GOES 16 and 17 Solar X-Ray Sensor (XRS) Status and Updates:

The GOES 16-17 XRS will continue to provide solar X-Ray irradiance measurements in two channels. The XRSA Short Channel covers wavelengths from 0.05 to 0.4 nm and the XRSB Long Channel covers from 0.1 to 0.8 nm. The XRS observations are provided at a one-minute cadence although higher cadence data are available.

Improvements:

The new XRS is more sensitive so the data will show more variability during quiet solar periods. As we introduce these new data, we are at solar minimum where this added sensitivity will be most noticeable. As the solar cycle progresses, the impacts of the improved sensitivity will be less noticeable.

Issues and Changes:

We will not be applying the correction to the new XRS. As a result, the GOES 16-17 XRS data will be about 30% higher than the XRS data from the older GOES (e.g. GOES 14 and 15). For more information on this correction factor, please read the section below.

The new GOES 165-17 XRS are more sensitive to contamination from electrons. There is a new correction algorithm which removes most of the electron contamination. This contamination is only apparent during quiet solar periods when the solar x-ray fluxes are low and the electron fluxes are high. It should be noted that the current parameters within this electron correction algorithm are preliminary and may change.

History and Background on the XRS "Correction Factor":

For decades, the Space Weather Prediction Center has been adjusting the GOES XRS data downward by about 30%. There was a shift in the XRS data that occurred with the launch of GOES 8 in 1994. To maintain continuity with early XRS data, the GOES 8 XRS data (and all subsequent XRS data) were scaled downward by a pair of correction factors to match the GOES 7 and earlier data. The Space Weather Prediction Center is removing these correction factors from the GOES 16 XRS data and all subsequent XRS data from GOES satellites.

The GOES 16-17 XRS were calibrated at the NIST calibration facility and there is confidence in the values provided by the new GOES. These calibrated data confirm that the correction factors make the XRS data less accurate. The actual XRS measurements on GOES 16 agree very well with the uncorrected XRS values from earlier satellites.

Because we are no longer applying the correction factors, the GOES 16 and 17 XRS data will be approximately 30% higher than data from earlier satellites. Any product or model as well as any automated alert programs will alert a little bit earlier and there will be more flares that reach critical levels. The impact will probably not be noticeable for most customers because the x-rays change by several orders of magnitude and a 30% offset is small compared to a change of a factor of 1000 or more.

If you want your alerts to maintain continuity with the past, you must multiply the new GOES 16-17 XRS data by the correction factors below before inputting the data into your model. For some space weather models, such as the D-RAP HF Absorption product, SWPC will be scaling the XRS data before using it to drive the model.

Correction Factors as currently applied to the GOES 15 and earlier data.

$XRSA_{Presented} = 0.85 * GOES15\_XRSA_{Observed}$
$XRSB_{Presented} = 0.70 * GOES15\_XRSB_{Observed}$