

Solar Backscattered Ultraviolet Radiometer (SBUV)  
Operational Ozone Product System Version 8

**System Description Document**  
(Documentation Version 1.0)

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Prepared for:  
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## 1. SYSTEM OVERVIEW

The Solar Backscattered Ultraviolet radiometer (SBUV) instruments are flown in polar orbits to obtain global coverage. There are about 14 orbits per day with 26 degrees of separation at the equator. Each SBUV instrument consists of a nadir-viewing double monochromator of the Ebert-Fastie type, and a cloud cover radiometer (CCR, a filter photometer). A photomultiplier tube detects light exiting the monochromator. They are designed to measure the ratio of backscattered ultraviolet solar radiance to solar irradiance. During normal operation, the backscattered radiance from the nadir is measured at 12 near-UV wavelengths from 252 to 340 nm with a band-pass of 1.1 nm about 100 times per orbit on the sunlit portion. The CCR makes measurements at 379 nm wavelength with a band-pass of 3 nm, and is used to detect scene reflectivity changes during a scan.

The SBUV algorithm version 8 is a new generation of the series of algorithms to derive total ozone and ozone profile from the SBUV measurements. It works as a follow-on processing system to the existing Version 6 algorithm and uses the Version 6 daily output as input. The total ozone retrieval algorithm is a three-step process of successive estimation improvement. Step 1) the algorithm uses a pair of wavelengths 331 nm and 318 nm (340 nm and 331 nm for high solar zenith angle) to derive reflectivity and total ozone as a first guess linearization point. Step 2) adjustments due to seasonal and latitudinal variations in ozone and temperature profiles are made. Step 3) a simple procedure based on N-value residues is followed to correct errors due to aerosol, sea glint and profile shape deviation. The ozone profile retrieval algorithm is based on the optimal estimation (OE) technique and combines SBUV measurements and a priori profile information to achieve the maximum likelihood estimate.

## 2. SYSTEM INPUTS AND OUTPUTS

### 2.1. Input

- OOPS Version 6 daily Product Master File (PMF) output file – Used as source of SBUV instrument measurements
- ROPES Version 6 orbital PMF

### 2.2. Output

- OOPS Version 8 daily PMF output file
  - Unique name for each daily product
- ROPES Version 8 orbital PMF
  - Over-written each orbit
- Daily Version 8 BUFR format PMF
  - Over-written each day
- Orbital Version 8 BUFR format PMF
  - Unique name for each orbital product

### **3. OPERATIONAL SCENARIO**

The Version 8 system is managed through the OPUS system. It is fully automated, requiring no operator intervention.

### **4. RESOURCE REQUIREMENTS**

The SBUV Version 8 operational system operates on IBM POWER based machines. The system does not demand a large amount of RAM (less than 20 megabytes), nor intensive CPU usage.

The needed hard drive space depends on the system configuration. Currently, the Version 8 system processes SBUV data from three satellites (NOAA-16, NOAA-17 and NOAA-18) and keeps a week worth of output data files on the local disk, which requires about 250 megabytes of disk space.

### **5. MAINTENANCE AND MONITORING**

The Version 8 processing system is fully automated and no regular maintenance required. Pre-defined error messages with the location of the error will be sent to the OPUS operators via the “op\_msg” utility in case of execution failure. Log files, which are saved in logs/ subdirectory for about a week, will provide more detailed job status information.

Besides “op\_msg” and log files, a small program **pmfv8reader.x** is provided as a handy tool for checking up the content of a Version 8 SBUV output file.

Additional monitoring of the Version 8 processing system will be done on a routine basis by Ozone staff as part of normal daily Ozone monitoring. This will include monitoring of V8 production processing as well as V8 product quality. Version 8 monitoring by staff will consist of automated e-mails to the Ozone group and looking at graphics pages and other charts on an Intranet Web page. (For further details of Version 8 monitoring procedures, refer to the SBUV Version 8 System Maintenance Manual, Section 7). Any required software maintenance of the V8 system will also be performed by Ozone staff through the standard procedures under the maintenance contract currently in place.