

NAAMES Mission C-130 Flight Report

From: CYYT

To: CYYT

Start: 11/23/15 09:55Z

Finish: 11/23/15 19:16Z

Flight Time: 9.4 hours

Log Number: 161006

PI: Mike Behrenfeld

Funding Source: Paula Bontempi - NASA - SMD - ESD Ocean Biology and Biogeochemistry

Official Report Logged At:

[https://airbornescience.nasa.gov/science_reports/NAAMES - C-130H Hercules 439 11 23 15 Science Report](https://airbornescience.nasa.gov/science_reports/NAAMES_-_C-130H_Hercules_439_11_23_15_Science_Report)

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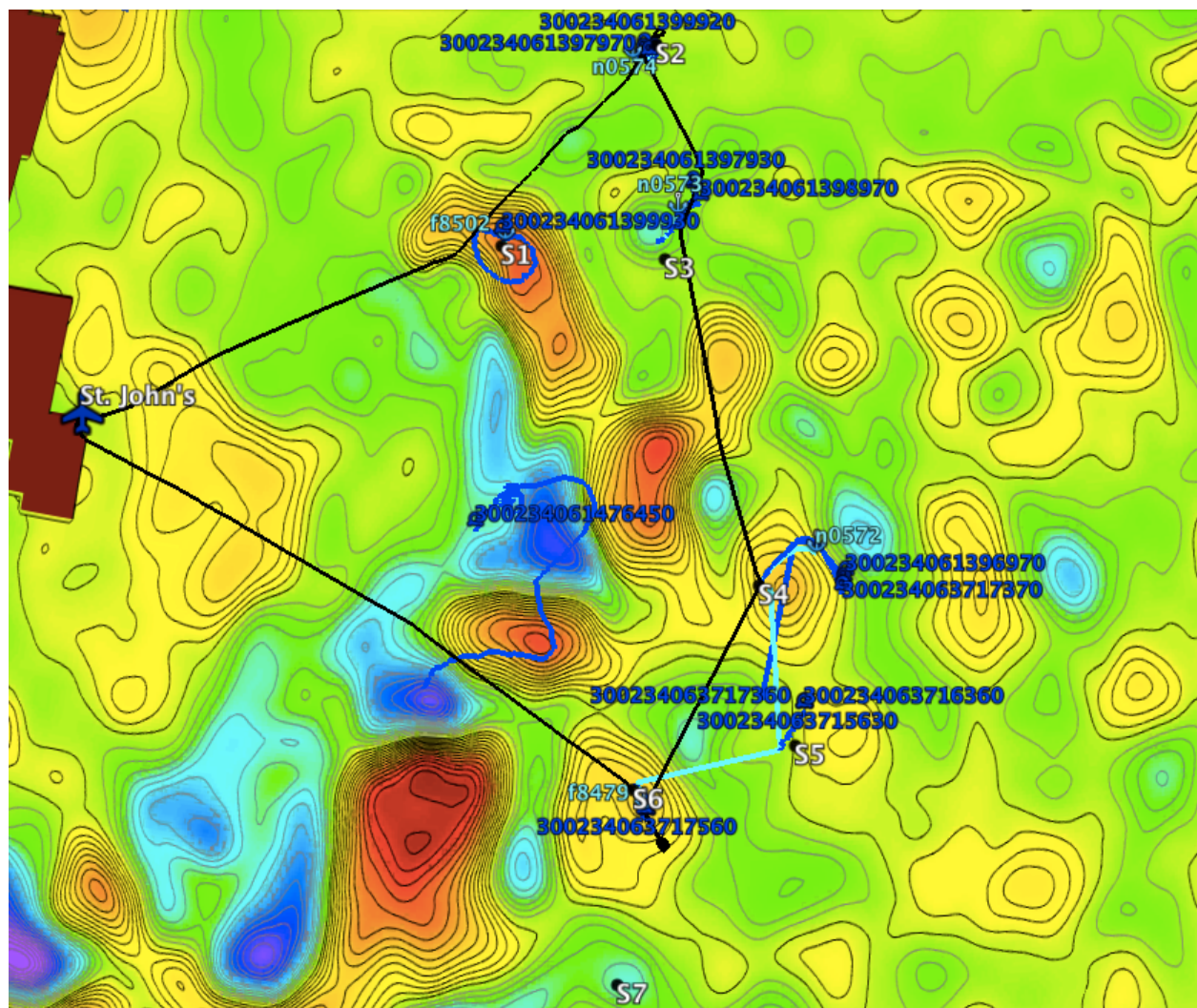
Flight Hour Summary:

Date	Flt #	Purpose of Flight	Duration	Running Total	Hours Remaining
10/31/15	Airworthiness Test Flight	Check	1	1	99
11/04/15	Project Test Flight	Check	5.5	6.5	93.5
11/09/15 - 11/10/15	NAAMES Nov-2015 Transit	Transit	4.6	11.1	88.9
11/12/15	NAAMES Nov-2015 Data Flight #1	Science	9.9	21	79
11/14/15	NAAMES Nov-2015 Data Flight #2	Science	9.7	30.7	69.3
11/17/15	NAAMES Nov-2015 Data Flight #3	Science	8.8	39.5	60.5
11/18/15	NAAMES Nov-2015 Data Flight #4	Science	9.8	49.3	50.7
11/23/15	NAAMES Nov-2015 Data Flight #5	Science	9.4	58.7	41.3

Comments: The C-130 departed St. John's for the fifth, 10-hr. NAAMES science flight targeting the clouds around the ship to the south at Point S6 as well as drifters deployed during previous stations at Points S1, S2, and S3. Vertical winds calibration maneuvers were carried out on both the outbound and inbound transit legs at 21,000 and 20,000 ft., respectively. Conditions around the ship were forecast to be predominantly overcast clouds with remnants of the high sea salt aerosol sampled by the ship in the previous few days; however, low concentrations of small particles were observed in the shallow boundary layer similar to those encountered at the north end of the cruise track during Science Flight #2. Cloud bases were also much lower than previously observed during this first NAAMES deployment at or below 300 ft. with tops around 2000 ft. A stacked wall-pattern cloud module was performed running to the southeast of the ship along the solar principal plane. The 300 ft. leg captured the transition from clear air at the south end of the module to heavy precipitation and fog at the north end of the module with descending cloud bases and tops. High concentrations of sub-20 nm particles were observed above

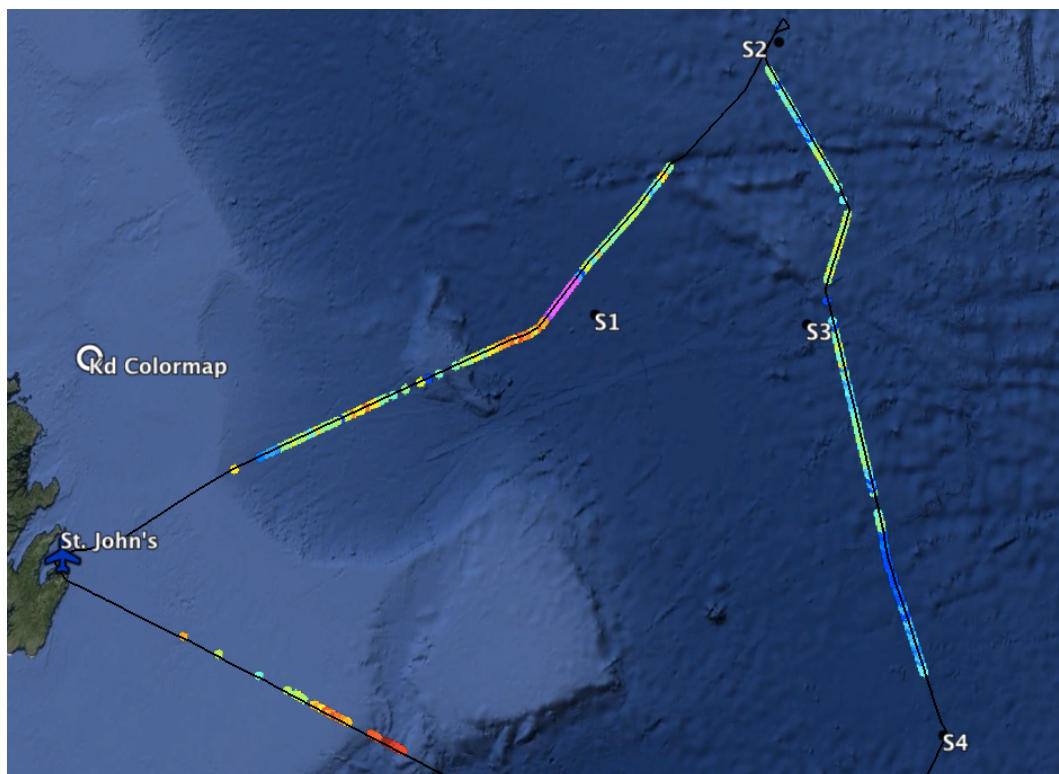
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clouds, while the boundary layer was much cleaner – the observations suggest no real continental influence in this area and a relatively decoupled boundary layer from the free troposphere. It was noted that the low concentrations of particles feeding the puffy stratocumulus clouds seem to create a rapidly evolving cloud system, where the clouds form and then rain out very quickly. Cloud cover at the south end of the track was overcast through to just north of Point S4, which prevented ocean remote sensing over this region. Cloud conditions over the north end of the ship cruise track were much more favorable for ocean remote sensing with large areas of clear sky. Ocean remote sensing observing conditions over Points S1 and S3 were ideal for HSRL, RSP, and GCAS. Partial cloud cover in the vicinity of S2 appeared to limit the proximity to the drifters to 10 nautical miles, although it is likely that further data analysis may show short periods of good data as the lidar punched through the clouds closer to the drifters. Differences in the K_d were noted between the retrievals from this flight and from previous station overflights at S2, while the retrieved K_d at S1 and S3 were similar to the previous observations at these stations. All instruments were fully operational for the duration of the flight.

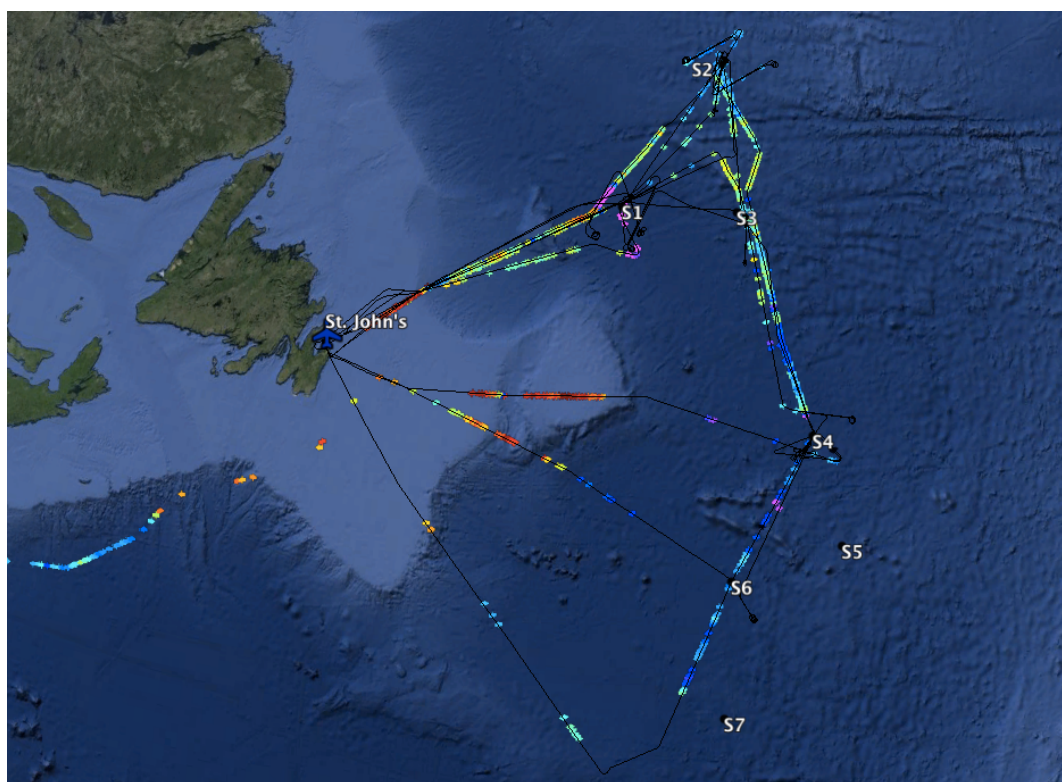


C-130 flight track (black) overlaid on the sea level anomaly (SLA) eddy map. Float (light blue anchors) and drifter (dark blue circles) positions and IDs are also shown. The ship carried out a dawn casting at Point S6. Eddy map courtesy of Peter Gaube.

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Map of ocean diffuse attenuation (K_d) in arbitrary units as remotely sensed by the High-Spectral Resolution Lidar (HSRL) for the 23 November 2015 flight.



Map of HSRL ocean diffuse attenuation (K_d) in arbitrary units for all NAAMES flights to date.

