Dst Storm Predictor

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Background : Members of the Virginia Tech and MIT/Haystack groups have been experimenting with predicting SAPS events with an eye towards triggering joint radar operations. In addition, SuperDARN people involved with RBSP have been discussing ways to predict storms as a way of triggering radar operations in support of RBSP.

Overview : This plotting tool helps to identify recurrences in Dst with respect to Carrington cycle. Larger Dst events are flagged and projected forward through one and two cycles to predict recurrences. In retrospective mode one can determine which Dst events produced echoes. In forecasting mode, one can project forward to predict echo events based on activity over the last two Carrington cycles.

Explanation: We plot the minimum value of Dst each day, one value per day, as a function of date with Carrington cycle indicated by vertical dashed lines. Occurrences of Dst < -50 nt are marked with large red X's and the corresponding date and times (to one hour in UT) are listed at the bottom of each Carrington 'column'. A flagged disturbed day is projected forward through two Carrington cycles to predict disturbed days based on expectation of recurrence; the 1-cycle event is indicated by a green circle and the 2-cycle event by a green square. A horizontal dashed line is drawn from the red X of the initial disturbed day to its 1-cyle and 2-cycle 'echo' days. A potentially successful prediction is indicated by the overlap, within a day, of a projected event and an actual event – this is also indicated by overdrawing a small red X on the circle or square symbol. (The symbols overlap in time but may be widely separated on the Dst scale.) Disturbed days tend to occur in two or three day sequences so that one generally observes a connection between separated groups of large red X's and circles and squares overdrawn with small red X's.
For example, in 2012 the disturbance event of 9/3 – 9/5 (3 days) recurred as a 1-cycle event on 9/30 – 10/1 (2 days). A 2-cycle event is predicted for the current Carrington cycle, on or about 10/28. You can see this prediction most easily by tracing the large negative Dst in Carrington cycle 2128 forward to the green circle labeled 10/28. On the next cycle it will arrive on 11/24 as indicated by the green square.