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Changes in SSF for ValidationR3

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Purpose:

The purpose of this bulletin is to record the differences between the ValidationR2 and ValidationR3 SSF data products. The SSF parameter changes are reflected in a format change of the binary and HDF SSF files. The other changes are reflected by the change in the production strategy.

Introduction:

The ValidationR3 SSF will be substantially different from the ValidationR2 SSF. In addition to algorithm changes, two SSF parameters have been redefined and renamed. 'Mean logarithmically averaged visible optical depth for cloud layer' has been replaced with 'Mean logarithm of visible optical depth for cloud layer' (SSF-82). 'Stddev of the logarithmically averaged visible optical depth for cloud layer' has been replaced with 'Stddev of logarithm of visible optical depth for cloud layer' (SSF-83). This change in parameters is accompanied by a change to the variable names within the SSF_typdef.f90 module and by an increase to 'SSF ID' (SSF-H1). Therefore, all subsystems which read an SSF must be aware that they will require the new ssf_typdef.f90 module to read ValidationR3 granules and the new ssf_typdef.f90 module will not read older versions of the SSF. The change to SSF ID should keep CERESlib users from improperly using the redefined parameters. The discussion that follows highlights the reasons for redefining the optical depth parameters and lists all the major SSF changes.

Users wishing additional information on particular SSF parameters can find the DRAFT SSF definitions on-line at http://lposun.larc.nasa.gov/~dms/SSF/.

Discussion:

SSF Parameter Changes:

The mean and stddev of logarithm of visible optical depth for cloud layer replaces the mean and stddev of logarithmically averaged visible optical depth for cloud layer. Most SSF cloud parameters are defined in terms of a mean and a standard deviation. However, it was not possible to compute a standard deviation of logarithmically averaged visible optical depth which made sense, so this parameter was set to CERES-default. SARB, however, has need of the standard deviation of logarithm of visible optical depth, and requested that it be included on the SSF. Therefore, the standard deviation of logarithm of visible optical depth replaced the standard devi-

ation of logarithmically averaged visible optical depth. The corresponding mean value was altered accordingly to avoid confusing users who assume mean and standard deviation pairs.

Users of the SSF module ssf_typdef.f90 should be aware that the parameter names of SSF-82 and SSF-83, now the mean and standard deviation of logarithm of visible optical depth for cloud layer, have been altered. The parameters are now called logoptdepth_mn and logoptdepth_std. In addition, SSF-H1, 'SSF ID', has been increase by one, to 113.

The HDF SSF granule parameter names for SSF-82 and SSF-83 have been altered to reflect the changes. The HDF SSF granule parameter names for SSF-80 and SSF-81 have had the term "linearly averaged" removed from the names. The parameters are now called 'Mean visible optical depth for cloud layer' and 'Stddev of visible optical depth for cloud layer.' There has been no algorithm change for these parameters. The name change is strictly to avoid potential user confusion. The variable names in ssf_typdef.f90 remain unchanged.

These optical depth parameter changes reverse the changes discussed in Software Bulletin 97-07 and implemented in the Summer of 1997.

Other SSF Changes:
The SSF definition has changed and no longer restricts Fields of View (FOVs) to full Earth view. Partial Earth view FOVs which have a Point Spread Function (PSF) centroid that intersects the WGS-84 Earth model may also be processed. Once these partial Earth view FOVs are included on the IES, they will get passed onto the SSF. Users requiring full Earth view FOVs are encouraged to check SSF-36, the radiance and mode flag, to determine whether or not the FOV is a full Earth view.

The cloud processing flags which indicate strong cloud, weak cloud, sunglint from cloud, and indirectly indicate VINT no retrieval are included in SSF-79, 'Cloud layer note.' Similarly, the flags which indicate weak clear, strong clear, and indirectly indicate other clear are included in SSF-72, 'Notes on cloud algorithms.'

'Percentiles of visible optical depth for cloud layer' and 'Percentiles of IR emissivity for cloud layer', SSF-108 and SSF-109, have had their definitions expanded. Previously these 13 percentiles were computed only when there were at least 100 non-default optical depth values within the cloud layer of a FOV. At SARB's request, these percentiles will now be computed for every cloud layer which contains non-default optical depth values within the cloud layer of a FOV.

The ValidationR3 SSF data product is the first to be inverted with a set of CERES ADMs. These ADMs are known as the VIRS12A, and exist for all 3 channels. The VIRS12A LW and WN channels are not seasonal, but are separated by day and night. Previous versions of the SSF were inverted using the RPM ADMs developed for ERBE reprocessing and the WN channel was inverted using the LW ADM.

There have been a couple other changes made to the processing of the CERES WN channel. First, the WN channel width has been corrected. The previously used WN channel width of 3.6 µm has been updated to 3.7µm. Second, the WN channel spectral correction coefficients,

which are used to unfilter the WN channel, have been corrected. The WN spectral correction coefficients used to unfilter the WN channel in ValidationR2 were incorrect.

Conclusion:

In conclusion, all subsystems which follow the SSF and use these parameters may need to adjust their processing and/or output products. The new ssf_typdef.f90 module will be delivered to CERESlib shortly. Older versions of the ssf_typdef.f90 module are available from anonymous ftp to asdsun and can be found in the directory ceres/software/SS4.4/Revision2.