

Supplementary Material for: Investigating the cloud liquid water and droplet concentration relationship across cloud morphologies with machine learning

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1 Detailed k-Means clustering of cloud morphology

This supplement contains plots of each of the 64 clusters produced by k-means clustering of North Atlantic cloud morphology. Each page summarizes one cluster. The top panel shows randomly selected sample images from the 25% of cases closest to the cluster center. The middle row shows the time- and space-distributions of all images assigned to the cluster. The bottom row

5 show the distribution of liquid water path and cloud droplet number concentration for each cluster using only the 25% of cases closest to the cluster center. Reported liquid water path, number concentration, cloud top temperature, and cloud top pressure are computed based only on pixels that meet the criteria given in Section 2.2 of the main text and only reported for samples when at least 10% of the pixels in the image meet these criteria.

Figure S1, Cluster 1

77K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 281.0 K, Mean CTP: 841.0 hPa, Mean LWP: 88.55 gm^{-2} , Mean Nd: 37.6 cm^{-3} (for cloudy pixels)

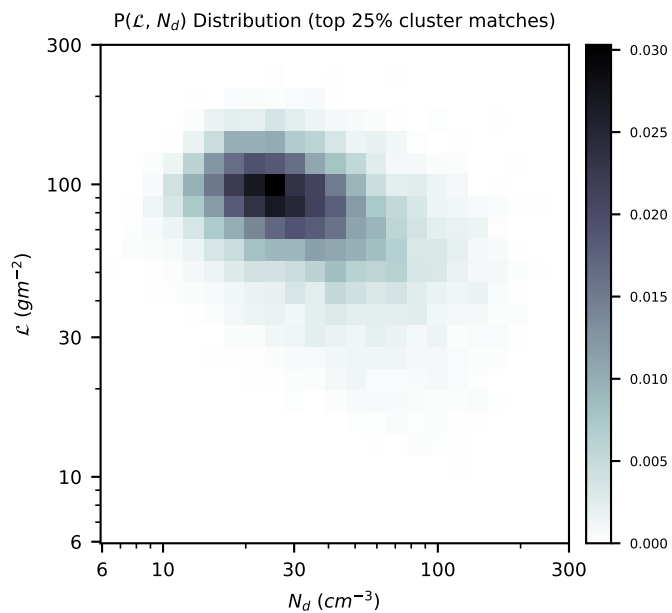
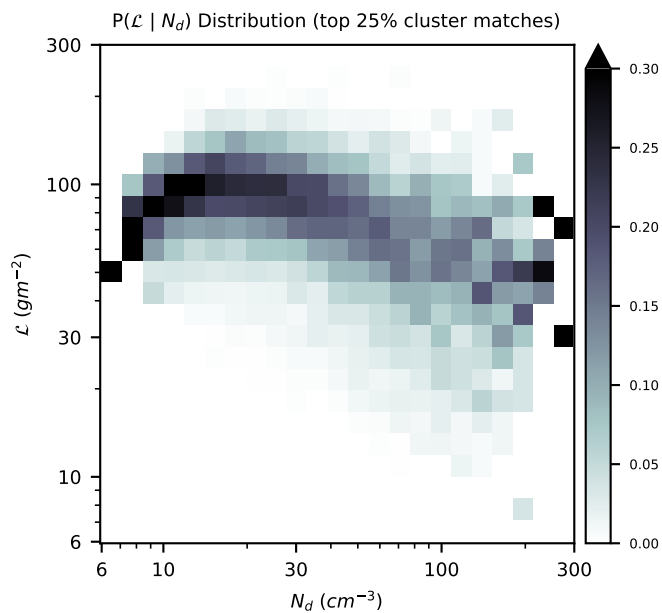
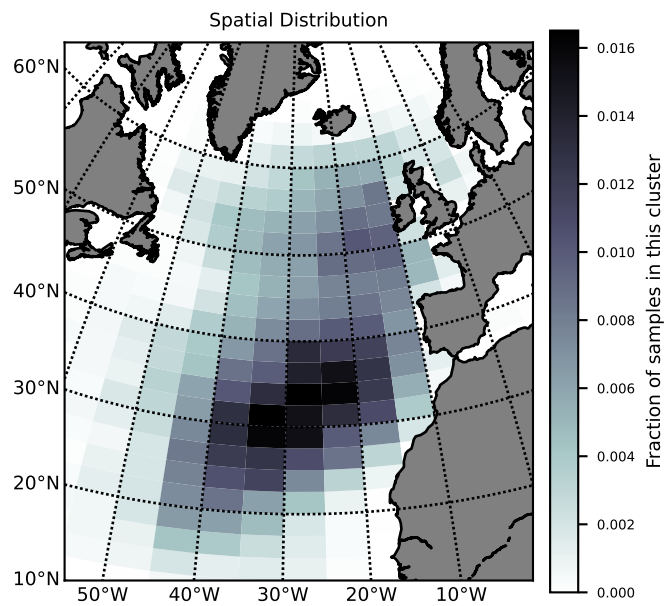
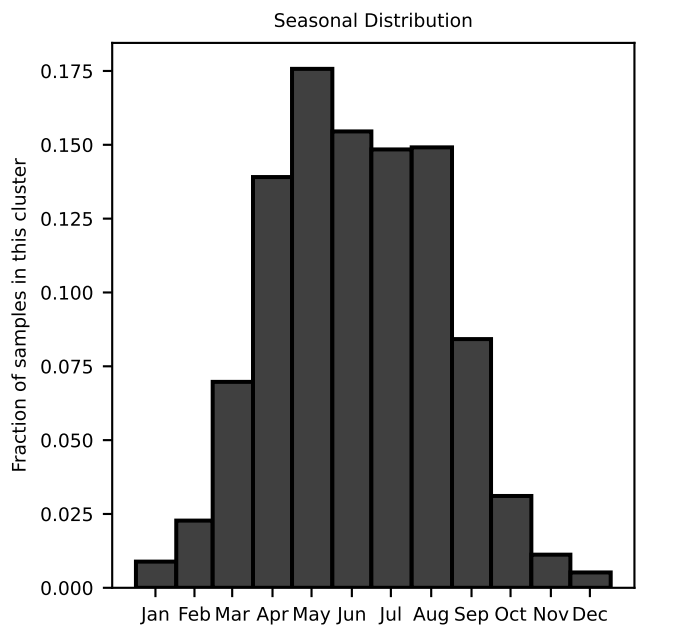
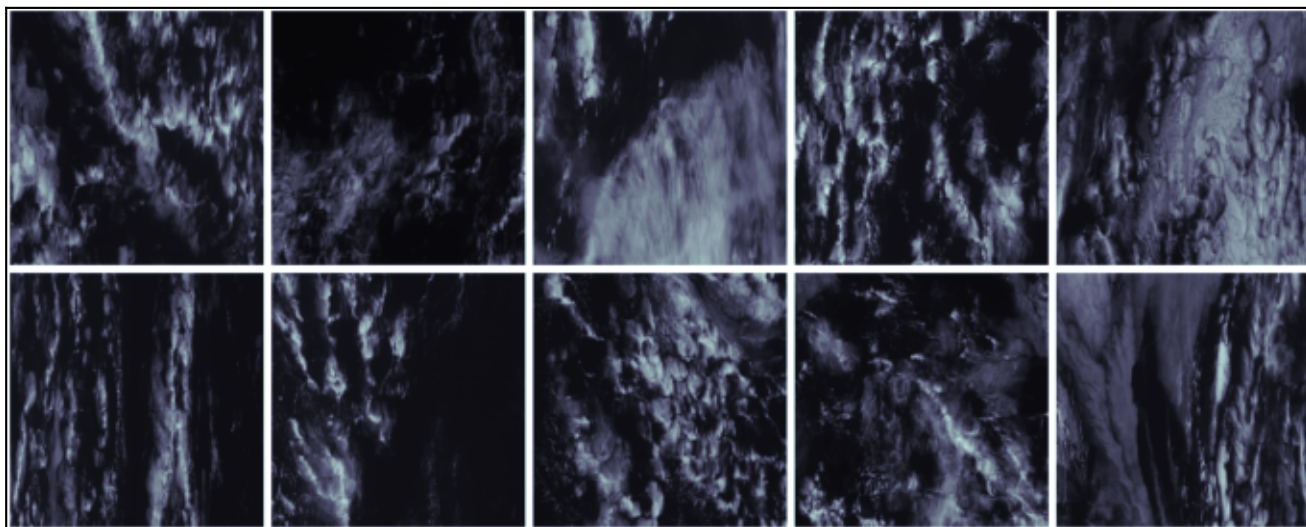


Figure S2, Cluster 2

75K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 284.0 K, Mean CTP: 821.0 hPa, Mean LWP: 92.19 gm^{-2} , Mean Nd: 35.66 cm^{-3} (for cloudy pixels)

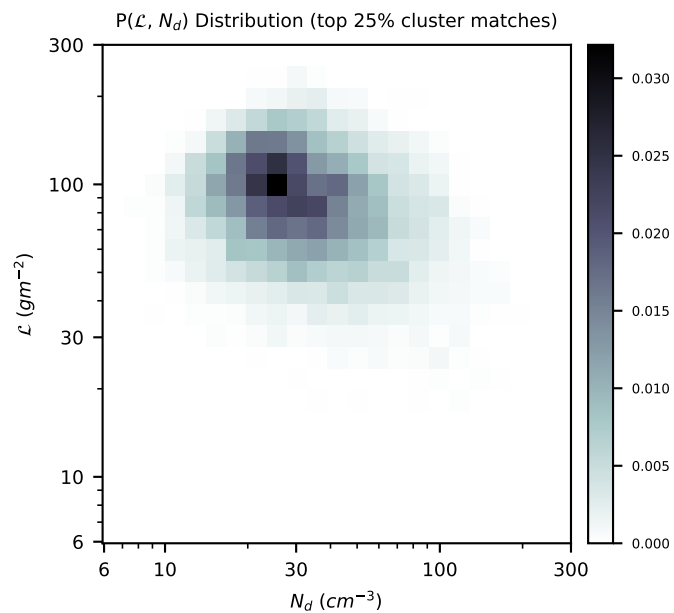
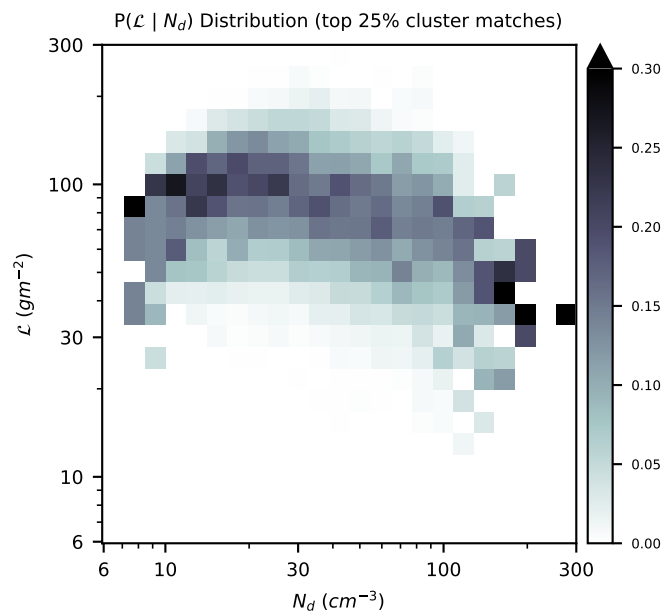
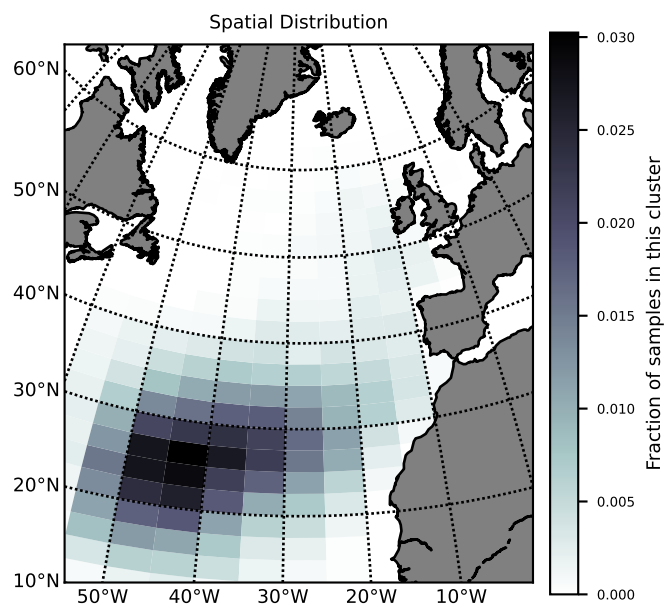
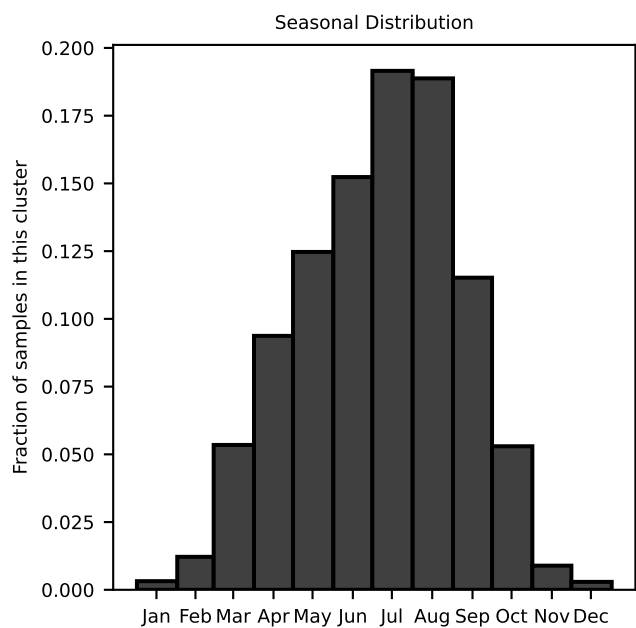
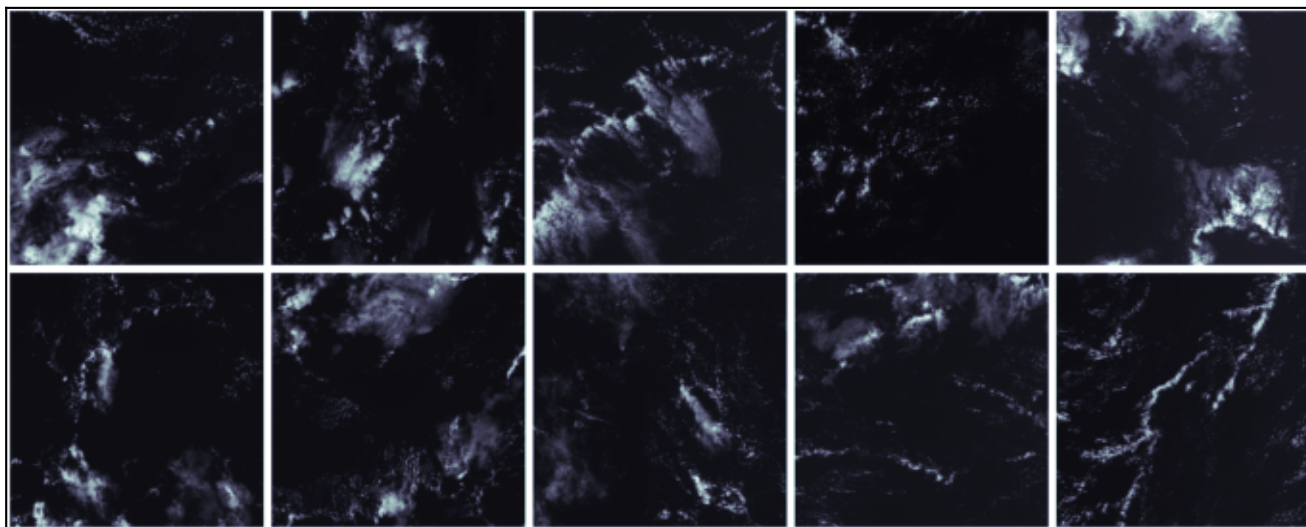


Figure S3, Cluster 3

30K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 280.0 K, Mean CTP: 896.0 hPa, Mean LWP: 112.04 gm^{-2} , Mean Nd: 31.55 cm^{-3} (for cloudy pixels)

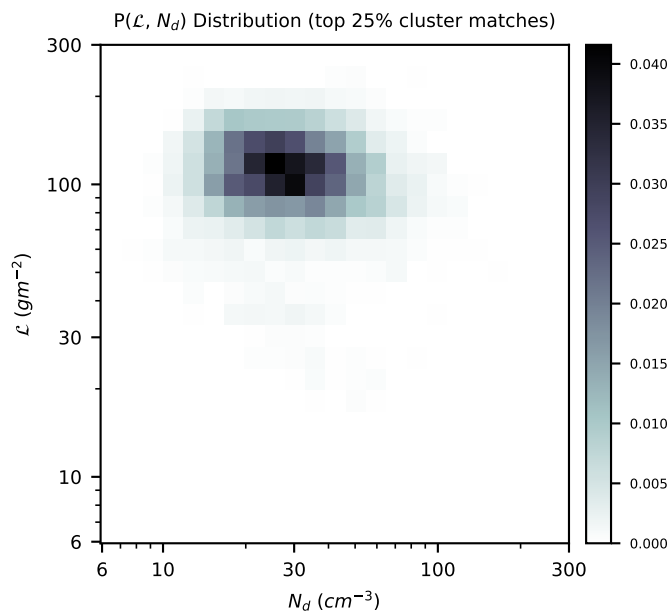
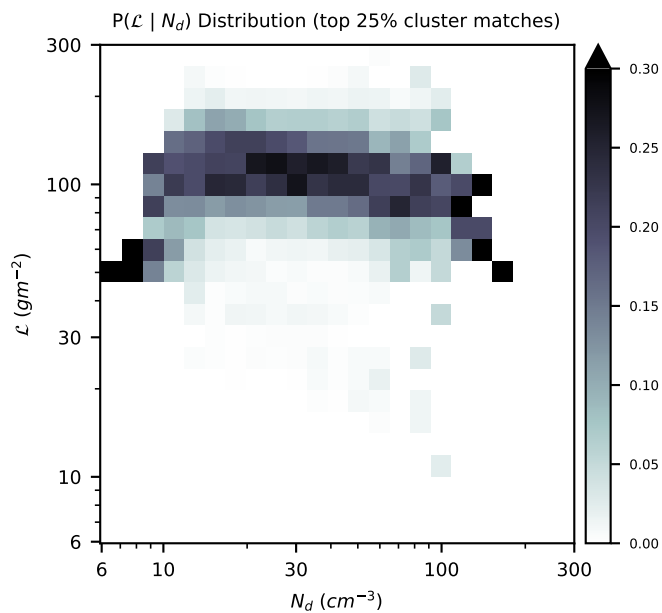
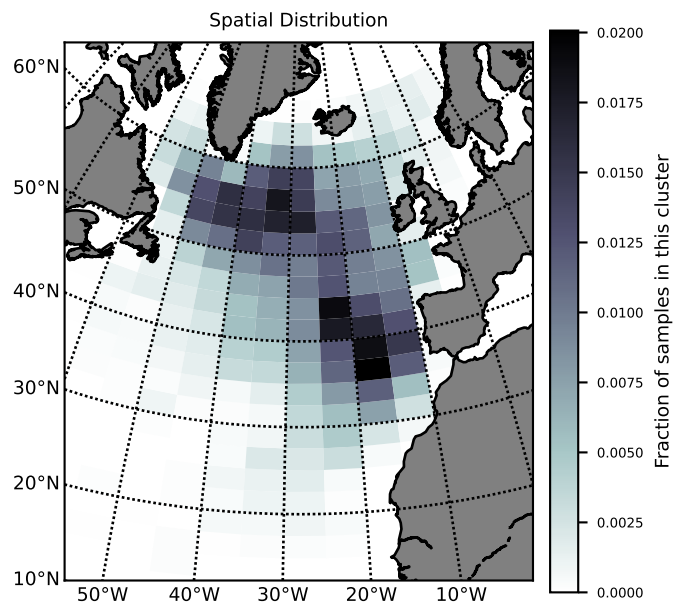
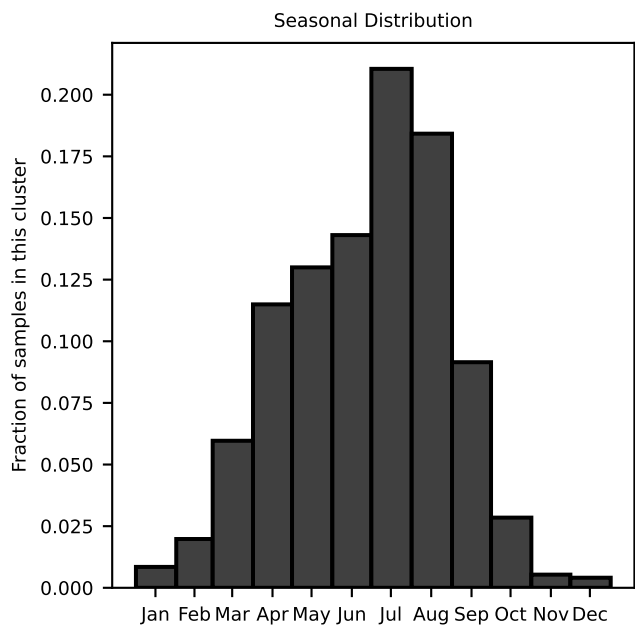
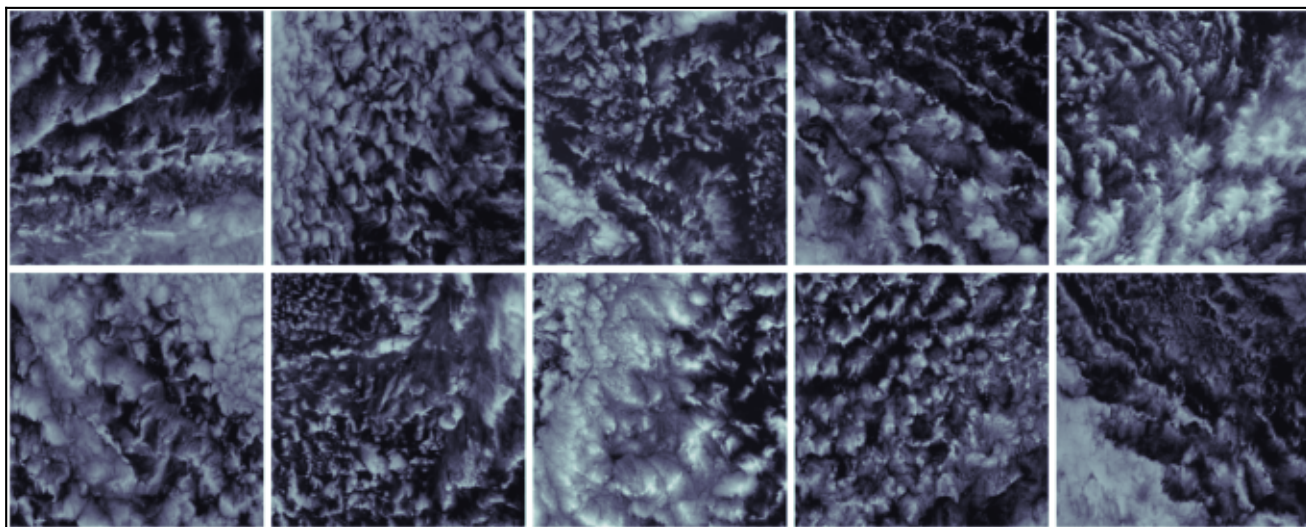


Figure S4, Cluster 4

35K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 278.0 K, Mean CTP: 887.0 hPa, Mean LWP: 122.49 gm^{-2} , Mean Nd: 133.61 cm^{-3} (for cloudy pixels)

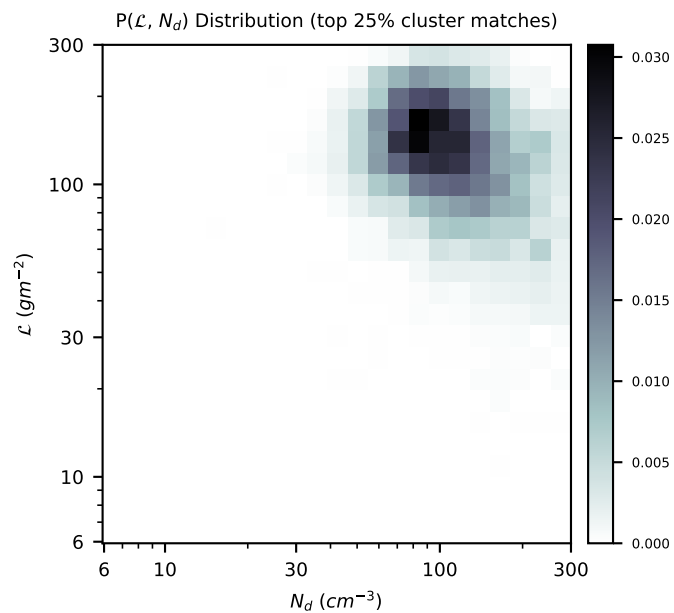
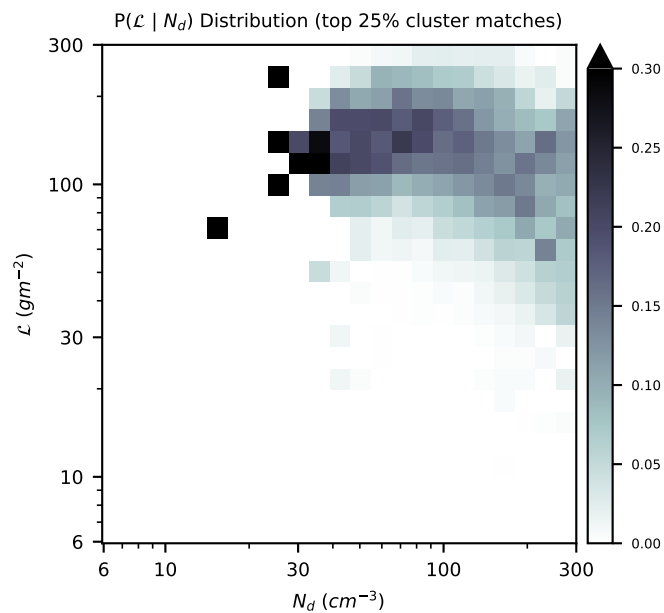
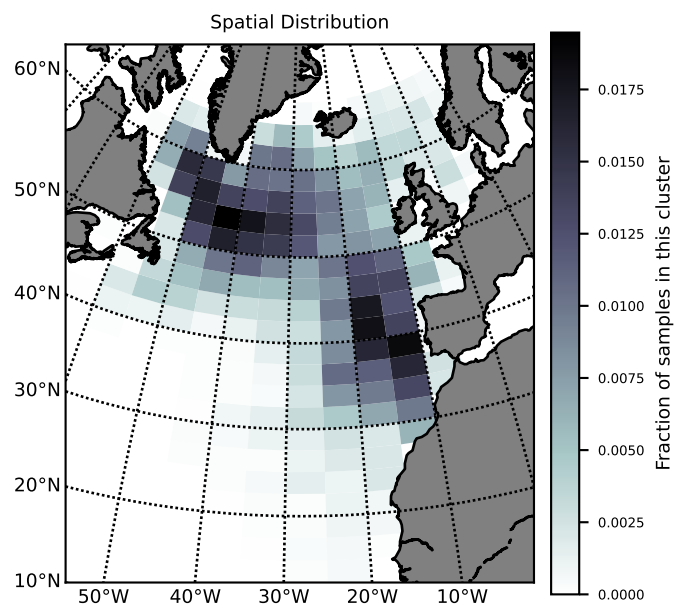
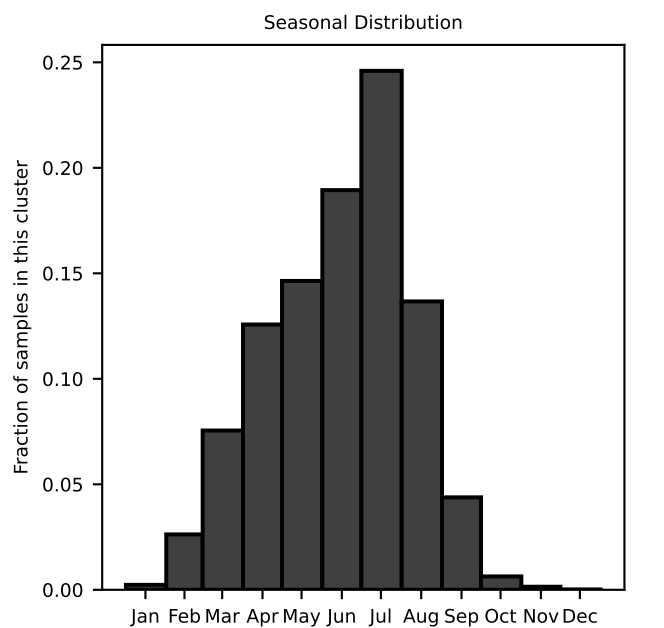
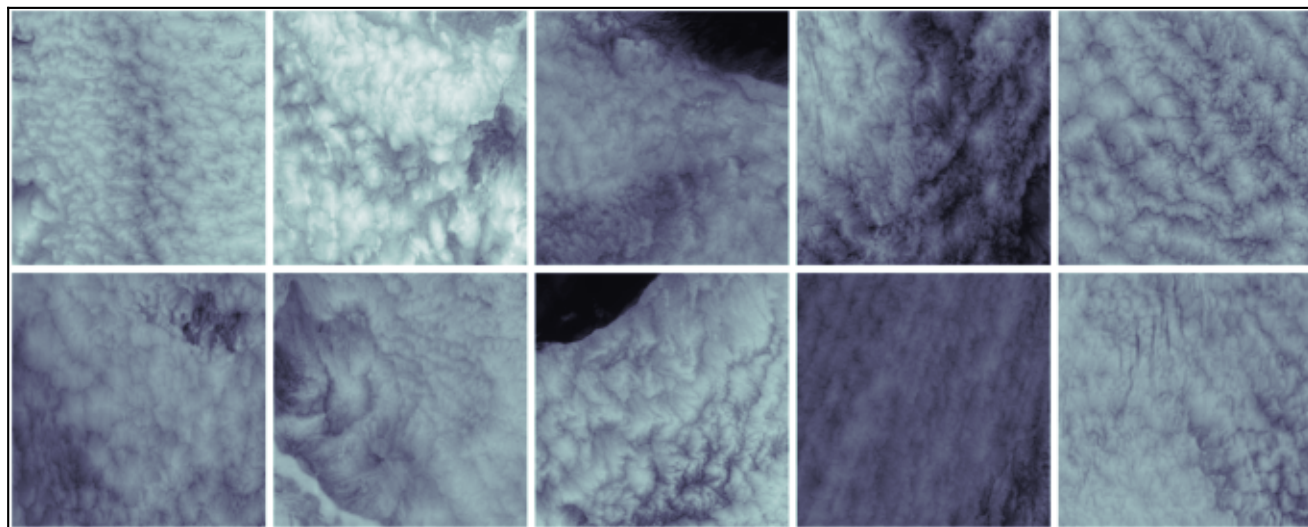


Figure S5, Cluster 5

75K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 278.0 K, Mean CTP: 909.0 hPa, Mean LWP: 161.32 gm^{-2} , Mean Nd: 115.62 cm^{-3} (for cloudy pixels)

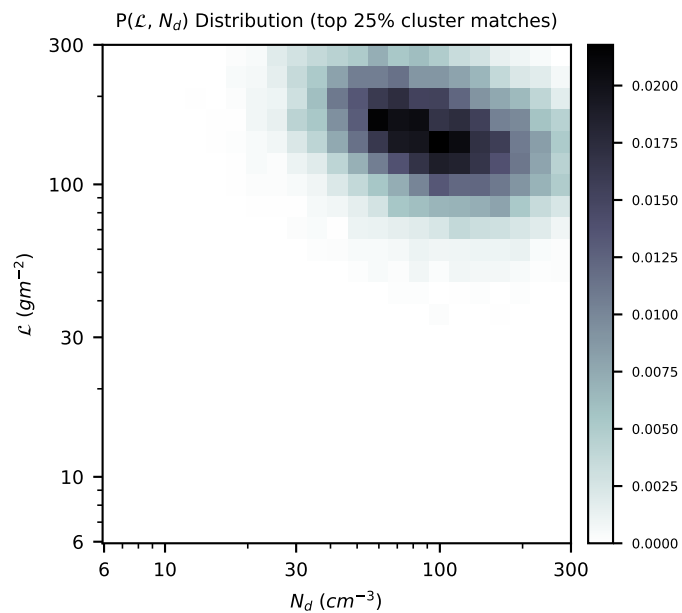
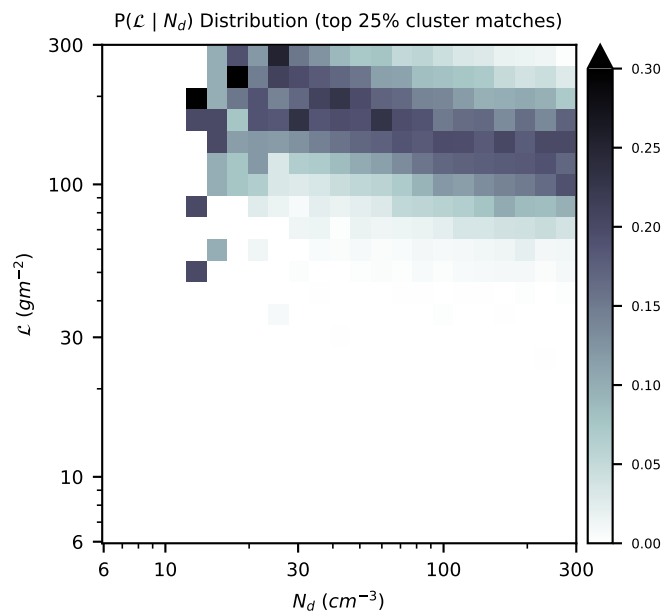
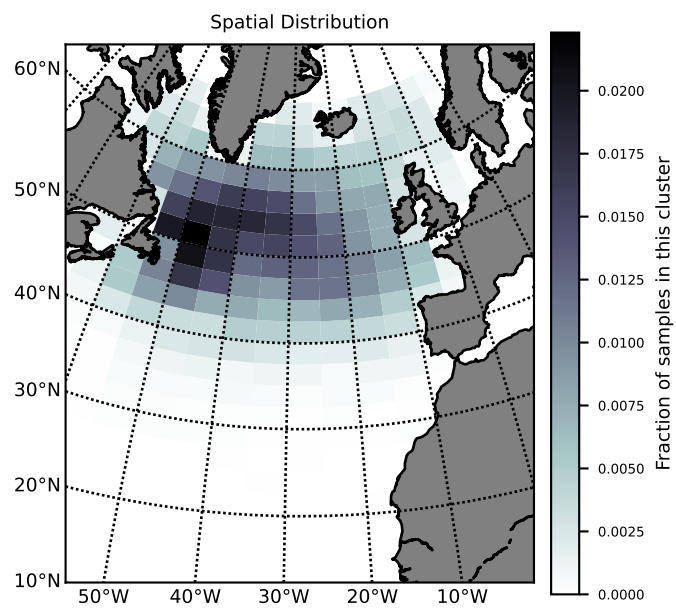
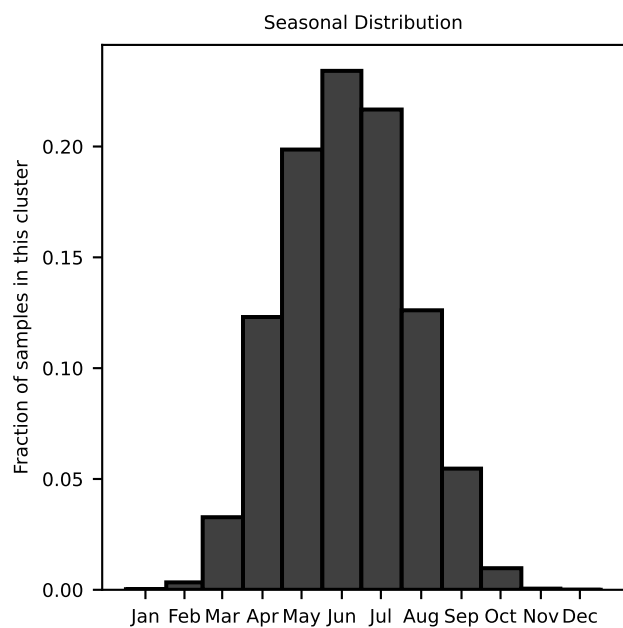
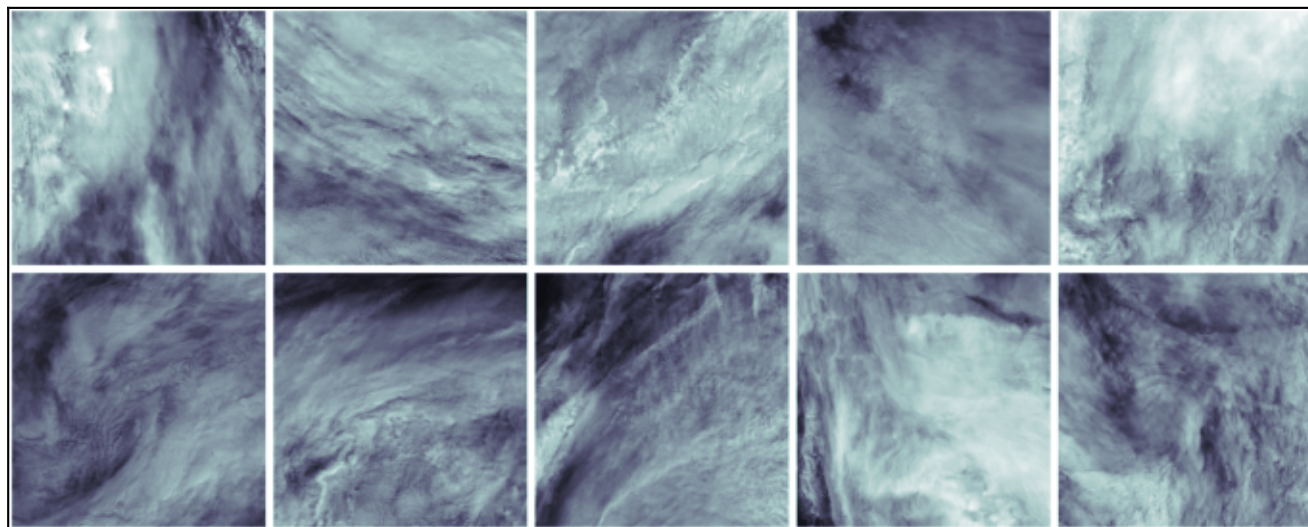


