Supplementary information for the paper entitled "Long range correlations in the electric signals that precede rupture: Further investigations".

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The results of the analysis for *all* the signals mentioned in Fig.1 of the main text are presented below.

I. HURST ANALYSIS AND DFA FOR THE ORIGINAL TIME-SERIES

In Figs.2 and 4 of the main text the results of Hurst analysis and DFA are depicted respectively. These refer to the original time series (in normalized units) of the SES activities and four (out of nine) "artificial" noises mentioned in Fig.1 of the main text. The relevant results for *all* the signals of Fig.1 of the main text are now given in Figs.1 and 2 for the Hurst analysis and DFA, respectively. In both figures, the data points for each-time series are vertically displaced after subsequent multiplication by a factor of 2, starting from N9.

II. HURST ANALYSIS FOR THE SERIES OF THE DURATIONS OF THE TWO STATES

In Fig.3 of the main text, typical examples(one SES activity and one "artificial" noise) were presented. Here, the relevant results for the series of the high- and low-level states' durations for *all* the signals mentioned in Fig.1 of the main text are depicted in Figs. 3 and 4. More precisely, the results for the SES activities are shown in Fig.3, while those of the "artificial" noises in Fig.4. The data points for each time-series are vertically displaced after subsequent multiplication by a factor of 2, starting from U, or N9, respectively.

III. RESULTS OF THE DFA FOR THE SERIES OF THE DURATIONS OF THE TWO STATES

The analysis for the series of the high- and low-level states' durations was made by considering (see Appendix B) both the E-approximation as well as the improvement of Eq.(5) of the main text for $q = 2$. Figure 5 of the main text presents typical examples(one SES activity and one "artificial" noise). Here, the results for *all* the signals mentioned in Fig.1 of the main text are depicted in Figs.5 and 6 for the SES activities and "artificial noises", respectively. For the sake of clarity, the data points for each time-series are vertically displaced after subsequent multiplication by a factor of 2 as follows: a) in Fig.5, starting from U. b) in Fig.6(a) starting from N9 (N5 is not multiplied). For the same purpose, in Fig.6(b) N4 and N9 are not multiplied, N5 and N3 are multiplied by a factor of 2, while N2 and N1 are multiplied by 4 and 8 respectively.

IV. RESULTS OF THE MULTIFRACTAL DFA

Typical examples of the analysis of the original time-series for both the SES activities and "artificial" noises are depicted in Fig.6 of the main text. Here, the results for *all* the signals mentioned in Fig.1 of the main text are depicted in Fig.7 (the improvement of Eq.(5) of the main text was also considered). The $q-$dependence of the asymptotic scaling exponent $h(q)$ is determined by fits to the log-log plots of $F_q'(l)$ vs l at the regimes where the fits are straight lines for all q. In view of the fact that a single straight line does not describe satisfactorily the experimental data in Fig.4 of the main text, the corresponding regimes were selected K1: $30 \leq l \leq 3000$; K2: $30 \leq l \leq 1050$; A: $30 \leq l \leq 1125$; U: $30 \leq l \leq 440$; N1: $230 \leq l \leq 3300$; N2: $230 \leq l \leq 12000$; N3: $230 \leq l \leq 3800$; N4: $230 \leq l \leq 3200$; N5: $230 \leq l \leq 2030$; N6: $100 \leq l \leq 325$; N7: $30 \leq l \leq 400$; N8: $100 \leq l \leq 430$; and N9: $100 \leq l \leq 670$. An inspection

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of Fig. 7 shows that no obvious common characteristic can be recognized to allow any systematic distinction between SES activities and "artificial" noises.

We now turn to the study of the series of the high- and low-level states' durations alone. The results for *all* the signals mentioned in Fig.1 of the main text are depicted in Fig.8, upon considering both the E-approximation and the improvement of Eq.(5) of the main text(cf. only some typical examples were presented in Fig.7 of the main text). Note that for the noises N6, N7 and N8, no reliable MF-DFA results could be obtained due to the small (< 25) sample size. An inspection of Fig.8 reveals the following common feature in the time-series of the high-level states (i.e., when MF-DFA is, in reality, applied to the "natural" time domain), the $h(q)$ curves for the SES activities, Fig. 8(a), lie systematically higher(at least in the range $1.5 \leq q \leq 5$) than those in the case of "artificial" noises, Fig. 8(b). For example, for $q = 2$, the $h-$values for the SES activities lie close to unity, while for the "artificial" noises they scatter approximately in the range $0.65 - 0.8$. On the other hand, if we compare the series of the low-level states' durations (although, in general, they have smaller $h-$values than those corresponding to the upper-level states' durations), no general feature can be recognized to discriminate the SES activities from the "artificial" noises.

