DOWNLOADING IMAGES FROM WEATHER SATELLITES

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K5DKB

Image received by K5DKB from Russian METEOR M2-4 16 JAN 2025

WHAT IS IT?

- Currently, there a 5 satellites that transmit on VHF that users can <u>easily</u> receive photos from.

- As the satellites pass overhead, they send real-time images back to earth that can be received and decoded by an ordinary computer.

- The hardware requirements are very minimal, and the software is free.

SATELLITES?

USA

- NOAA-15
  - Launched 15 MAY 1998
- NOAA 18
  - Launched 30 MAY 2005
- NOAA 19
  - Launched 6 FEB 2009

Russia

- METEOR M2-3
  - Launched 27 JUN 2023
- METEOR M2-4
  - Launched 29 FEB 2024
- *METEOR M2-5 possibly launching in 2025

WHERE ARE THEY?

- These satellites maintain a polar orbit around the Earth at an altitude of about 800 to 865km or about 500 to 540 miles. That is about the distance to Pensacola, FL or Roswell, NM.

- By comparison, the ISS only orbits at about 420km or 260 miles. That is about the distance to Lafayette, LA or Sweetwater, TX.
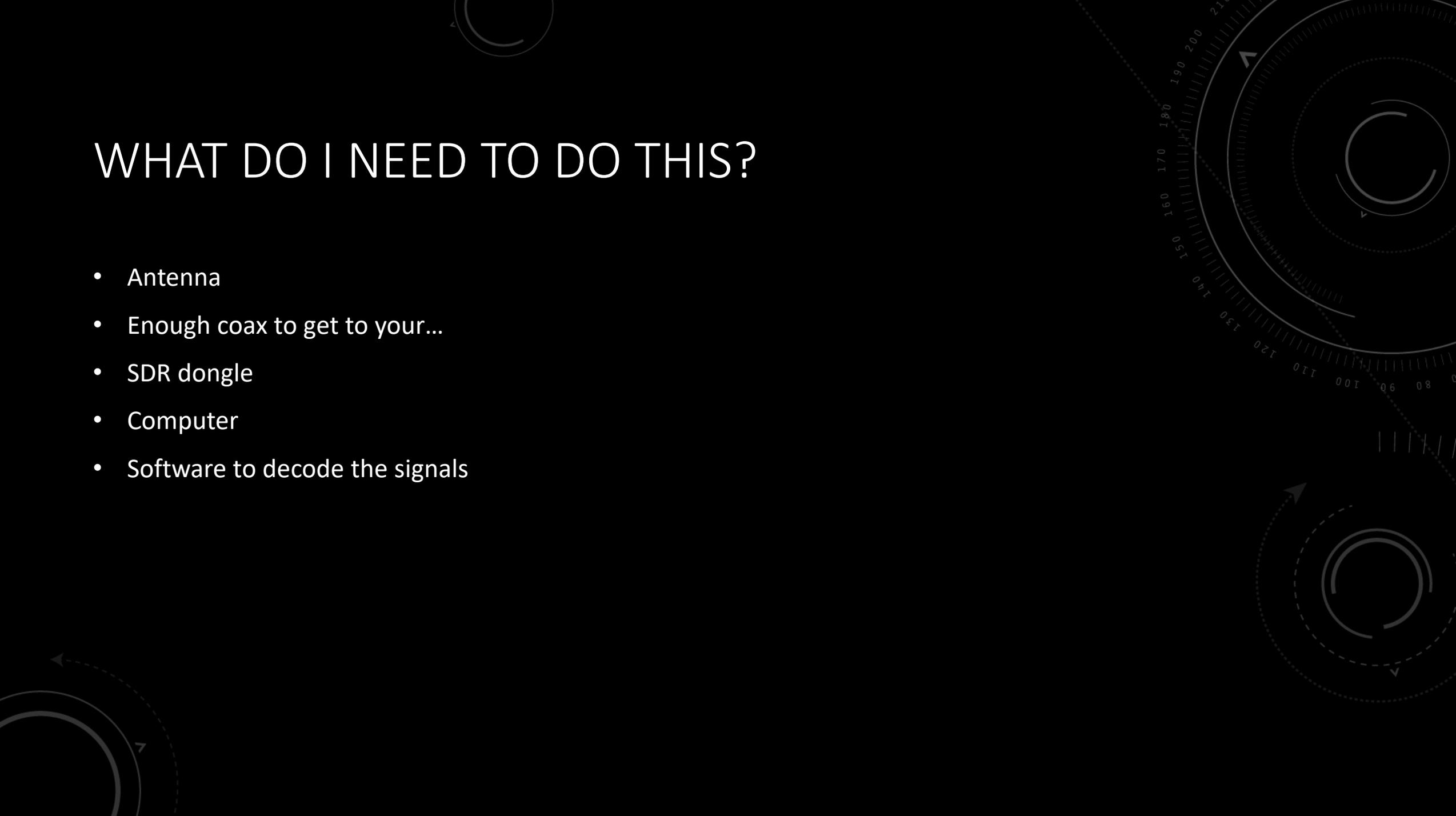

Equatorial orbit

Polar orbit

WHO CAN DO IT?

- In the US, anyone can access these images. Other countries are almost certainly different.

