

# Polarimeter to Unify the Corona and Heliosphere



## PUNCH Science Operations Center Data Products and Software

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DASH Meeting  
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# SOC Members



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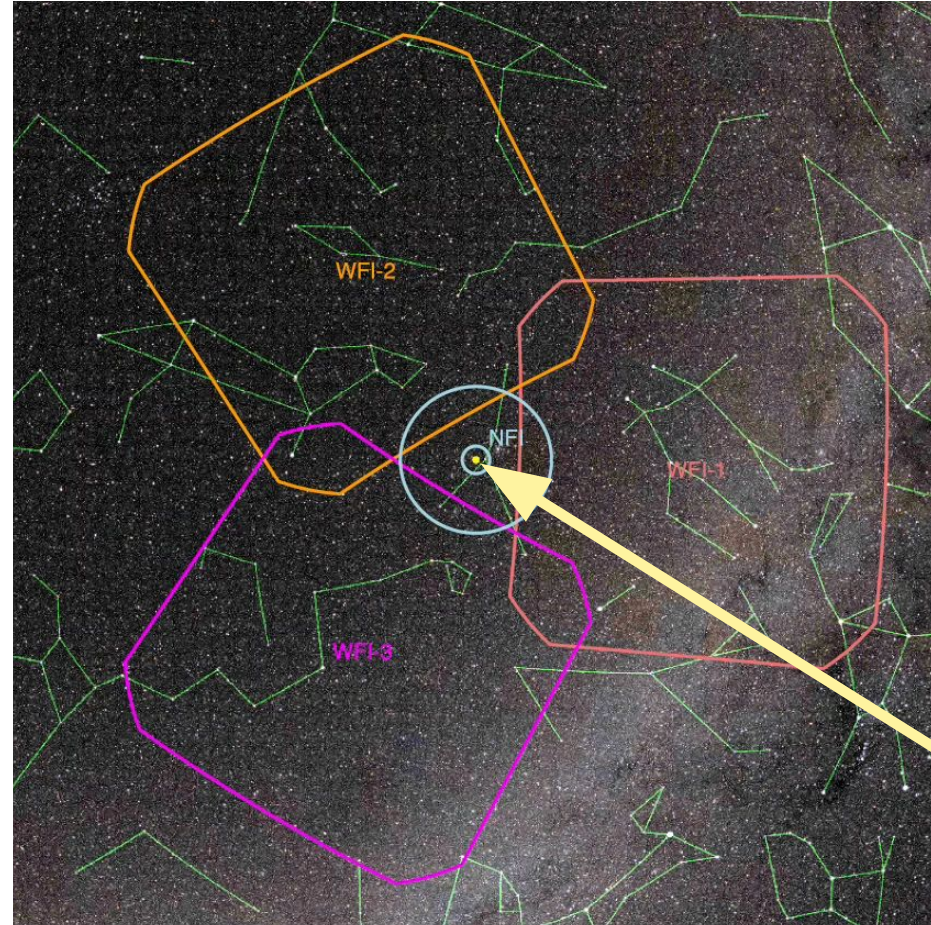
Sarah Kovac





# What is PUNCH?

- PUNCH will be a constellation of four smallsats to study the solar wind
- Launch early next year
- Complicated processing pipeline of stitching together images from multiple satellites
- Software will be completely open