FIGURE CAPTIONS

FIG. 1. The rescaled range analysis as a function of Δt for the original time-series (in normalized units) for the totality of the signals mentioned in Fig.1 of the main text.A straight line corresponding to the slope $H = 1$ is also plotted, for the sake of convenience.

FIG. 2. The dependence of F_{DFA} on Δt in the conventional DFA of the original time-series in normalized units of the totality of signals mentioned in Fig.1 of the main text. A straight line corresponding to the slope $\alpha = 1$ is also plotted, for the sake of convenience.

FIG. 3. The rescaled range analysis for the series of high- (a) and low-level states' (b) durations for the SES activities. For the sake of convenience, beyond the linear least-squares fits, the lines with slopes 0.9 in (a) and 0.7 in (b) are also plotted.

FIG. 4. The rescaled range analysis for the series of high- (a) and low-level states' (b) durations for the "artificial" noises mentioned in Fig. 1 of the main text. Beyond the linear least-squares fits, the lines with slopes 0.75 in (a) and 0.6 in (b) are also plotted.

FIG. 5. The DFA analysis, by considering both the E-approximation and the improvement of Eq.(5) of the main text, for the series of the high- (a) and low-level states' (b) durations(measured in s, and hence $F_2'(l)$ is also measured in s) for the SES activities. Beyond the linear least-squares fits, the lines with slopes $\alpha = 1$ in (a) and $\alpha = 0.5$ in (b) are also plotted.

FIG. 6. The DFA analysis, by considering both the E-approximation and the improvement of Eq.(5) of the main text, for the series of the high- (a) and low-level states' (b) durations(measured in s, and hence $F_2'(l)$ is also measured in s) for the "artificial" noises mentioned in Fig. 1 of the main text. Beyond the linear least-squares fits, the lines with slope $\alpha = 0.8$ in (a) and $\alpha = 0.5$ in (b) are also plotted.

FIG. 7. The MF-DFA analysis, upon considering the improvement of Eq.(5) of the main text for the original time-series in normalized units of the SES activities (continuous lines) and "artificial" noises (broken curves) mentioned in the main text. In view of the fact that a single straight line does not describe satisfactorily the experimental data in Fig.4 of the main text, the corresponding regimes were selected K1: $30 \leq l \leq 3000$; K2: $30 \leq l \leq 1050$; A: $30 \leq l \leq 1125$; U: $30 \leq l \leq 440$; N1: $230 \leq l \leq 3300$; N2: $230 \leq l \leq 12000$; N3: $230 \leq l \leq 3800$; N4: $230 \leq l \leq 3200$; N5: $230 \leq l \leq 2030$; N6: $100 \leq l \leq 325$; N7: $30 \leq l \leq 400$; N8: $100 \leq l \leq 430$; and N9: $100 \leq l \leq 670$. The corresponding symbols are: K1: plus; K2: crosses; A: asterisks; U: open squares; N1: filled squares; N2: open circles; N3: filled circles; N4: open triangles; N5: filled triangles; N6: open inverse triangles; N7: filled inverse trangles; N8: open diamonds; and N9: filled diamonds.

FIG. 8. The $q-$dependence of the asymptotic scaling exponent $h(q)$ obtained from the MF-DFA analysis, upon considering the E-approximation as well as the improvement of Eq.(5) of the main text, for the series of the high- and low-level states' durations for: (a) the SES activities and (b) "artificial" noises mentioned in Fig. 1 of the main text. The former states (i.e., high-level) correspond to the continuous lines, while the latter to the dotted ones. For (a) the following symbols were used for the high-level states' durations: K1: plus, K2: asterisks, A: filled squares, U: filled circles; for the low-level states' durations: K1: crosses, K2: open squares, A: open circles, U: open triangles. For (b) for the high-level states' durations the symbols are: N1: plus, N2: asterisks, N3: filled squares, N4: filled cirlces, N5: filled triangles, N9: filled inverse triangles; for the low-level states' durations: N1: crosses, N2: open squares, N3: open circles, N4: open triangles, N5: open inverse triangles, N9: open circles.