Figure S6, Cluster 6

47K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 290.0 K, Mean CTP: 904.0 hPa, Mean LWP: 51.48 gm^{-2} , Mean Nd: 47.2 cm^{-3} (for cloudy pixels)

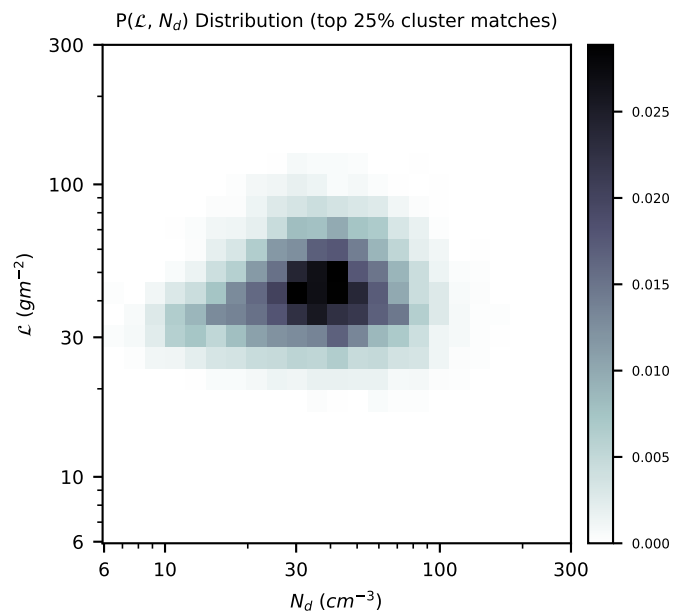
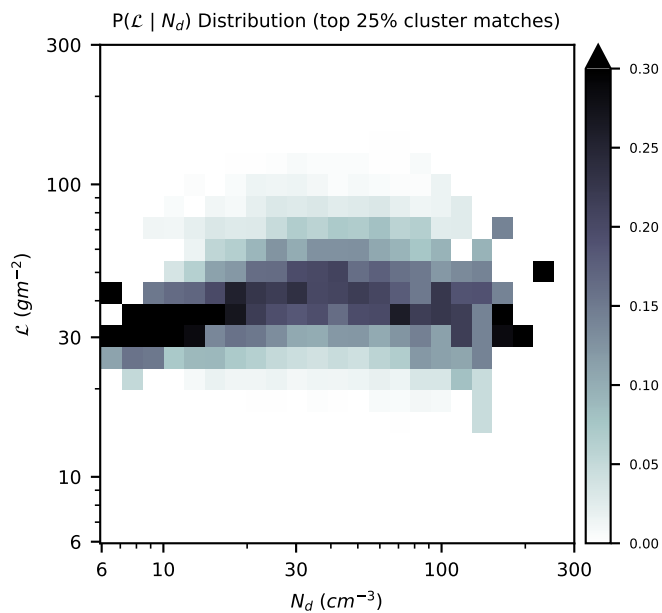
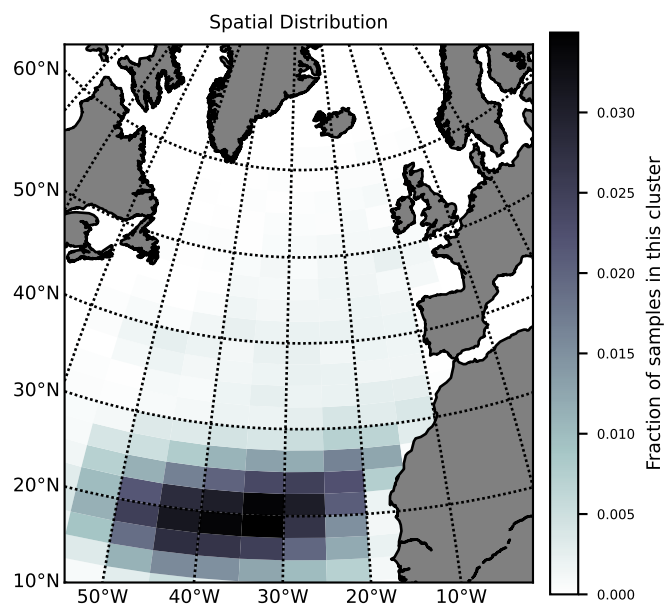
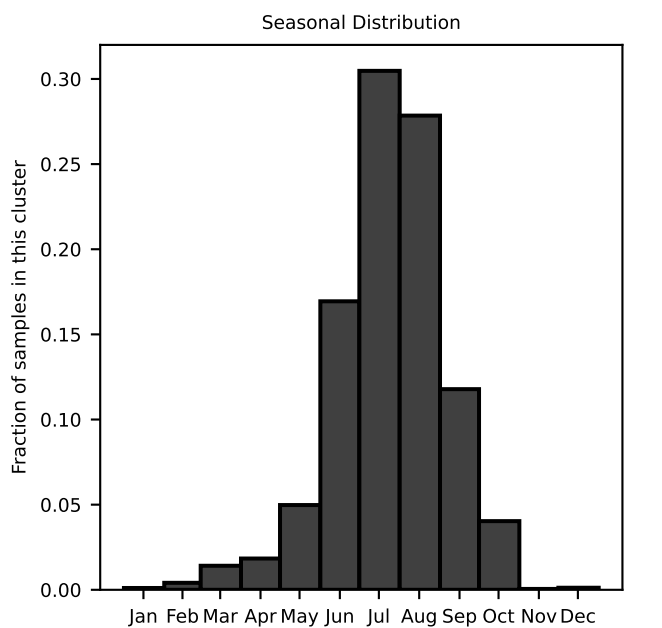
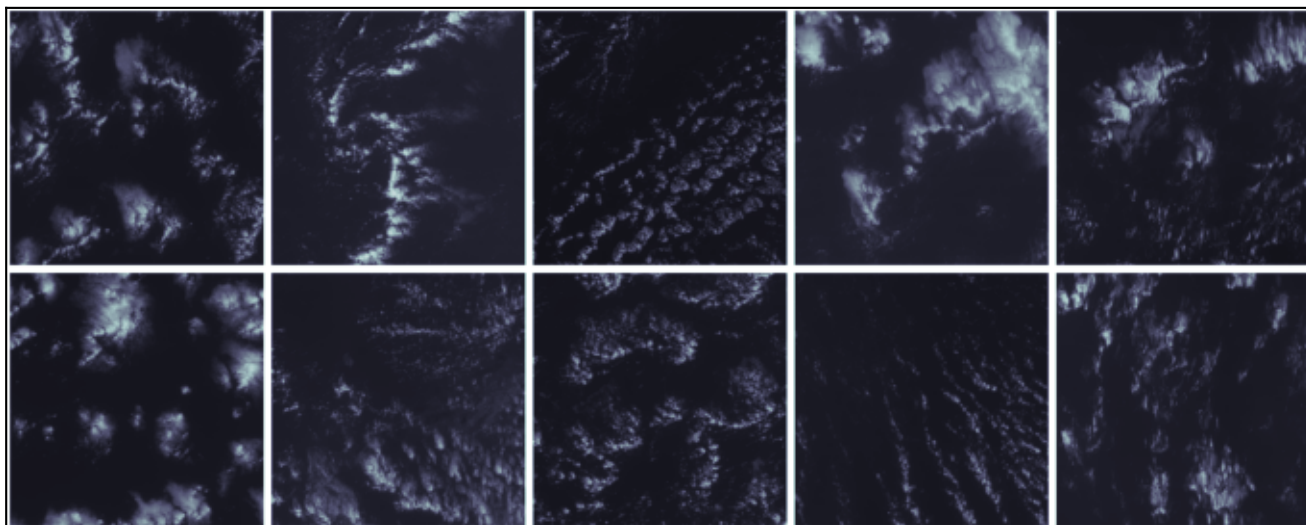


Figure S7, Cluster 7

66K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 283.0 K, Mean CTP: 858.0 hPa, Mean LWP: 84.88 gm^{-2} , Mean Nd: 51.78 cm^{-3} (for cloudy pixels)

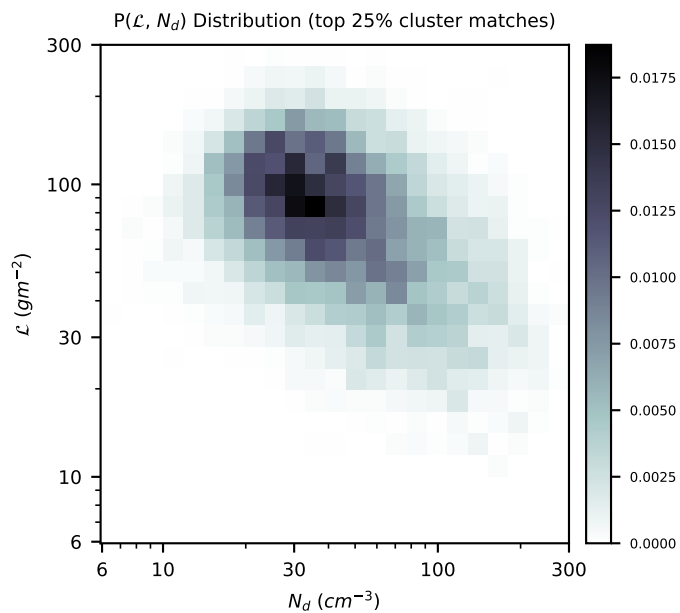
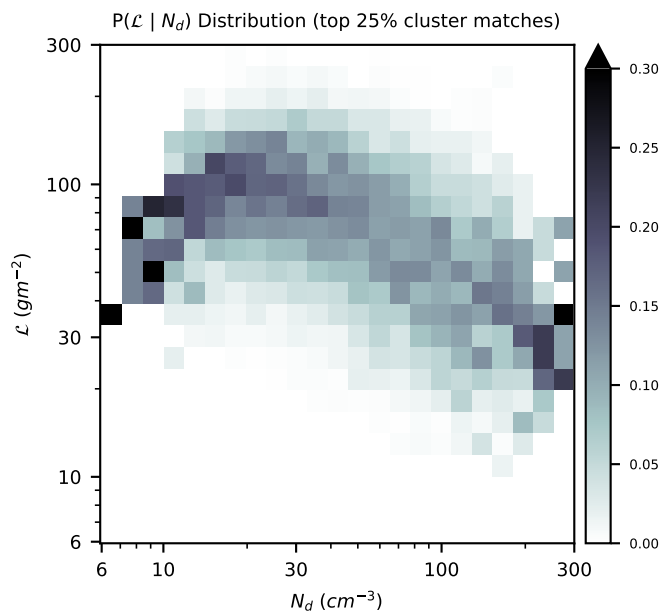
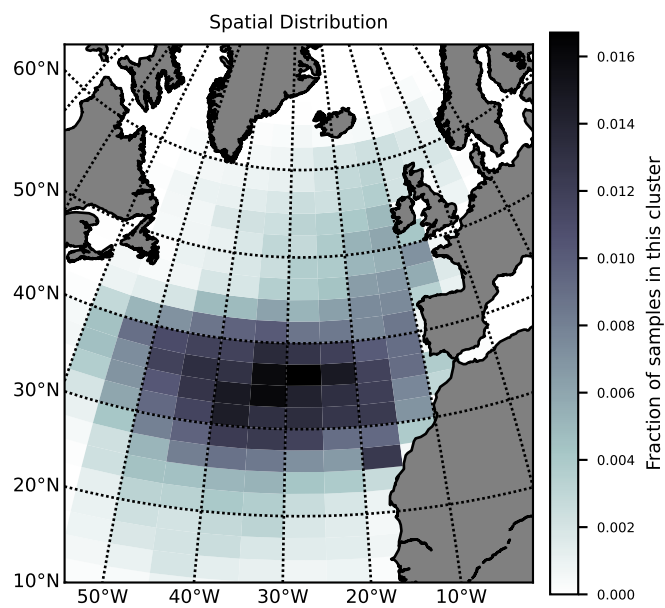
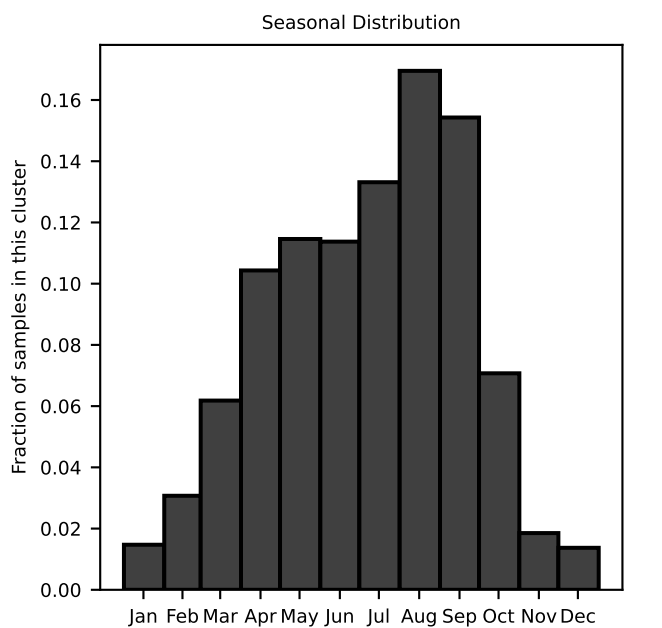
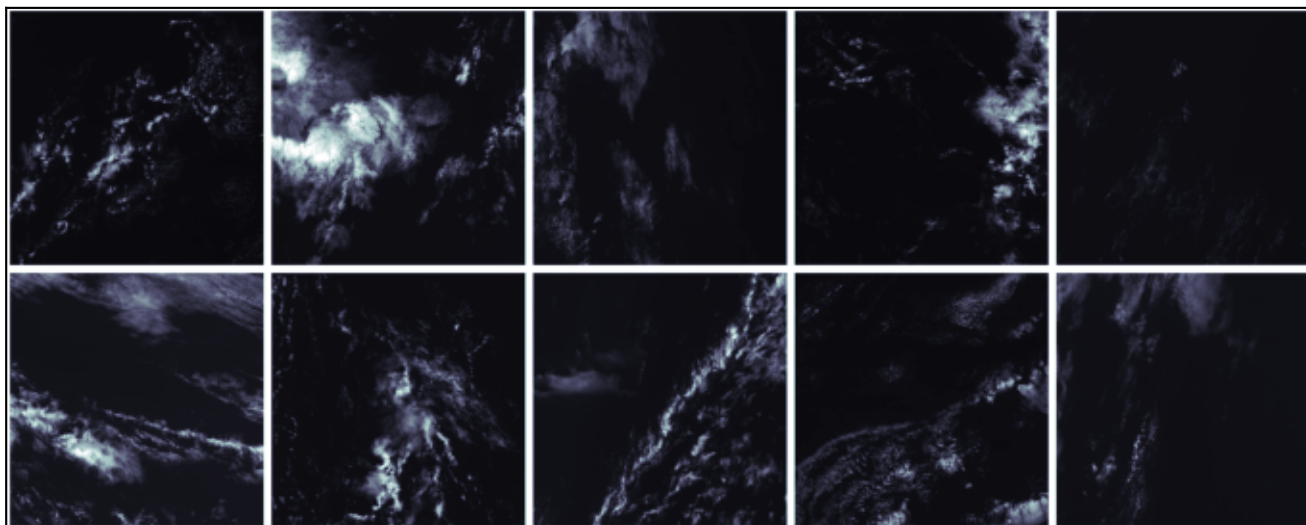


Figure S8, Cluster 8

52K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 276.0 K, Mean CTP: 835.0 hPa, Mean LWP: 107.83 gm^{-2} , Mean Nd: 71.56 cm^{-3} (for cloudy pixels)

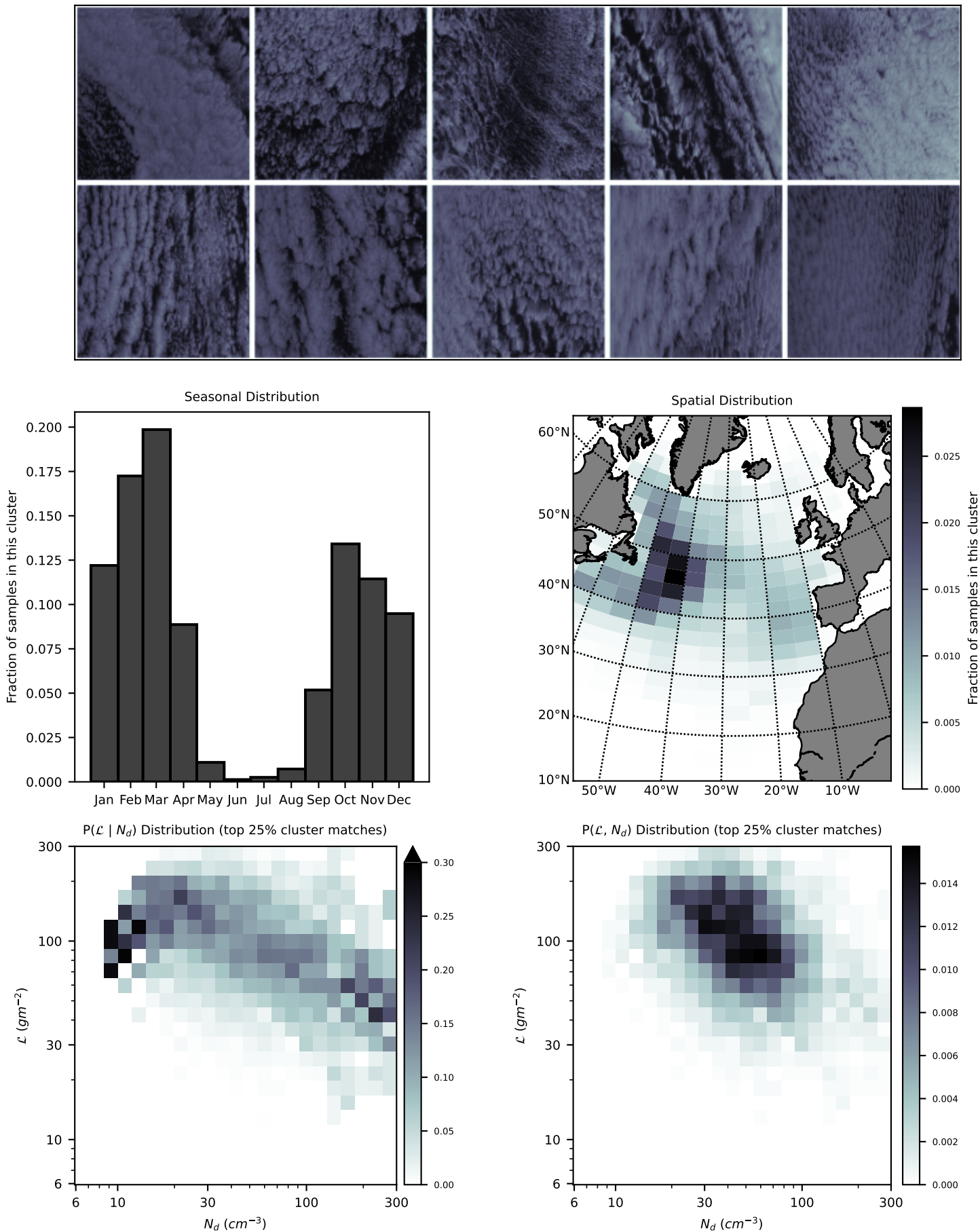


Figure S9, Cluster 9

73K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 282.0 K, Mean CTP: 825.0 hPa, Mean LWP: 77.77 gm^{-2} , Mean Nd: 66.46 cm^{-3} (for cloudy pixels)

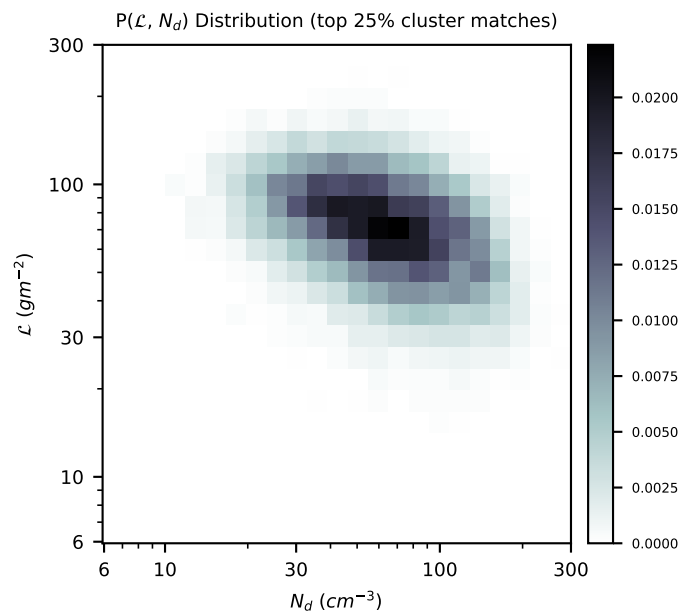
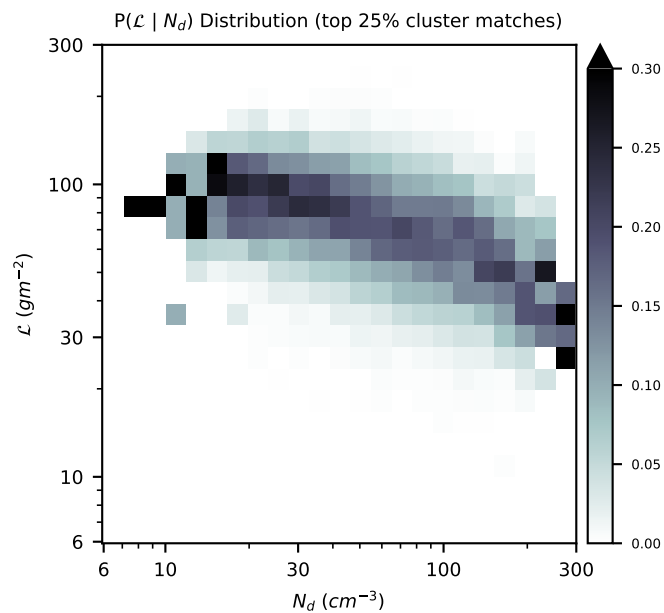
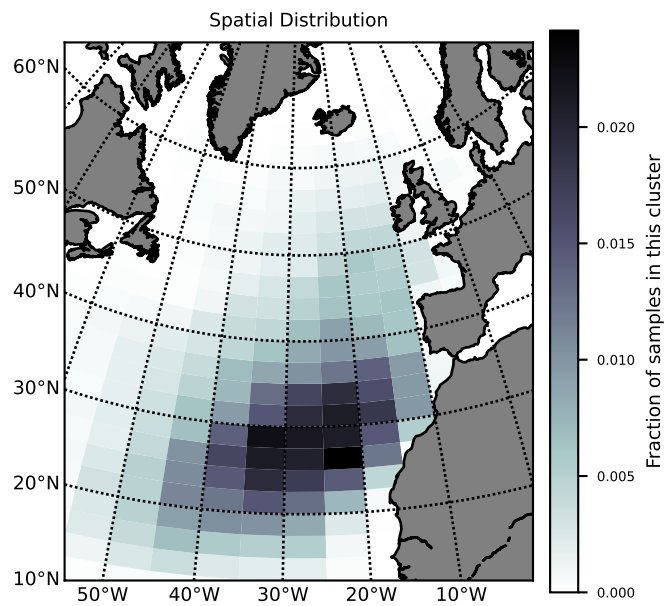
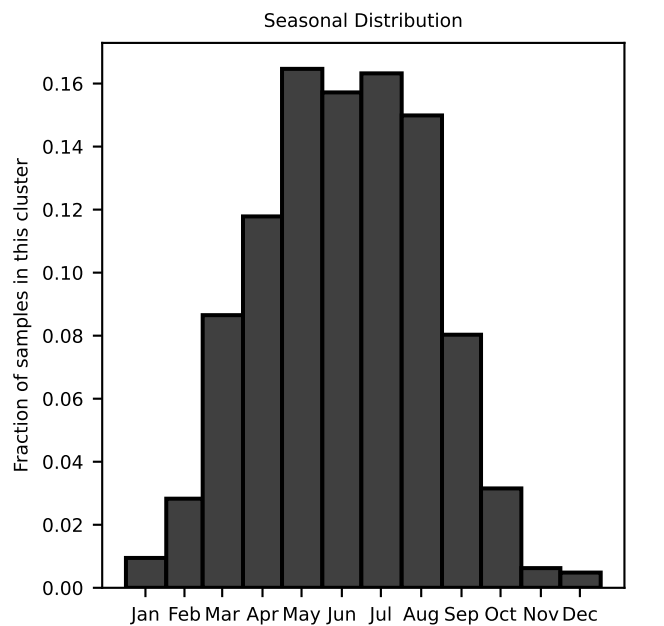
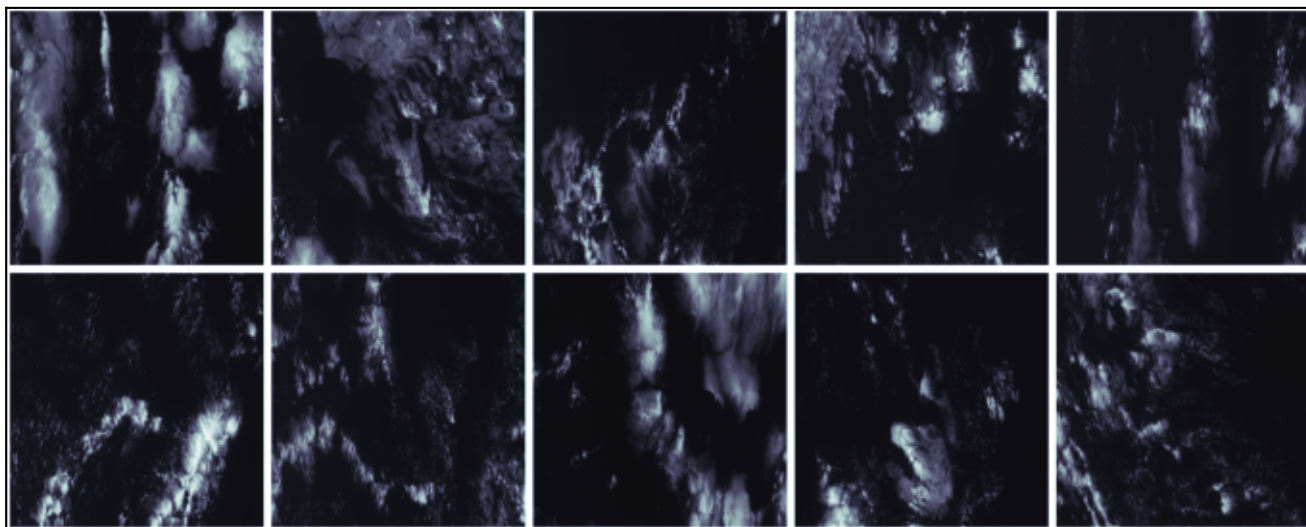
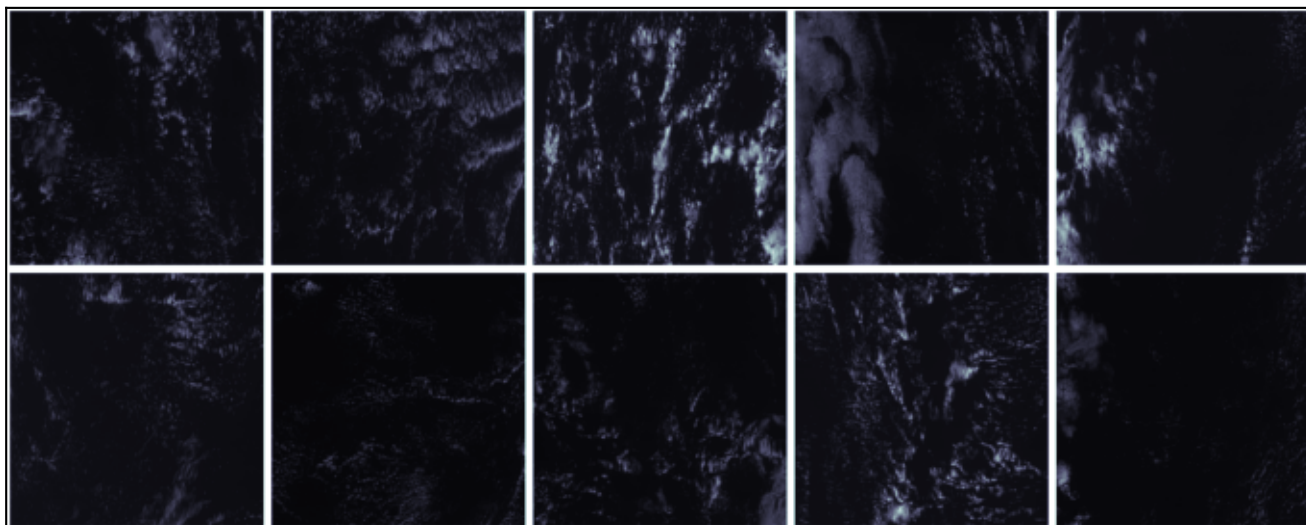


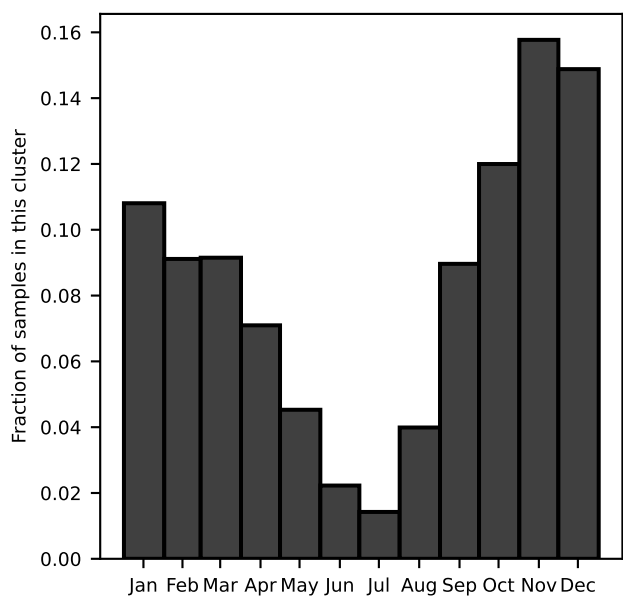
Figure S10, Cluster 10

72K out of 3.7M low cloud images and 10.8M total images

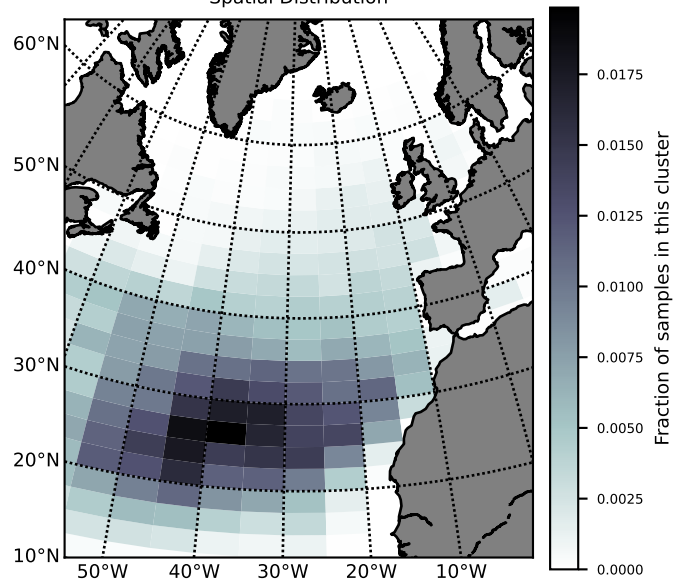
Mean CTT: 281.0 K, Mean CTP: 796.0 hPa, Mean LWP: 102.2 gm^{-2} , Mean Nd: 46.15 cm^{-3} (for cloudy pixels)



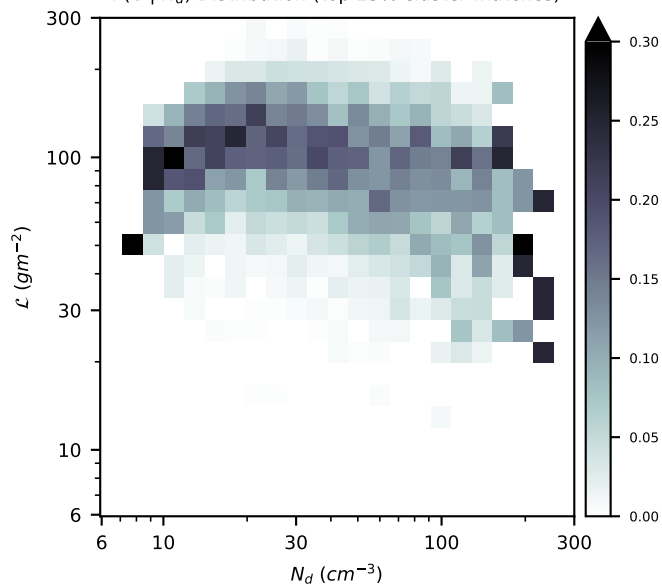
Seasonal Distribution



Spatial Distribution



$P(\mathcal{L} | N_d)$ Distribution (top 25% cluster matches)



