



Figure 4—supplement 1: The Hog1 response of the fast mutant in ramps of stress indicates derivative action. **A** Ramp data from Fig. 2D showing the consistent overshoot of the wild-type Hog1 by the fast mutant. The sorbitol concentration was calculated from the fluorescent signal of the cy5 dye (black dotted lines and right y-axis) and a linear approximation is shown by the orange lines. Numbers of cells are listed in order of wild-type, *ste11Δ*, *ssk1Δ* for each experiment ($n=201, 195, 192$ for 0.026M/min ; $n=112, 198, 97$ for 0.03M/min ; $n=193, 226, 200$ for 0.035M/min ; $n=175, 164, 144$ for 0.041M/min ; $n=134, 86, 60$ for 0.055M/min ; $n=148, 187, 186$ for 0.071M/min). **B** The cross-correlation between the single-cell trajectories of Hog1 and the time-derivative of the input in the fluctuating ramp of Fig. 4D. The derivative was smoothed using a first order filter and the correlation is plotted as a function of the smoothing parameter α . Cross-correlation for 3 experiments were calculated in total and the average is shown in Fig. 4E.