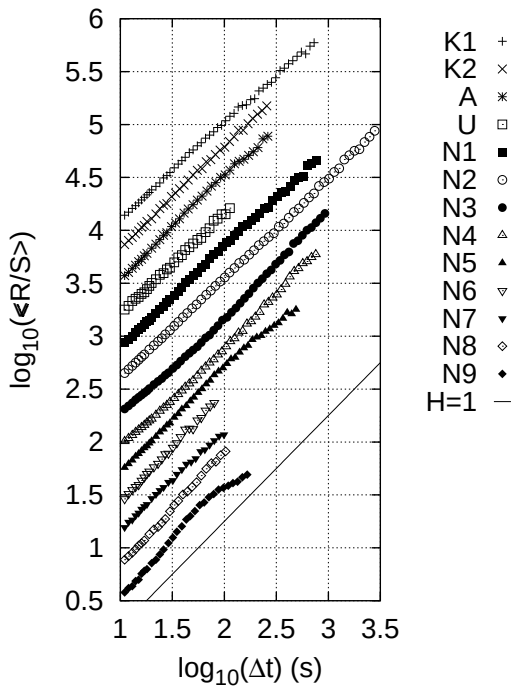

6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
1
1.5
2
2.5
3
3.5
log10(R/S>)
log10(Δt) (s)
K1
K2
A
U
N1
N2
N3
N4
N5
N6
N7
N8
N9
H=1

Figure 1

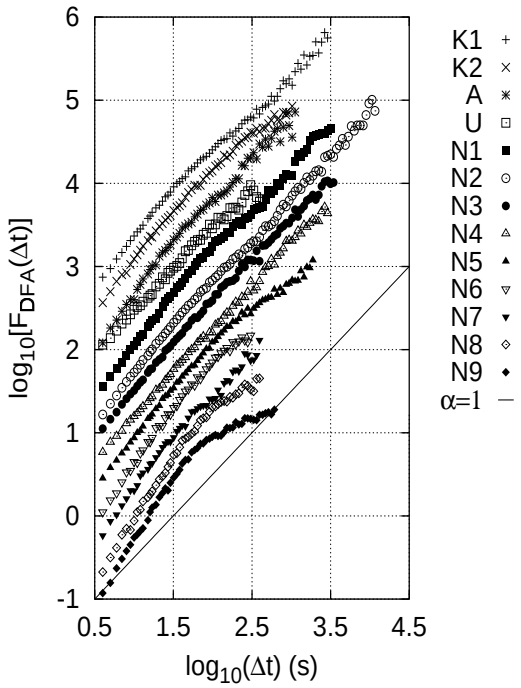
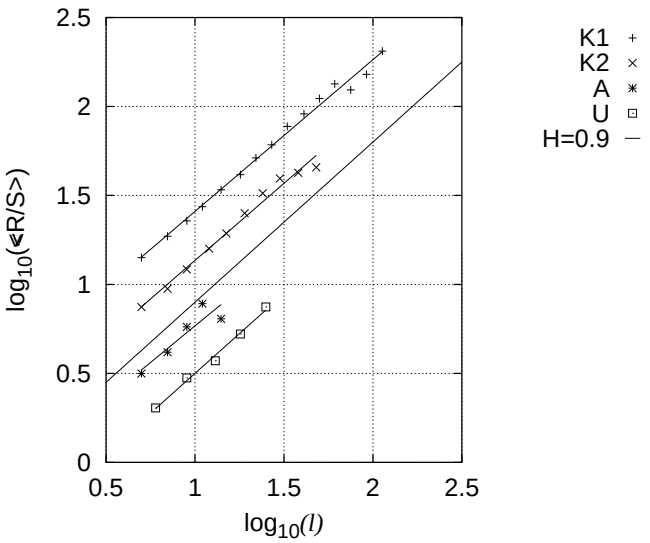

6
5
4
3
2
1
0
-1
0.5
1.5
2.5
3.5
4.5
log10[FDFA(Δt)]
log10(Δt) (s)
K1
K2
A
U
N1
N2
N3
N4
N5
N6
N7
N8
N9
α=1

Figure 2

(a)


2.5
2
1.5
1
0.5
0
0.5
1
1.5
2
2.5
log10(⋖R/S⋗)
log10(l)
K1
K2
A
U
H=0.9

(b)

