







FIG. 2. Response to a heater pulse perturbation (0.3 W, for 19 ms), as measured by the probe near the heater (left graphs) and by the probe near the sample (right graphs). The vertical dotted lines indicate the pulse timing. The control algorithm uses information from (a) the near (heater) probe only (gains are  $K = 2.3$ ,  $K_i = 0.5$ , and  $K_d = 0.6$ ); (b) the far (sample) probe only (gains are  $K = 0.4$ ,  $K_i = 0.05$ , and  $K_d = 0.45$ ); and (c) both probes (gains are  $K = 2.5$ ,  $K_i = 0.5$ , and  $K_d = 0.6$ ). The setpoint in all cases was  $T = 40$  C.

$(K + K_i/s + K_d s)$  and our new, split-PID algorithm. The discretization of the derivative is done via  $(1 - z^{-1})$