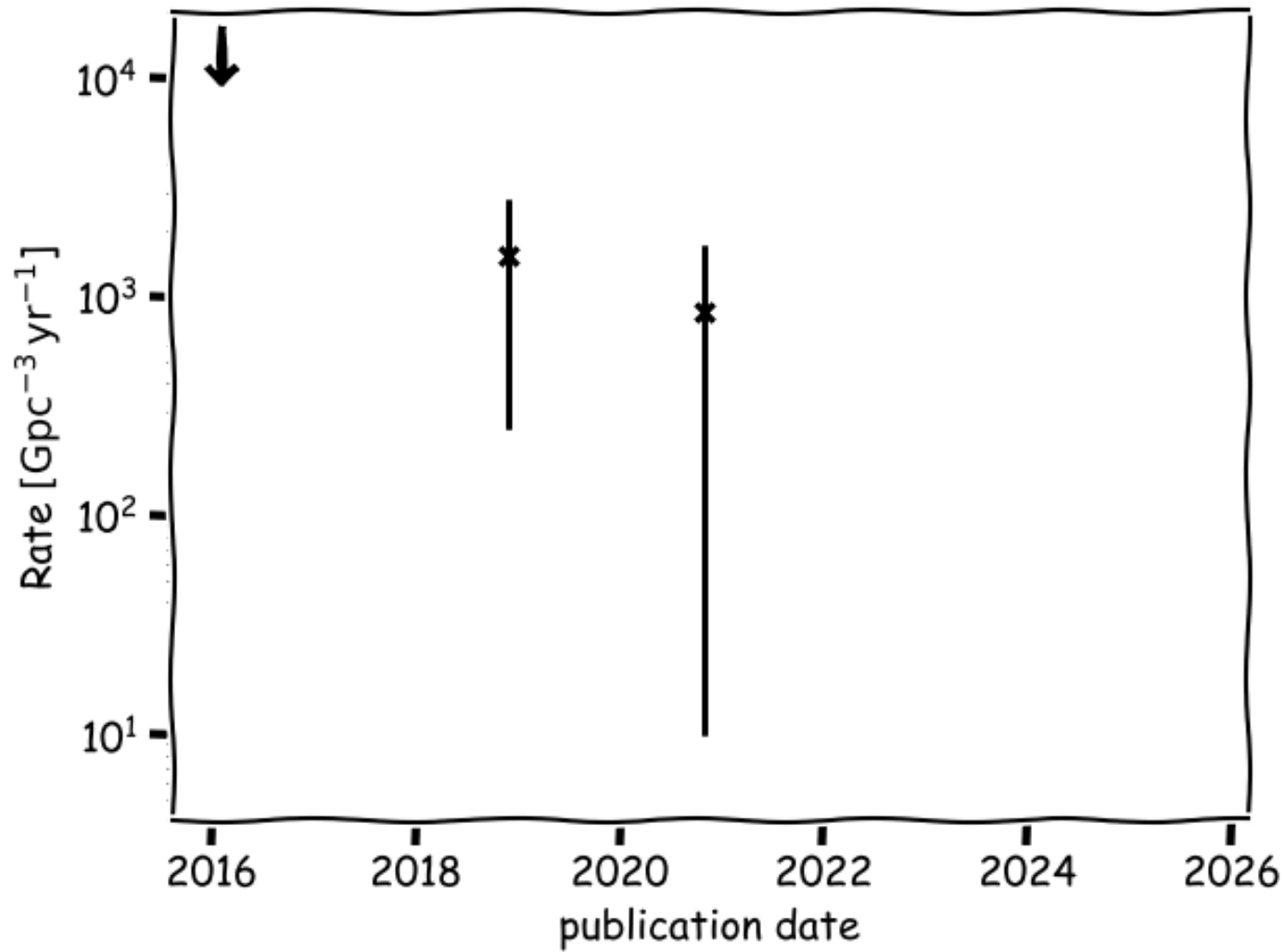
Mooley, Deller+17

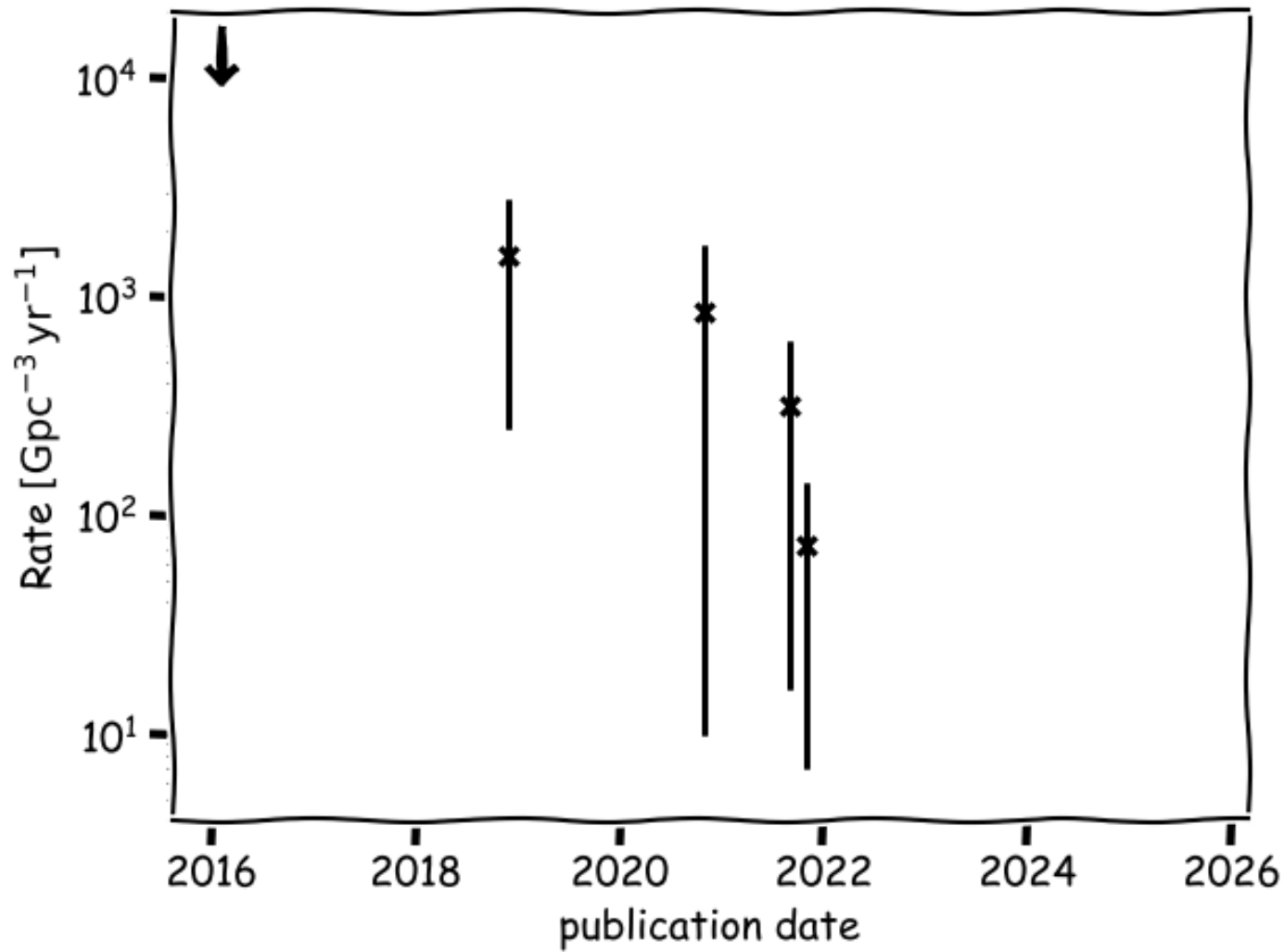
Hotokezaka (inc. Dell)