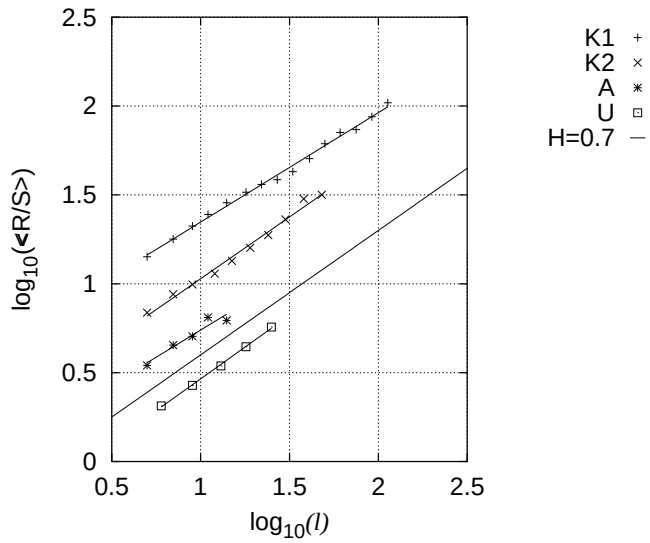
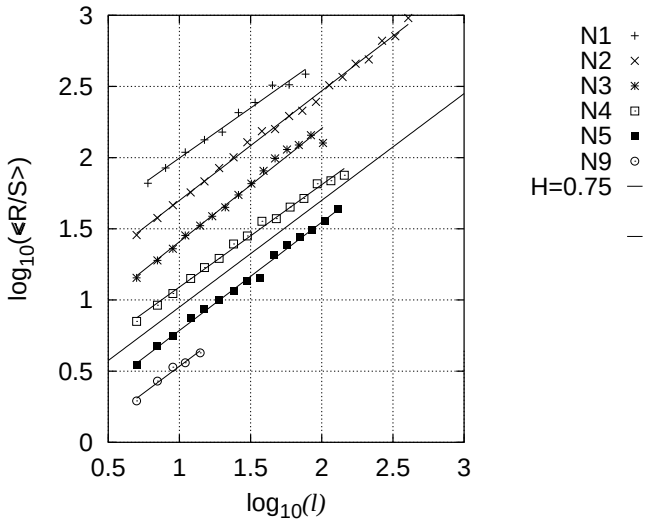

2.5
2
1.5
1
0.5
0
0.5
1
1.5
2
2.5
log10(⋖R/S⋗)
log10(l)
K1
K2
A
U
H=0.7

Figure 3

(a)


3
2.5
2
1.5
1
0.5
0
0.5
1
1.5
2
2.5
3
log10(⋖R/S>)
log10(l)
N1
N2
N3
N4
N5
N9
H=0.75

(b)

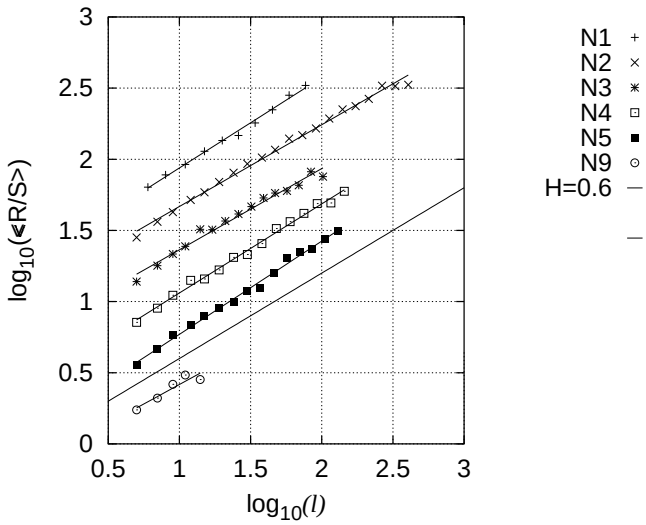

3
2.5
2
1.5
1
0.5
0
0.5
1
1.5
2
2.5
3
log10(⋖R/S>)
log10(l)
N1
N2
N3
N4
N5
N9
H=0.6

