Carleton High Altitude Radiometer

Project Proposal

Canadian Stratospheric Balloon Experiment Design Challenge

December 2, 2018

DAVID BASCELLI TEAM LEAD
JACOB BOOTH SENSOR LEAD

Carleton University

Contents

List of Figures

List of Tables

1 EXECUTIVE SUMMARY

2 PROPOSAL

2.1 Scientific Objectives

Microwave remote sensing has been a common payload on earth observation satellites since the early days of space-flight. In as early as 1962, a radiometer on-board the Mariner 2 mission measured the surface temperature of Venus. 1968 Saw the first space-born earth observation radiometer on-board the Cosmos 243 satellite, which measured atmospheric water vapour and global ice cover. Many different radiometer configurations can make a wide array of different geological, biological, and climate measurements. Our scientific objective is to make low cost measurements of soil moisture content using a balloon born microwave radiometer. Soil moisture measurements are crucial in predicting local weather conditions and monitoring climate change. Incorporating soil moisture measurements into weather and climate models allows for more accurate medium term weather forecasts and can also give clues about future droughts, crop yields, and water resource management. Currently, most radiometric data comes from space-born radiometers, such as those on the SMAP or SMOS satellites. To achieve high resolution and accuracy, these space-born radiometers utilize cryogenic components, complex phased array or synthetic aperture technologies, and require large and very directional antennas. Our belief is that similar measurements could be performed from a high altitude balloon at significantly reduced cost. Balloon born radiometers even have some advantages to space-born radiometers, including reduced antenna directionality requirements and reduced atmospheric effects.

2.2 Experiment Design

2.2.1 Outline

2.2.2 Radiometer Block Diagram

David

2.2.3 Attitude Determination

Jacob

2.2.4 Experimental Procedures

David

2.2.5 Resources

David

2.2.6 Technical Risk Assessment

Jacob

1. Human [1]
2. Technical and Environmental

2.3 Management

David

2.3.1 Team Structure

2.3.2 Project Time-line

2.3.3 Budget

2.3.4 Managerial Risk Assessment

2.4 Outreach

Jacob

2.4.1 Public Outreach

2.4.2 Academic Outreach

3 CONCLUSION

4 REFERENCES

REFERENCES

[1] M. Omar, M. El-Kassaby, and W. Abdelghaffar, "A universal suspension test rig for electrohydraulic active and passive automotive suspension system," *Alexandria Engineering Journal*, vol. 56, no. 4, p. 359âĂŞ370, 2017.

5 APPENDIX