

Geospatial  
Center for the  
Arctic and  
Pacific (GCAP)

Chris Parrish

Oregon State University



# GCAP

- Supported by \$6.5-million (5-year) Geospatial Modeling Grant from the National Geodetic Survey (NGS)
- Based at OSU
- Partners include the University of Alaska Anchorage, the Columbia River Intertribal Fish Commission, and the Yurok Tribe
- GCAP's research supports NGS in modernizing the National Spatial Reference System (NSRS), the official system of latitude, longitude, height and gravity throughout the U.S.
- GCAP's education and outreach activities support the development of the next generation of surveyors, geodesists, and geospatial professionals



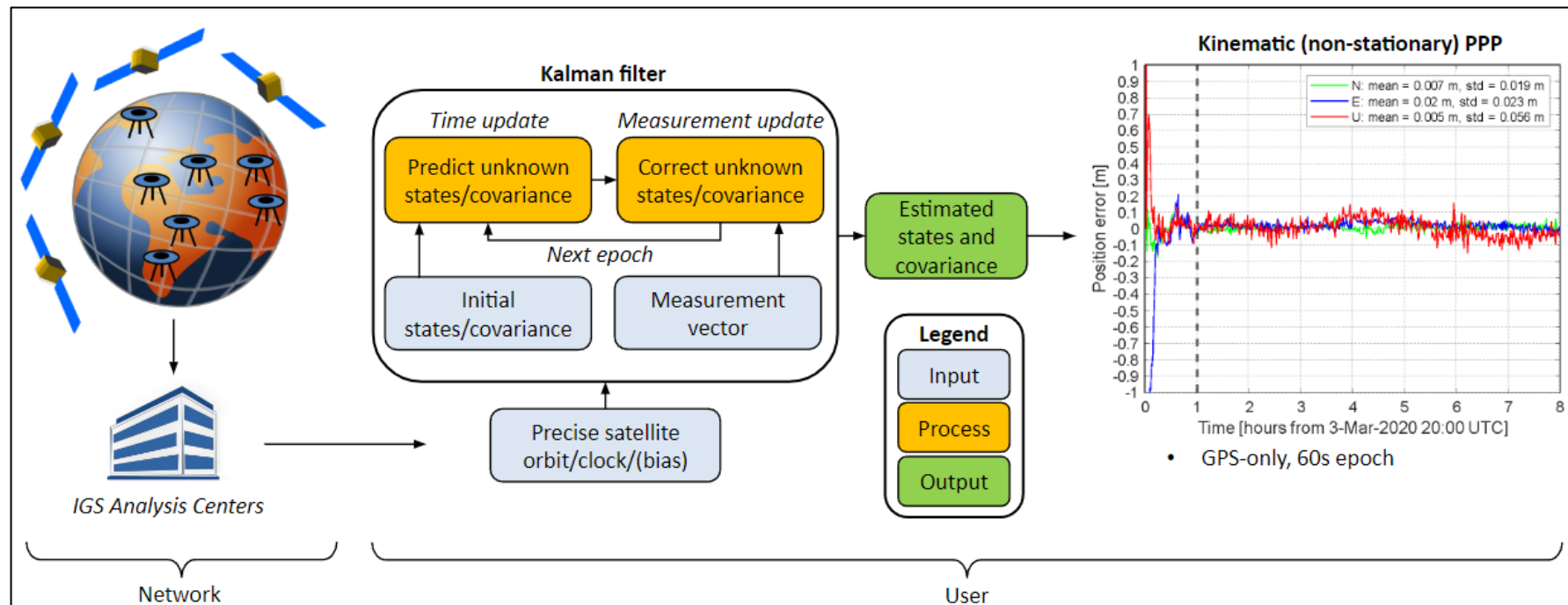
**Oregon State**  
University

# NGS Geospatial Modeling Grant

- 8 Tasks (each essentially being its own project), organized into 3 broad themes
  - Geodetic Tools, Models, and Workflows
  - Geodetic Infrastructure
  - Partnerships, Education, and Outreach
- 8 Task Leads from OSU, CRITFC, Yurok Tribe – Fisheries Dept, and UAA
- 8 PIs/Co-Is; 3-4 GRAs; 1 Project Manager, 2 FRAs, 1 Education Coordinator
- Focus on NSRS modernization and workforce development in a region that is tectonically-active, yet currently underserved by existing geodetic infrastructure, education, and outreach