$P(\mathcal{L}, N_d)$ Distribution (top 25% cluster matches)

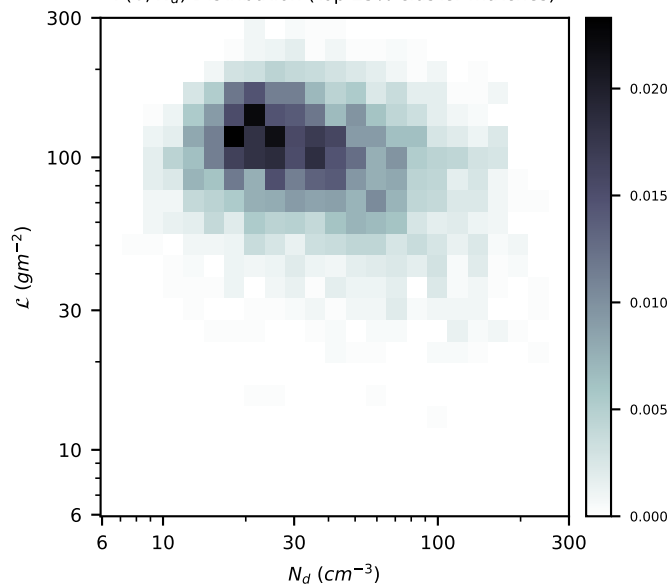
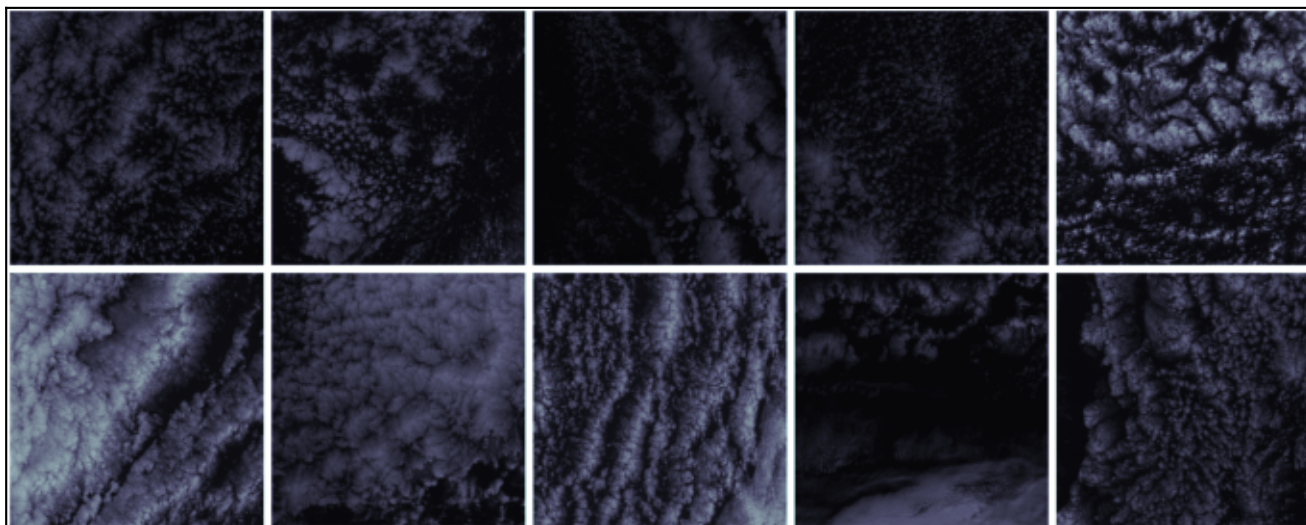


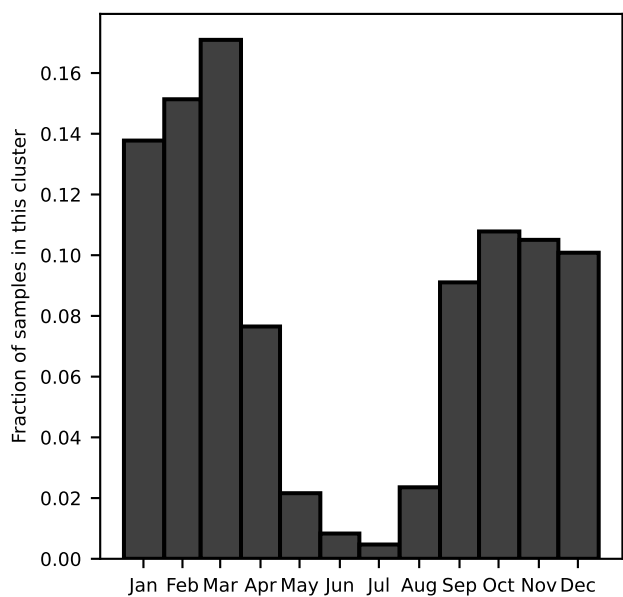
Figure S11, Cluster 11

40K out of 3.7M low cloud images and 10.8M total images

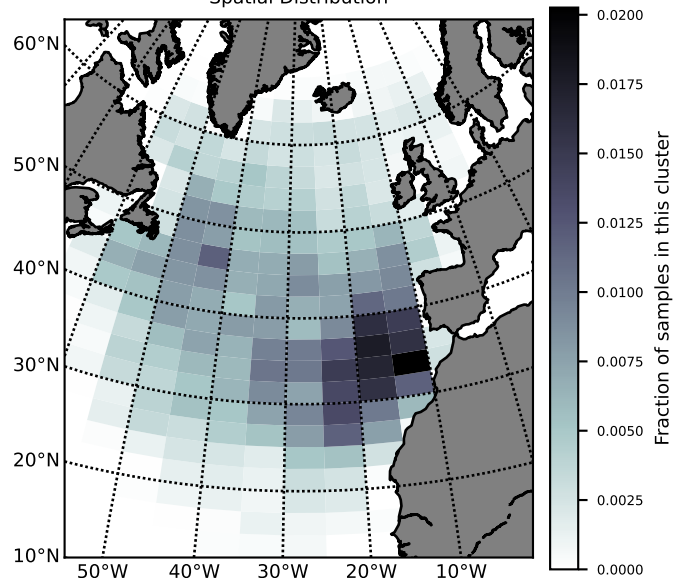
Mean CTT: 279.0 K, Mean CTP: 847.0 hPa, Mean LWP: 58.57 gm^{-2} , Mean Nd: 103.63 cm^{-3} (for cloudy pixels)



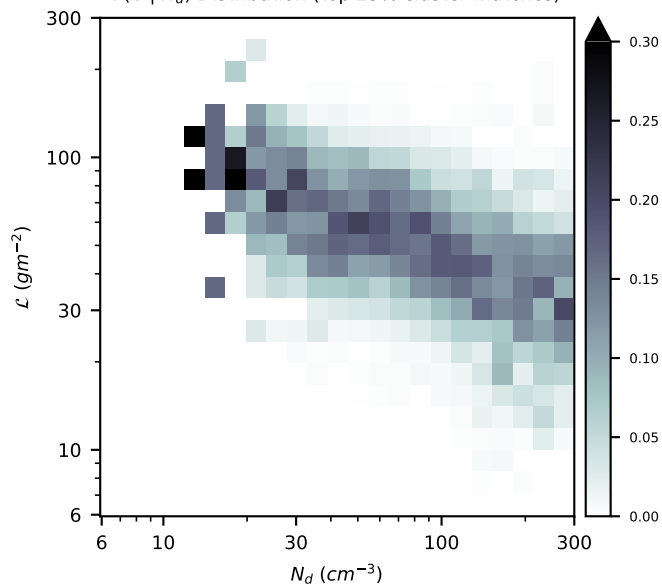
Seasonal Distribution



Spatial Distribution



$P(\mathcal{L} | N_d)$ Distribution (top 25% cluster matches)



$P(\mathcal{L}, N_d)$ Distribution (top 25% cluster matches)

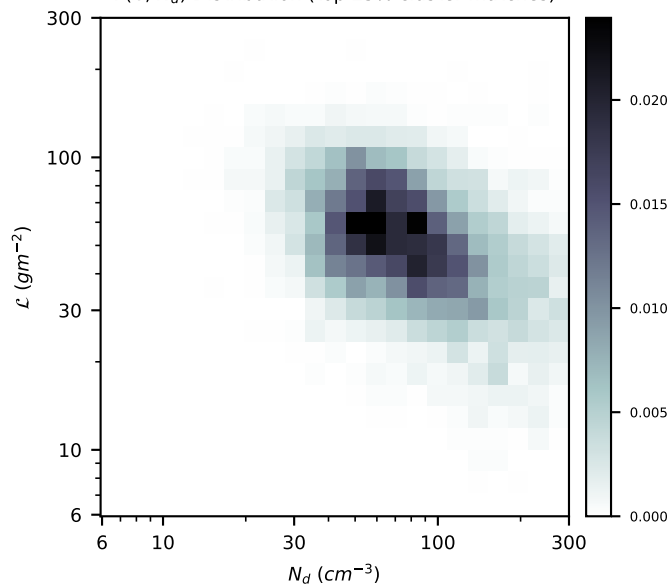


Figure S12, Cluster 12

77K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 277.0 K, Mean CTP: 828.0 hPa, Mean LWP: 99.64 gm^{-2} , Mean Nd: 74.81 cm^{-3} (for cloudy pixels)

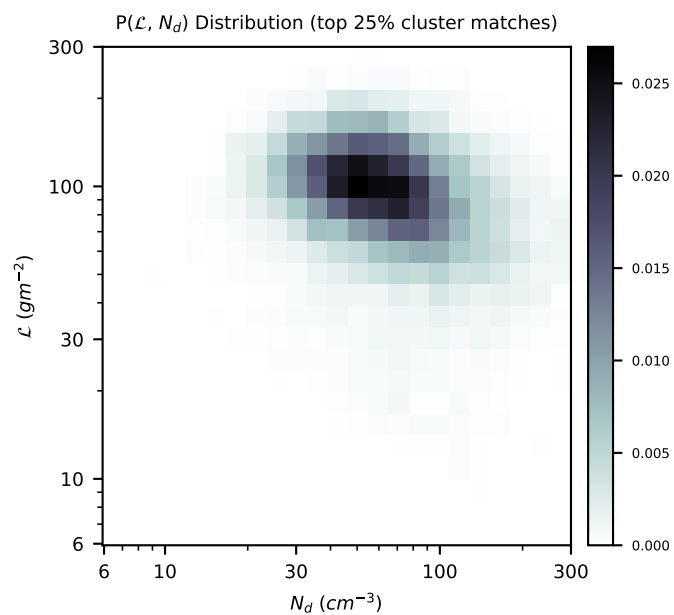
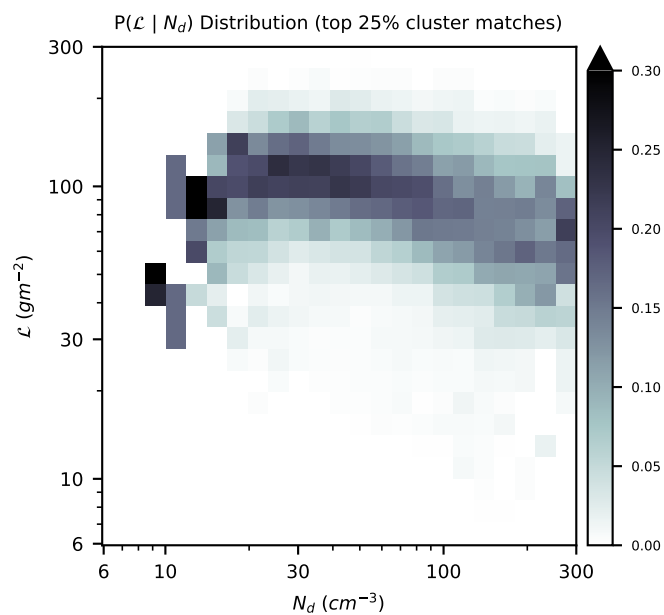
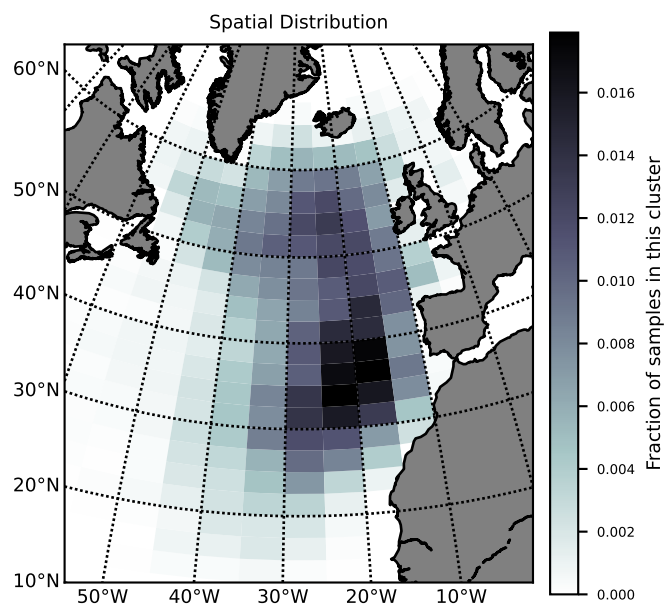
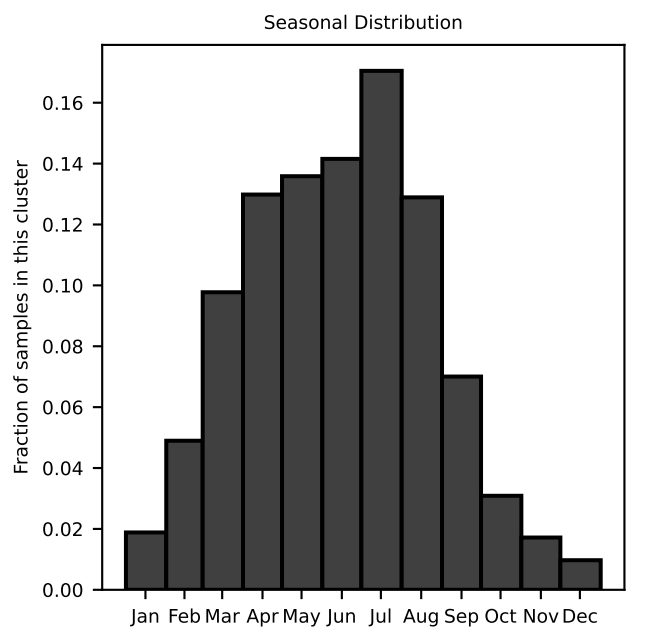
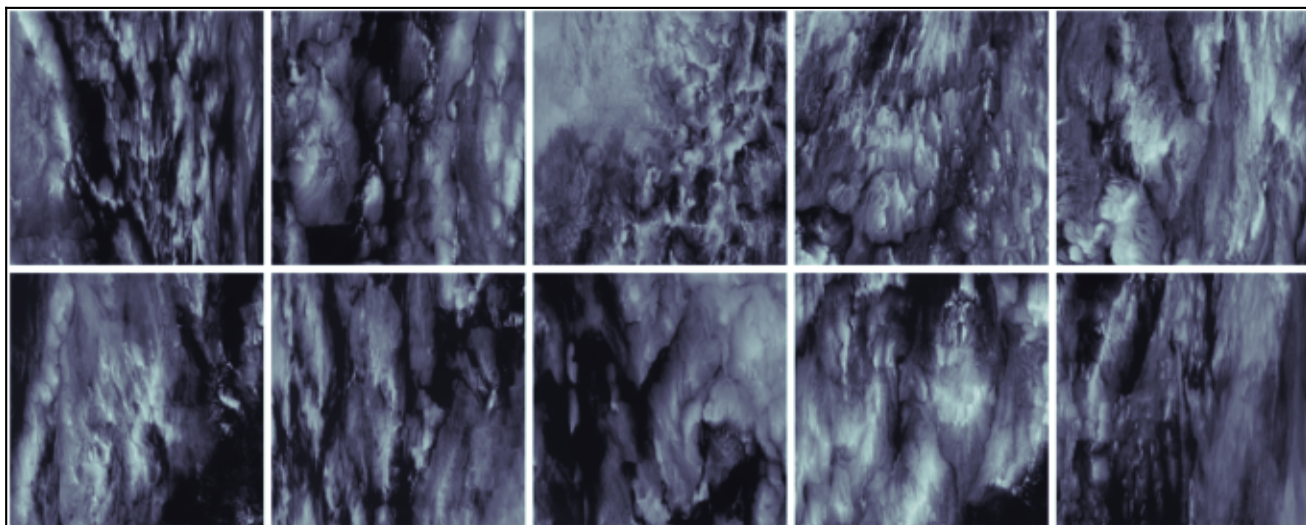


Figure S13, Cluster 13

49K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 282.0 K, Mean CTP: 807.0 hPa, Mean LWP: 98.33 gm^{-2} , Mean Nd: 35.85 cm^{-3} (for cloudy pixels)

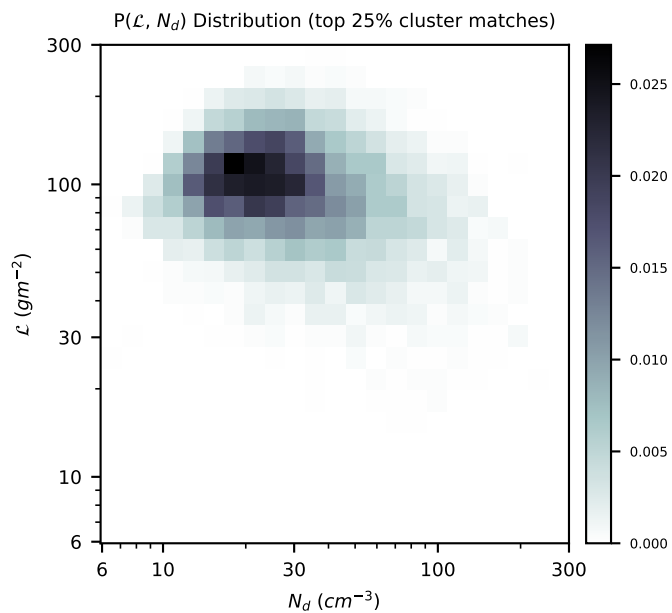
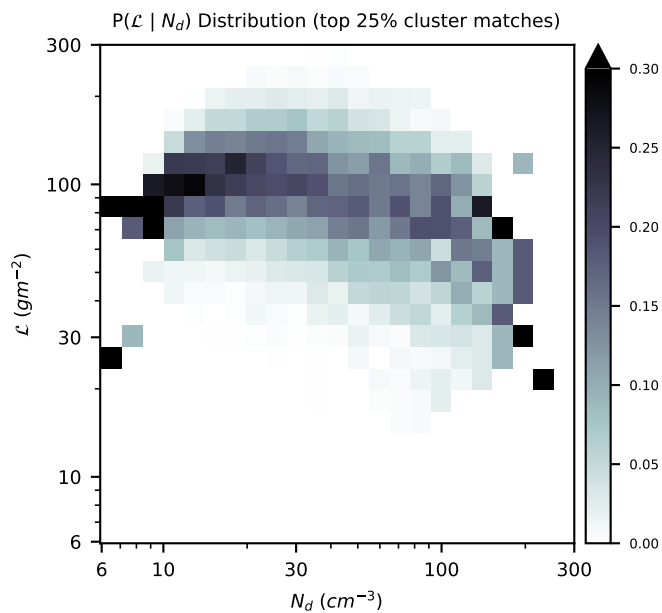
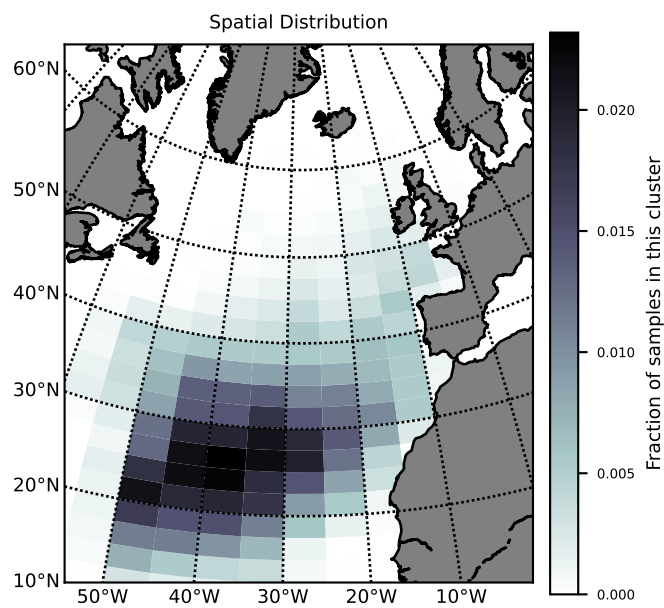
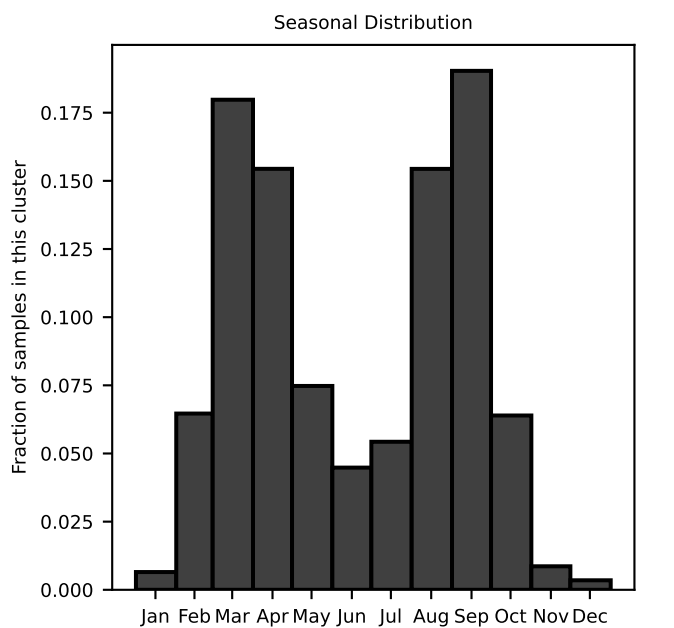
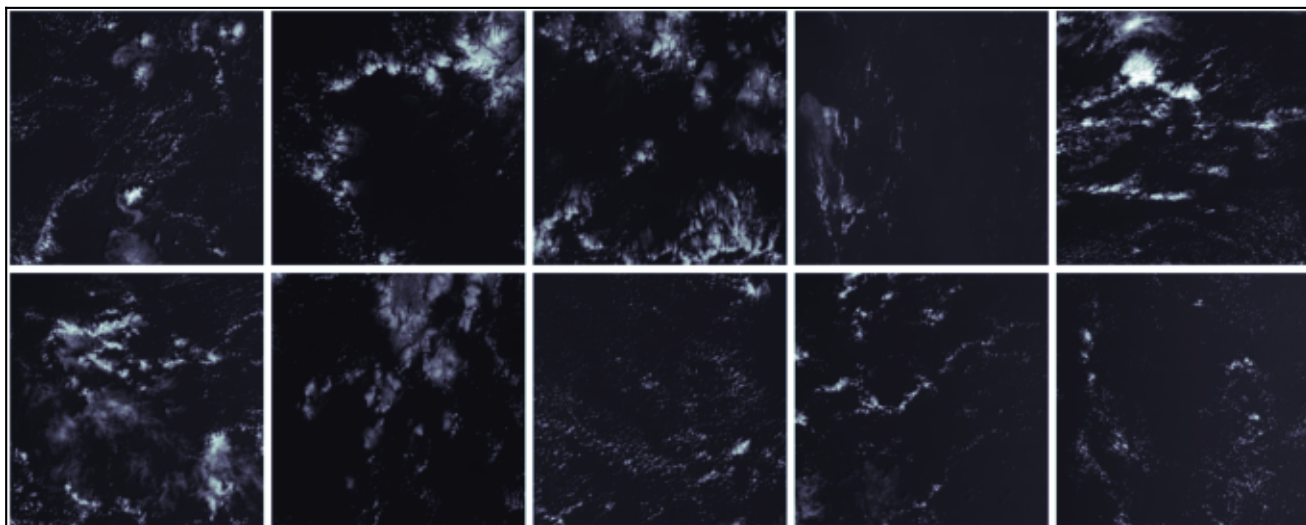


Figure S14, Cluster 14

75K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 281.0 K, Mean CTP: 907.0 hPa, Mean LWP: 59.66 gm^{-2} , Mean Nd: 85.93 cm^{-3} (for cloudy pixels)

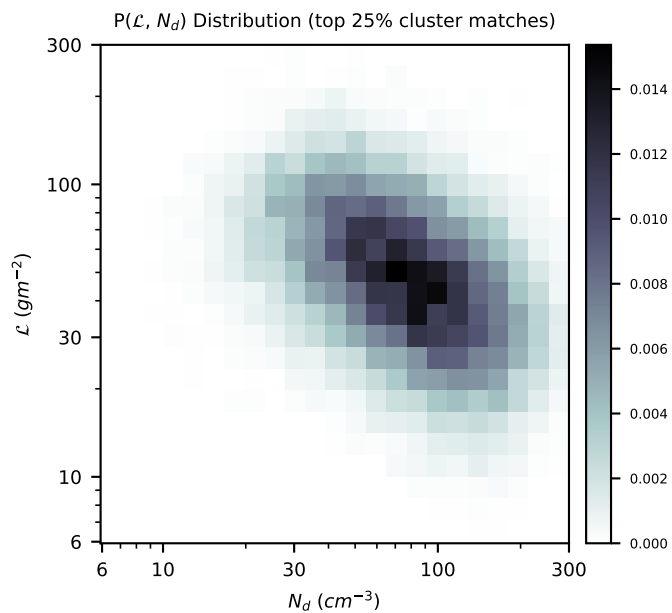
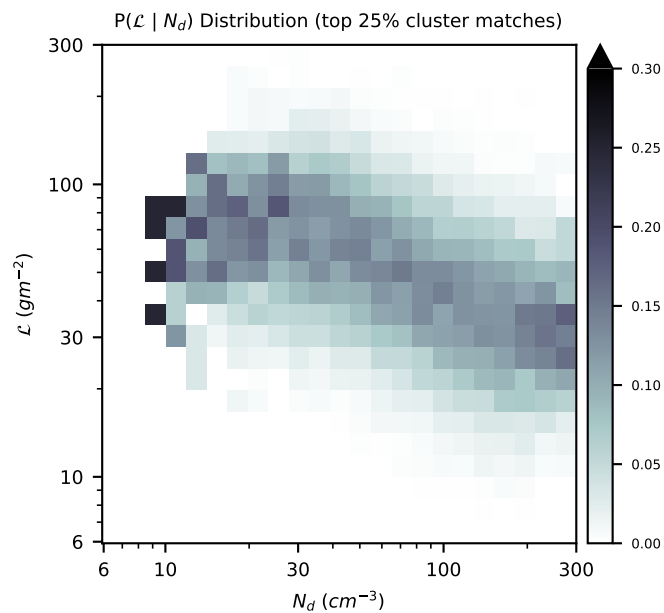
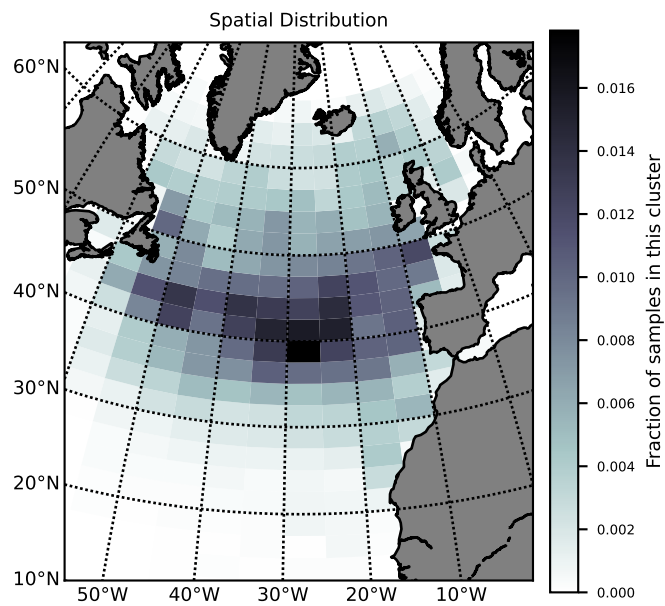
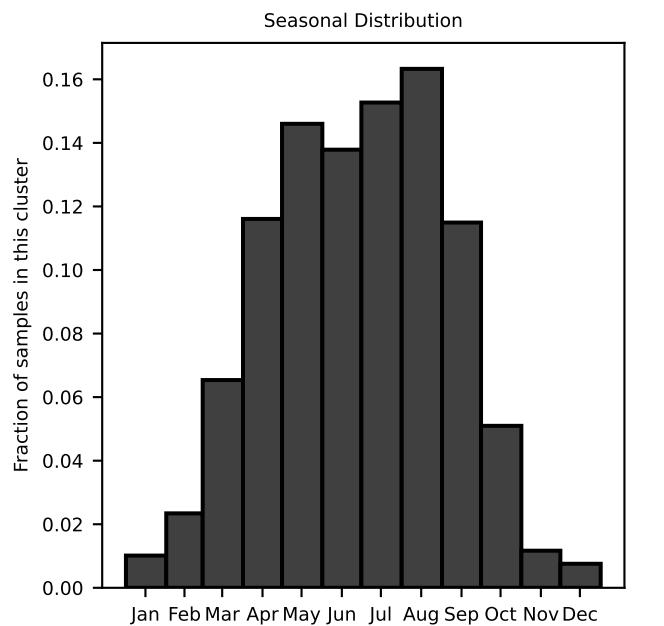
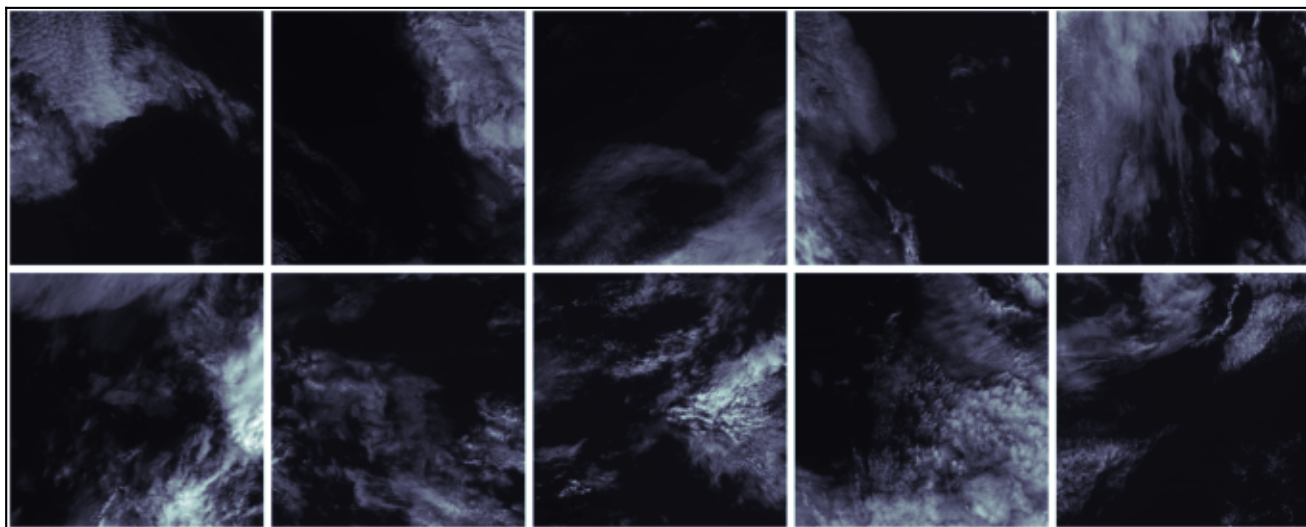


Figure S15, Cluster 15

54K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 285.0 K, Mean CTP: 844.0 hPa, Mean LWP: 69.23 gm^{-2} , Mean Nd: 76.23 cm^{-3} (for cloudy pixels)