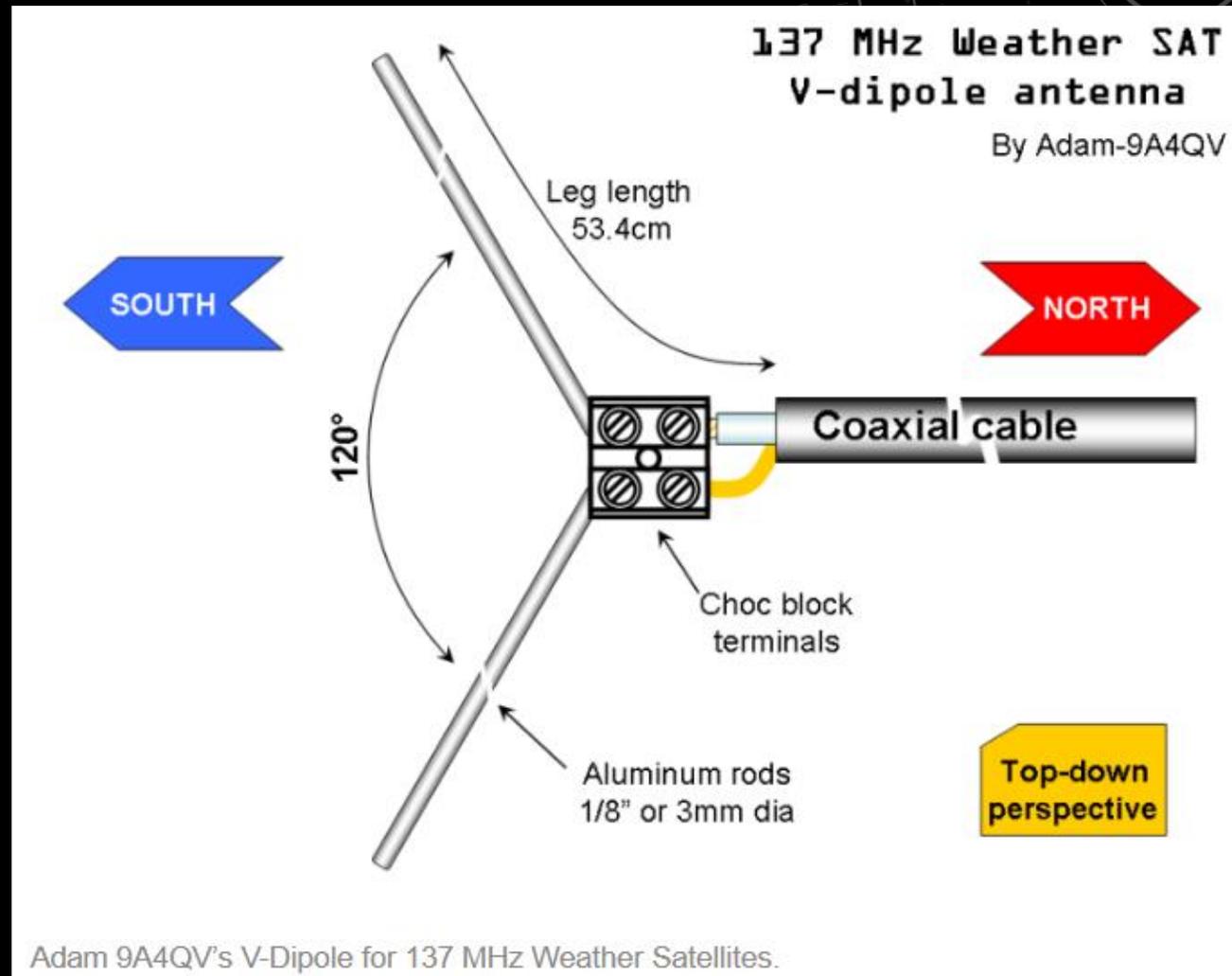- Since this is a receive only operation, <u>no FCC license is required</u>.
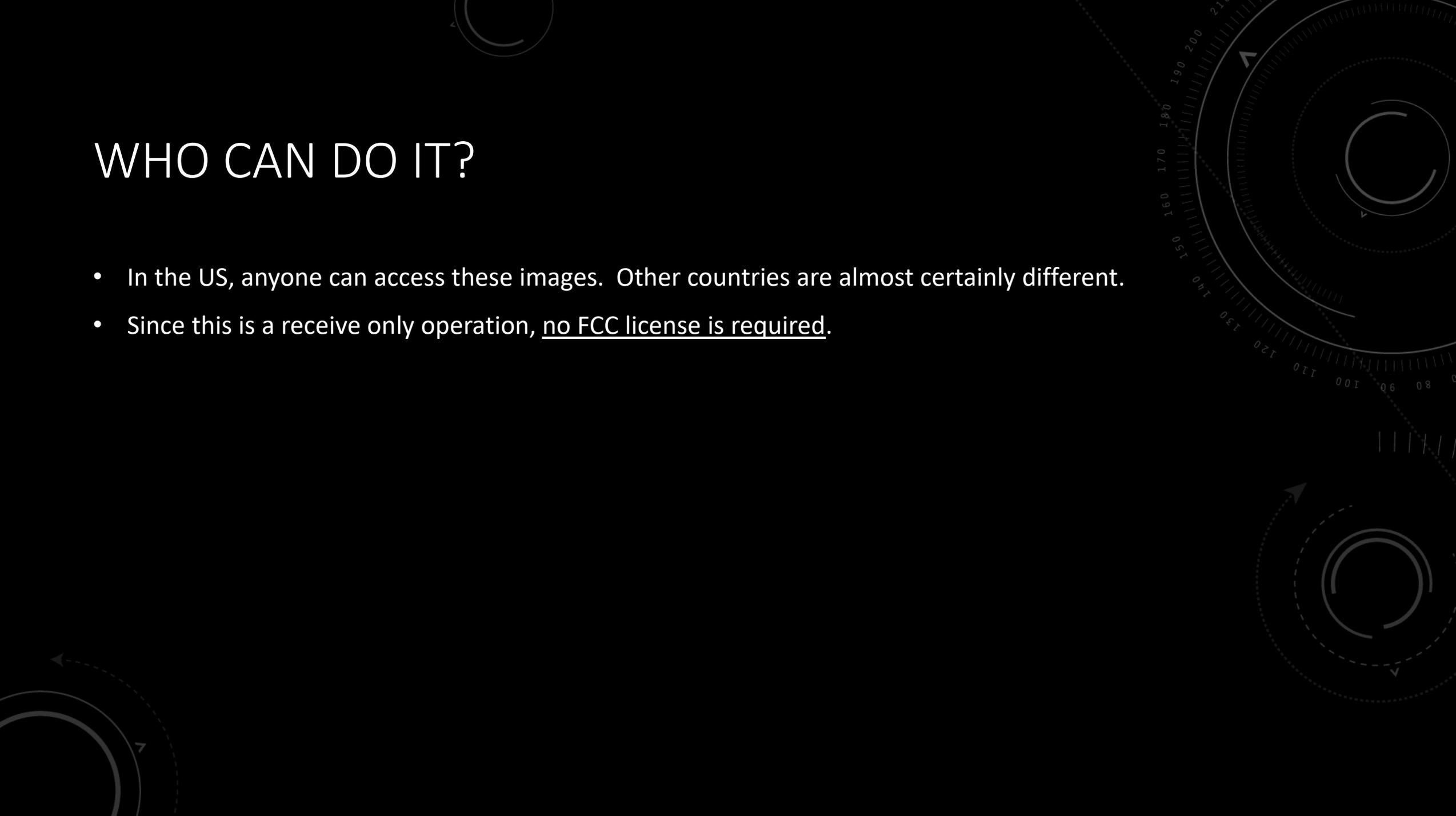
WHAT DO I NEED TO DO THIS?

