



I-ALiRT: Improving SWx Forecasting Capabilities with IMAP



Laura Sandoval¹, Greg Lucas¹, Evan Brooken¹, Steve Monk¹, Kristopher Larsen¹,
Christina O. Lee², Eric R. Christian³, David J. McComas⁴, Arik Posner⁵

¹ Laboratory for Atmospheric and Space Physics, CU Boulder

² University of California, Berkeley

³ NASA Goddard Space Flight Center

⁴ Princeton University

⁵ NASA Headquarters

Imperial College London

Overview

The Interstellar Mapping and Acceleration Probe (IMAP) mission includes the Active Link for Real-Time (I-ALiRT) system to measure Space Weather phenomena. IMAP I-ALiRT will continually broadcast data 24/7 from the IMAP observatory, facilitated by NASA's Deep Space Network (DSN) of ground stations as well as antenna partners across the globe. The IMAP Science Data Center (SDC) at the Laboratory for Atmospheric and Space Physics (LASP) will receive I-ALiRT raw data from ground stations and implement a real-time, low-latency processing pipeline. I-ALiRT will utilize AWS cloud resources to facilitate efficient data ingest and processing. Launch for the IMAP mission is scheduled for 2025.

Data Products and Latencies

IMAP will be in orbit about the Sun-Earth L1 Lagrange point. The latency for the SDC to decom the packets and process the data is < 5 min. Data products will be made available to the public through the IMAP Science Data Center via a REST API using Amazon API Gateway. Additionally, data products will be available to view in real-time plots similar to <https://lasp.colorado.edu/space-weather-portal/now>.

Table 1. I-ALiRT Instruments and Data Products

Instrument	Data product	Cadence
Magnetometer (MAG)	Magnetic Field Vector, Total Magnetic Field, Magnetic Field Clock and Cone Angles	4 sec
Solar Wind Electrons (SWE)	Suprathermal Electron Anistropy	1 min
Solar Wind and Pickup Ions (SWAPI)	Pseudo Solar Wind Ion Flow Speed, Proton Number Density, Solar Wind Ion Temperature	12 sec
Compact Dual Ion Composition Experiment (CoDICE-Lo)	Solar Wind Charge State Ratios	4 min
CoDICE-Hi	Suprathermal and Solar Wind Proton Fluxes	1 min
High-energy Ion Telescope (HIT)	Energetic Proton and Electron Fluxes	1 min

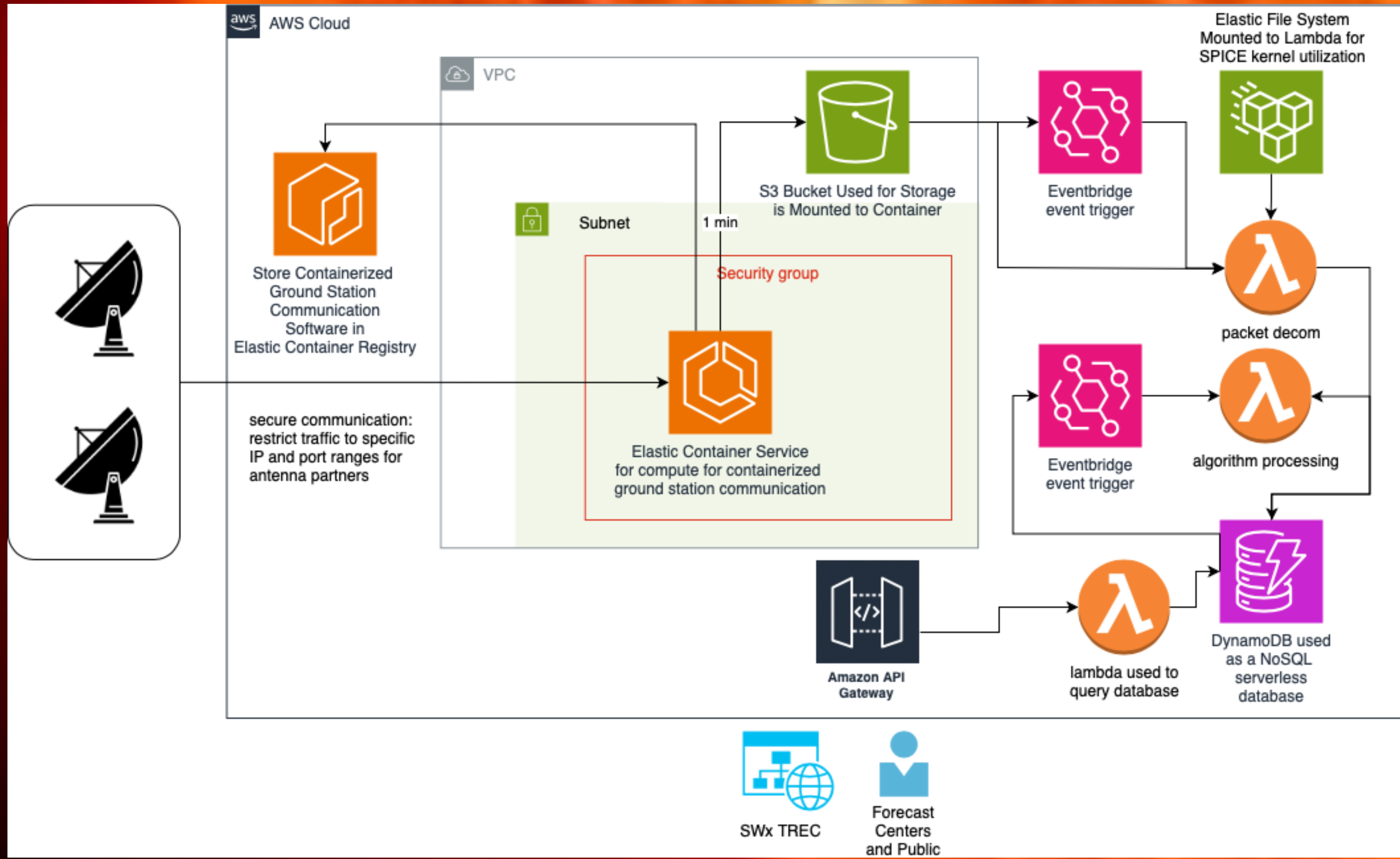


Figure 1. I-ALiRT AWS Cloud Resources