Response to Reviewers

Responses to reviewer comments for article submission

The authors would like to extend their gratitude to the reviewer who offered excellent suggestions. Their efforts helped make the revised version of the submission better than the initial version. Thank you.

Begins by thanking reviewers

Clear organization: first column is the reviewer comment, second column is the response

First Review	
Reviewer 1	Response
Define acronyms at first use.	Ensured acronyms are defined at first use in text.
Fix capitalization of ICEYE.	Fixed capitalization.
Describe how visibility stressing task pool is obtained.	Added more detail in text describing pool creation.
Areal extent of commercial SAR data products includes more than just spotlight mode.	Added sliding spotlight and stripmap modes to be inclusive.
Is Strahler stream network derived from hydrology?	Yes, clarified this in text.
Do desired observation times always occur within observation opportunity windows?	No, they do not. Clarified this in text.
Suggest including 3D visualization of a visibility relaxing and visibility stressing target to compare. *Provides a reasoned explanation for the decision while maintaining a professional tone*	The authors feel this is not necessary since a detailed description is given on how the visibility stressing task locations and ROIs are derived. Furthermore, the Strahler stream segment in figure 3b gives the reader context for the size, shape, and surrounding terrain of a typical visibility stressing task. In the interest of not extending an already lengthy article, the authors suggest that the aforementioned description of the visibility stressing tasks already present in the paper is sufficient.
Make Strahler stream segment in figure 3b more visible.	Remade figure to increase contrast between background DEM and Strahler stream segment of interest.
Concern that the incidence angle and squint angle constraints are overly constraining. *Succinctly describes the edit and reasoning*	Reworded description of angle constraints. The initial wording suggested a more constraining condition that did not accurately represent the actual implementation. More

	accurate wording that reflects the actual implementation is now in the text.
Incorrect equation for the time deviation.	Equation in initial text was a depricated version of the actual implementation. Corrected the equation to represent the actual implementation that meets the described variable bounds.
Confusing wording on whether the scheduler is the first to account and optimize for ROI visibility.	Reworded language to clarify that this the first to account and optimize for ROI visibility while simultaneously considering other common performance metrics.
Reword tasklist timeline legend.	Reworded legend.
Review and add citation from iancopino's work on metaheuristic optimization algorithms for satellite task planning.	Reviewed material and added appropriate citation in text.
Concern in how problem complexity was computed.	Computation of problem complexity was corrected in text since the decision process is indeed binary.
Define all optimization variables and provide relevant domains.	Added descriptions of all relevant optimization variables to text.
Add description of purpose of soft constraints.	Added further description of soft constraints relative to the optimization process.
Clarify that what no constraints means in optimization solution quality analysis.	Clarified that no constraints refers to soft constraints in text.
What parameter was randomized in Monte Carlo trials?	Added description of randomized parameter in Monte Carlo trials (initial population).
Clarify what changes in Monte Carlo sample initial conditions.	Clarified that the initial conditions refer to the randomized initial population sample.
Provide more information in visibility figure caption for how to interpret data.	Added clarification in caption of what trends in the plots signify improved visibility performance. Also added clarification for time deviation plot caption.
Reconsider language used to convey analysis on the number of observations that switched passes between visibility informed schedulers.	Revised language to acknowledge the fact that increased weight in ROI visibility will result in increased reshuffling of observation times compared to traditional schedulers.
Change legend entry in figure 10 from jump to different to be consistent with language in text.	Changed legend entry to different from jump.
Confusion over off-state language used when referring to satellite duty cycles.	Revised language to reference duty cycle, which was defined prior in the text, rather

	than off state, which was never defined in text.
Second review	
Reviewer 1	
Pn page 8, bottom of the left column. You write "where N corresponds to the number of _tasks_". I though _tasks_ should be _observations_ because otherwise the second term in the objective function (equation 11), \sumAN_{i=1 }w_{uni(i)}u(x_i), becomes redundant did not initially make sense. I was thinking that tasks are already unique, and you are already encouraging collection due to the inclusion of the first term, but I guess this does make sense given the variable weighting scheme, if you setw_vis = 0, you would want some way to encourage collecting tasks which w_uni > 0 would accomplish. Its a little redundant with the other two summation terms in the objective, but not wrong by any means since shaping objectives like this is a design choice. I would encourage mentioning what the unction u(x_i) is since it isn't otherwise discussed in the text. I assume that it converts a scheduling time (x_i \in [0, ub_i]) to an indicator variable (0 or 1) whether the request has been scheduled or not, but could be wrong.	Your assumption on the definition of the function u(x_i) as an indicator function is correct. I have added this description in the text to hopefully clear up any confusion. Thank you for this note!
You introduce the constraint d_{s,i} \leq x_i \leq d_{e,i} (equation 16) to enforce that task collection falls within the satellite duty cycle. However, I don't think this is either correct or there are implementation details being glossed over that should be briefly	Excellent catch, thank you for this. I updated the equation to include a "T" variable corresponding to a satellite period number. The text now describes how a duty cycles are specified for each orbital period by randomly

mentioned. In particular, a 40% duty cycle means that 40% out of every orbit that the satellite can collect images, however this constraint is indexed by task. However there would be multiple periods over the course of the simulation window (of 24 hours) where the satellite is "active". These are discontinuous times when the planning horizon is longer than 1 orbital period and cannot be represented by a single compound inequality constraint, you at least need an indexing term on each duty cycle period. A common way to represent this constraint is that you discretize your scheduling horizon into orbital periods of length T. Then you write a constraint that the total amount of collection time (x_i *collection_duration) over the time period, is less than the allowed duty cycle over any part of the planning horizon. Then you increment that time window by some small amount, t_offset (say 5 minutes), then add another constraint. That constraint needs to indexed by time and by satellite. Additionally, it is not discussed in the text (that I saw) how $d_{s,i}$ and $d_{e,i}$ are selected in the simulations. This should be at least briefly mentioned.	selecting start and end times while ensuring they specify continuous on and off periods. Thanks reviewer for a detailed suggestion
Page 4, Section 2.2, paragraph 1: "Bessle" should be "Bessel"	Corrected spelling
Page 13, Section 3.1, paragraph 4: "eliminate" should be "eliminates" to match the conjugation of the previous verb "reduces"	Corrected tense of eliminate
Page 5, column 1, below equation 8: Use "J_2=1.08262\times 10^{-3}" instead of "J_2=1.08262E-3", in written text avoiding the "E" format makes it a little more readable	Implemented suggested change
Page 8, Column 2, "Matlab" should be "MATLAB" to match how the company capitalizes their product in all official material	Implemented suggested change
Page 9, Algorithms 1 and 2. Remove "Goto line 7"/"Goto line 8". These Gotos are	Implemented suggested change

redundant with the "while" statement which already implies looping	
Finally, I would encourage the authors to open source whatever part of the code for this work is possible (on Github, Zenodo, or otherwise). There is some complicated code in here and the community would benefit from seeing how it was realized and implemented. It would also be useful to include the exact TLEs used to produce the results either as an appendix in a public repo for reproducibility of the work.	I will be sure to note that code and TLE data will be available upon request for those interested. I will be happy to fulfill such requests.