

Preliminary evaluation of the soil moisture in Taiwan

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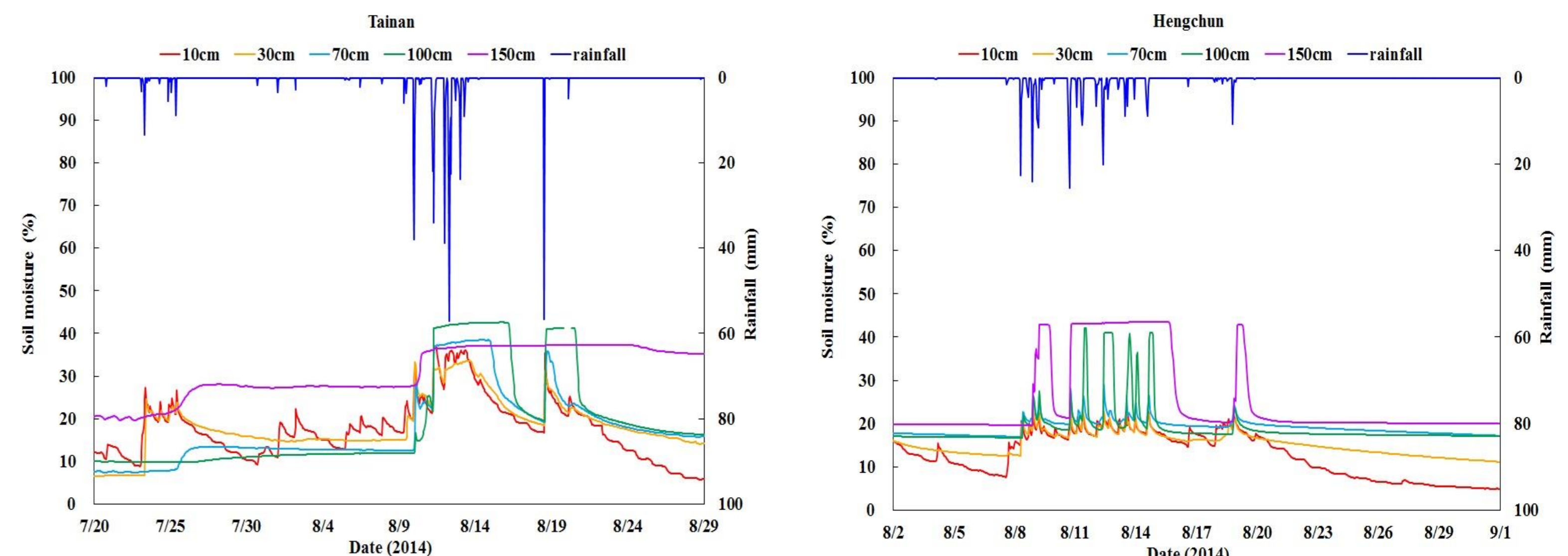
Introduction

Cooperating with CWB/TW and NSC/TW, the soil moisture observed stations in Taiwan were established. Various land-use types are involved in the stations, including urban, grassland, mountain forest and rice paddy. In this study, we have used FDR method to observe soil moisture underground 10, 30, 70, 100 and 150 cm, and in situ measurement from June, 2013 till now. The range of soil moisture is from 10~50%, soil texture is also investigated.