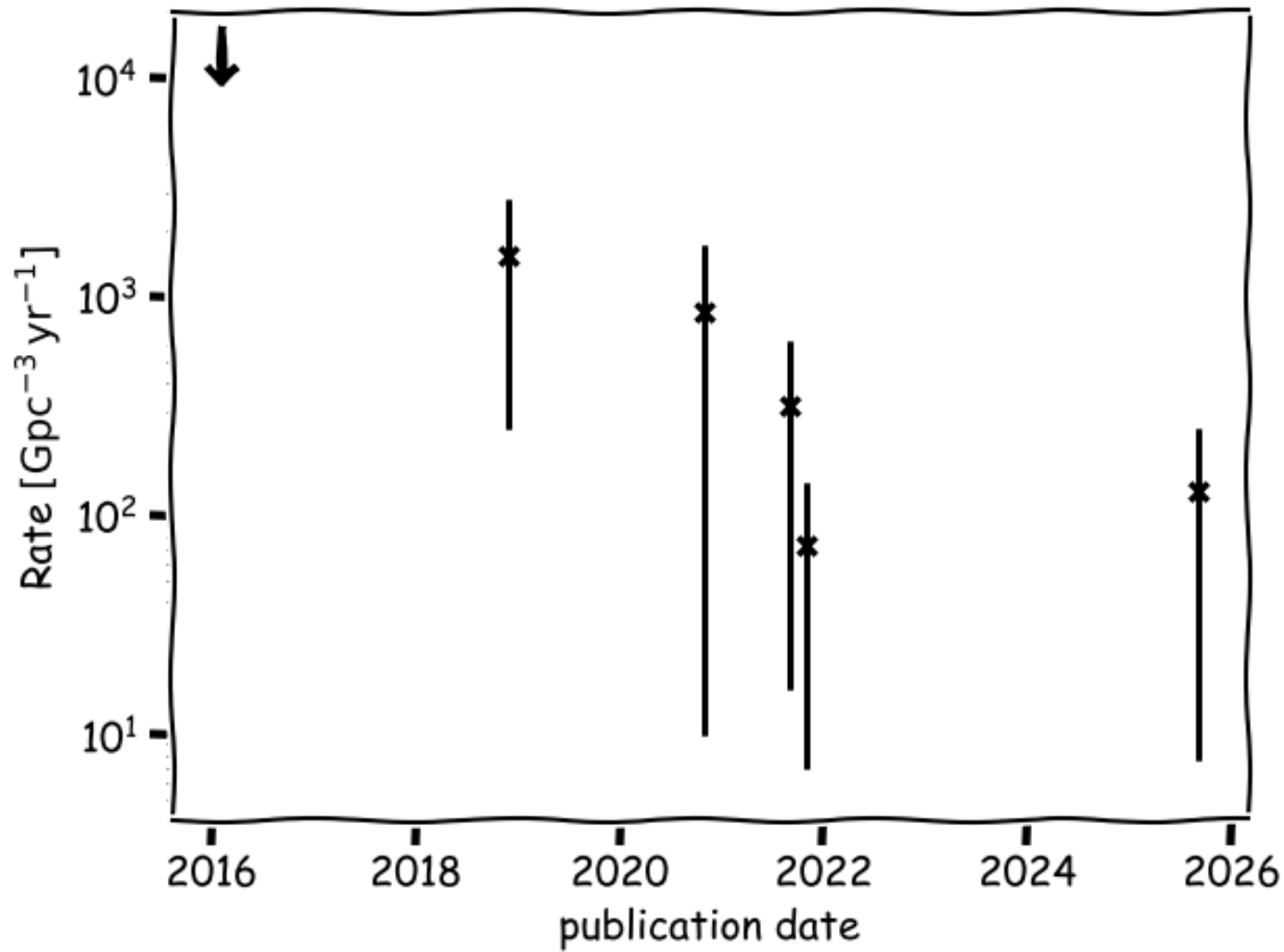
Mooley (inc. Dobie, Lenc, Murphy)+17





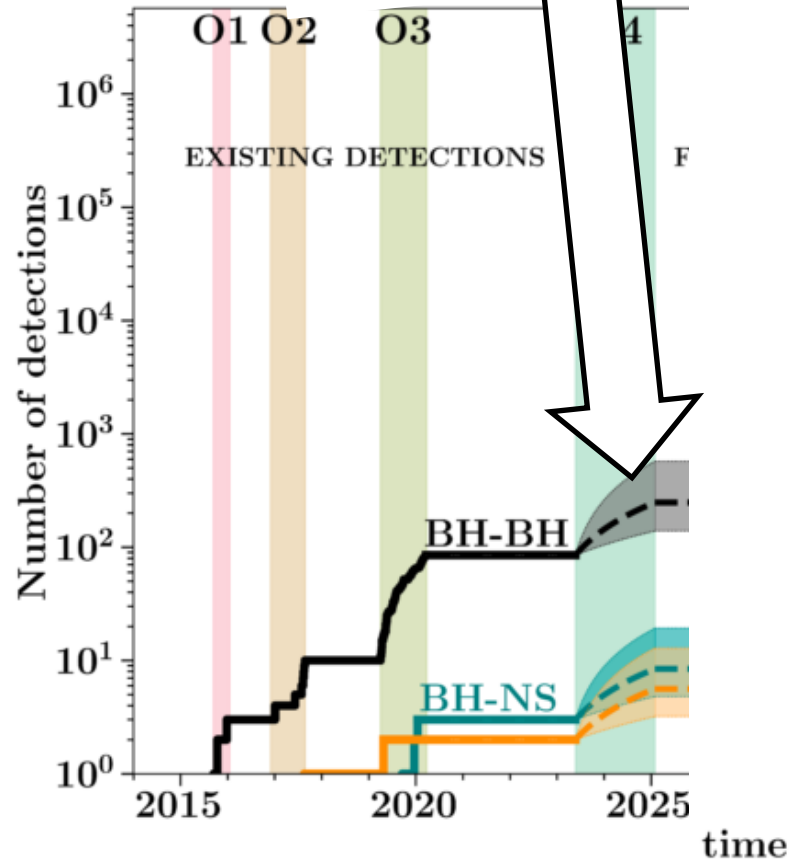




