DEVELOPMENT OF COMPUTATIONAL TOOLS AND EDUCATIONAL RESOURCES TO SUPPORT PI-WRF COMMUNITY DRIVEN LEARNING MODULES

'Joba Adisa
Clemson University I National Center for Atmospheric Research

Agbeli Ameko
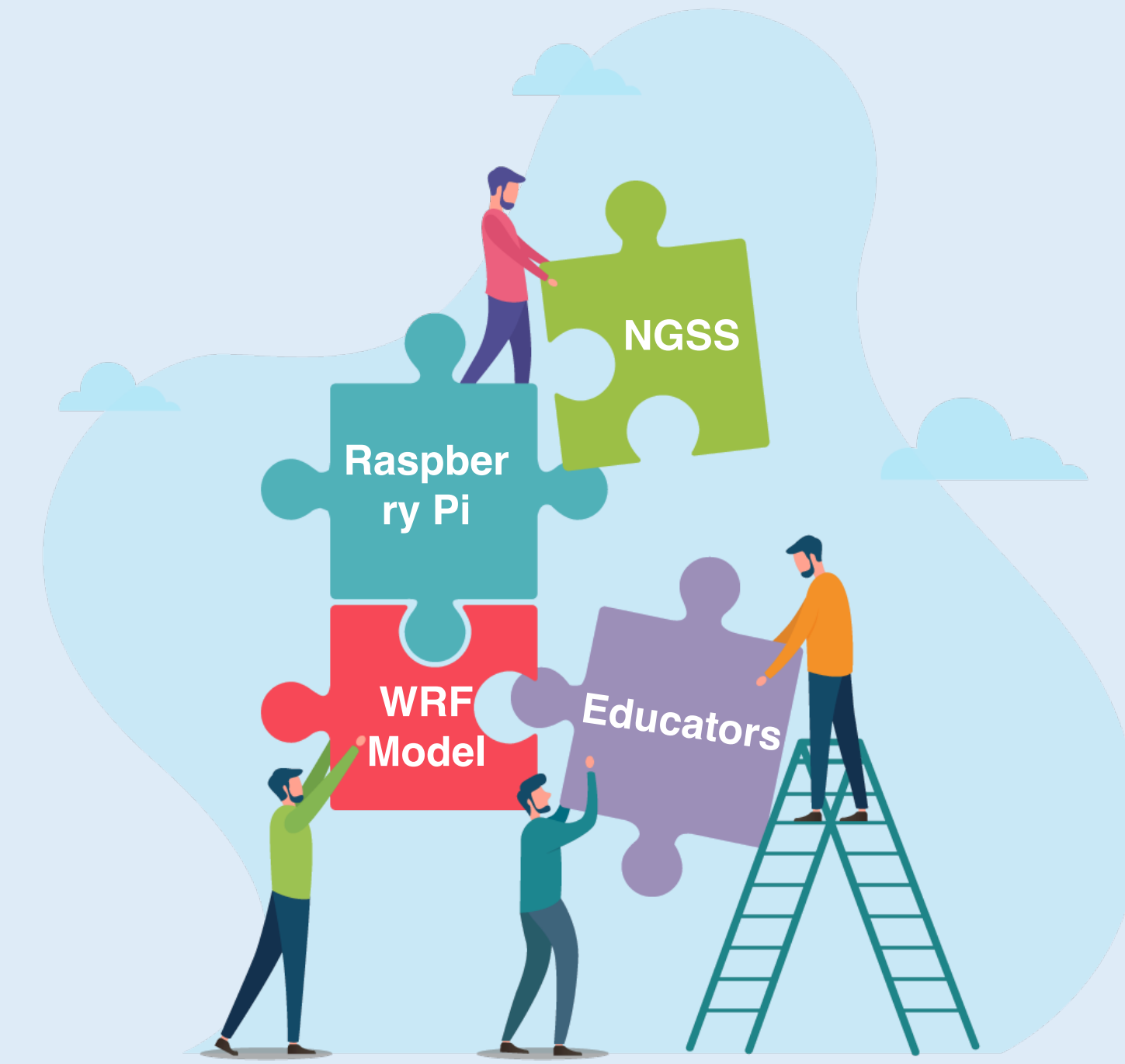National Center for Atmospheric Research

Keith Maull
National Center for Atmospheric Research

Main Idea

Development of computational tools and educational resources to facilitate the contribution of Pi-WRF teaching boxes among members of the community.

