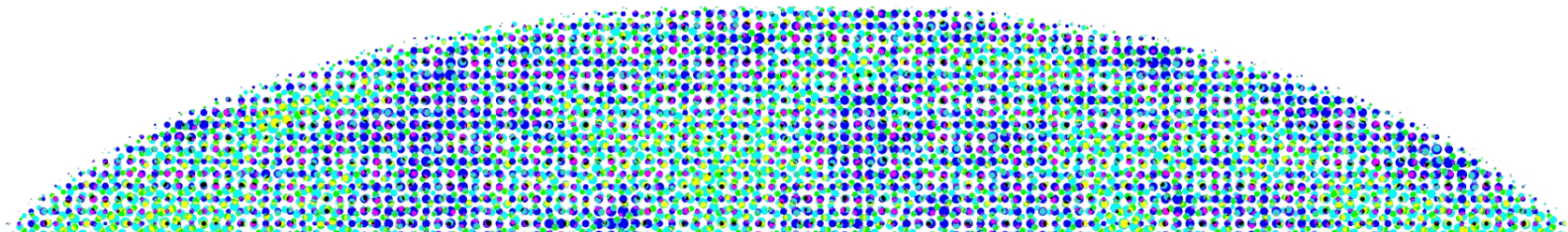


Chile r forecasting: Sky area selection and scan strategy

Sara M. Simon (she/her)

07/31/24



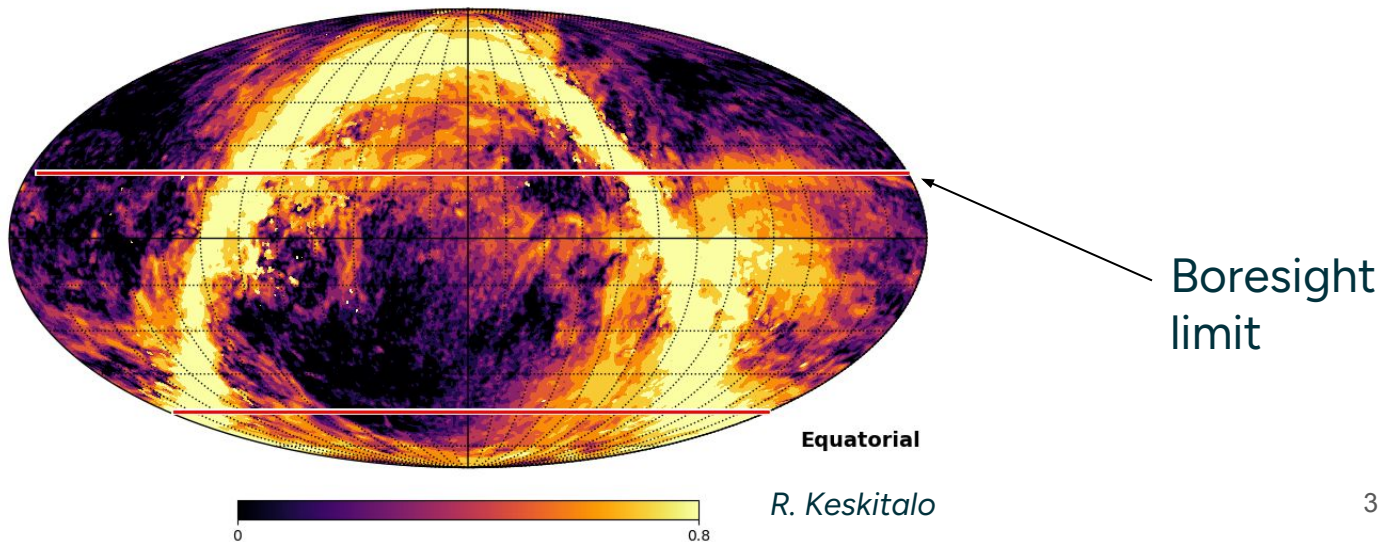
Current Status

- Developed a SAT and LAT delensing scan strategy from Chile (Reijo)
 - This is the “S4-like” survey from the Analysis of Alternatives
 - Maximizes the depth of the highest priority (Deep) field in Chile
 - Deep field is centered on the lowest foreground area
 - Observes three additional fields when the deep field is unavailable
 - Not constrained to discrete elevations or azimuthal ranges
- Current configuration:
 - Dedicated wide-field CHLATs
 - Dedicated delensing CHLAT(s)
 - CHSAT survey

CHLAT Wide

Assumes scan rate accelerates when approaching the field edges

Maximizes sky area and cadence while maintaining near uniform hit distribution. Using only the lowest available elevation of 40° .