Figure 4

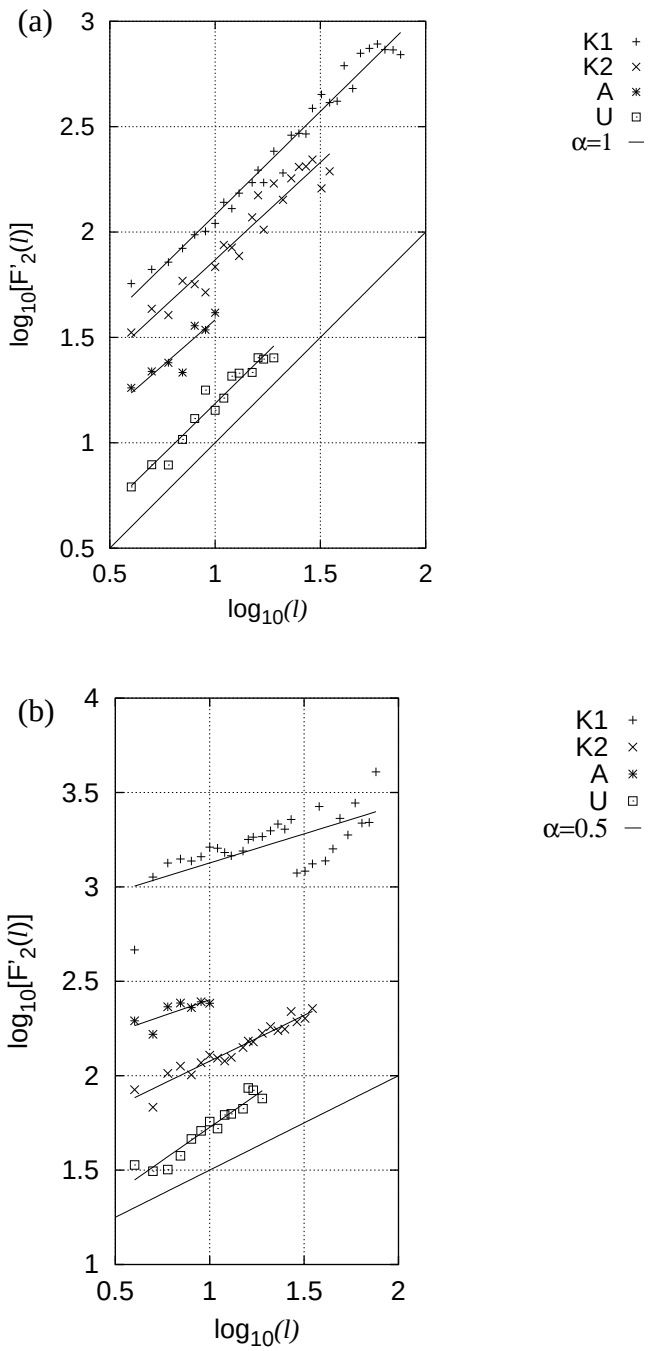
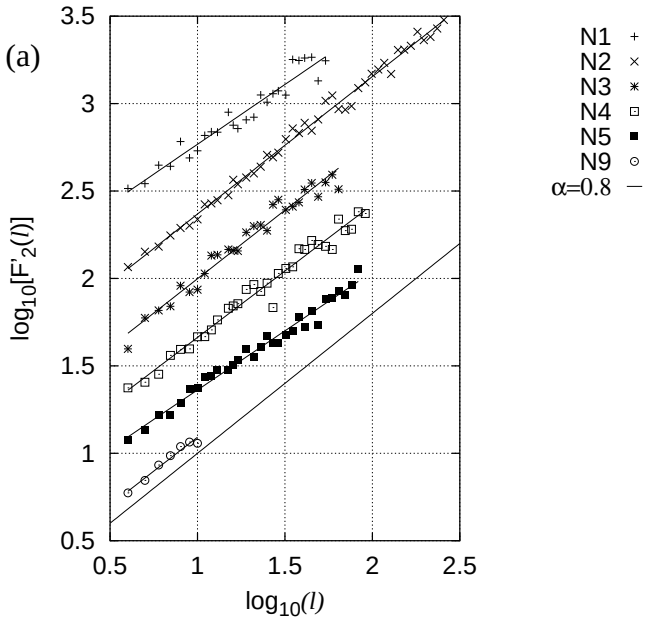

(a)
3
2.5
2
1.5
1
0.5
0.5
1
1.5
2
log10[F'2(l)]
log10(l)
K1
K2
A
U
α=1
(b)
4
3.5
3
2.5
2
1.5
1
0.5
1
1.5
2
log10[F'2(l)]
log10(l)
K1
K2
A
U
α=0.5

