

Pi-WRF 3.0

Incorporating Jupyter Notebook

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July 27, 2021



- **Introduction**
- **Project Goals**
- **Development**
- **Demo**
- **Conclusion and Future Work**



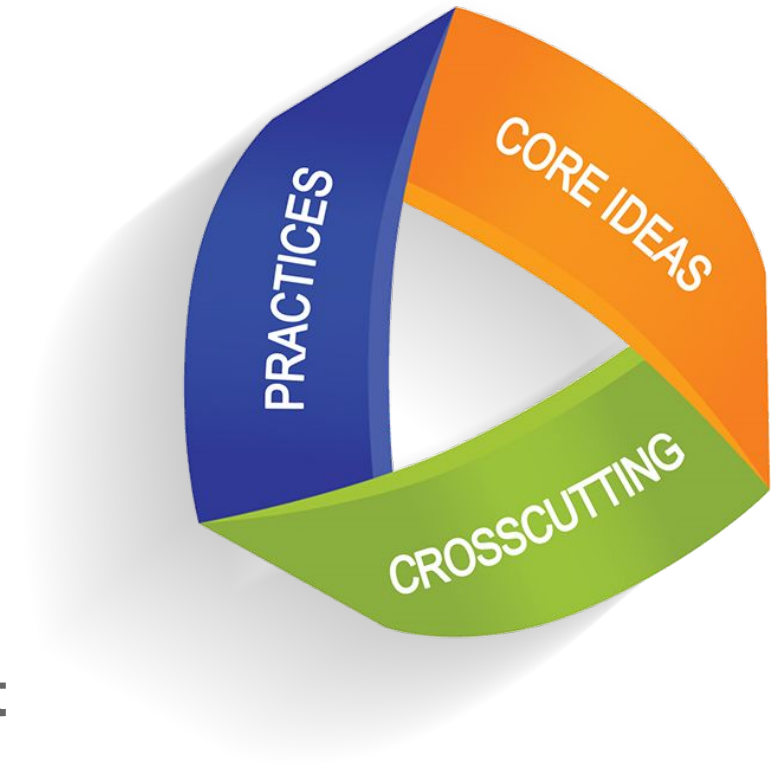
Introduction: Motivation

- Pi-WRF running WRF on Raspberry Pi
- Using Pi-WRF to facilitate science education
- Target relevant NGSS



Introduction: NGSS

- **NGSS components**
 - **Core Ideas**
 - **Practices**
 - **Crosscutting Concepts**
- **Interactive vs static content**

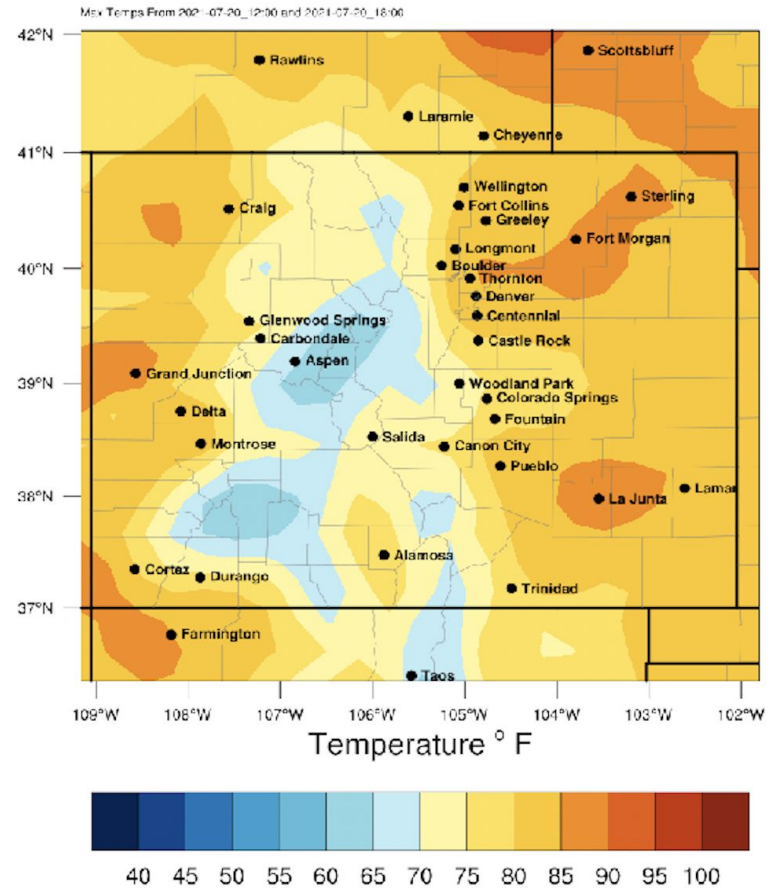


Introduction: Pi-WRF

- Python based GUI
- Run WRF on Raspberry Pi
- Output series of plots

	Relative Domain	Domain	Temperature	Wind	Rain	Snow	Save All Figures		
00	01	02	03	04	05	06	Low Temps	High Temps	Save Temps

