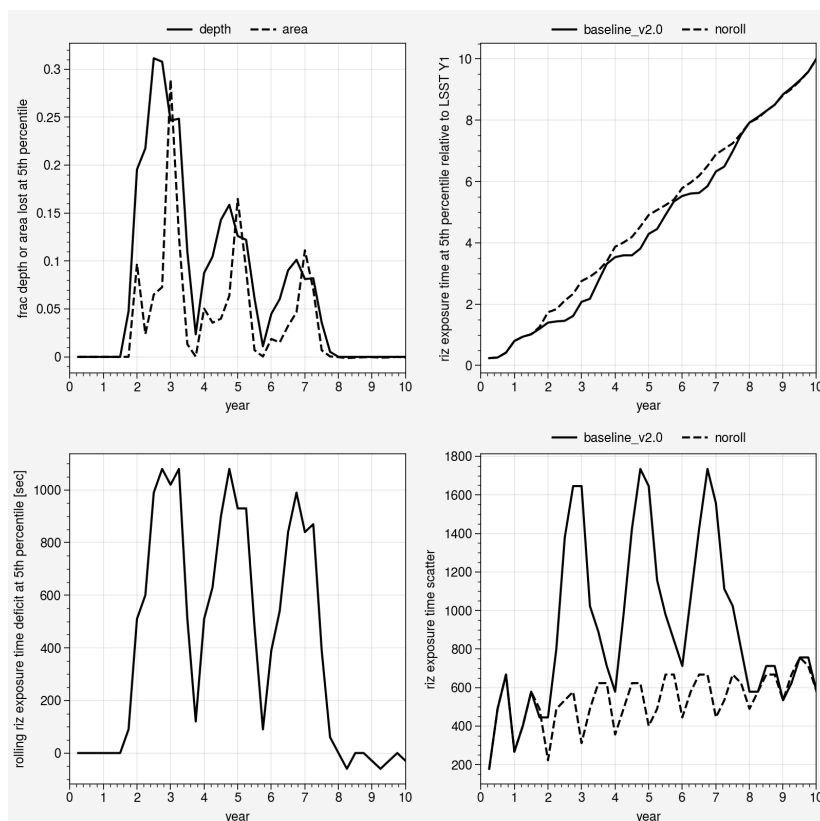


This summarizes some DESC concerns on the quantitative recommendations of the Survey Cadence Optimization Committee (SCOC) on some key questions being considered by the SCOC. While further optimization of recommendations is possible after release – there is a significant concern that the Rubin community will **expect any changes to these recommendations to be merely perturbative** and we should therefore be very cautious to release recommendations to the community if we remain uncertain of their impact on science cases and collaborations.