In this project we developed learning modules and a multiarchitecture container application that allows user to run the Weather Research Forecasting (WRF) model on a Raspberry Pi.
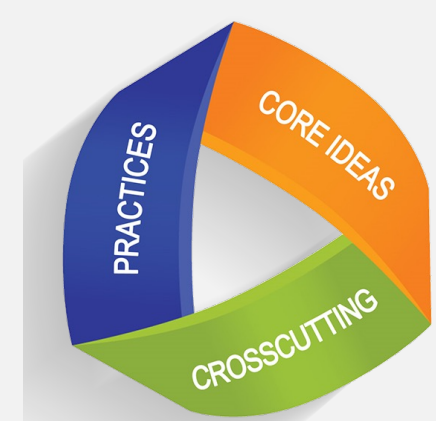
We also developed learning modules that connects Pi-WRF activities to middle and high school NGSS standards.

Finally, we developed lesson templates, forms and web pages to encourage the contribution of Pi-WRF teaching boxes among educators.

Development

Educational Modules

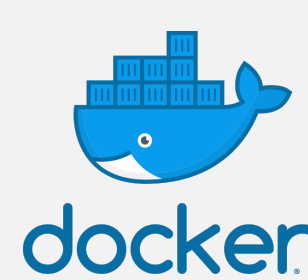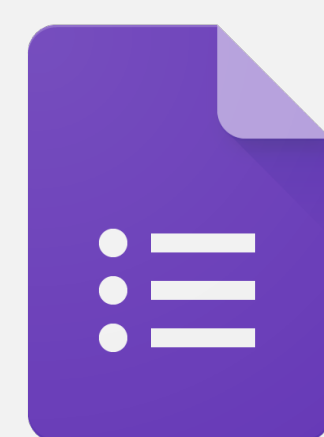Used Jupyterbook to create and connect Pi-WRF activities to NGSS standards.

Pi-WRF Extension

Integration of newer python libraries. Interactive weather simulation using Jupyter notebook.
Support for multiple architectures (AMD, ARM)

Teaching Box Contribution

Development of a contributor's guide. Creation of Pi-WRF lesson templates, form and web pages to facilitate sharing.