- Antenna

- Enough coax to get to your…

- SDR dongle

- Computer

- Software to decode the signals

ANTENNA

- Many option, but I built my own.

- Instructions at: https://www.rtl-sdr.com/simple-noaameteor-weather-satellite-antenna-137-mhz-v-dipole/

- Alternative helix design: https://chrz.de/2018/04/15/building-a-weather-satellite-antenna/

Adam 9A4QV's V-Dipole for 137 MHz Weather Satellites.

THE ONE I BUILT:

All parts were things I already had at home.

- 2 lengths of reclaimed galvanized fencing wire
- I PVC pipe cap
- 2 screws
- 2 crimp-on ring terminals
- Scrap SO-239 coax end

Tools: drill, screwdriver, crimping tool

SDR DONGLE – LOTS OF OPTIONS

SOFTWARE

- Goto satdump.org
- Software is free
- Available on Windows, macOS, Linux, and Android

IN ACTION:

- Set up the equipment.

- Run SatDump.

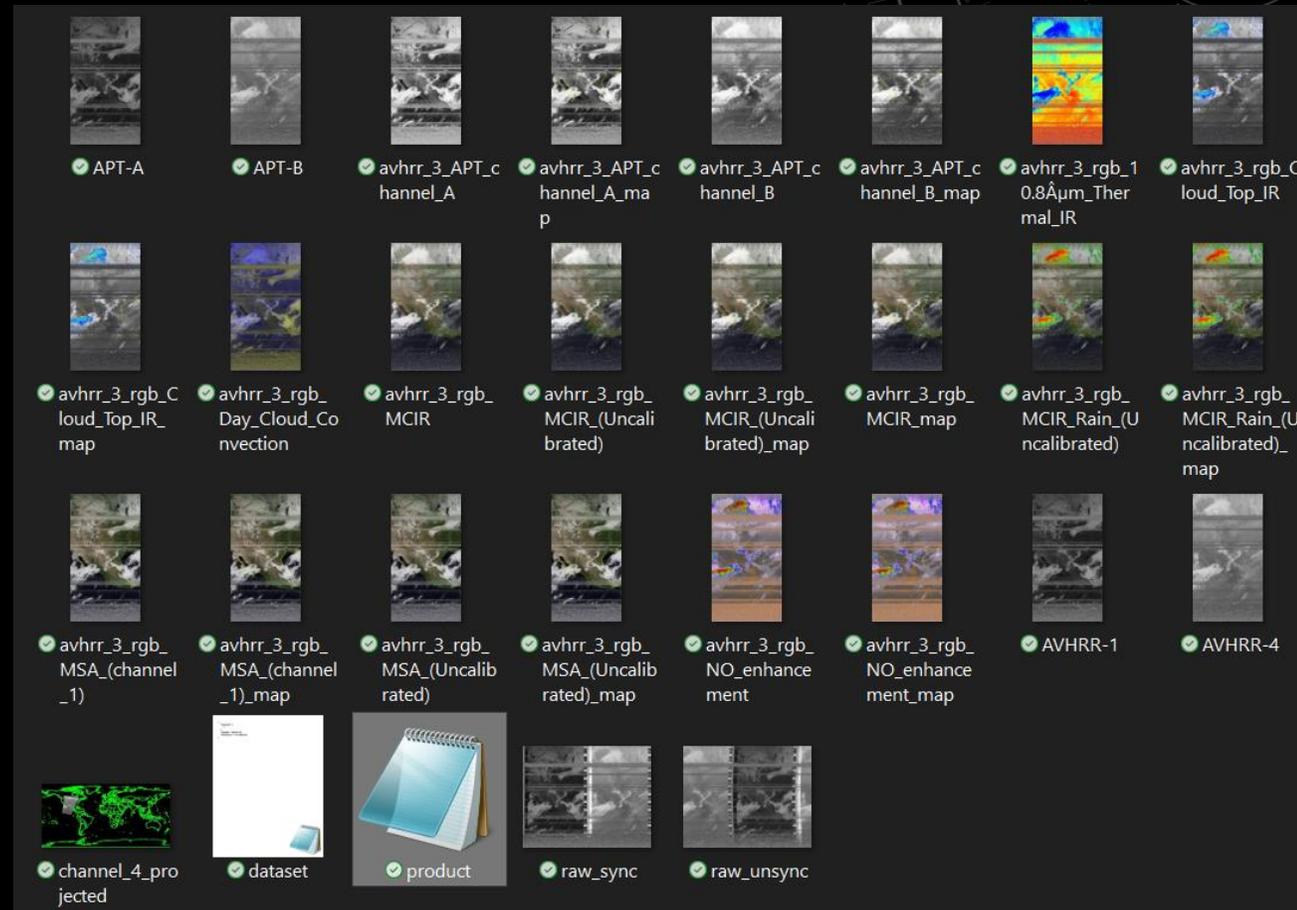- Once running, SatDump will use satellite orbital data to track when the selected satellites pass overhead.