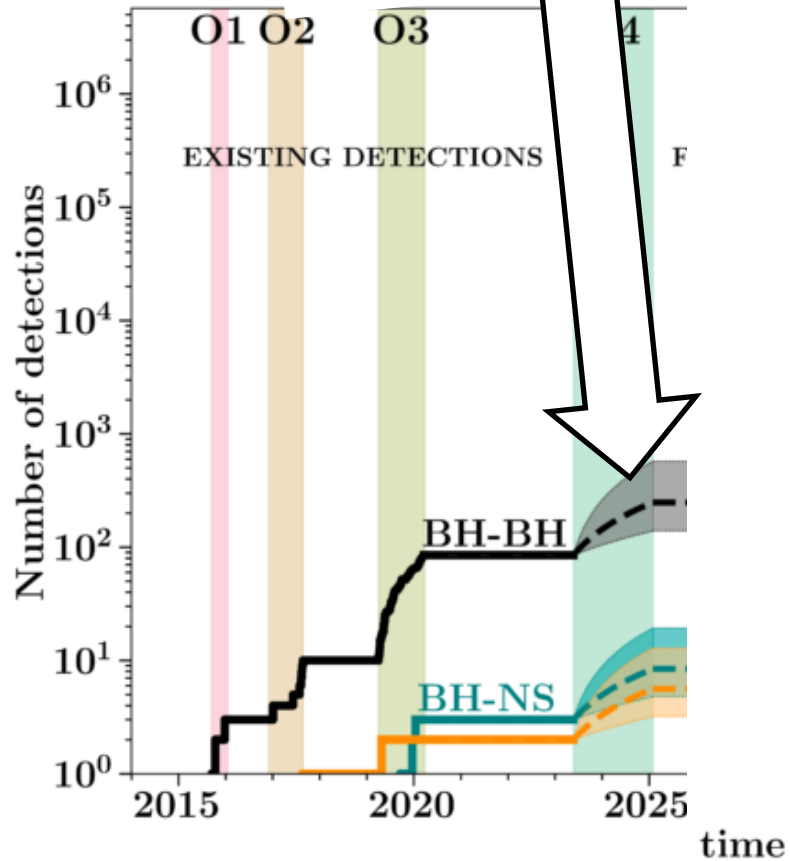


You are here!

Floor Broekgaarden



You are here!

