

DATE: January 27, 2020

TO: All members of our technical report group

## INTRODUCTION

My proposal is an investigative report on a sub-project of NASA and the USGS called LandSat. This proposal covers the broad mission of the LandSat satellites along with specific missions and research and introduces paths for the report. I hope there is shared interest in LandSat that keeps us engaged in the process and believe we can all find a niche.

## PRESENTATION OF OPTION

I propose we profile and analyze the NASA and USGS earth science division, with specific focus on the LandSat satellites, an ongoing series of Earth observation missions that NASA launches in partnership with the USGS. As an alternative topic, the earth science division has other large-scale projects that may be of more interest to us than LandSat. LandSat was chosen due to a shared interest in aerospace from the mechanical engineers in our group, a shared interest in climate science research from the environmental scientists in our group, and a long history of operation and contribution to the scientific community.

## DESCRIPTION OF FOCUS

LandSat is a series of Earth observation satellites, with two currently operational vehicles, LandSat 7 and LandSat 8. LandSat 9 is in development and scheduled to launch in December of 2020. There are two primary paths we could take with the LandSat focus: a broad and historical view of the entire series of LandSat missions starting with LandSat 1 in 1972 or a more focused investigation of the most current operational vehicle, LandSat 8. LandSat cameras capture images of Earth in various bands of the electromagnetic spectrum, both within and outside the visible range, with LandSat 8 having a nine-band optical imager and two-band thermal imager. This imaging data is processed the USGS and NASA to gain insights into many phenomena on Earth including tracking deforestation, cloud coverage, localized fires, watersheds and irrigation, and polar ice levels. The LandSat series of satellites are an instrumental part of global climate change research due to the longevity of the program and the data we continue to gather from the current vehicles.

## JUSTIFICATION OF FOCUS

Using LandSat as a topic for a group technical report would allow all group members to pursue a sub-topic they are passionate about while having a cohesive theme to tie to report together. From the engineering side, one could focus on mission planning hurdles from physical design of the satellite itself, to successful launch of the vehicle and its continual operation in orbit for years or decades. From the environmental science side, LandSat is a vital part of the Earth science research performed by NASA and USGS and has captured decades of imaging data of all sorts of environmental developments, from the Mt. St. Helens eruption, to degradation of the Greenland ice sheet. Many of the most well-known high-resolution images of environmental events and shifts were taken by LandSat satellites. While LandSat does not contribute directly to climate change policy and action, it is a powerful tool to provide context and data for how effective those measures can be.

## LIMITATIONS OF FOCUS

LandSat missions have a broad range of research focuses that could make it difficult for the report to be cohesive. Most of the publications related to LandSat focus on the imagery captured by the vehicles not on their physical design and would be more difficult to research from a mechanical engineering perspective. Intended audience and purpose for the report may also be difficult to dial in as they would not be as clear for LandSat as they would for more persuasive report topics.

## CONCLUSION

I hope that LandSat will be as interesting to the rest of the group as it is to me. As a program run by NASA and USGS, it is a credible and extensive source of Earth science research. I look forward to working on whichever topic we choose, and believe LandSat to be a great option for all of us.