# Task 1: PPP within the NSRS

- Lead: Dr. Brian Weaver
  - Goal: support fast and accurate real-time positioning in the NSRS
  - Develop and test a *Precise Point Positioning (PPP) – Real-time Kinematic (RTK)* model
    - cm-level positioning precision for a single GNSS receiver (reference station observations not needed)
    - Can support an RTN Alignment Service (Task 5), while also determining the positions of NGS CORS in real-time




# Task 2: Improve Hydrodynamic Modeling of Columbia & Klamath Rivers through NSRS Modernization

- Leads: Charles Seaton, Columbia River Inter-Tribal Fish Commission and DJ Brandowski, Yurok Tribe - Fisheries Dept
- Goal: leverage NAPGD2022 and GEOID2022 to improve hydrodynamic modeling for the Columbia River and Klamath River
- Supports efforts to protect and restore salmon runs



# Task 3: New Datums in Geospatial Applications

- Lead: Dr. Chris Parrish
- Goals:
  - Work with broad geospatial community (including software developers, vendors, and end users) on tools, procedures, and best practices to transition to NGS's new datums
    - Meet with various communities; obtain input on challenges and concerns
    - Ex: participation in ASPRS NSRS Modernization Working Group
  - Evaluate the accuracy, reliability, consistency, and scalability of datum transformations for large geospatial datasets
  - Ensure backwards compatibility
  - Perform outreach related to NSRS Modernization



**THE  
IMAGING & GEOSPATIAL  
INFORMATION SOCIETY**

**LAS Specification 1.4 - R15**

**Release Information:**  
Version Approved – November 2011  
Revision date – 09 July 2019

PDF build date – 09 July 2019  
GitHub commit – 72a54a4ab79bdb94e4ee7977be2859c41fc119f0  
GitHub repo – <https://github.com/ASPRSorg/LAS>

**Published by:**  
The American Society for Photogrammetry & Remote Sensing  
425 Barlow Place, Suite 210  
Bethesda, Maryland 20814-2160  
Voice: 301-493-0290  
Fax: 225-408-4422  
Web: [www.asprs.org](http://www.asprs.org)

Copyright © 2002-2019 American Society for Photogrammetry and Remote Sensing (ASPRS).  
All rights reserved.

# Task 4: Develop and Evaluate OPUS Projects

- Lead: Dr. Brian Weaver
- Goals:
  - Rigorously test and evaluate new OP features (criteria: accuracy, reliability, consistency, and scalability)
  - Ensure results are tied to NSRS
  - Assist in the development of SOPs to increase public, academic, and private sector constituents' ability to access the NSRS

Results From ALL SESSIONS

Controls: ? ← ↻

LEGEND

MARKS: ● meet preferences ● do not meet preferences ● are not included ● have error

CORS: ● meet preferences ● do not meet preferences ● are not included

Baselines: [Progress Bar]

