

## 16. Additional Introduction

The ATMS consists of a single module, with 22 channels. The nominal beamwidth for each channel is as follows: channels 1- 2 are 5.2 degrees, channels 3-16 are 2.2 degrees, and channels 17-22 are 1.1 degrees. Ninety-six contiguous beam positions are sampled during the Earth view sector. Four beam positions are also sampled in the cold calibration sector (cold space) and four in the hot calibration sector (an internal blackbody target). The integration period for each beam position is 17.66 msec. JPSS ATMS is a cross-track scanner, which has an Earth-viewing sector 105.45° wide with 96 beam positions (or 96 Fields of View, FOVs), plus Warm and Cold sectors for two-point calibration. The scanning geometry is shown below in Figure 16.1.

The ATMS scan period is 8/3 second, with a 2.118 s timing adjustment relative to a spacecraft-provided scan synchronization pulse. This 2.118 sec timing adjustment was first implemented on JPSS2 ATMS. And, beginning with JPSS-2 a -0.917 deg spacecraft yaw mounting offset was included so that the projected 96 ATMS FOVs and the projected 30 CrIS Fields of Regard (FORs) overlap. See Figure 16.2 below. The synchronization maximized the overlap of ATMS & CrIS scans as required by certain applications.

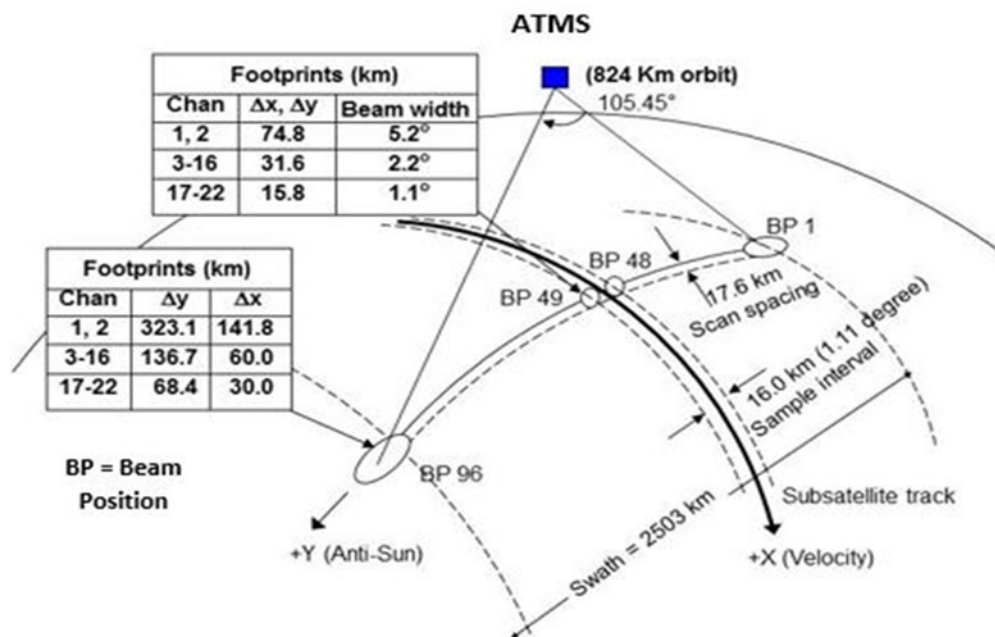
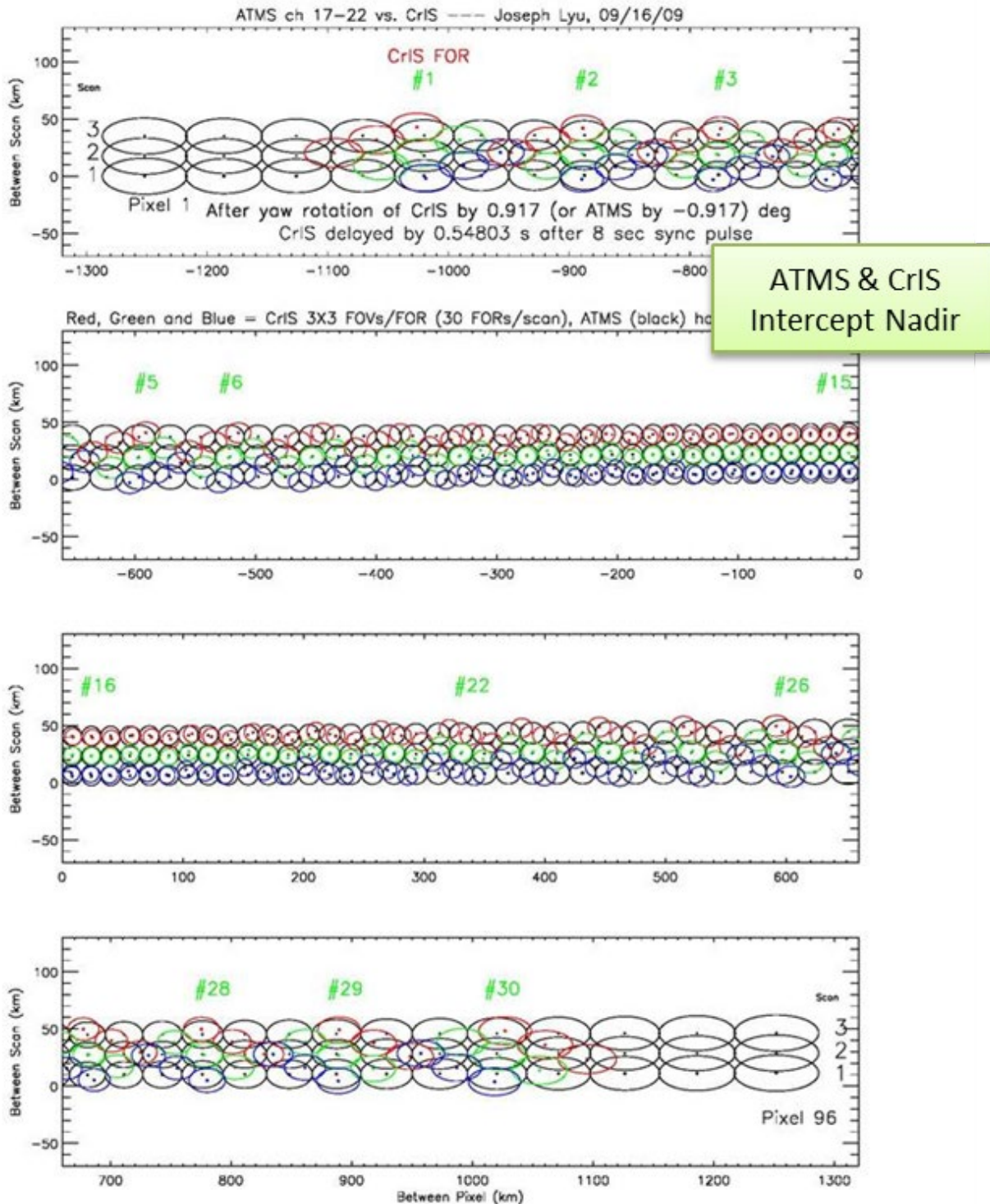


