

AQRP Monthly Technical Report

PROJECT TITLE	Improve Cloud Modeled by WRF using COSP and Generative Adversarial Network	PROJECT #	20-026
PROJECT PARTICIPANTS	PI: Zheng Lu	DATE SUBMITTED	Aug. 19, 2021
REPORTING PERIOD	From: July. 12, 2021 To: Aug. 19, 2021	REPORT #	12

A Financial Status Report (FSR) and Invoice will be submitted separately from each of the Project Participants reflecting charges for this Reporting Period. I understand that the FSR and Invoice are due to the AQRP by the 15th of the month following the reporting period shown above.

Detailed Accomplishments by Task for reporting period

During this period, we finished Generative Adversarial Network (GAN) training for period of 2005-2020 (2007 year not included because of corrupted NAM data) and GAN evaluation for year 2020. The three fields, liquid water path, cloud optical depth, and cloud fraction of each day are composed into one figure as R, G, B channels. The results showed that GAN training was very successful in terms of reproducing observed cloud fields. However, for several day in summer when local strong convections occur and when hurricanes hit, GAN's performance is compromised.

Preliminary Analysis

We found that cloud fraction is greatly enhanced after applying GAN. The normalized mean bias decreases in magnitude from -37% to -0.05%, while the spatial correlation coefficient also increases from 0.49 to 0.69. The correlation coefficients of the liquid water path and cloud optical depth fields are also improved from 0.16/0.17 to 0.2/0.2.

Data Collected

We collected GAN weight matrix, Figures from GAN evaluations, and converted cloud field data in netcdf format.

Identify Any Problems or Issues Encountered and Proposed Solutions or Adjustments

N.A.

Goals and Anticipated Issues for the Succeeding Reporting Period

N/A

Detailed Analysis of the Progress of the Task Order to Date

100% of Tasks 1, 2, and 3

Do you have any publications related to this project currently under development? If so, please provide a working title, and the journals you plan to submit to.

Yes No

Do you have any publications related to this project currently under review by a journal? If so, what is the working title and the journal name? Have you sent a copy of the article to your AQRP Project Manager and your TCEQ Liaison?

Yes No

Do you have any bibliographic publications (ie: publications that cite the project) related to this project that have been published? If so, please list the reference information. List all items for the lifetime of the project.

Yes No

Do you have any presentations related to this project currently under development? If so, please provide working title, and the conference you plan to present it (this does not include presentations for the AQRP Workshop).

Yes No

We submitted an abstract titled “Improve WRF Simulated Clouds by Using COSP Simulator and Generative Adversarial Network” for AGU meeting

Do you have any presentations related to this project that have been published? If so, please list reference information. List all items for the lifetime of the project.

Yes No

Have any personnel changes occurred that were not listed in the original proposal? If so, please include a detailed description of the personnel change(s) below.

Yes No

Are any delays expected in the progress of the research? If so, please include a detailed description of the potential delay below.

Yes No

Describe any possible concerns/issues (technical or non-technical) that AQRP should be made aware of.

Are you anticipating using all the available funds allocated to this project by the end date? If not, why and approximately what is the amount to be returned?

Yes

No

Submitted to AQRP by
[Zheng Lu]