Figure 5


(a)
3.5
3
2.5
2
1.5
1
0.5
0.5
1
1.5
2
2.5
log10[F'2(l)]
log10(l)
N1
N2
N3
N4
N5
N9
α=0.8

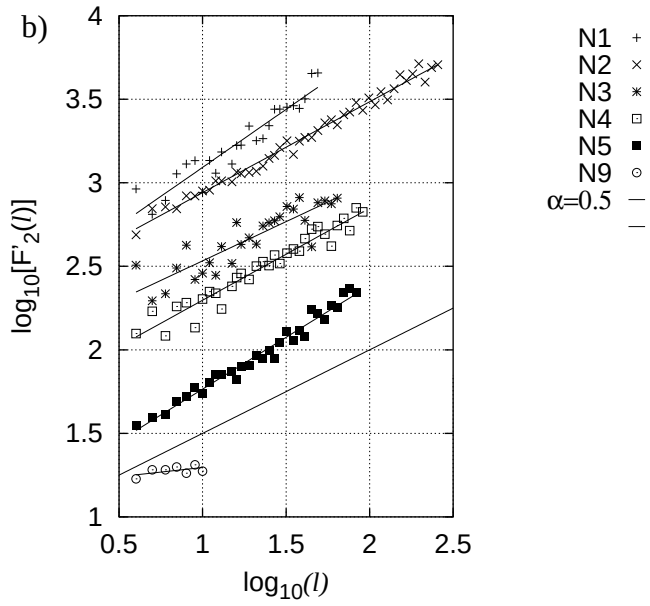

b)
4
3.5
3
2.5
2
1.5
1
0.5
1
1.5
2
2.5
log10[F'2(l)]
log10(l)
N1
N2
N3
N4
N5
N9
α=0.5

Figure 6

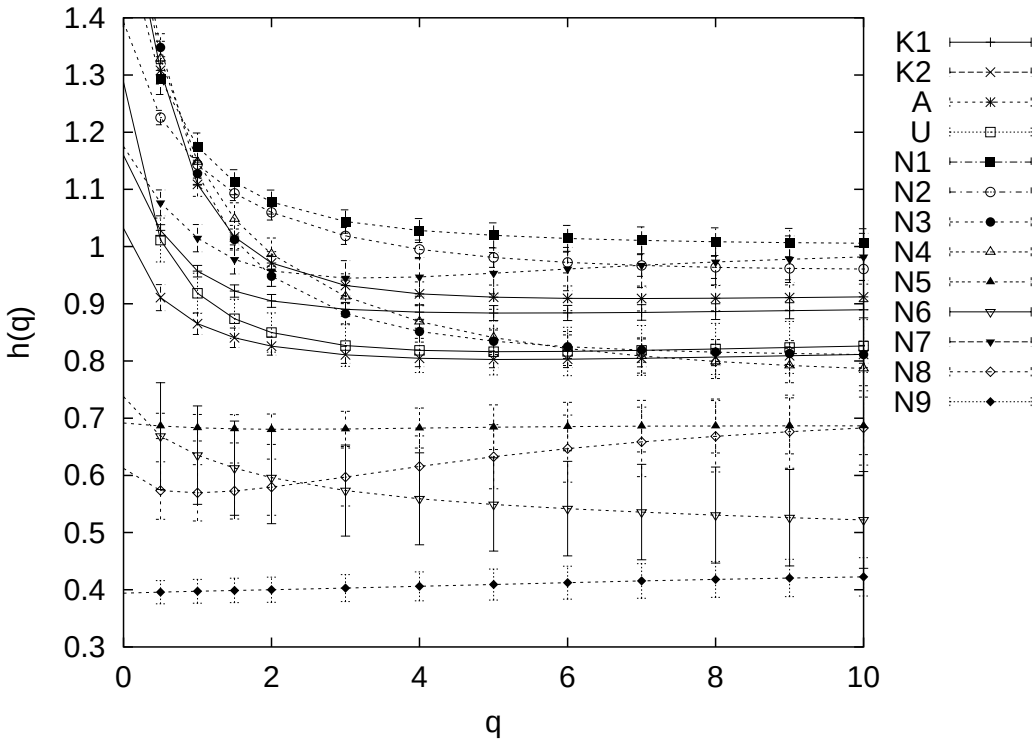

h(q)
q
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0
2
4
6
8
10
K1
K2
A
U
N1
N2
N3
N4
N5
N6
N7
N8
N9

