INTRODUCTION

The primary objective of this work is to enhance the utility of the National Polar-orbiting Operational Environmental Satellite System (NPOESS) soil moisture data by converting passive microwave sensor data records (SDRs) to a soil moisture depth profile using satellite data assimilation and Backus-Gilbert (BG) spatial filters. The goal of satellite spatial filters such as the Backus-Gilbert (BG) spatial filters is to improve the sensor spatial coregistration behaviors. Spatial coregistration is beneficial since spatial resolution is a critical aspect of the satellite sensor. However, in order to maintain the original intended resolution from the sensor, the coregistration approach must be designed such that spatial errors that are not caused by spatially dependent noise are not always corrected. The Backus-Gilbert (BG) spatial filtering approaches create modified data at a resolution different from the original sensor resolution. However, in all cases, the original sensor data remains intact. The BG methods rely upon precomputed coefficients that create modified data at a resolution different from the original sensor resolution. However, in radio frequency interference (RFI) contaminated environments, the data error characteristics are dynamic. This is a new dynamic extension to the backus-gilbert (BG) spatial filtering approaches that create modified data at a resolution different from the original sensor resolution. The improvement using BG is shown below.

GOALS

This work is used to develop:
1) a four-dimensional data assimilation methodology to retrieve deep soil moisture profiles using the National Polar-orbiting Operational Environmental Satellite System (NPOESS) and other associated data sets, and to better spatial mapping of the masking effects caused by vegetation.
2) a methodology for better spatial mapping of the masking effects caused by vegetation.
3) a discrete Backus-Gilbert (BG)-based methodology for reducing the radio frequency interference impacts at 8.7 and 16 GHz.

ARMY APPLICATIONS

This work contributes to several areas of interest to the Army as well as other agencies including:
1. More accurate probability estimates of mobility and trafficability
2. Improved hydrologic forecasting capabilities
3. Improved NWP land surface initialization
4. Better understanding of atmospheric/land interactions
5. More accurate agricultural assessments

CONCLUSIONS

The goal of satellite spatial filters such as the Backus-Gilbert (BG) technique is to either enhance the satellite data spatial resolution and/or to reduce spatially dependent noise. The latter is beneficial since spatial resolution is a function of sensor frequency (lower frequency results in larger spatial scale). The BG techniques rely upon precomputed coefficients that create modified data at a resolution different from the original sensor resolution. However, in radio frequency interference (RFI) contaminated environments, the data error characteristics are dynamic. This is a new dynamic extension to the backus-gilbert (BG) spatial filtering approaches that create modified data at a resolution different from the original sensor resolution. The improvement using BG is shown below.

References

Vegetation masking effects such as vegetation water content reduce the physics of the microwave brightness temperature. The sensitivity to vegetation water content is present at few vegetation impacts. We present the VEGETATION IMPACTS.