Results

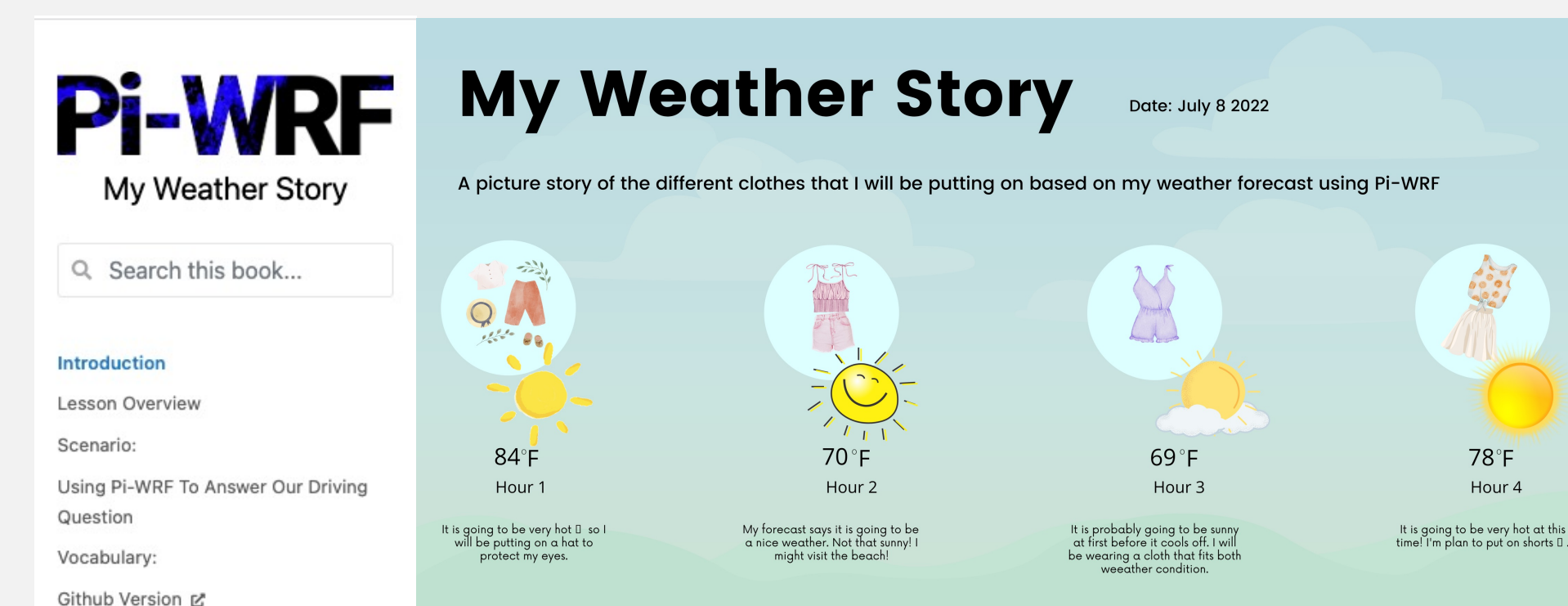We provided learning modules that exemplify how Pi-WRF can be used to teach physical sciences to middle and high school learners.

We used real-world problems that allow learners to be creative as they connect weather forecasting to their daily lives.

Fig. 1: A snapshot of a Pi-WRF learning activity published as a Jupyter book
Available at: https://oluwajobs.github.io/myweatherstory/

Using the Pi-WRF application, users can run weather simulation on a variety of devices including a Raspberry pi and a laptop computer.

