Pi-WRF 3.0
Incorporating Jupyter Notebook

Reid Olson, University of Wyoming
Mentors: Agbeli Ameko, Keith Maull

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Outline

- 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
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

- 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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Conclusion and Future Work

Results

- Pi-WRF transition to community driven framework
- Pi-WRF Teaching Box (Jupyter Book)
- Pi-WRF GUI replaced with Jupyter Notebook
Conclusion and Future Work

- Future Work
  - Extend WRF output -- notebook connection
  - Contributor guidelines
  - Educator feedback
  - GitHub CI/CD, automated testing
  - Develop Modules
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Reid Olson
reidpolson@gmail.com

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

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