Note on Revised Geometrical Factors for GOES 13, 14 and 15 EPEAD Electron Channels (April 14, 2010)

Starting with GOES 13, SWPC is using new geometrical factors for processing two of the three Energetic Proton, Electron and Alpha Detectors (EPEAD) electron channels (E1 and E3) and a new energy threshold for one of the electron channels (E1). The processing of the most heavily used channel (E2) remains unchanged. The changes are summarized as follows:

	GOES 8-12 EPS		GOES 13-15 EPEAD	
Channel	Energy (MeV)	Geom. Fact. (cm^2 sr)	Energy (MeV)	Geom. Fact. (cm^2 sr)
E1	>0.6	0.078	>0.8	0.75 (9.6x increase)
E2	>2.0	0.05	>2.0	0.05
E3	>4.0	0.0175	>4.0	0.056 (3.2x increase)

These changes represent reevaluations of the instrument performance, not design changes. There are currently no plans to reprocess the GOES 8-12 electron data.

Background

On GOES 13, 14 and 15, the Energetic Proton, Electron and Alpha Detectors (EPEAD) are essentially the same as the Energetic Particle Sensor (EPS) on GOES 8-12. There are two EPEADs on each satellite, one looking east and one looking west. Of the three electron channels, E1 and E2 are derived from the D3 Dome detector and E3 is derived from the D4 Dome detector. For more information, please see T. G. Onsager et al. (1996), Operational uses of the GOES energetic particle detectors, in GOES-8 and Beyond, Proc. SPIE, Vol. 2812, edited by E. R. Washwell, pp. 281-290, Bellingham, WA.

For operational processing at SWPC, a single geometrical factor is applied to the count rates for each channel regardless of the shape of the electron spectrum. Based in part on recharacterizations of the EPEAD performed for GOES 13, 14 and 15, the instrument contractor recommended effective single geometrical factors and energy thresholds for the three electron channels. SWPC has adopted the recommended changes for E1 and E3. (For E2, the most heavily used electron channel, the recommended geometrical factor was only 10% lower than the old factor; therefore, for consistency, the old factor has been kept in use for GOES 13-15.) The new factors result in lower fluxes for E1 and E3.

The old geometrical factors for E1 and E3 were derived by SWPC, not by the contractor. The difference between the old and new energy thresholds for E1 reflects a gradual “turn-on” of the channel response to electrons. The new

factors do not account for intercalibration between units on the same spacecraft or on different spacecraft.