Answers to RC1

The manuscript entitled "Earth Observations from the Moon surface: dependence on lunar libration" provides innovative thoughts and visions on deploying DSCOVER/EPIC-Type camera on the moon for earth monitoring. Indeed, the Moon is a stable and longevous carrier for an Earth-observing sensor. It also exerts influences on precipitation, ice nuclei concentration, hurricanes, etc. For those Moon-related terrestrial phenomena, the lunar platform provides a unique perspective to understand the evolution of the phenomena.

Detailed analysis of the impact of the lunar libration on the visual position of the Earth on the Moon sky is presented, providing suggestions/insights on the possible field of view for the lunar-base earth observing sensors. This manuscript focuses on the impact of lunar libration on the sensor FOV. However, it would be more appealing if a more detailed discussion on the configuration of the potential lunar-base EPIC instruments.

Overall, I recommend the publication of this paper with minor revisions. The following are some minor points when I went through the paper in detail. They are only suggestions for the consideration of the authors when they revise the paper.

Line 9, line 293, and line 363, it will be better to have consistent values for the angular diameter of the Earth in the Moon sky.

Answer 1: Done. The angular diameter of the Earth is 1.8°-2.0°

Line 92, Libration of the Moon. I like the detailed explanation of optical libration provided here. It looks like the physical libration is neglected in the discussion due to its small magnitude compared to the optical libration.

Answer 2: The following text has been added to the new version of the paper: "The libration of the Moon discussed above (Figures 3 and 4) is called optical libration. The tidal action of the Earth causes physical libration associated with a change in the period of the Moon's own rotation. Physical libration is only 2 arc minutes, that is, much less than optical libration. In the calculations (Figure 5 and below), physical libration is taken into account along with optical."

Line 165, what does Figure serve for? I cannot find any discussion in the main text.

Answer 3: Figure 6 has been removed.

Line 285, what is the scientific goal for the slit observation? It will be better to provide some potential applications there to enlighten the reader.

Answer 4: The following text has been added to the new version of the paper: "Spectrometric observations through the slit are a common practice for many satellite observations of the Earth. Scanning of the Earth's surface is usually carried out by movement of the low orbit satellites. For observation from the Moon, it is logical to consider the option when scanning occurs due to the libration and diurnal motion of the Earth. The scientific goals for the slit observation are close in both cases".

Line 298, does this WFOV camera have the same spectral configuration as the EPIC?

Answer 5: This will be determined in more detail later. The following insertion was made in the text of the paper: "The camera can be hyperspectral, with the inclusion of wavelengths that EPIC uses."

Line 292, is ‘wich’ a typo?

Answer 6: Fixed.

Line 307, what does Figure 11 serve for? It looks like only the polar regions of the moon are plausible areas for the long-term operation of a lunar sensor. I suggest combining Figures 10 to 12 into one figure and focusing on one period to avoid unnecessary confusion.

Answer 7: Figure 11 has been removed. The PRISM program consider the possibility of placing automatic instruments in the equatorial part of the Moon, which could work for several lunar days.

Line 342, it will be better to provide the percentage of the loss of the lit area as the decrease of the Earth phase to give readers a better concept of the spatial and temporal observational capability of a moon-base sensor. I guess the Earth phase is one of the disadvantages of the lunar-base sensor. But if there is a dark/nighttime component in the instrument, it will greatly fill the gaps and provide valuable information on the dark side of the Earth just like VIIRS DNBs do.

Answer 8: The information about the fraction of the illuminated areas has been added to Figure 12d. Observations of the night side of the Moon are possible, but this will depend on the specific instrument configuration, which has not yet been determined. The Earth phase is actually the advantage for the lunar-base sensor: a large range of phase angles is more important than the area of the Earth available for observation at any given moment. If the Earth is only partially illuminated, the diurnal rotation will cause the entire surface of the planet to pass through this illuminated portion as seen from the Moon.

Line 363, What is the potential scan frequency of the WFOV camera and the hyperspectral sensor? Without this information, it is hard to follow the author’s claim ‘which will allow each slit to receive at least one scan of the entire Earth's surface in one pass. Please discuss more here if possible.

Answer 9: The following text has been added to the new version of the paper: “The potential scan frequency depends on the field of view of the device and on the detector matrix used, so that the spatial pixel across the slit is comparable to the size of the spatial pixel along the slit. For a detector matrix with a size of 1000-4000 pixels and a field of view of 5 to 15 degrees, the scan frequency should be 10-100 seconds”.

Although it might be beyond the scope of this paper, it will be better to also shortly discuss/mention the possible limitation of the lunar-base sensor, such as the impact of the lunar environment (lunar dust exosphere, high energy cosmic particle, meteoroid, etc.) to give readers a whole picture of the concept.

Answer 10: The following text has been added to the new version of the paper: “The lunar environment may have serious problems for the operation of sensors due to dust settling and impact on moving parts, and due to the influence of high-energy particles and meteoroids. The discussed design of instruments on a fixed mount with no movement of the external parts of the instruments, significantly reduces the dependence of observations on lunar dust. During the use of such instruments on the lunar surface, the rate of dust settling and the degree of degradation of *instruments due to radiation will be clarified, which will make it possible to optimize the design of future instruments and protect them as much as possible from a hostile environment".*