

# Alaska's Continuously Operating Reference Network (ACORN)

*Alaska Geospatial Council GIS Day*

*Presented by:*  
Peter Flint, Land Surveyor  
Mining, Land & Water  
Alaska Department of  
Natural Resources

*November 14, 2022*



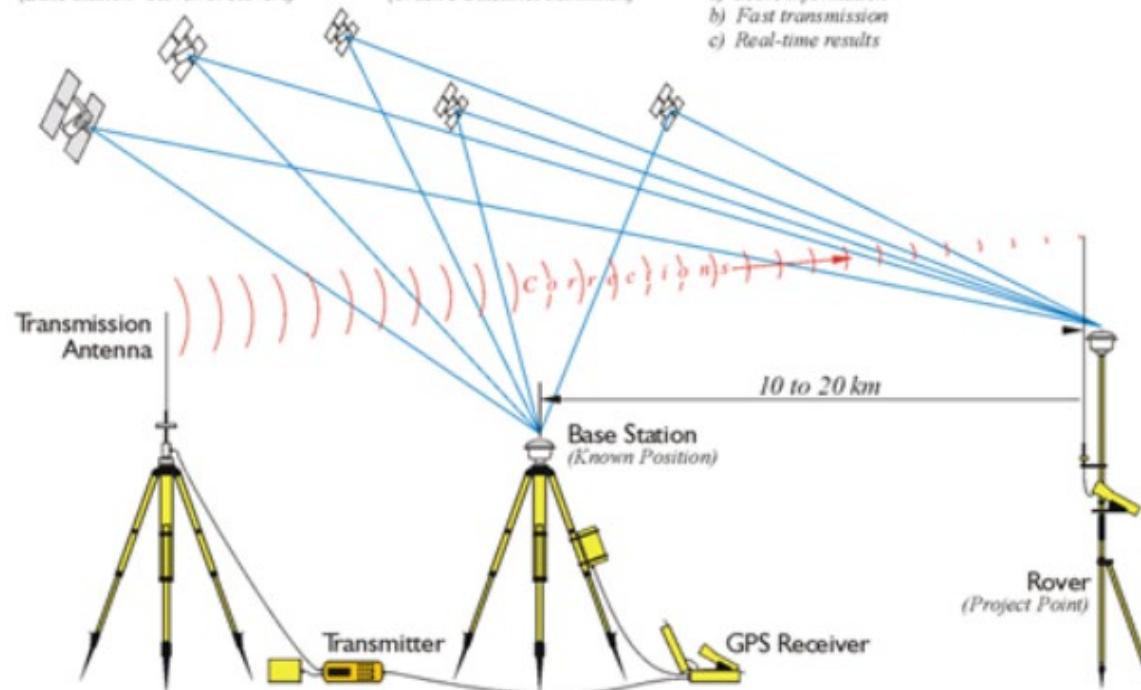
# GNSS REAL-TIME NETWORKS VS TRADITIONAL GNSS REAL-TIME KINEMATIC (RTK) SURVEYING