Sun

PUNCH will change how we understand the solar wind



# What Makes PUNCH Software Special?

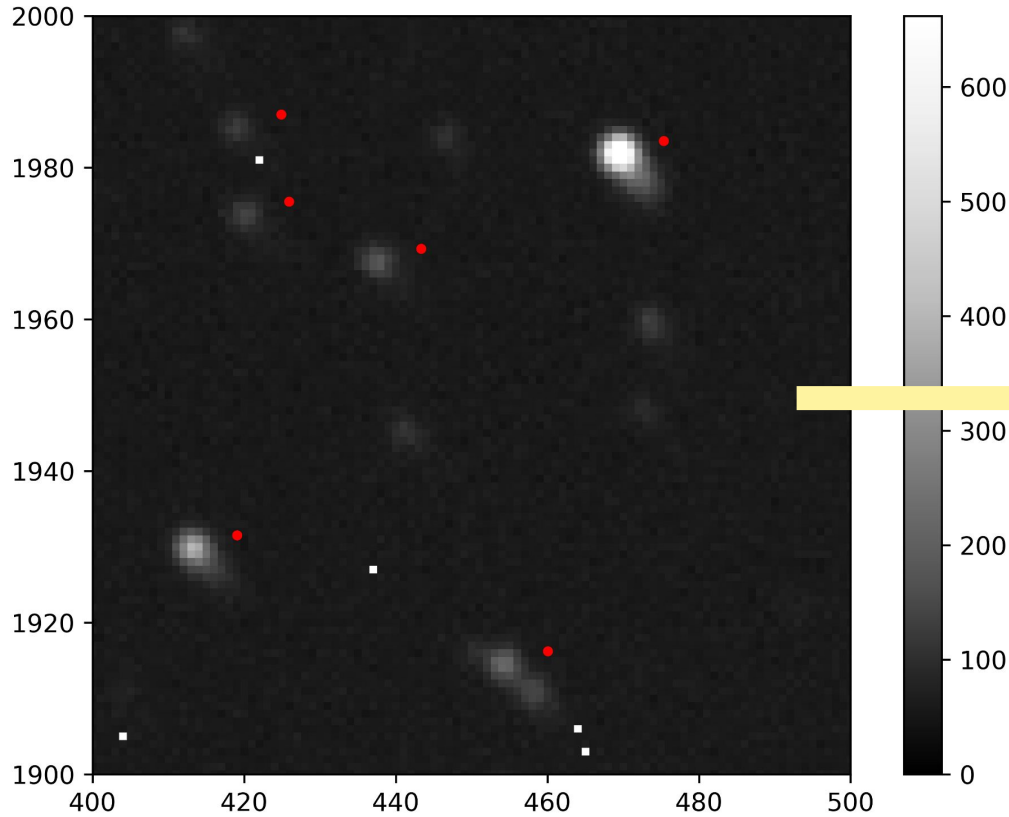
- Implements science code completely separate from automation logic
  - Enables more scientist interaction and easily added custom flows
  - Can be run on any machine with or without database set up
- Tracks uncertainty
  - Every step of the pipeline tracks the uncertainty in observed values so it can be reported with the observations
- Allows for reprocessing of data while prioritizing space weather products
- Includes novel algorithms
  - Point spread function regularization
  - WCS alignment
  - Starfield removal



