Soil Pit Data Descriptions with Equations and Notes

Column Name	Acronyms	Units	Description	Equation	Note
Soil_Pit_Number			Soil pit number, where the soil sample was collected.		
Pit_Sample_ID			Samples were collected adjacent together, from each coarse depth of soil layer		
Min/Max_Depth		cm	Interval of sampling		
Horizon			Soil Horizon		
Field_Wet_Mass	M_w	g	Weight of the wet soil samples in the field		
Dry_Mass	M_d	g	Oven Dried weight of the soil samples after 48 hours drying at 65 C		
Moisture Mass	M_m	g	Difference of Field_Wet_Mass and Dry_Mass	$M_m = M_w - M_d$	
Sample_Volume	V	cm^3	Volume of the sampling container		
Sample_Volumetric_Water_Content	θ	cm^3/cm^3	Volumetric Water content, of the soil sample	$\theta = \frac{M_m * 1\ g/cm^3}{V}$	
Field_Bulk_Density	ρ_b	g/cm^3	Bulk density of the soil sample	$\rho_b = \frac{M_d}{V}$	
Porosity	ϕ	cm^3/cm^3	Porosity of the soil sample	$\phi = \frac{M_S}{V}$	M_S Saturated Soil Weight
Saturation water fraction	S_w		Showing the fraction of saturation of the sample	$S_w = \frac{\theta}{\phi}$	
Root_Biomass_Fractions	RB	g/g %	Fraction of the sample with dimension > 2mm over the entire dry sample	$RB = \frac{M_{RB}}{M_d}$	M_{RB} Weight of sample > 2mm
Fiber_Content_Fraction	FB	g/g %	Fraction of the sample with 0.15mm<dimension <2 mm over the entire dry sample	$FB = \frac{M_{FB}}{M_d}$	M_{FB} 0.15mm< Weight of sample <2mm
Soil _Fraction		g/g %	Fraction of the sample with 0.15mm>dimension over the entire dry sample	$\frac{M_{Soil}}{M_d}$	M_{Soil} 0.15mm> Weight of sample
Soil_Organic_Matter	SOM	g/g %	Soil organic matter content, Loss on ignition over the samples <2mm	$SOM = \frac{M_{OM}}{M_{d<2mm}}$	M_{OM} Weight of organic matter $M_{d<2mm}$ Weight of soil passing through a 2mm sieve
Gravel fraction	GF	g/g %	Gravel fraction (>2mm)	$GF = \frac{M_G}{M_d}$	M_G Weight of Gravel and pebbles
Organic_Matter	OM	g/g %	Total organic matter content	$OM = RB + SOM \times (100 - RB - GF)$	
Sand		g/g %	Sand fraction, analyzed through hydrometer method		Texture analysis over soils with dimension less than <2mm, the
Silt		g/g %	Silt fraction, analyzed through hydrometer method		

Clay		g/g %	Clay fraction, analyzed through hydrometer method		organic matter hasn't been removed
Type of Soil			Type of mineral soil according to soil classification		

Soil Dielectric Profile Measurement Descriptions with Equations and Notes

Column Name	Acronyms	Units	Description	Calibration Equation	Note
Sampling_Depth		cm	Sampling depth		
ADC_Count			METER Procheck data logger, gives the adc count to measure the permittivity [1], this sometimes refer to as Raw ADC count as well		TEROS 12 [2]sensor has been used for measuring dielectic permittivity at 70 MHz
Electrical Conductivity	σ	mS/cm	TEROS 12 sensor has been used, and by using Procheck we measured Electrical Conductivity		
Temperature		℃	TEROS 12 sensor has been used for measuring temperature		
Permittivity_70 MHz	${\epsilon_r}'$		We used equation 7 from reference [2] to transfer Raw ADC count to dielectric permittivity.	${\epsilon_r}' = (2.887 \times 10^{-9} \times ADC_{Count}^3 - 2.080 \times 10^{-5} \times ADC_{Count}^2 + 5.276 \times 10^{-2} \times ADC - 43.39)$	
Loss_70MHz	${\epsilon_r}''$		Effective loss factor at 70MHz	$\epsilon_r'' = \frac{\sigma}{2\pi f \epsilon_0}$	$f = 70MHz$ $\epsilon_0 = 8.852 \times 10^{12}$

References:
[1] https://www.metergroup.com/environment/articles/buy-browse-meter-legacy-handheld-devices/
[2] http://publications.metergroup.com/Manuals/20587_TEROS11-12_Manual_Web.pdf