Figure 7

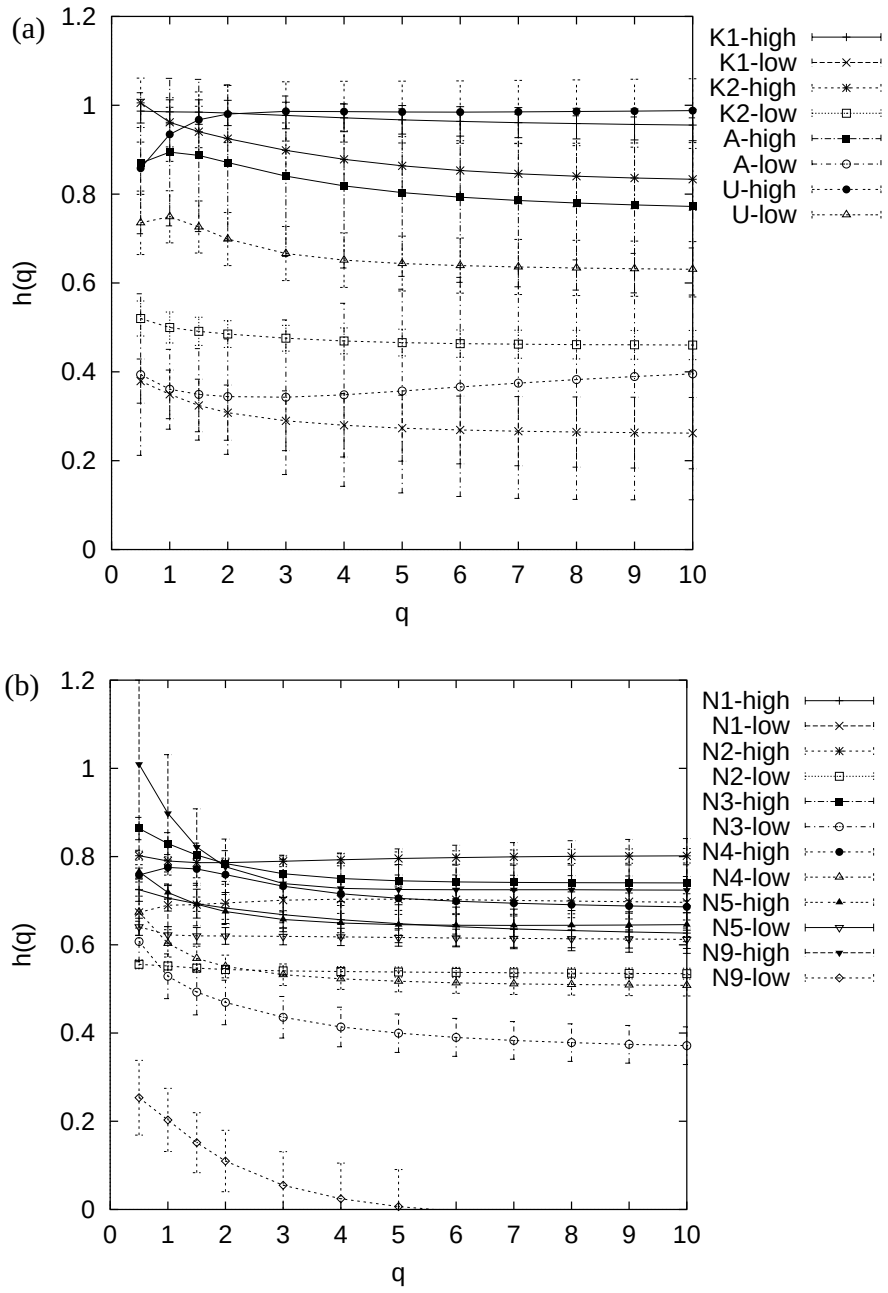

(a)
h(q)
q
K1-high
K1-low
K2-high
K2-low
A-high
A-low
U-high
U-low
(b)
h(q)
q
N1-high
N1-low
N2-high
N2-low
N3-high
N3-low
N4-high
N4-low
N5-high
N5-low
N9-high
N9-low

Figure 8