Uniformity and Rolling Cadence

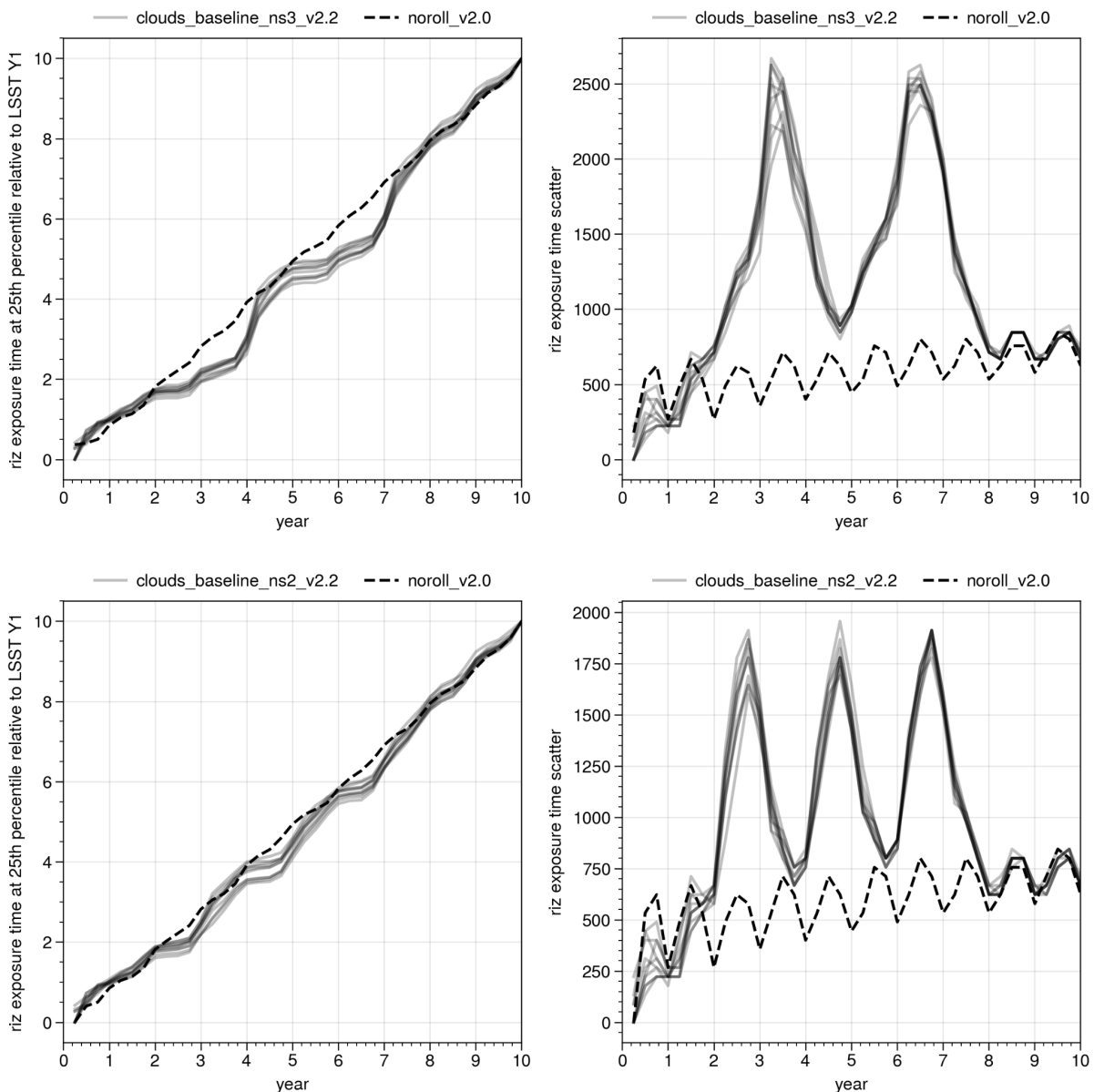
Rolling cadence is *strongly recommended by the DESC as extremely important for time domain science*, and that hasn't changed, but more analysis is needed to make quantitative recommendations on rolling to ensure uniformity at intermediate data releases (not just the final survey). It also needs to be clarified how the SCOC recommendation for observing strategy interacts with the data management (DM) data release schedule.

Following a presentation of the SCOC draft recommendations in a DESC seminar, several collaboration members repeated a concern (also shared by the SCOC) about uniformity of observations around the data release timetable in the rolling cadence scenario. Uniformity concerns for static science *were already present* in the DESC recommendations on the v2.1 simulations (and have been mentioned in our draft SCOC recommendations on rolling cadence). However, a recommendation merely suggesting that DM make data releases on timescales that prioritize uniformity could potentially be too weak. Some recent examples of uniformity concerns for static science, investigated by DESC member Matt Becker, are shown below:



This figure above shows various diagnostics including the fractional depth or area lost if one requires a uniform-depth coadd, and the scatter in riz exposure time as a function of time under the baseline rolling or the no roll scenario.

The rolling has the effect of making the survey significantly non-uniform near the data releases as currently scheduled, and so requiring uniformity would result in cutting significant fractions of data (close to 25% in year 1). Following Lynne's advice, Matt then also ran the analysis on the clouds rolling scenario (which includes variable weather patterns) to test how this would make the non-uniformity worse.



The figures above show these rolling cadences in the 2-band or 3-band scenario, where rolling begins after Y1. Rolling over half the sky has a significant impact on the uniformity needed for static science in years ~3,5,7 (but recovers in years 4,6,8). A 3-band rolling scenario causes significant degradation in uniformity over years 3,4,6,7 and the recovery of

uniformity by year 5 is not as complete as in the 2-band case. The DESC's currently-planned science analysis is at intervals Y1,2,4,7,10, but uniformity is a broader consideration for other SCs as well.

As suggested by the DESC Observing Strategy Working Group, a resolution to this uniformity could be an updated observing strategy (i.e., favoring 2-band over 3-band or adding in a "catchup" no-roll strategy in year 5, etc.). A strong recommendation from the SCOC to the Project should be that potential for, and timeline of, DM producing uniform catalogs for the data releases needs to be investigated. DM needs to weigh in on this uniformity in advance of definitive selections of a rolling strategy. This would affect any science case that uses catalogs.

