Joint functional convergence of partial sum and maxima processes

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For a strictly stationary sequence of random variables we study functional convergence of the joint partial sum and partial maxima process under joint regular variation with index $\alpha \in (0,2)$ and weak dependence conditions. The convergence takes place in the space of $\mathbb{R}^2$–valued càdlàg functions on $[0,1]$ with the Skorohod weak M_1 topology, and the limiting process consists of an α–stable Lévy process and an extremal process. We also show that the weak M_1 topology in general can not be replaced by the standard M_1 topology.