High Temperatures



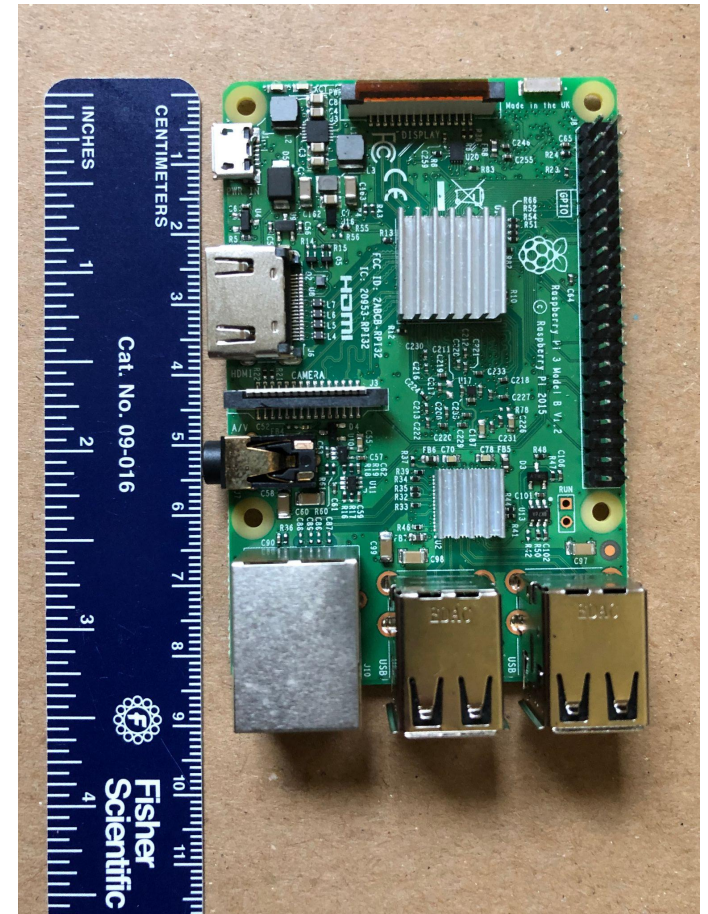
Introduction: What is WRF?

- **Weather Research and Forecasting (WRF) Model**
- **Numerical weather prediction (NWP) system**
- **Atmospheric research and forecasting applications**



Introduction: What is a Raspberry PI?

- **Single-board computers (SBC)**
- **Computing education**
- **Computer/electronic hobbyists**
- **Low cost and open design**



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Project Goals: education module(s)

- **NGSS (high school level) connections to Pi-WRF**
- **Plan and develop education modules that target relevant NGSS**
- **Present modules to educators for feedback and revise**
- **Publish modules**



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Development: Jupyter Book

jupyter {book}

- **Content organization**
- **Lots of support available**
- **Community driven framework**
- **Pi-WRF bug**

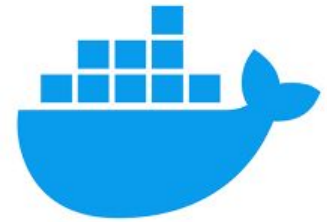
Development: Pi-WRF Teaching Box

- **Numerical Weather Prediction content**
 - **Data**
 - **Model**
 - **Interpretation/Forecast**
- **Framework allows community contributions**
- **Transfer existing Pi-WRF and Pieyenne content**



Development: Pi-WRF module framework

- Pi-WRF bugfix
- Pi-WRF integration with modules
- Pi-WRF components
 - Docker container
 - WRF, NCL, plotting scripts
 - Python Tkinter GUI



Development: Jupyter Notebook

- **Web-based interactive programming**
- **Opinionated Docker Stacks**
- **Raspberry Pi: ARM architecture**
- **Replace GUI with Jupyter notebook**
- **Pi-WRF 3.0**



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- **Results**
 - **Pi-WRF transition to community driven framework**
 - **Pi-WRF Teaching Box (Jupyter Book)**
 - **Pi-WRF GUI replaced with Jupyter Notebook**



- **Future Work**
 - **Extend WRF output -- notebook connection**
 - **Contributor guidelines**
 - **Educator feedback**
 - **GitHub CI/CD, automated testing**
 - **Develop Modules**



Acknowledgments

Mentors

Agbeli Ameko

Keith Maull

SIParCS Team

AJ Lauer

Virginia Do

Jerry Cyccone

Max Cordes Galbraith

NCAR
UCAR



Thank You!!

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Pi-WRF GitHub repository: <https://github.com/NCAR/pi-wrf>

Pi-WRF Teaching Box: <https://reidolson.github.io/piwrf-teachingbox/intro.html>