Map Satellite

MARKS

- lack
- yb10
- yb19
- yb32

Add MARKS

CORS

- ▲ chzz
- ▲ iflo
- ▲ lpsb
- ▲ mcso
- ▲ orsb
- ▲ p032

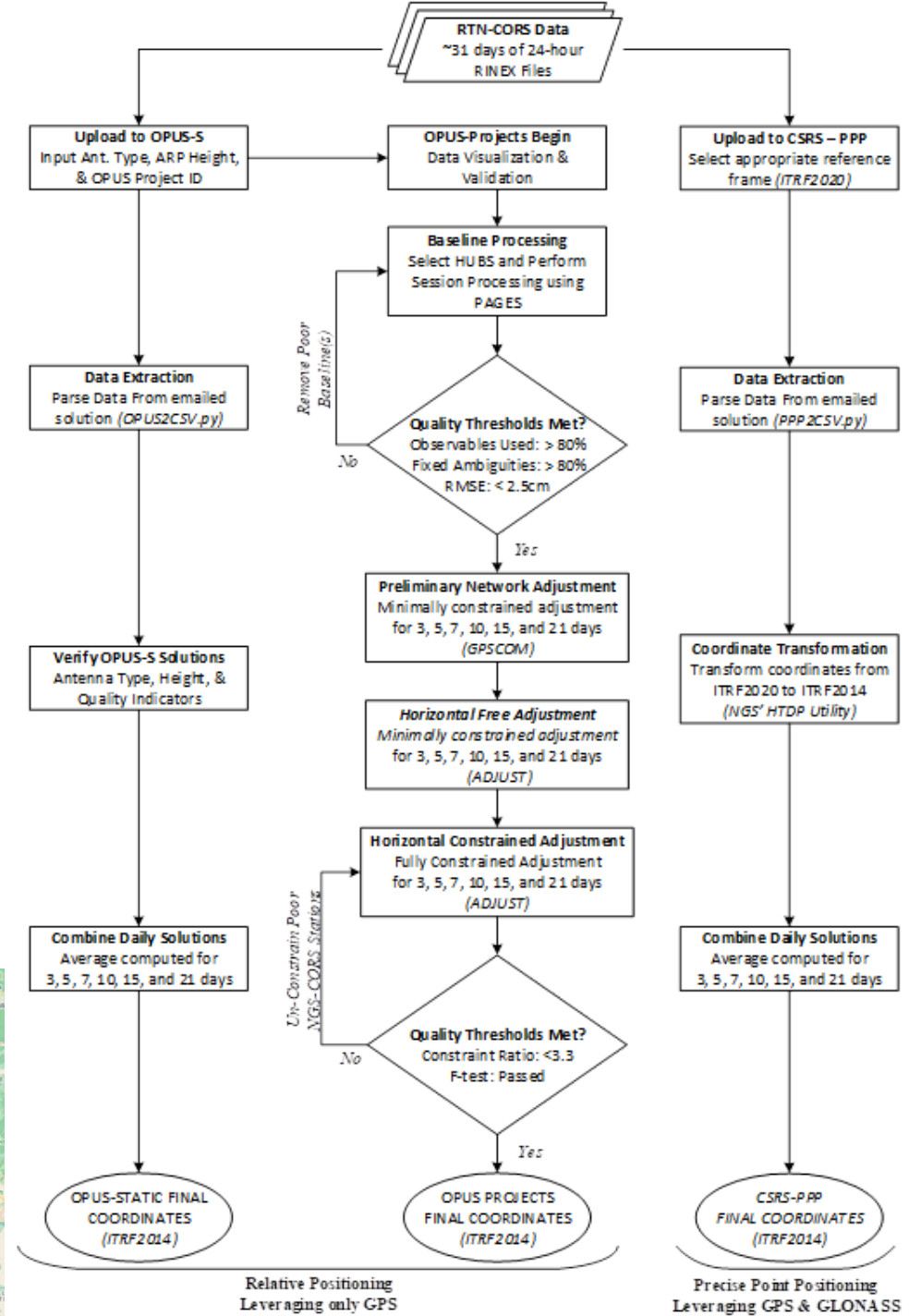
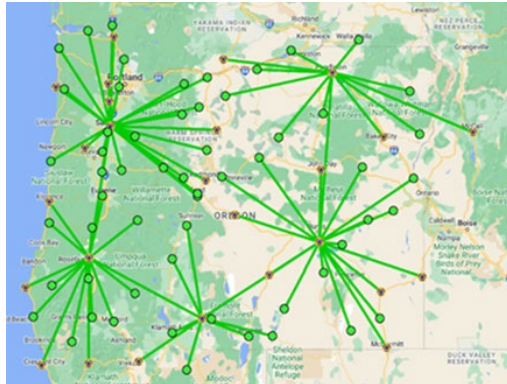
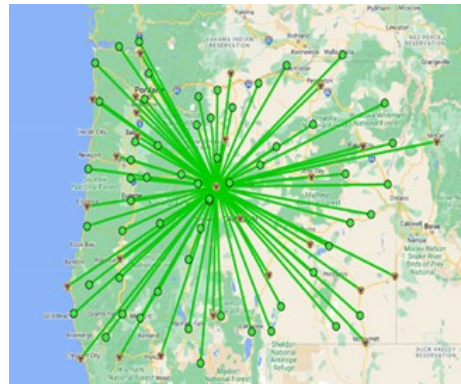
Add/Del CORS

Occupation From ALL SESSIONS

Map data ©2020 Google, INEGI 100 km Terms of Use

# Task 5: Develop a National RTN Alignment Service

- Lead: Chase Simpson
- Goals:
  - Exploration of alternative methods to monitor Real-Time Network (RTN) health
  - Develop a semi-automatic workflow for aligning RTNs to the NSRS
  - Create an accessible web-based interface to empower surveying practitioners and RTN managers with real-time network alignment information