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View of the vicinity of S6 and cloud module from high altitude.
(Credit: L. Ziemba)

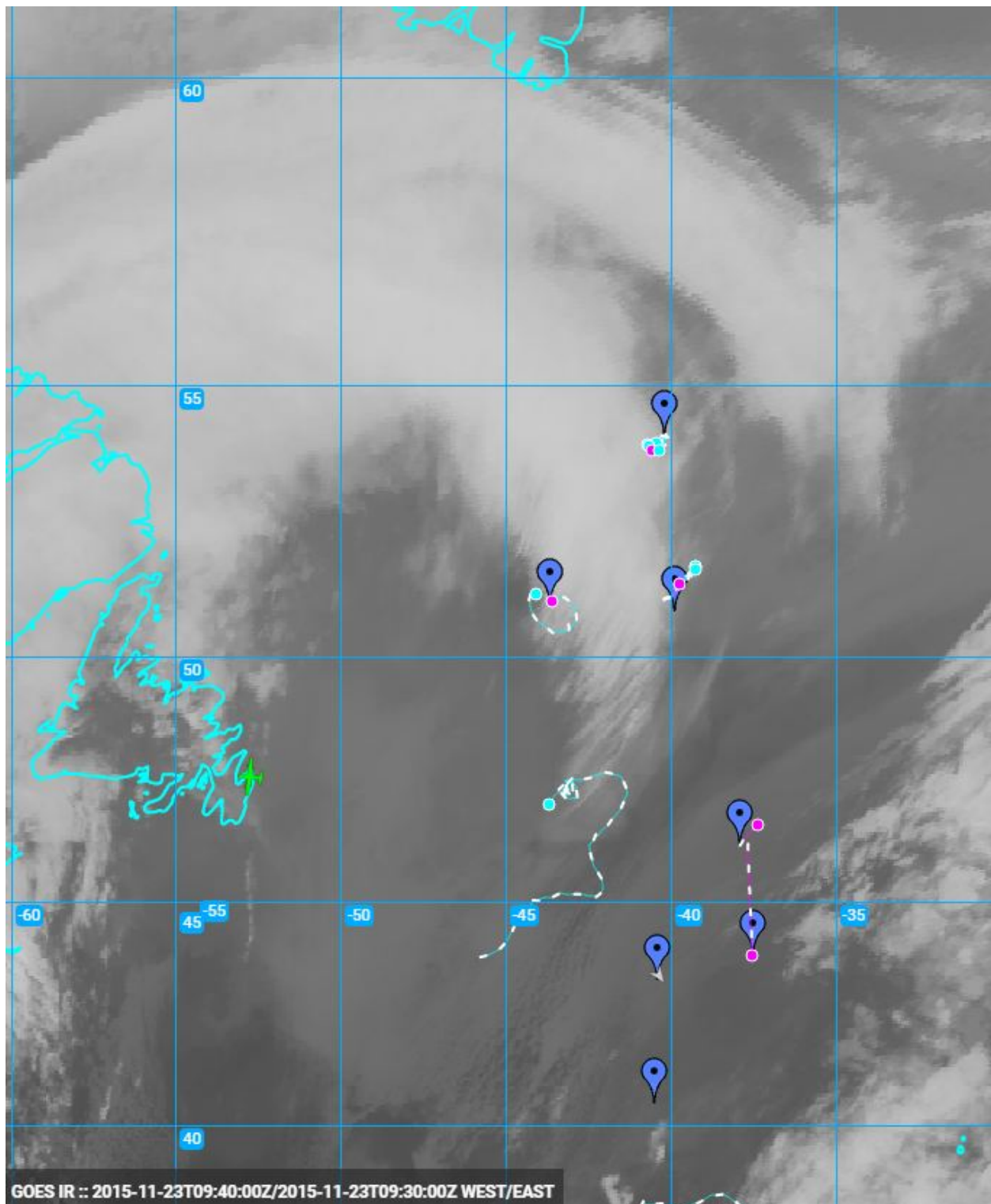


View of foggy marine boundary layer below cloud during the cloud module
(Credit: L. Ziemba)

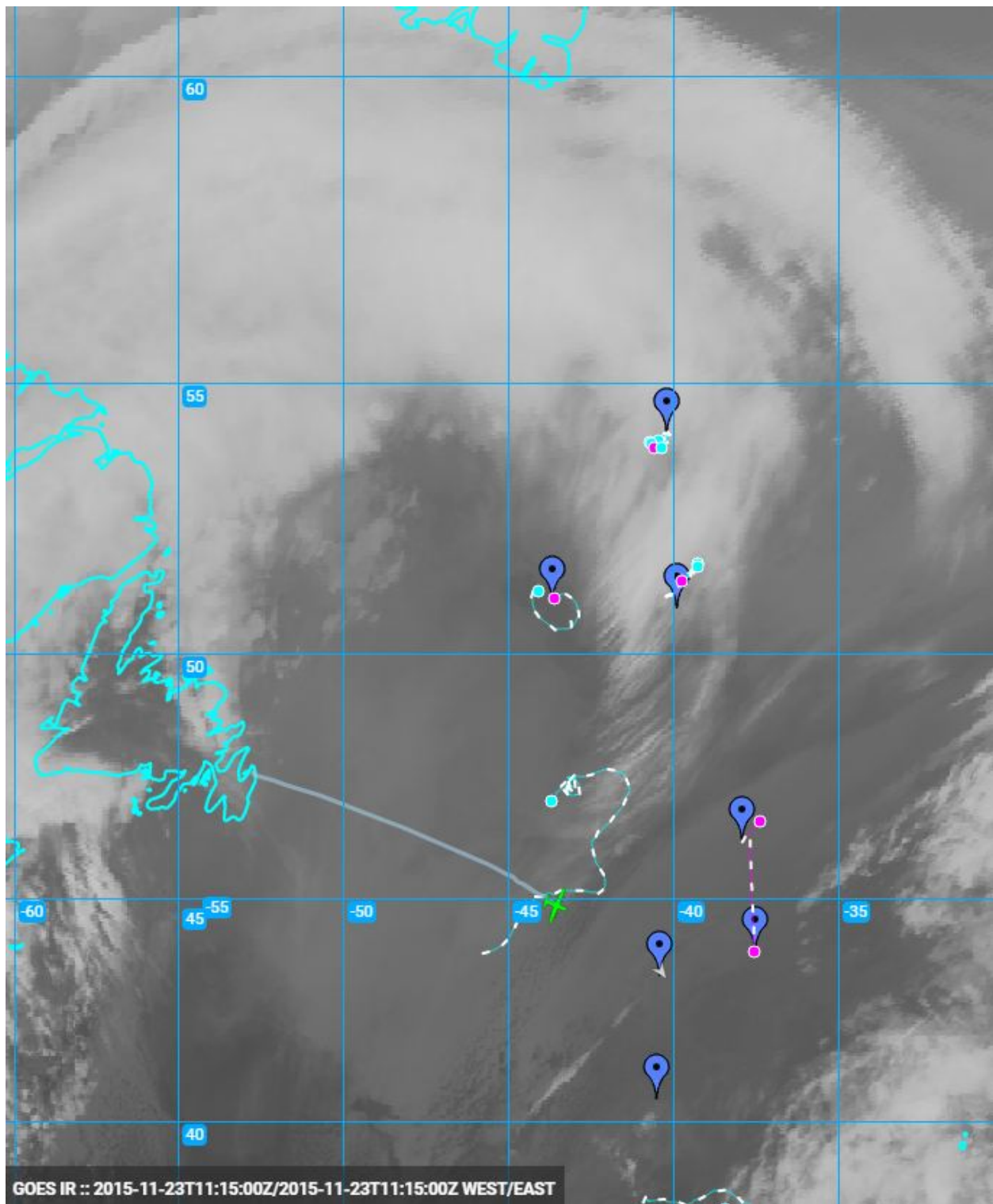


View of gaps between clouds during the clear-air above-cloud leg of the cloud module (Credit: L. Ziemba)