- It will automatically listen to and decode the signals.
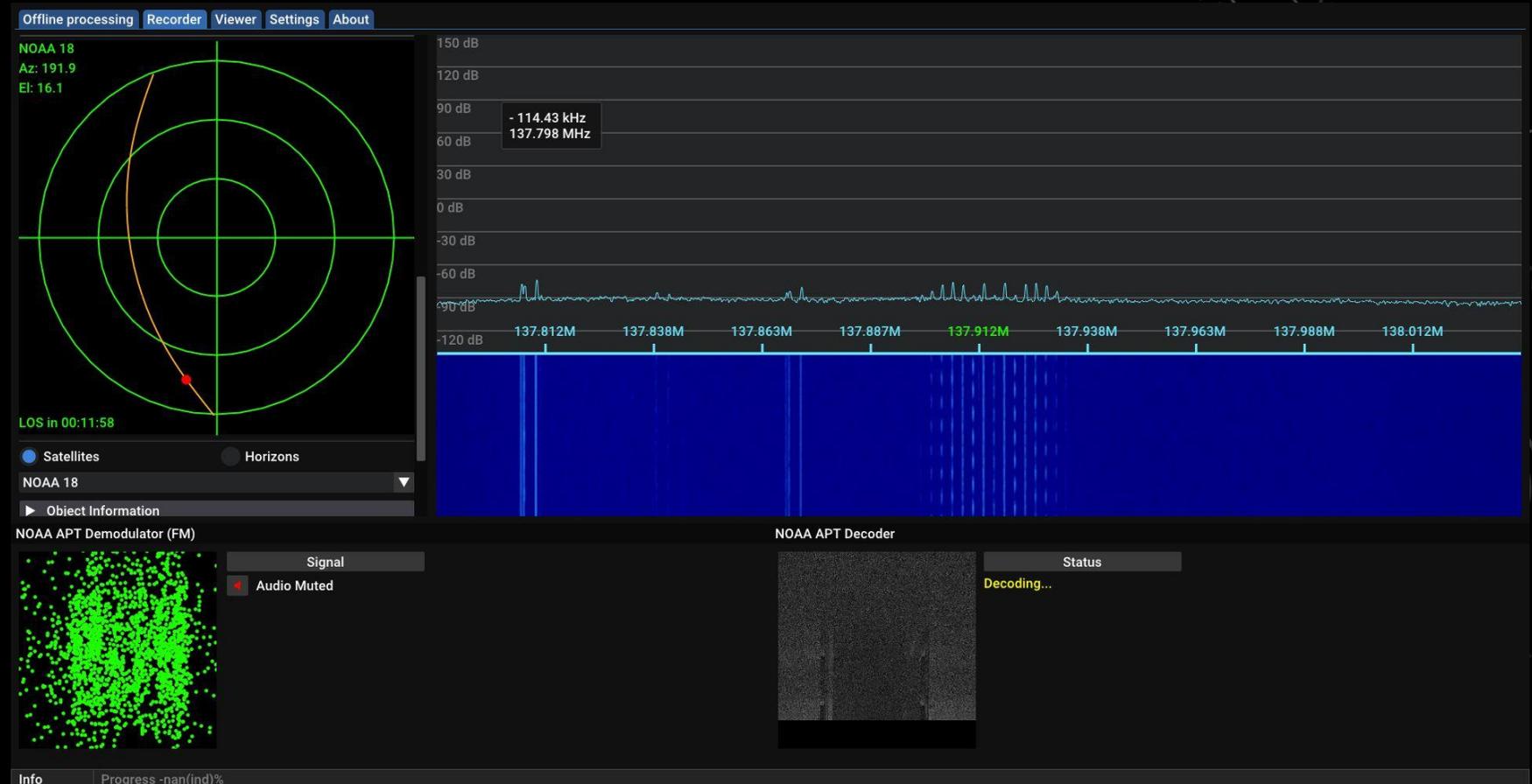
WHAT SHOULD I EXPECT TO RECEIVE?

- You will receive images of the visible cloud cover in your region and IR images.

- The information that you receive will be more than just image data.

- You will also receive:

  - Information on which satellite was sending the data and when it was sent.

  - A representation of the visible area that you received data from

  - CBOR file (this is well above my head).

