

Noise forecasting for small-area survey

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for Noise Tiger Team and r Forecasting WG
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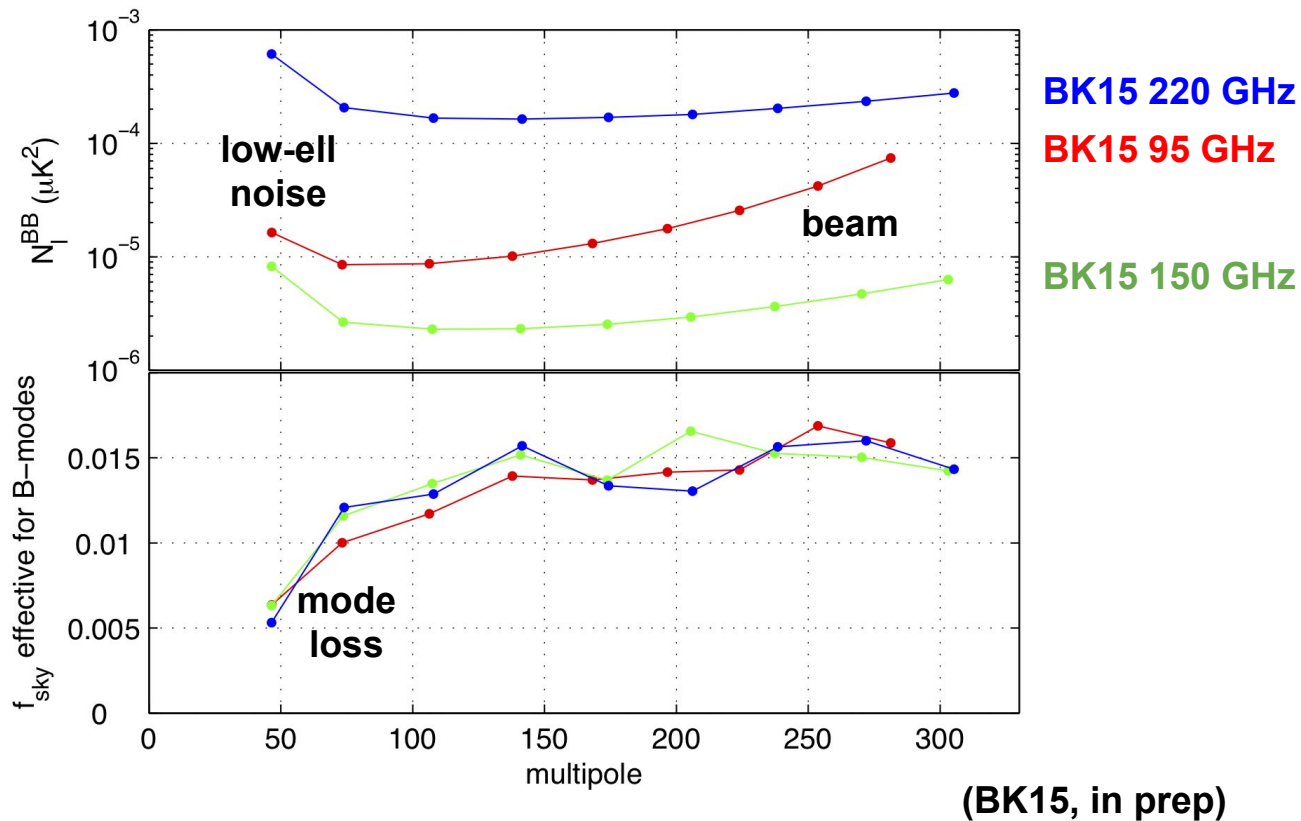
Noise models for CDT data challenge

- Based on BICEP2/Keck Array achieved performance → automatically includes yield, noisy detectors, weather, observing efficiency, etc.
 - BK15 = 1152 det-yrs @ 95 GHz, 5734 det-yrs @ 150 GHz, 1024 det-yrs @ 220 GHz
 - Scale noise component of bandpower covariance matrix → includes excess low-ell noise, mode loss due to filtering, off-diagonal correlations, etc.
 - Some rescaling for beam size and per-detector NETs (for frequencies not represented in BK15).
- Paper in prep to describe noise scaling, Fisher optimization, map-based data challenges.
- We think that this will continue to be the best method to forecast performance of small apertures at South Pole.