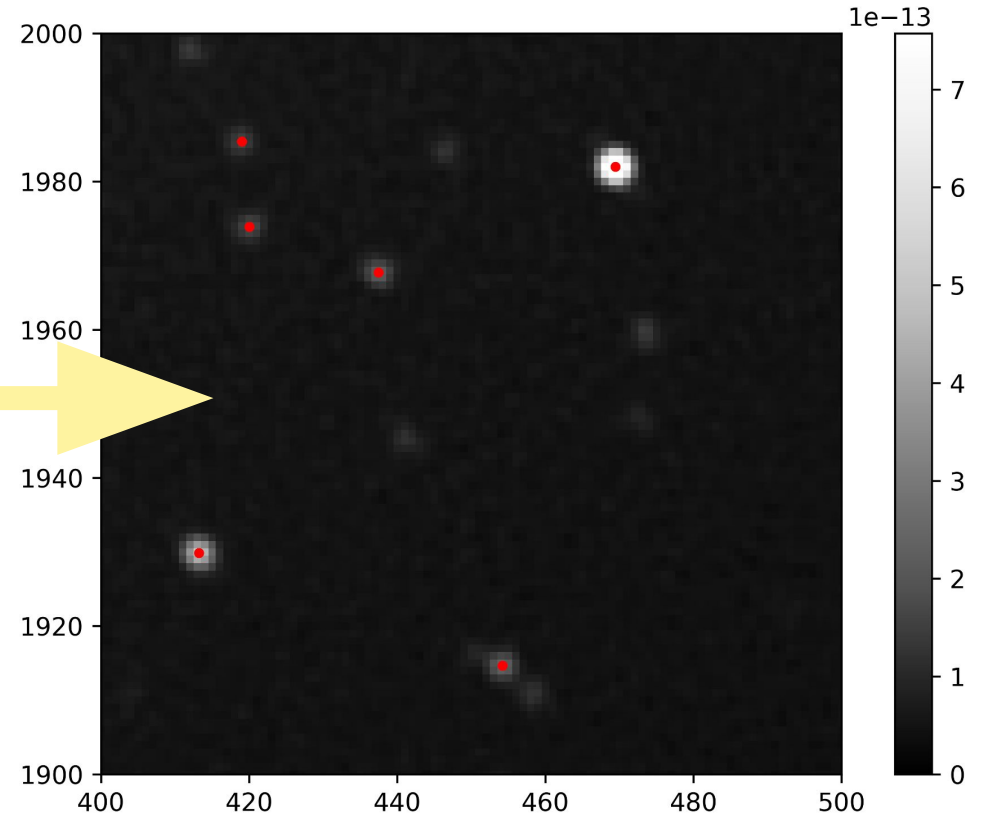


# Sneak peek: Simulated PUNCH Data

## Level 0



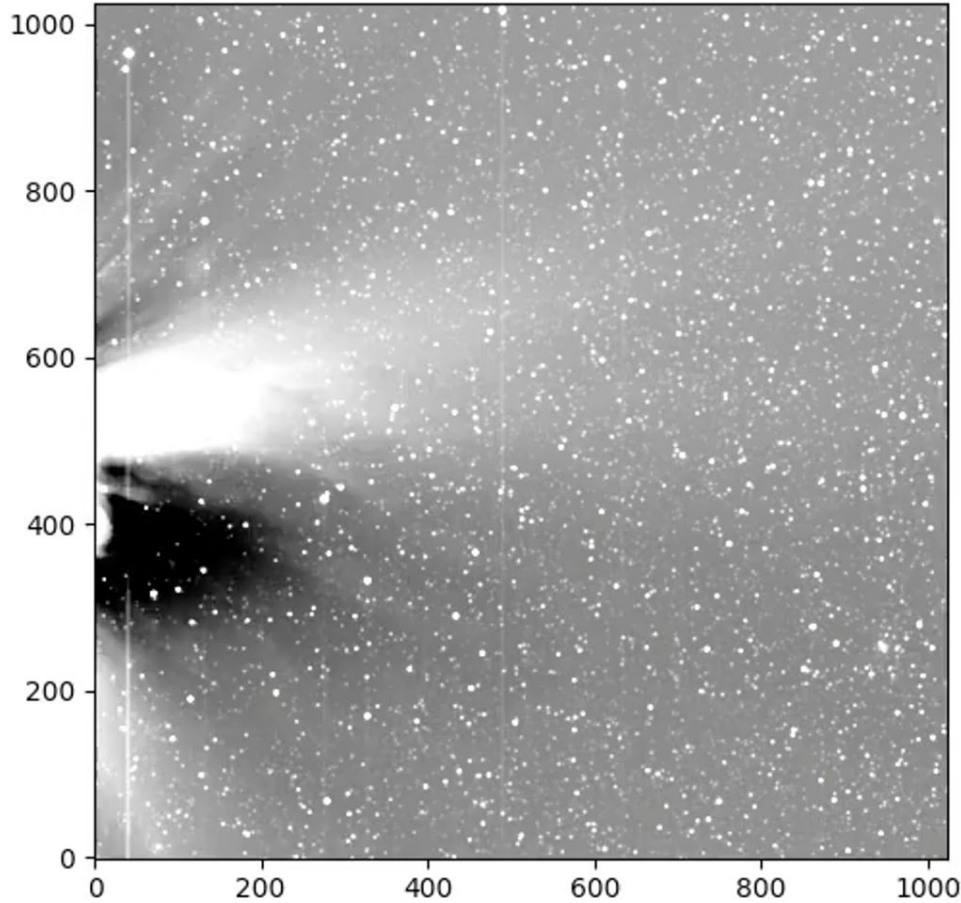
## Level 1



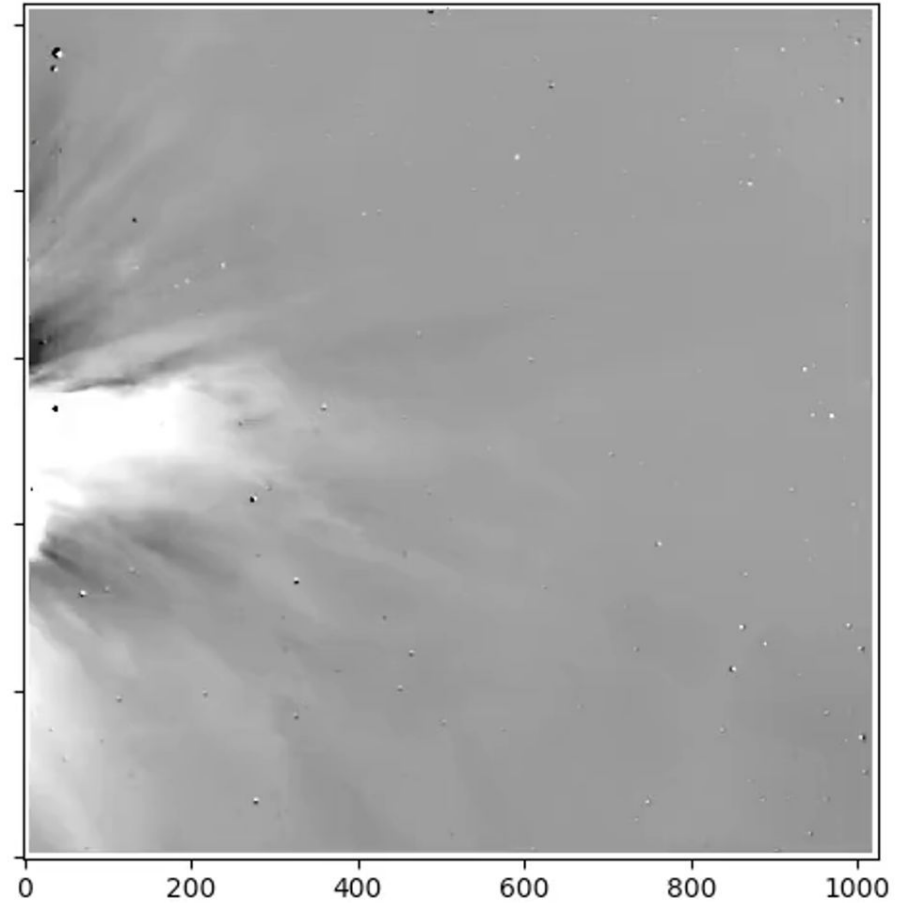