  - Russian – telemetry file

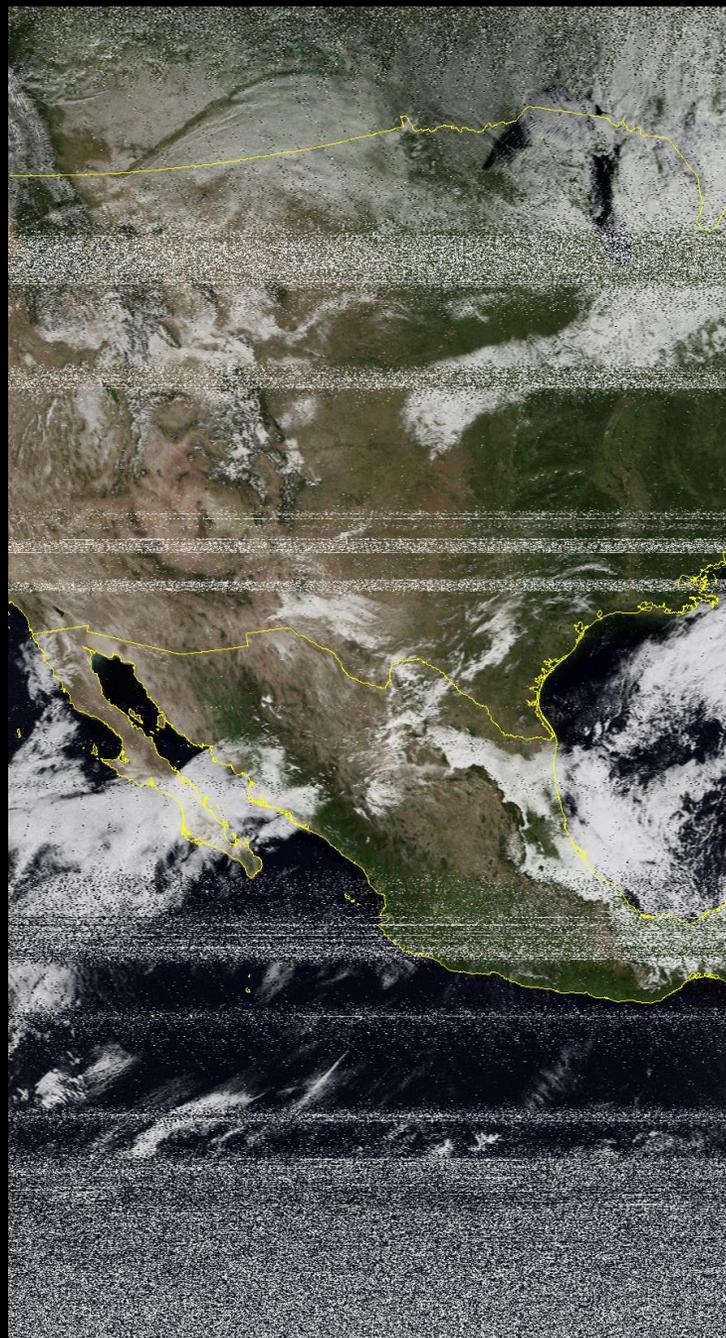 - Russian – CADU file

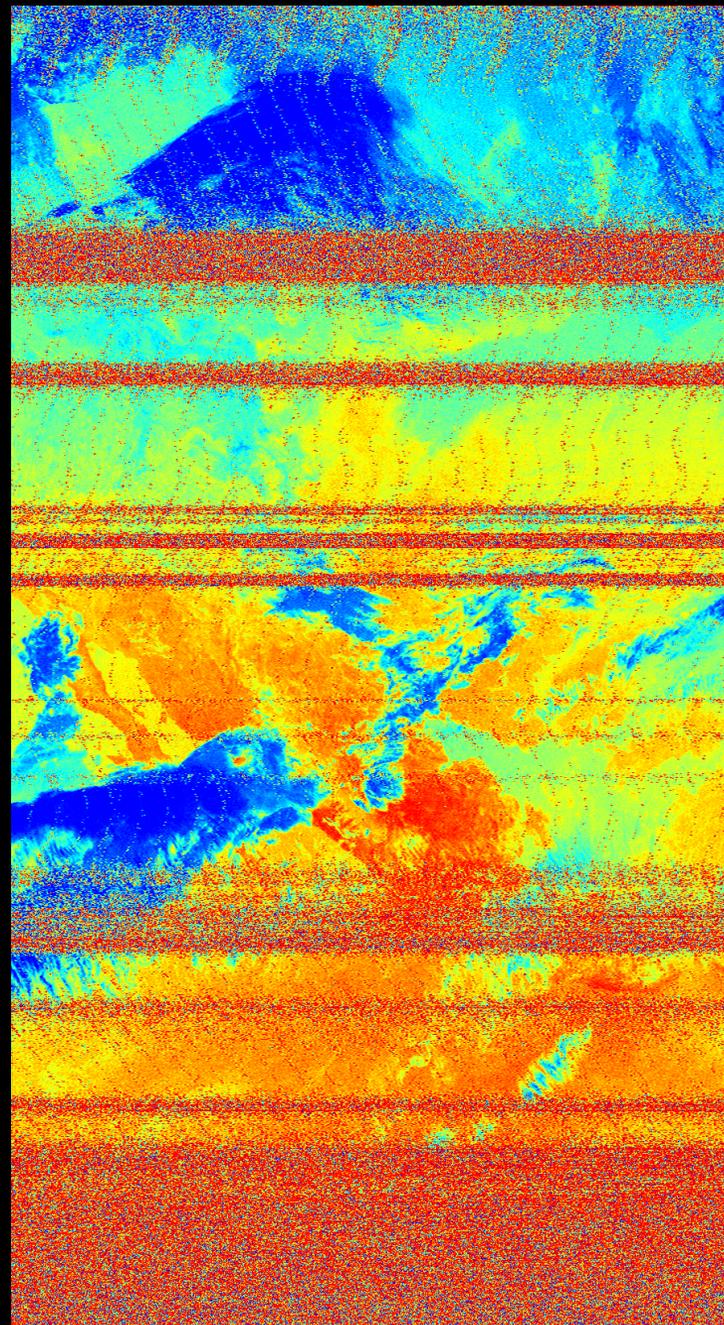# RAW DATA

NOAA-18

16 JAN 2025
