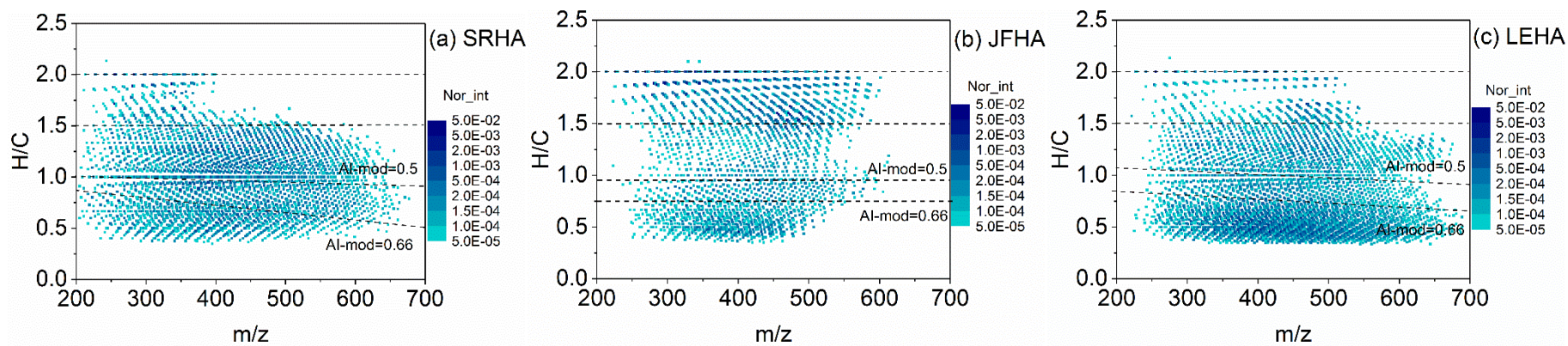
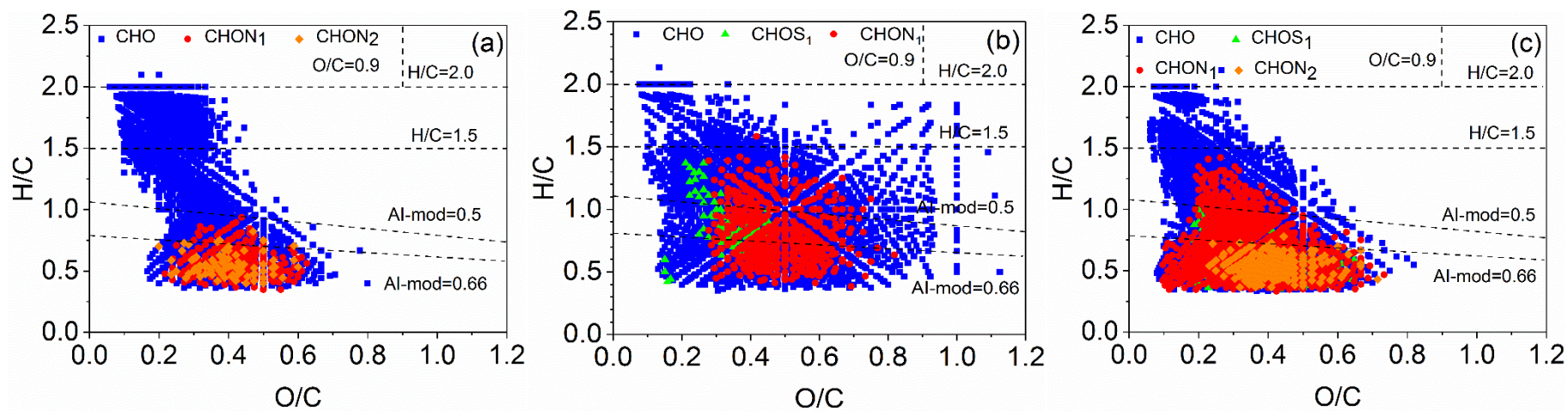


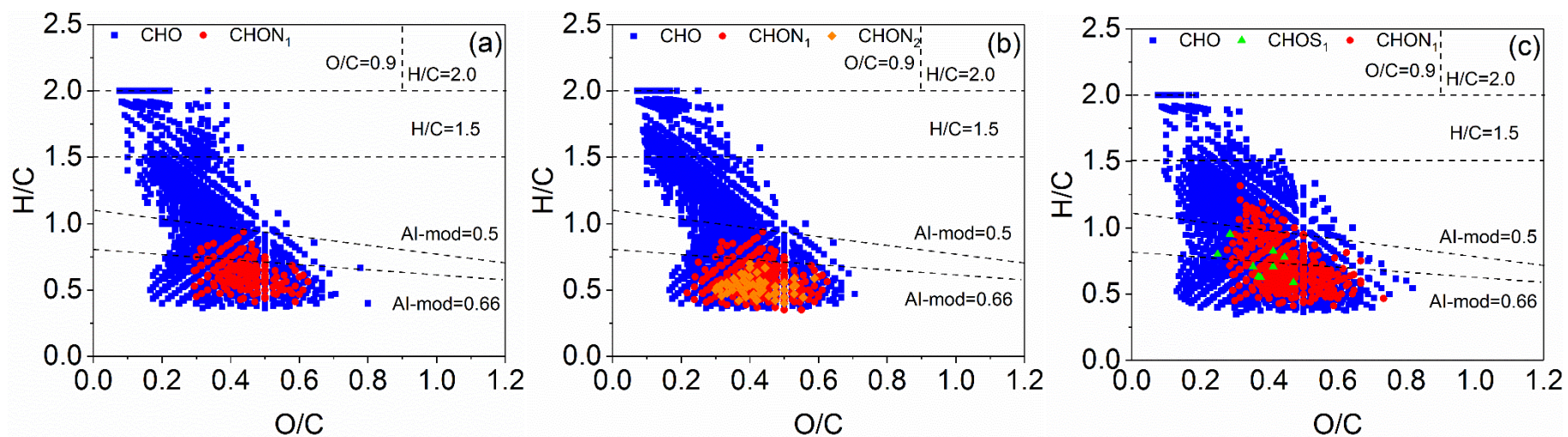
**Figure S1.** Respective ESI FT-ICR mass spectra from (a) humic acids from Jiufeng forest soil, (b) humic acids from Suwannee River, (c) humic acids from leonardite.



**Figure S2.** Respective H/C-m/z diagrams from (a) humic acids from Jiufeng forest soil, (b) humic acids from Suwannee River, (c) humic acids from leonardite. Nor\_int is the normalization of the intensity of each molecule.



**Figure S3.** Van Krevelen diagrams from the mass spectra of (a) humic acids from Jiufeng forest soil, (b) humic acids from Suwannee River, (c) humic acids from leonardite. Formulas include CHO (blue), CHOS<sub>1</sub> (green), CHON<sub>1</sub> (red), and CHON<sub>2</sub> (orange).



**Figure S4.** Van Krevelen diagrams of molecular formulas (a) common among in humic acids from Jiufeng forest soil and Suwannee River; (b) common among in humic acids from Jiufeng forest soil and Leonardite; (c) common among in humic acids from Suwannee River and Leonardite. Formulas include CHO (blue), CHOS<sub>1</sub> (green), CHON<sub>1</sub> (red), and CHON<sub>2</sub> (orange).