Peter has pointed out lots of new simulations (see https://s3df.slac.stanford.edu/groups/rubin/static/sim-data/sims_featureScheduler_runs2.2/rolling/) to investigate. There is a strong need to have no-roll sims to compare against the rolling cadence simulations in v3, ideally for every major change, but at the very least for the baseline strategy including rolling. This is critical as the v2.1 simulations did not have a no-roll scenario and therefore did not allow 1-1 comparison of baseline rolling vs no rolling.

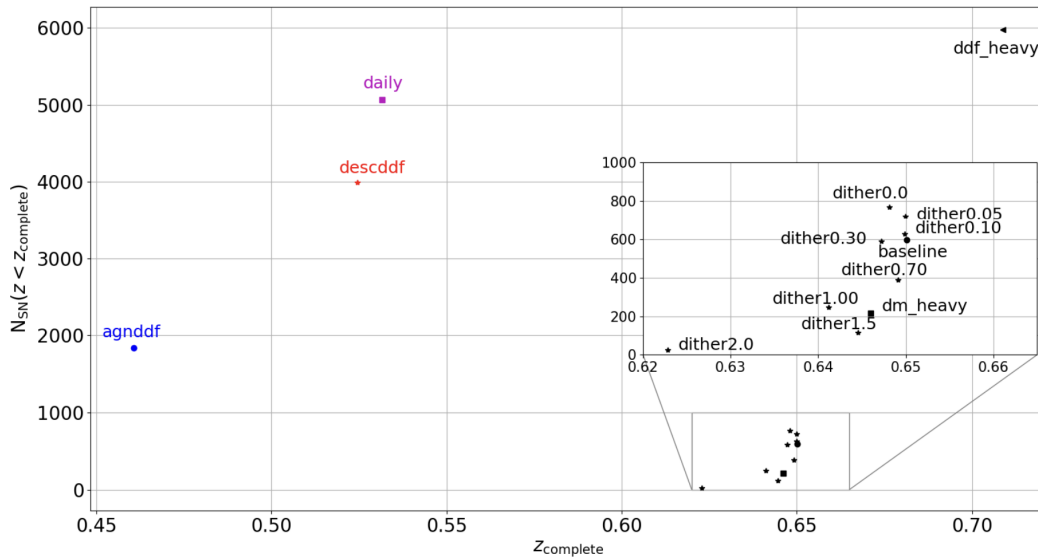
Now that this new uniformity metric has been implemented, there is a well-defined pathway to better understanding this, but the take home messages are that:

- We should delay making detailed recommendations advocating for a specific rolling cadence strategy till the impact on uniformity is known.
- We should wait to make final recommendations until we know how much flexibility DM will have to make uniform releases. The SCOC should initiate discussions with DM about this as soon as possible, since it is a key element of enabling all four LSST science pillars given the adopted observing strategy.

DDF optimization and alternative metrics

The draft recommendations for the DDF include a request for $\geq 5\%$ of time spent on the deep fields. However there are many ways to further optimize the DDF across different science interests and SCs.

One such example is the high-z DESC SN optimization from Philippe Gris. His recent paper <https://arxiv.org/pdf/2205.07651.pdf> performs optimization according to how many well-measured supernovae are available up to a given completeness redshift (to make a 'gold sample' of extremely well measured supernovae to calibrate other samples from eg WFD).



The figure shows his SN metrics run over some of the DDF-focused optimization strategies in v1.5 - similar work on v2 simulations is ongoing; note that this figure is using MAF metrics at a resolution higher than that run by the MAF team.

Philippe Gris's metric is implemented in MAF; however this is scaled down to lower resolution for speed of computation. The implemented precision is insufficient to compare this in the slate of MAF metrics presented by the OpSim team. More time is needed to compare this DDF optimization strategy with other potential DESC metrics and other SC metrics. The SCOC has not considered this particular metric in sufficient detail/at sufficient resolution in our DDF optimization strategy.

[As an additional aside, similarly some ToO metrics not in MAF but contained in e.g. white papers need to be absorbed to ensure that the ToO recommendations are also prioritising the best science.]

The home message is that additional DDF sims may be required and the SCOC **should not make definitive recommendations** on DDF strategy without fully considering new strategies and known metrics that cannot easily be run in MAF.