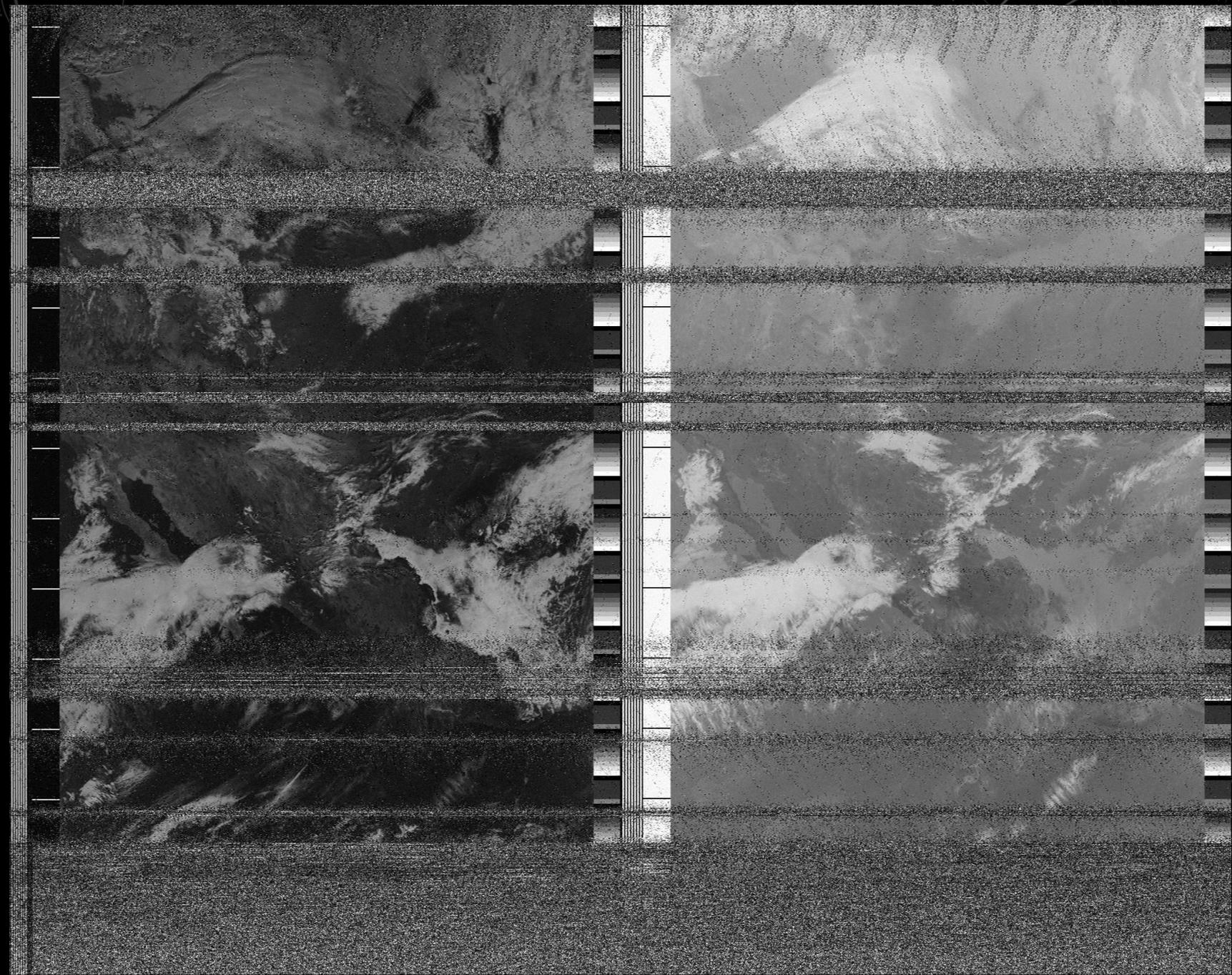
VISIBLE MAP
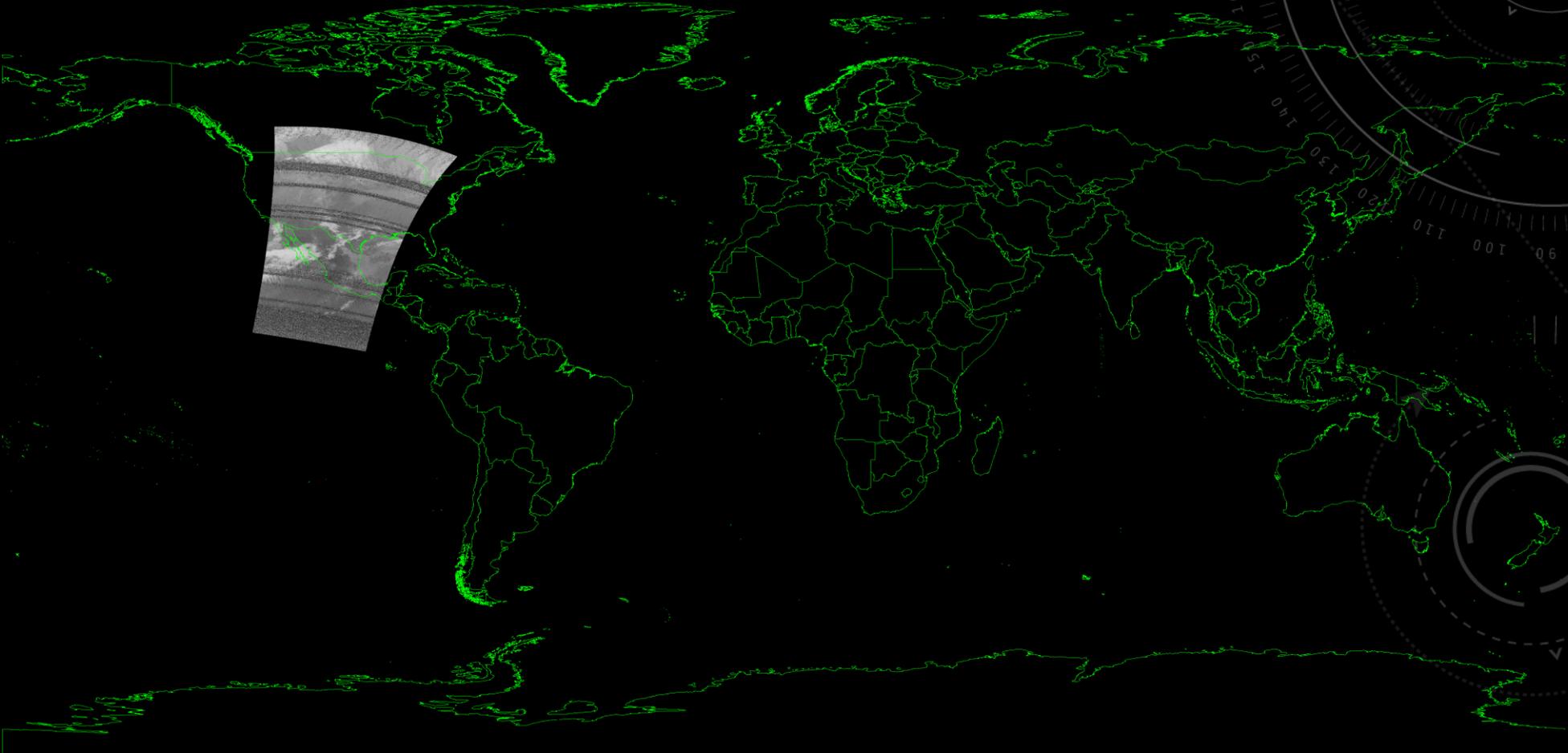
NOAA-18
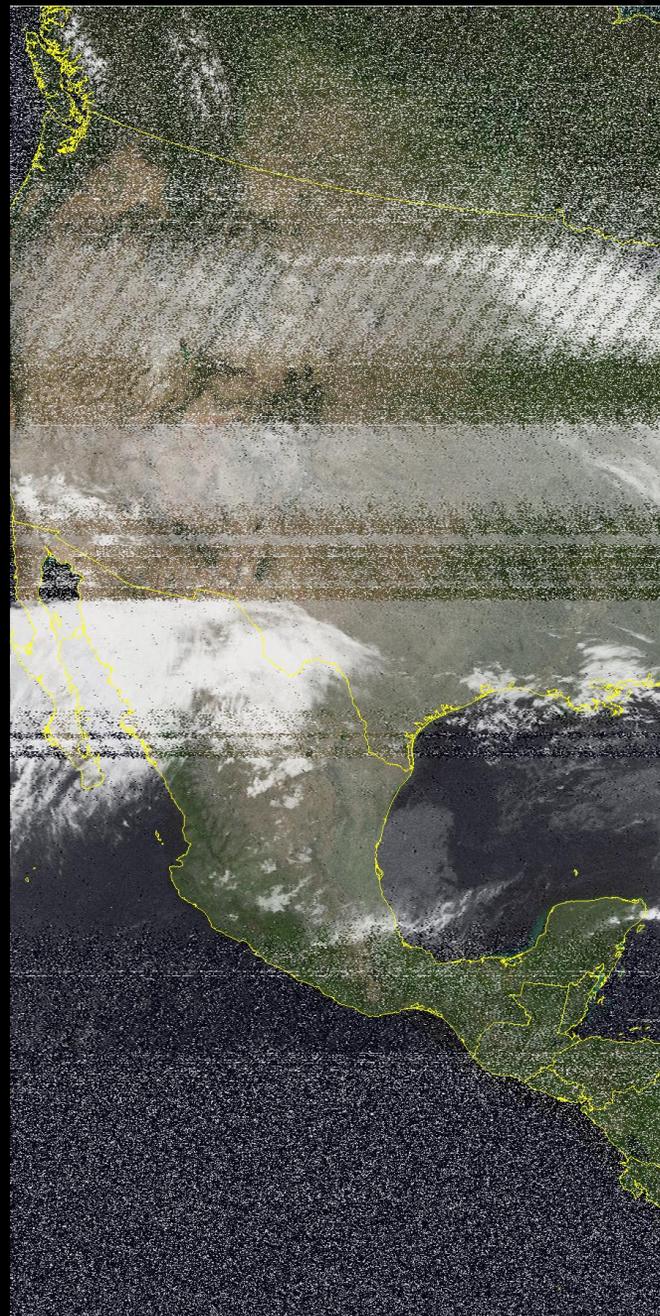
16 JAN 2025