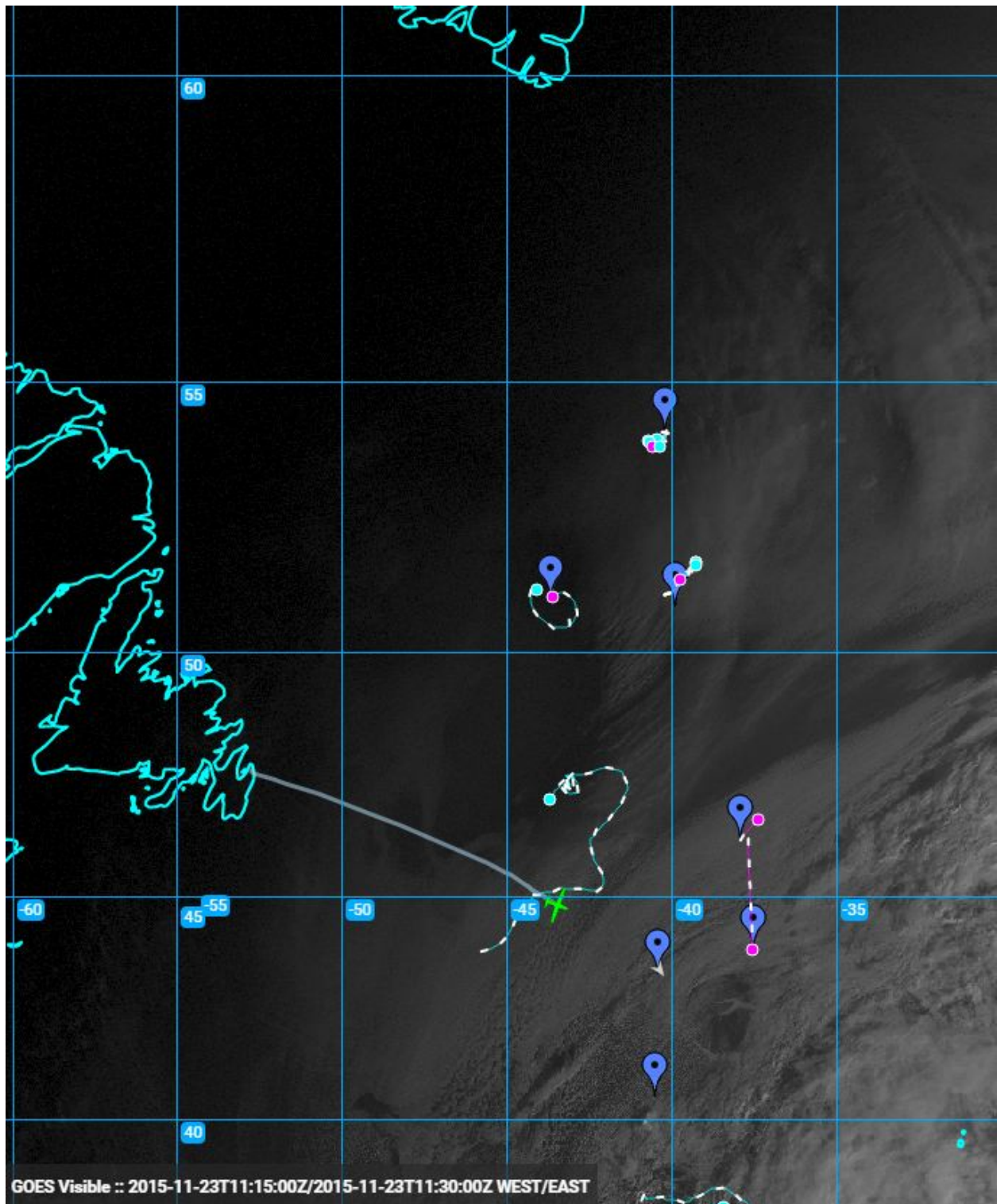
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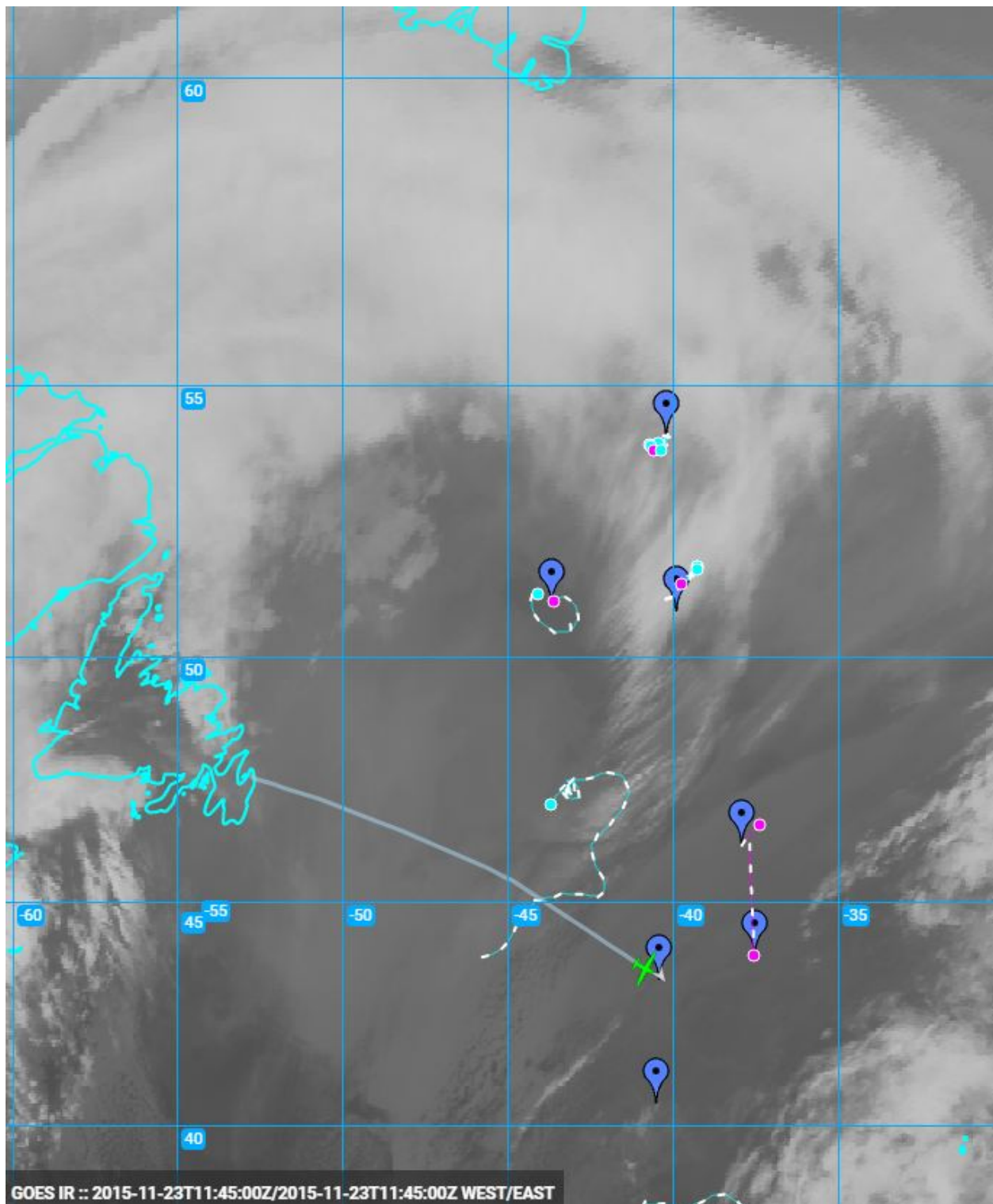
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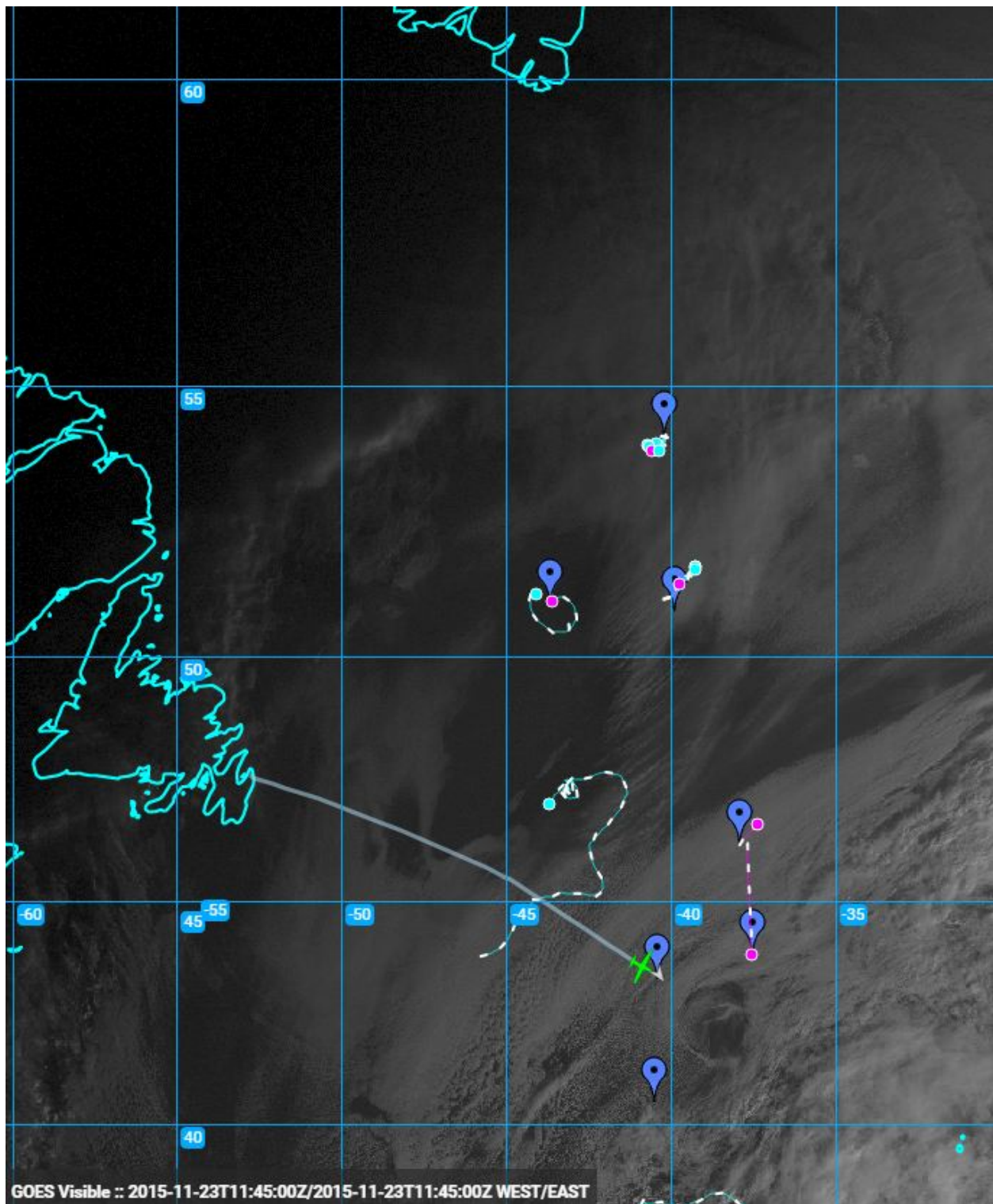
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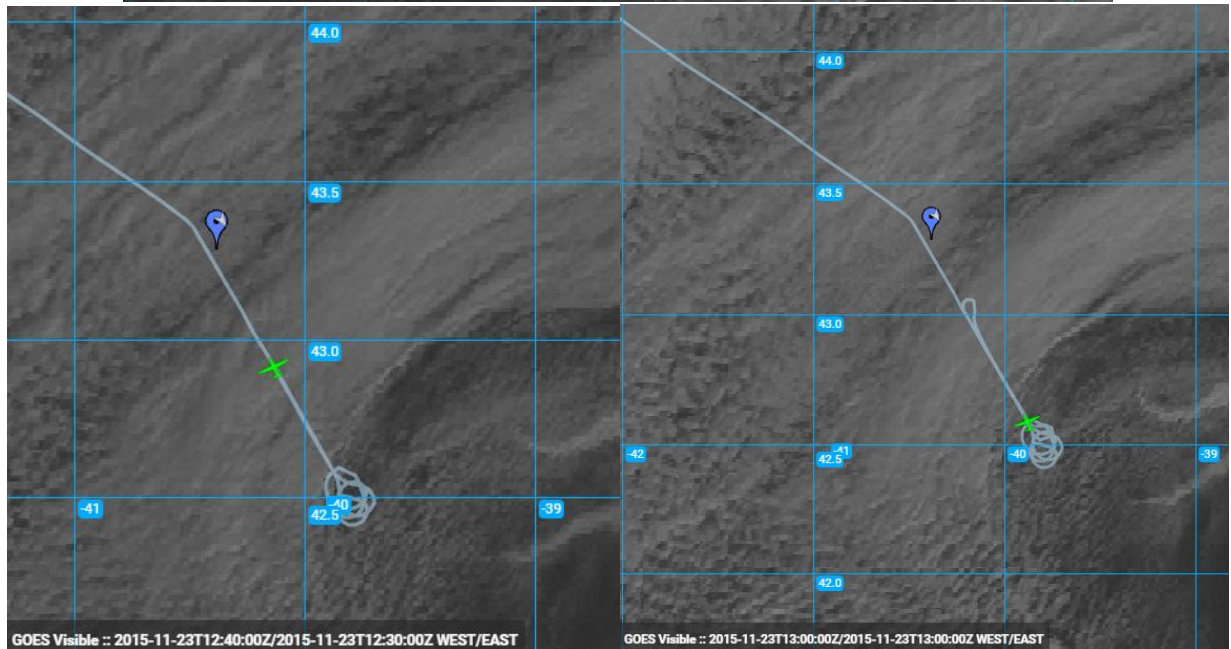
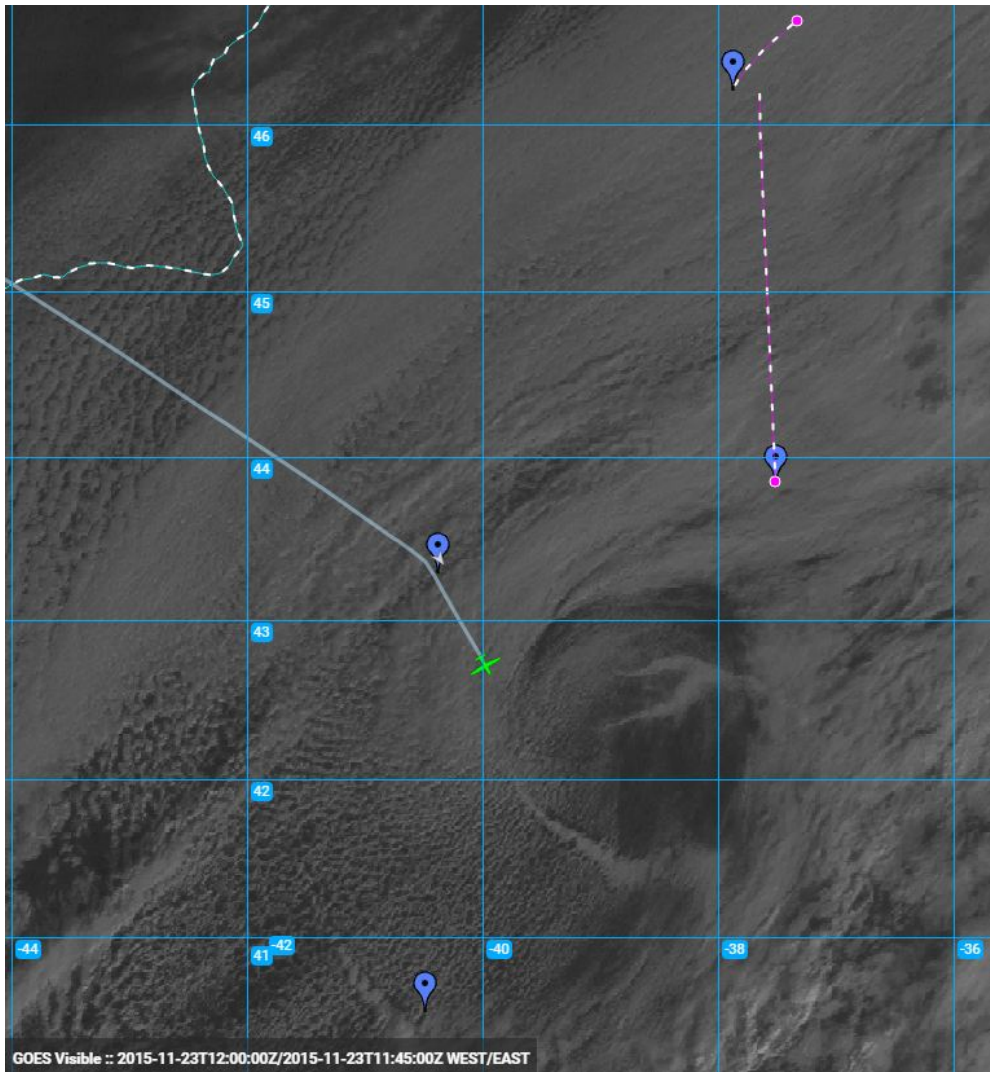
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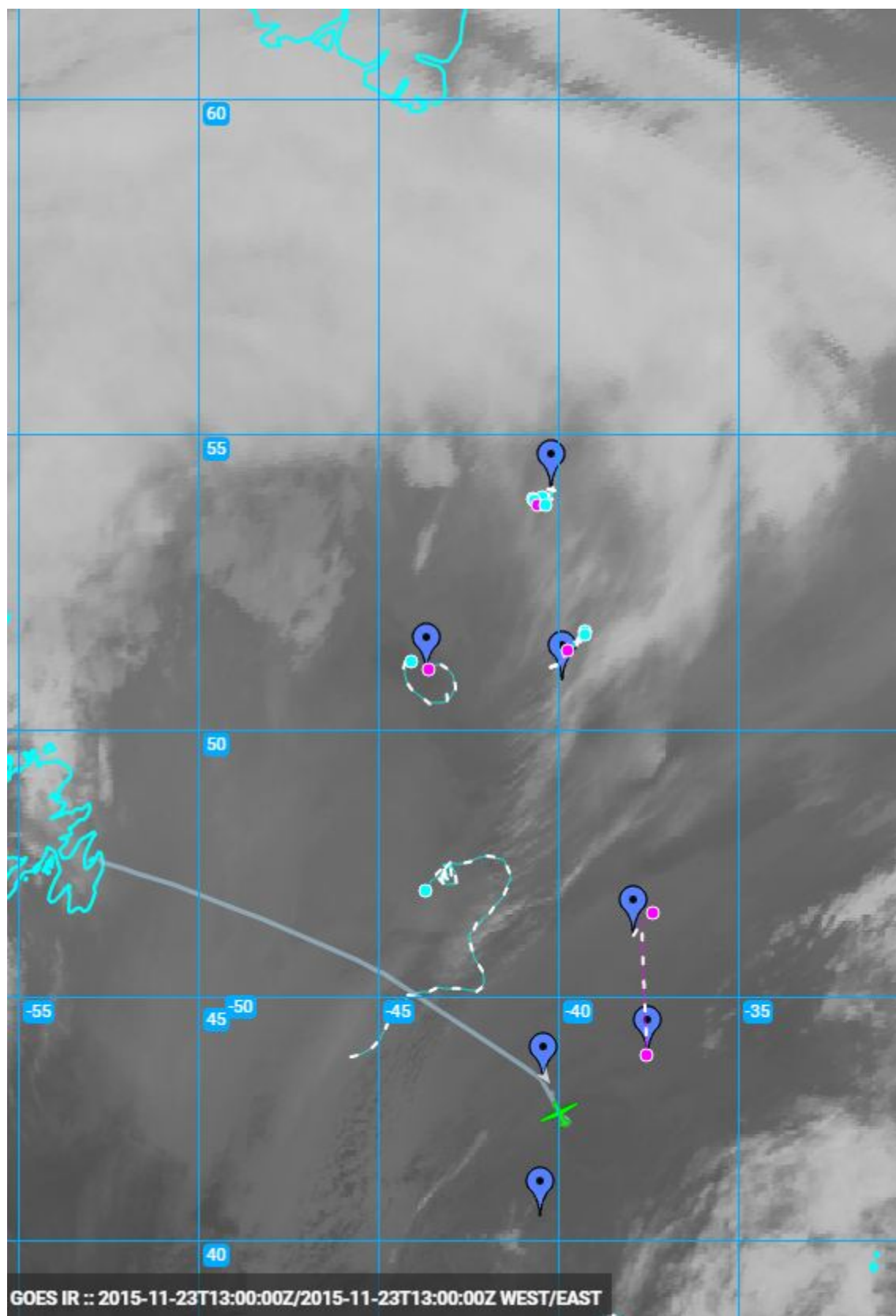
