

Study on dew characteristics in Loess Plateau, China

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1. INTRODUCTION

In fact, in arid environment such as desert, dew plays an important role to some vegetation and ecosystem[1]. Dew can help the vegetation restore from excessive water loss state[2]. In addition, dew is an important water source for some microorganism[3], insects and small animals. In particular, the distribution of dew may influence on remotely sensed measurements[4] and remote sensing parameters such as albedo[5-6]. It also affects bright temperature and the backward reflection at microwave band[7]. Therefore, remote sensing data processing is closely related to the dew variation and it is helpful to understand variation characteristics of dew to processing remote sensing data

This work aims to know dew variation relationship at different height and to demonstrate that there is

a maximum condensed height in surface layer.

2. FIELD EXPERIMENT AND DATA PROCESSING

2.1 Site Description

The observation data was at Qingyang in Loess Plateau of China from Oct 11 to Oct 27, 2010. Qingyang(QY) observation station (35°39'N, 107°50'E; altitude of 1280 m) is located at the south-east of city and about 25 kilometres distance. The mean annual precipitation is 485 mm. The underlying surface is farmland.

2.2 Materials and methods

Dew was collected by weighing method[8]. The formula to calculate dew amount is as follows:

$$P_{dew} = 10m / \rho \pi r^2 \quad (1)$$

Where, P_{dew} is dew, m is mass variation of soil sample, r is the radius of box, ρ is the water density ($\text{g}\cdot\text{cm}^{-3}$)

Dew was observed at the

different height which is on 0, 25, 50 and 100cm above the ground, respectively. Five rainfall events happened including peak of 10.1mm on Oct 25 during the period of time.

3.RESULTS AND DISCUSSION

It is obvious different dew amount in different layer(Fig.1). Dewfall was produced at 0cm and 50cm on Oct. 12, but no dewfall at 25cm and 100cm. Overall, the maximal dew amount is at 50cm height. In the layer, there is 1.66mm at the observation period all told and 1.16mm at 0cm. The difference is almost half of total dew amount at 0cm. The difference is almost half of total dew amount at 0cm. Dew

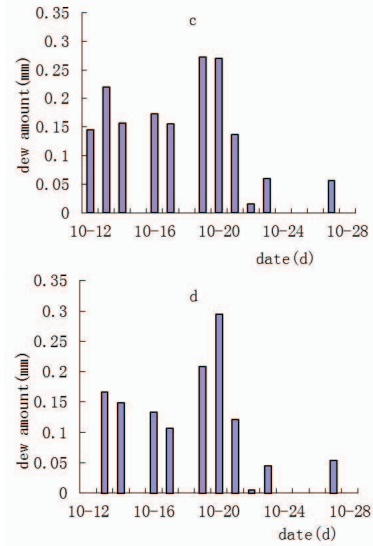
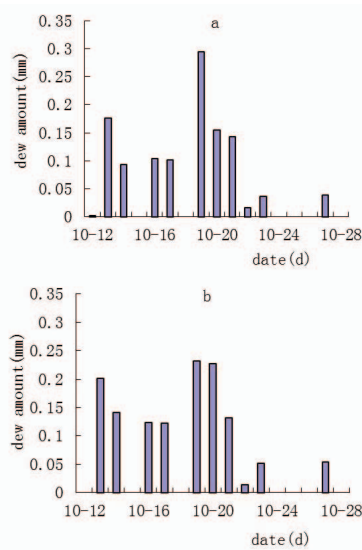


Figure 1. Variation of average daily dew amount with different height at QY

amounts at 25cm and 100cm are 1.3mm and 1.28mm, respectively. Kabela et al.[7] noted that light dew events happened at the top of corn leaf, moderate and heavy dew events appear at the bottom of corn leaf in SMEX05. They didn't measured dew at the different height.

As we can see that it is obviously different at different height. It also suggest that maybe it is overestimated the dew amount by eddy covariance apparatus. Strictly speaking, only as the flat and homogenous underlying surface, the vertical distribution of water vapor is also homogenous. But in fact, hardly such

underlying surface exist. It is found in “HEIFE”(the Heihe river basin Field Experiment)that water vapor flux in surface layer over desert is not constant fluxes. There is a “zero flux layer” of water vapor flux in the surface layer. They also noted that water vapor flux and latent heat flux at a fixed height cannot completely equal to that on the surface[9]. Recent results[10]show that water vapor flux measured by eddy covariance apparatus at the height of 2.5m overestimated evapotranspiration on the surface. So it should exist a maximal condensed height.

From above, maybe it is overestimated evaporation or condensation by eddy covariance method because height of sensor often exceed 2m above surface. Recent results[10] also show that water vapor flux measured by eddy covariance apparatus at the height of 2.5m overestimated evaporation on the surface.

4.CONCLUSION

Dew amount at different height is different significantly. The maximum condensation height at QY is at the height of 50cm. Surface layer is the bottom of land-air exchange where has

uncertain turbulence, wind speed, air temperature and water vapor and resulting in difference condensation value.

This article although analysis different height dew characteristics in different sites. But it can not reveal seasonal variation of dew due to limited data. Besides, observation data is only from 4 height that we can not obtain accuracy profile in surface layer. So the maximum condensing height at 50cm is only a reference value and it needs to research how varies in different regions in the future.

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