IR MAP

NOAA-18

16 JAN 2025

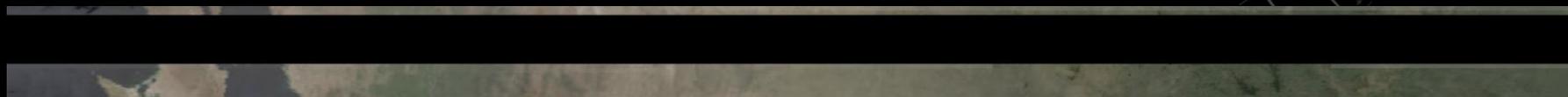# FLYOVER MAP

NOAA-18

16 JAN 2025

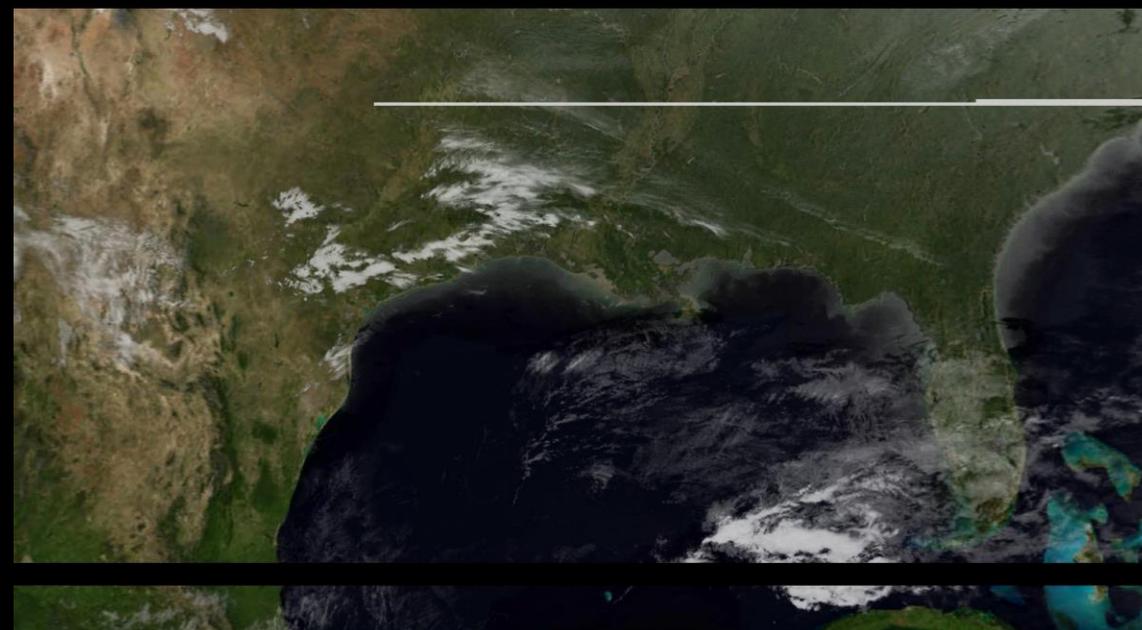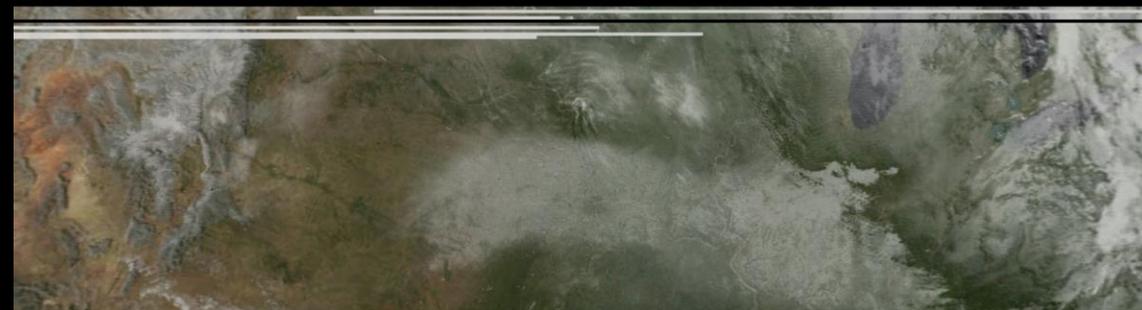# YOUR MILAGE MAY VARY