Users can visualize plots for the following features:
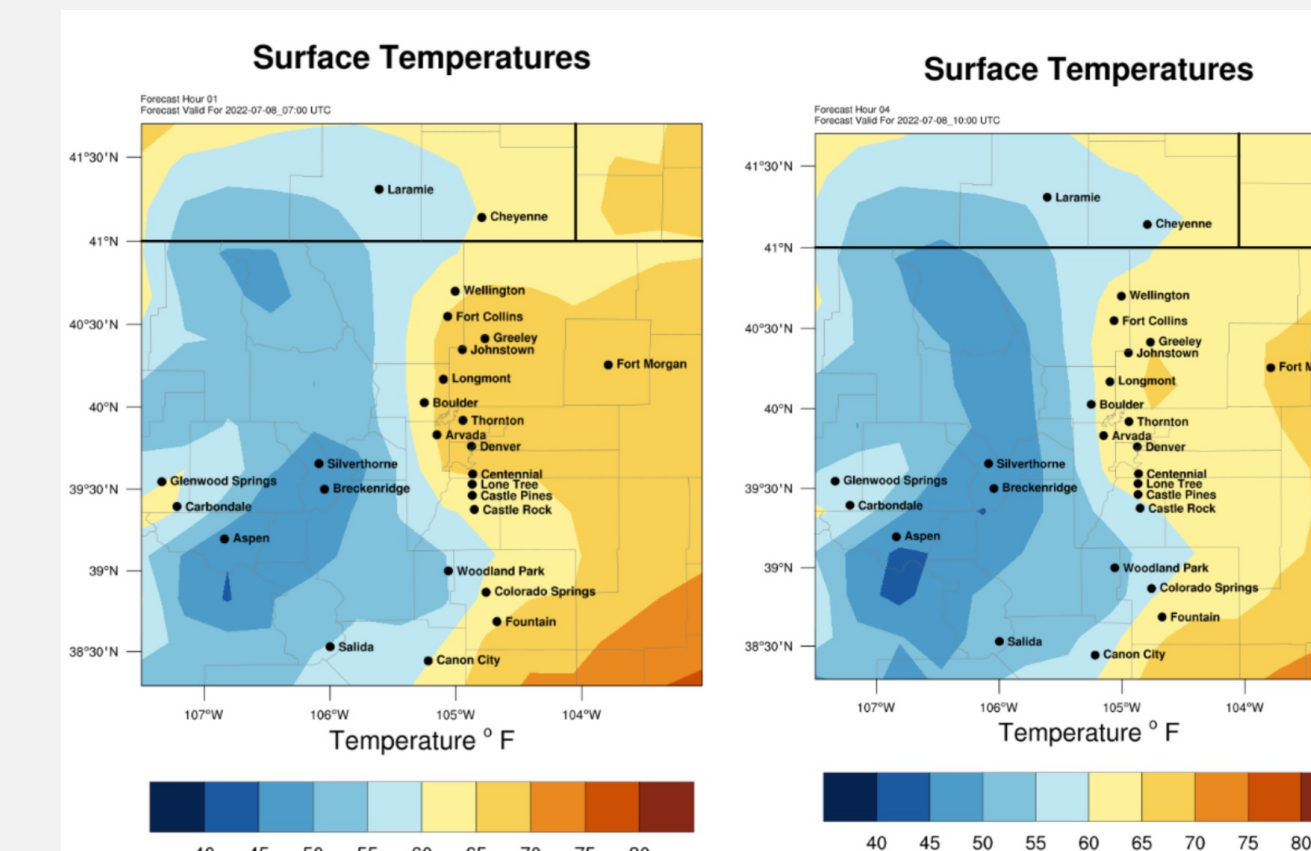- temperature
- rainfall
- windspeed
- snow and
- humidity

Fig. 2: Plot showing the temperature for areas around Boulder for July 8, 2022 at 0700hr and 1000hrs respectively.
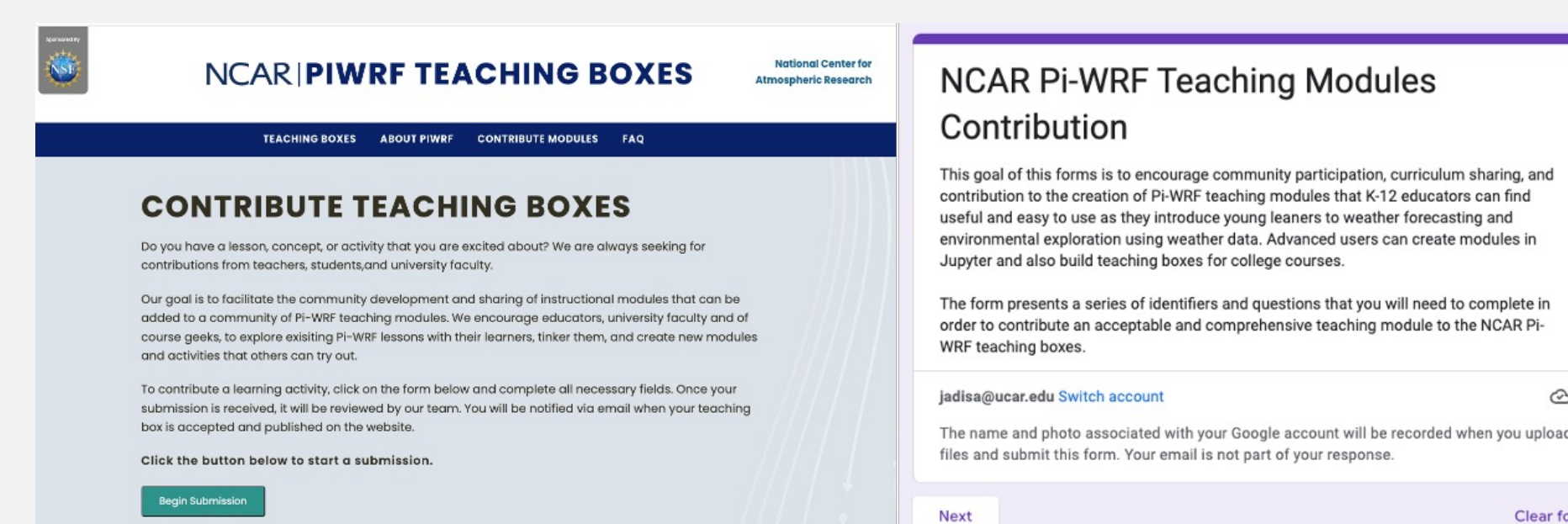
The web page provides direction and resources to support community members who are interested in creating and sharing a teaching box.