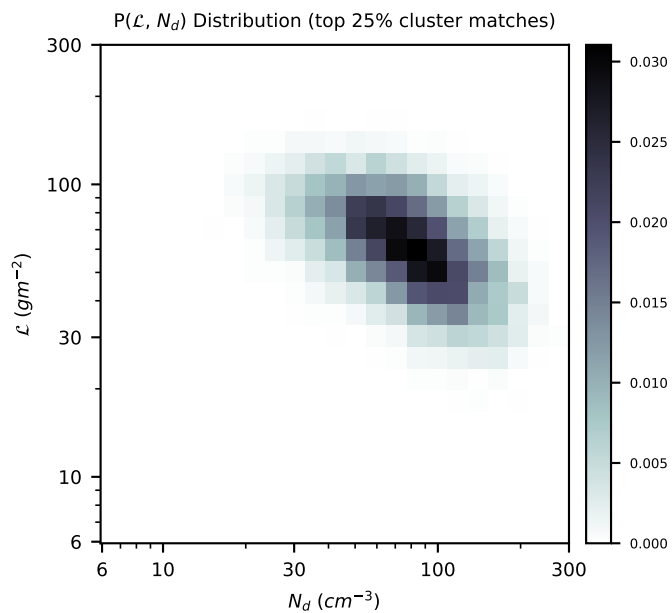
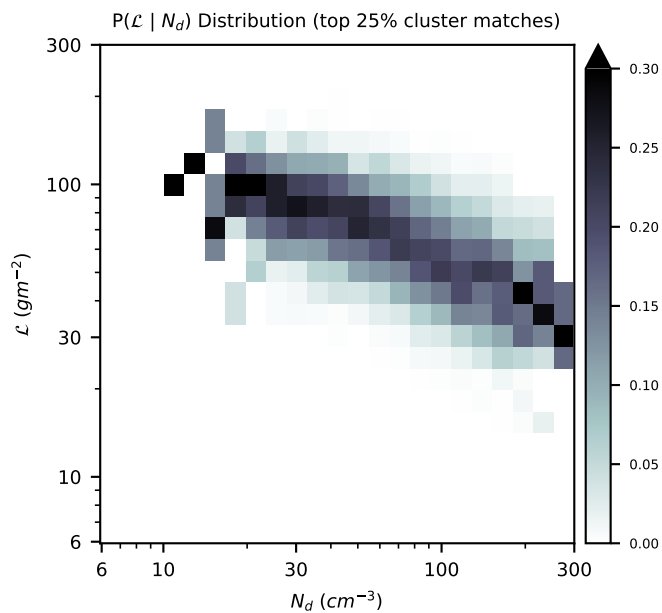
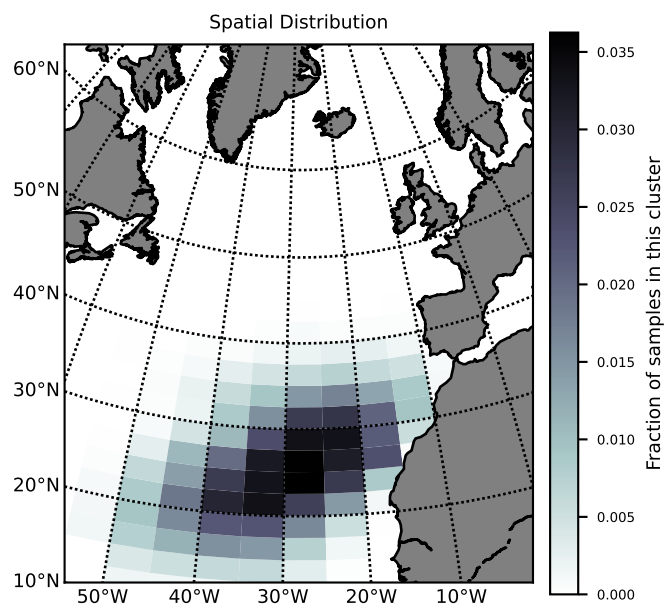
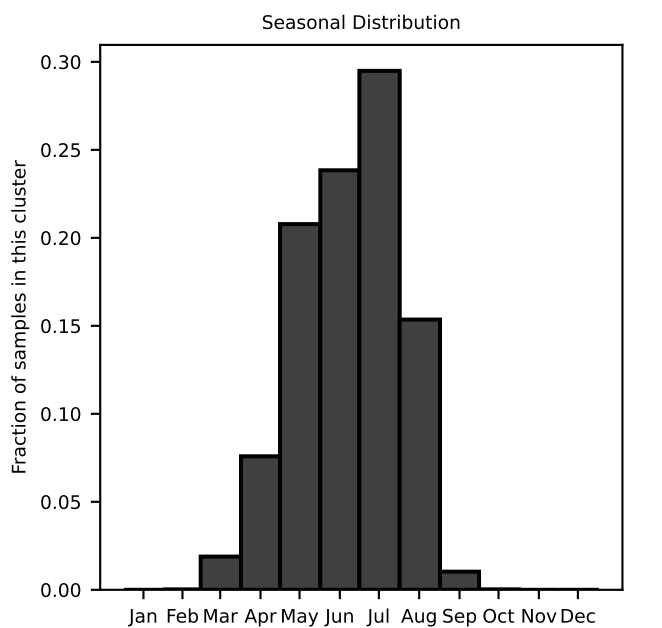
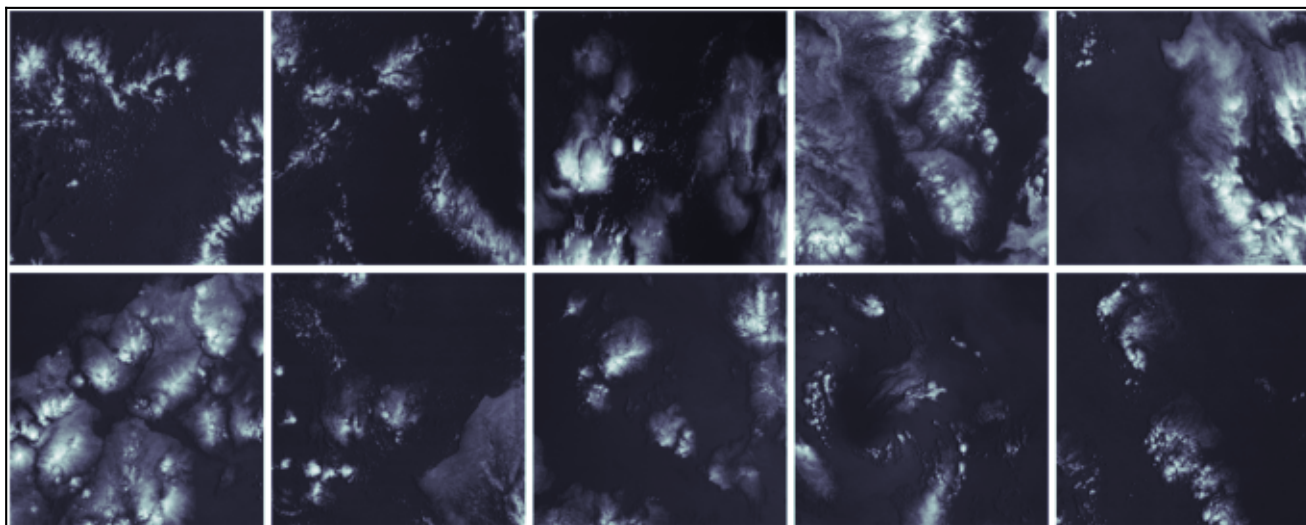


Figure S16, Cluster 16

55K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 278.0 K, Mean CTP: 897.0 hPa, Mean LWP: 106.76 gm^{-2} , Mean Nd: 98.44 cm^{-3} (for cloudy pixels)

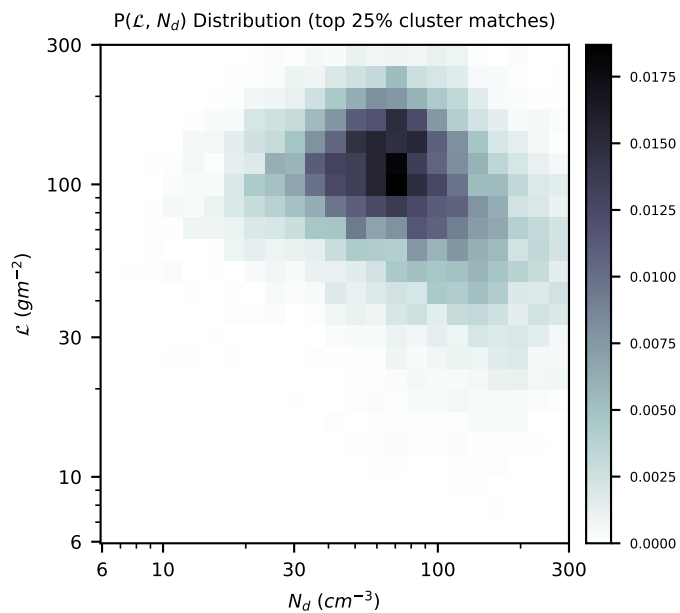
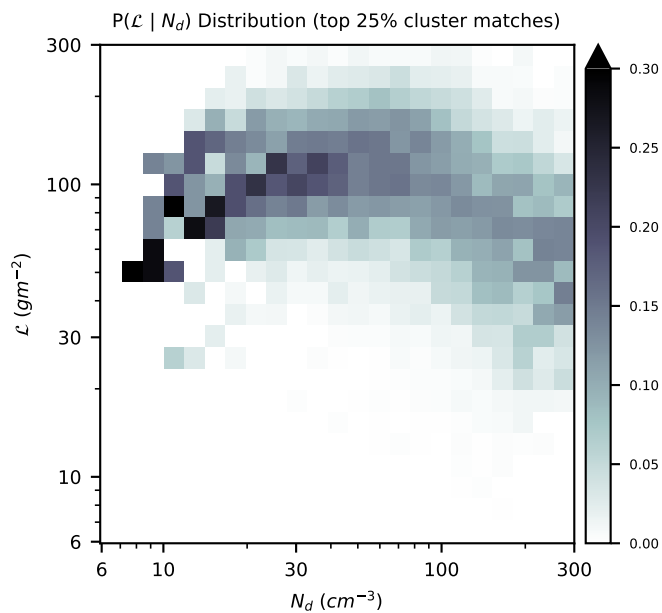
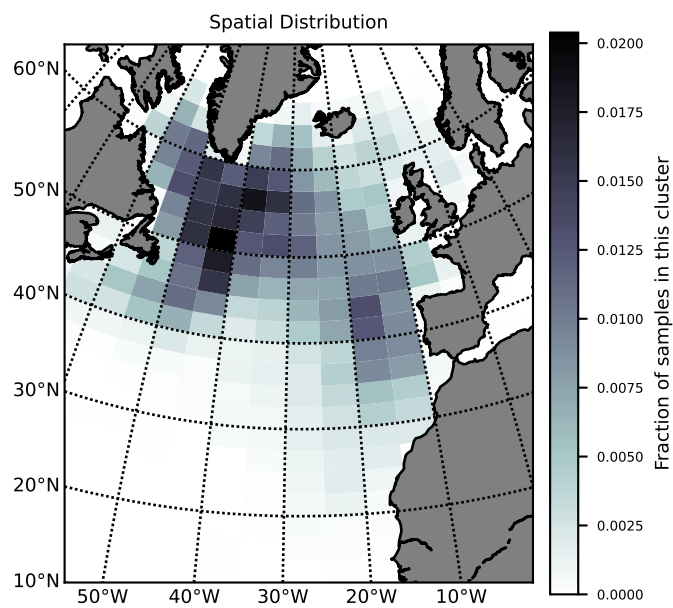
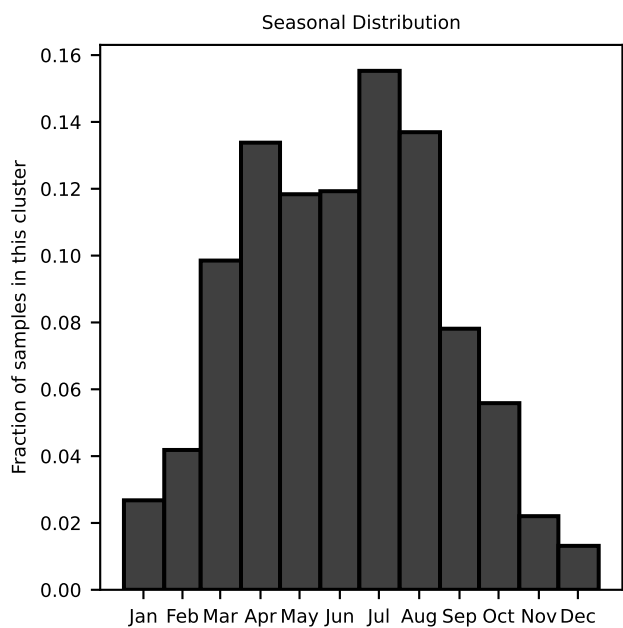
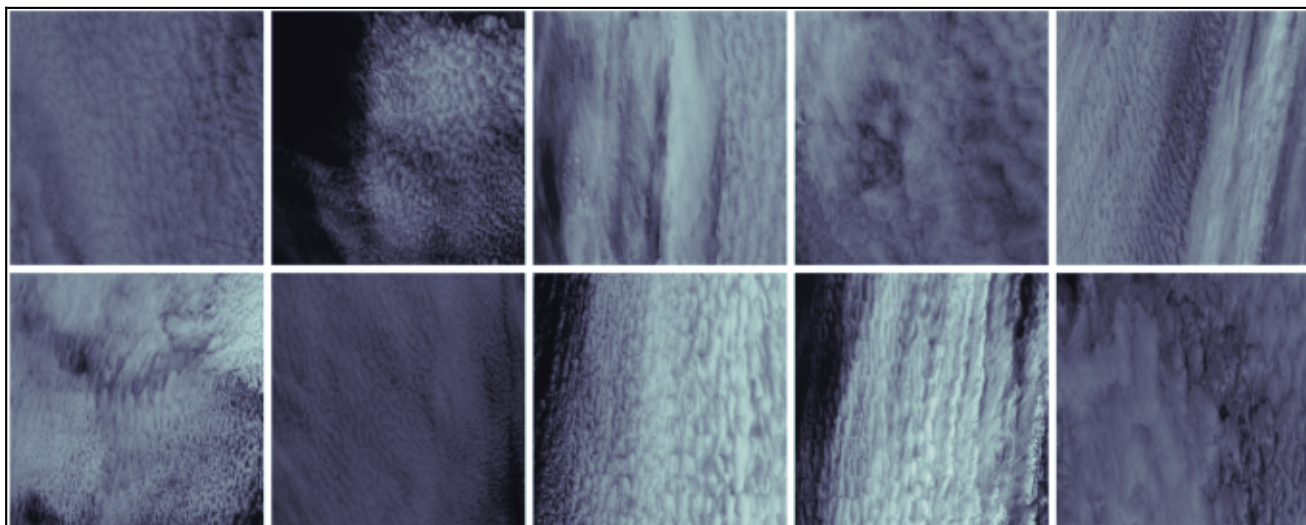


Figure S17, Cluster 17

48K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 284.0 K, Mean CTP: 861.0 hPa, Mean LWP: 58.18 gm^{-2} , Mean N_d : 114.27 cm^{-3} (for cloudy pixels)

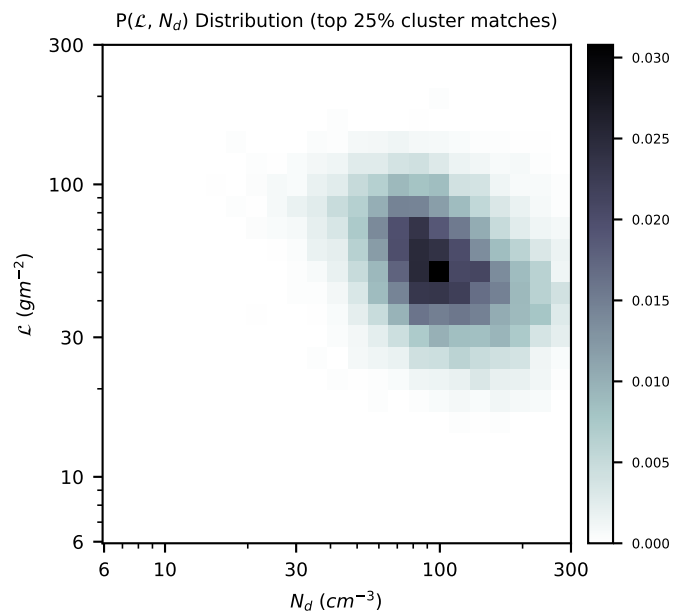
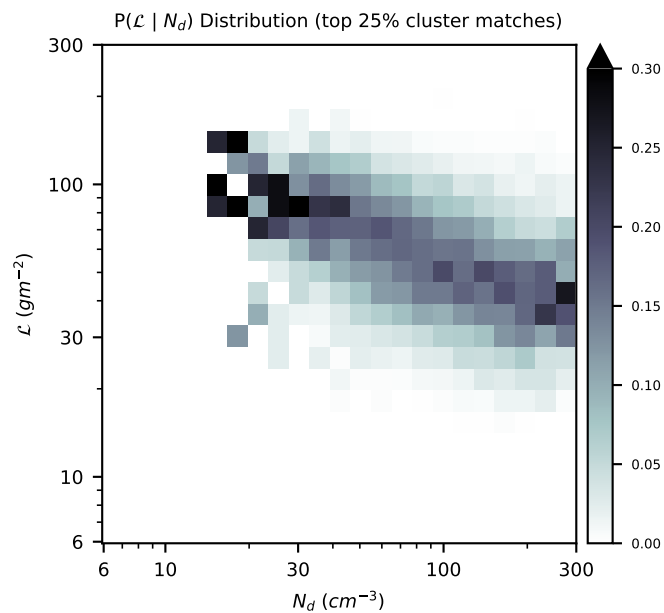
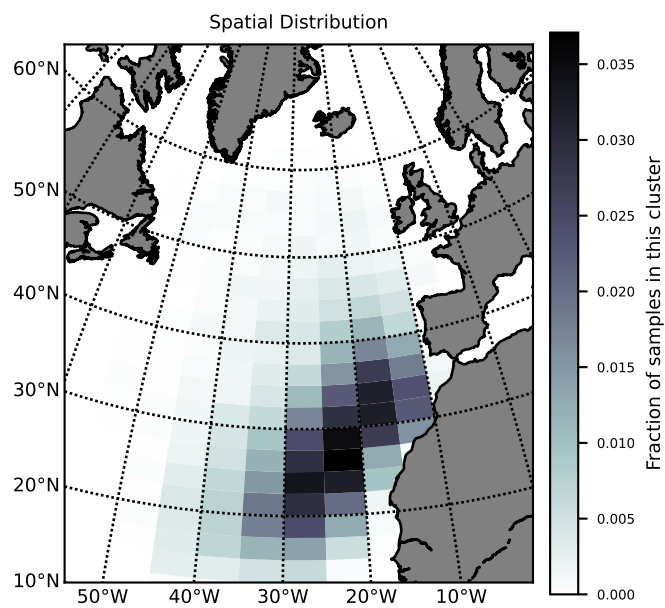
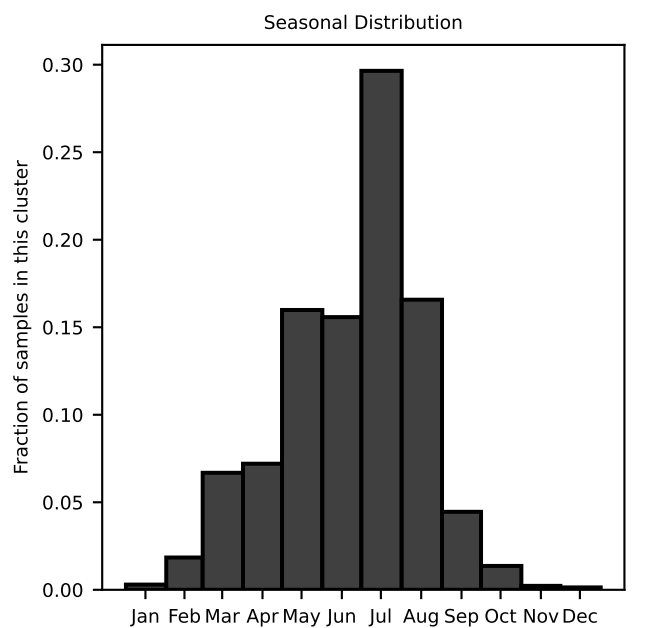
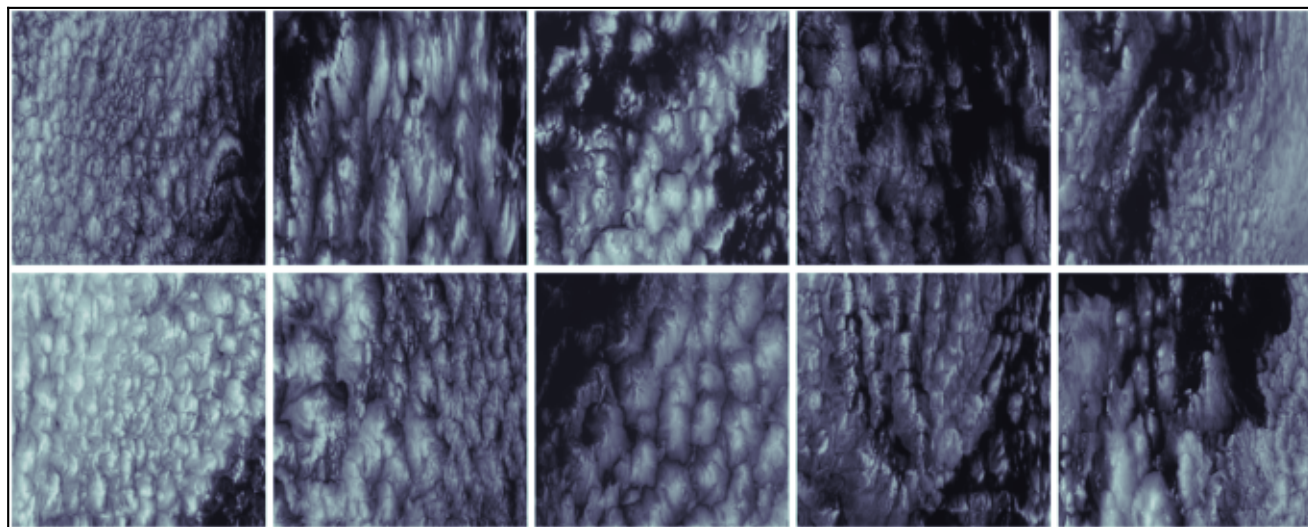
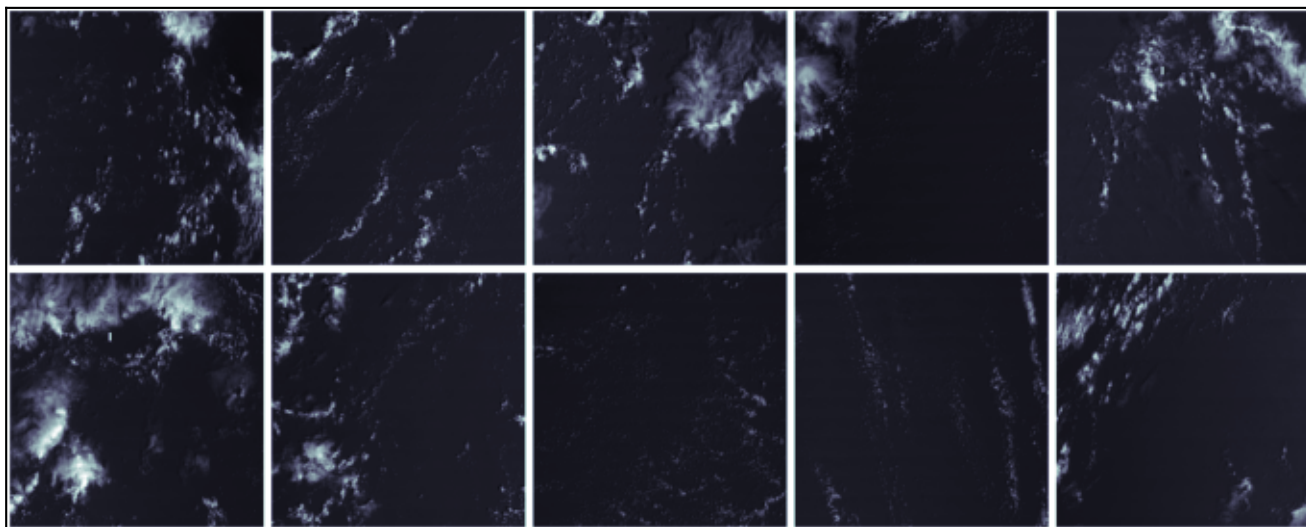


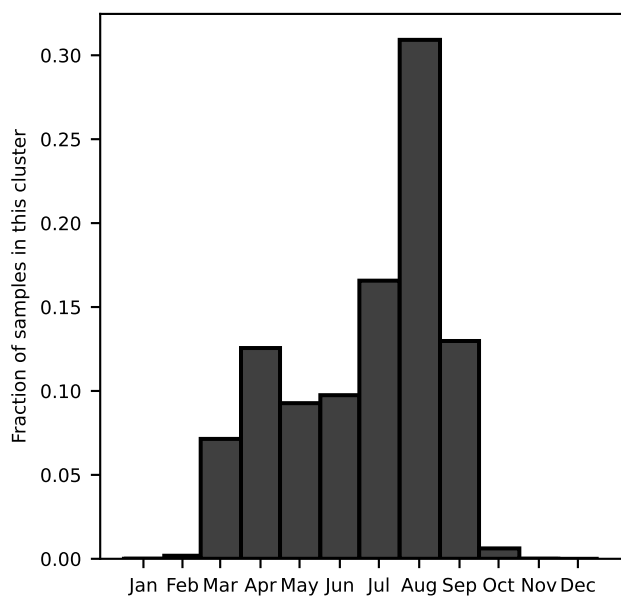
Figure S18, Cluster 18

28K out of 3.7M low cloud images and 10.8M total images

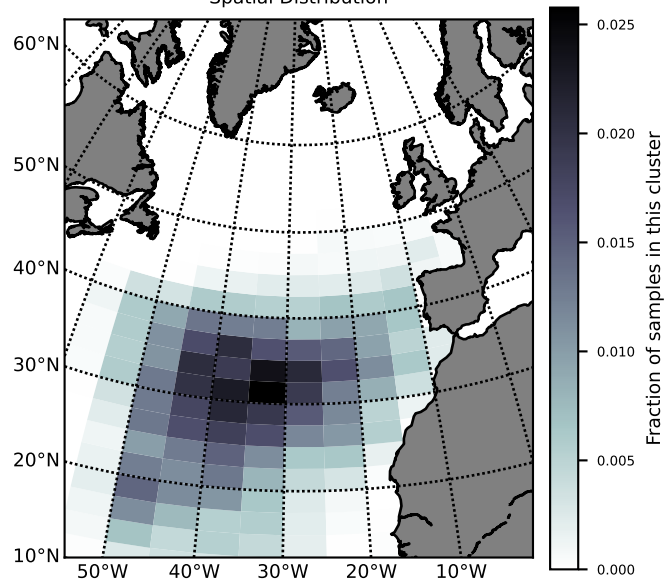
Mean CTT: 284.0 K, Mean CTP: 829.0 hPa, Mean LWP: 89.86 gm^{-2} , Mean Nd: 39.77 cm^{-3} (for cloudy pixels)



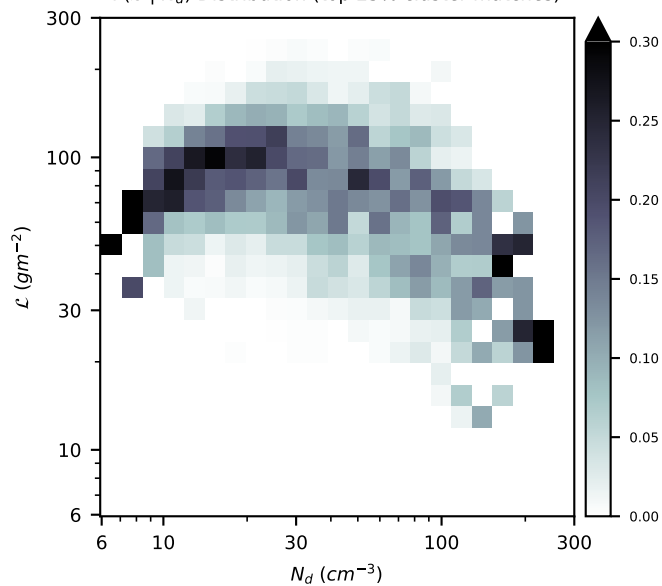
Seasonal Distribution



Spatial Distribution



$P(\mathcal{L} | N_d)$ Distribution (top 25% cluster matches)



$P(\mathcal{L}, N_d)$ Distribution (top 25% cluster matches)

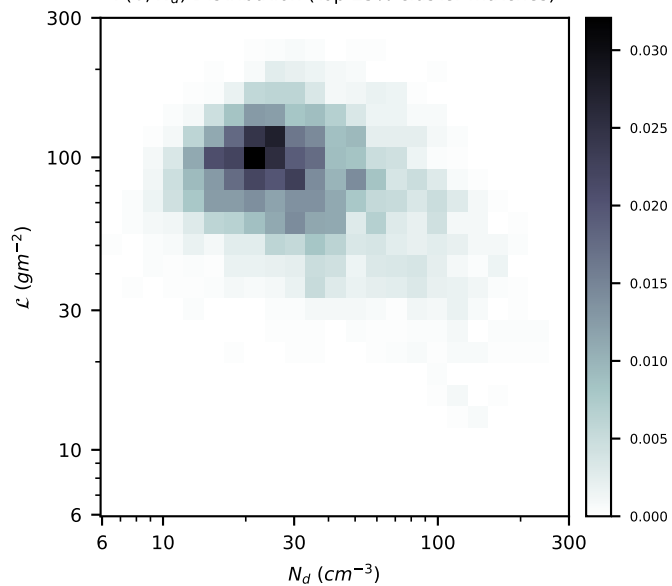
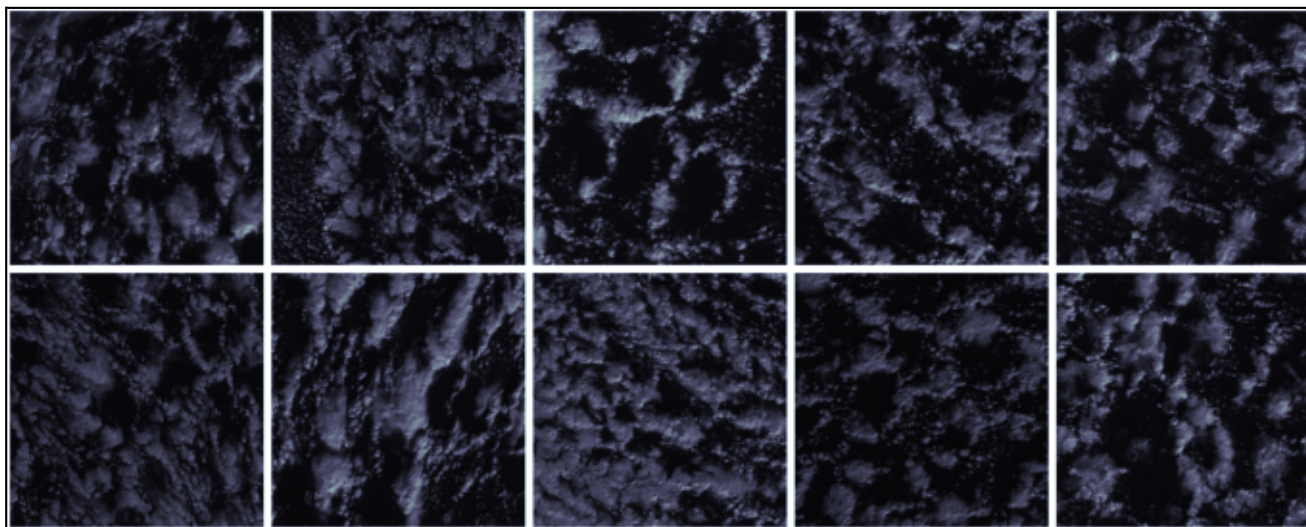


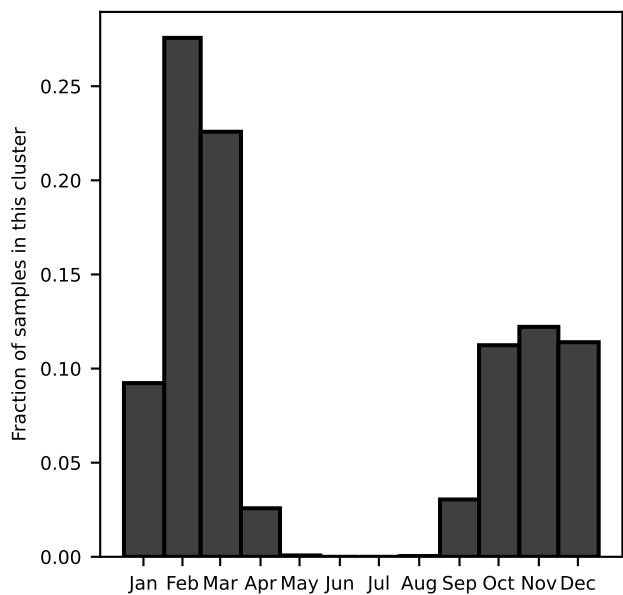
Figure S19, Cluster 19

51K out of 3.7M low cloud images and 10.8M total images

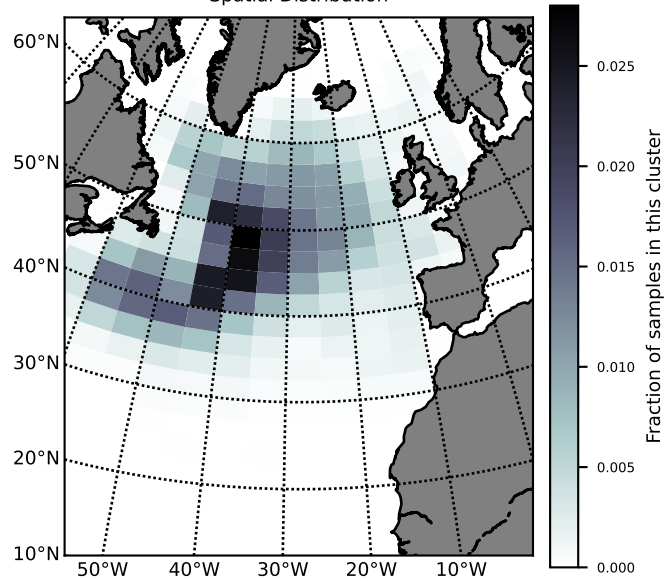
Mean CTT: 274.0 K, Mean CTP: 768.0 hPa, Mean LWP: 144.72 gm^{-2} , Mean Nd: 42.63 cm^{-3} (for cloudy pixels)



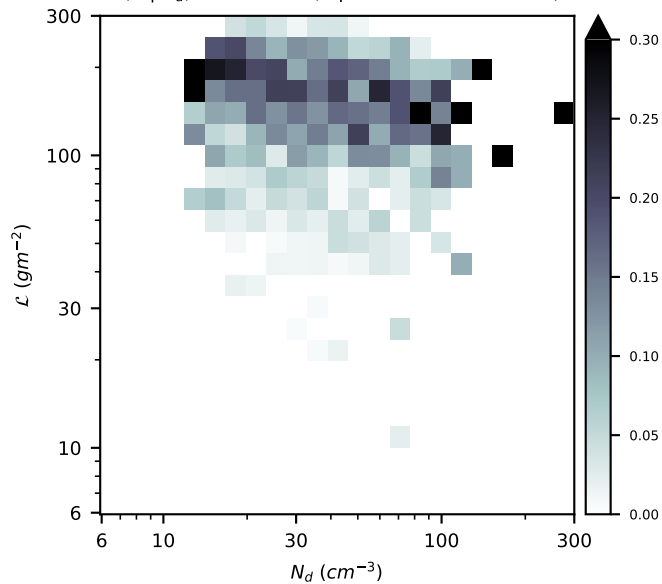
Seasonal Distribution



Spatial Distribution



$P(\mathcal{L} | N_d)$ Distribution (top 25% cluster matches)



$P(\mathcal{L}, N_d)$ Distribution (top 25% cluster matches)

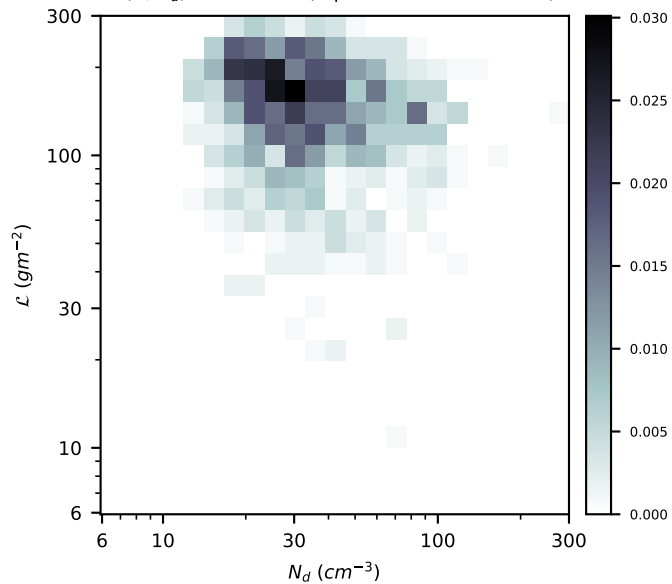


Figure S20, Cluster 20

73K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 280.0 K, Mean CTP: 941.0 hPa, Mean LWP: 77.01 gm^{-2} , Mean Nd: 75.25 cm^{-3} (for cloudy pixels)

