



**Figure 1** Results for the irradiation experiments and on-orbit event rate predictions (a) SEU cross sections for BRAM and CRAM in different test modes vs. LET (XC7K325T); (b) SEU cross sections for BRAM and CRAM in different test modes vs. LET (XC7VX690T); (c) Total error counts vs. time for standard and hardened DFFs under <sup>12</sup>C and <sup>19</sup>F irradiation; (d) Total error counts vs. time for standard and hardened DFFs under <sup>209</sup>Bi irradiation; (e) Total SEU cross sections for DFF(TMR) test with square wave data pattern; (f) The cross sections for burst error and MBU of DFF1 vs. LET (the functional failures are not included); (g) On-orbit upset rates for BRAM and CRAM in GEO; (h) On-orbit upset rates for standard and hardened DFFs in GEO.