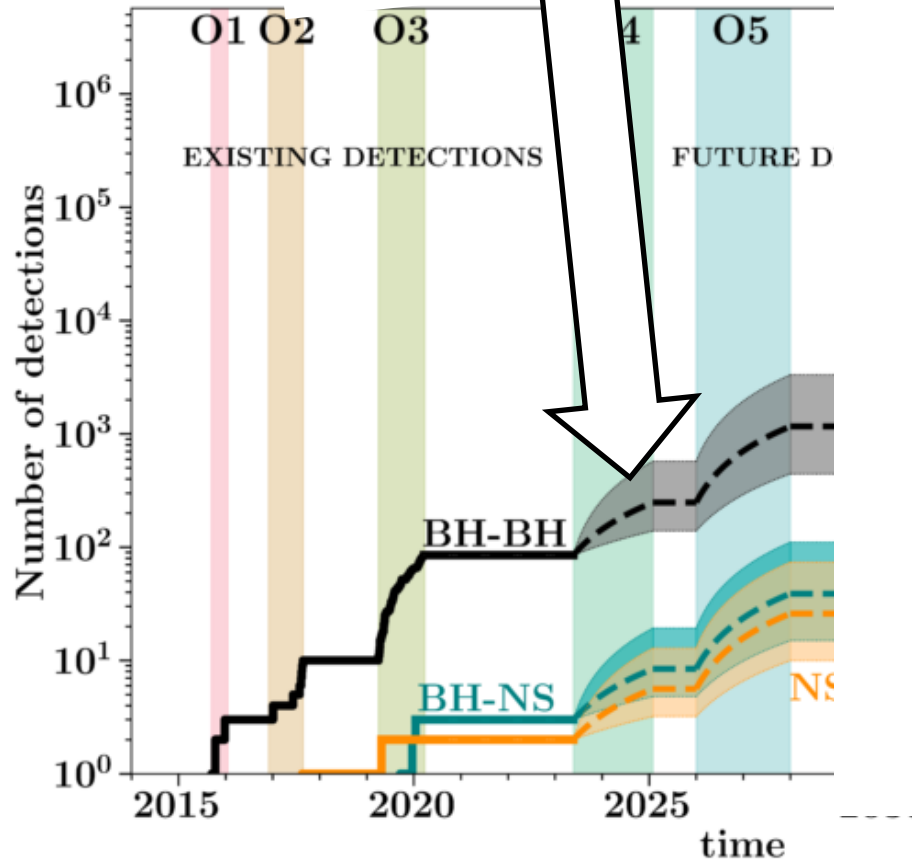


Floor Broekgaarden

$$\text{SNR} \propto \frac{1}{d}$$

You are here!

