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A Two-Step Scenario for Both Solar Flares and Magnetospheric Substorms: Short Duration Energy Storage

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We present a common scenario of double magnetic reconnection for both substorms and flares based on previous interplanetary observations and substorm-triggering results. Central to the scenario is that the first magnetic reconnection process is the source of energy loading for possible substorms and flares. The energy placed in the magnetotail or magnetosphere/at the sun lasts for only a short duration of time however. The energy gets dissipates away rapidly (in some less dramatic form). This scenario predicts that if the initial reconnection process is sufficiently rapid, substorms and flares occur in short order. If the energy input is less rapid, there may be lengthy delays for the onset of substorms and flares. If external influences (shocks, etc.) occur during the latter energy buildup, the “trigger” will cause a sudden release of this energy. The model explains reconnection without subsequent substorms and flares. It also addresses the question why some strong triggering events are ineffective.