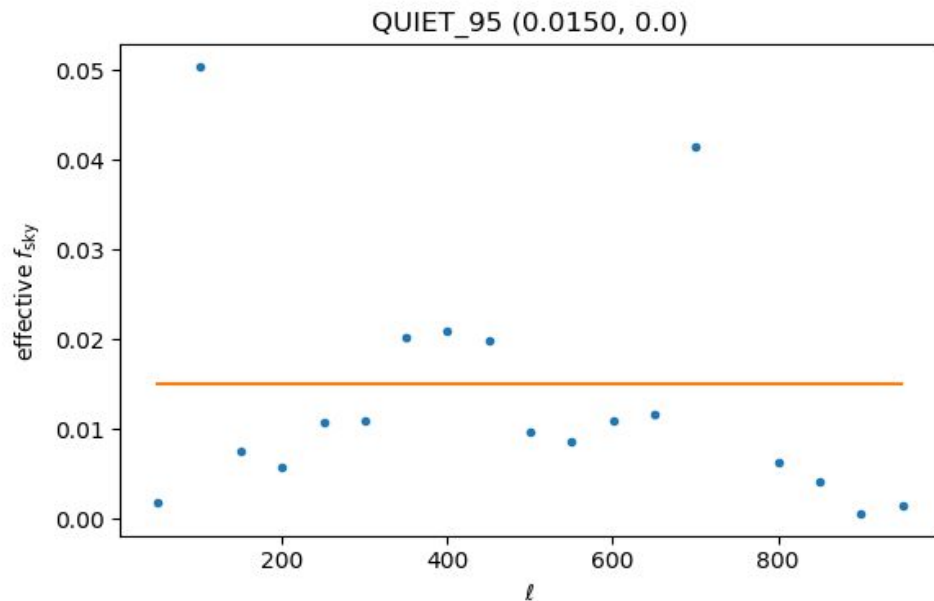
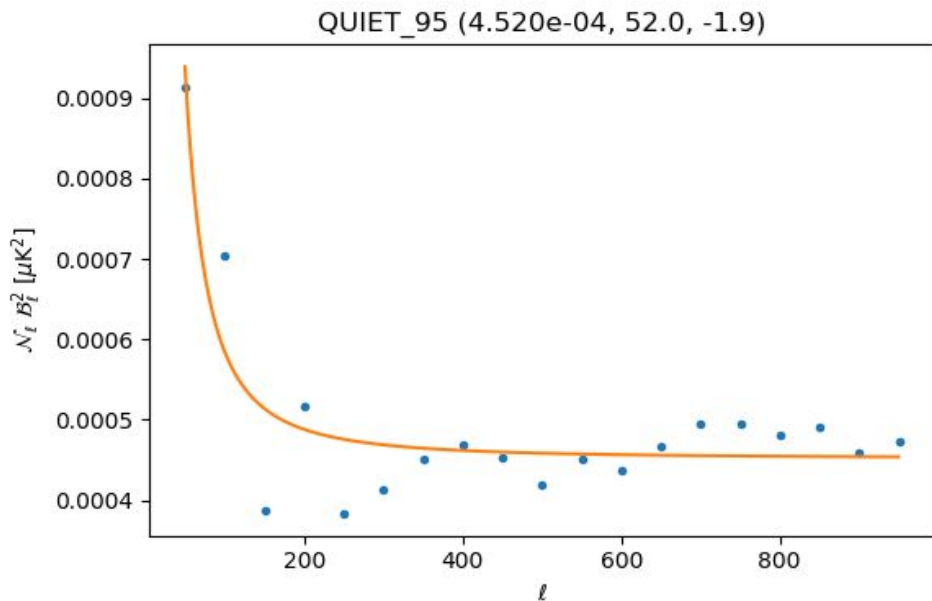
Small aperture noise forecast for Chile

- So far, we are just using the same BK-performance-based forecasts as for Pole.
- Two major questions:
 - Is the same low-ell noise achievable given atmosphere and HWP effects?
 - Is the observing efficiency from Chile on a smaller survey the same as Pole (or from Chile on a larger survey)?