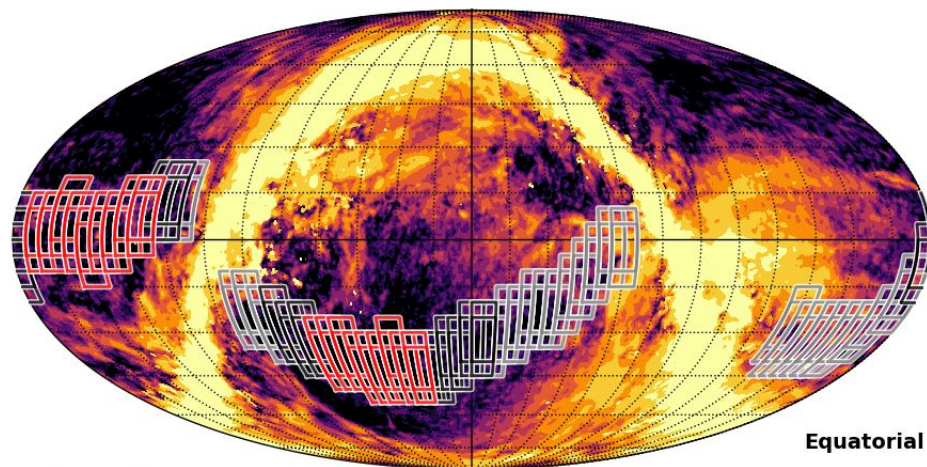
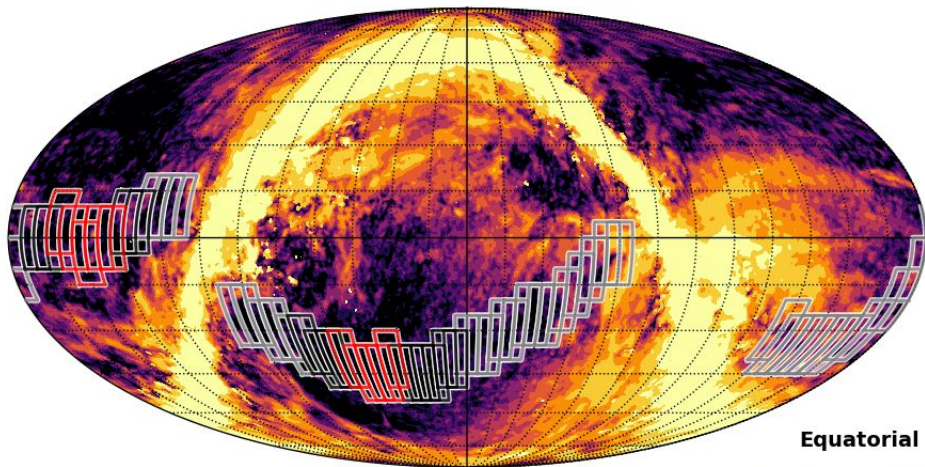
CHSAT + CHLAT Delensing

Highest priority tiles in area with lowest foreground emission
High priority targets always observed when available