## Summary

### Real-Time-Kinematic

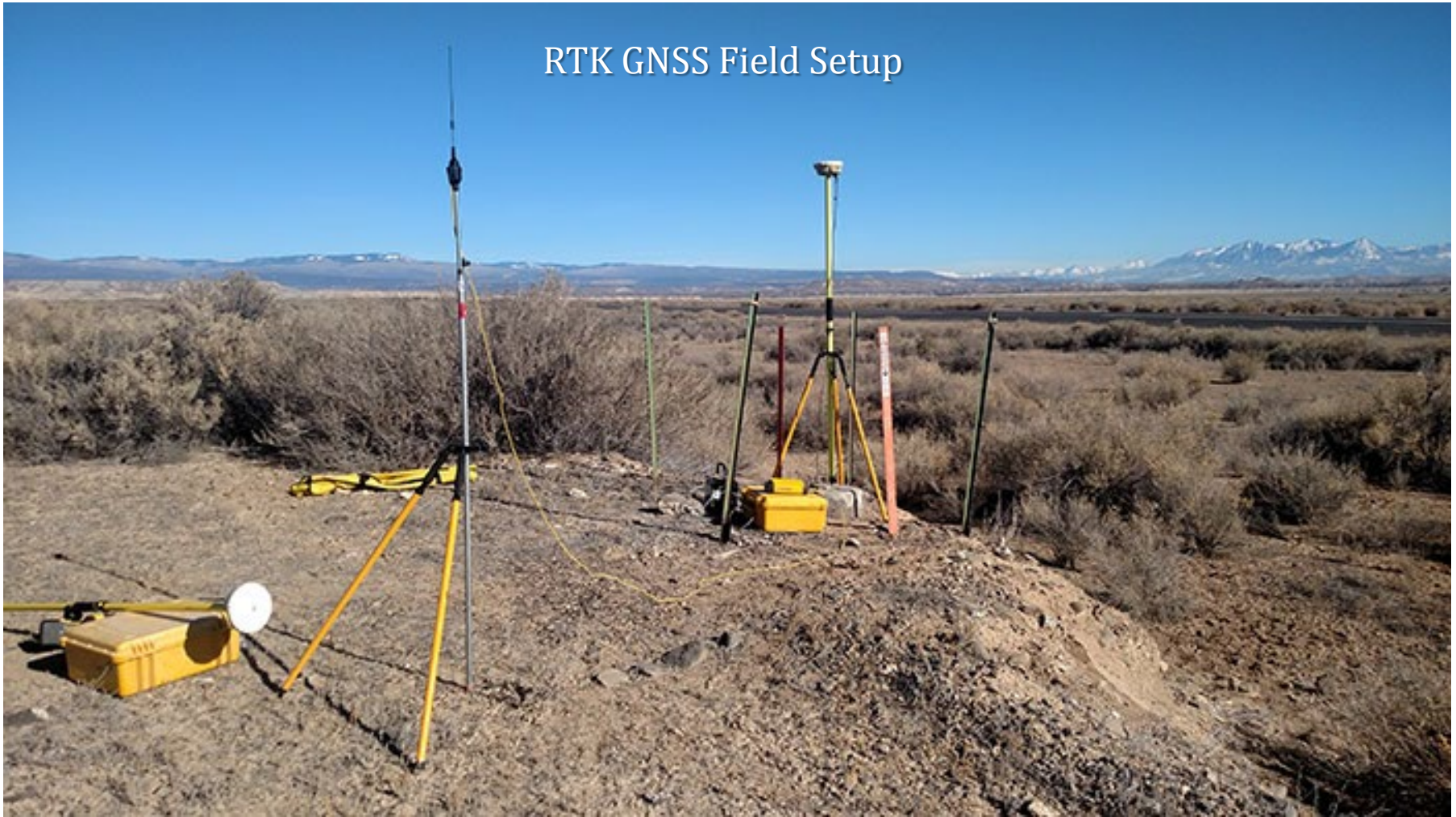
Positional Accuracy +/- 2 cm or so

- Same Satellite Constellation  
(Base Station - Rover/ or Rovers)
- Carrier Phase  
(Track 5 Satellites Minimum)
- Radio Link
  - a) More information
  - b) Fast transmission
  - c) Real-time results