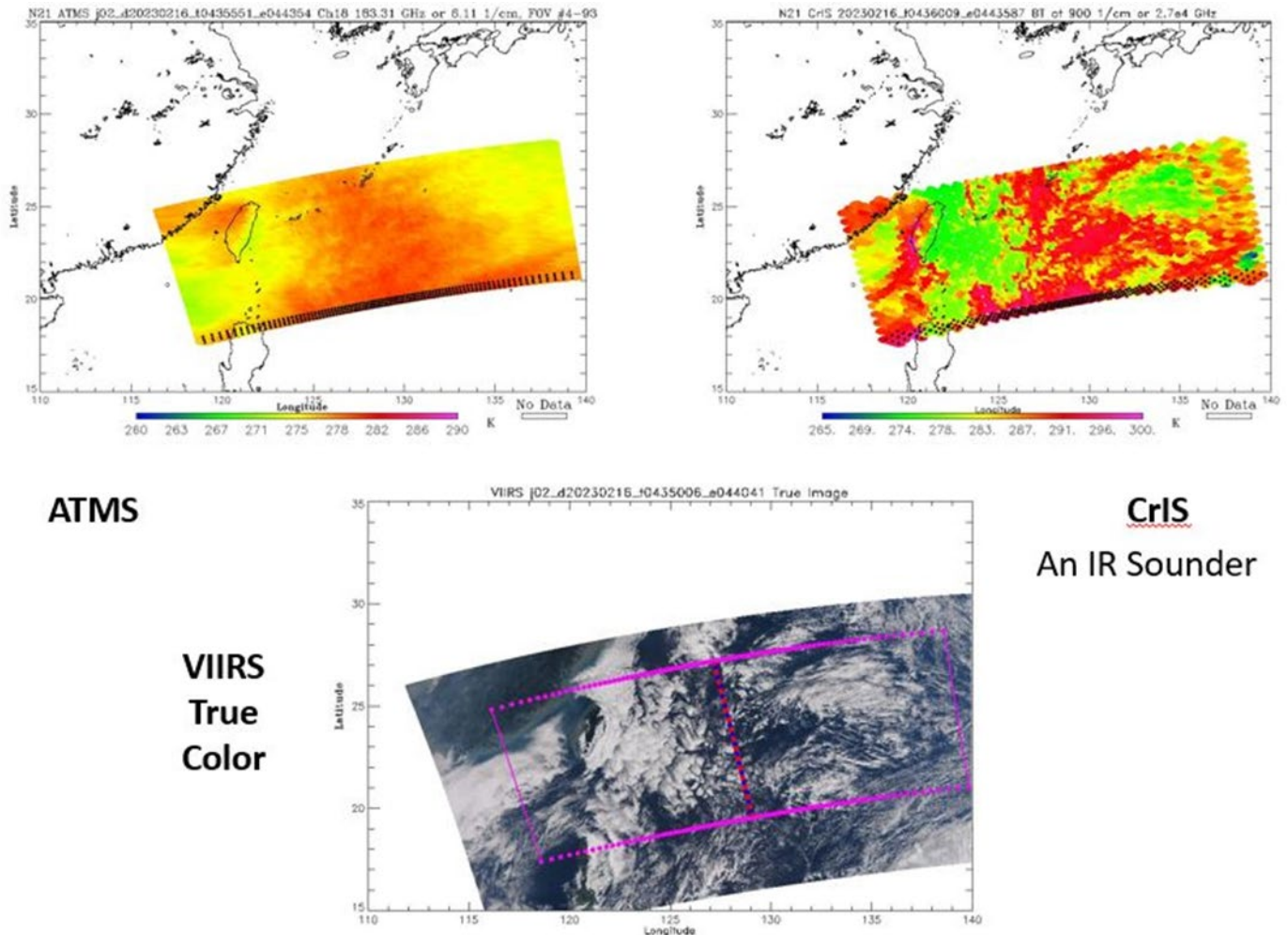
Figure 16.1: JPSS ATMS Scanning Ground swath and footprint geometry