10x20 degree tiles with three tiers of priority: **high**, medium, low

CHSAT

CHLAT

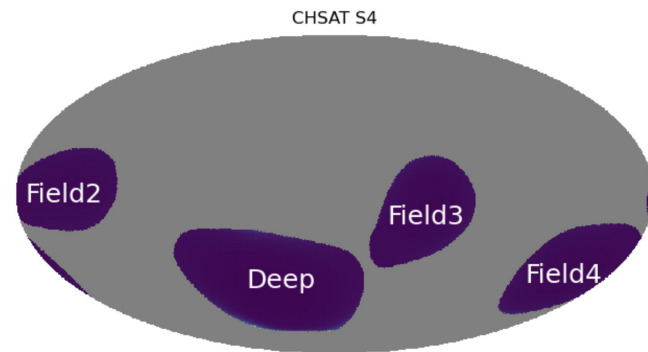


Equatorial

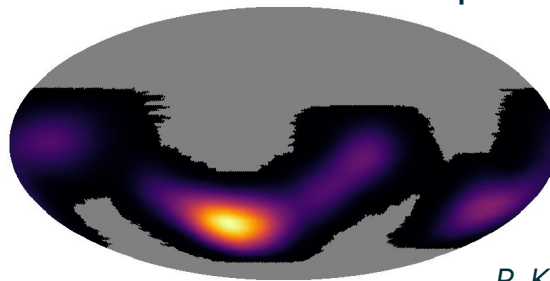
Equatorial

Ongoing Work

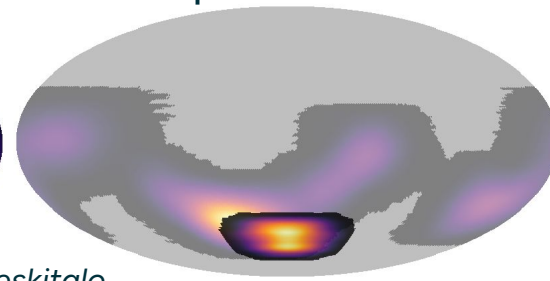
- Most depth is in the deep field → Observing efficiencies and optimizations focus on time in the deep field
- What are the implications of a more complex schedule? What is the cost to simplify?
 - Efficiency loss from time needed to rebias detectors/thermal settling time
 - Simplifying would improve understanding of scan synchronous signal
- Can we get more depth by optimizing scan parameters?
- Does a hybrid wide+delensing survey make sense?



Normalized hitmap



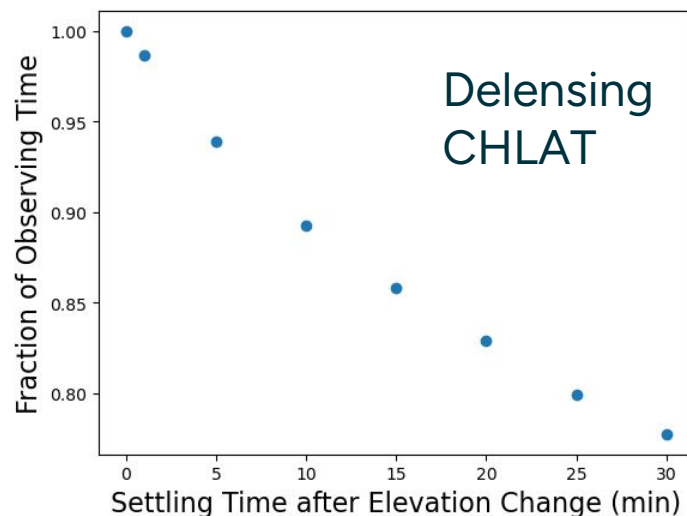
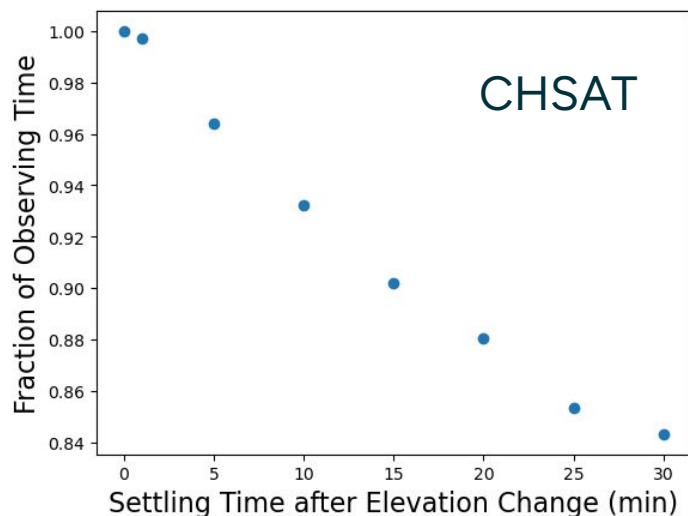
Overlap with BK field



R. Keskitalo

Rebias/Settling Time Losses

- Fraction of observing time in **deep field** for different rebias/settling times after elevation changes
- Can lose a significant fraction of observing time → instrumental requirements, alternate scans