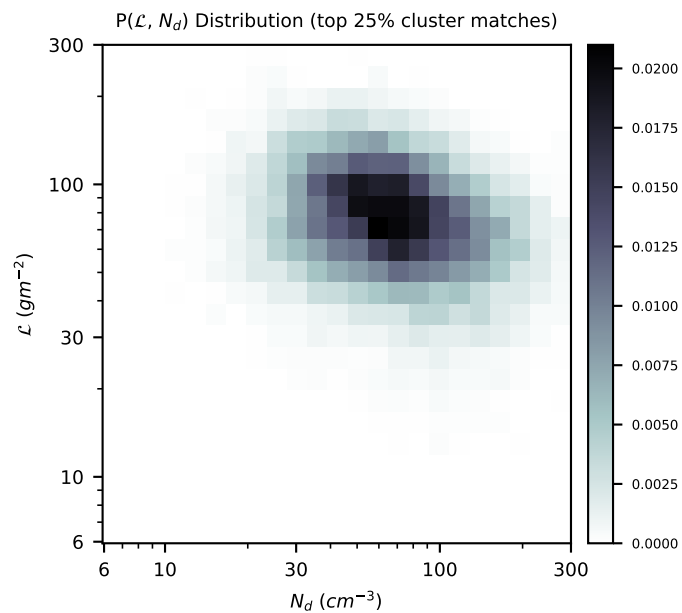
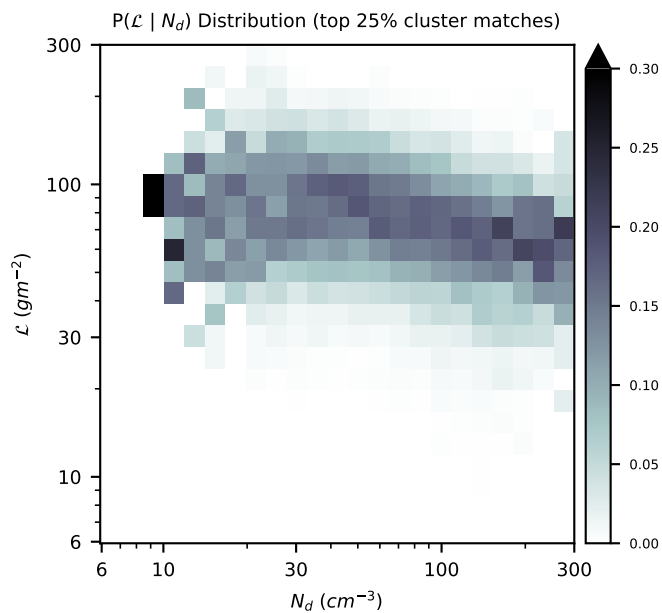
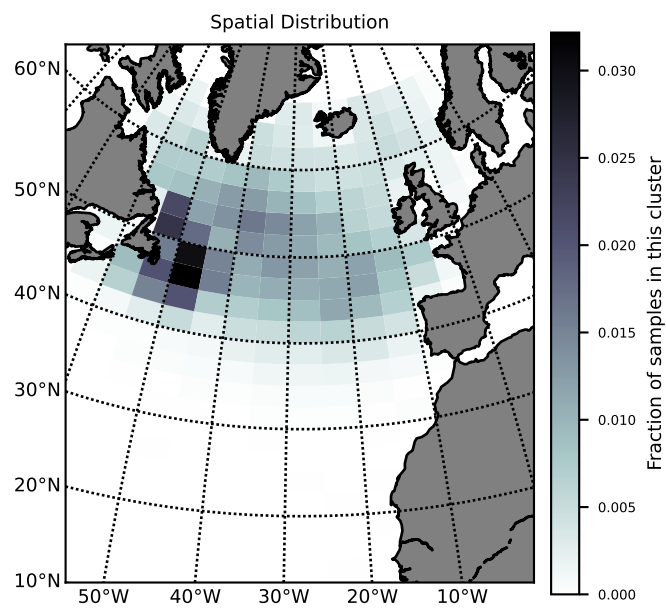
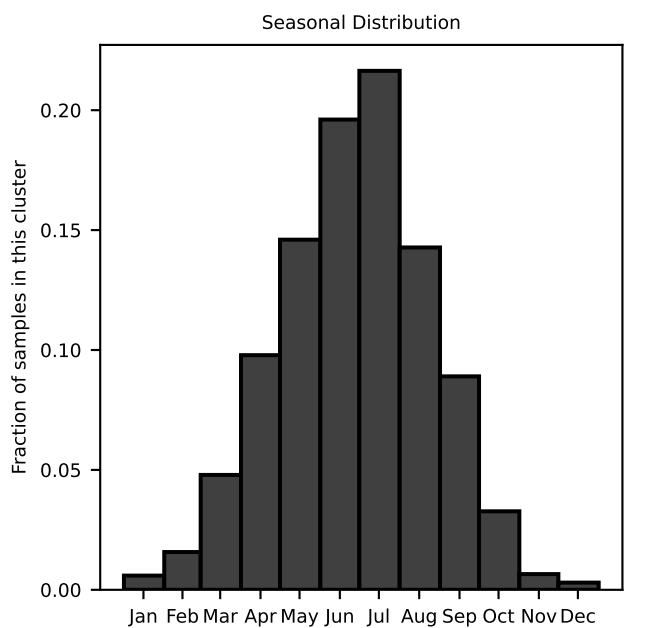
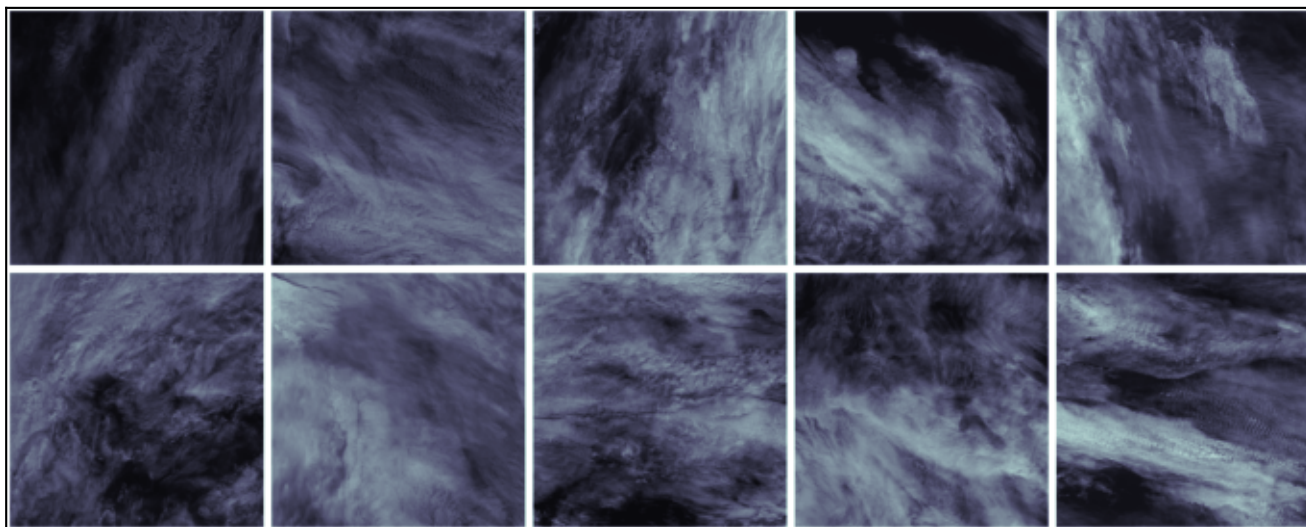


Figure S21, Cluster 21

55K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 278.0 K, Mean CTP: 782.0 hPa, Mean LWP: 118.99 gm^{-2} , Mean Nd: 59.58 cm^{-3} (for cloudy pixels)

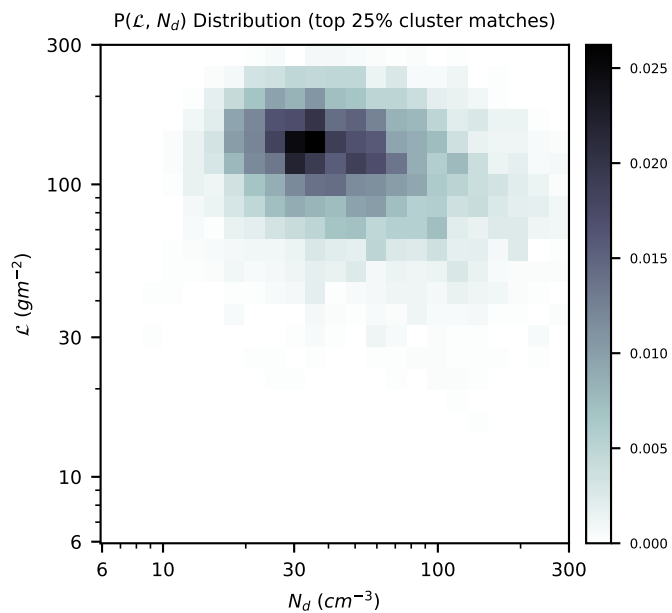
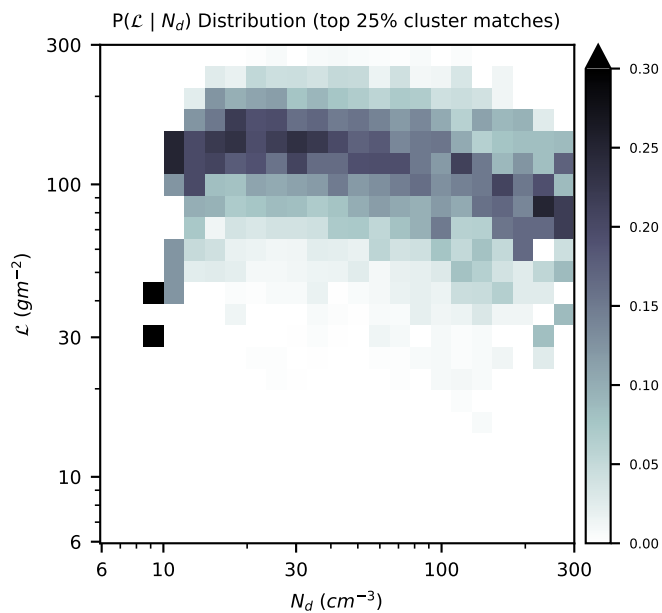
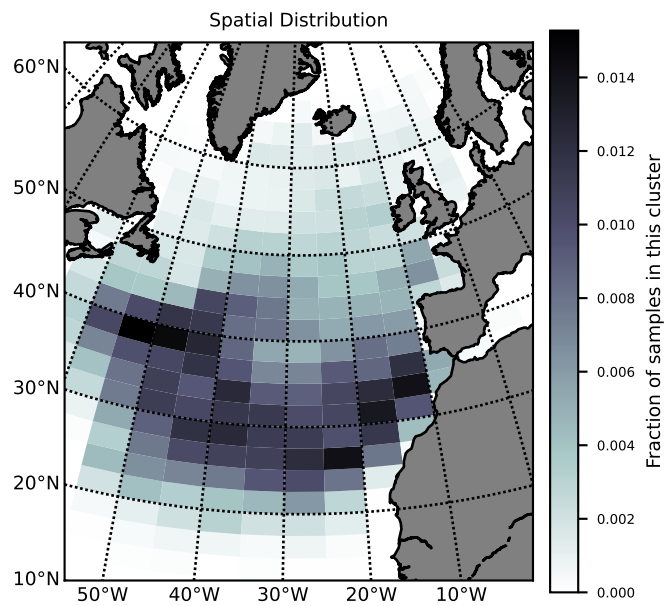
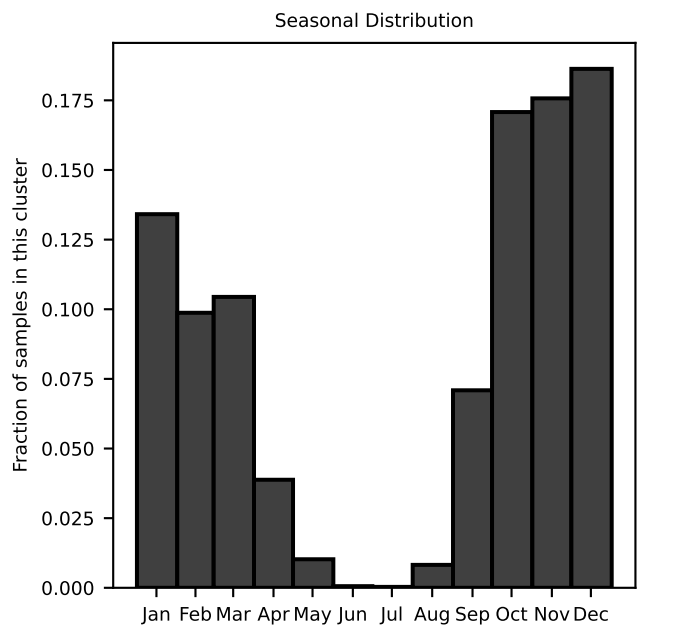
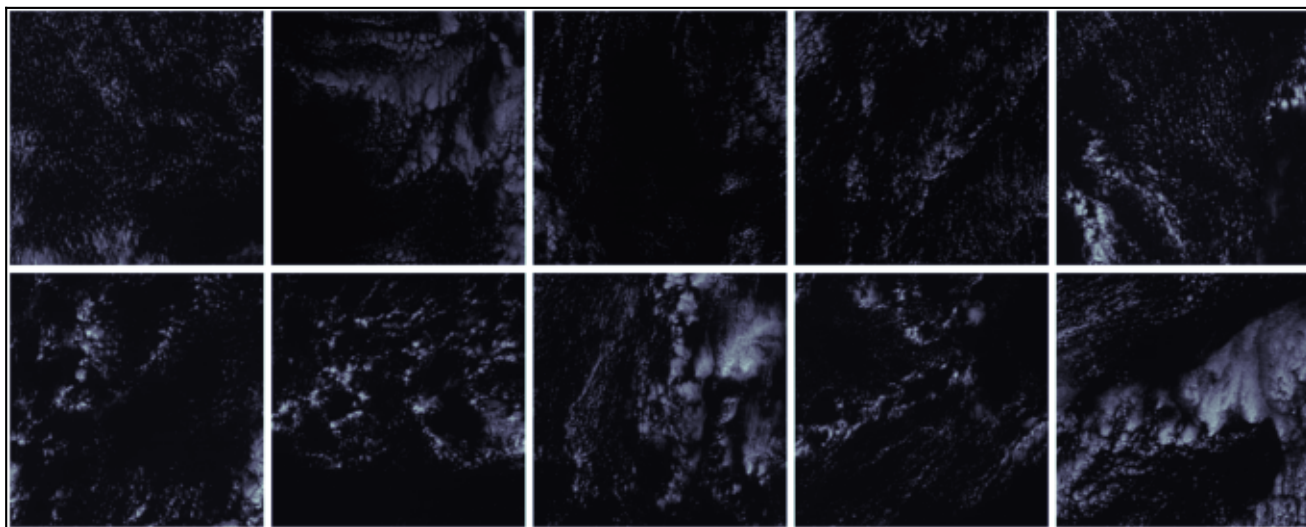


Figure S22, Cluster 22

45K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 277.0 K, Mean CTP: 817.0 hPa, Mean LWP: 104.14 gm^{-2} , Mean Nd: 71.71 cm^{-3} (for cloudy pixels)

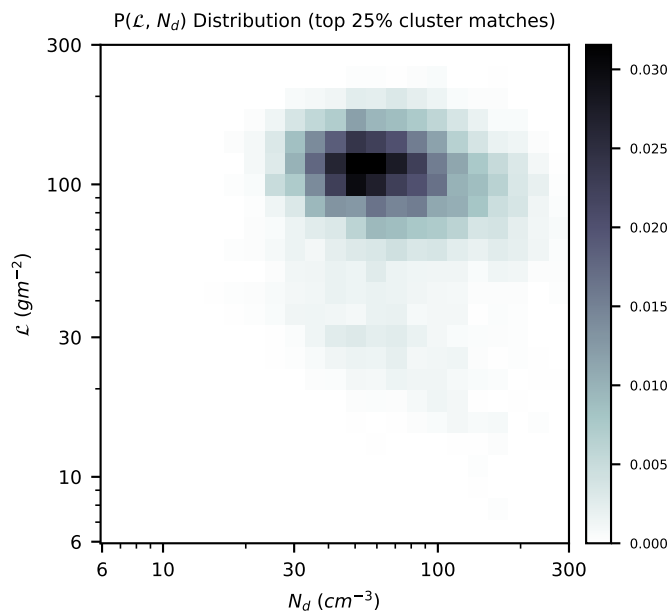
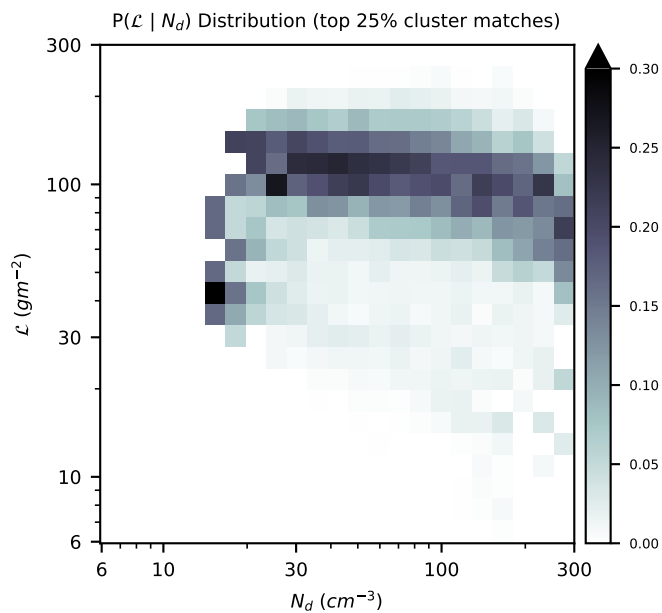
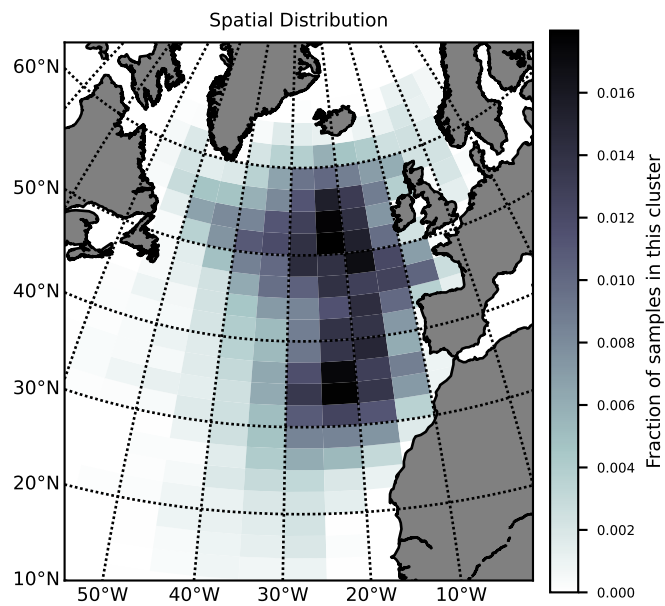
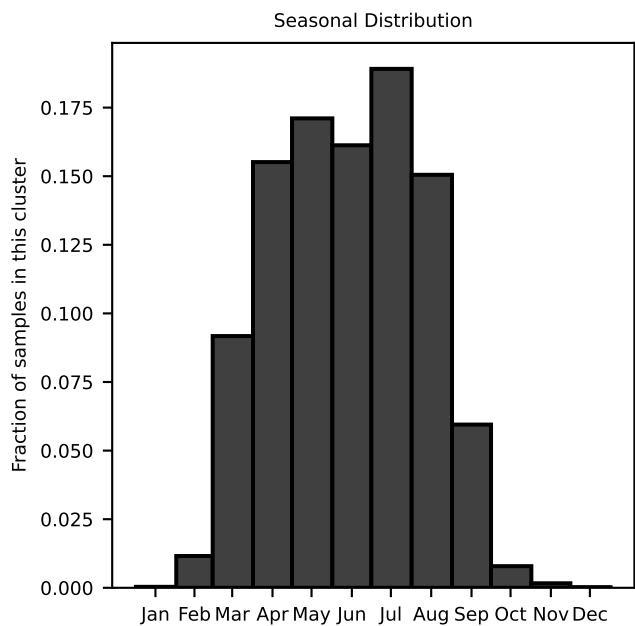
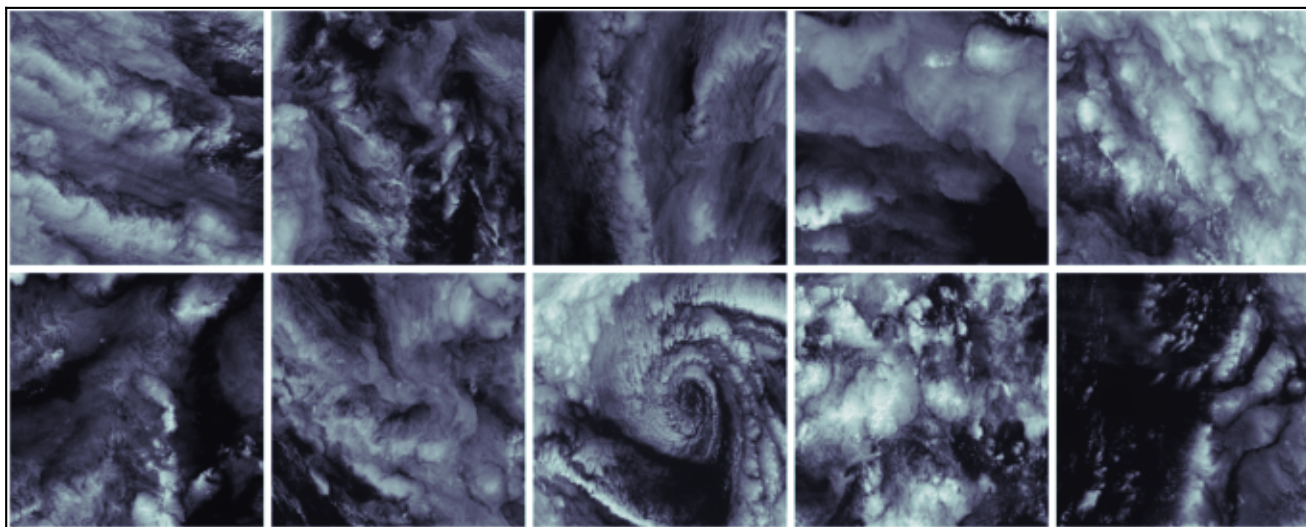
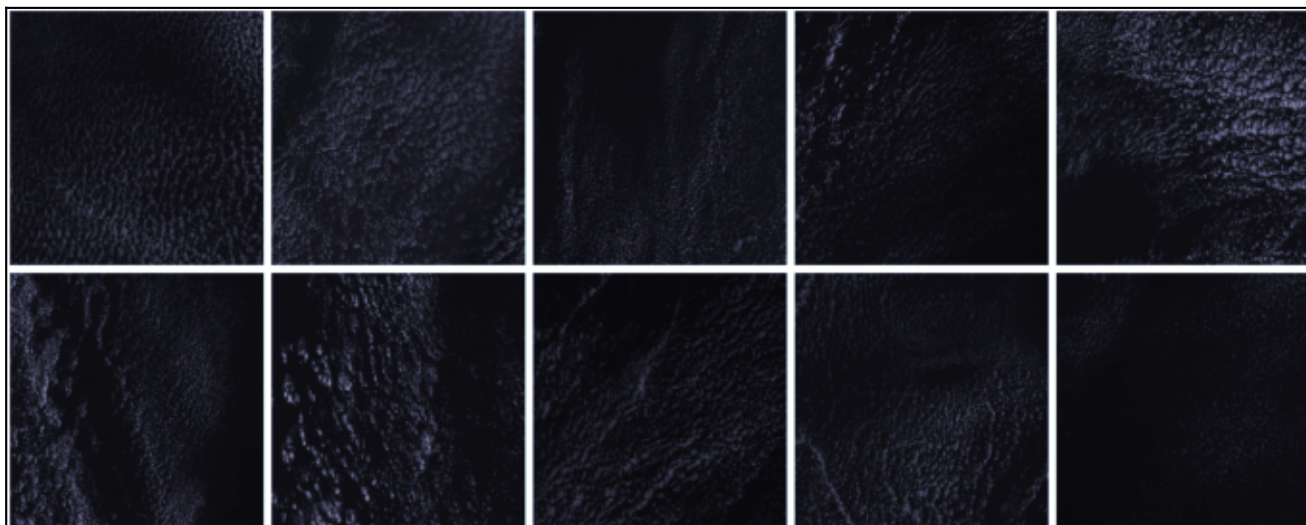


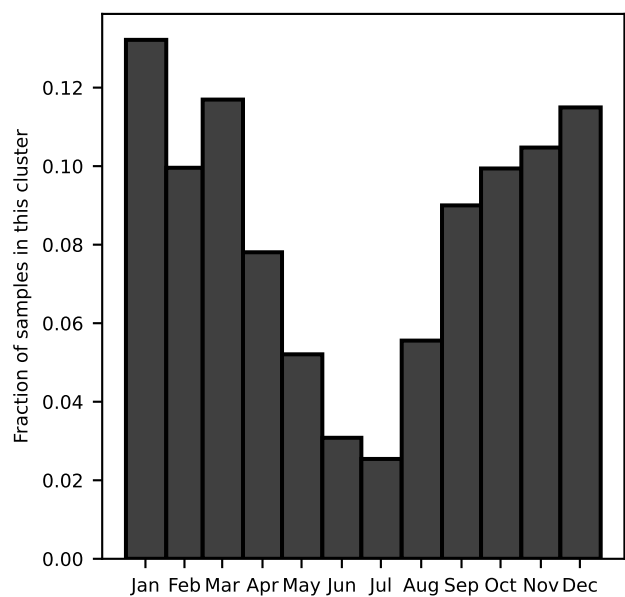
Figure S23, Cluster 23

50K out of 3.7M low cloud images and 10.8M total images

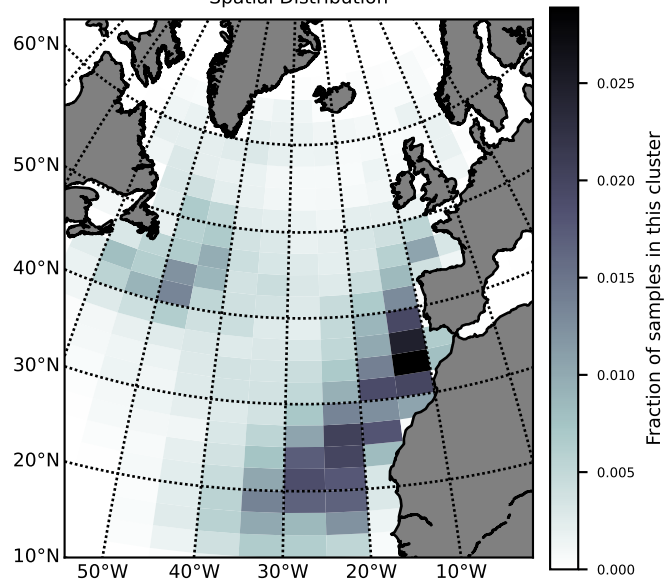
Mean CTT: 283.0 K, Mean CTP: 904.0 hPa, Mean LWP: 43.42 gm^{-2} , Mean Nd: 117.75 cm^{-3} (for cloudy pixels)



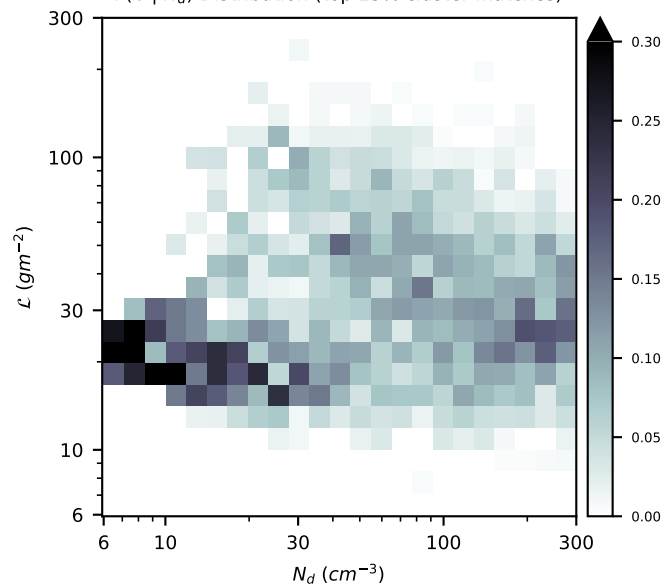
Seasonal Distribution



Spatial Distribution



$P(\mathcal{L} | N_d)$ Distribution (top 25% cluster matches)



$P(\mathcal{L}, N_d)$ Distribution (top 25% cluster matches)

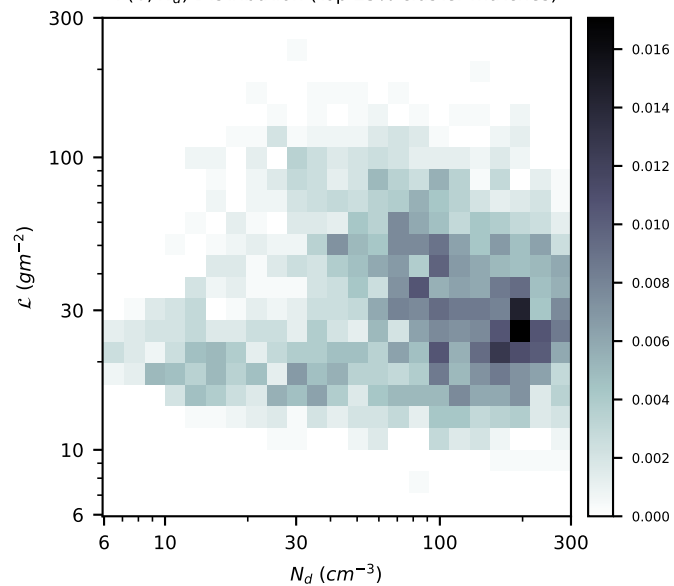


Figure S24, Cluster 24

61K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 284.0 K, Mean CTP: 838.0 hPa, Mean LWP: 69.06 gm^{-2} , Mean Nd: 71.81 cm^{-3} (for cloudy pixels)

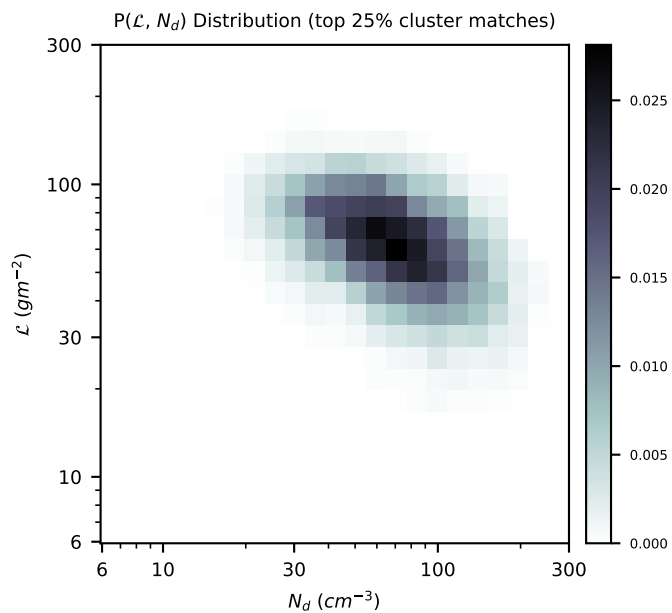
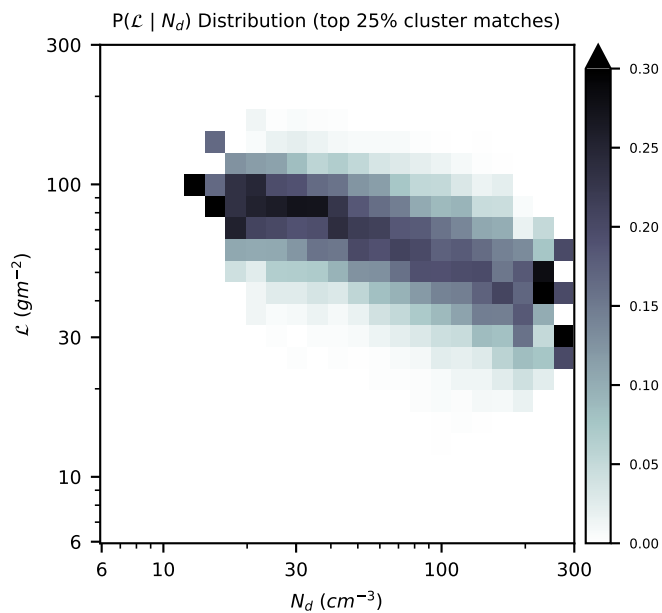
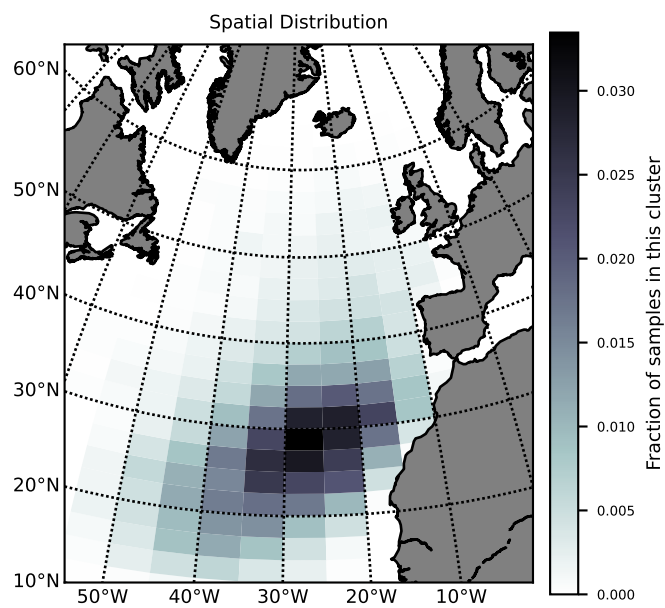
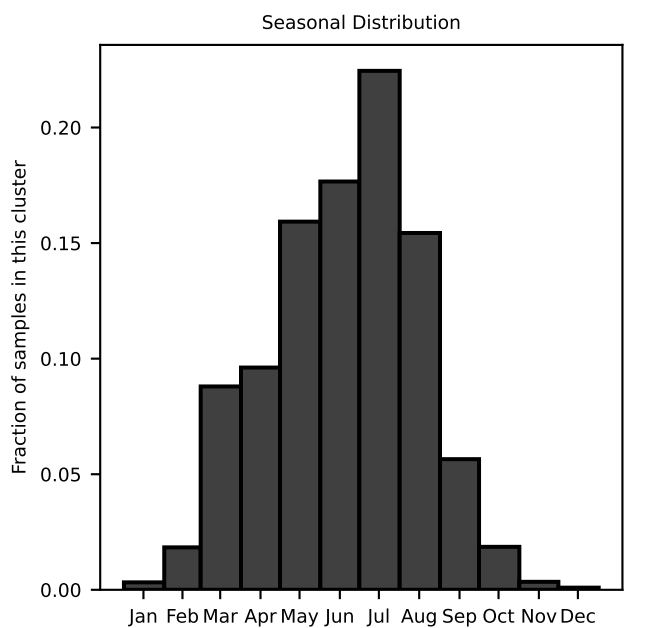
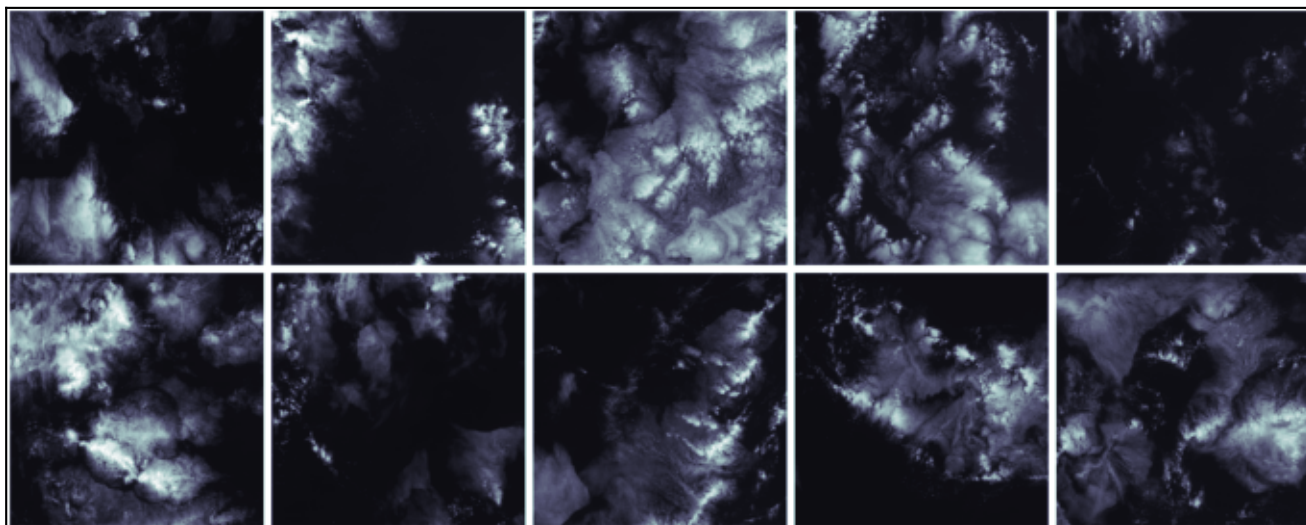