**Figure 16.2 : On-orbit footprint projection of JPSS-2 ATMS and CrIS on the Earth surface**

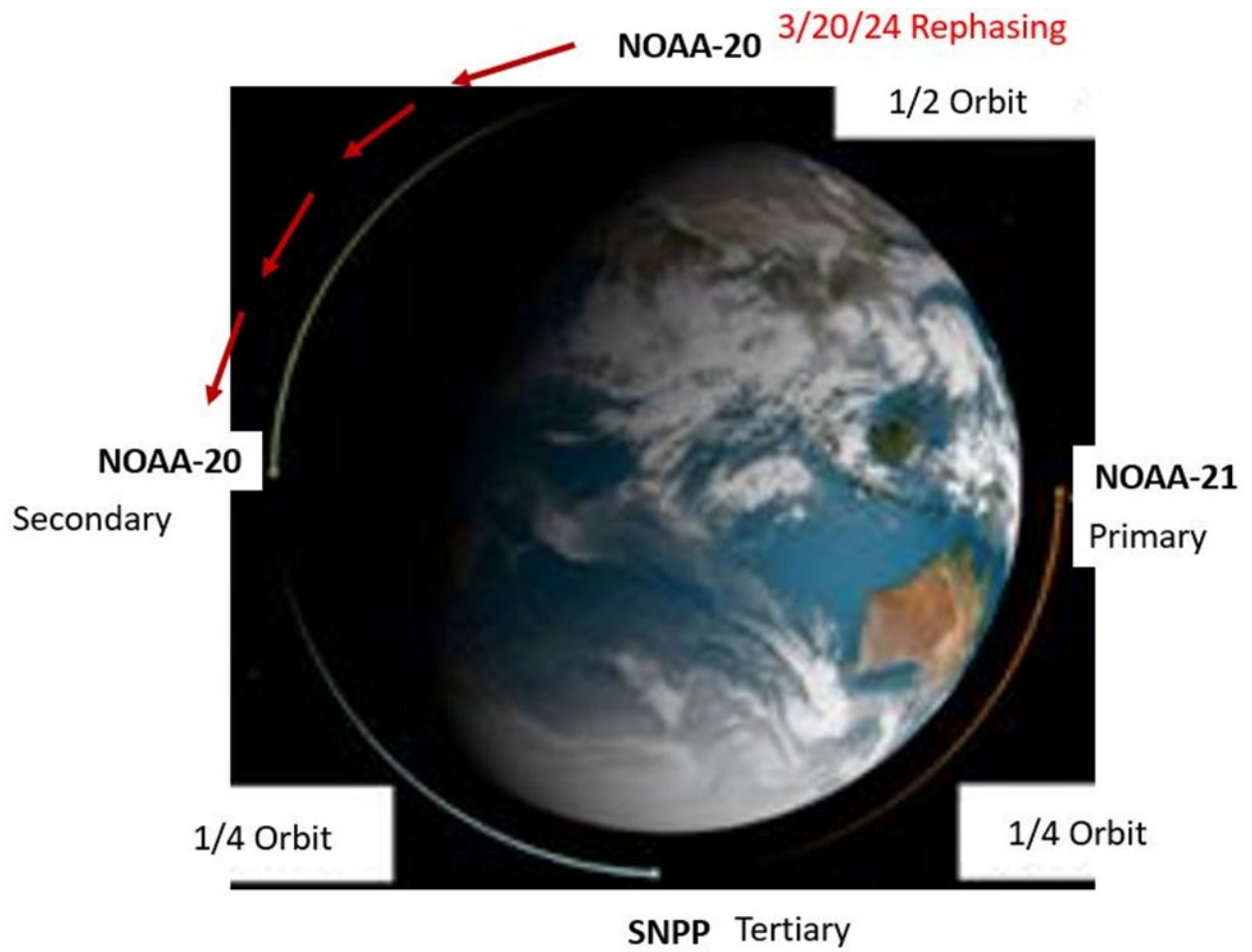
After comparing the images from JPSS-2 ATMS, CrIS, and VIIRS, the Brightness Temperatures of cold clouds from both ATMS & CrIS can be recognized as similar features to those from the true color image of VIIRS, See Figure 16.3. Note that at the bottom of the ATMS & CrIS images,

three ATMS scan locations (96 FOVs) and one CrIS FOR (3x3 FOVs) location are shown, which showed the relatively best alignment between these two sensors. Note also that the images shown in Figure 16.3 are the derived brightness temperature of ATMS channel #18, 183.31 GHz (6.11  $1/cm$ ) FOV # 4 – 93, the infrared derived brightness temperature of CrIS at 900  $1/cm$ , or  $2.7 \times 10^4$  GHz, and the corresponding true color image of VIIRS. Note also that ATMS channel #18 penetrates through the clouds so that ATMS can detect the brightness temperature from the surface of the Earth.



**Figure 16.3: On-orbit footprint projection map of JPSS-2 ATMS, CrIS Brightness Temperature images, and the corresponding VIIRS true color image on the Earth surface**

For the current configuration of 3 on-orbit operational satellites, S-NPP, JPSS-1 (NOAA-20), and JPSS-2 (NOAA-21), we have performed rephasing of NOAA-20 on Mar. 20, 2024, so that its polar orbital location is separated by one half orbit of NOAA-21, see Figure 16.4. Note that S-NPP is planned to be de-commissioned in 2027 or earlier.



**Figure 16.4: Current on-orbit JPSS constellation configuration of NOAA-21, NOAA-20, and SNPP**