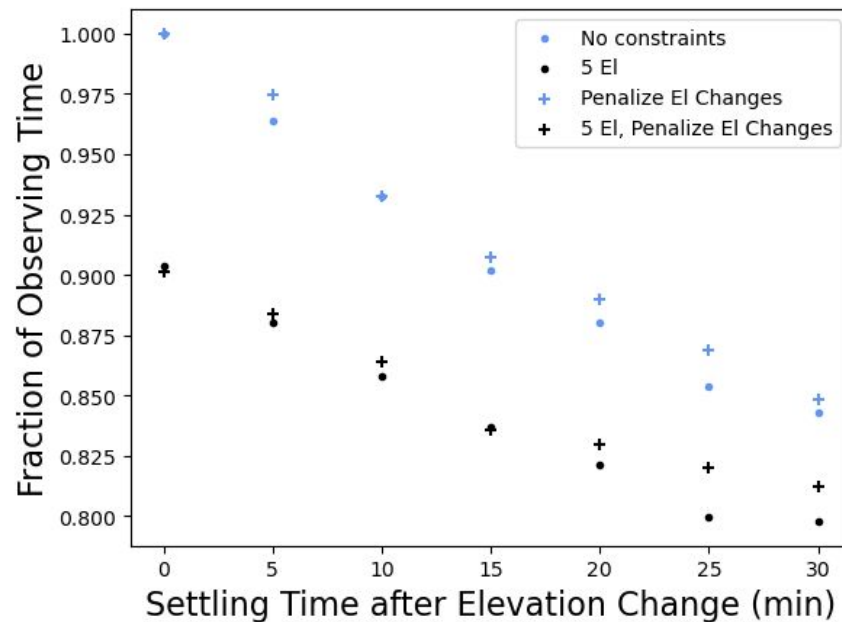


Understanding Cost of Simplification

- Explore efficiency trade-offs with simplification → Work ongoing
 - Set number of elevations
 - Elevation change penalties
 - Set number of azimuth ranges

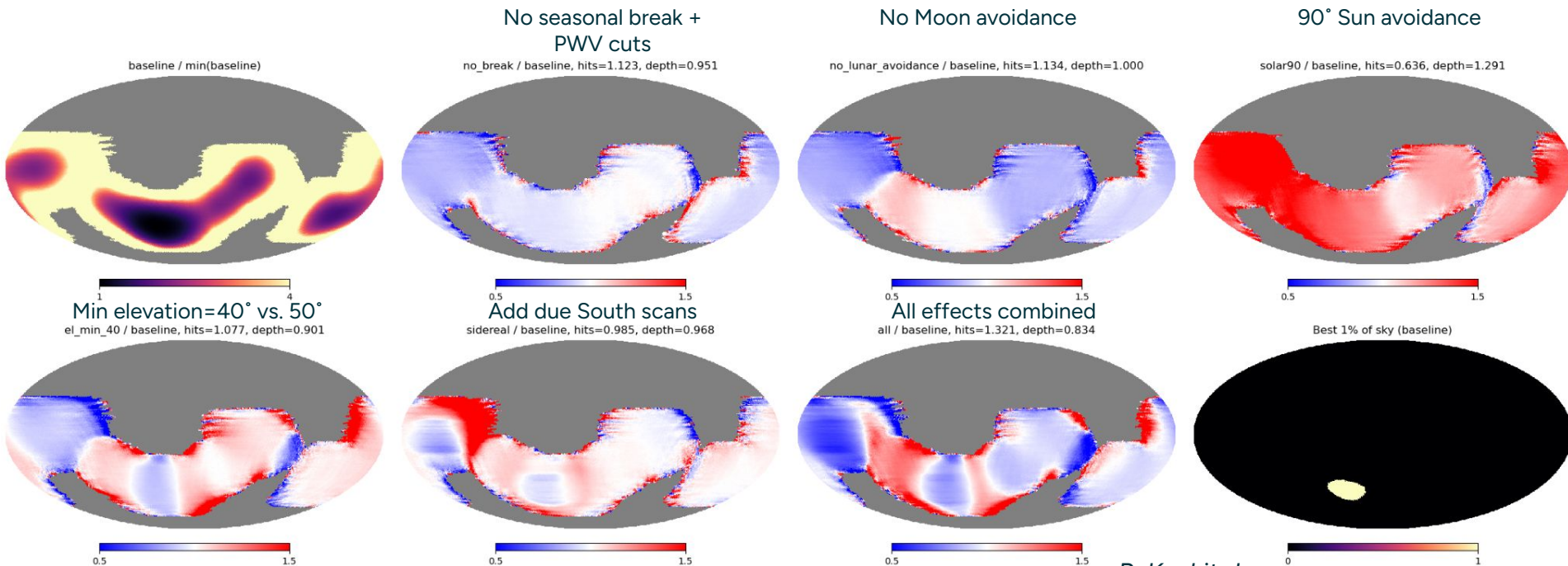
~10% loss in deep field observing time to simplify to 5 elevations in CHSAT survey