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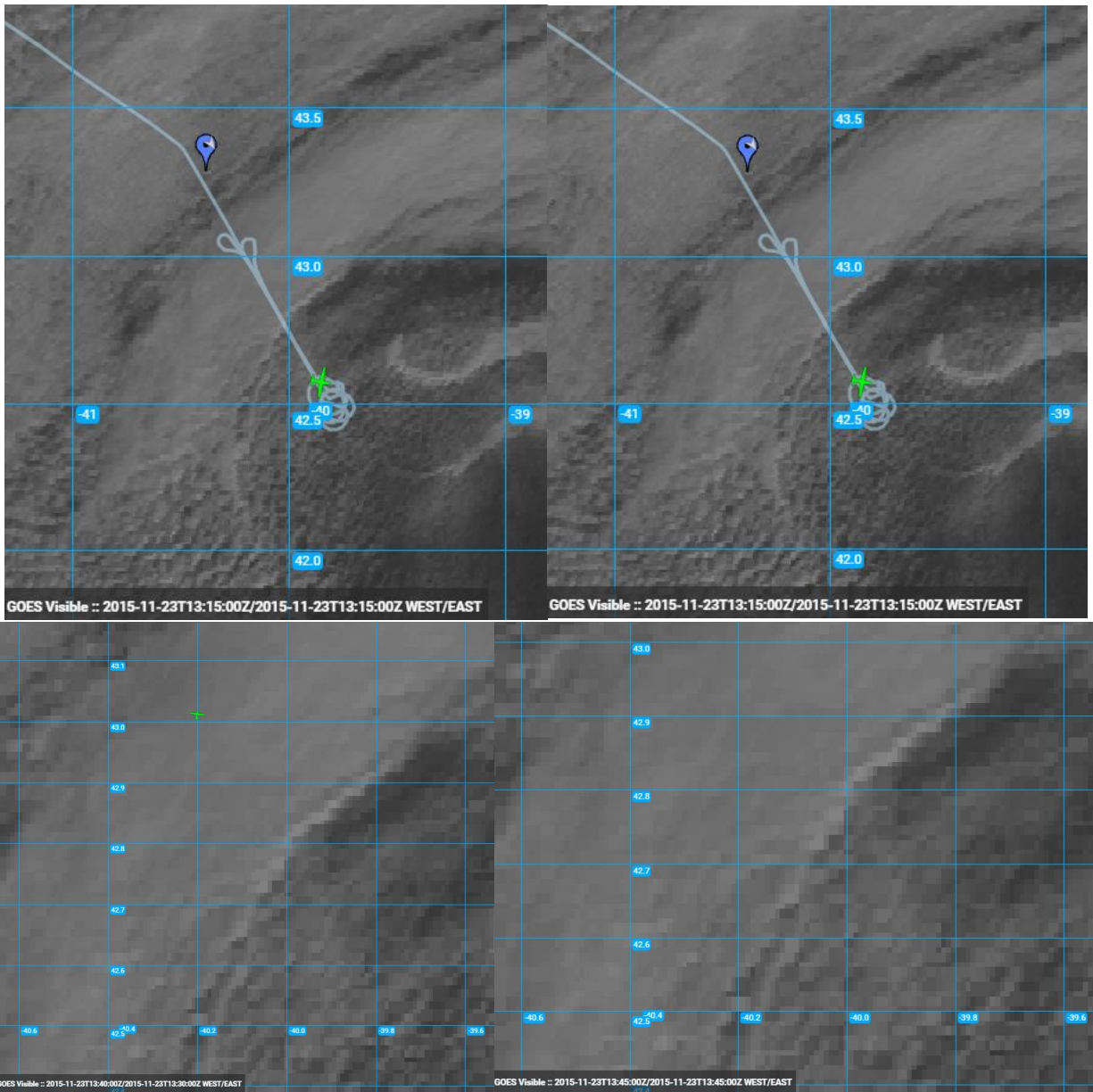
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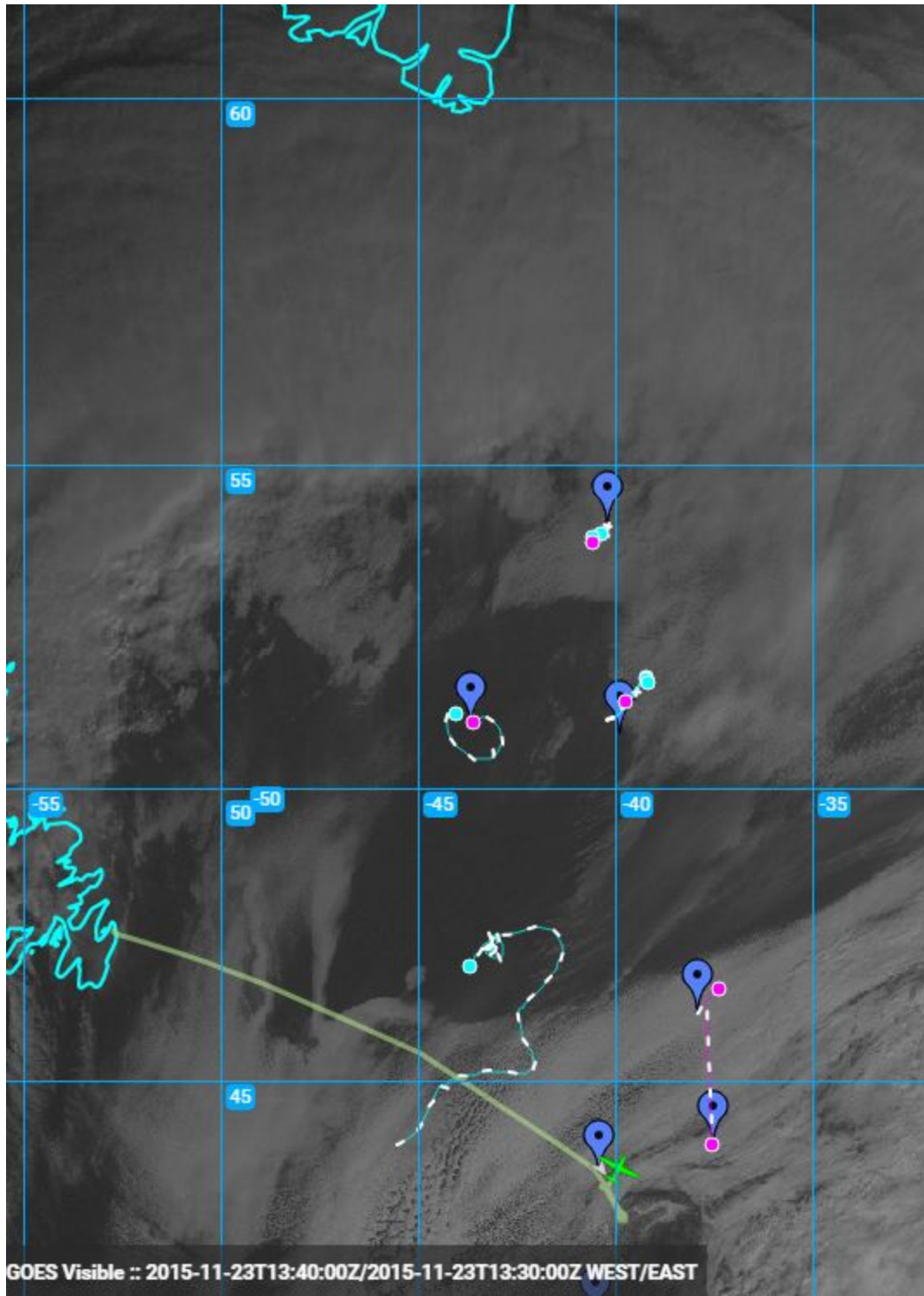
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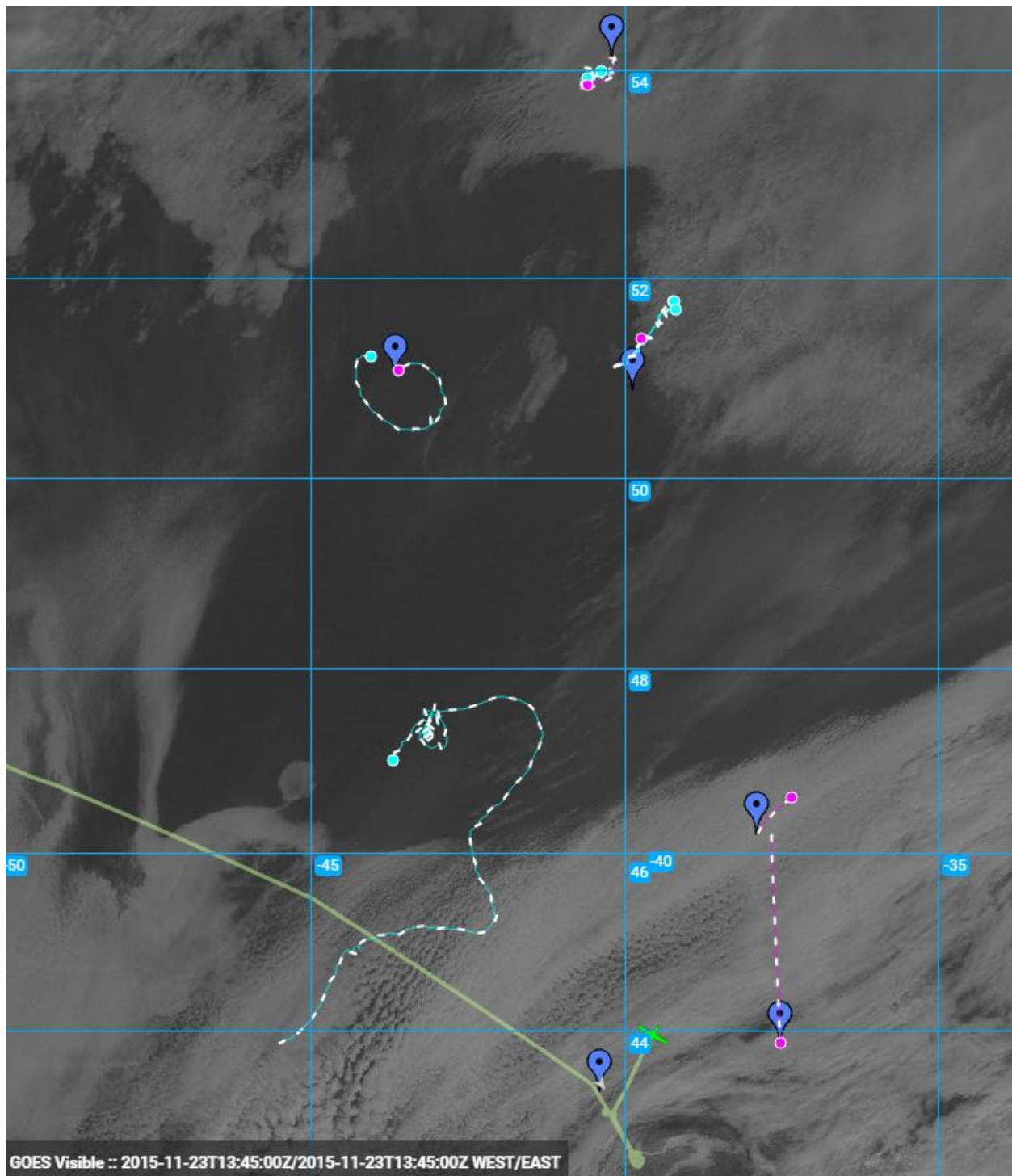
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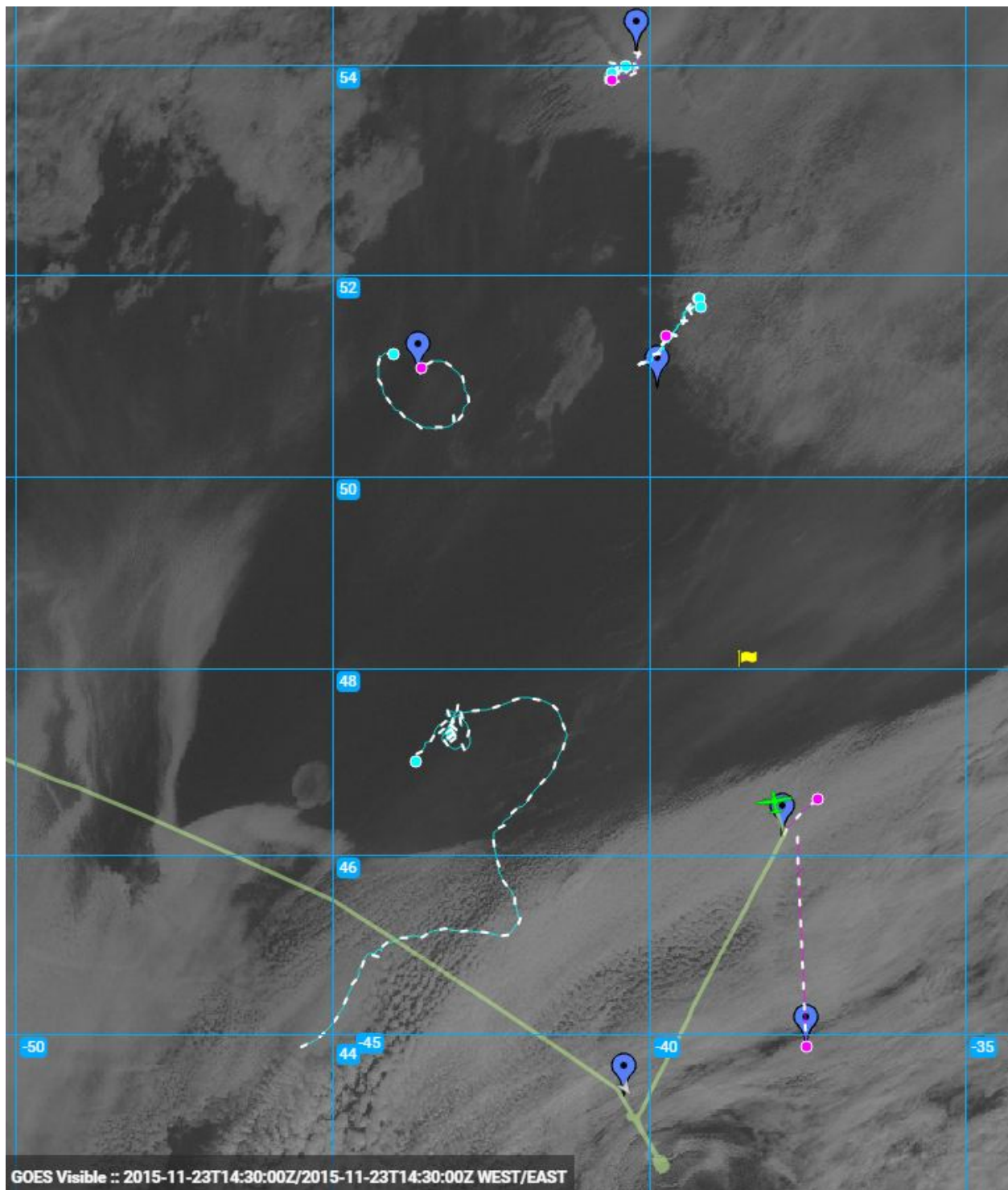