Measure survey weight from published BB results

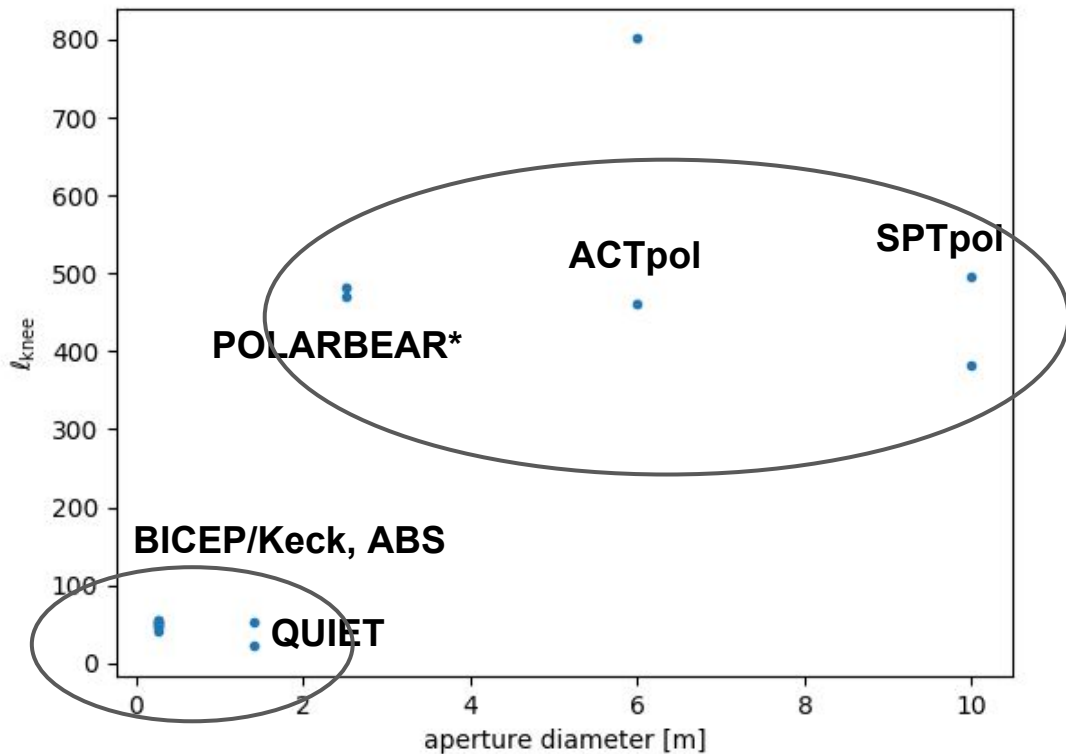


Measure survey weight from published BB results



See [“2018 Aug 10: Achieved Performance Roundup”](#) on CMB-S4 r Forecast Logbook

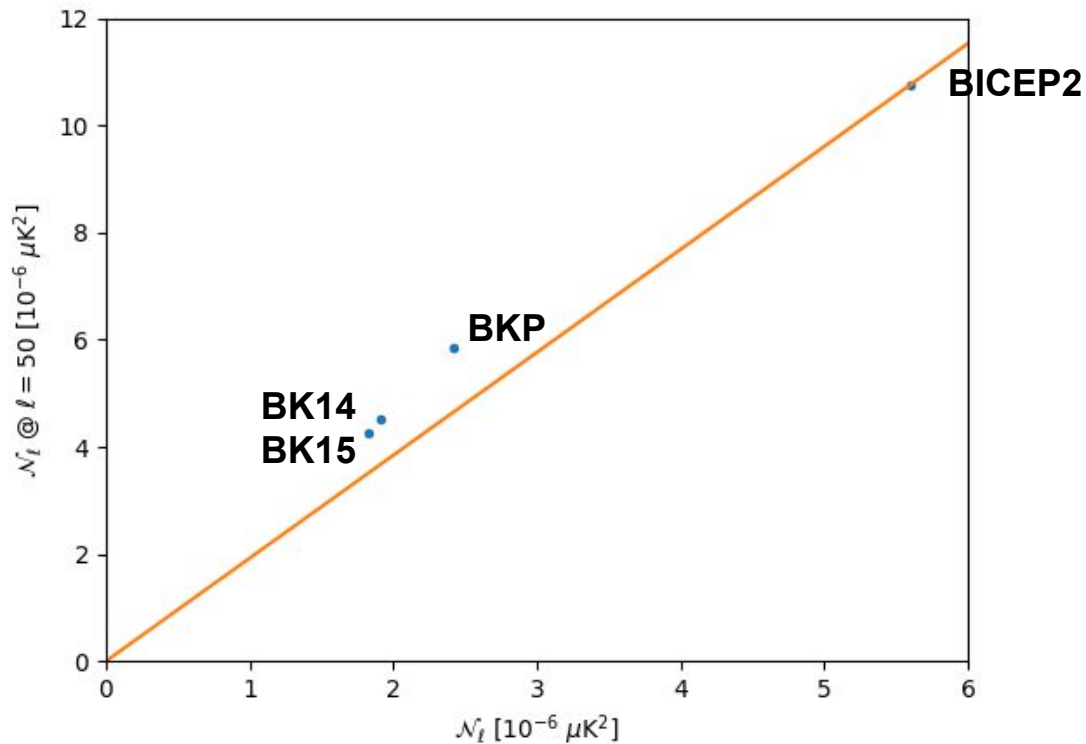
l_{knee} vs aperture size (or telescope baffling?)



*for POLARBEAR, couldn't distinguish between excess low-ell noise and lack of modes due to very small observing region

l_{knee} seems to be a fairly good parameter

(but does it integrate down with # of detectors?)



What can we say about observing efficiency for small-area survey from Chile?

- Try to attribute achieved survey weight to **instrument NET** and **observing efficiency** — by lumping all non-idealities into these two terms, will it be possible to distinguish meaningful trends?
- This project will probably require a significant number of fudge factors. Will collaboration buy into the results or should we just invent pessimistic vs optimistic scenarios?
- Compare to efficiency numbers assumed in SO calculator.
- Questions about plausible survey area are being addressed directly with scan/schedule simulations (i.e. maps in Clem's talk).