# Sneak peek: Removing Stars

Before

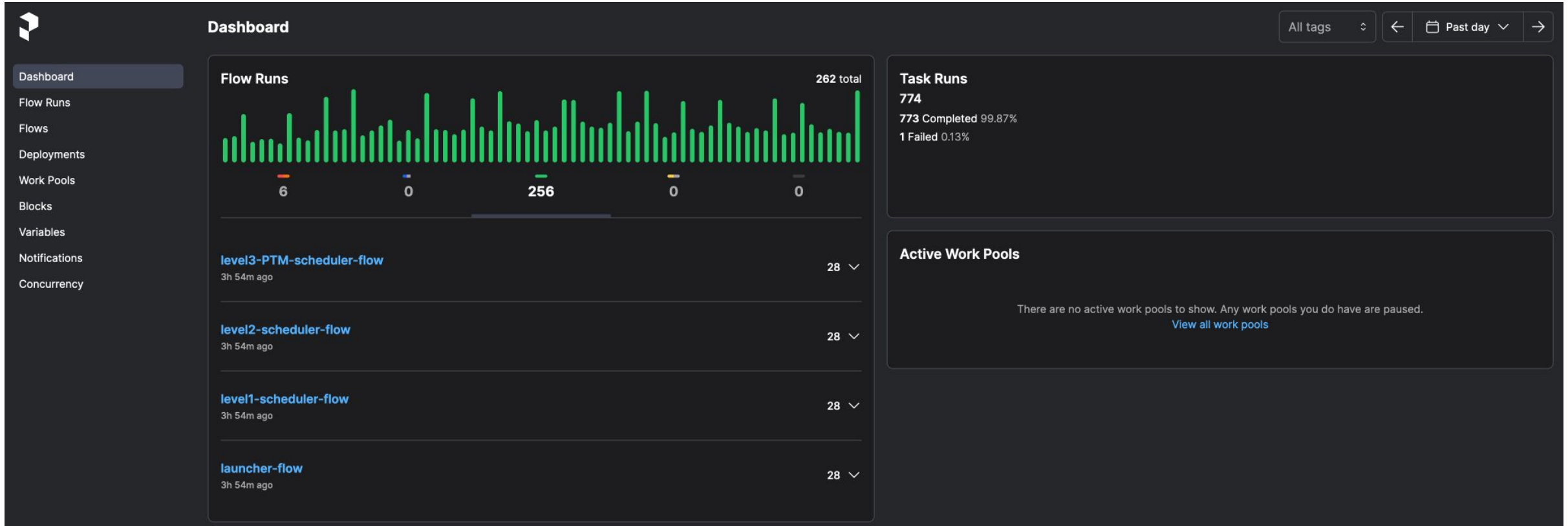


After





# Prefect: the Orchestrator behind the PUNCH pipeline



Prefect provides easy observability and automation.