- NOAA-15

- 17 JAN 2025

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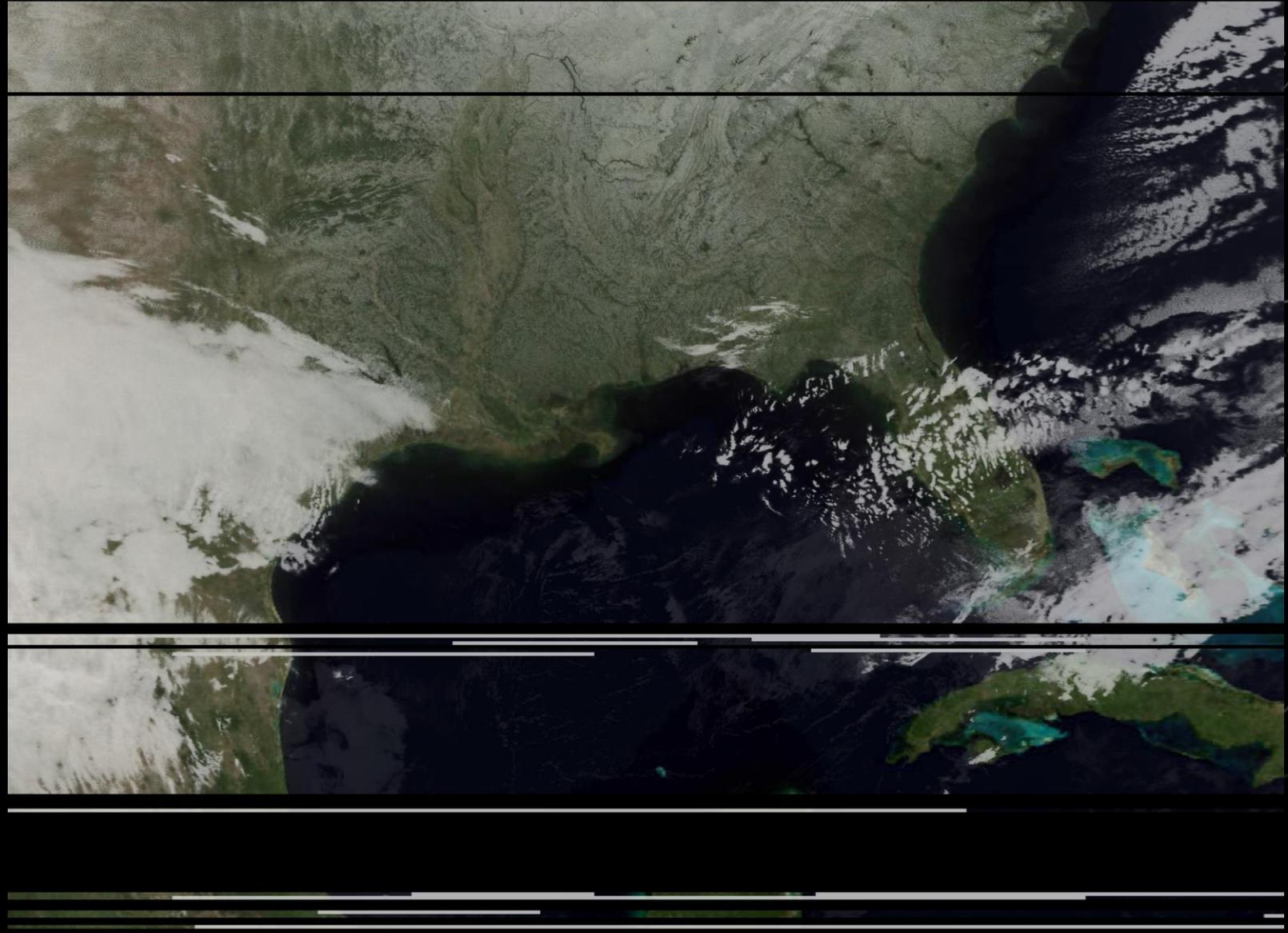
- METEOR M2-3

- 17 JAN 2025

BUT SOMETIMES…

- METEOR M2-4

- 16 JAN 2025

BUT SOMETIMES…

- METEOR M2-4

- 17 JAN 2025

CLOSING THOUGHTS

- It is an interesting part of the amateur radio hobby

- It is inexpensive to get into.

- Could be beneficial in a <u>temporary</u> grid-down situation

- It does require internet to generate satellite pass predictions.

- Additional Resources:

- Ham Radio Crash Course (this is what I started from): https://www.youtube.com/watch?v=3AN5-yDk7mE

- Another HRCC Video: https://www.youtube.com/watch?v=PWWGDL5tC_I

- The antenna that I built: https://www.rtl-sdr.com/simple-noaameteor-weather-satellite-antenna-137-mhz-v-dipole/

- Frequency Info: https://leshamilton.co.uk/satfreq.htm