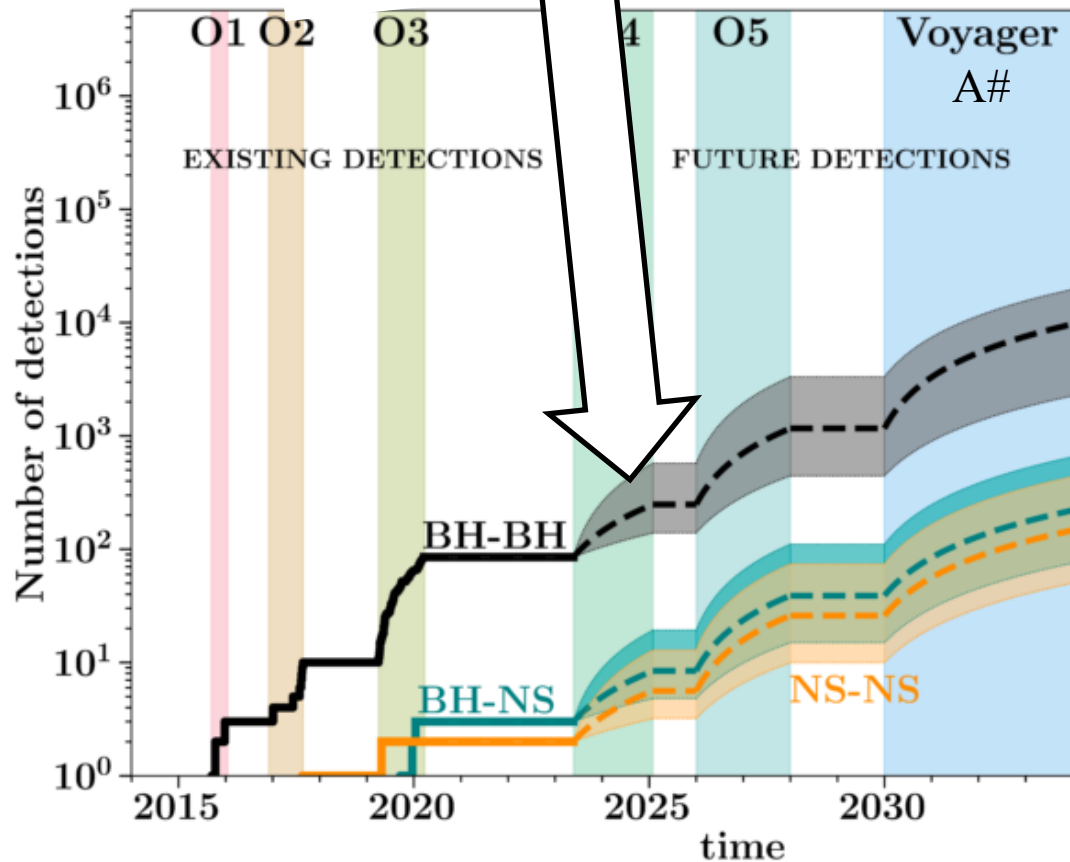
Floor Broekgaarden



$$\text{SNR} \propto \frac{1}{d}$$

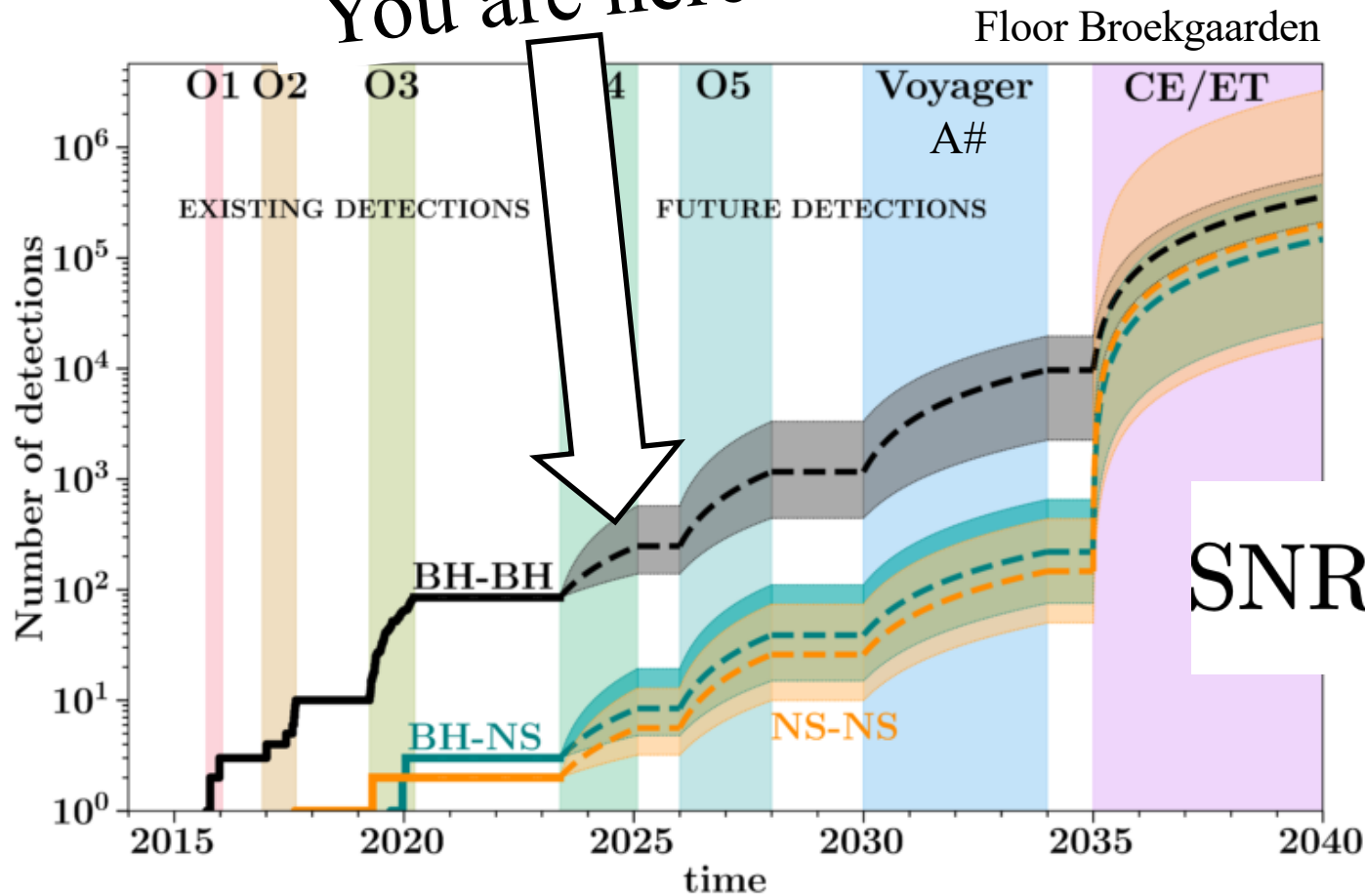
You are here!

