**We appreciate the reviewers’ comments. The following is our response.**

**Reviewer #1:**  
Manuscript Summary:  
The manuscript Femtosecond Laser Filaments for Use in Sub-Diffraction-Limited Imaging and Remote Sensing is a very helpful article that covers experimental and theoretical details of remote sensing over a broad range of applications and methods. The article should be published after some substantial changes in the format.  
  
Major Concerns:  
The protocol described in lines 84 onward is very detailed but it most contain a cartoon of the experimental setup. There is a great contrast between the basic description of the protocol and the lack of graphic experimental detail and the theoretical description.  
We thank the referee’s comments. We add a new figure 1 to describe the experiment detail. We add sentences on page 3 before the protocol “….**The experimental setup is shown in Fig. 1**.” And sentences in the first paragraph on page 5 “… **Figure 1 shows the experimental setup. The pulse is generated in a amplifier system (Legend Elite, Coherent Co.). The pulse is 1KHz, 50 fs, and centered at 800 nm..**.”

The theoretical description that follows after page 12 are of great scientific value as a compilation of work and should remain as part of the article. However, there seems to be a disconnect with the protocol described above. A link between Raman/Dicke at a distance and the protocol should be established early on. This disconnect is particularly strong after page 60 where a list of techniques seem to be listed but there is no "guide" to the reader on how the connection between experiments mentioned. While this connection can be done by a more specialized person, and might be good enough in that context, a connection between the experiments and the original protocol would greatly enhance the article.  
The theoretical description is supplementary to our experimental protocol. It provides several proposals for remote sensing method using quantum optics. In the protocol we focus on the experiment of the generation and application of filamentation. We plan to have a special person to explain the connection between experiments and theory.  
Finally, while the remote sensing aspect is present through out the discussion, the use of laser filaments is not clear and the Sub-Diffraction-Limited aspect seems to be completely absent from all discussions other than the nanosystems discussed in page 64.

We appreciate the comments. We note that the characteristic transverse sub-linear-diffraction width of filamentation phenomena makes it generally applicable for high-resolution sensing at longer distances and we have not belabored this point in the text. However, we have made a few revisions for additional clarity on this point. The modification is on page 5, the first paragraph of discussion is rewritten as “**The method presented above is a laboratory protocol for the use of high-intensity laser light delivered at classically intractable distances. Of the numerous possible applications of such light – CARS, FIBS, THz radiation, photoacoustics, superradiance, etc – many applications can deliver point information about surface material properties. Femtosecond laser filaments with sub-classical-diffraction-limited spot size allows use of these techniques while scanning the surface on a point-by-point basis. This protocol is an ideal test bed the development of such techniques**.”

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**Reviewer #2:**  
Manuscript Summary:  
The protocol is described reasonably well and is suitable for publication after minor edits.  
  
l 53-56: The authors suggest that extreme intensities of ultrafast intense laser pulses are useful for several application. In fact, none of the provided examples are appropriate. Extreme intensities are applicable to radiation generation, high-field science, and similar "intensity frontier" problems, whereas for the applications the authors listed the required intensities are many orders of magnitude smaller. In the context of filamentation, the typical intensity is 10^13 W/cm2, seven orders of magnitude lower than 10^20 W/cm2 (which is still not the highest intensity demonstrated in laser experiments).

We appreciate the comments. The extreme intensities in our situation is on the order of 10^13 W/cm2. We correct it in the text. The applications we mention generally are not intensity-frontier phenomena, as they rely on relatively low-order nonlinearlities. While filaments are versatile in a number of applications, we agree that they are inherently limited to the intensities given above. This is elaborated in the manuscript paragraph beginning “**With femtosecond laser filaments**…”

l 71: in addition to the two effects listed, the classical diffraction also contributes to the dynamic balance in filamentation

We thank the comments and we add the classical diffraction in the first paragraph on page 5. “radius whose small size is maintained by a dynamic balance **among classical diffraction**, Kerr self-focusing, and defocusing due to plasma generation [9].

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l 127-131: it is not clear why the authors restrict the scope to single-shot measurement at one point, as it is not generally true that all material studied is always removed by a single shot

Typically, the single-shot regime is most useful for maximum speed of data collection as well as reducing the damage to the sample in those cases where this is a concern. For weaker signals, deeper interrogation of underlying material, and related cases it may be advantageous to operate in a multiple-shot regime. We have added language to this effect in the text. We modify sentence on page 5:”…**In general, filamentation provides a number of mechanisms for target effects. The initial pulse can provide information on the surface layer, while subsequent pulses can provide information on deeper portions of the material through ablation or mechanical removal of surface layers.”**

In Fig. 2, the colors should be explicitly labeled. What is the significance of (a) and (b) - does the result in (c) correspond to (a) or (b)?  
Fig3. (a) shows the objects and Fig3. (b) shows that the objects are buried under sand. The result in Fig 3(c) is related with that of Fig 3(a). To make it clear, we update Fig.3 with label of metals.  
  
**Reviewer #3:**  
Manuscript Summary:  
This manuscript describes the use fs laser filaments for imaging and remote sensing. Though the examples given in the manuscript is not adequate for remote sensing application, the method described may be interesting to remote sensing and other communities.  
  
Major Concerns:  
The representative results discussed in the report are not adequate to highlights its use in image and remote sensing. For example, figure 2 provided LIBS scans of metal objects buried in sand. The mechanism behind the removal of sand may be shocks rather than ablation.

We appreciate the referee’s comments. We update Fig.3 to enhance our results for the imaging and remote sensing.

Additionally, mechanical removal of coarse surface layering is a valid use case for remote sensing, e.g., in interrogating subsurface properties of materials with less pulse energy than is required for material removal via ablation.  
  
Minor Concerns:  
The authors commented about the applications of ultrahigh intense laser (~1e20 W/cm2) such as LIBS, Raman, material characterization etc. For all these applications, typically intensities ~,1e14W/cm2 are used. For example, see Applied Physics Reviews 5 (2), 021301 (2018)

Attachments area

We are grateful for the author to point it out. It should be around a few 1013 W/cm2 instead of 1e20 W/cm2. We correct it in the context.