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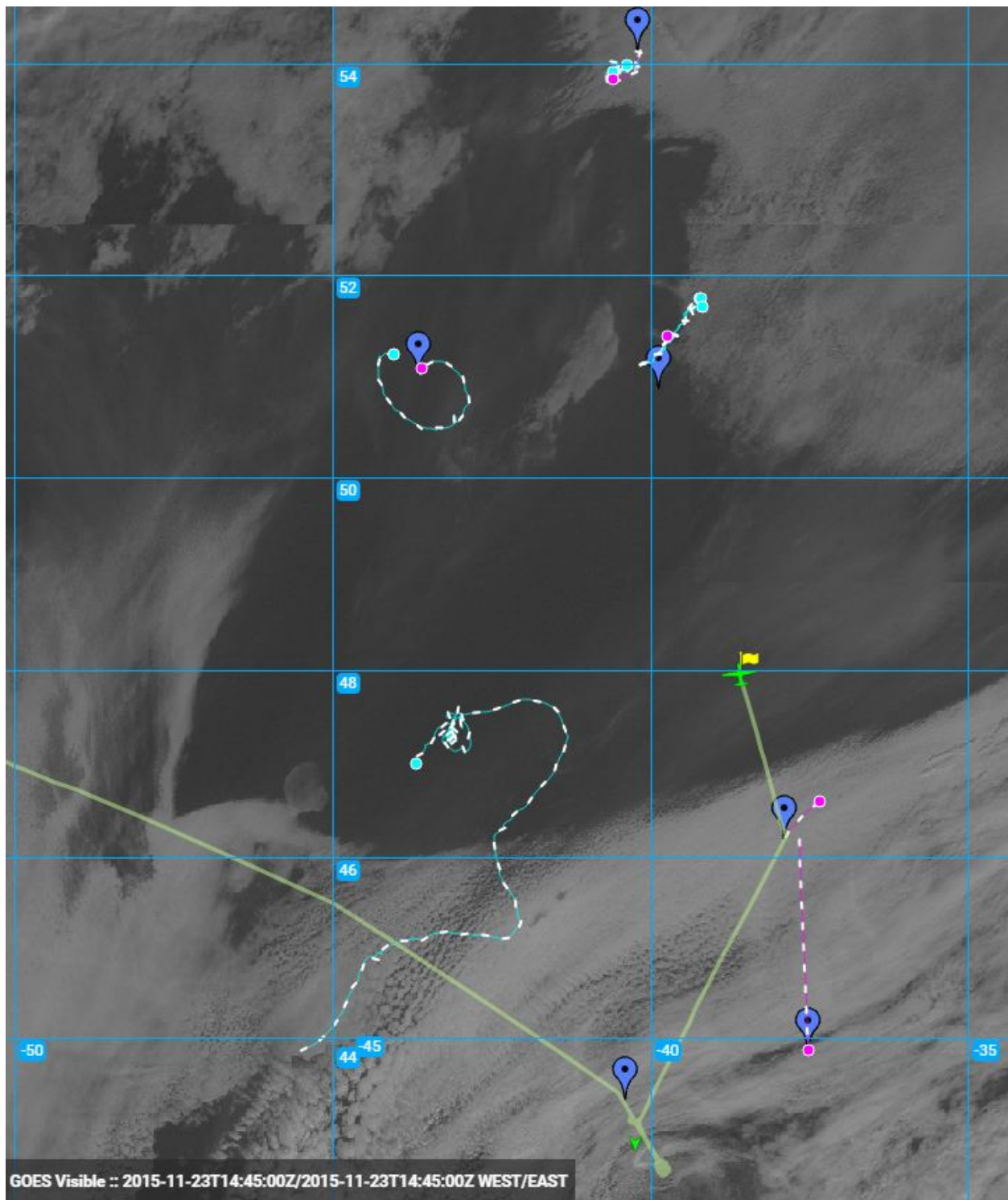
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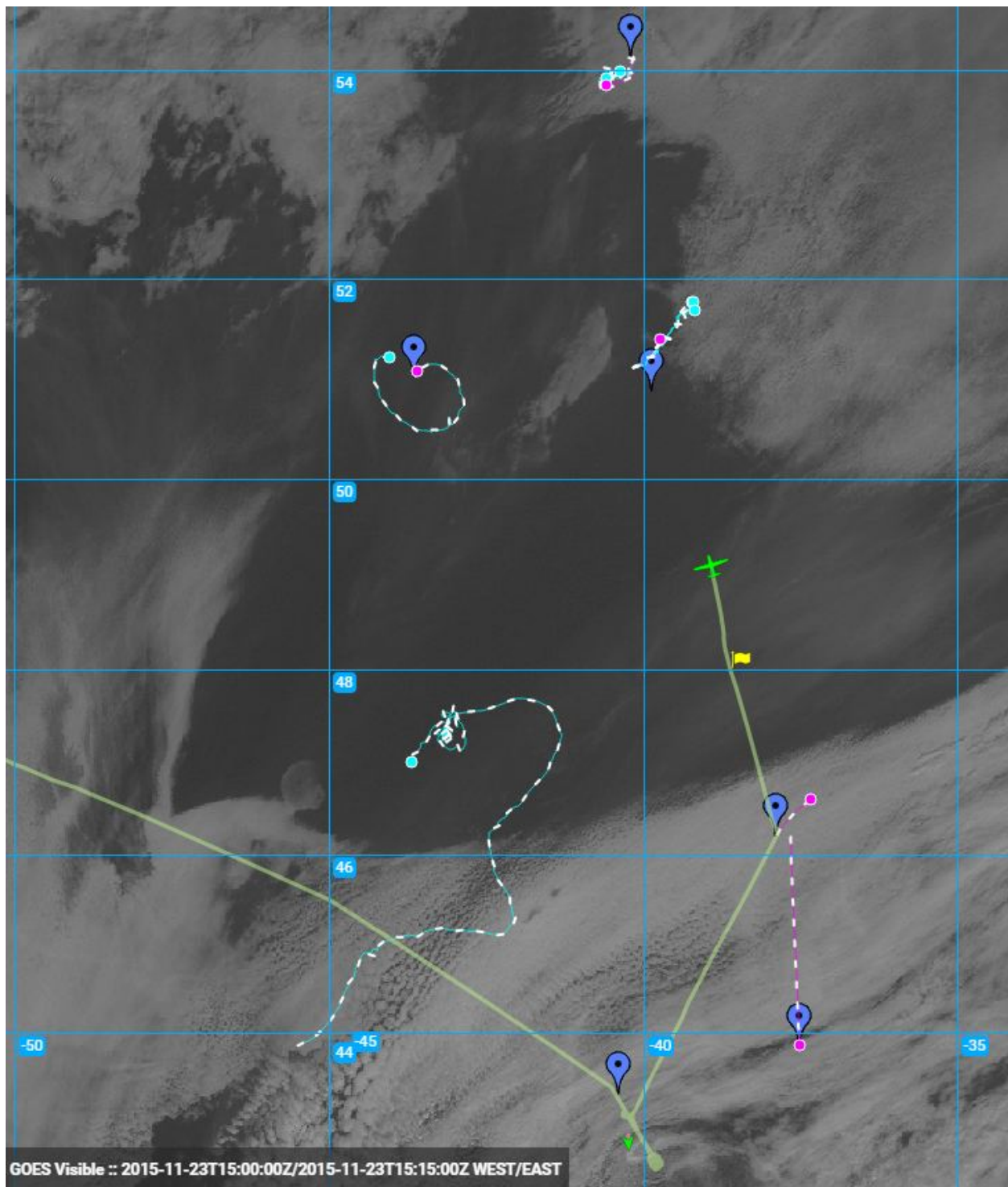
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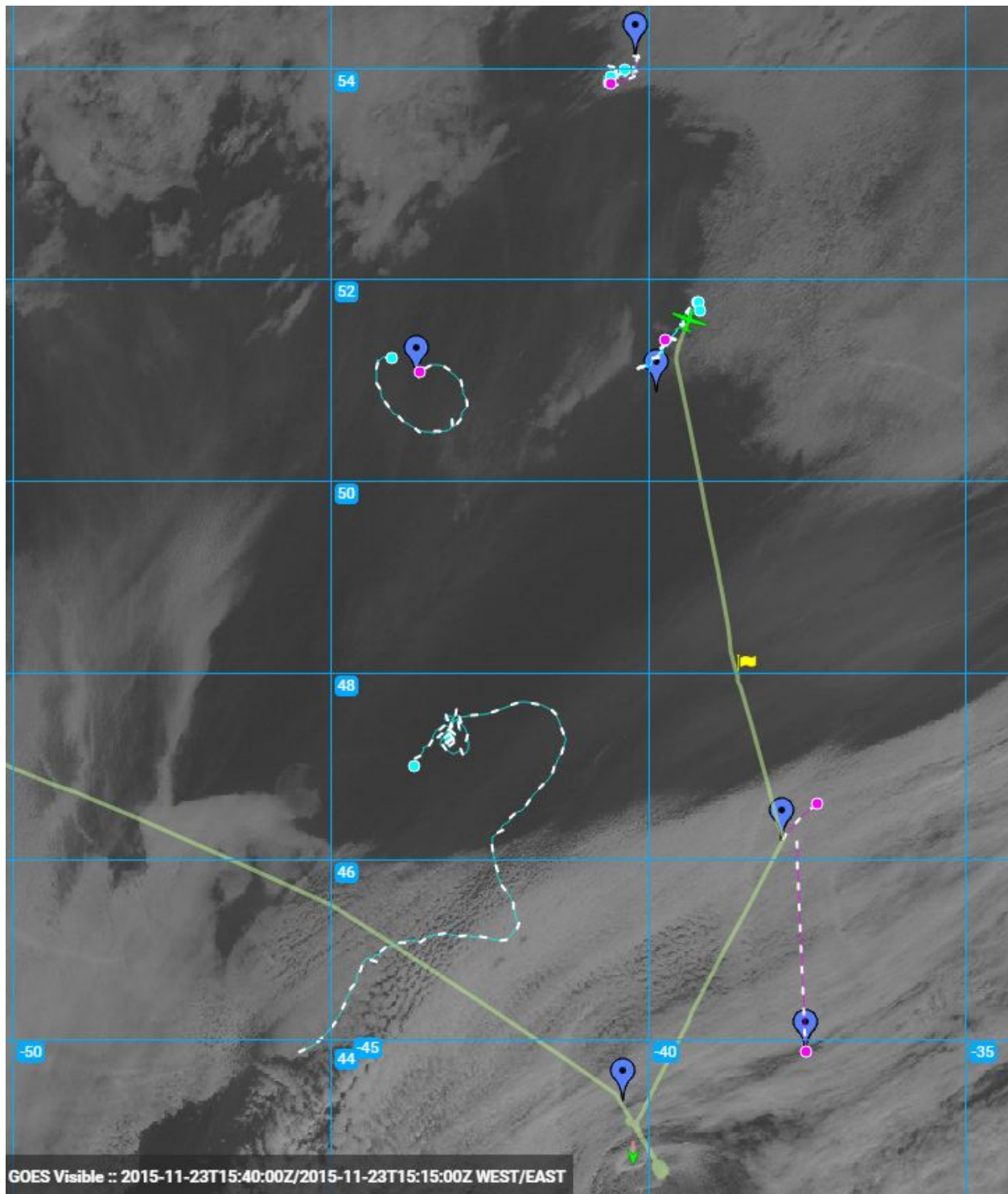
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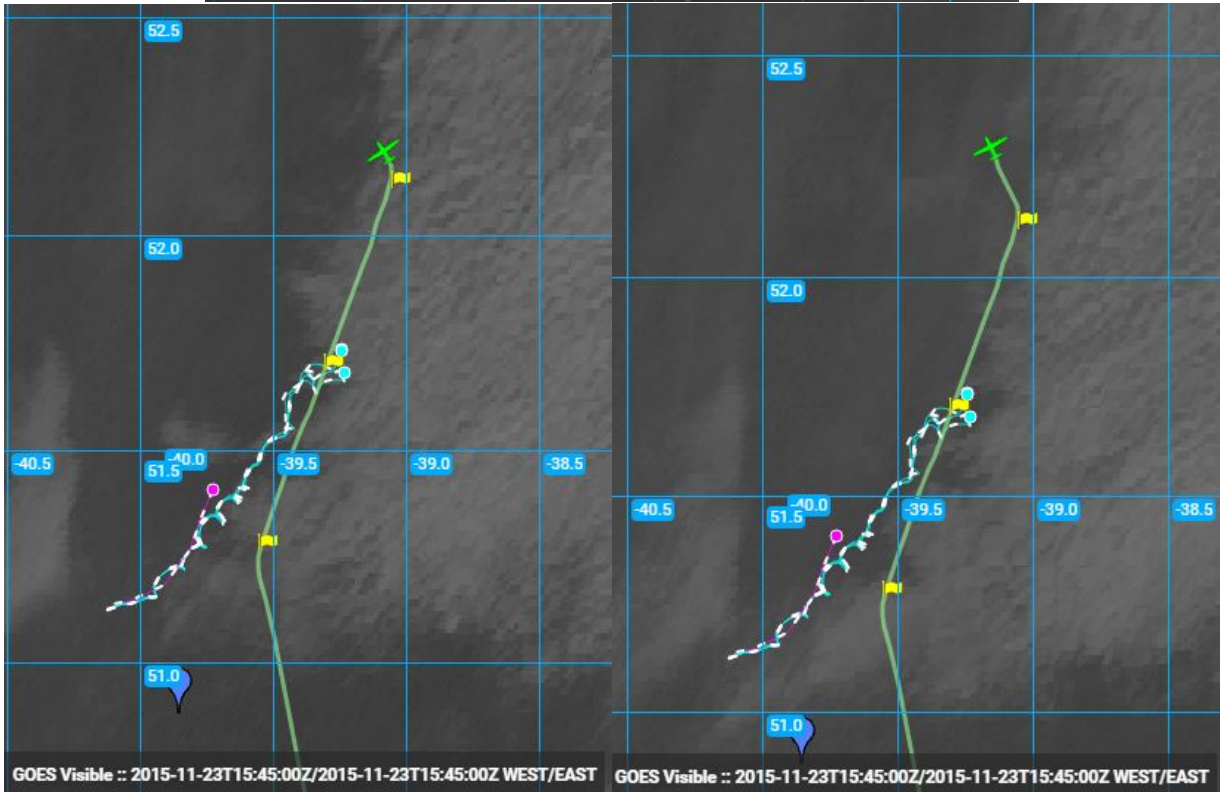
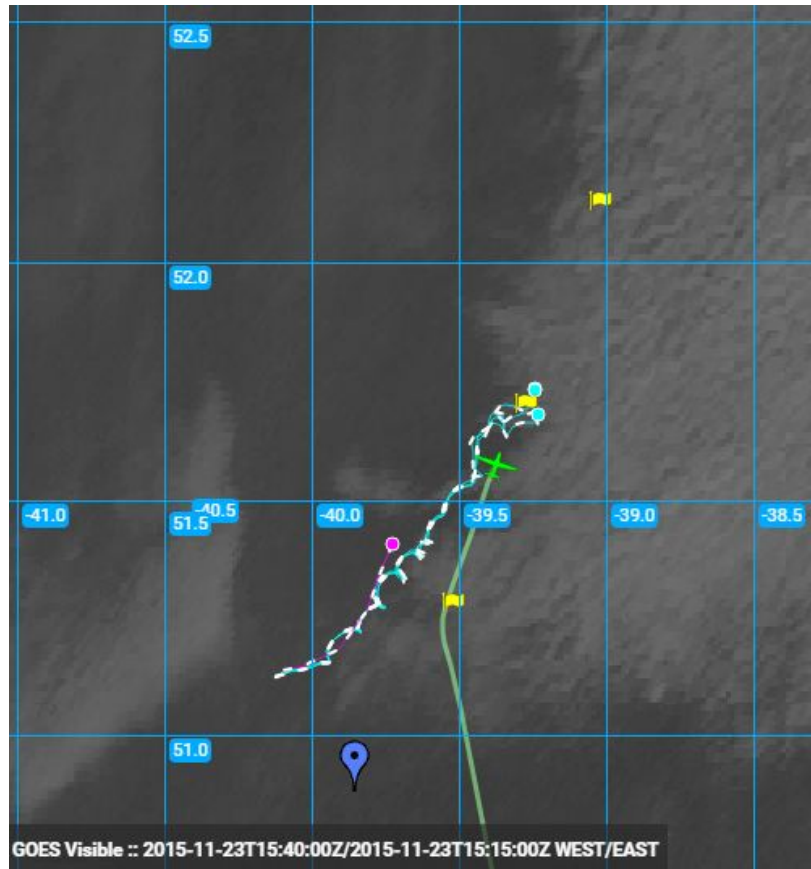