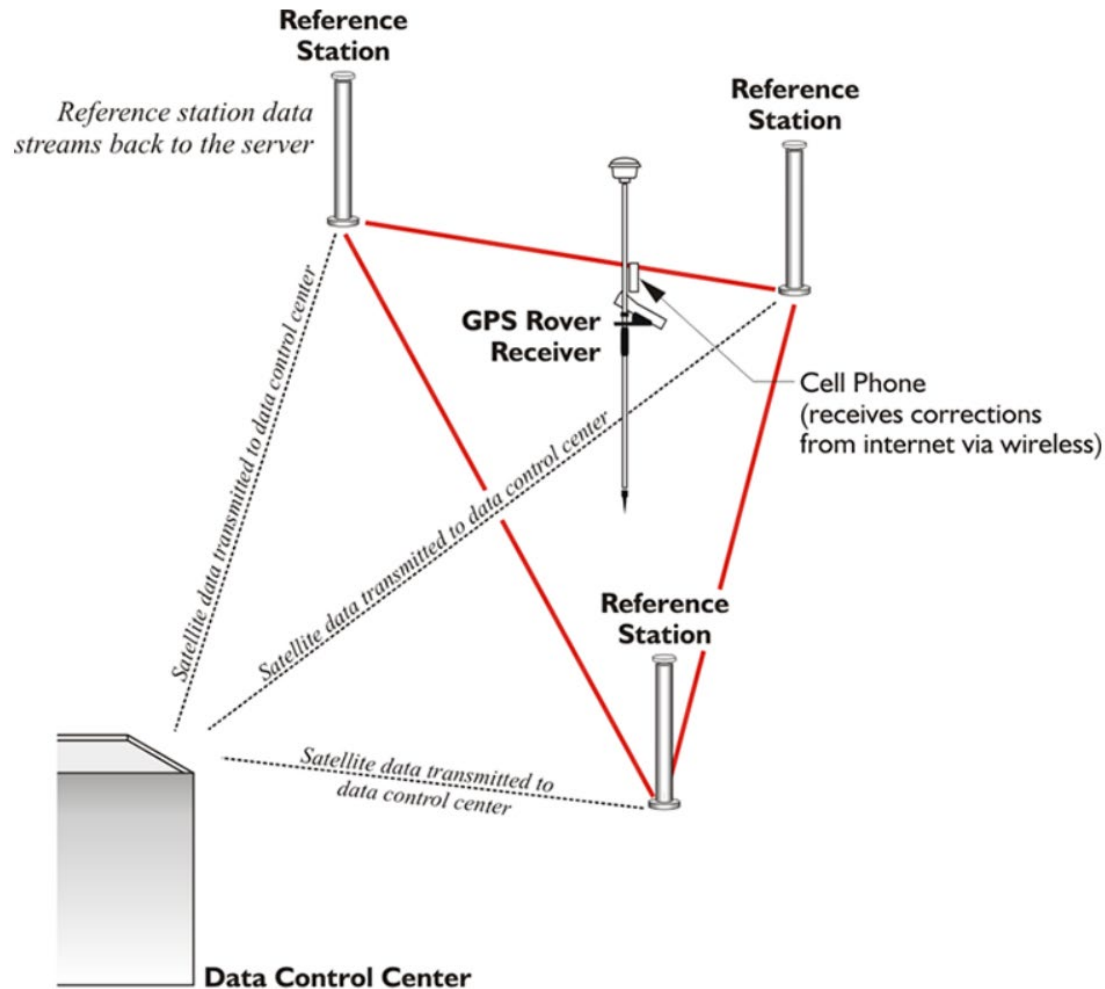


# GNSS REAL-TIME NETWORKS VS TRADITIONAL GNSS REAL-TIME KINEMATIC (RTK) SURVEYING

RTK GNSS Field Setup



# GNSS REAL-TIME NETWORKS VS TRADITIONAL GNSS REAL-TIME KINEMATIC (RTK) SURVEYING



Real-Time Network  
Source: GPS for Land Surveyors

# ACORN PARTNERSHIP

- **SOA-DNR to provide:**
  - **Full GNSS reference station and materials needed to install**
  - **Network processing software within SOA servers specifically built for this project**
  - **Support for any surveying/mapping curriculum**
  - **All maintenance costs associated with system upkeep**
- **Partner to Provide**
  - **Location for installation, power, and data connection for GNSS Station to continuously operate**
  - **IT and Facilities coordination for installation to meet needs of both partners**
  - **Local contact for any minor troubleshooting – i.e. system restarts and checks**

# ACRON PARTNERSHIP



# ACRON PARTNERSHIP



# ACRON FY 23 PROGRESS

## **Winter 2021/2022**

- Awarded Contract to Frontier Precision for Hardware and Support

## **Spring 2022**

- Installed Trimble Pivot Platform and purchased 30 Trimble Alloy GNSS Reference Stations.

## **Summer 2022**

- Worked with existing GNSS reference station owners to incorporate data streams into Pivot (NPS, UNAVCO, City of Fairbanks, Others)
- Developed MOU for existing GNSS Station Operators and Partner's willing to host a station
- Contracted Installation of 7 GNSS Reference Stations at SOA Ferry Terminals

## **Fall/Winter 2022**

- Currently have 23 stations in the system
- Testing Southcentral network that will cover from Palmer to Homer



# ACRON PIVOT WEB INTERFACE

The screenshot displays the ACORN Pivot Web Interface in a browser window. The page title is "ACORN - Alaska Continuously Operating Reference Network". The browser address bar shows the URL "10.213.70.8/TrimblePivotWeb/Map/SensorMap.aspx". The interface includes a navigation menu on the left with options like "Home", "Sensor Map", "Login", and "External Links". The main content area features a map of Alaska with several sensor locations marked by colored pins (green, yellow, red). A scale bar indicates 100 km and 100 miles. The footer contains accessibility and privacy information, along with the copyright notice "© COPYRIGHT 2022, ALASKA DEPARTMENT OF NATURAL RESOURCES".