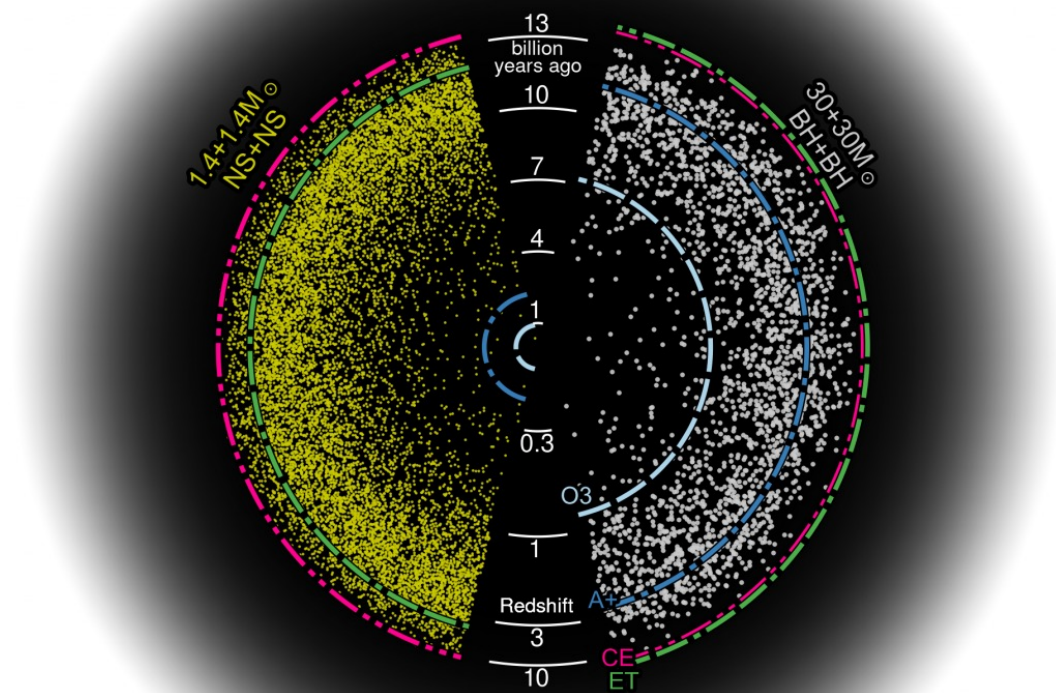
Floor Broekgaarden

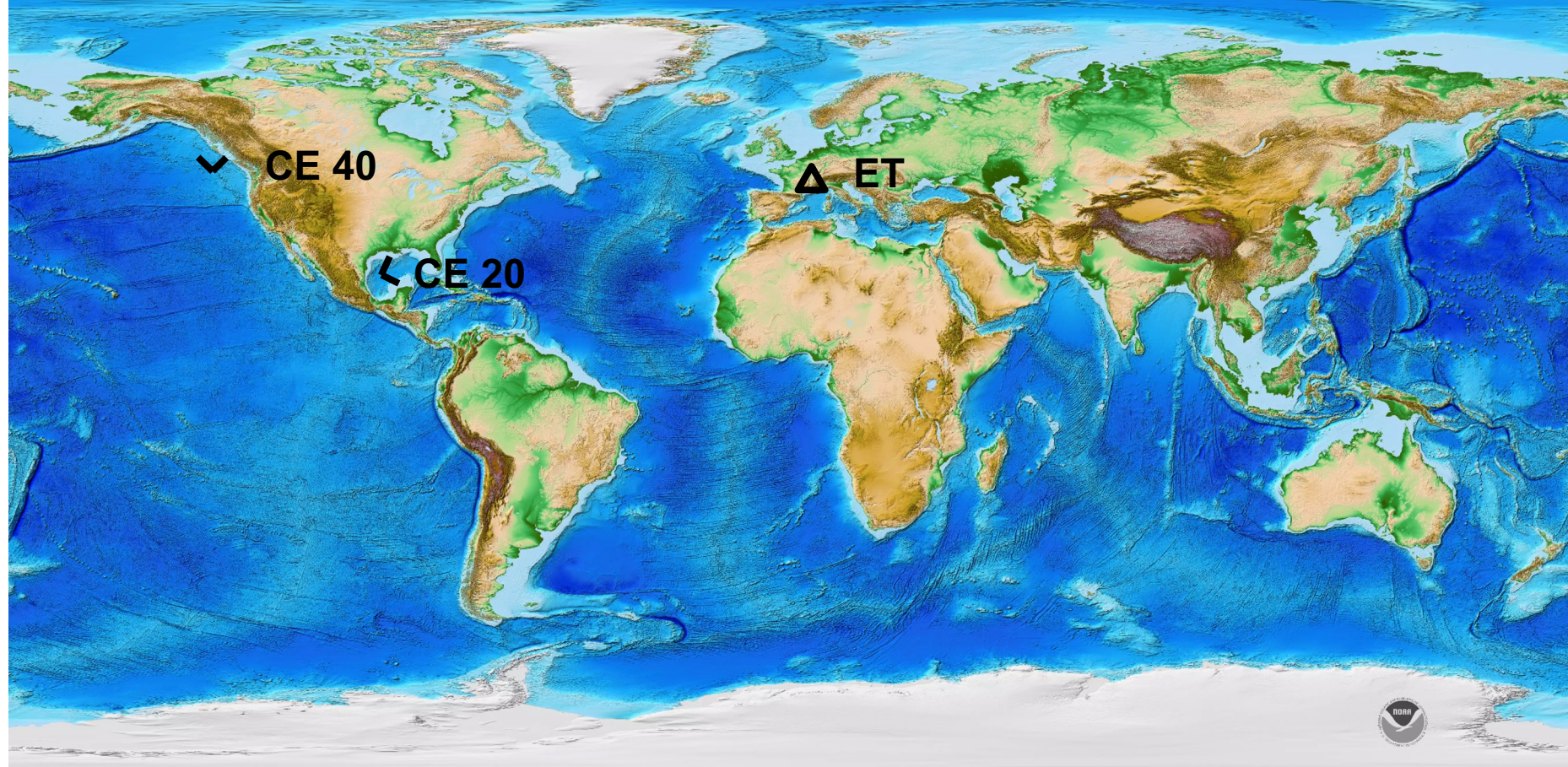


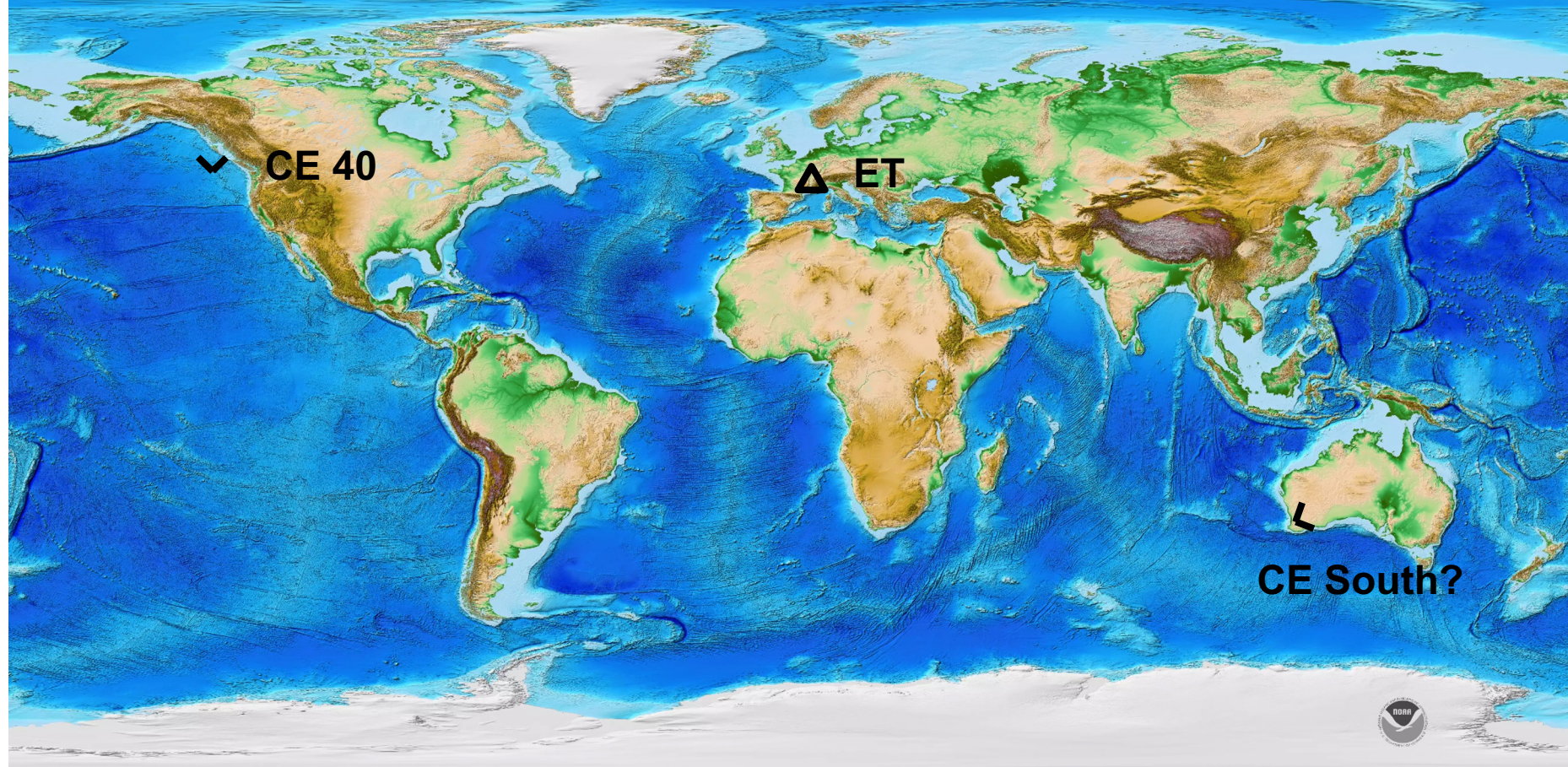
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You are here!







