

Report Title: Boeing Project Agreement at the
University of Wisconsin-Madison (CIMSS/SSEC)
Prepared For: Timothy Rahmes (Boeing) and Stephen Papineau (Boeing)
Period of Performance: 1 April 2018 – 30 November 2018
Prepared By: Wayne F. Feltz
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Task Highlights & Progress Summary:

This is the final progress (1 April 2018 – 30 November 2018) report for the 2018 Boeing Project Agreement at University of Wisconsin-Madison CIMSS/SSEC (UW Reference #MSN218939) in collaboration with the Boeing Corporation, Seattle, WA. Described are tasks as listed on the CIMSS Statement of Work for Boeing Project agreement 2011-043-9.

Wayne Feltz leads the University of Wisconsin-Madison CIMSS/SSEC effort. The contact information is (608) 265-6283, or wayne.feltz@ssec.wisc.edu. The CIMSS Boeing-project staff also includes: Justin Sieglaff, Tony Wimmers, Jerrold Robaidek, Sarah Griffin, and Steve Wanzong

Coordination, Presentations and Conferences:

SSEC-Boeing coordination with in person and telcon meetings which were held on January 9th at AMS conference and atmospheric Turbulence workshop on September 4th-5th along with telcons March 27th and October 11th 2018.

Research Milestone Progress:

1.1.1 Mature Cloud top height estimate refinements:

- GOES-16 and 17 radiances will be processed within ACHA to improve quality of cloud top height measurements [issue with the NOAA satellite itself – task complete, but may go to 15 minutes vs 5 minute mode...].
- Continue to support global ACHA but for limited times of interest so resources can focus on turbulence research to continue Boeing services - Completed

1.1.2 RealEarth WMS improvements –

1. Tutorial slides needed to describe turbulence inference products - Completed
2. Implement downslope turbulence logic – new machine learning technique will be tested in near future and results will be shared with Boeing
3. Capability to evaluate oceanic turbulence & GGTG - Completed
<http://www.emc.ncep.noaa.gov/gmb/icao/grdplot/plot.html>
4. Bring into RealEarth (global turbulence and icing). Remove US domain GTG and use global product.

5. Implement HIGHPASS globally as new generation of global geostationary satellite forward... see <http://cimss.ssec.wisc.edu/goes/blog/archives/category/aviation>
6. Exploratory presentation on use of Deep Learning to identify turbulence probability as a research idea – In progress
7. Integrate cold air aloft product from CrIS and ATMS into RealEarth – Contacted U of Colorado State and will integrate into RealEarth when available and anticipated by 1 January 2019

1.1.3 Integrate multiple satellite-derived turbulence inference into a common satellite centric product (overshooting-top, tropopause-fold, and downslope wind detection) and attempt to optimize display and interpretation solutions

- Improve display of gravity wave scoring product within RealEarth, possibly implementing Gaussian high-pass filter on improved horizontal resolution Himawari-8 and GOES-16/17 water vapour imagery – all implemented except for downslope wind detection which new machine learning technique is being applied

Other Topics: Volcanic ash progress for future SOW

1.2 Data: Seller shall submit data in accordance with this SSOW. All data submitted shall be complete and accurate and comply with all subcontract requirements. Seller shall submit data for "information" or "approval". Seller shall resubmit disapproved data items in sufficient time to prevent schedule impact.

ACHA derived cloud top heights are available for Boeing use and other products will be added as they mature.

1.3 PROGRAM REVIEWS/TECHNICAL COORDINATION MEETINGS: Seller shall attend the coordination meetings. Presentation materials shall be provided to Boeing as required.

SSEC CIMSS has and will continue to participate in regularly scheduled progress meetings via phone or in person.

1.4 SUMMARY OF DELIVERABLES - All deliverables under this effort are summarized as follows:

- Final Report detailing the work performed on each task element due by 15 November 2018
- Provide https access to satellite-derived convective cloud top height, inferred cloud top cooling/convective growth rate, and new turbulence products. - complete
- Provide monthly telecons or as otherwise determined by SSEC and Boeing to brief Boeing on progress - complete
- Follow-on technical support available through 2Q2019, or until potential follow-on 2019 SOW is determined – in progress