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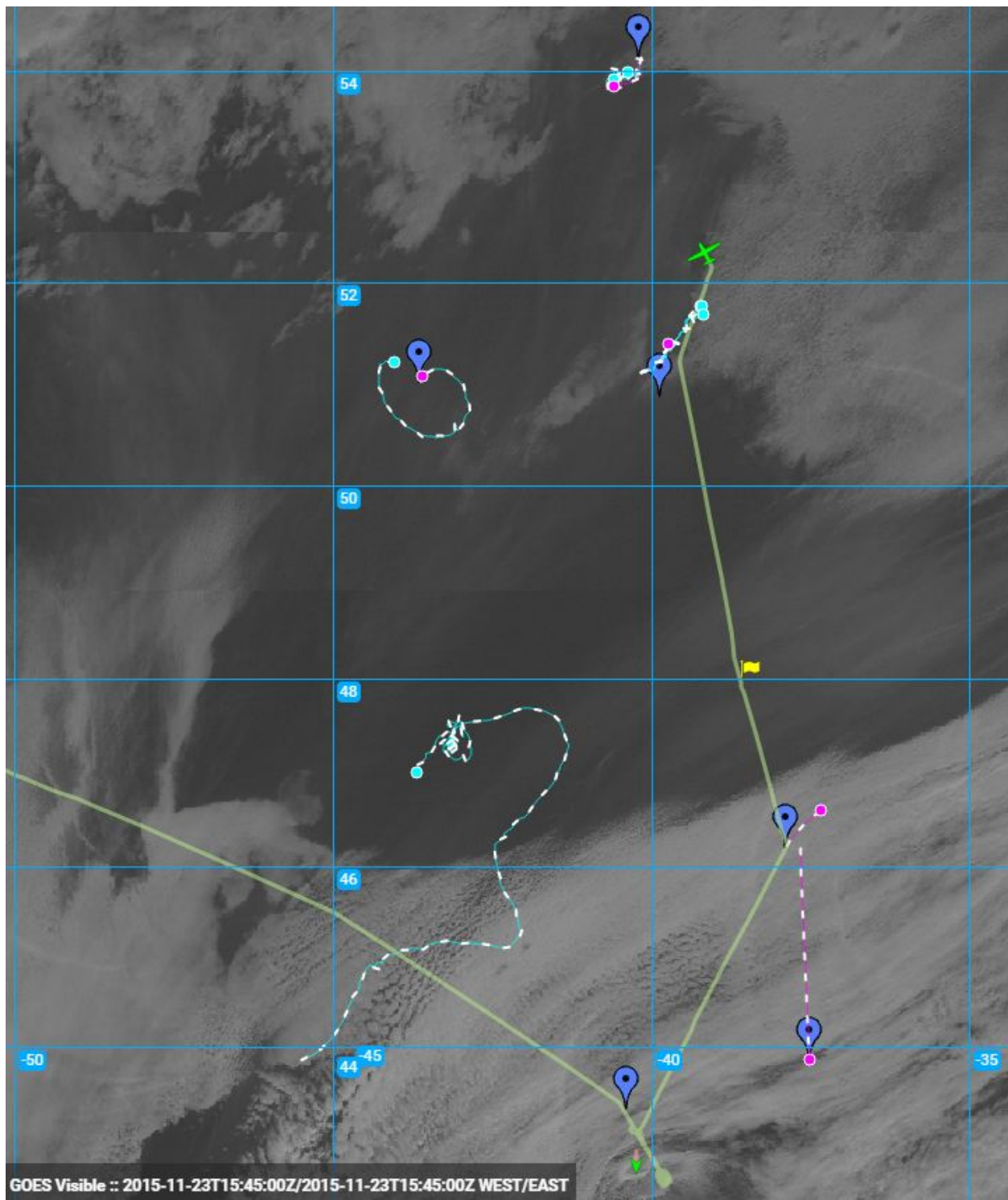
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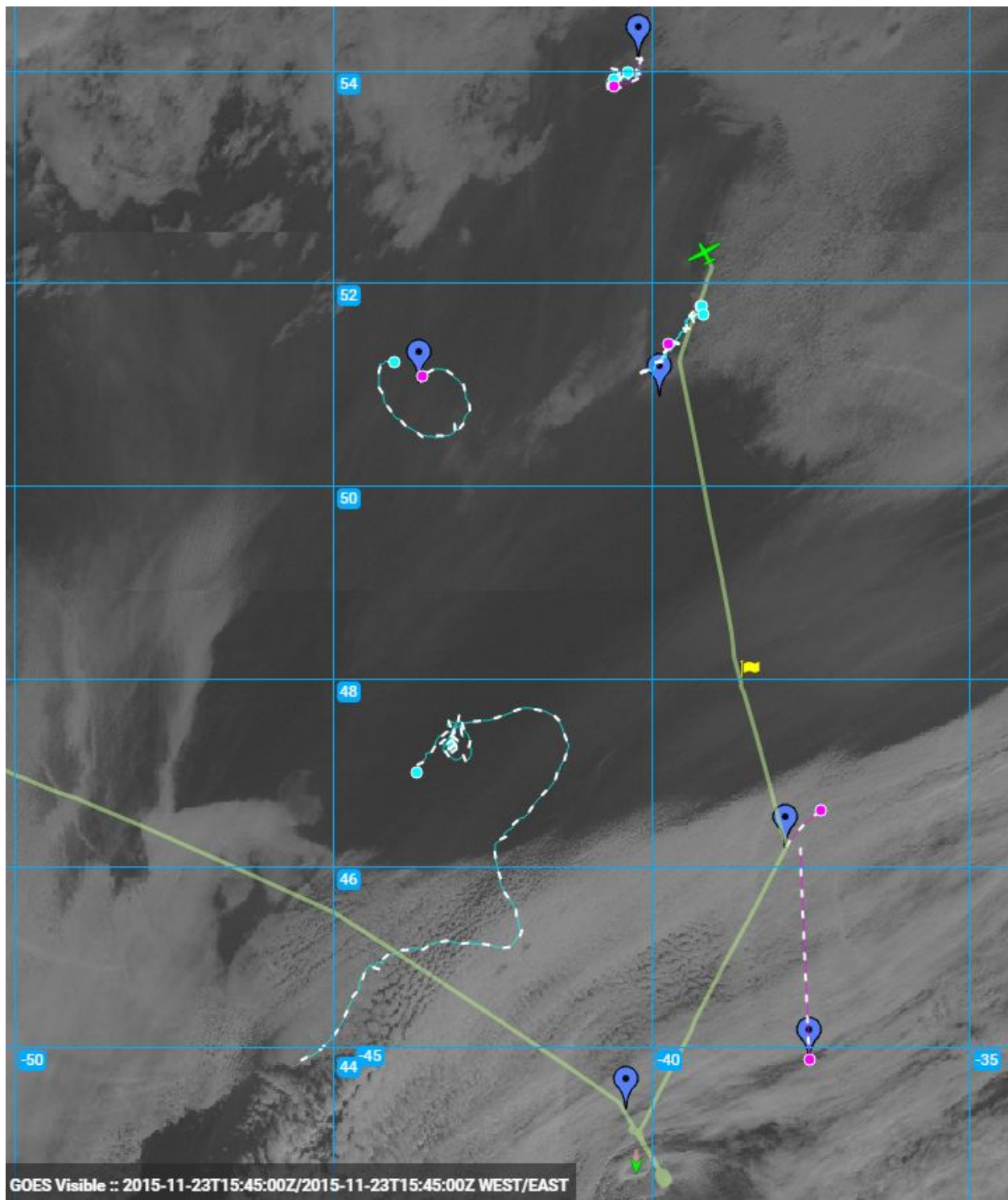
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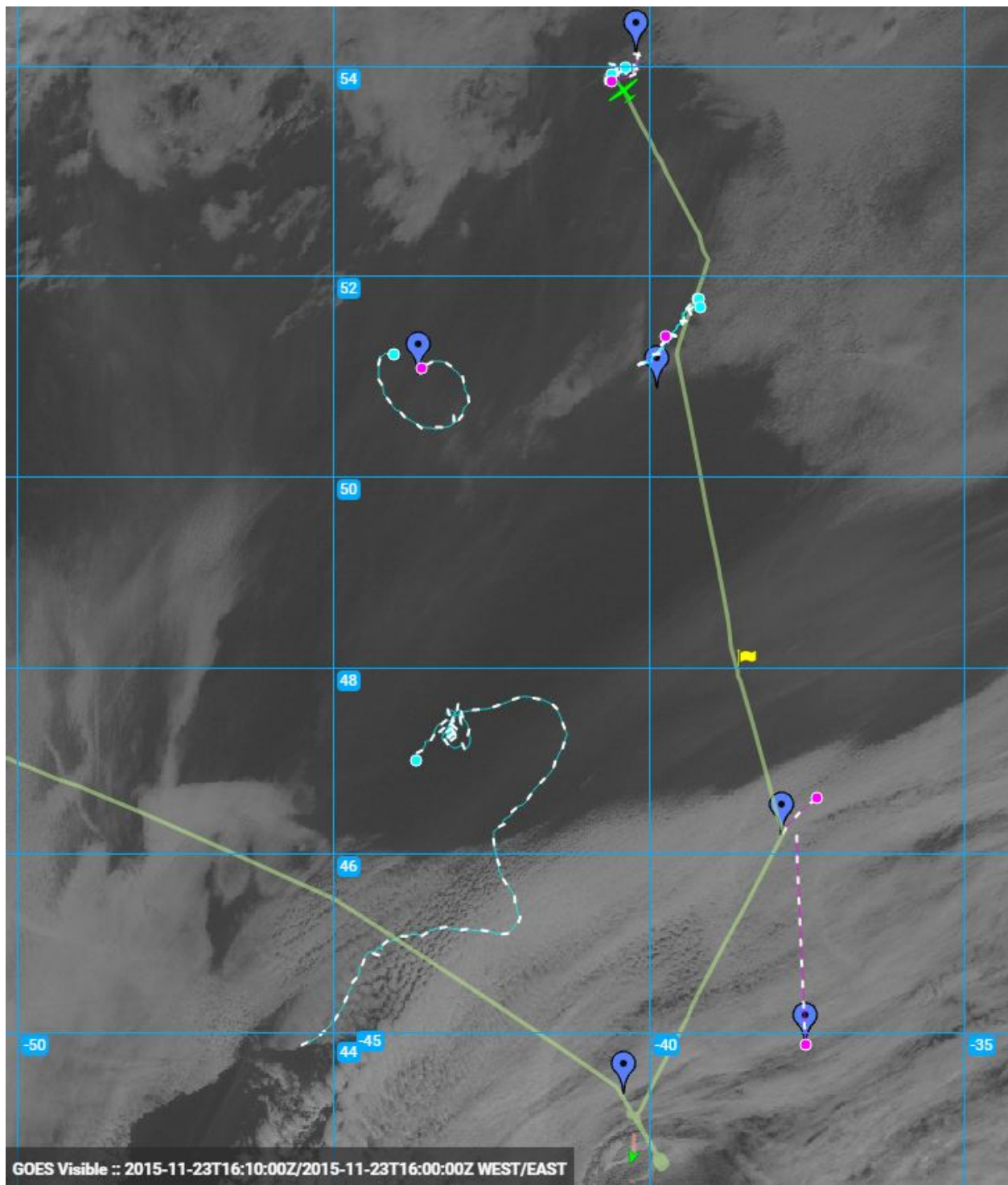
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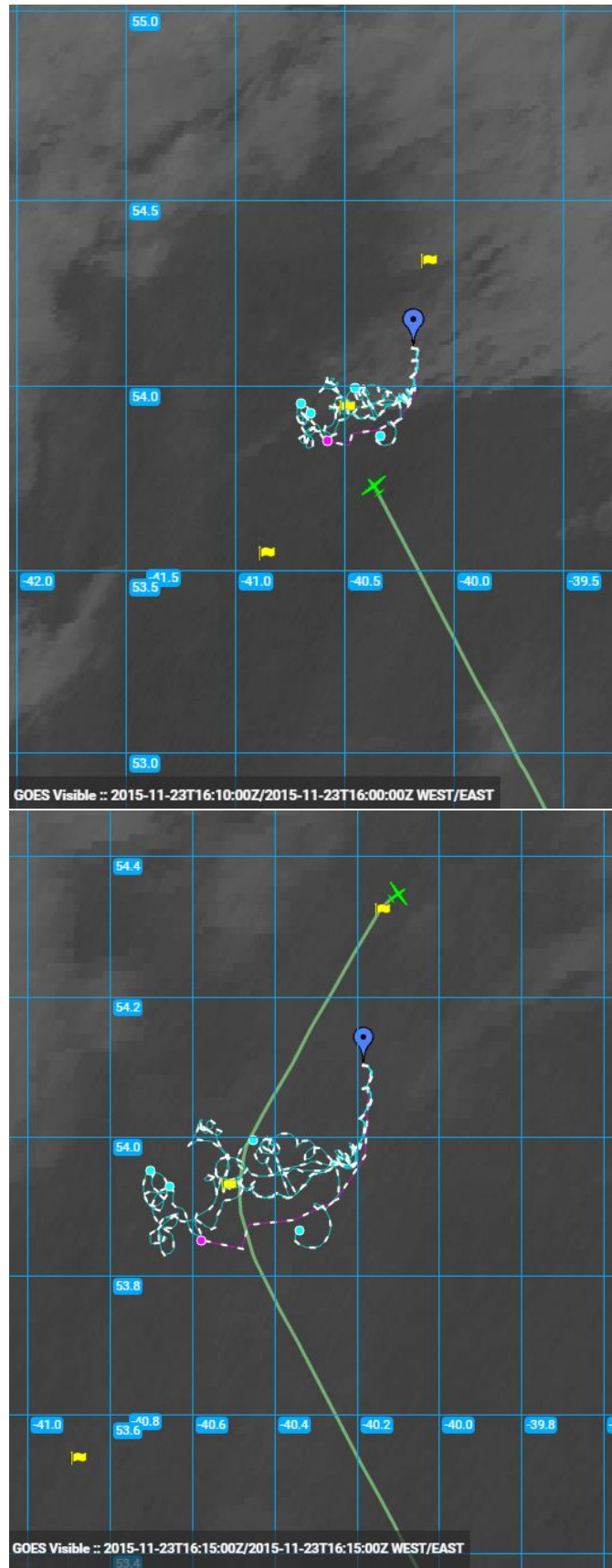
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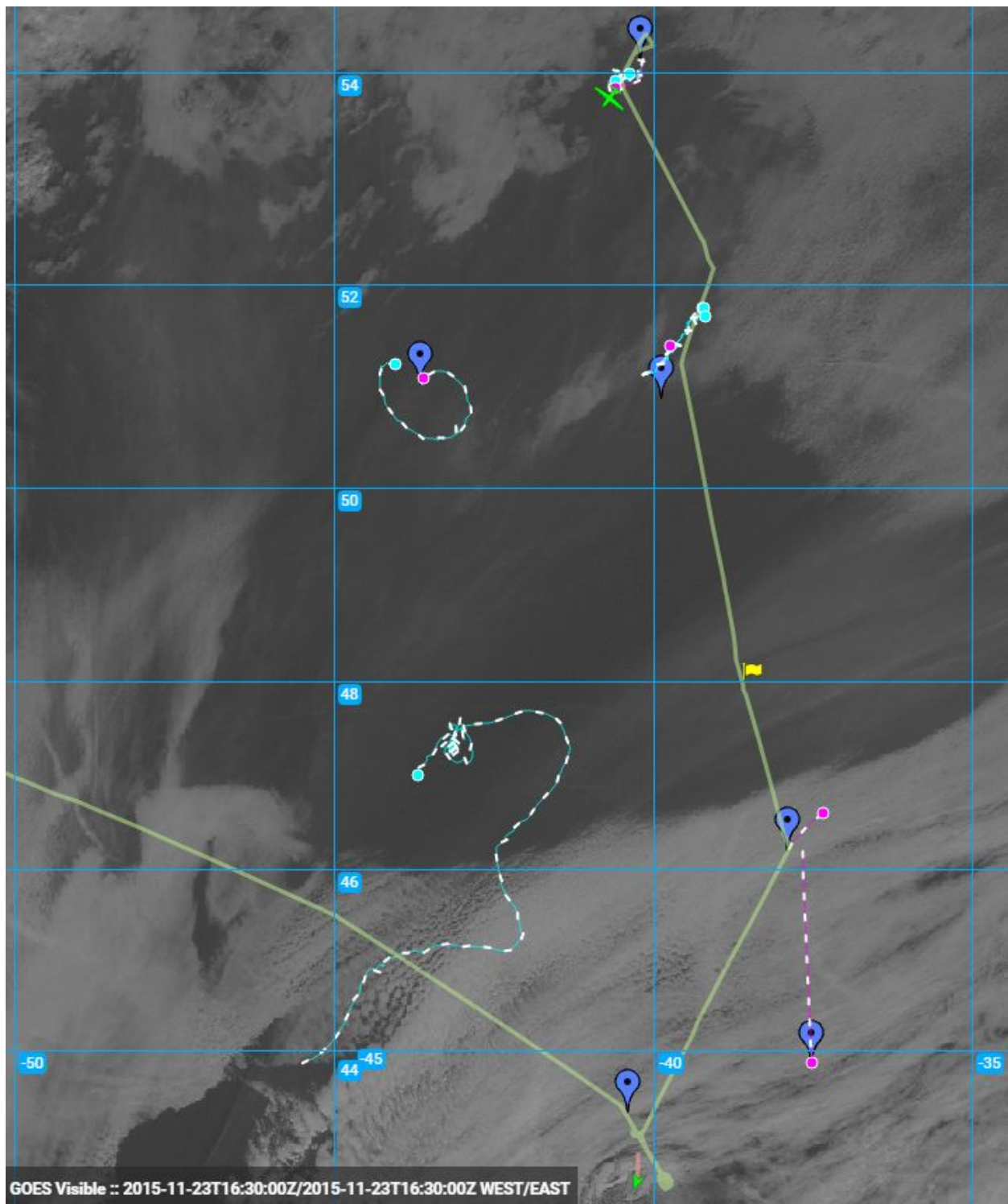
