Weekly Report

RAMMB / CIRA
Cooperative Research Program Division (CoRP)
STAR/NESDIS
National Oceanic and Atmospheric Administration (NOAA)

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Products and Applications

Publications (Citation: followed by a short **Summary:** (Why & so what)**, & detailed summary):**

Citation: Ebert-Uphoff, I., and K. Hilburn, 2023: The outlook for AI weather prediction. *Nature*, News and Views, July 5, 2023. https://doi.org/10.1038/d41586-023-02084-9. (Full article access: https://rdcu.be/df8LB)
Summary: This *Nature News & Views* article discusses two new Artificial Intelligence (AI) models for global weather forecasting published in this issue of *Nature* that seek to replace traditional physics-based numerical weather prediction models.
Detailed summary: This article places into context two new AI models for global weather forecasting. These new models demonstrate the enormous potential that AI holds for weather prediction, speeding up the process of forecasting by up to a factor of 10,000. Such increases in computational speed could yield immense benefits, such as increasing spatial resolution of models, generating large ensembles, and the potential to integrate additional physical processes (such as fire spread). However, our article also spells out several potential risks of AI-based models, including potential under-prediction of extreme events, not representing meteorological features with as much clarity as their numerical counterparts, inconsistencies between different fields, and the risk of unpredictable behavior when encountering conditions the model was not trained on. Given both the potential benefits and risks associated with AI models for weather prediction, this article issues a call to action for weather forecasters to get involved in evaluating and interpreting such systems to ensure that they meet the needs of forecasters and thus contribute to - and not endanger - public safety. (POC: Imme Ebert-Uphoff and Kyle Hilburn, CIRA, iebert@colostate.edu, kyle.hilburn@colostate.edu, Funding: NSF and CIRA ML strategic funds)

Figure 1 from the article: ***Weather forecasters must vet artificial-intelligence weather-prediction models.*** *There is a pressing need for scientists to learn how to use and evaluate weather-prediction models that use artificial intelligence to ensure that they meet the needs of forecasters and thus contribute to - and not endanger - public safety.*

Awards and Recognition

Media Interactions and Requests

Blog Posts and Social Media

Travel, Workshops, Conferences, and Meeting Reports

CIRA Presence at 50th Annual AMS Broadcast Meeting: During the week of June 19th, 2023, Dakota Smith attended the 50th Annual Broadcast Conference in Phoenix, Arizona. At the conference Dakota presented a talk titled, "The Importance of Satellite Imagery in Weather and Climate Stories and How to Utilize Imagery Resources". In his talk Dakota highlighted CIRA's SLIDER and Satellite Library as tools broadcast meteorologists can use to access satellite imagery. Dakota also created and furthered relationships with users of CIRA's tools and imagery, getting useful feedback. (POC: Dakota Smith, dakota.smith@colostate.edu. Funding: GOES-R)

AI2ES Sitewide Presentation: On June 21st, 2023, Lander Ver Hoef presented a talk titled "Using Mathematical Techniques to Leverage Domain Knowledge in Image Analysis for Environmental Science" at the virtual sitewide meeting for the NSF AI Institute for Research on Trustworthy AI in Weather, Climate, and Coastal Oceanography (AI2ES). This presentation was a summary of the work Lander did as a graduate student working with CIRA, including topics such as using topological data analysis to classify mesoscale cloud organization, using geometric deep learning on severe storm forecast data, and using harmonic analysis to enhance the signature of gravity waves in day-night band data. (POC: Lander Ver Hoef, lander.ver_hoef@colostate.edu. Funding: NSF-AI2ES)

1st International KPOP-MS workshop: Post-meeting and Discussion: Y. Lee presented a talk "Use of geostationary satellite data for detecting convection and turbulence" for graduate students during the 1st International Korea Precipitation Observation Program: International collaborative experiments for Mesoscale convective system in Seoul metropolitan area (KPOP-MS) workshop: Post-meeting and Discussion held on 3-4 July. The post-meeting was held to discuss instrument plans during the KPOP-MS field campaign and shape up research topics. (POC: Y. Lee, CIRA, yoonjin.lee@colostate.edu, Funding: GOES-R)

Training and Education activities

Future Meetings and Events (dates, meeting/event, location, staff involved)

Other

Manuscript Reviews: Chris Slocum reviewed three articles submitted for publication, the first for the *Journal of Atmospheric Science*, the second for *Weather and Forecasting*, and third for *Geophysical Research Letters*. (POC: Chris Slocum, StAR, 970-491-2409, Christopher.Slocum@noaa.gov; Funding: PDRA)