Site & Methodology

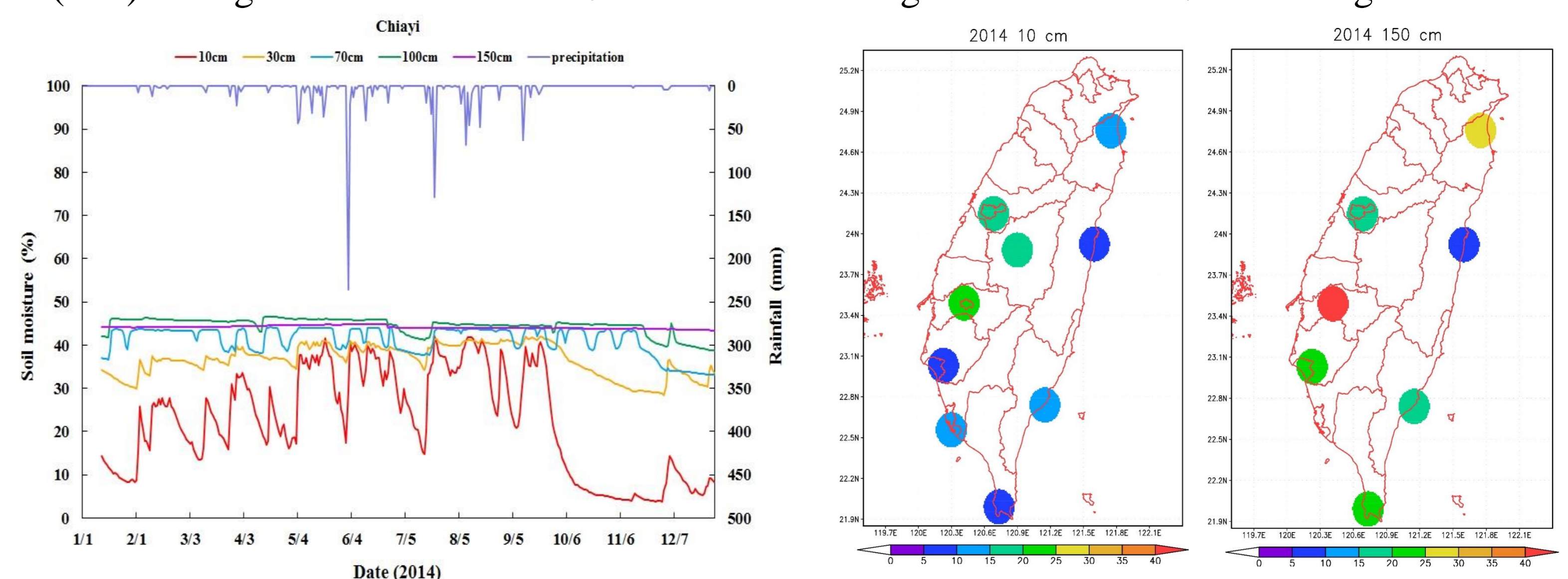


Result



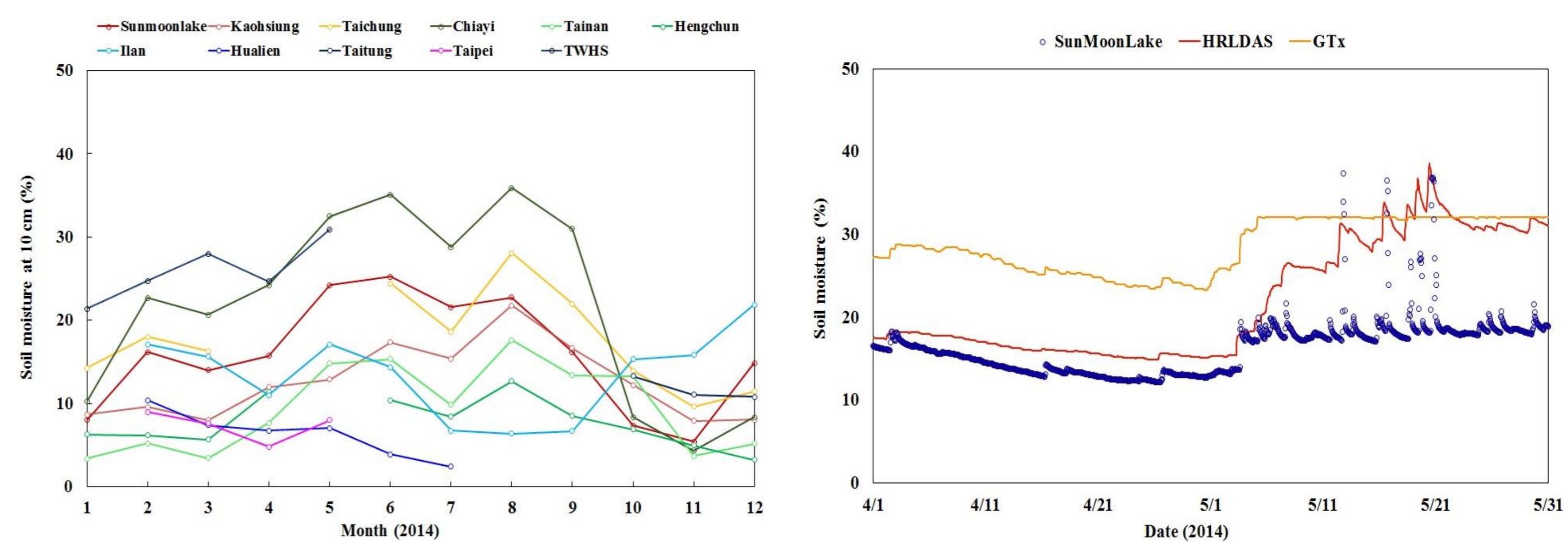
a. Observed soil moisture (%) and rainfall (mm) during 2014/7/20~2014/8/29 in Tainan