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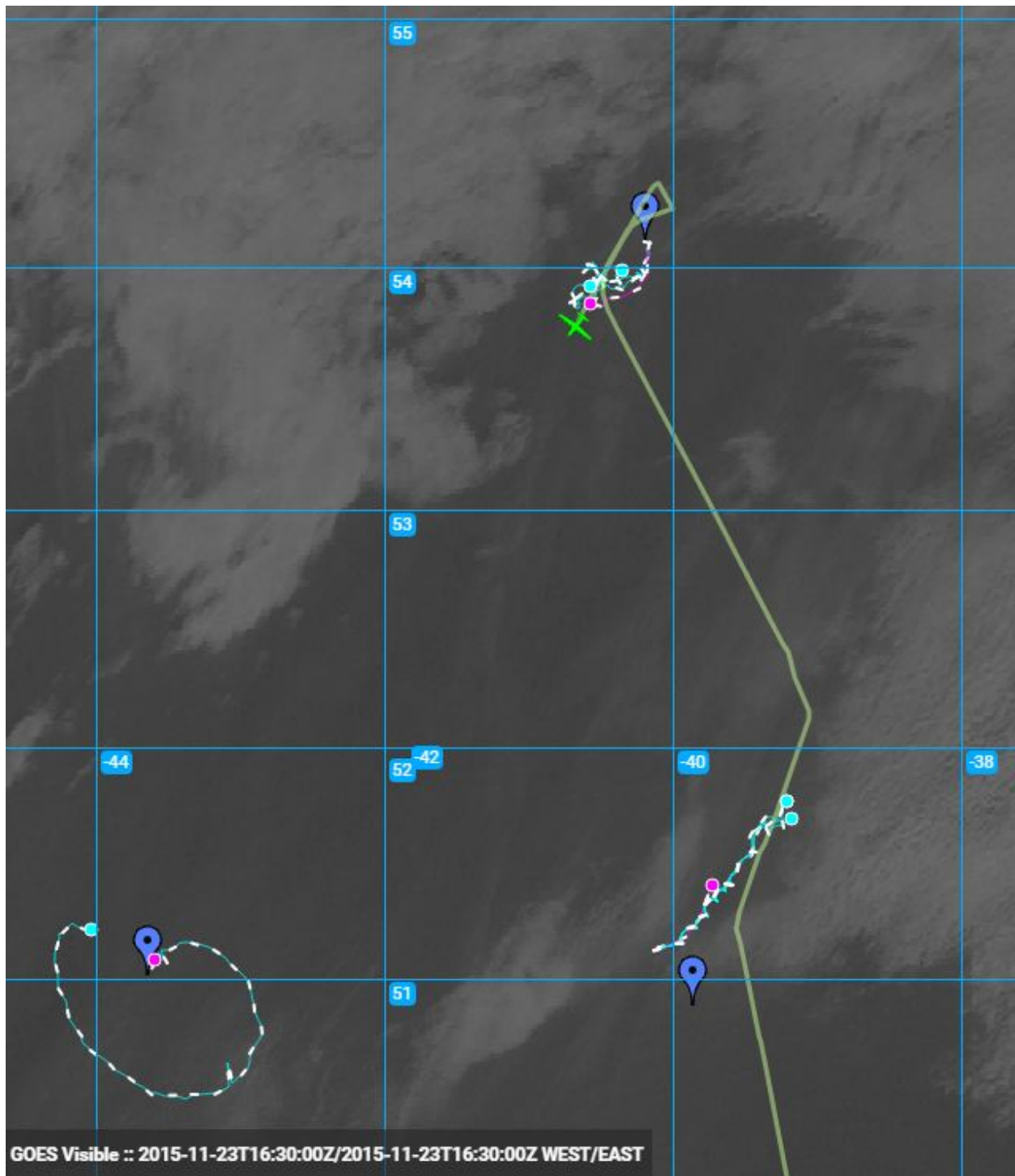
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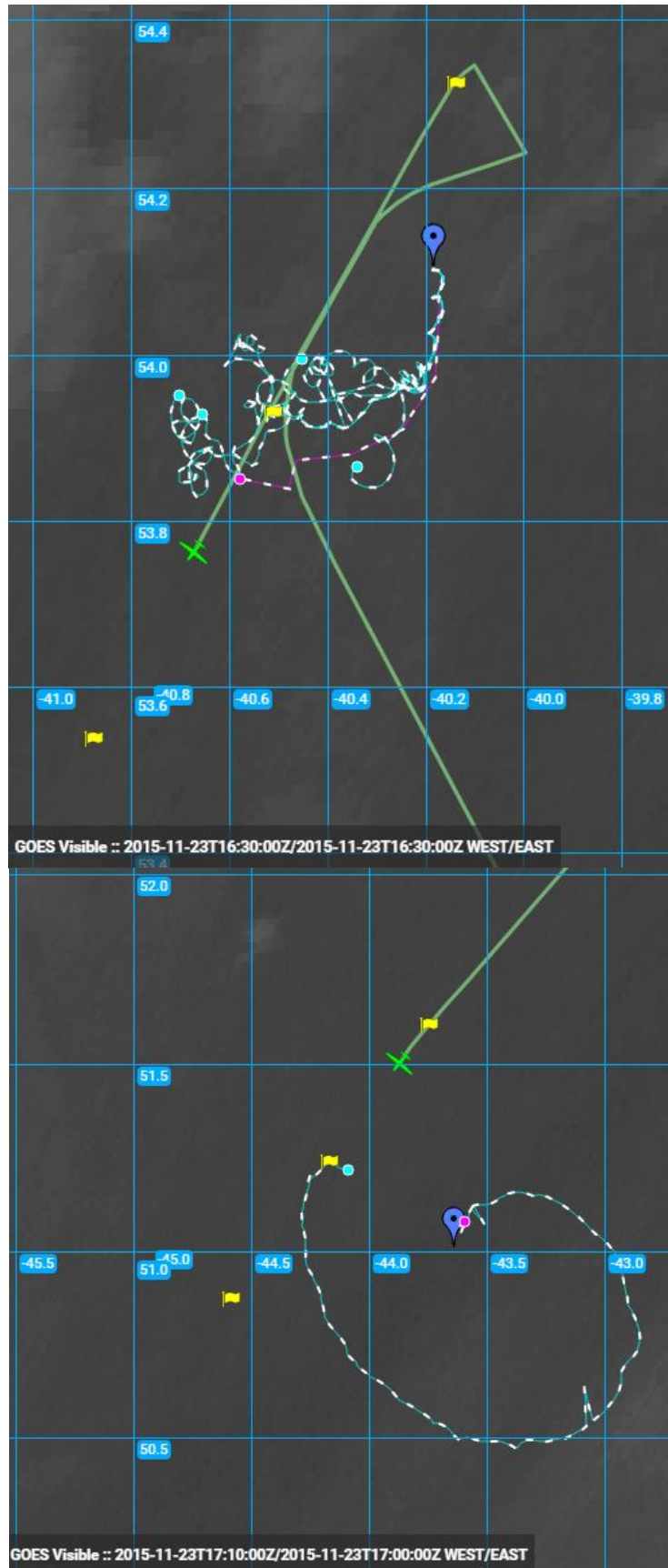
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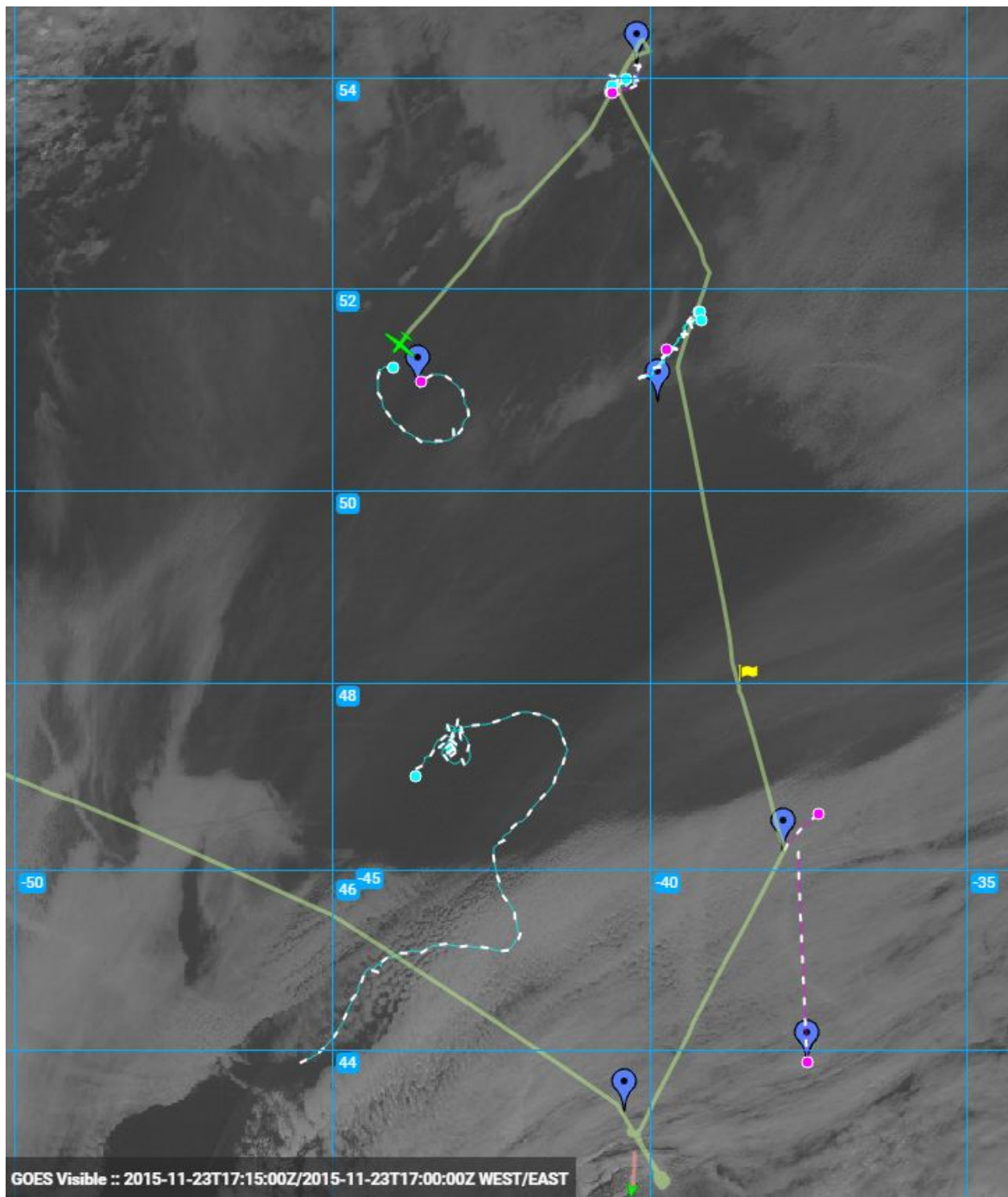
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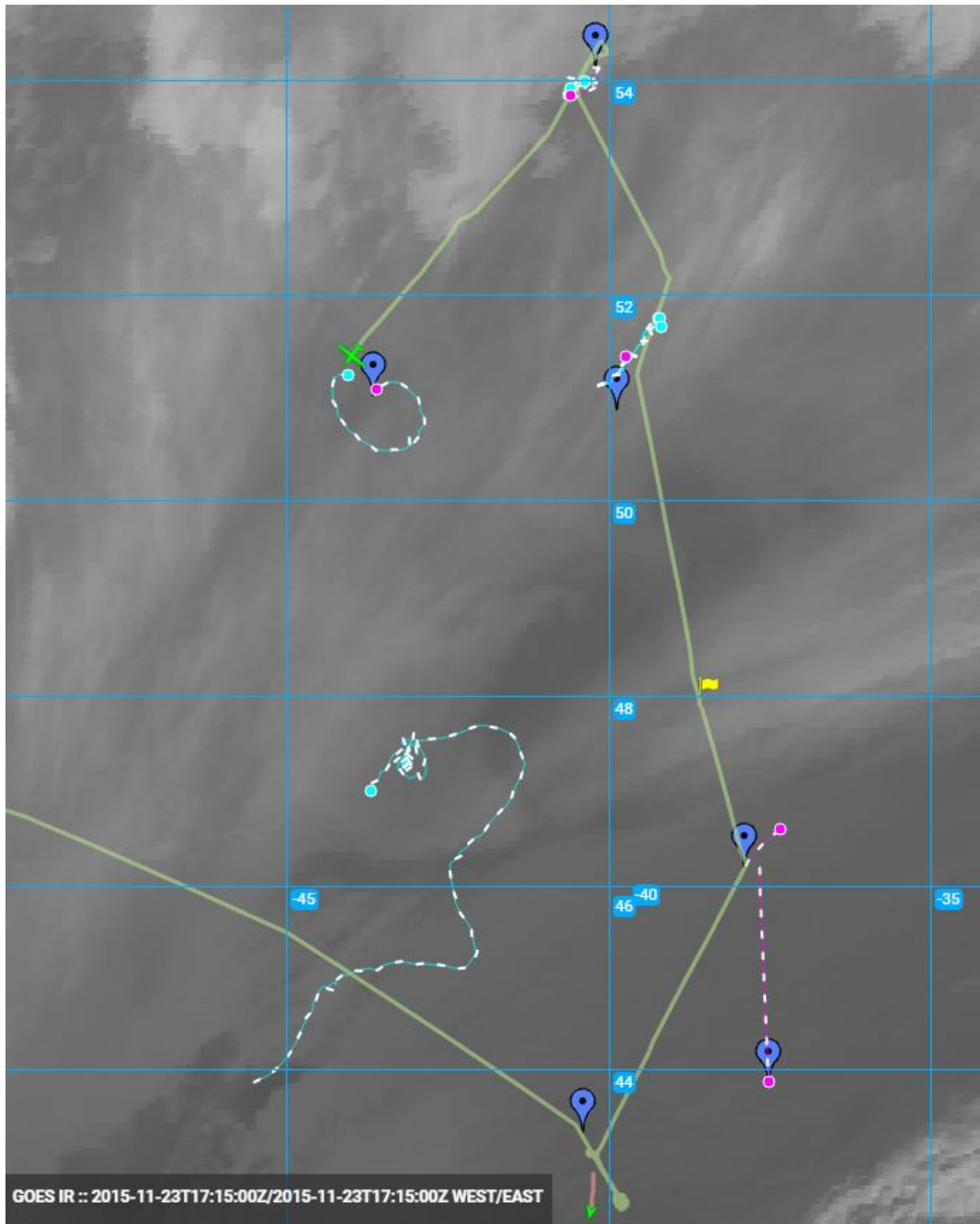