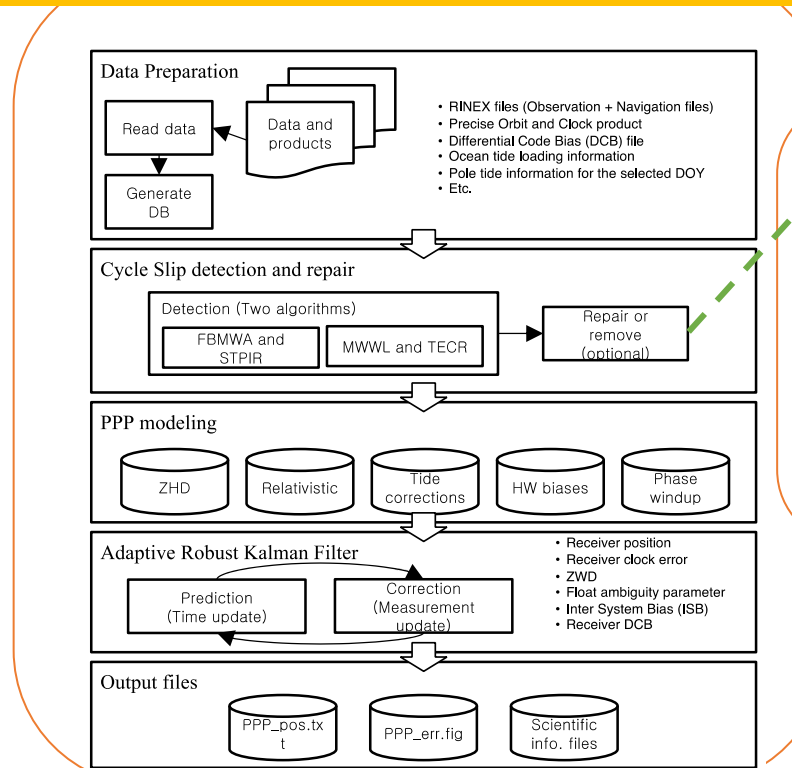




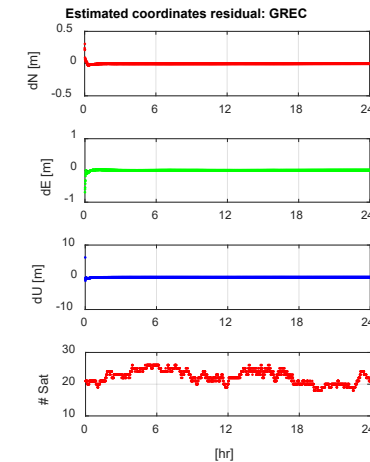
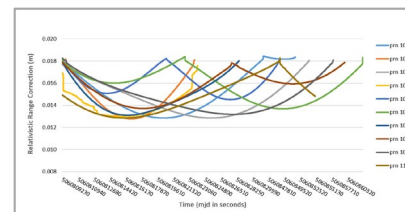
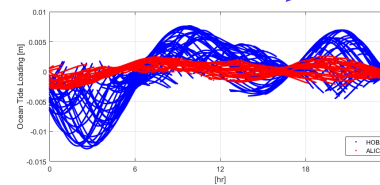
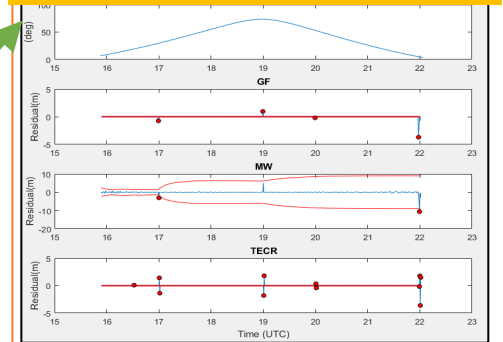
# Task 6: Multi-GNSS

- Lead: Dr. Jihye Park
- Assist in the Development and Testing of Multi-GNSS Processing Service
- Objectives
  - Participate in M-PAGES development and testing
  - Develop GNSS data processing algorithms relevant to M-PAGES
  - Develop advanced GNSS data processing algorithms for earth environment monitoring (e.g., GNSS-Met, GNSS-RS)
  - Train students in multi-GNSS

## ORPPP-Precise Point Positioning SW



## ORCyder-Cycleslip Detection and repair SW



# Tasks 7-8: Education and Outreach

- Leads: Dr. Mike Olsen and Dr. Caixia Wang (UAA)
- Significant decline in the number of people going into the fields of geomatics and geodesy since the 1990s
- At the same time, we've seen rapid advancement in the technologies used in these fields
- GCAP's goals
  - Expand/enhance our education and outreach programs
  - Enhance geomatics workshop series
  - Improve the accessibility of educational materials
  - Broaden the workforce & develop the next generation of professionals



# GCAP in the News

---

- News Release:  
<https://www.diwou.com/2023/11/09/oregon-state-to-receive-6-5m-for-federal-effort-to-modernize-geospatial-coordinate-system/>
- KGW TV Interview:  
<https://www.youtube.com/watch?v=agXKo4A039A>
- OSU Barometer interview
- OPB “Live Wire”: working to schedule interview

