 Request for Action Form 

**Suomi NPP EDR Product Maturity Readiness Review**

**January 7-8, 2014**

**NCWCP, College Park, MD**

**Originator Name: Guenther Phone #: 240 393-1186 Org: DPA**

**RFA Title: Ocean Color Verification of ACO**

**Action: (include presentation section and page #)Menghua’s Chart 10 for example**

**Part 1. Please verify the Rayleigh scattering contribution to Atmospheric Correction and nLw retrieval.**

**Part 2. Please verify the Aerosol contribution to Atmospheric Correction and nLw retrieval.**

**Rayleigh scattering and aerosols are intermediate products for ocean color.**

**Rationale: The nLw contribution to the top of atmosphere signal is frequently much smaller that is the Rayleigh scatter or aerosols signal contribution to satellite measurement. For MODIS ocean color retrievals, the ocean color team started with verification of aerosol models used and the Rayleigh corrections. No evidence seems to be provided that these contributions are verified or not verified. If the intermediate products are verified then the SDR must be in error. On the other hand the SDR may be accurate and nLw still fail if the Intermediate Products are inaccurate.**

**Review Team Clarification:**

**I had several email exchanges with Bruce, explaining in details to address his concerns and issues. It is provided below.**

It should be clarified that for the purpose of atmospheric correction, it is correcting Radiance (molecules and aerosols) not aerosol properties. Thus, for ocean color, one should compare satellite-derived data with in situ normalized water-leaving radiance (nLw), that has been shown in my slides. One may derive correct aerosol optical thickness (AOT), but not necessary nLw, because aerosol radiance is proportional to the product of (AOT)\*(phase function)\*(single-scattering-albedo). One has to get all three components correct to get aerosol radiance right. Thus, correct AOT does not mean correct nLws.

For the Rayleigh and aerosol radiance computations, there are long references for very detailed descriptions, as well as improvements (with wind speed, atmospheric pressure), e.g., Gordon et al. (1988), Gordon and Wang (1992), Gordon and Wang (1994), Wang (1999; 2002; 2005; 2007), etc. There is an overall discussion about atmospheric correction, i.e., IOCCG report #10, which was produced from a group of international experts (I chaired).

**Bruce later also raised VIIRS polarization sensitivity issue (detector-based). It is addressed below (couple email exchanges).**

As you know, polarization effects in SNPP-VIIRS are much smaller than MODIS-Aqua, and at the current status (Provisional) this is not that important. The same polarization correction as MODIS has been applied to VIIRS in deriving ocean color products using the pre-launch polarization characterization data. I was involved that pre-launch characterization and they are quite reasonable (of course, effects are very small for VIIRS). For on-orbit detector-based polarization effect, I don't think this is task for the Provisional, and frankly this is not a high priority for the OC team because of small effects and because there are other much more important things to deal with, e.g., VIIRS Cal issue, performance in coastal and inland waters, etc. In fact, on-orbit detector-based polarization characterization should fall into SDR task.

We will try to evaluate polarization effect (also various other effects as appropriate) in a later status (in V1 or V2) when some most important issues are addressed.

**References:**

Gordon, H.R., Brown, J.W., and Evans, R.H., “Exact Rayleigh scattering calculations for use with the Nimbus-7 Coastal Zone Color Scanner,” *Appl. Opt.*, 27: 862-871, 1988.

Gordon, H. R. and M. Wang, “Surface roughness considerations for atmospheric correction of ocean color sensors. 2: Error in the retrieved water-leaving radiance,” *Appl. Opt.*, **31**, 4261–4267, 1992.

Gordon, H. R. and M. Wang, “Retrieval of water-leaving radiance and aerosol op­tical thickness over the oceans with SeaWiFS: A preliminary algorithm,” *Appl. Opt.*, **33**, 443–452, 1994.

Wang, M., “A sensitivity study of SeaWiFS atmospheric correction algorithm: effects of spectral band variations,” *Remote Sens. Environ.*,**67**, 348–359, 1999.

Wang, M., “The Rayleigh lookup tables for the SeaWiFS data processing: Accounting for the effects of ocean surface roughness,” *Int. J. Remote Sens.*, **23**, 2693–2702, 2002.

Wang, M., “A refinement for the Rayleigh radiance computation with variation of the atmospheric pressure,” *Int. J. Remote Sens.*, **26**, 5651–5663, 2005.

Wang, M., “Remote sensing of the ocean contributions from ultraviolet to near-infrared using the shortwave infrared bands: simulations,” *Appl. Opt.*, **46**, 1535–1547, 2007.

IOCCG (2010), “Atmospheric Correction for Remotely-Sensed Ocean-Colour Products,” Wang, M. (ed.), *Reports of International Ocean-Color Coordinating Group,* No. 10, IOCCG, Dartmouth, Canada. (<http://www.ioccg.org/reports_ioccg.html>)

**Assigned To: Assignee Phone #**

**Date Closed:**