b. Observed soil moisture (%) and rainfall (mm) during 2014/8/2~2014/9/1 in Hengchun



c. Observed soil moisture (%) and rainfall (mm) in Chiayi during 2014/1/1~2014/12/31

d. Spatial distribution of observed soil moisture (%) at 10 and 50 cm during 2014/1/1~2014/12/31



e. Observed soil moisture (%) at 10 cm in 2014

f. Observed and simulated soil moisture (%) from GTX and HRLDAS in SunMoonLake

Conclusion

This study focus on the behavior of surface soil moisture after a rainfall event. Result shows a positive correlation between the soil moisture and precipitation. After a rain fall event, the short-term and long-term variation of soil moisture decreased with soil depth which followed by gravity and transpiration, respectively. In addition, deeper soil was less affected by rainfall. Sandy loam soil in the Tainan and Hengchun stations make the soil water easy to penetrate and made soil moisture keep in a stable status (8~15%) during a year in the surface soil. Temporal precipitation patterns in Taiwan concentrated on May to September caused from plum rains and typhoon. Therefore, significant seasonal variations in Taichung, Sun Moon Lake and Chiayi station where the lower soil moisture had in winter. On the other hand, spatial characteristic of surface soil moisture reflect in the high-altitude stations; Sun Moon Lake and Mt. Peitungyen with higher soil moisture (25~30%) due to mountains are frequently covered with mist and rain. In addition, the soil moisture is also available derived from HRLDAS and GLDAS. Compared with our measurements, both can catch the spatial distributions on surface soil, but overestimated in deep soil (20~30% soil moisture) in HRLDAS from April to May, 2014. Furthermore, we will examine the accuracy of model results after the observed soil moisture data applied to meteorological models.

Site	Above-sea level (m)	Soil moisture depth				
		0~30 cm	30~60 cm	60~90 cm	90~120 cm	120~150 cm
Instrument Center	6.1	Clay loam	-	Clay loam	-	Clay
Hsinchu	26.9	Silt clay loam*				
Taichung	84	Silt	Silt	Silt	Silt clay loam	Clay loam
Sun Moon Lake	1014	Silt clay loam	Silt clay loam	Silt clay loam	-	-
Chiayi	26.9	Clay loam	Clay	Clay loam	Clay	Clay
Alishan	2414	Silt	Silt clay loam	Silt clay loam	-	-
Tainan	8.1	Silt loam	Silt loam	Silt	Silt	Silt
Kaohsiung	2.3	Silt clay loam	Silt loam	Clay	-	-
Hengchun	22.2	Silt	Silt	Silt clay loam	-	-
Ilan	7.4	Silt loam	-	Silt loam	-	Silt
Haulian	16.1	Sand	-	Sand	-	Sand
Taitung	9.0	Silt	-	Silt loam	-	Silt loam
Peitungyen Mountain	2087	Clay	Clay	-	-	-