Figure S25, Cluster 25

93K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 278.0 K, Mean CTP: 862.0 hPa, Mean LWP: 101.14 gm^{-2} , Mean Nd: 40.39 cm^{-3} (for cloudy pixels)

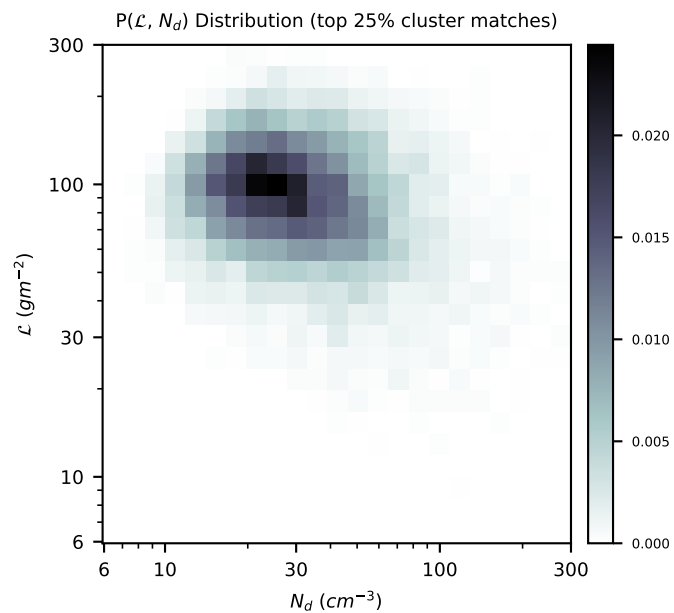
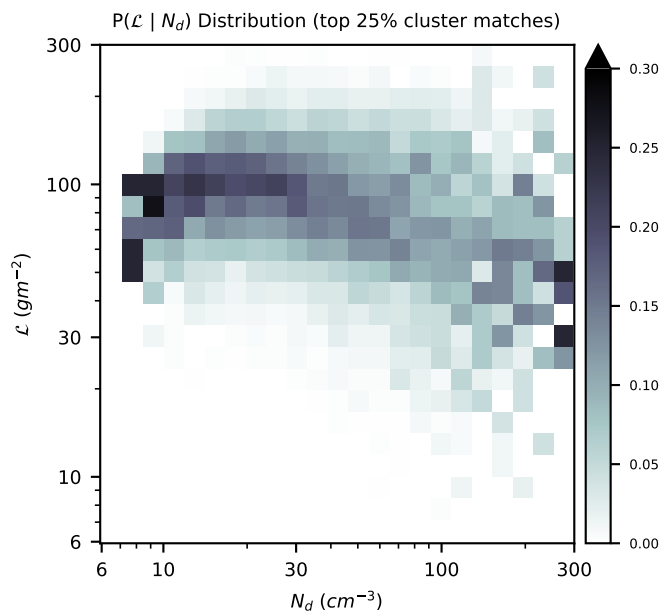
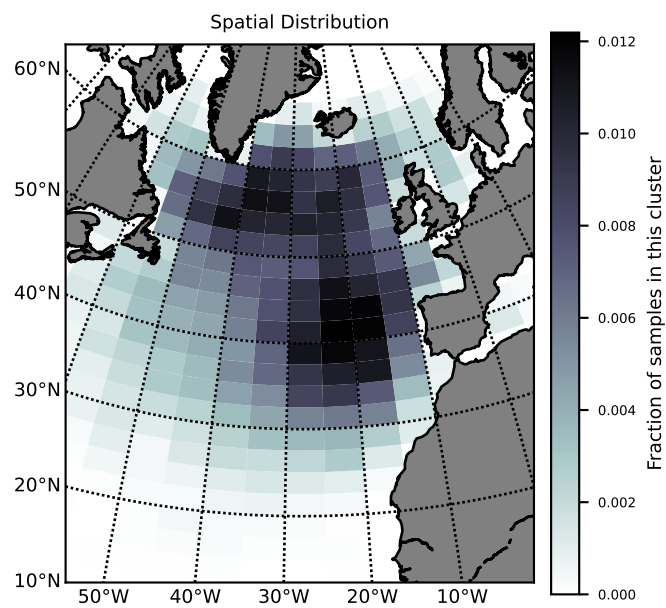
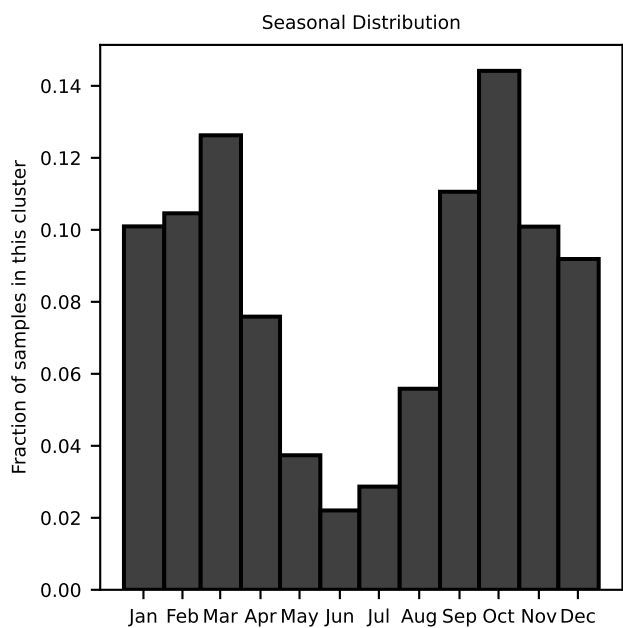
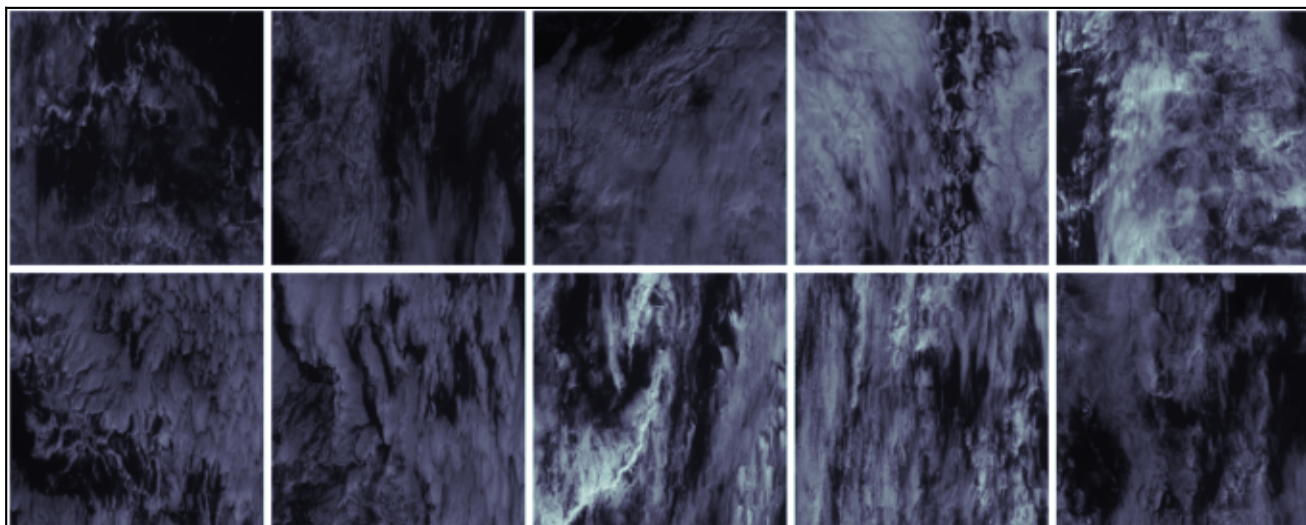
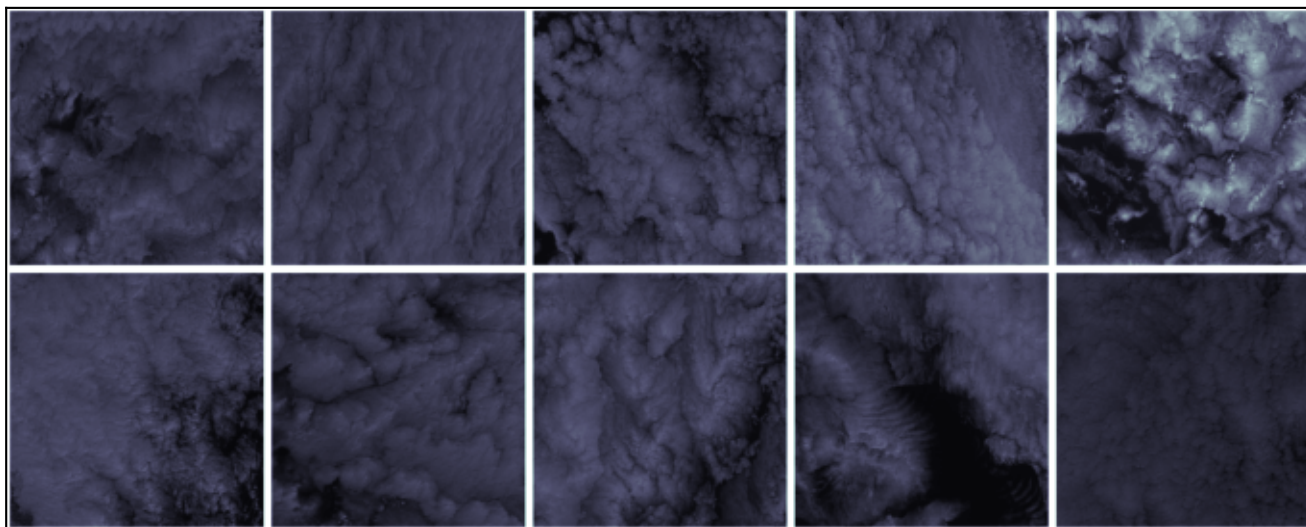


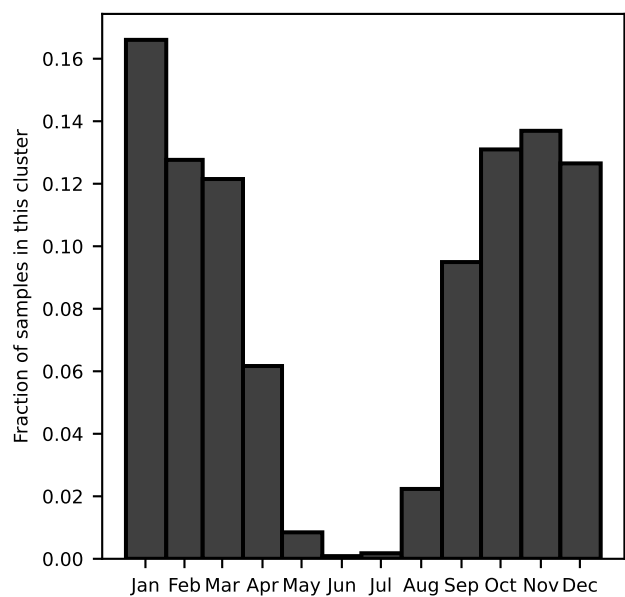
Figure S26, Cluster 26

51K out of 3.7M low cloud images and 10.8M total images

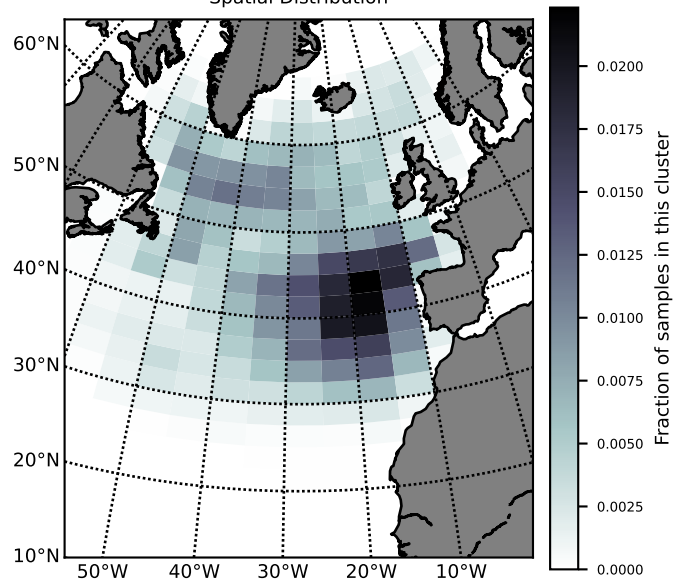
Mean CTT: 276.0 K, Mean CTP: 832.0 hPa, Mean LWP: 130.04 gm^{-2} , Mean Nd: 81.67 cm^{-3} (for cloudy pixels)



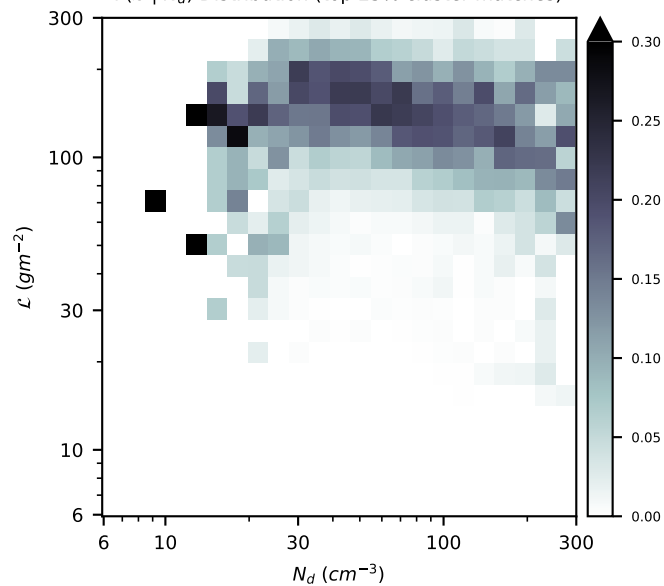
Seasonal Distribution



Spatial Distribution



$P(\mathcal{L} | N_d)$ Distribution (top 25% cluster matches)



$P(\mathcal{L}, N_d)$ Distribution (top 25% cluster matches)

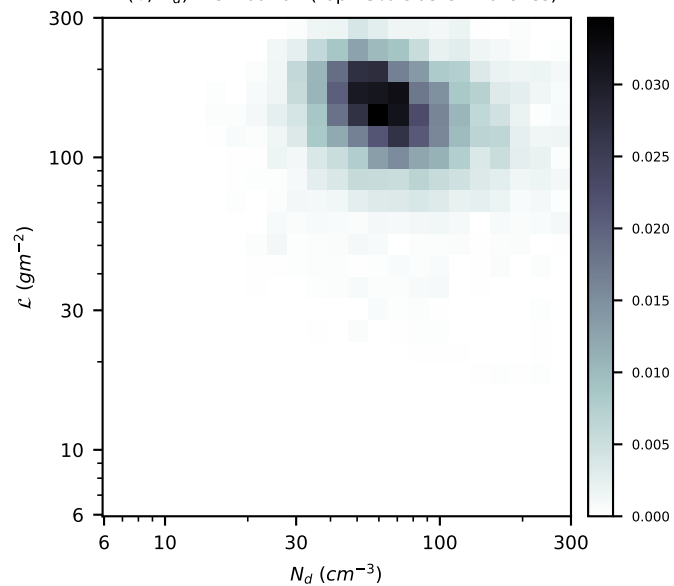


Figure S27, Cluster 27

72K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 278.0 K, Mean CTP: 810.0 hPa, Mean LWP: 85.48 gm^{-2} , Mean Nd: 64.07 cm^{-3} (for cloudy pixels)

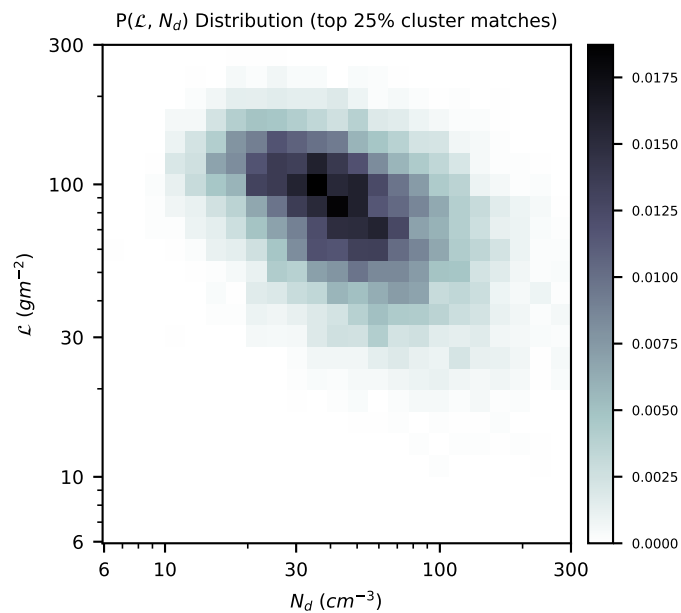
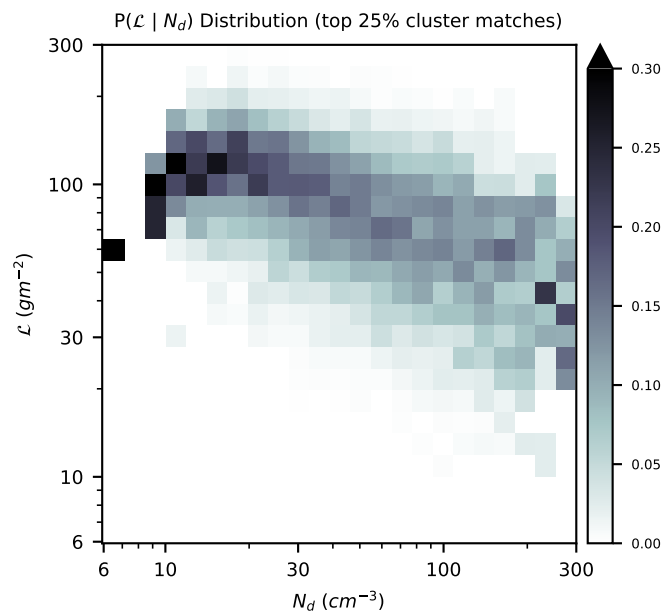
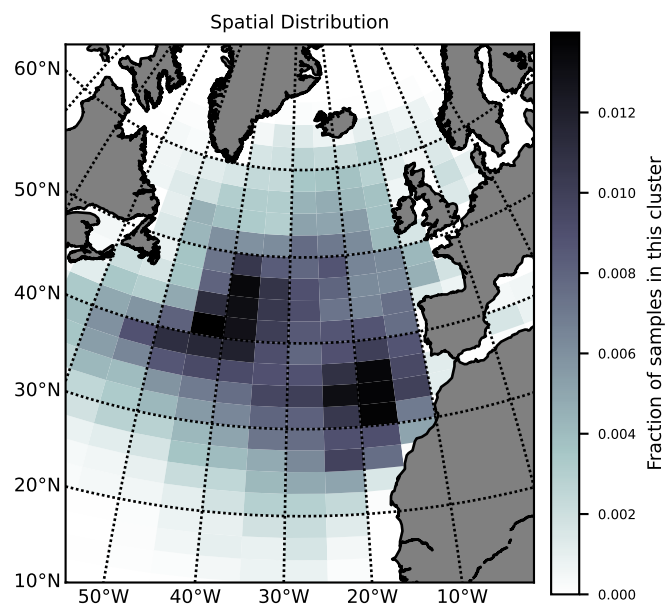
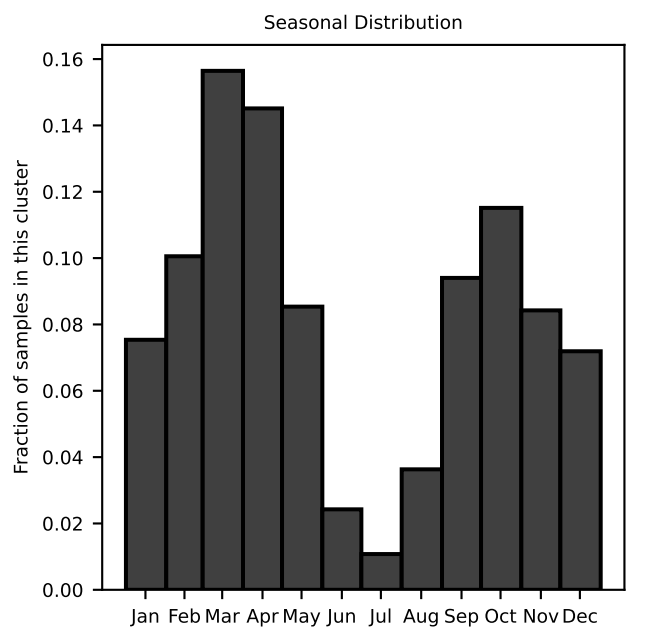
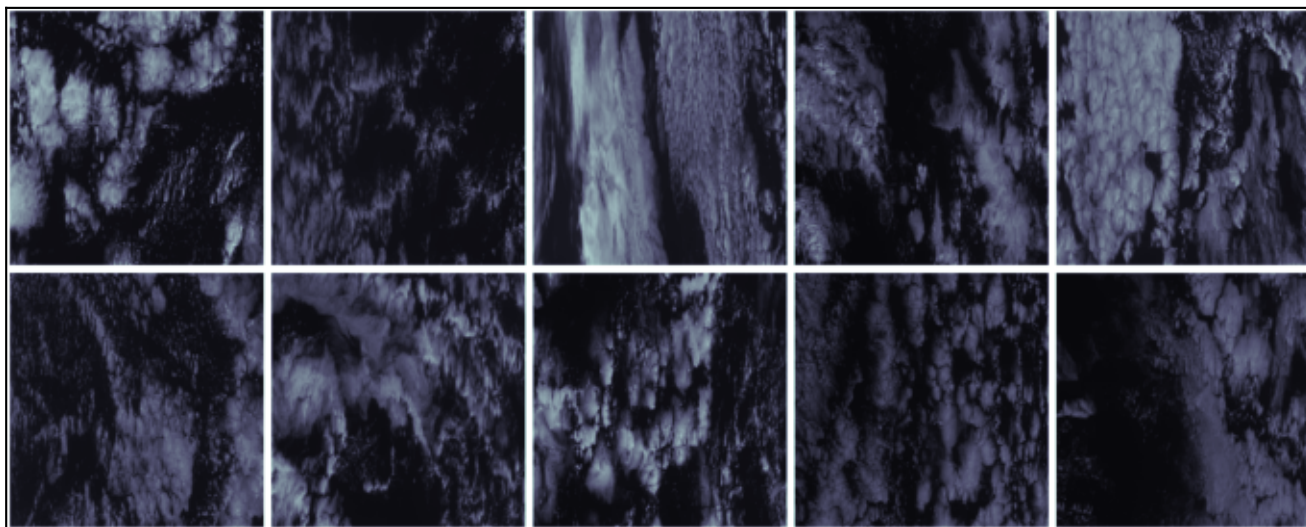


Figure S28, Cluster 28

46K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 287.0 K, Mean CTP: 931.0 hPa, Mean LWP: 36.5 gm^{-2} , Mean Nd: 84.45 cm^{-3} (for cloudy pixels)

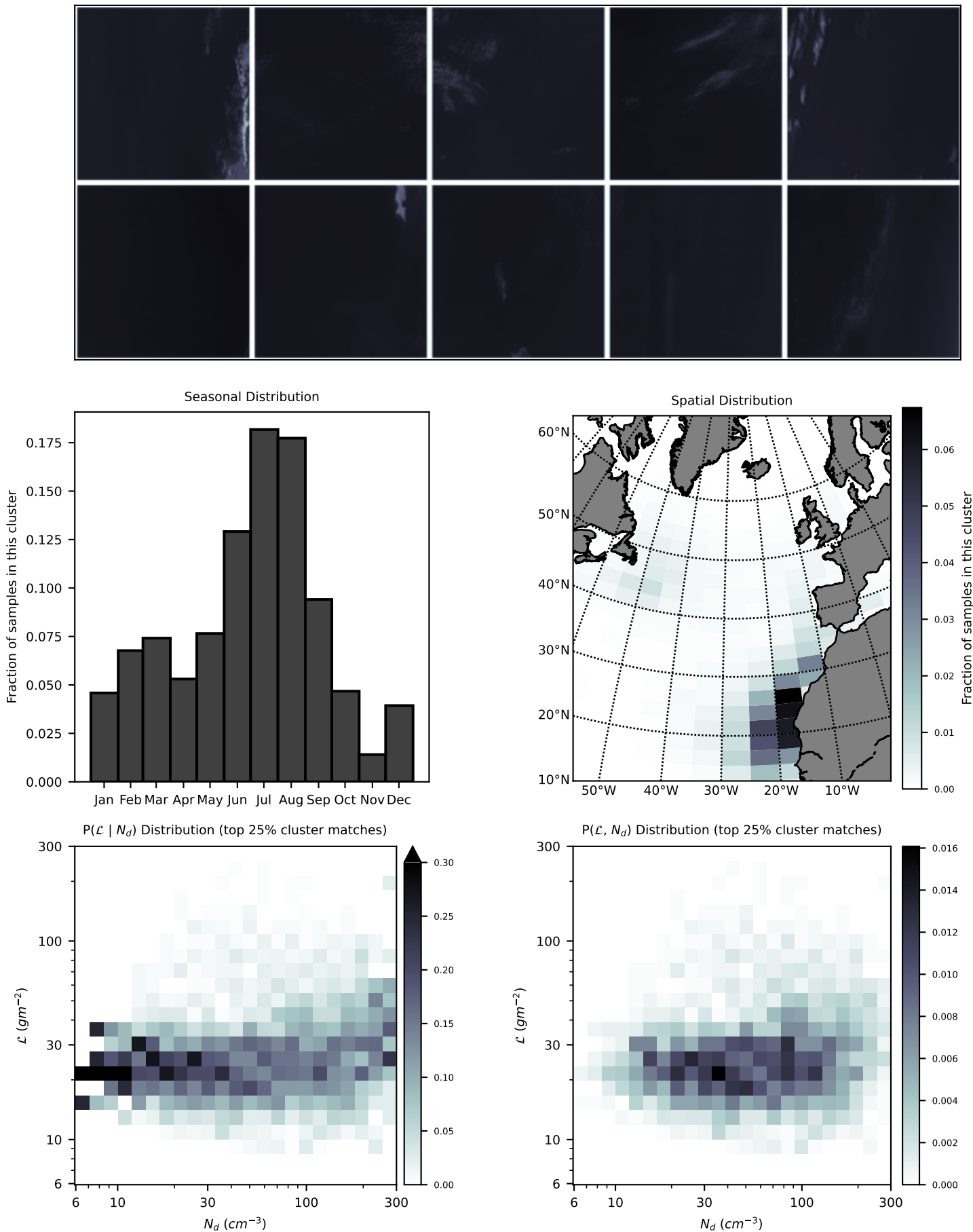


Figure S29, Cluster 29

55K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 285.0 K, Mean CTP: 828.0 hPa, Mean LWP: 97.21 gm^{-2} , Mean Nd: 38.2 cm^{-3} (for cloudy pixels)

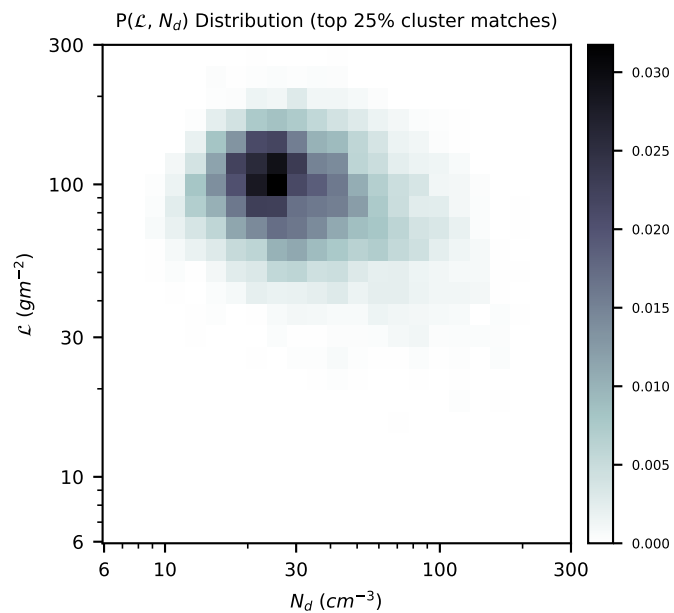
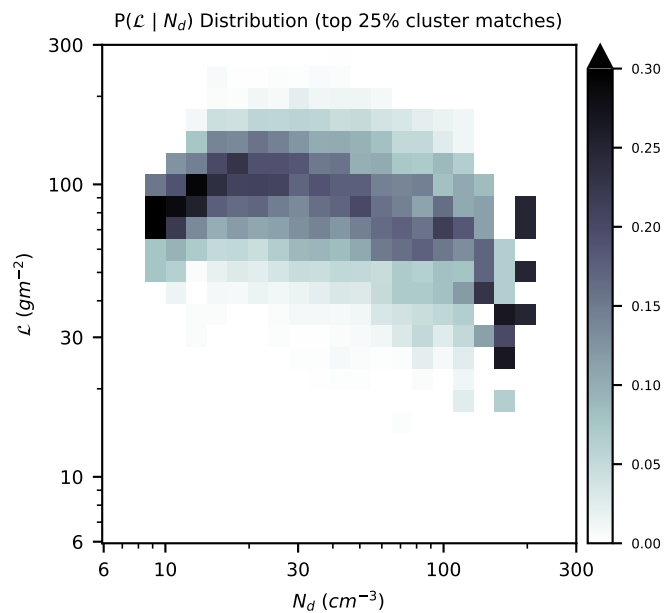
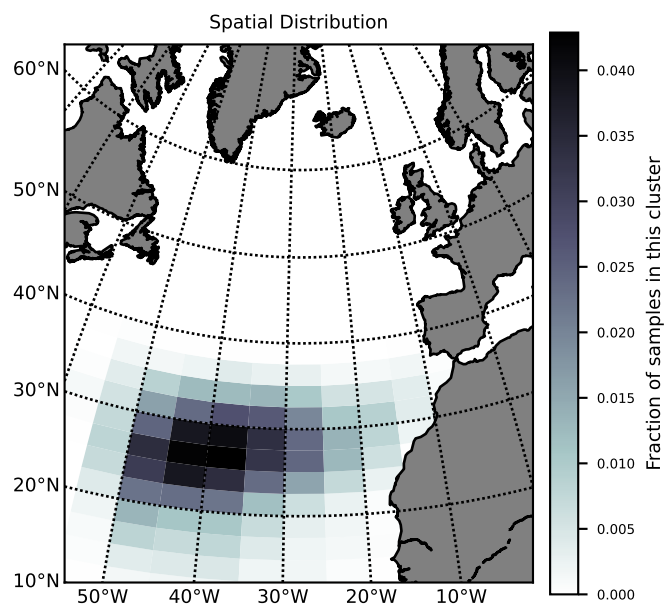
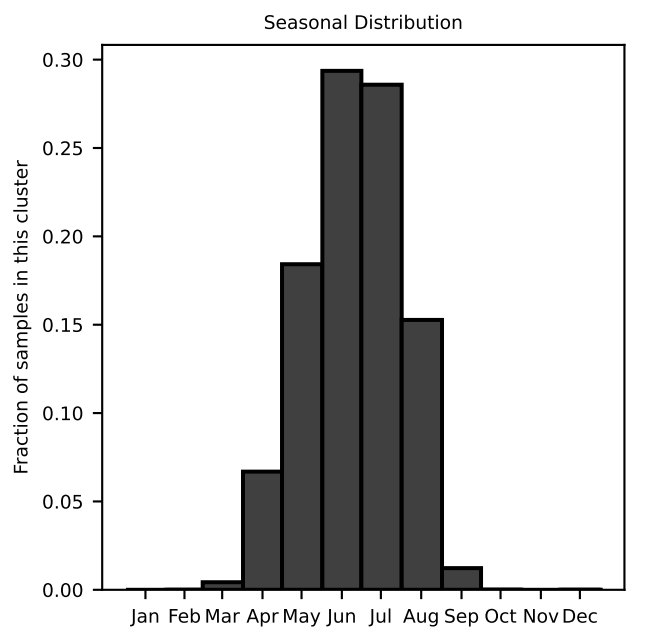
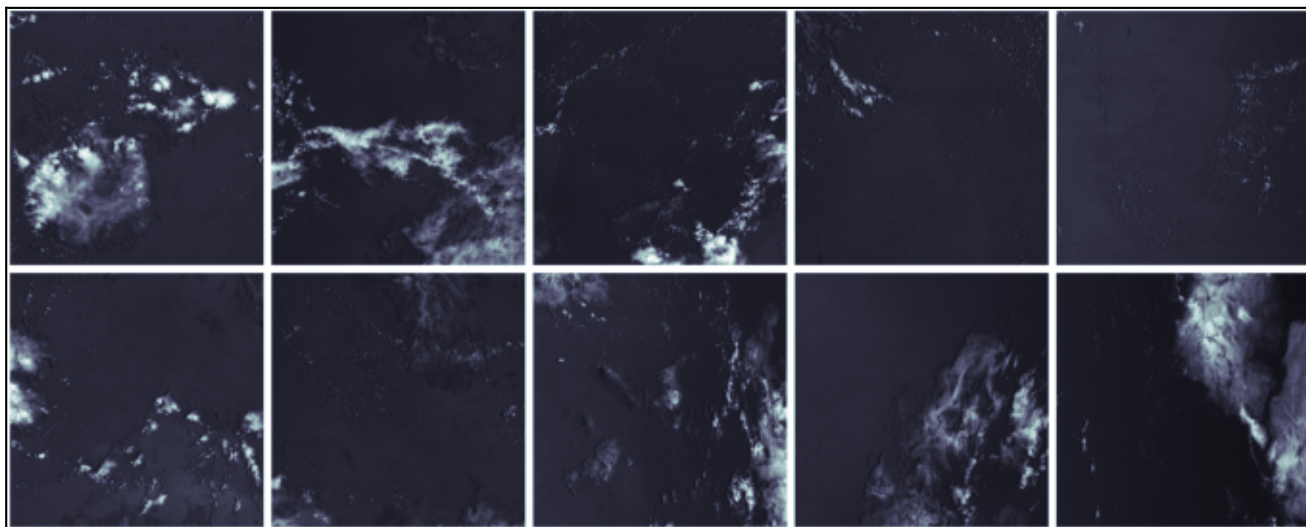


Figure S30, Cluster 30

54K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 276.0 K, Mean CTP: 776.0 hPa, Mean LWP: 140.85 gm^{-2} , Mean Nd: 30.12 cm^{-3} (for cloudy pixels)

