

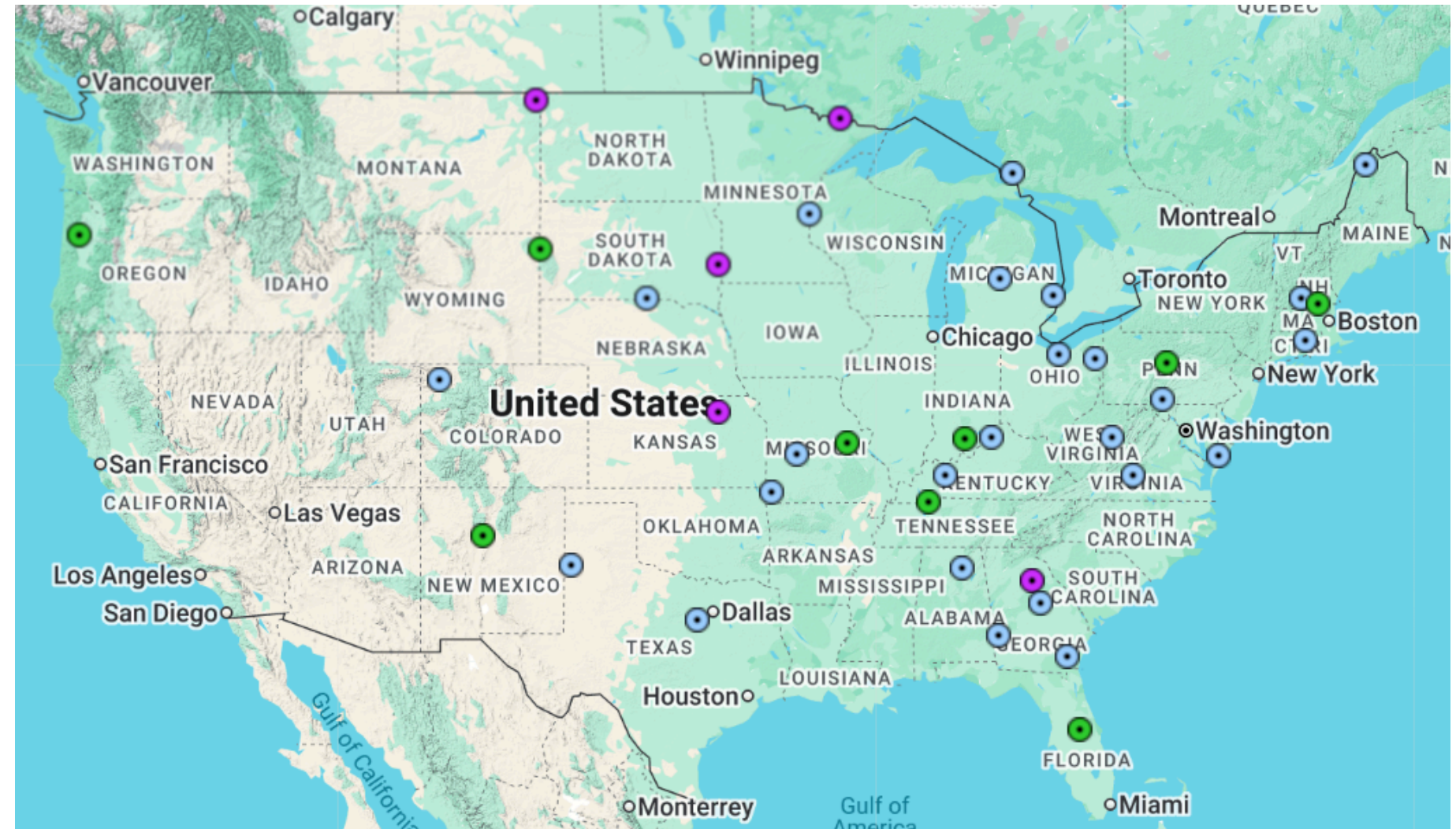
# **Development of Quality Control Metrics for Variometer Magnetic Data Using Geomagnetic Observatory Measurements**

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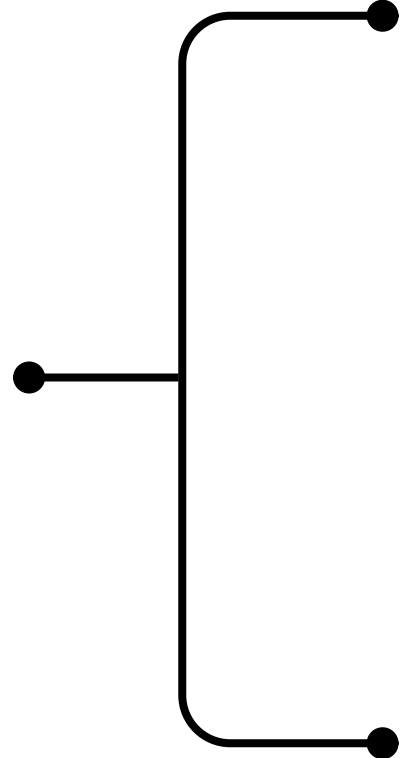
# Introduction

- USGS has installed several variometers across US in past decade (right)
- Variometers measure relative change in magnetic field
- Variometers are lower cost and easy to deploy
  - Expands monitoring coverage



*US locations of variometers (NSF SAGE)*

# Problem



In the absence of absolute calibration from geomagnetic observatories, assessing the quality and reliability of variometer data remains challenging.

# Project Goals

## Wire, Test, & Deploy Two Variometers

- Use the USGS Geomagnetism lab to wire, test, and calibrate two new variometers
- Deploy variometers near the Boulder Magnetic Observatory

## Evaluate Variometer Data Quality

- Compare variometer magnetic measurements with reference observatory data
- Identify and quantify issues such as noise, drift, and offsets

## Develop Quality Control Metrics

- Create reproducible metrics to assess the reliability of variometer data
- Create automated data quality checks

# Primary Data Sets

## Fairbanks, AL

- Geomagnetic Observatory
- Variometer

## Tucson, AZ

- Geomagnetic Observatory
- Variometer (pending install)

## Boulder, CO

- Geomagnetic Observatory
- Variometer (pending install)



*Boulder Magnetic Observatory (USGS)*

# Field Work

- Install of two variometers at the Boulder Magnetic Observatory in late February / early March
- Assess metrics at three locations with observatory + variometer data

# Timeline

## **Phase 1: Jan - Feb**

- Gain access to magnetometer lab @ USGS Golden
- Wire and test two variometers

## **Phase 2: March**

- Field Install
- Exploratory data analysis
- Algorithm & metric development

## **Phase 3: April**

- Application to broader variometers
- Figure & report development

## **Phase 4: May**

- Final report and presentation development



# Impact

- Improve variometer data quality at sites without full observatories
- Increase confidence in variometer data use in research and science
- Support expansion of variometer networks









**Questions?**