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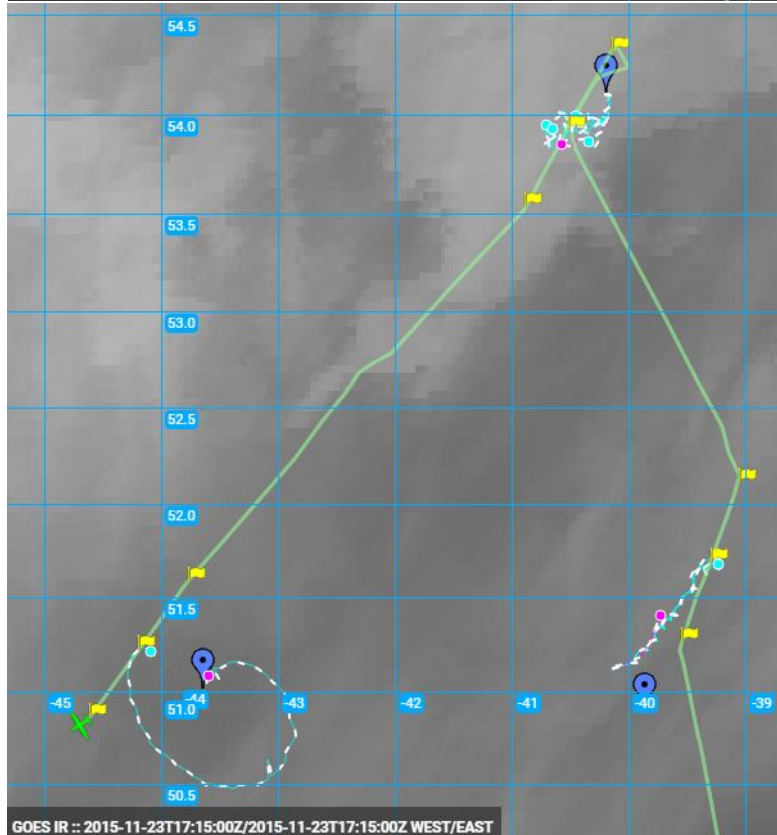
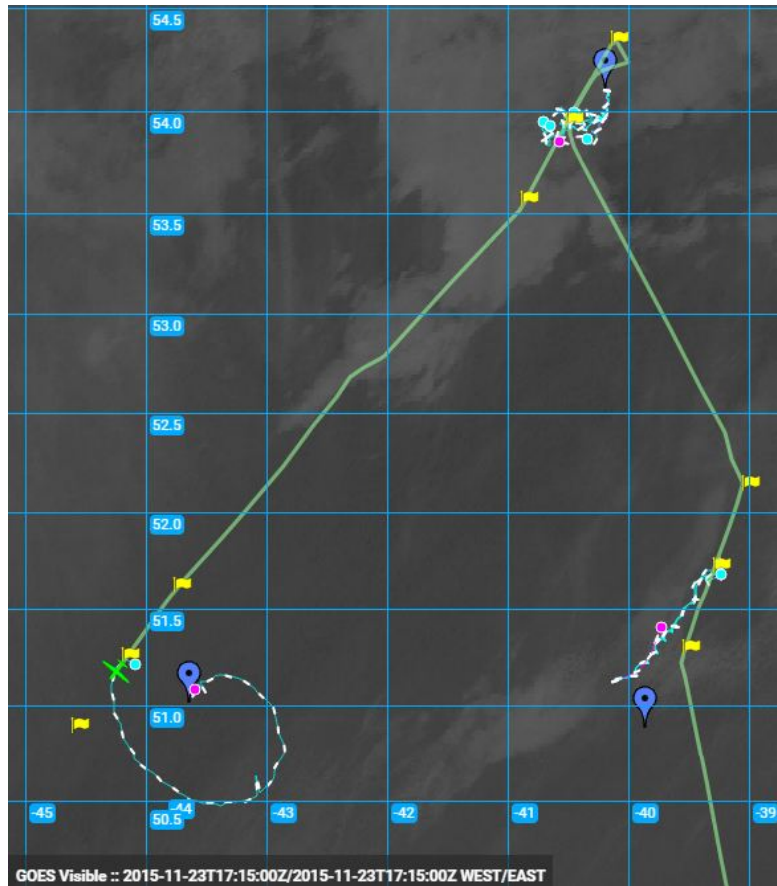
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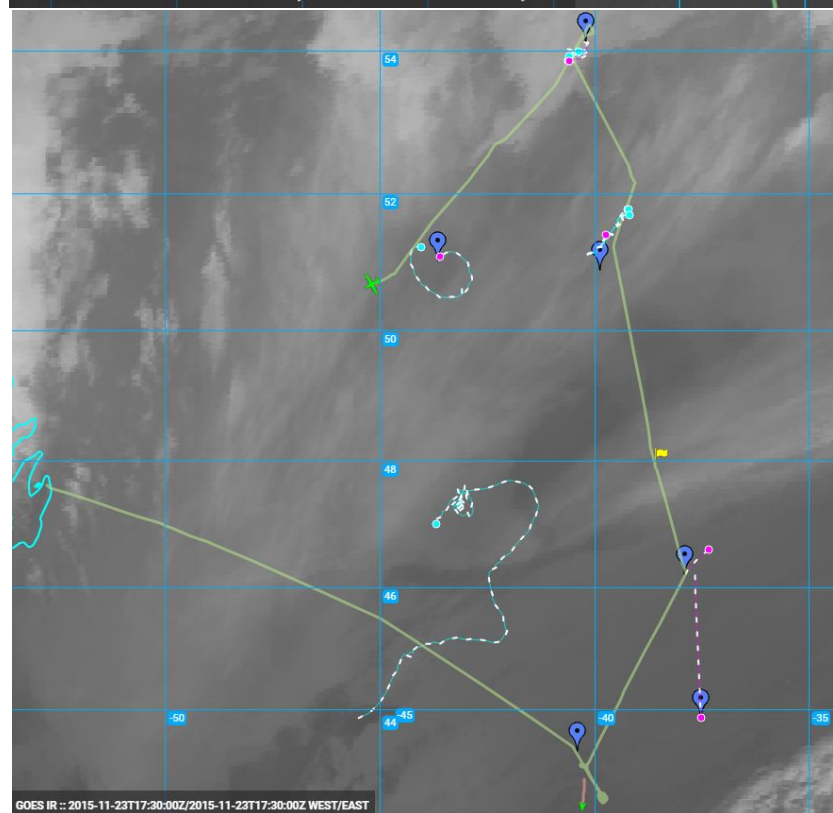
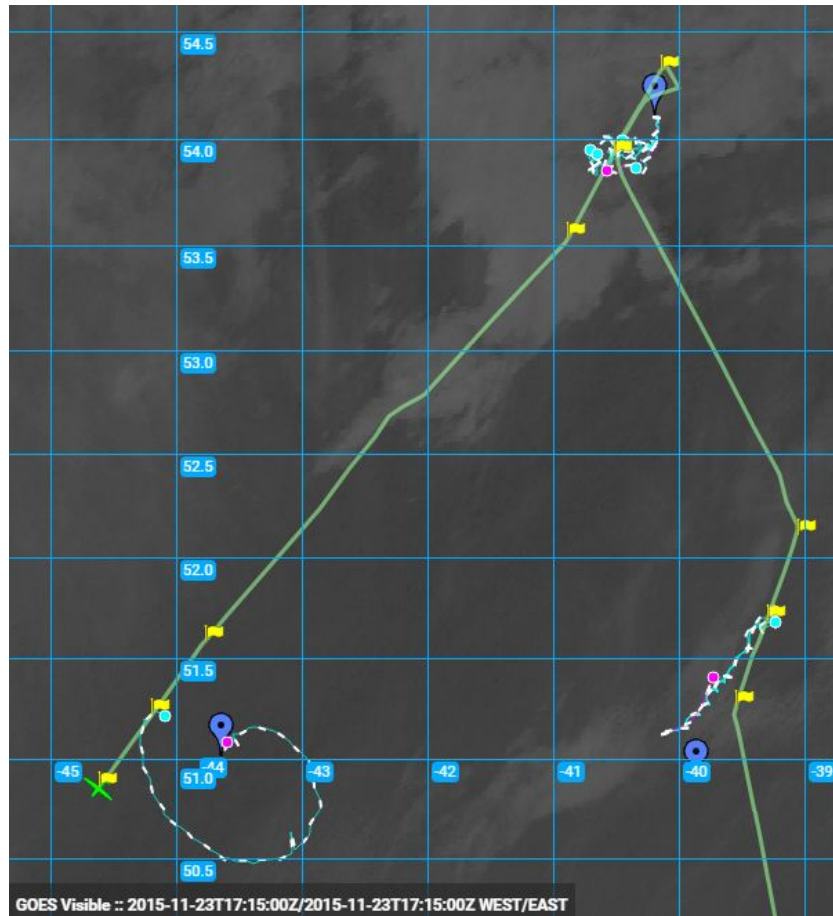
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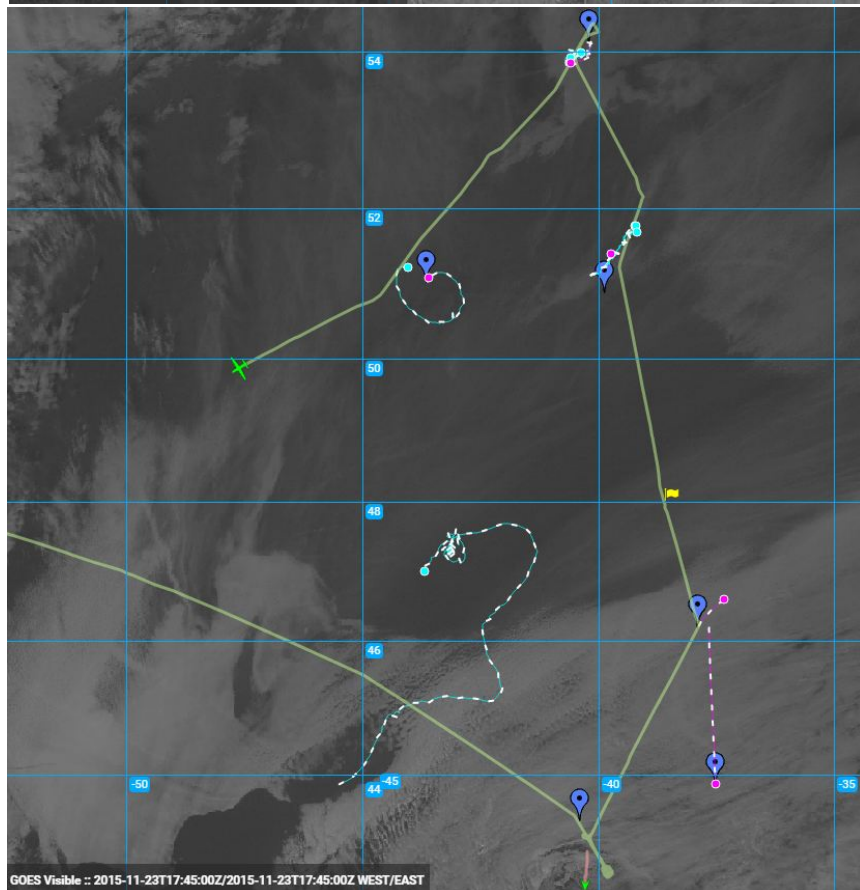
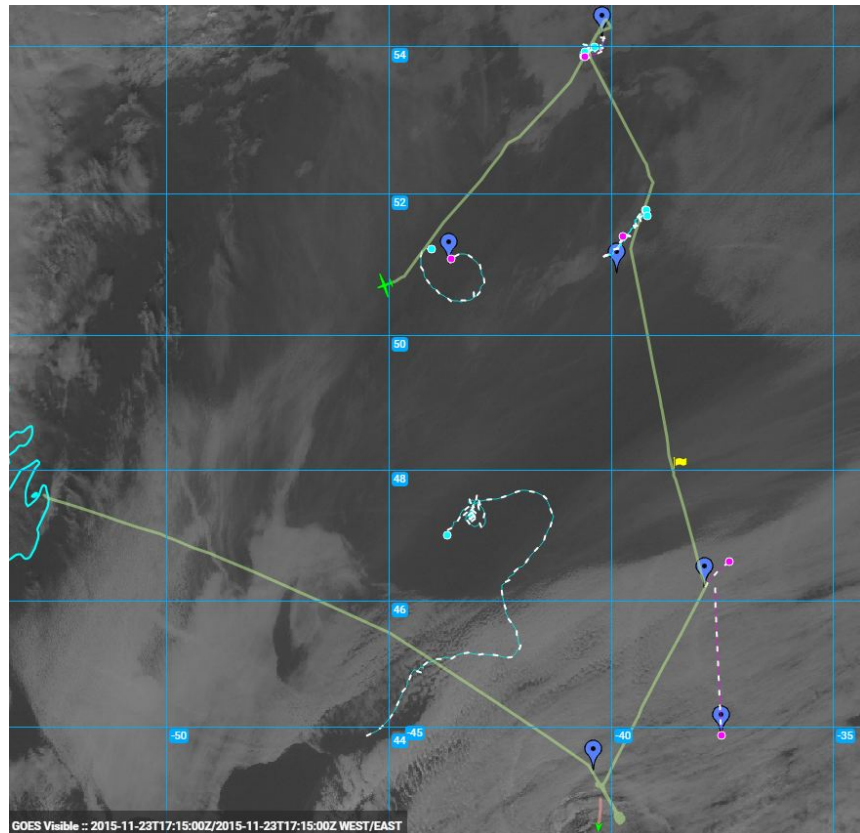
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