The Cd pollution and possible source in soil and rice grains around Zhuzhou, Hunan

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The soil around Zhuzhou, Hunan was found heavily polluted by heavy metals, especial Cd from 1:250,000 multi-target soil survey. 75km^2 detailed paddy soil and rice grains surveys at 4 samples/km^2 were carried out to follow up the pollution and identify possible source of the metals in southern Zhuzhou. Results showed that the Cd in soil near city is higher than 1000ppb and highest 21712.7ppb, which might came mostly from the previous Zhuzhou smelting plant and the Cd in over 95% rice grains samples exceeds 200ppb with highest 3306.35ppb,the food safety standard. However the Cd in paddy soil do not correlated the Cd in rice grains even though the sample sites are the same. As a whole most of Cd anomalies in rice grains locate in the north area near city but the strongest anomaly are concentrated around a new Metal Material Factory. $\delta^{114/110}$Cd and$\delta^{12/110}$Cd were analysed in dust near old Zhuzhou smelting plant, paddy soil and rice grains to trace the Cd sources. The $\delta^{114/110}$Cd and$\delta^{12/110}$Cd in the dust near Zhuzhou smelting plant range from -0.36 to -0.21‰ and -0.79 to -0.52‰ respectively, which came from sulfides including sphalerite and galena. The $\delta^{114/110}$Cd and$\delta^{12/110}$Cd in contaminated soil vary greatly from -0.54 to +0.32‰ and -0.26 to +0.13‰, which shows multi-sources including dust from smelting plant and human activity. The $\delta^{114/110}$Cd (-0.22 to +0.16‰) and$\delta^{12/110}$Cd (-0.07 to +0.14‰) in rice grains from contaminated area is different from that($\delta^{114/110}$Cd -0.26～-0.22‰ and $\delta^{112/110}$Cd -0.15～-0.11‰) in background area. It can be concluded that Cd in rice grains mostly came from old Zhuzhou smelting plant and new Metal Material Factory.