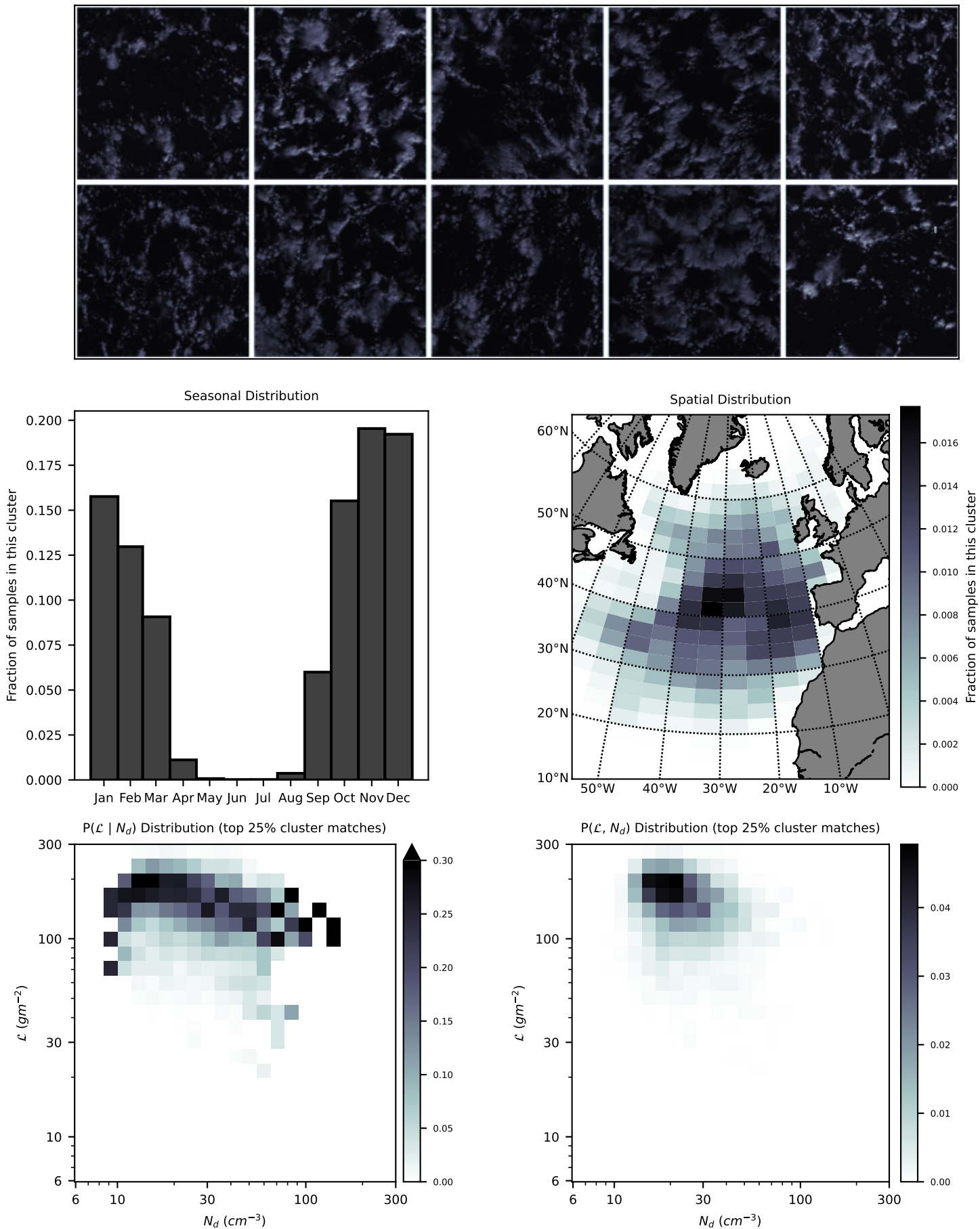


Figure S31, Cluster 31

61K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 282.0 K, Mean CTP: 837.0 hPa, Mean LWP: 86.17 gm^{-2} , Mean Nd: 52.86 cm^{-3} (for cloudy pixels)

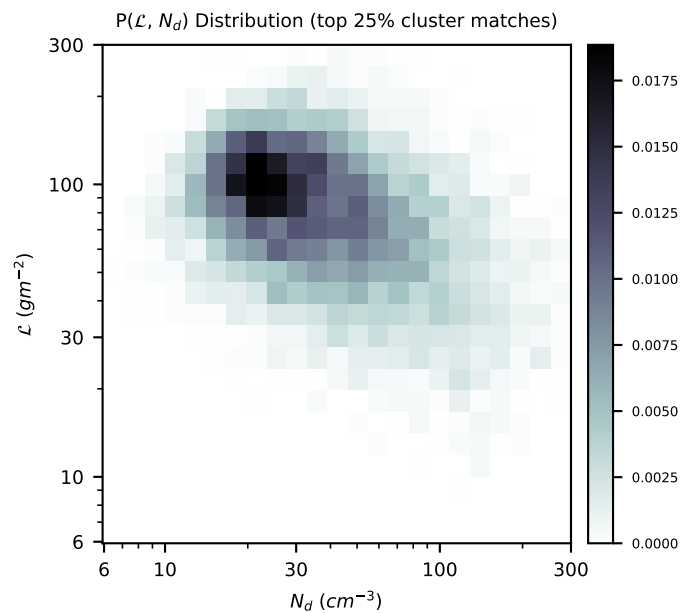
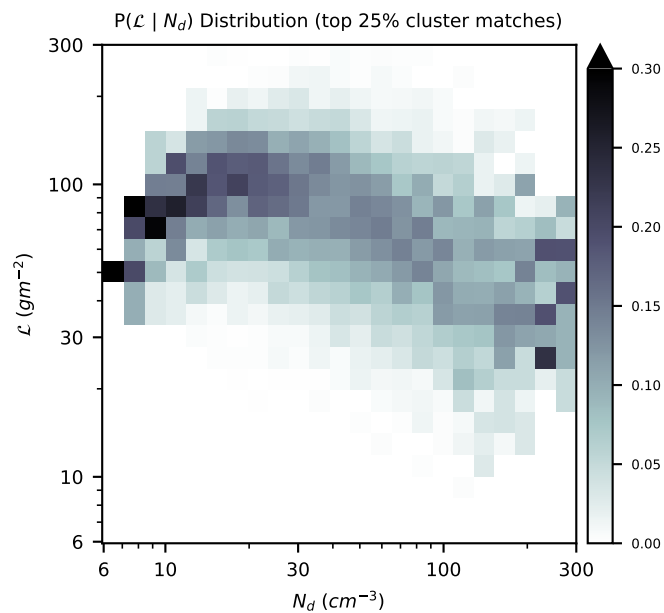
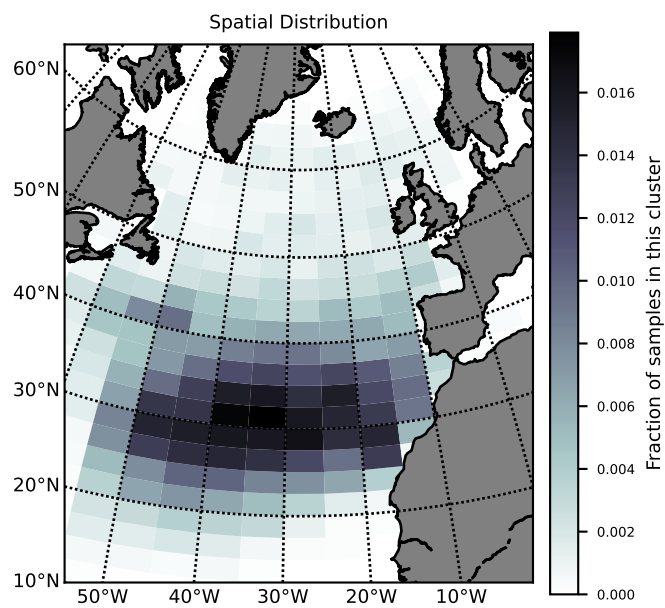
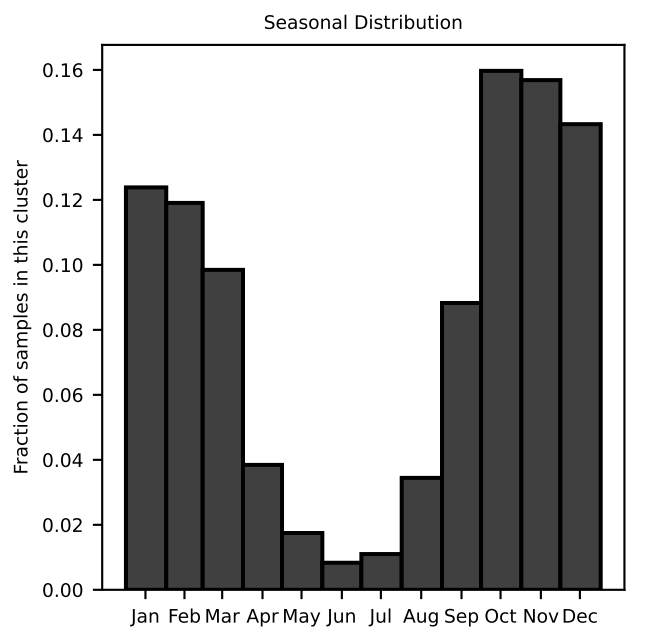
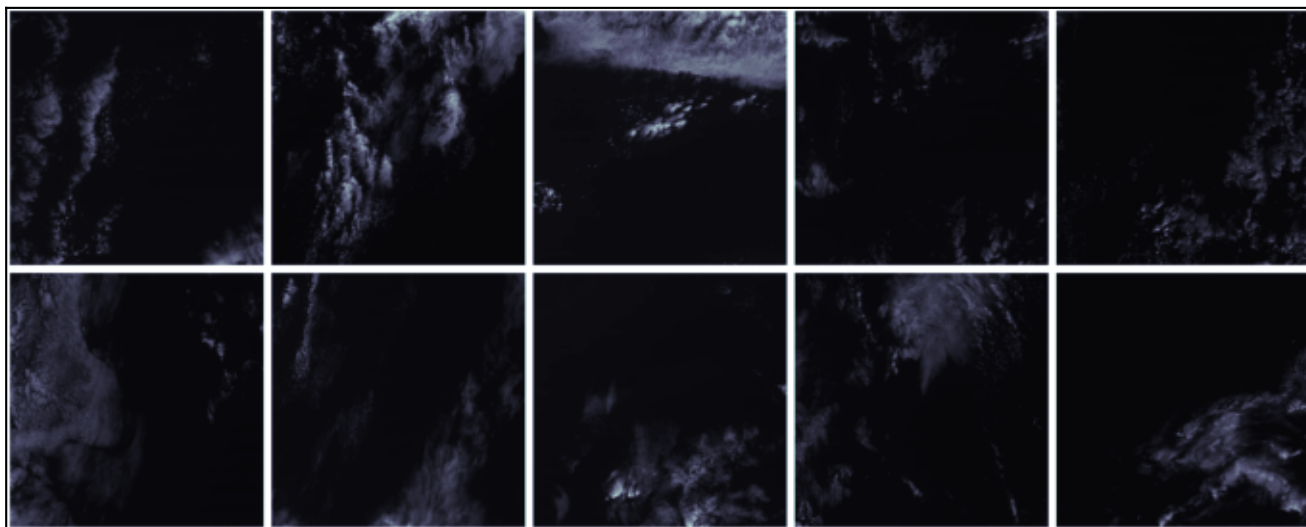
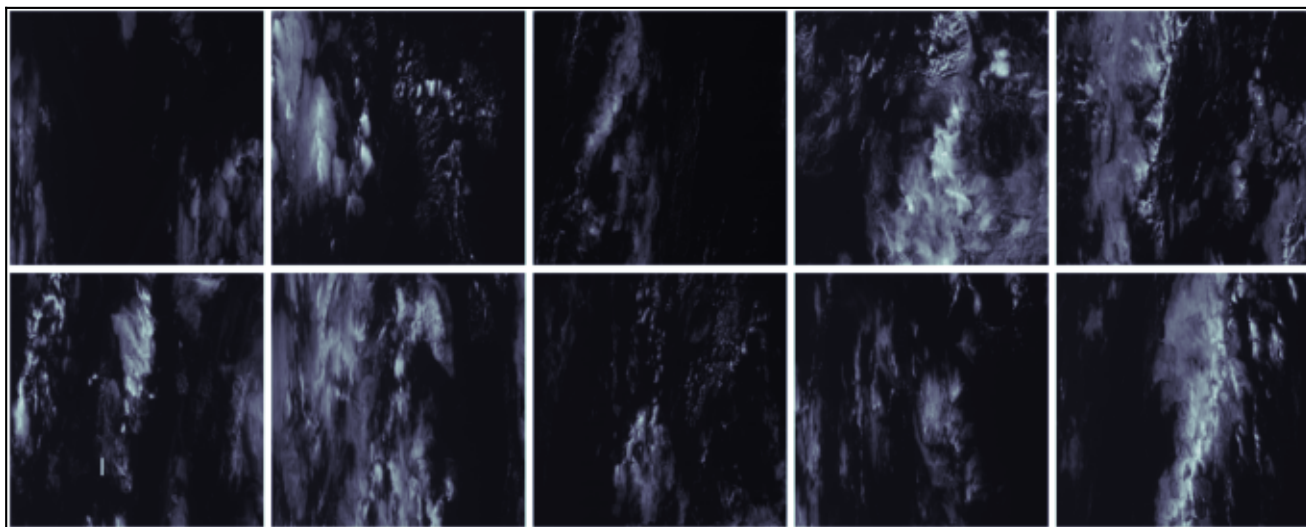


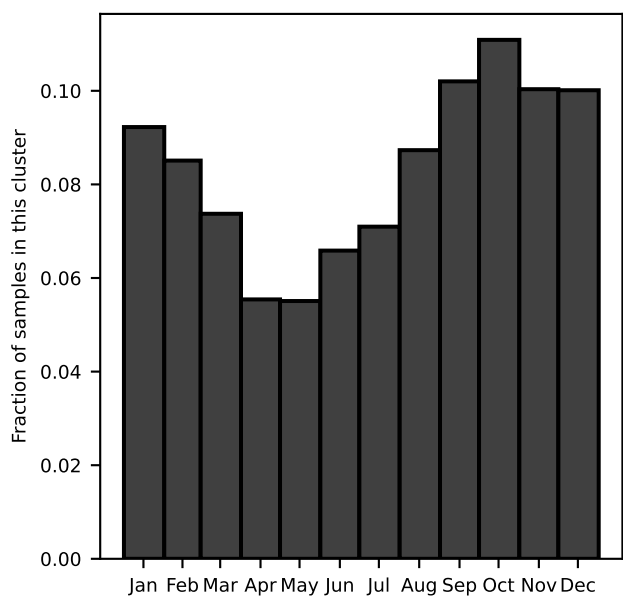
Figure S32, Cluster 32

90K out of 3.7M low cloud images and 10.8M total images

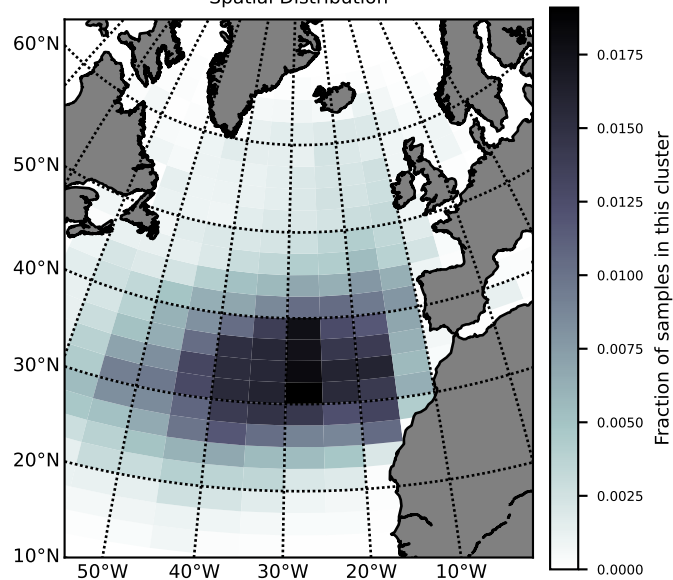
Mean CTT: 282.0 K, Mean CTP: 854.0 hPa, Mean LWP: 77.74 gm^{-2} , Mean Nd: 51.62 cm^{-3} (for cloudy pixels)



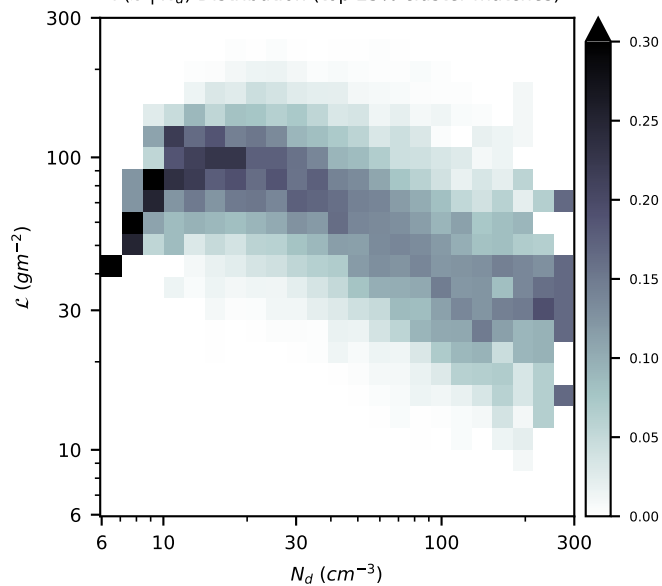
Seasonal Distribution



Spatial Distribution



$P(\mathcal{L} | N_d)$ Distribution (top 25% cluster matches)



$P(\mathcal{L}, N_d)$ Distribution (top 25% cluster matches)

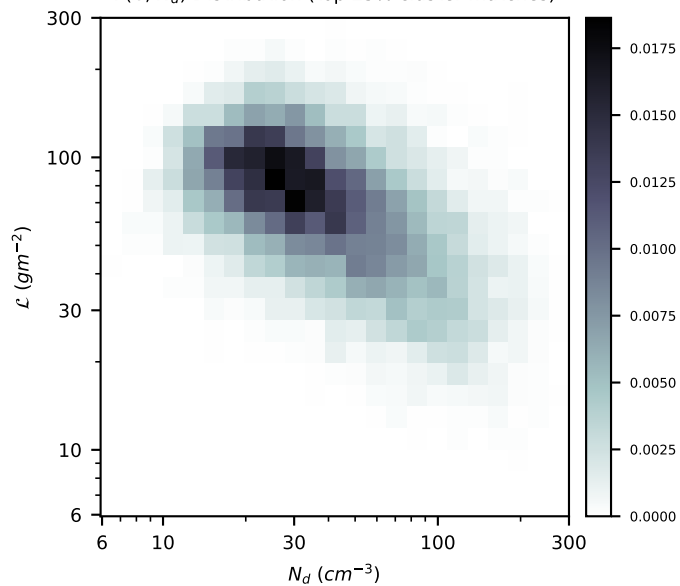


Figure S33, Cluster 33

88K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 285.0 K, Mean CTP: 864.0 hPa, Mean LWP: 74.73 gm^{-2} , Mean Nd: 41.62 cm^{-3} (for cloudy pixels)

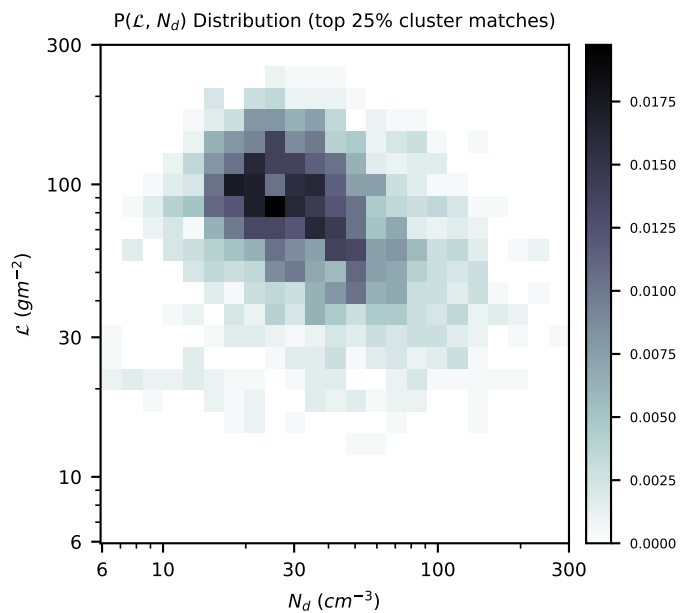
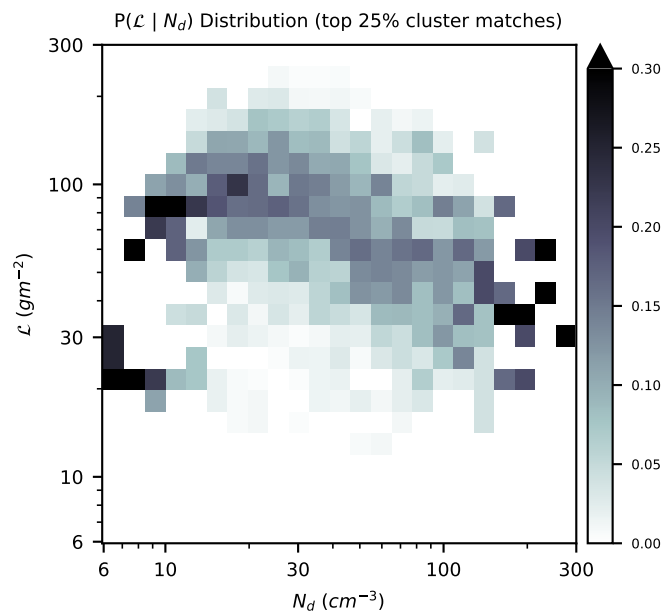
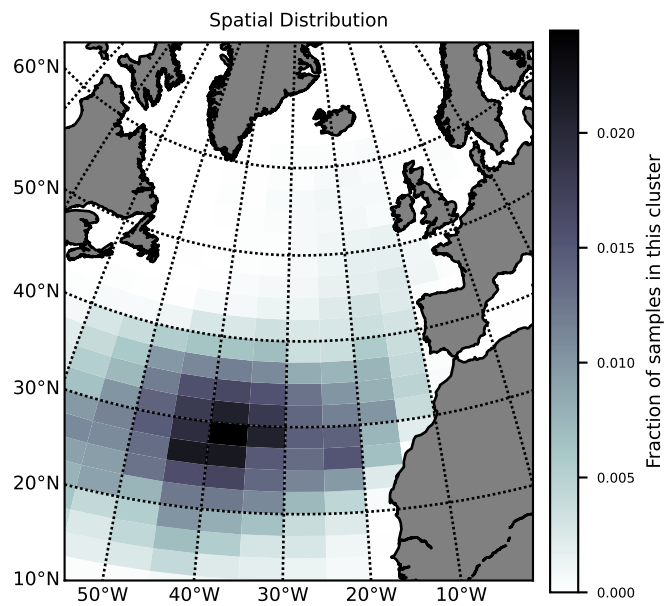
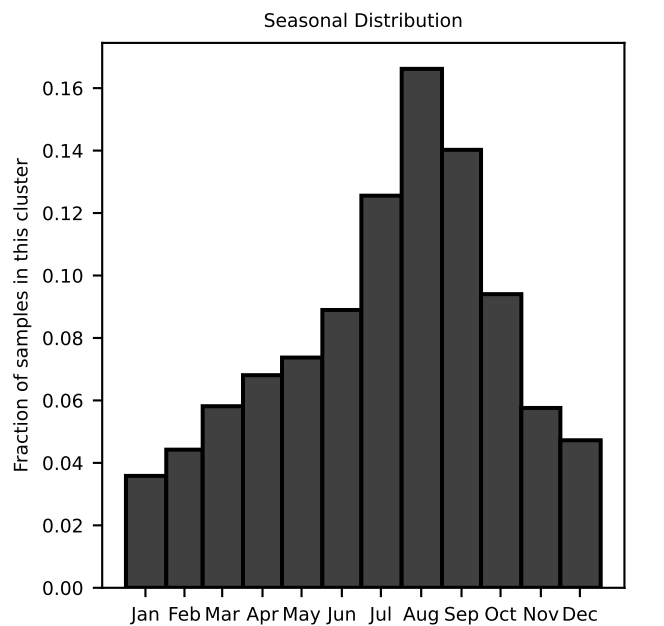
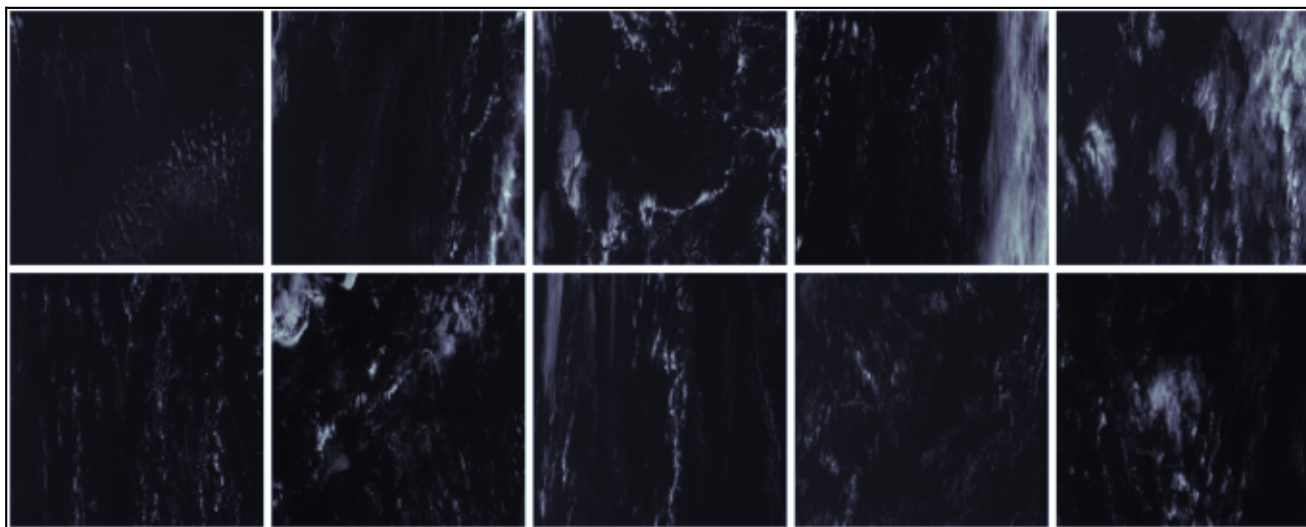


Figure S34, Cluster 34

45K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 274.0 K, Mean CTP: 797.0 hPa, Mean LWP: 153.01 gm^{-2} , Mean Nd: 69.91 cm^{-3} (for cloudy pixels)

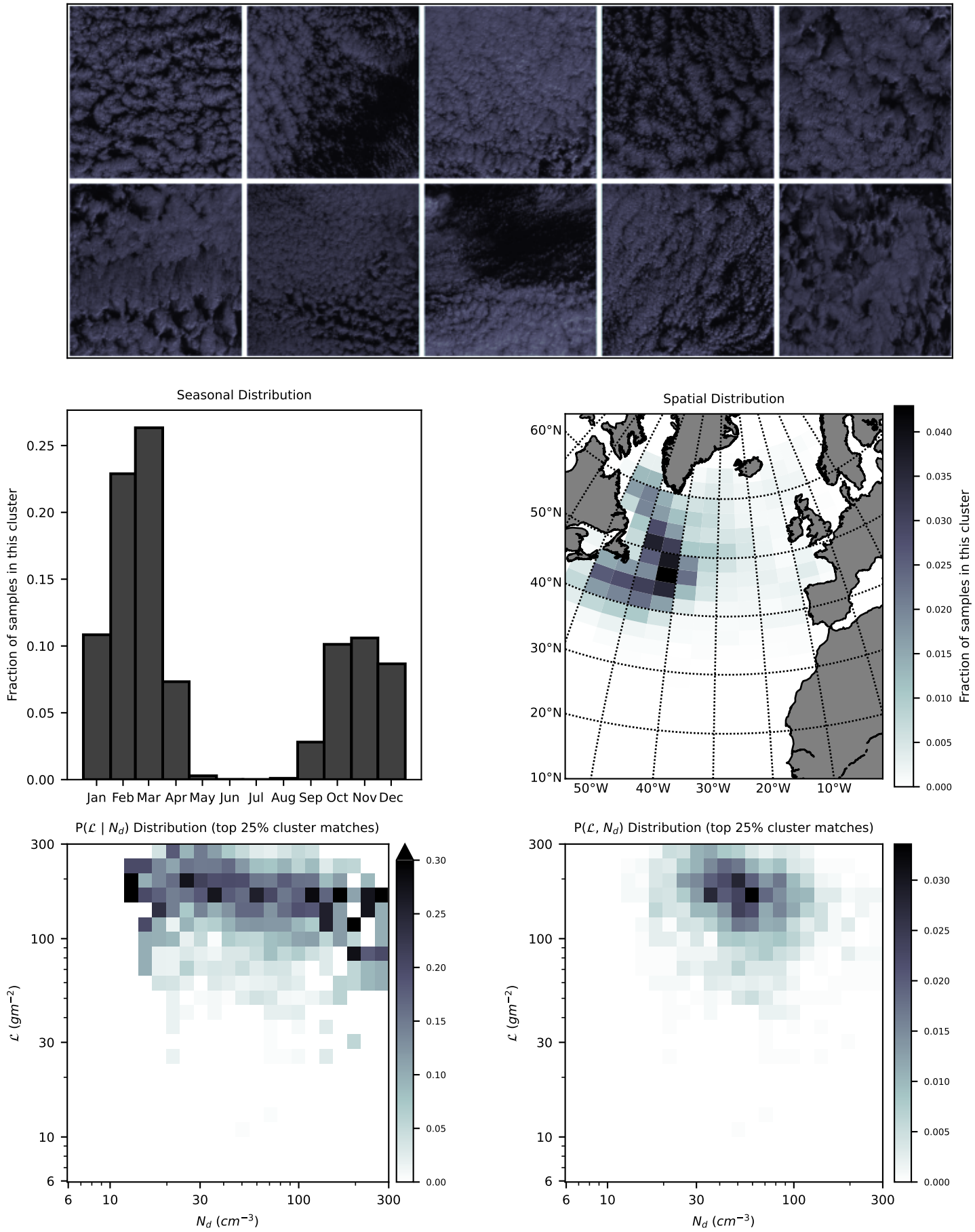


Figure S35, Cluster 35

12K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 274.0 K, Mean CTP: 976.0 hPa, Mean LWP: 87.85 gm^{-2} , Mean Nd: 124.41 cm^{-3} (for cloudy pixels)

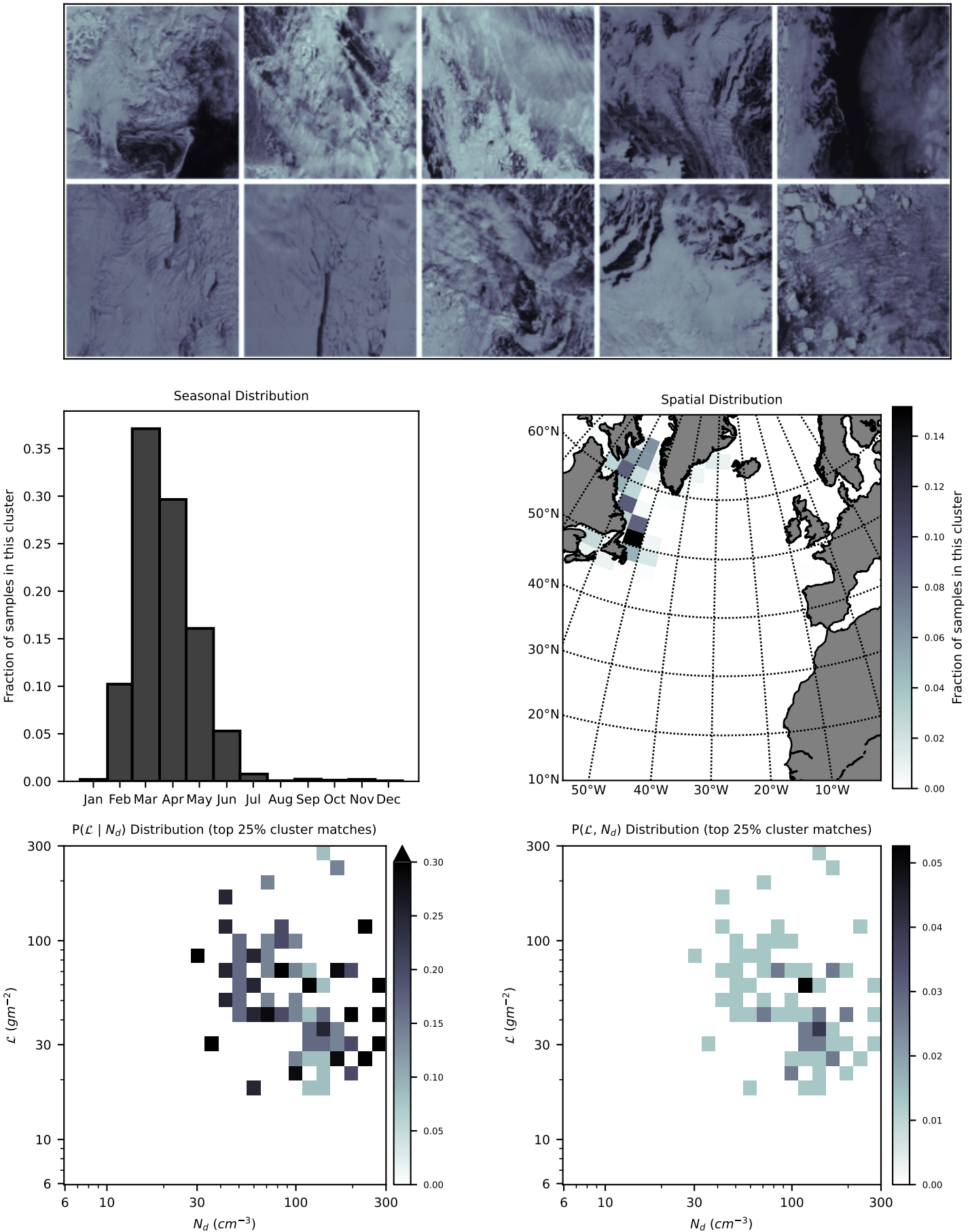


Figure S36, Cluster 36

30K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 282.0 K, Mean CTP: 784.0 hPa, Mean LWP: 121.19 gm^{-2} , Mean Nd: 28.05 cm^{-3} (for cloudy pixels)