**ACORN**  
Alaska Continuously Operating Reference Network  
Alaska Department of Natural Resources

ACORN - Alaska Continuously Operating Reference Network

Home > Sensor Map

Sensor Map

23 sensors:

- AKAN
- AKMT
- AKRO
- AKUA
- City of Fairbanks
- DENA
- GAA3
- GAAR
- KEFJ
- KNAI
- LACL
- UNAVCOAC03
- UNAVCOAC11
- UNAVCOAC15
- UNAVCOAC23
- UNAVCOAC32
- UNAVCOAC44
- UNAVCOAC53
- UNAVCOAC71
- WRS2
- WRS3
- WRST
- YUCH

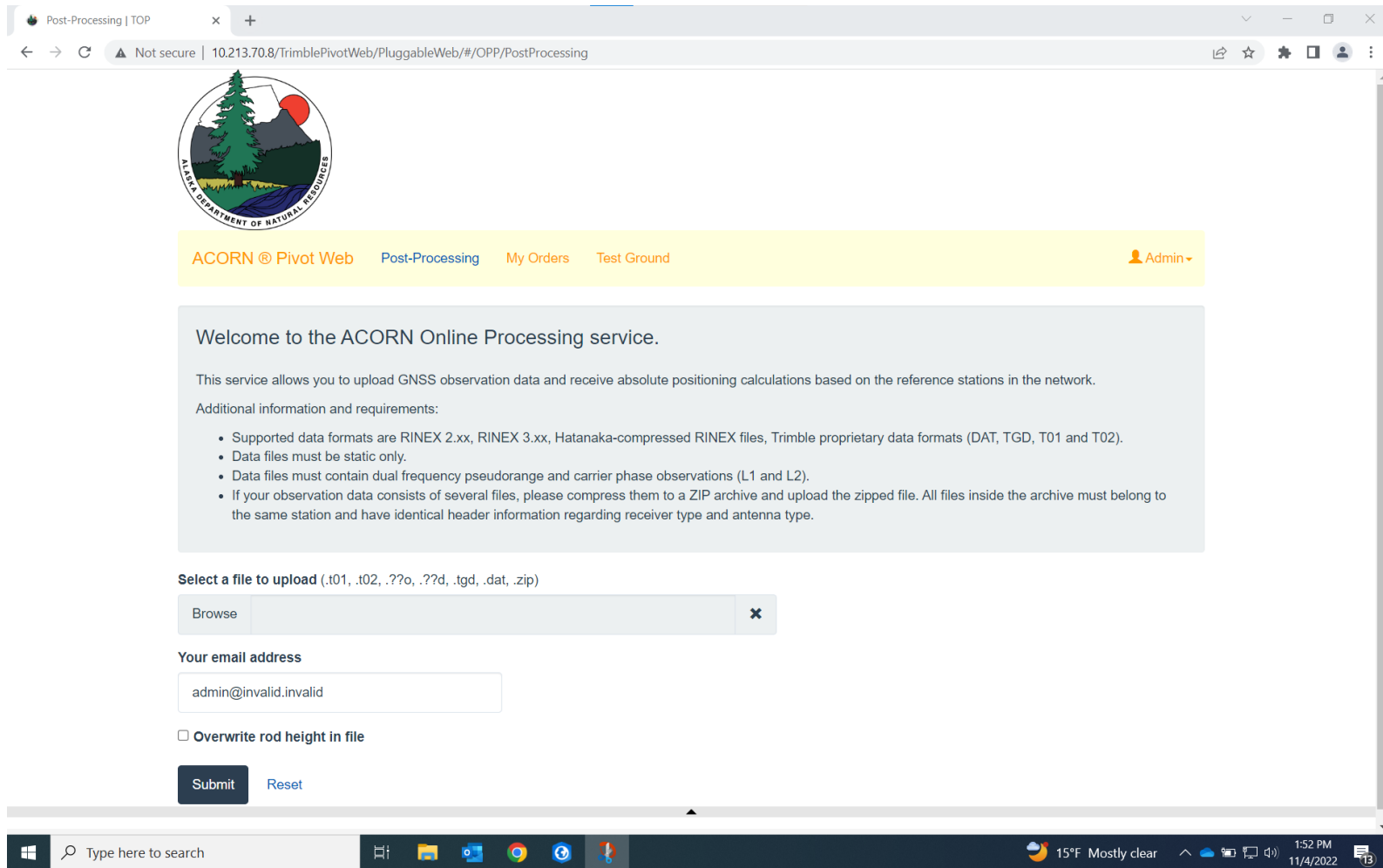
© OpenStreetMap contributors

100 km  
100 mi

ACCESSIBILITY CONTACT PRIVACY POLICY © COPYRIGHT 2022, ALASKA DEPARTMENT OF NATURAL RESOURCES

15°F Mostly clear 1:46 PM 11/4/2022

# ACRON PIVOT WEB INTERFACE

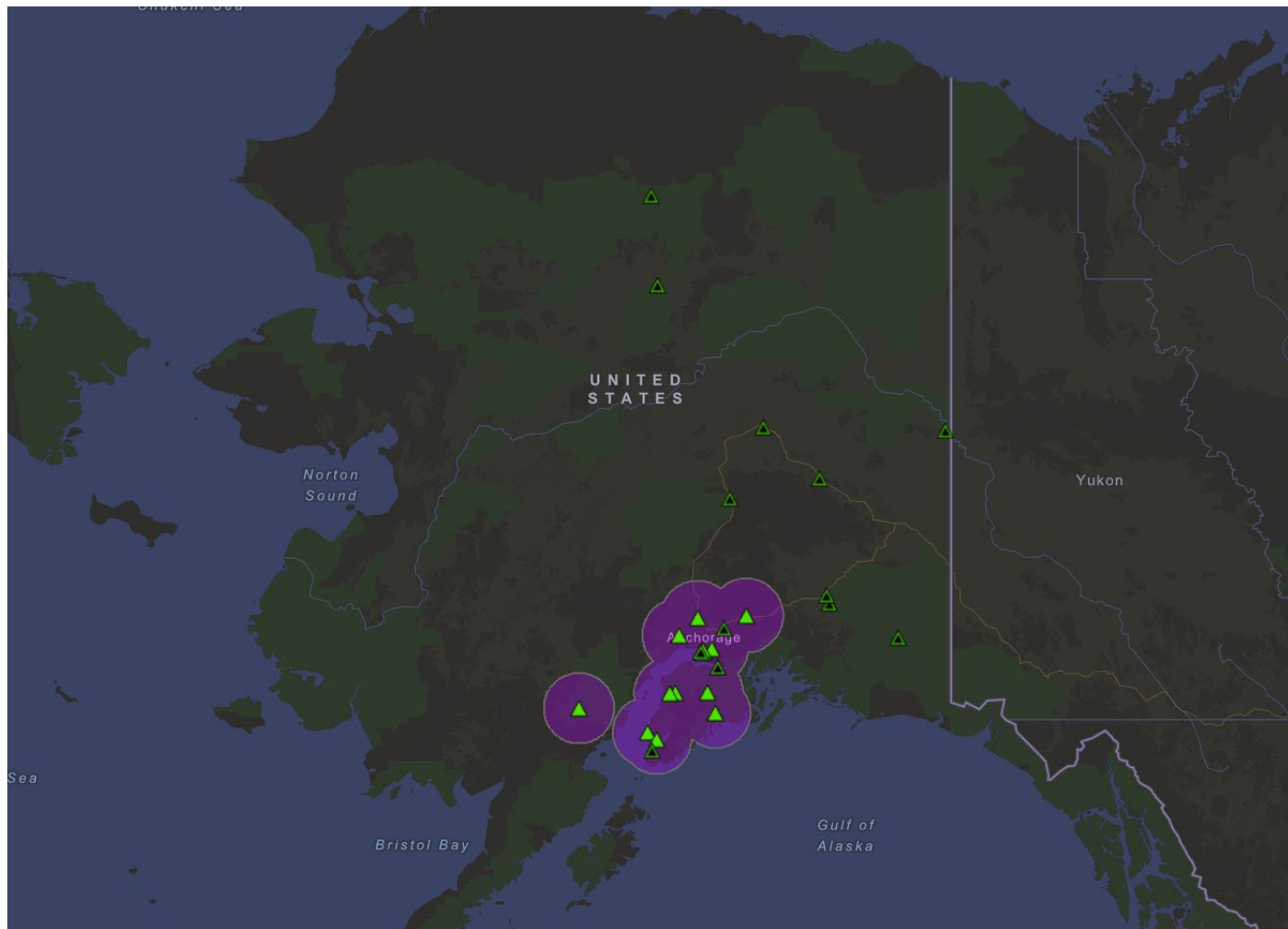


The screenshot shows a web browser window with the following elements:

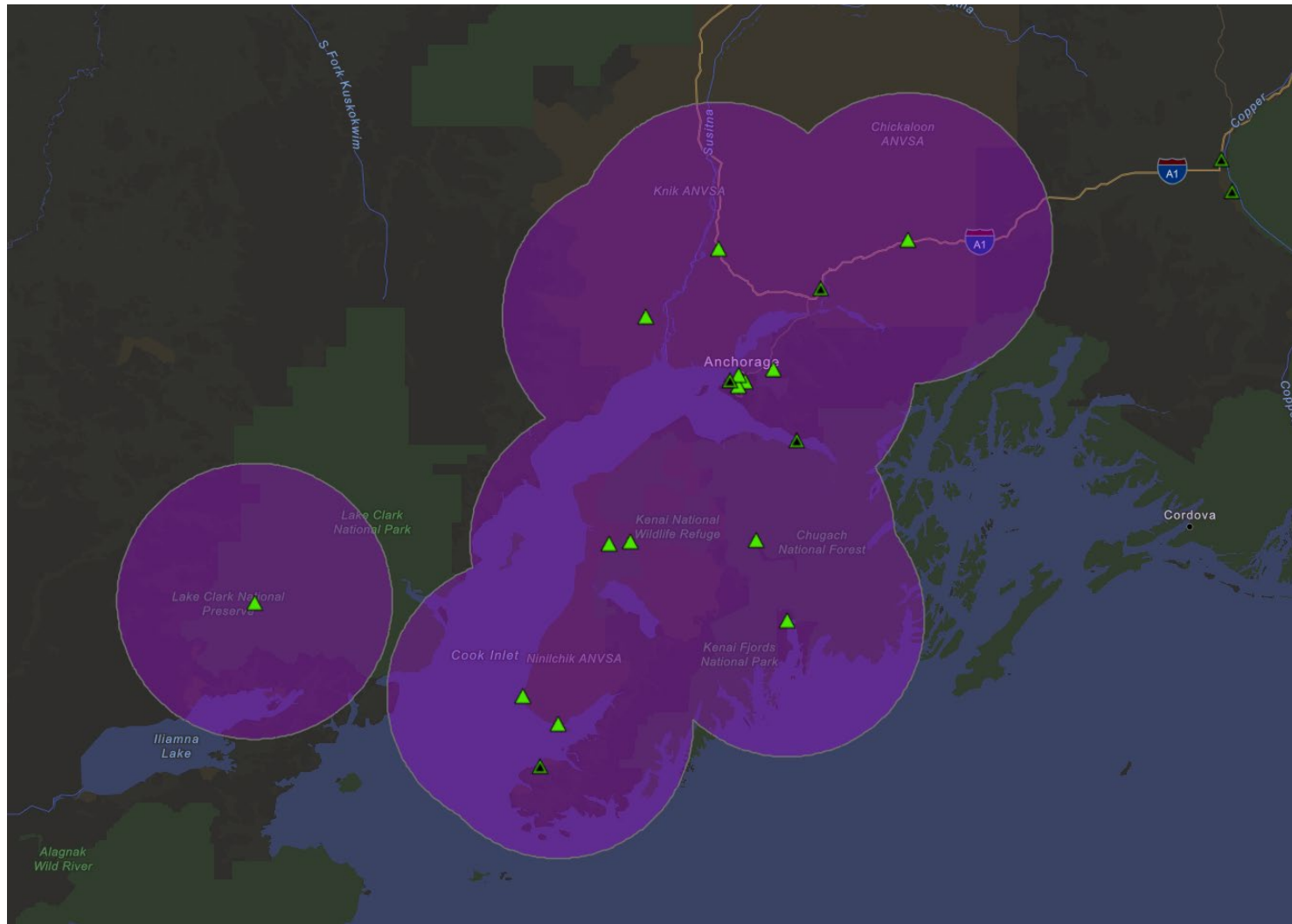
- Browser Tab:** Post-Processing | TOP
- Address Bar:** Not secure | 10.213.70.8/TrimblePivotWeb/PluggableWeb/#/OPP/PostProcessing
- Logo:** Alaska Department of Natural Resources (ADNR) logo featuring a tree, mountains, and a sun.
- Navigation Bar:** ACORN @ Pivot Web | Post-Processing | My Orders | Test Ground | Admin (dropdown)
- Welcome Message:** Welcome to the ACORN Online Processing service.
- Description:** This service allows you to upload GNSS observation data and receive absolute positioning calculations based on the reference stations in the network.
- Additional information and requirements:**
  - Supported data formats are RINEX 2.xx, RINEX 3.xx, Hatanaka-compressed RINEX files, Trimble proprietary data formats (DAT, TGD, T01 and T02).
  - Data files must be static only.
  - Data files must contain dual frequency pseudorange and carrier phase observations (L1 and L2).
  - If your observation data consists of several files, please compress them to a ZIP archive and upload the zipped file. All files inside the archive must belong to the same station and have identical header information regarding receiver type and antenna type.
- File Upload Section:** Select a file to upload (.t01, .t02, .??o, .??d, .tgd, .dat, .zip). Includes a "Browse" button and a file selection area.
- Email Address:** Your email address: admin@invalid.invalid
- Options:**  Overwrite rod height in file
- Buttons:** Submit, Reset

The Windows taskbar at the bottom shows the search bar, task view, and several application icons. The system tray displays the weather (15°F Mostly clear), time (1:52 PM), and date (11/4/2022).