CHSAT



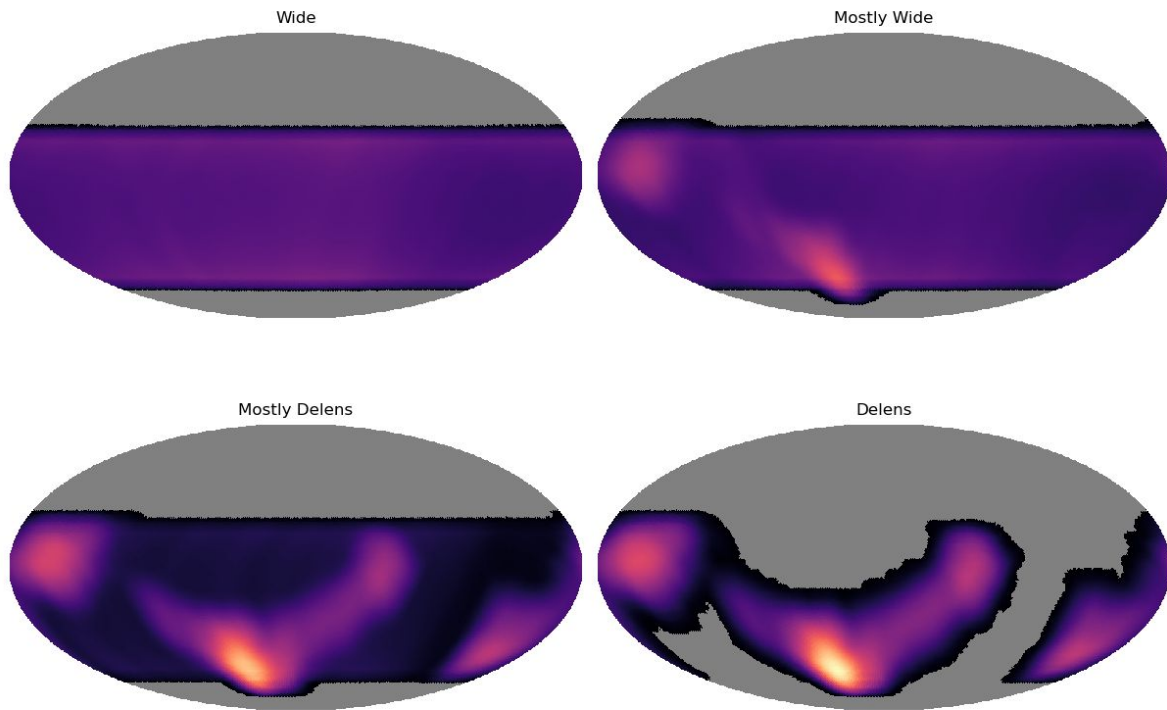
Exploring Potential Gains

Depths relative to baseline depth \rightarrow some potential areas to explore with 5-10% gains in depth



Hybrid Wide + Delensing Schedule

- Tune priority of delensing field and wide field targets using same LAT
- Mostly wide: Highest priority on top priority delensing targets and higher priority on wide field
- Mostly Delens: Highest priority on all delensing targets and lower priority on wide field
- Can use these edge cases to assess if we want to look at these further (tunable)



Depths normalized by deepest region

Summary



- Building detailed understanding of current scan candidates in Chile
 - Understanding their tradeoffs and cost to simplify
 - Implications for technical requirements
 - Understanding avenues for potential gain
 - Can help inform if other scan types are motivated
- In addition to scan optimizations, potential gain of ~10% observing time with improved power reliability at Chile site
- Breakout topics
 - Potential implications for technical requirements
 - Efficiency vs. simplification
 - Assessing Hybrid-type CHLAT scan
 - Other scan types we should compare to



Thank you for
listening to our
presentation.

Learn more at <https://cmb-s4.org/>