

## ***Interactive comment on “Comparing Stability in Random Forest Models to Map Northern Great Plains Plant Communities Using 2015 and 2016 Pleiades Imagery” by Jameson Brennan et al.***

**Jameson Brennan et al.**

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The authors use the unique plant community signature of Prairie Dog colonies to challenge RF methods, but the novelty of this approach is never articulated. Explain early on, with references, why temporal and spatial characteristics of prairie dog influence on vegetation makes it an interesting challenge for remote sensing and the combined ecological/rangeland management/remote sensing triumvirate of the manuscript will be clearer to the reader. The Introduction needs to be restructured and I recommend the Results and Discussion be entirely re-written, it was extremely difficult to follow and all of the cool aspects of this interesting study were either buried or not mentioned

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at all. After rather major revisions I can see how this paper could be acceptable for publication. It is technically sound for the most part but needs major changes.

Minor comments: The ecological justification for investigating Prairie Dog towns was somewhat lacking in the abstract. Is this study fundamentally about identifying colonies from remote platforms or using prairie dog colonies as an interesting opportunity to advance statistical techniques in remote sensing?

-The study was part of a larger study focusing on livestock production and diet selection within pastures occupied by prairie dog towns. A component of that study was to use remote sensing to identify plant communities of interest within the pastures, and explore how well RF models perform using imagery from different years.

The statement on line 43 is somewhat fuzzy. The cautious note at the end of the abstract is forthcoming.

-Sentence can be amended for clarity.

The transition from line 65 to 66 is a bit harsh. The narrative ‘funnels’ from remote sensing in general to prairie dog colonies in particular far too rapidly. As a consequence, the reader is left wondering if the central theme is prairie dog colony identification or remote sensing techniques or rangeland and cattle management (or all of the above, and if so how do they fit together).

-This aligns with the overarching goal of the larger project, linking plant communities’ on- and off-town to livestock behavior. As stated at the end of the paragraph, understanding these dynamics requires the ability to map plant communities at landscape scales.

The paragraph beginning line 79 is ‘listy’ and reads like a few random manuscripts that the authors read. How do these fit together to advance the overall objective of the study? I recommend restructuring the Introduction. ‘Writing Science’ by Schimel is a good text for describing logical flow in scientific manuscripts.

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-These manuscripts fit into the overall objective of the study by demonstrating mapping of various plant communities using spectrally derived data from satellite imagery, which is the overall goal of this study.

From the paragraph on line 101 it appears that the objective isn't to compare RF against different techniques, which is fine. But the opportunity to use the subtle (or not so subtle) vegetation changes induced by prairie dog colonies to challenge RF methods isn't brought to the forefront. This is a missed opportunity in my opinion. Note also in line 146 that a goal could also be to investigate prairie dog and plant ecology: you don't always have to bring it back to cattle foraging. The Utah and Mexican Prairie Dogs are endangered after all.

-Numerous studies have investigated prairie dog impacts on plant ecology. As mentioned in the paragraph beginning on line 66, studies have demonstrated that prairie dogs can have a large impact plant species composition, and older core areas often become characterized by annual forbs species and low production, which can directly impact livestock production. Though other species of prairie dog in the west are endangered, black tailed prairie dogs in the northern great plains are not federally listed and are often the focus of debates over biodiversity, conservation, and agricultural production. In addition, the rangelands in the Northern Great Plains are primarily in private ownership. Thus the considerable overlap between cattle and prairie dogs is very important.

156: The Ecological Sites notion was new to me and the descriptions sound like soil types. Are these a USDA thing?

-Ecological sites are used heavily by USDA and USDA agencies as well as by private land managers. They are a distinctive type of land with specific soil and physical characteristics produce unique vegetation.

162: I'm confused, I always thought that Kentucky bluegrass was *Poa pratensis*.

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-Kentucky bluegrass is *Poa pratensis*, this will be corrected.

173: the temperature and precip measurements are great but please specify the mesonet used (South Dakota).

-This can be added.

174: using common abbreviations like 'pdf' or common words like 'snow', 'cool', and 'warm' will lead to confusion. Sites are either on towns or off, so using PD with subscript f or g, then O (or similar, even 'NPD' as used on line 201 without previous description) with subscripted snowberry, c3, and c4 would help me at least. There is a lot to digest here and making things easier for the reader can go a long way.

-Acronyms can be changed to improve clarity for the reader.

I'm not entirely sure why an ordination, MRPP, NMS, Bray-Curtis, etc. was used for pre-defined vegetation types. Weren't they already selected to be different from each other? Is the point of this analysis to guarantee that the five vegetation types are in fact different from each other (e.g. line 256)? In this case of course it's fine to do so.

-We would expect a large separation in ordination space based on how plant communities were selected. I think it is of value for plant classification studies to demonstrate that the plant communities one is classifying are actually distinct. The amount of overlap between plant communities may also factor into error rates or help explain differences between years.

NDVI probably doesn't need to be defined on 231 although a note about any differences in the spectral resolution of the red and NIR among Pleiades and other common satellites may be interesting for the Discussion.

-NDVI definition can be removed.

276 is probably a methods point and 278 may even be an Introduction point. Literature as a whole needs to be woven into the narrative. In general, any time a sentence

### C4

starts with the author of a paper, the sentence needs to be changed. Doing this makes the author(s) the subject(s) of the sentence. The topic at hand should be the topic of the sentence. Please start a sentence with authors only when those authors are the subject of the sentence, which can happen.

-Respectfully disagree. Listing an author at the beginning of a sentence is a common convention in ecological literature.

The paragraph beginning 265 could benefit from a few more quantitative values rather than qualitative ones like 'high degree' and 'lower'.

-Tables are referenced giving specific values. Most ecological and agricultural publications require that specific values be either in tables or in the text, but not both.

296: I disagree somewhat. Different species will be more prominent during different times of the year (e.g. cool vs warm season grasses).

-I agree somewhat that different species will be more prominent during different times of the year. This is especially true of forb species that flush early in the season in the region. However substantial increases or decreases in perennial cool and warm season grasses from one season to the next are rare without a major disturbance. They often occur in mixed stands, and thus occupy the same physical space on the landscape. Thus changes in pixels from warm season to cool season (and the reverse) is less likely due to a real shift in composition and more likely due to phenological responses to climatic variables.

The manuscript would probably benefit from separating the results and discussion to show first what happened then explain it. The discussion never comes back to prairie dogs.

-Respectfully disagree. Separation vs. combination of the results and the discussion is often a matter of preference, however combination is very common in the literature. Regarding prairie dogs, the objective of this paper is not to focus on prairie dogs or

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cattle; it is to focus on the use of RF in distinguishing between the associated plant communities.

Please make font sizes larger in the figures. They are often hard to read. -This can be changed.

From Fig. 5 and 6 it appears that prairie dog colonies, at least in this area of SD, can be identified with a relatively large degree of accuracy. This needs to be made more prominent in the discussion.

-Though the objective of this study was not to remotely sense prairie dog colonies, the use of satellite imagery to accomplish this goal can be mentioned in the discussion and may warrant further investigation.

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