# ACRON SOUTH CENTRAL NETWORK



# ACRON SOUTH CENTRAL NETWORK



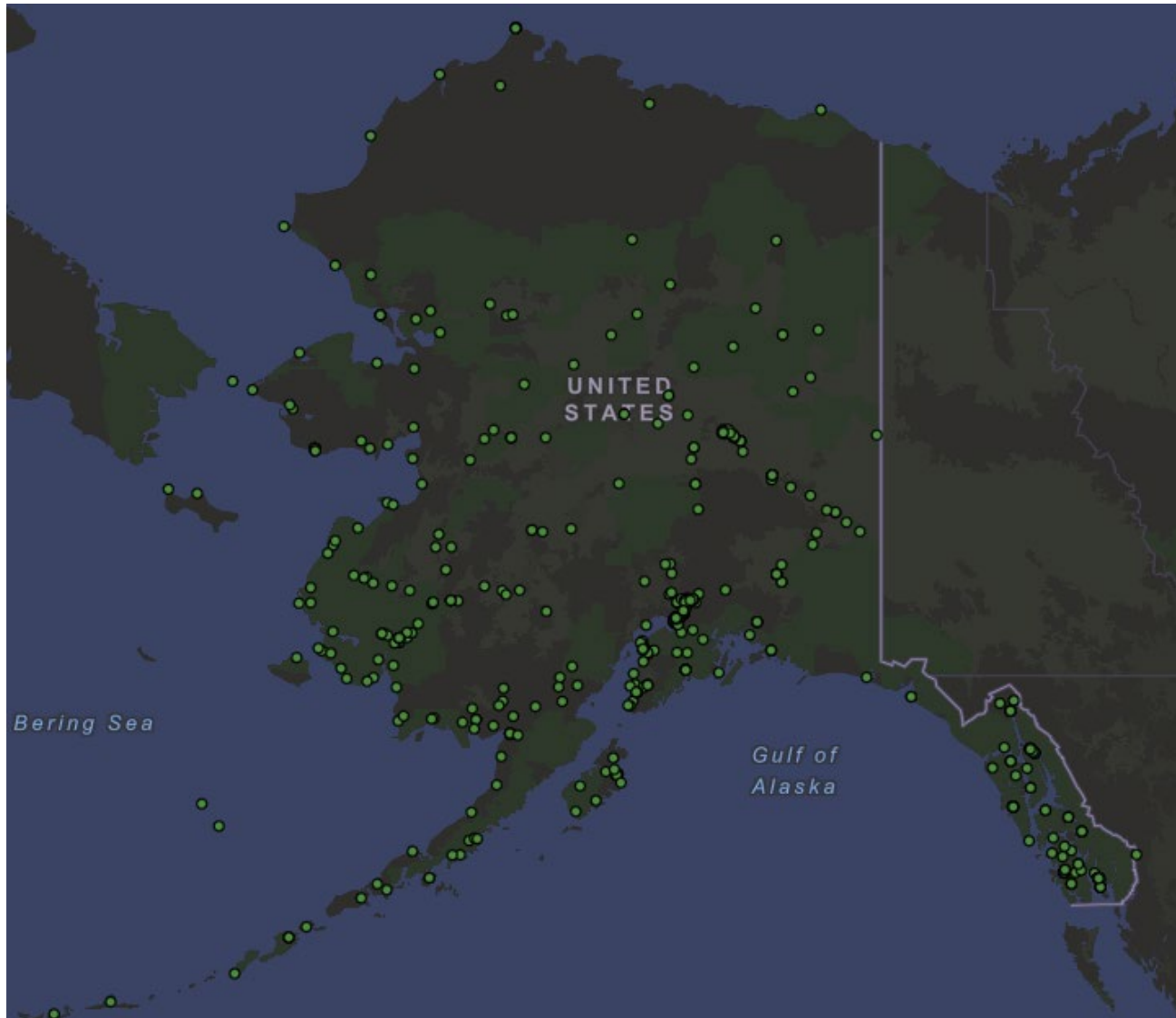
# ACRON FERRY TERMINAL INSTALLATIONS



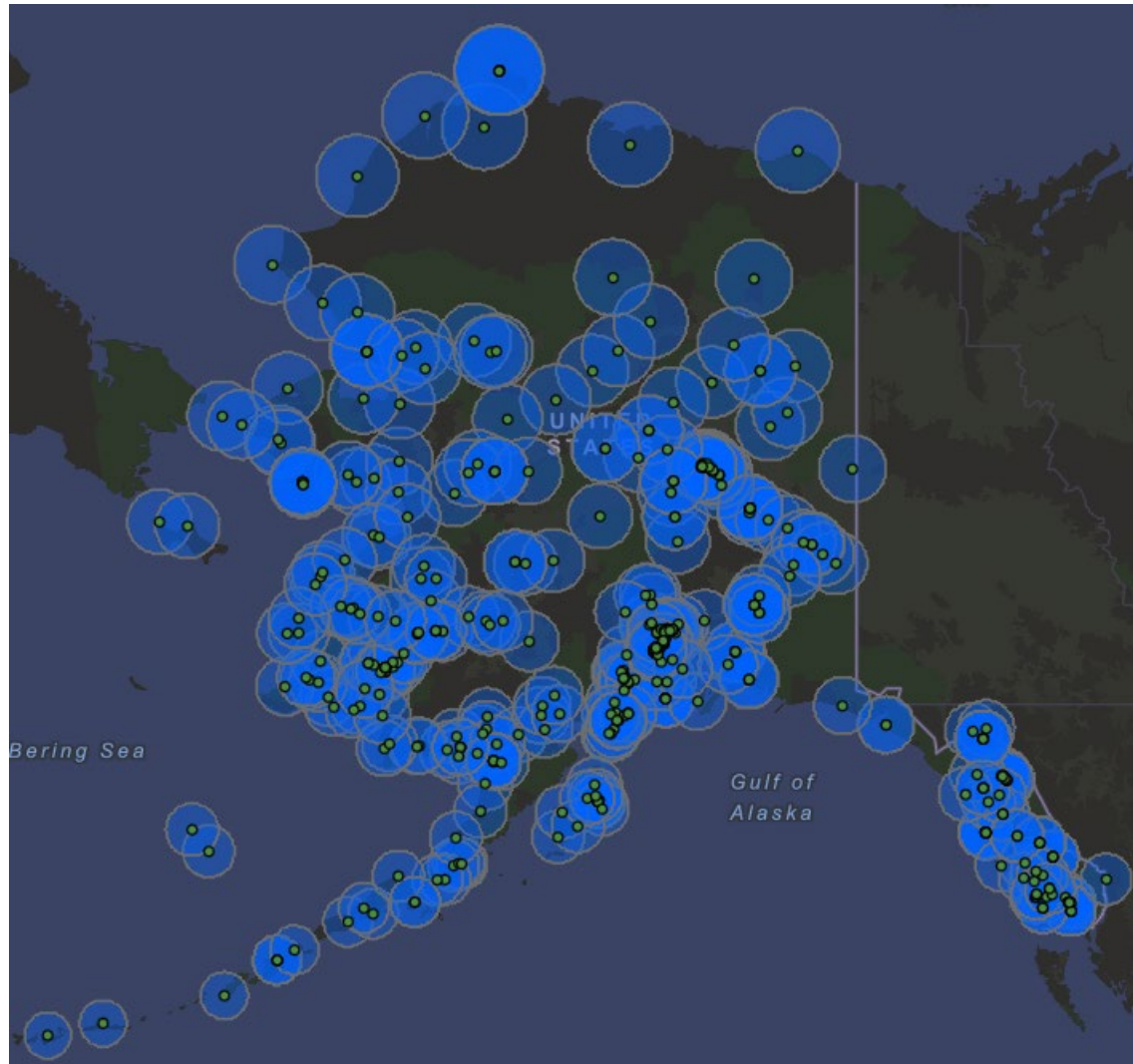
# ACRON FUTURE OUTLOOK

- MOU with DOT&PF for installing stations at Highway Maintenance Stations
- Continued Buildout at Ferry Terminals throughout the state
- MOU with school districts for installing stations at various schools throughout AK

# ACRON SCHOOL DISTRIBUTION



# ACRON SCHOOL DISTRIBUTION





# QUESTIONS

