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Multifractal fractional random walks and some results concerning the asymptotic behaviour of the empirical structure function.

Based on a recent construction of a general multifractal random measure we define a fractional multifractal random walk process based on a conditional gaussian characterization. We then study the asymptotic behavior of even powers of the increments of this process. As a corollary we discuss the properties of a moment based estimator of the scaling function. Our results provide a theoretical basis for both the linearization effect and the slow convergence of moment estimators reported in applications.