CRTM Monthly Meeting Protocol

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Core Topic of the Meeting: CRTM v2.4.1 Release

Date: 2022-04-28 Time: 15:00h EST

Location: Virtual

Invited Speakers: N/A

Meeting Chair: Benjamin Johnson

Keeper of the Minutes: Patrick Stegmann

Attendees: Benjamin Johnson, Cheng Dang, Patrick Stegmann, Ming Fang, Jim Jung, Yingtao Ma, Isaac Moradi, Yanqiu Zhu, Sarah Lu, Ming Chen, Shi-Wei Wei, Scott Sieron, Haixia Liu, Andrew Collard, Andrew Tangborn, Mingjing Tong, Bryan Karpowicz

Agenda Item 1:	CRTM v2.4.1 Release
Discussion:	Ben created a release tag on the repository but it's not fully ready yet. Ben shares the release notes. The new aerosol tables from Cheng are listed, including GOCART. - A new IRSSE table from Nick was added. - OpenMP parallelization over profiles and channels have been added for forward and Jacobians. - netCDF for multiple input coefficients. - Unit tests are comprehensive, but diligence is still required for new features. - Structural code changes for aerosol coefficients. - Some unused codes got removed. More cleanup is needed to improve code coverage in the CI system. Bug fixes: - Cheng fixed the Legendre term issue for the 2-stream case. Coefficients added: - ABI GOES-18 - ATMS-NG - MWI EPS-SG - TROPICS - MHS MetOp-C If something is missing, please let Ben know. Ben is now taking questions. Sarah Lu: How do you version the subcomponents for coefficients. Ben: Each coefficient has an internal versioning number. Overall, I want to accelerate moving to version 3.0. Haixia: Can you go to the coefficient slide. MHS-2 is just the spectral coefficients with antenna correction, right? Another question

There is a discussion on the converted instrument coefficients for JPSS-2 from NPP.

Liu Quanhua recommends using the TROPICS v3 coefficients because they cause lower biases.

Ben is asking whether GOES-18 coefficients are available as netCDF as well. Yingtao explains that he was not able to upload the netCDF files to the repository.

Ben is explaining why the coefficient files are currently saved in a tarball. The CRTM is currently exceeding the git-lfs quota. At some point in the future we will switch back to git-lfs.

Yingtao is asking about the process to obtain the coefficient files.

Haixia is asking about the NaN Jacobian issue for the MW and whether the provided fix is already implemented. Ben confused that with a different issue and the fix from Emily is not implemented yet. We will contact Emily.

Going back to the MHS MetOp-C v2 coefficients, we have some coefficients for AMSU-A MetOp-A, maybe you can change the name from v2 to ACC.

Using v2 will override the original name.

Ben: Sounds good, please create a Zenhub issue on this. Regarding the NaN issue, I will implement Emily's changes locally. I was not able to reproduce the issue.

Quanhua: It looks like that according to Emily's ticket there are some unusual cases. If the transmittance is very small, you don't need to apply the surface emissivity correction.

Ben: Should we apply a minimum limit?

Quanhua: Yes.

Quanhua: For CRTM internal testing, are we using Paul's original test?

Ben: Cheng added the 100-profile test. I was not able to revive the 5000-profile test. My plan is to use the JEDI system, where I can have access to millions of profiles. I know it's not useful to the entire community, but it gives a really comprehensive comparison between versions. I try to create a testing package from these profiles as a stress test.

Quanhua: A million profiles might be too much for TL testing especially.

Yingtao: Maybe we select some extreme cases and also some historic profiles that generate problems.

There's a discussion about using different line-by-line radiative transfer models in the coefficient generation process.

Ben: We are running out of time. I will be visiting the MetOffice this summer.

My goal will be to understand their MFASIS model to improve visible calculations in the CRTM. The second goal is to have a way to do a direct comparison with RTTOV.

	Quanhua: In the v3.0 development I didn't change much, but for the surface components you will have to Ming Chen. Ben: Ming and I should probably have a separate meeting. Ming: CSEM should probably already include these things. We should have a discussion on whether we need to modify the surface data structures to take advantage of the new features of the CSEM.
Result:	- CRTM v2.4.1 is imminent.
Tasks:	- Release
Responsible People:	- CRTM core team
Deadline:	N/A

Agenda Item 2:	Executive Retreat Items
Discussion:	Ben: JCSDA had its executive retreat and there need to be more frequent releases of JCSDA software, including the CRTM. This means Quarterly Releases. Version 3.0 will be released June 30, as long as it's functional. The advantage is smaller and faster increments in code changes. At the end of the FY, there will be a major CRTM release. Isaac: The NWP community is probably 1-2 versions behind when implementing it in GSI. There's no point to increase release frequency. Ben: I agree. But the hope is that the increased cadence will reduce overhead.
Result:	- JCSDA CRTM releases will be more frequent, on a quarterly basis.
Tasks:	- CRTM infrastructure for quarterly releases.
Responsible People:	- CRTM core team

Deadline:	N/A

Agenda Item 3:	General Updates
Discussion:	Yingtao: Is the active sensor work available? Ben: Isaac has taken over that exclusively through a proposal. Isaac: I implemented the forward operator, TL, and AD. It does not include the surface emissivity. There is reflectivity and reflectivity-attenuated as new output variables. I am working with Meteo-Swiss to create some testing data. The components are also documented. Ben: This is part of a long-term strategy to add active sensor capability to the CRTM, like lidars. The next evolution will be ground-based radar. This motivates the need for a melting-layer model in the CRTM. Wet-melting snowflakes have a very strong signal in radar. Greg Thompson and I will work on this. Yingtao: This is only a question of the coefficients, no? Ben: The CRTM will have to interprete model-information to obtain the melting state. We will have to estimate the rate of melting. There are fast ways to do it. Quanhua: Is the radar part in the AOP? Isaac: In RTTOV they have implemented in the coefficients. There are simple and complicated methods. Different groups at Goddard have their own lidar model. Arlindo is trying to get his own model into JEDI. I would like to convince people to use the CRTM instead. Ben: The challenge is doing unusual scattering by gases, and then having the right table information. Isaac: We had the discussion a few years ago when GMAO wanted to have their own aerosol tables, because the CRTM tables don't work for them. Standardizing the aerosol tables might solve this issue. Ben: We have taken their GEOS-5 aerosol table. Bred Pierce wants to compute AOD. The same capability exists in the CRTM. Sarah: That's right. The initial effort is focused on the extinction. Ben: Our ultimate goal for the next 5 years is to assimilate Level 1 radiances, not level 2 retrieval products like winds and AOD. But that's more of a UFO-OBS issue.
Result:	N/A

Tasks:	N/A
Responsible People:	N/A
Deadline:	N/A

Meeting End: 16:30h EST