The Global WildFire Automated Biomass Burning Algorithm (WF_ABBA) and LBA/GIMPAP

The current Geostationary Operational Environmental Satellite (GOES) series has had the ability to detect and characterize biomass burning since the launch of GOES-8 in 1995. The Global WildFire Automated Biomass Burning Algorithm (WF_ABBA) provides fire detection and fire characteristics (instantaneous fire size and fire temperature, and fire radiative power). The metadata available since the recent Global WF_ABBA update provides users with fire observations as well as an explanation for why fires were not found due to certain conditions. This data set will allow for more in-depth studies of diurnal fire activity and a fire climatology in the Western Hemisphere since 1995. This effort was made possible through funding from the NASA Large Scale Biosphere-Atmosphere Experiment in Amazonia (LBA) and GOES UM Product Assurance Plan (GIMPAP).

WF_ABBA Fire Mask Example – Clouds and Block Out Zones

Process for Creating the Satellite/Cloud Coverage

Corrected Binned Fire Files

Step 1: Create 0.25° X 0.25° latitude/longitude binned mask histogram files. The latitude range is 60° South to 70° North while the longitude range is 30° to 130° West. For each image time the satellite pixels are binned to 0.25° X 0.25° and counts for each mask value code are kept track of in each bin.

Step 2: Create 0.25° X 0.25° latitude/longitude binned satellite coverage corrected fire files for each image time from the binned mask histogram files. Certain mask code values are grouped together to calculate totals for each category (listed below) for each bin. -MV stands for Mask Value:

- **ClearFieldOfViewFOV:** Pixels=MV10+MV11+MV12+MV13+MV14+MV15+MV20+MV21+MV22+MV23+MV24+MV25+MV100
- **CloudyFOVPixels:** MV200+MV205+MV210+MV215+MV220+MV225+MV230+MV240+MV245
- **CloudMaskedPixels:** MV50+MV60
- **ErrantPixels:** MV0+MV120+MV125+MV150+MV170+MV180+MV182+MV185+MV186+MV187+MV188
- **WaterPixels:** MV150+MV151+MV152+MV153
- **SpacePixels:** MV40

**TotalPixels=SUM OF ABOVE 6 TOTALS OF PIXELS**

**Number of Non-Coverage Corrected Fire Pixels for each Fire Category = MV10 for processed fires, MV11 for saturated fires, MV12 for cloudy fires, MV13 for high possibility fires, MV14 for medium possibility fires, and MV15 for low possibility fires**

The Total Number of Satellite Coverage Corrected Fire Pixels for each Fire Category (fire category ranges from 0 to 5; 0 is processed fire, 1 is saturated fire, 2 is cloudy fire, 3 is high possibility fire, 4 is medium possibility fire and 5 is low possibility fire) is calculated as follows for each bin:

- Number of Satellite Coverage Corrected Fire Pixels[fire category] = Number of Total Pixels * (Number of Non-Corrected Fire Pixels[fire category] / Number of Clear FOV Pixels)

The Total Number of Cloud Coverage Corrected Fire Pixels for each Fire Category is calculated as follows for each bin:

- Number of Cloud Coverage Corrected Fire Pixels[fire category] = (Number of Clear FOV Pixels * Number of Cloudy FOV Pixels) / Number of Non-Corrected Fire Pixels[fire category] / Number of Clear FOV Pixels

Future Work

- Expand Trend Analysis/Climatology of Fires to other past, present and future Geostationary Satellites
- Work with user community to develop more useful real-time and climatological fire datasets

Western Hemisphere Diurnal Fire Activity 1995-2012: Description and Initial Fire Trend Analysis of the GOES-East Version 6.5 WF_ABBA Data Archive

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Western Hemisphere Fire Activity (North and South American) - 1995-2012

- GOES-11 (West): SEP 2011
- GOES-13 (East): AUG 2012
- GOES-12 (South America): AUG 2012
- Meteosat-9: AUG 2012
- MTSAT-2: SEP 2012

Annual Composites of WF_ABBA Version 6.5 Binned Satellite Covered Corrected Fires for 2011 and 2012. 2011 was a more active fire year compared to 2012 especially over the Yucatan Peninsula, Cuba, and Northern Florida. There were over 200,000 more North America fire detections in 2011 compared to 2012. However, in South America, 2012 was a slightly more active fire year compared to 2011.

**GOES-East temporally filtered WF_ABBA data was used to generate the satellite/cloud coverage corrected binned fire files which were then used to produce the fire stats below and to make the composites above. Temporal filtering keeps a fire if there was another detection within the previous 12 hours within 0.1° of its location. All fire categories but low possibility are included in the composites. The “low possibility” category is often indicative of false alarms in North America and along cloud edges and high viewing angles at sunrise and sunset, but should be monitored over time. All fire categories are shown in the fire stats below.**

**North America domain:**

- 10° - 70° North
- 45° - 130° West

**South America domain:**

- 10° North - 60° South
- 30° - 90° West

**Number of Pixels in North America (North of 10.0° Latitude) By Year and Category**

**Number of Pixels in South America (South of 10.0° Latitude) By Year and Category**

**WP_ABBA Fire Mask Example – Clouds and Block Out Zones**