The form also lowers barrier to contribution by providing teachers with no expertise in programming an opportunity to contribute to the Pi-WRF community.

Fig. 3: A snapshot of the teaching box contribution webpage (left) and form (right)

Future Work
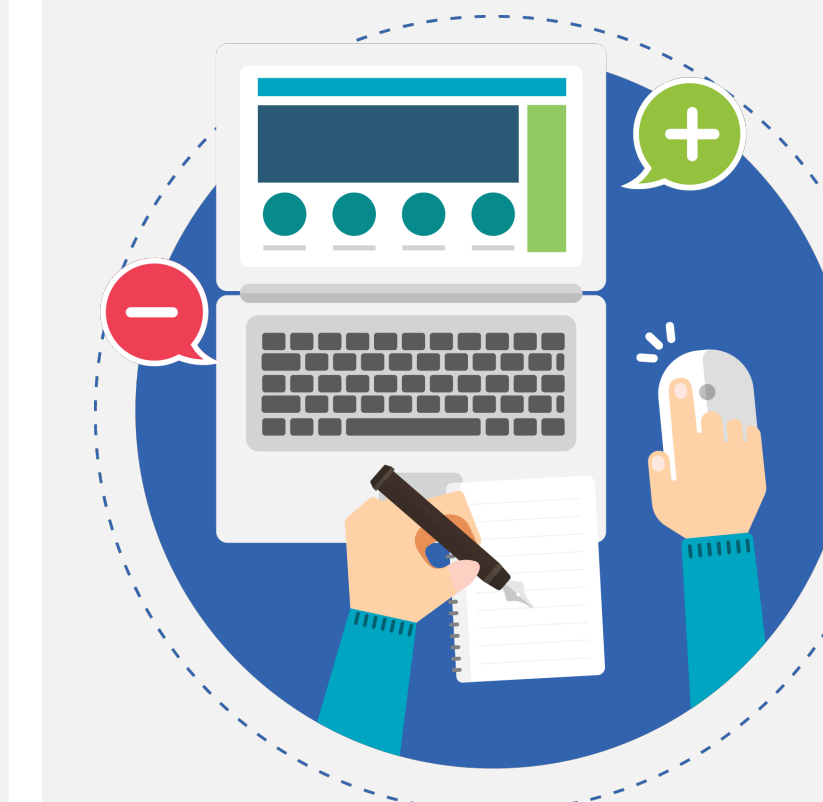
Usability and Testing

- Focus Groups Feedback
- Development of more educational modules
- Persistence of WRF outputs

Links & Resources

Jupyter Book Sample

Pi-WRF Repository

Teaching Boxes

For more information, email:

Agbeli Ameko: agbeli@ucar.edu
'Joba Adisa: iadisa@clemson.edu