The vorticity area index (VAI) is a measure of the size, intensity, and number of cyclonic disturbances, existing at any one moment, in the Earth's troposphere. Solar flares which cause PCA or GLE events seem to cause a double effect on the VAI: (1) An increase in VAI at about the time of the solar event, (2) A decrease in VAI some 3-5 days after the solar event, apparently in connection with the geomagnetic storm which typically follows the solar event.

The effects seem to be stronger for particle producing flares than for other flares of equal magnitude. However, when PCA events not having a well defined flare association are examined, the effects are much decreased. This is interpreted to suggest that the particle radiation is not solely responsible for the weather effects observed.

The observed effects are found at all seasons of the year, but are strongest in the equinoctial months. The position of the flare on the sun is relatively unimportant. If anything, there is a tendency for flares near the western limb to be less effective in producing the sun-weather effect. This is in contrast to the non-proton flares, which display a much stronger influence on the weather if the flare is near central meridian.