CHAPTER 1
INTRODUCTION AND BACKGROUND

This document was developed in response to the identification of metadata and data quality guidelines for in situ soil moisture monitoring as a top priority for the National Coordinated Soil Moisture Monitoring Network (NCSMMN) at the National Soil Moisture Workshop in 2022. This document focuses on metadata guidelines, while an accompanying Soil Moisture Data Quality Guidance document outlines soil moisture data quality standards. Due to the rapid expansion of soil moisture monitoring networks in the past decades, a number of disparate practices and standards exist regarding the definition and reporting of appropriate and necessary metadata for soil moisture monitoring networks. This document is intended to address and harmonize these various practices into an overarching synthesis of best practice.

The purpose of this document is to describe the metadata that will allow robust in situ soil moisture data interpretation and to support an assessment of data quality. Metadata here refers to the data and information that provide context and details relevant to soil moisture measurements. The overall aim is to provide best management practices for researchers, state and regional monitoring network managers, and federal agencies regarding the type and quality of metadata that should be made available in conjunction with measured soil moisture data.

Below we summarize existing metadata guidelines, provide our recommendations for comprehensive metadata types and reporting, present a tiering system developed to guide data users and provide aspirational goals for soil moisture monitoring networks based on metadata availability, and relate the recommendations in this document to the accompanying Soil Moisture Data Quality Guidance document.

This document was developed alongside the Soil Moisture Data Quality Guidance working document, and both documents should be considered when developing new networks or reporting information for existing networks. The tiering system developed in this document is aligned with that of the Data Quality Guidance document. Considered together, these tiering systems outline community-defined standards for various levels of metadata and data quality reporting.

It is acknowledged that the metadata standards and tiers provided here are quite comprehensive. The listed metadata may not be necessary to meet the specific objectives of a particular monitoring network; however, such information is likely to be needed for a wide range of potential applications and thus should be considered to help maximize the use and utility of the soil moisture monitoring data to serve the public good.