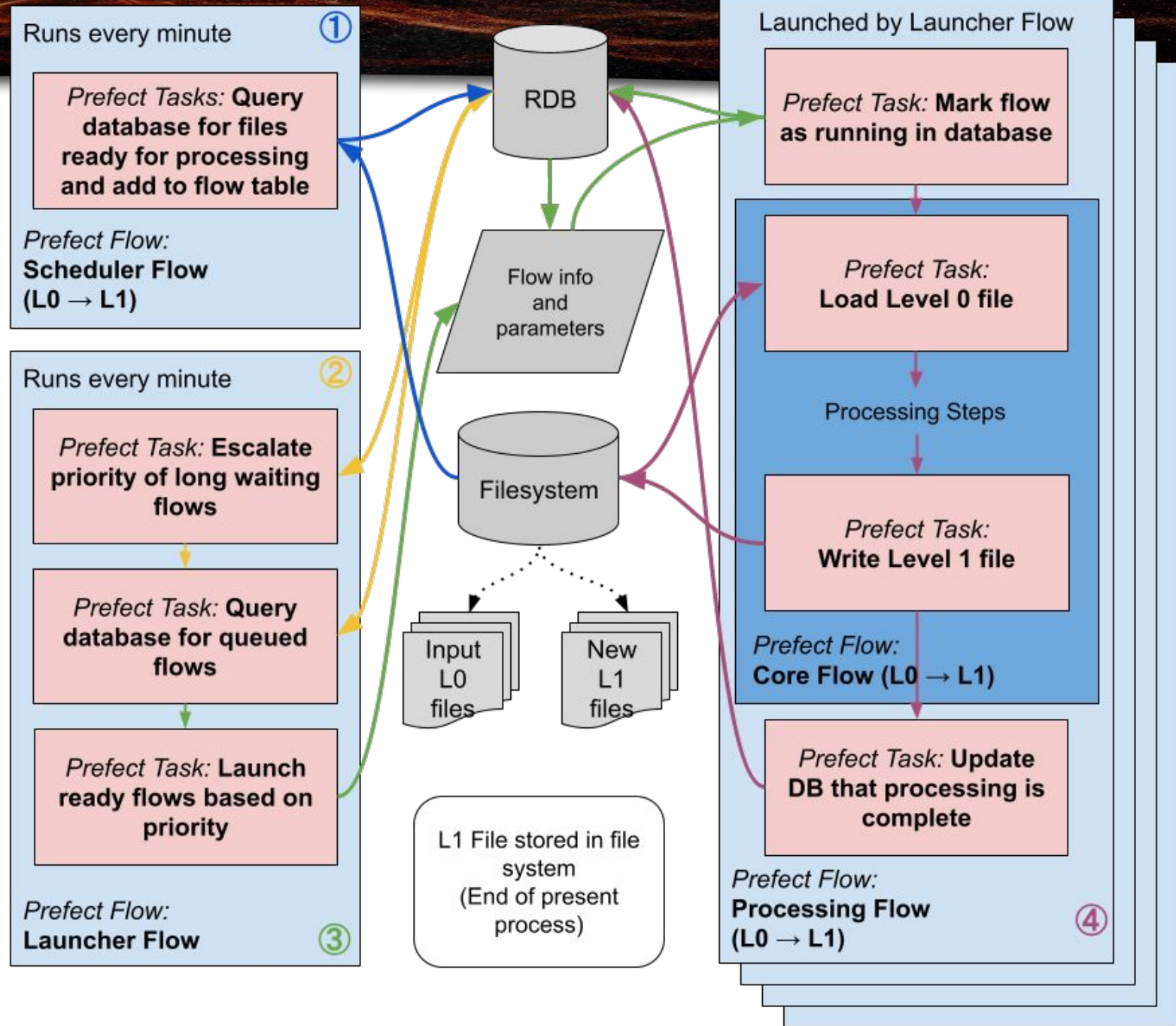
# Prefect Integration

All science code exists in a package called *punchbowl* and is represented by the dark blue

Automation is in *punchpipe* package

4 types of flows:

1. Core
2. Processing
3. Scheduler
4. Launcher







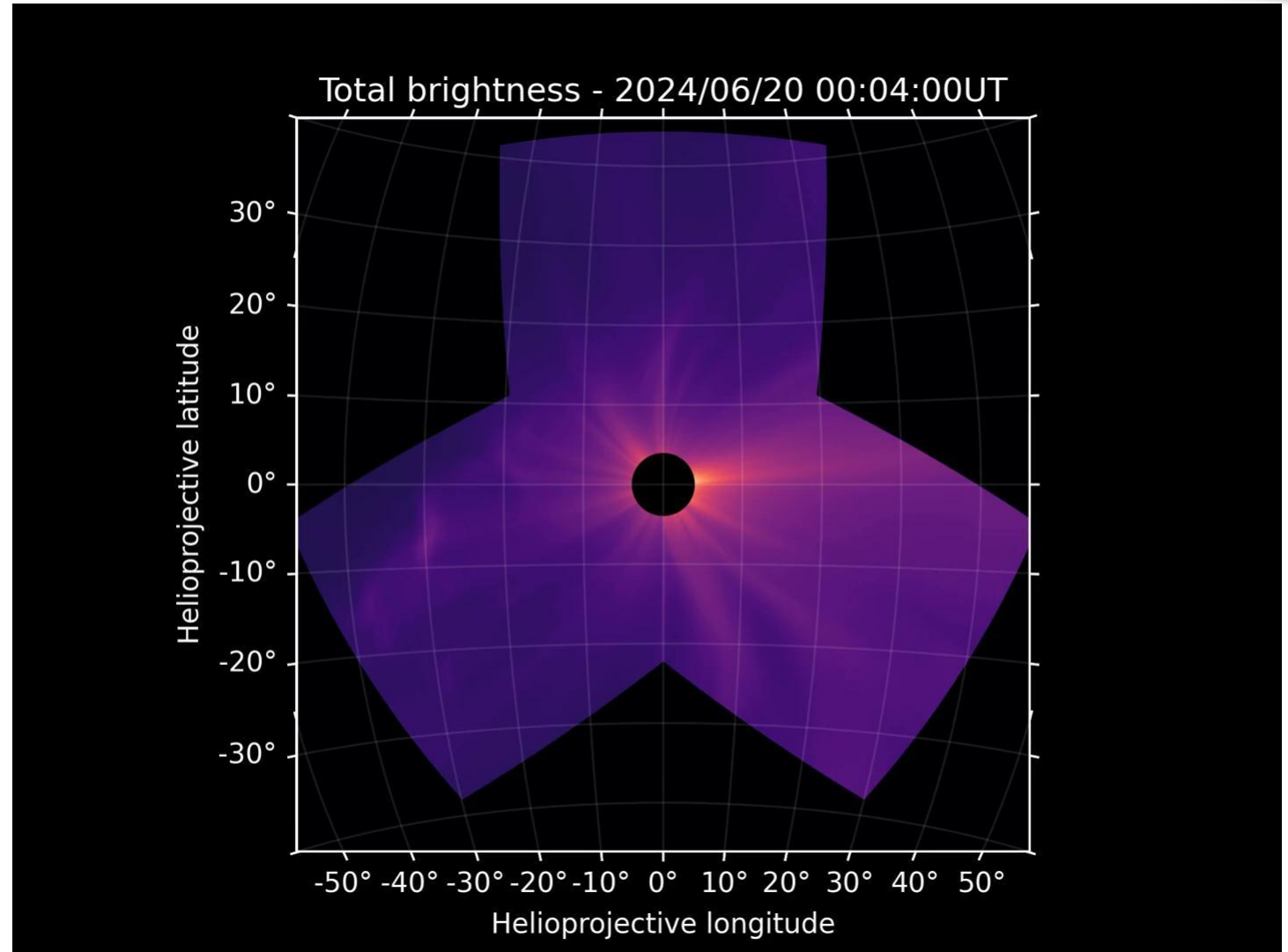
# Lessons Learned

- Create simulated data early so you can test early
  - Start with bare bones simulation and gradually make it more sophisticated
- Don't neglect code documentation
- Don't overdo official documents
  - They can eat up the entire development schedule
- Continuous integration is wonderful
- Clearly define your releases and release early



# Where We're Headed

- Launch early next year
- Data available as soon as commissioning ends





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### Follow PUNCH

<https://github.com/punch-mission>

PUNCH is an open mission comprised of four satellites that will change our understanding of the solar wind. The novel algorithms and software are freely available.