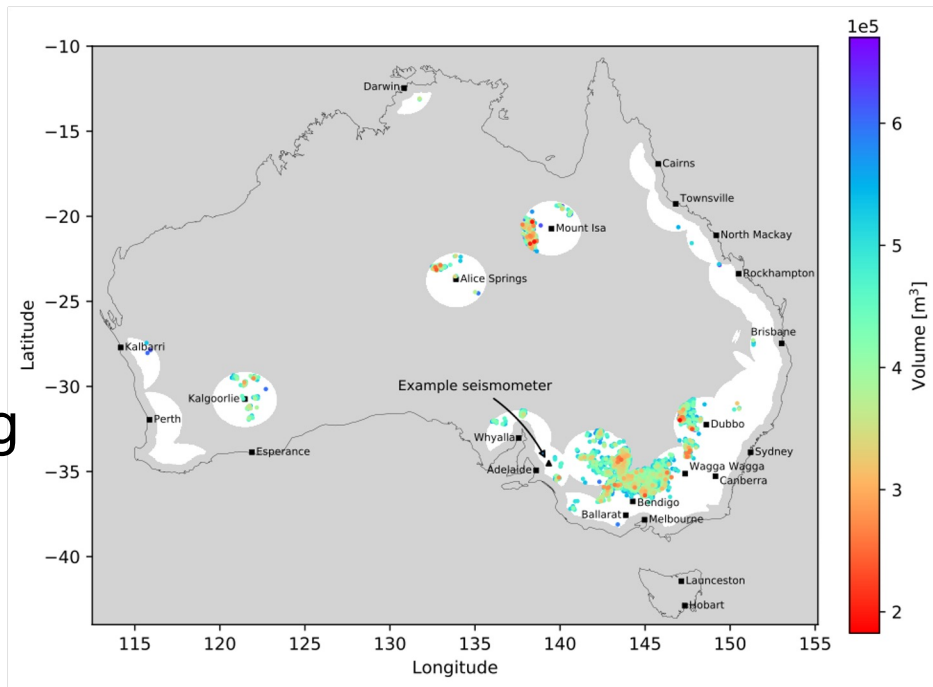




Where? Preliminary site-selection study

Bram Slagmolen & Daniel Toyra

- 20 km sites
- < 200 km from town of > 20k
- < 140 km from airport
- > 50 km from ocean
- < 1 M cubic meter Earth moving



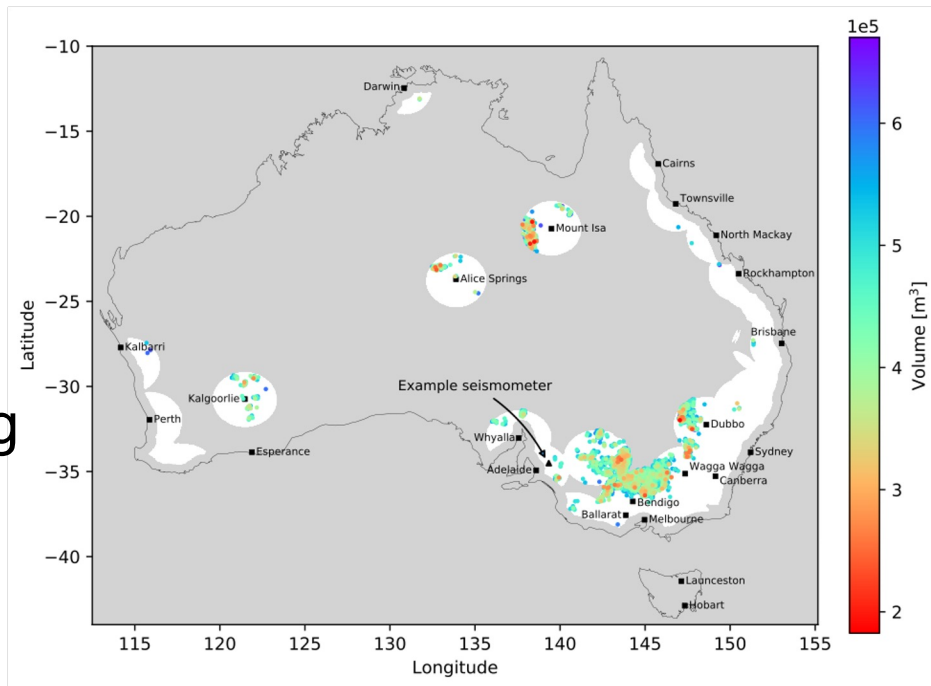
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> 3M sites! (2096 shown)



Where? Preliminary site-selection study

Bram Slagmolen & Daniel Toyra

Need to be delicate around indigenous land rights and relationships

- 20 km sites
- < 200 km from town of > 20k
- < 140 km from airport
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- < 1 M cubic meter Earth moving

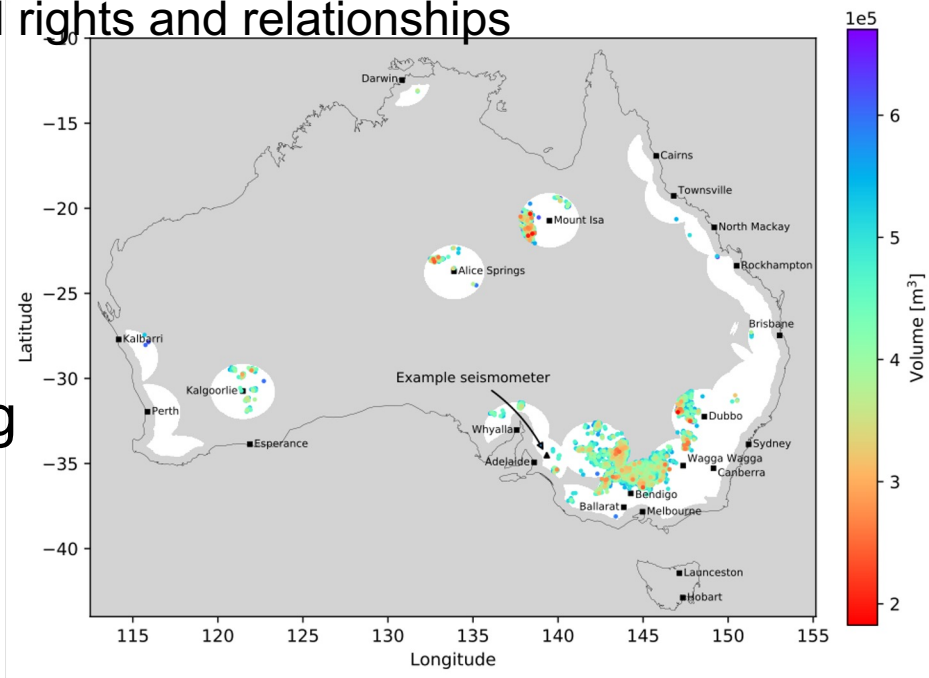


> 3M sites! (2096 shown)

Remove sites within
5km of better site



1062



Why Australia? Why now?

- OzGrav
 - Guaranteed funds: 2024 - 2031
 - \$42M; ~300 people
 - Instrumentation, data, astrophysics
- Aus decadal plan:
 - “fund the development of a GW pathfinder”
- We have funding: developing project office (AAL, NCRIS, OzGrav, ...)



A Gravitational-wave Observatory in Australia

- ATNF future radio facilities should consider synergies with 3G GW observatories (whether in Aus or not!)
- We'd love CSIRO/ATNF involved in Australia's work on ground-based gravitational waves