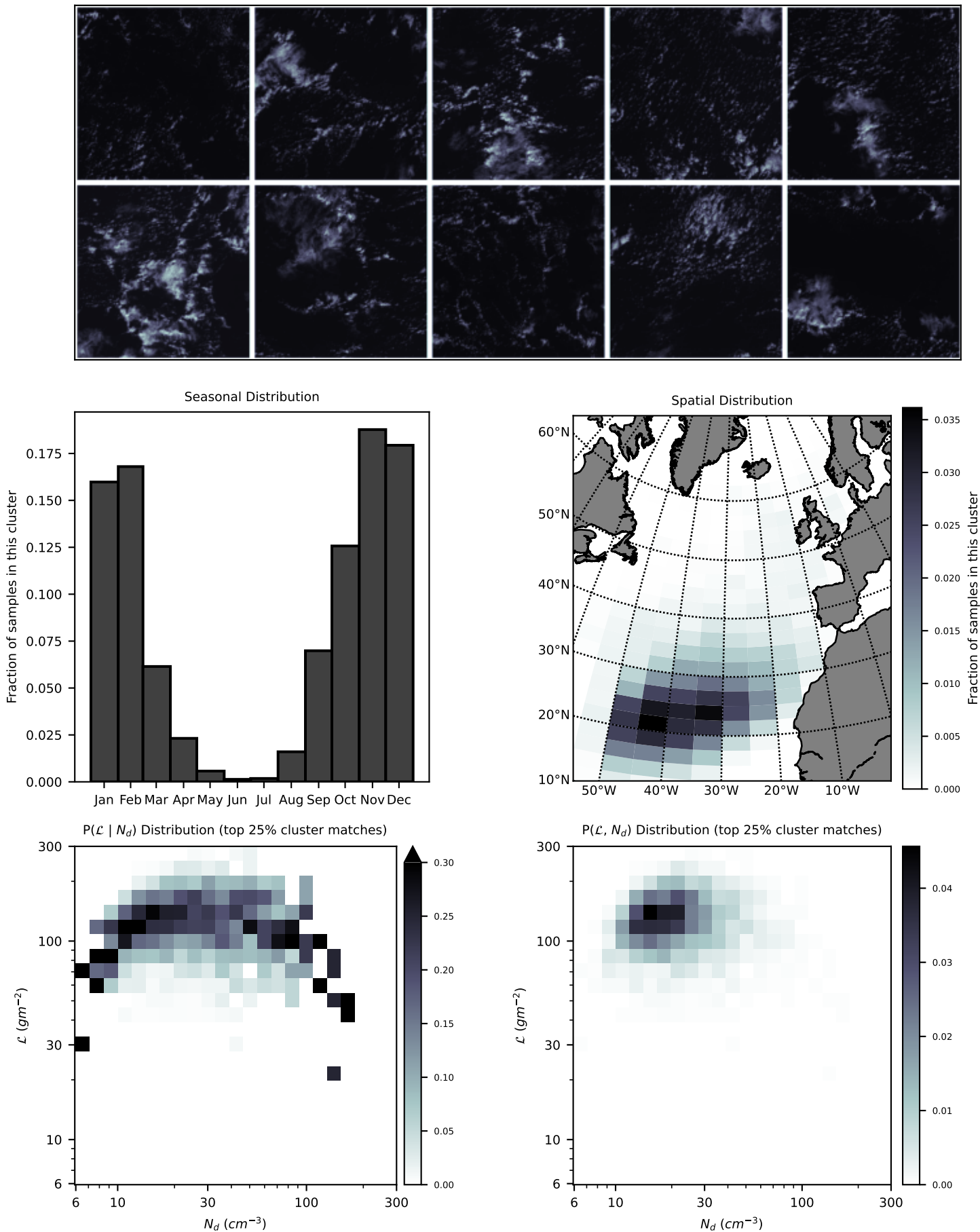


Figure S37, Cluster 37

65K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 280.0 K, Mean CTP: 846.0 hPa, Mean LWP: 109.52 gm^{-2} , Mean Nd: 47.79 cm^{-3} (for cloudy pixels)

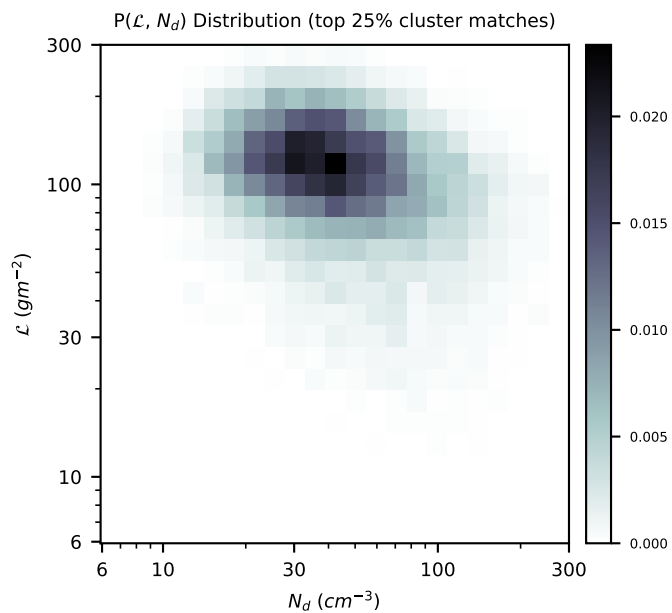
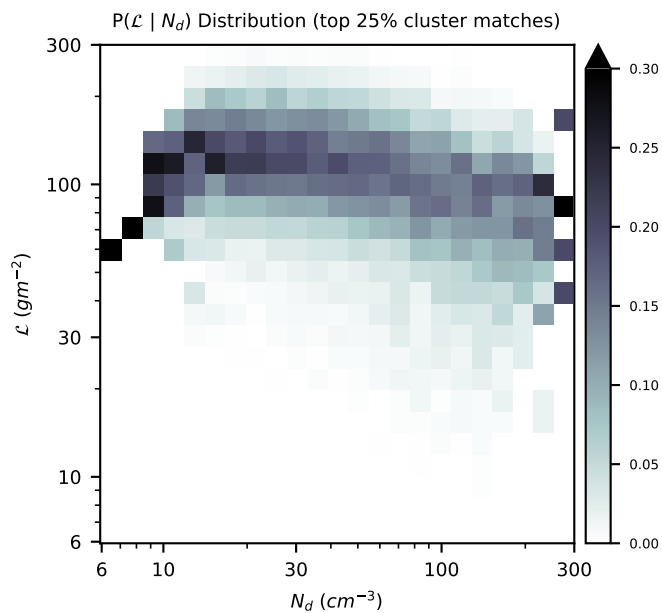
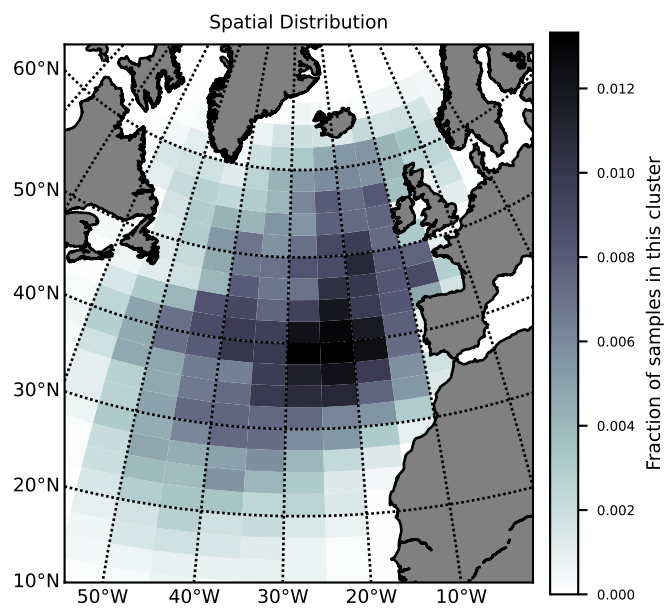
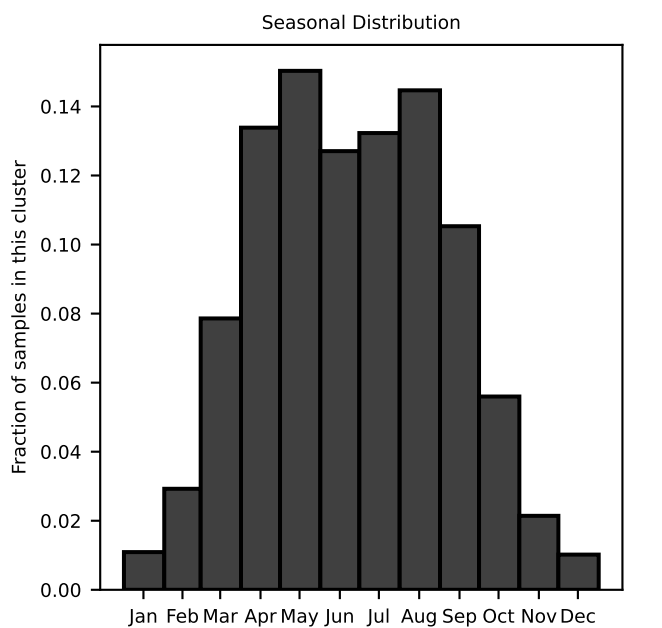
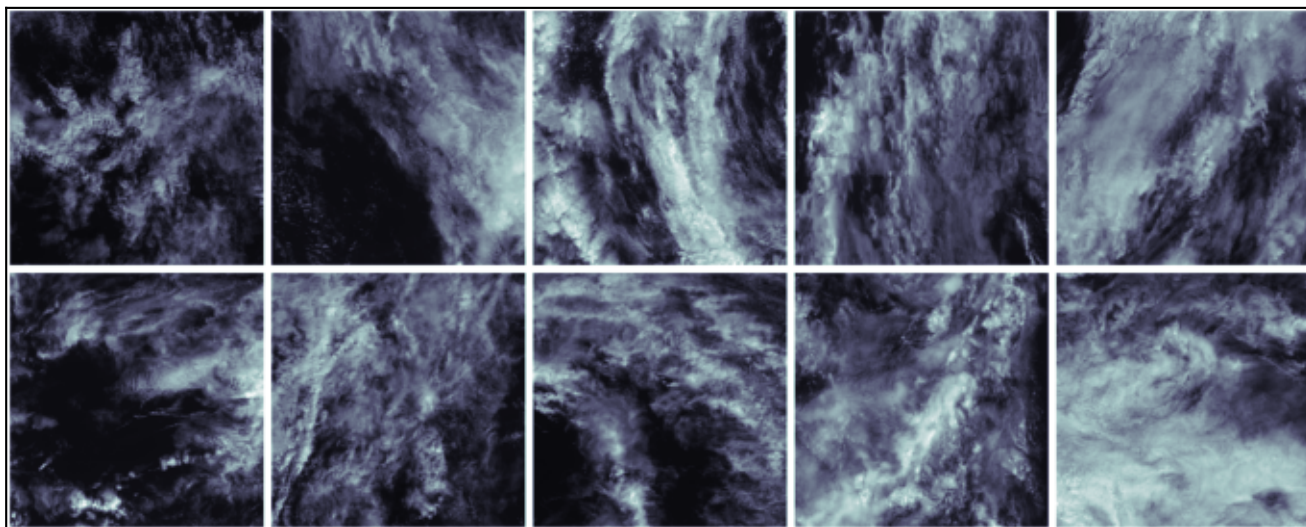


Figure S38, Cluster 38

42K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 287.0 K, Mean CTP: 896.0 hPa, Mean LWP: 39.15 gm^{-2} , Mean Nd: 134.64 cm^{-3} (for cloudy pixels)

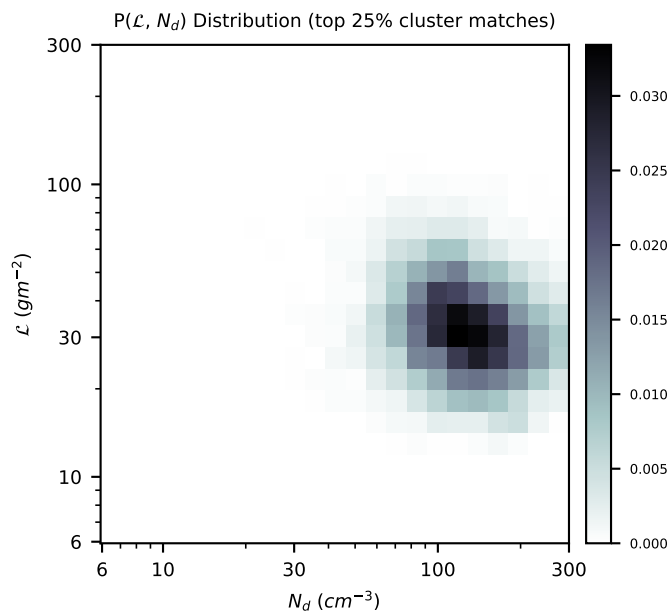
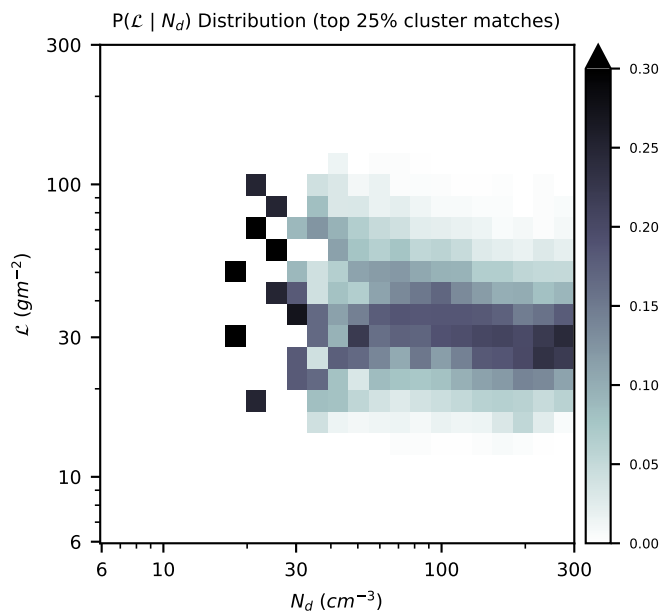
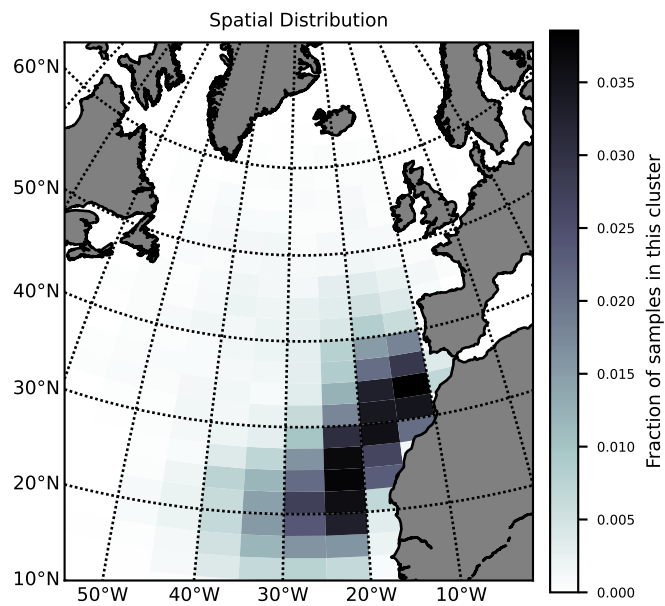
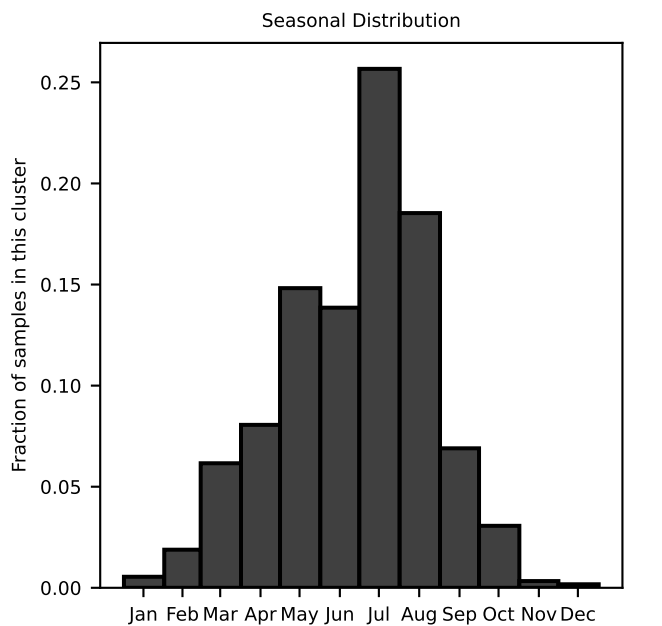
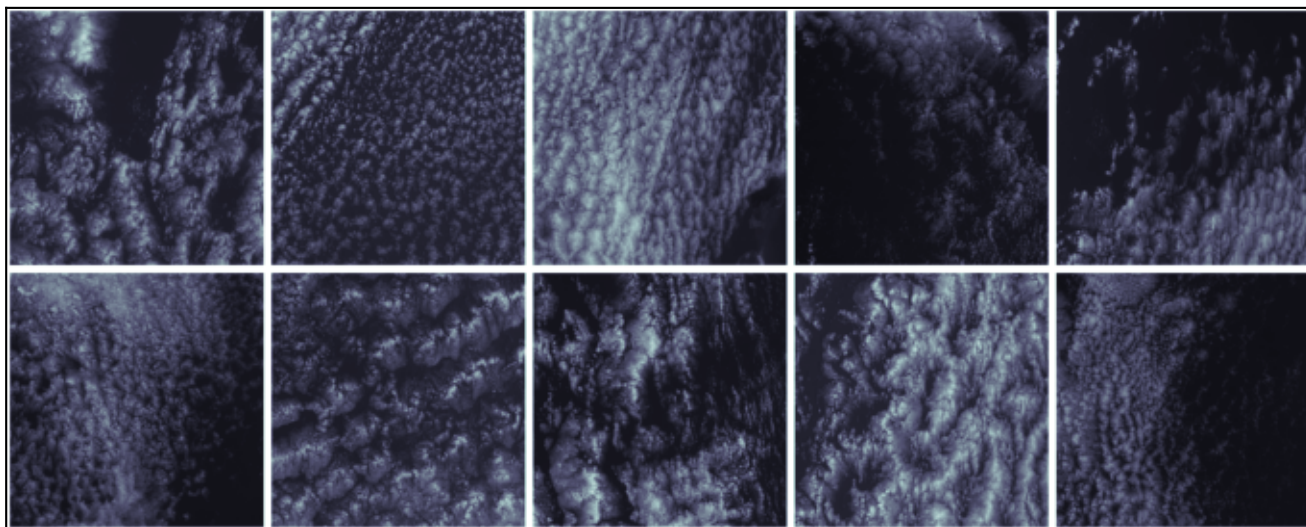
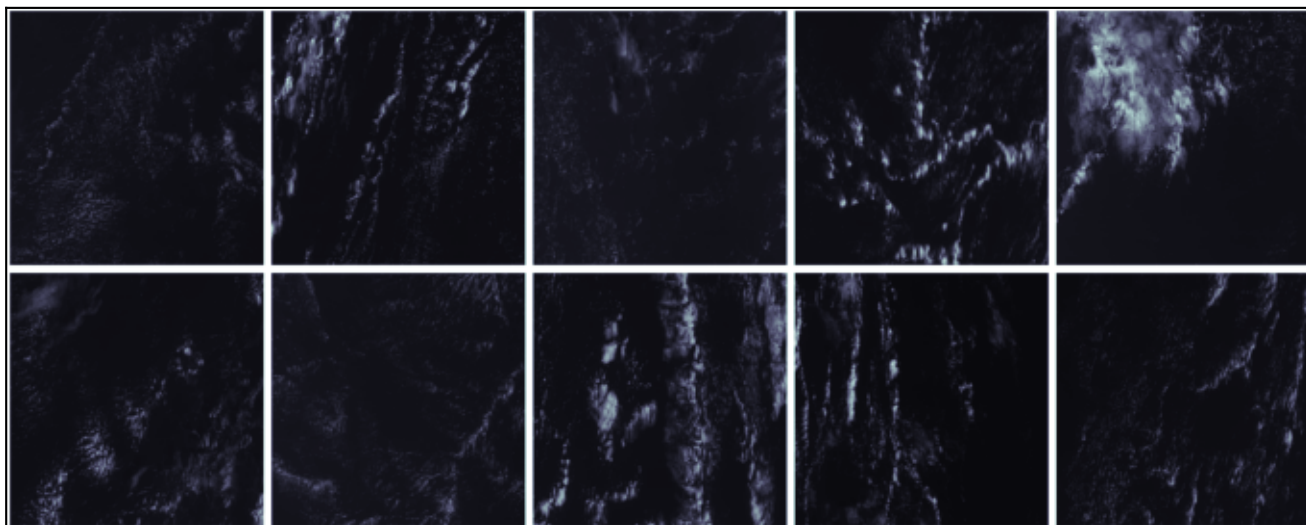


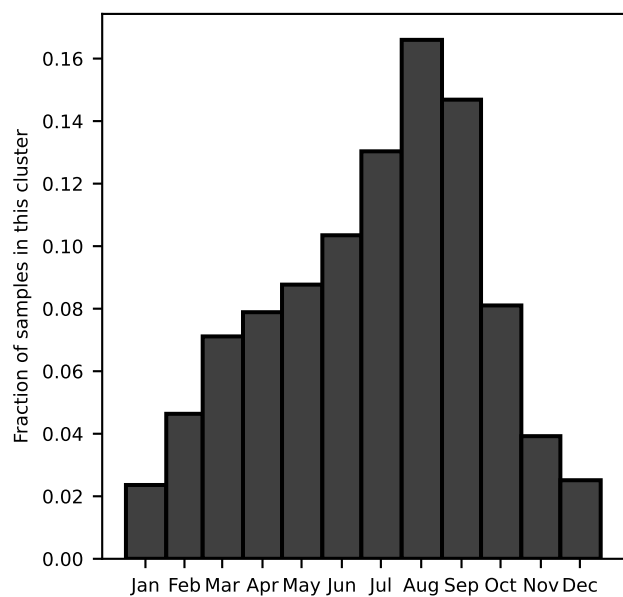
Figure S39, Cluster 39

47K out of 3.7M low cloud images and 10.8M total images

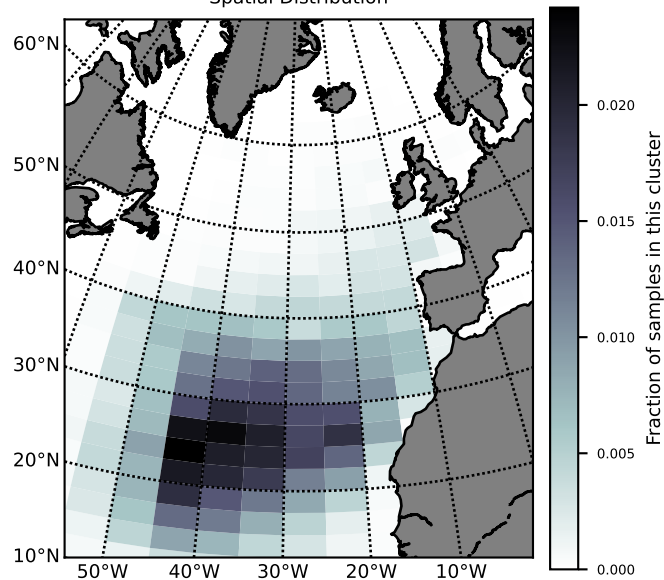
Mean CTT: 285.0 K, Mean CTP: 852.0 hPa, Mean LWP: 77.08 gm^{-2} , Mean Nd: 44.98 cm^{-3} (for cloudy pixels)



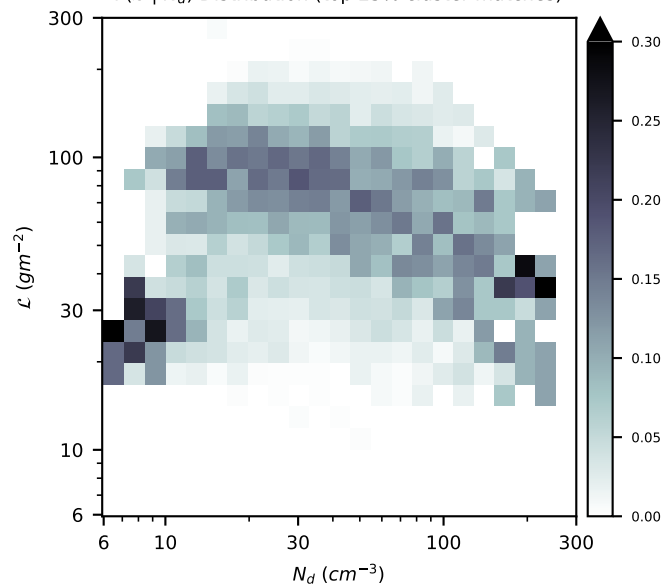
Seasonal Distribution



Spatial Distribution



$P(\mathcal{L} | N_d)$ Distribution (top 25% cluster matches)



$P(\mathcal{L}, N_d)$ Distribution (top 25% cluster matches)

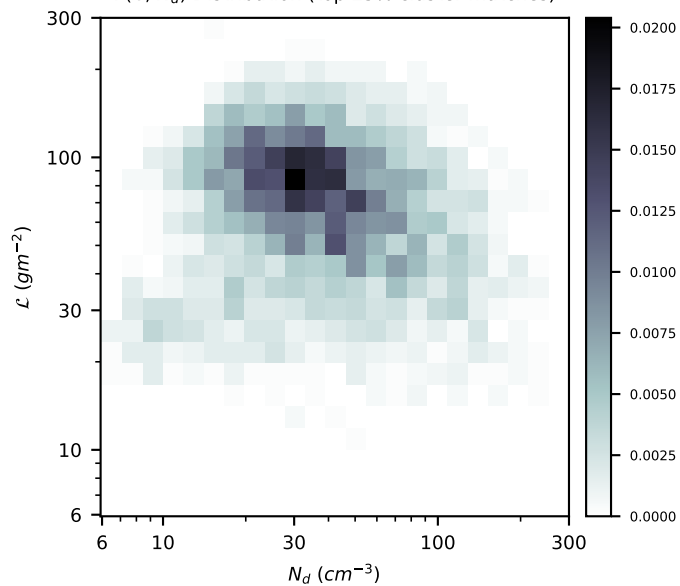


Figure S40, Cluster 40

61K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 277.0 K, Mean CTP: 886.0 hPa, Mean LWP: 153.61 gm^{-2} , Mean Nd: 66.1 cm^{-3} (for cloudy pixels)

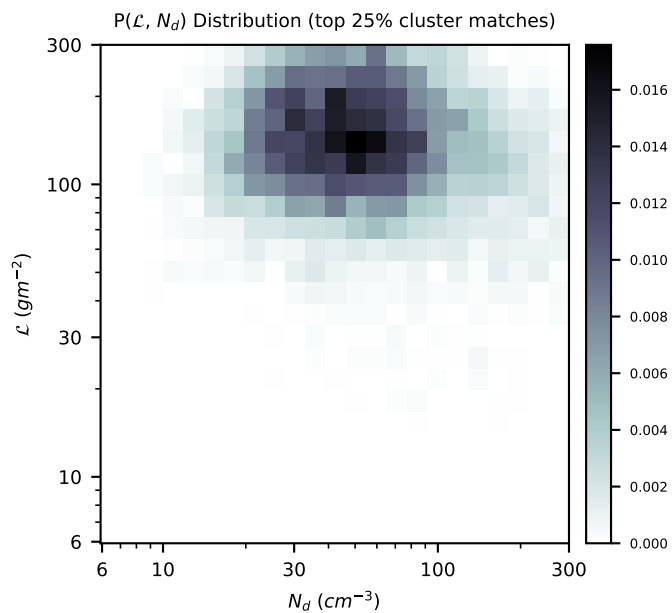
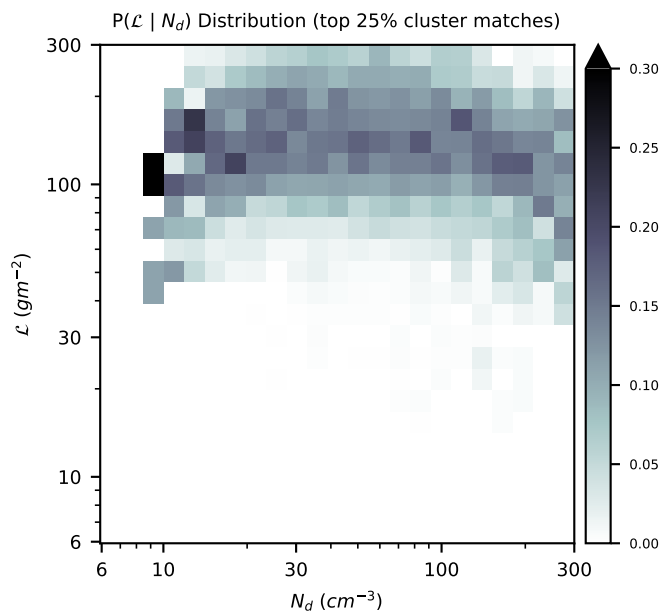
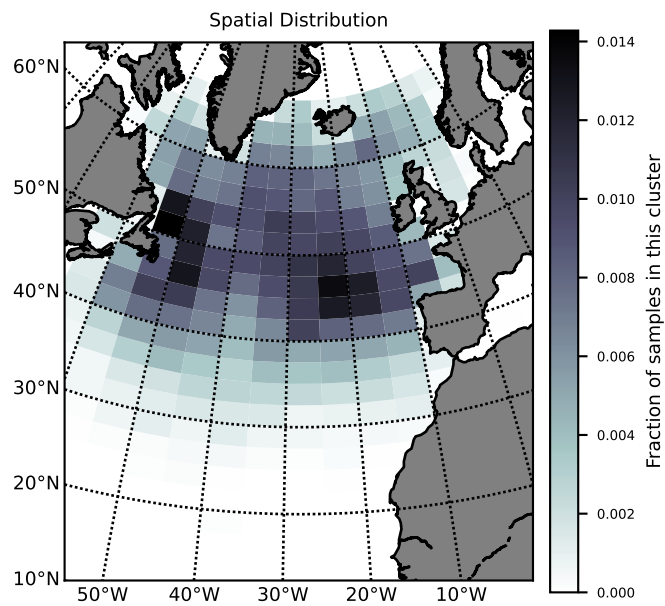
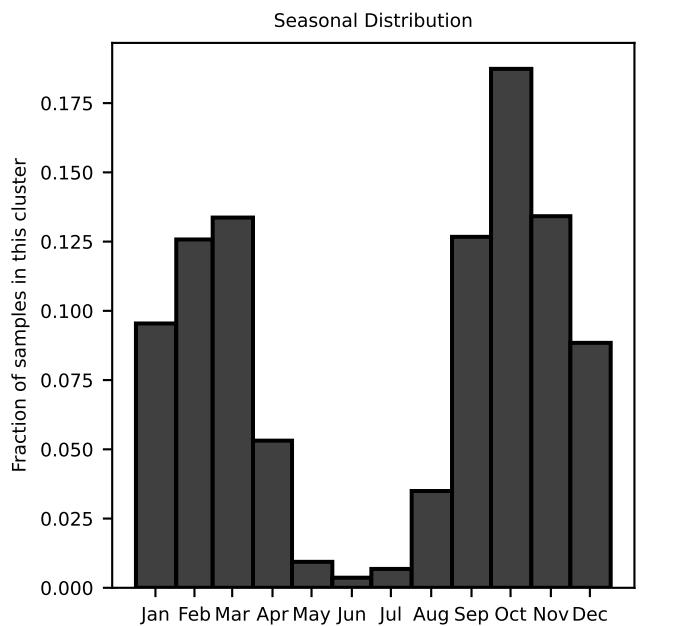
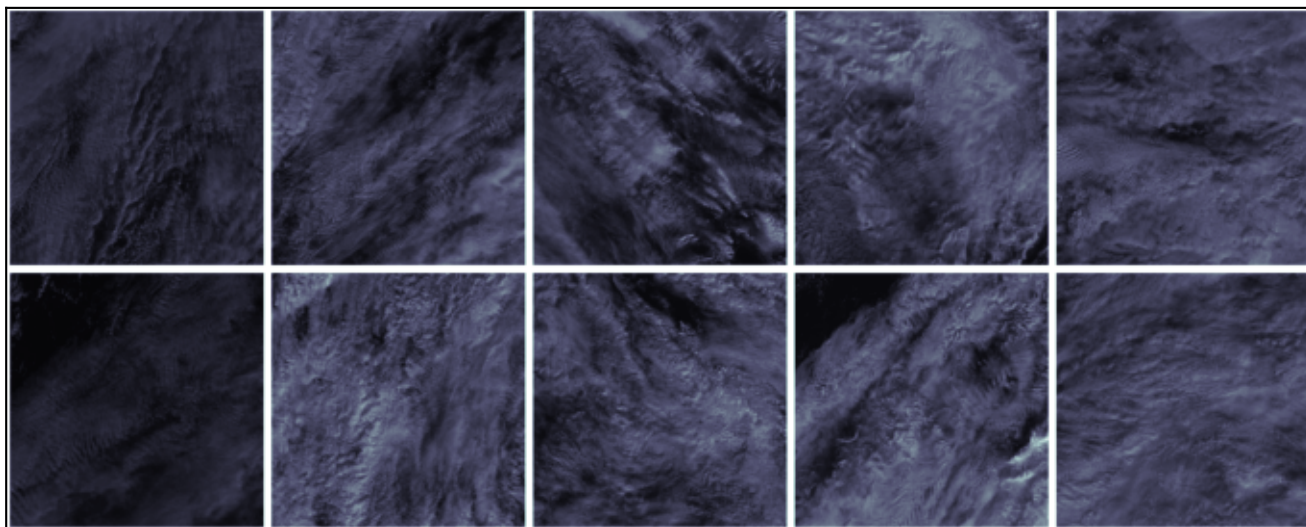


Figure S41, Cluster 41

82K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 282.0 K, Mean CTP: 893.0 hPa, Mean LWP: 61.01 gm^{-2} , Mean Nd: 88.89 cm^{-3} (for cloudy pixels)

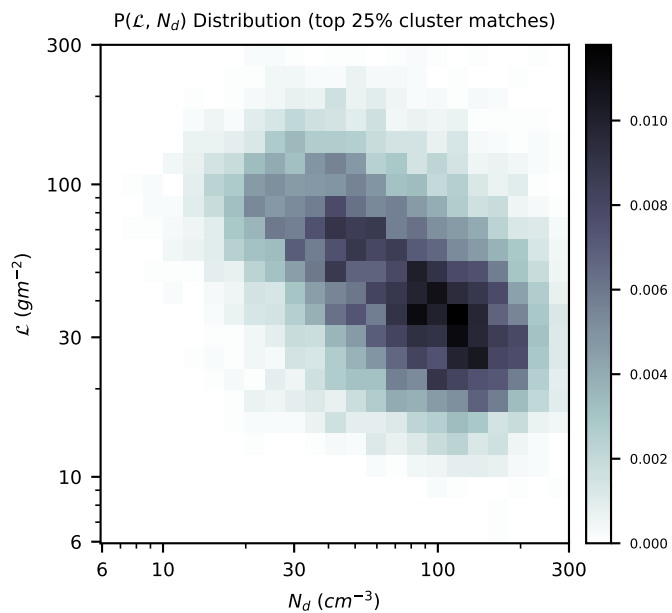
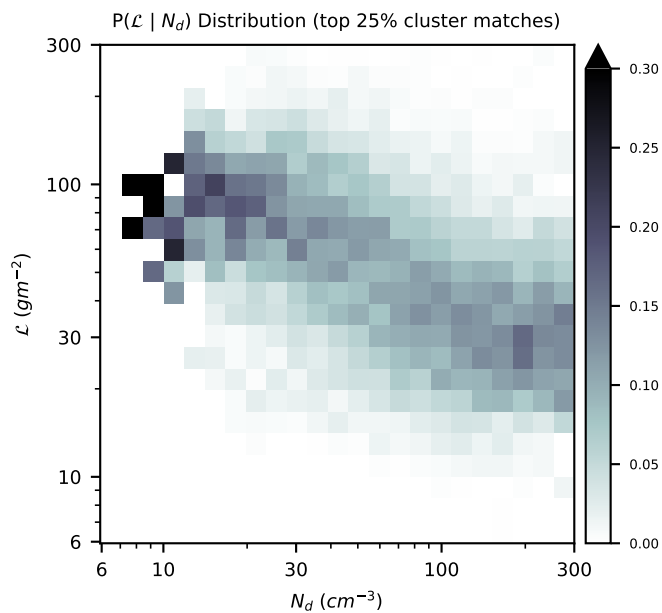
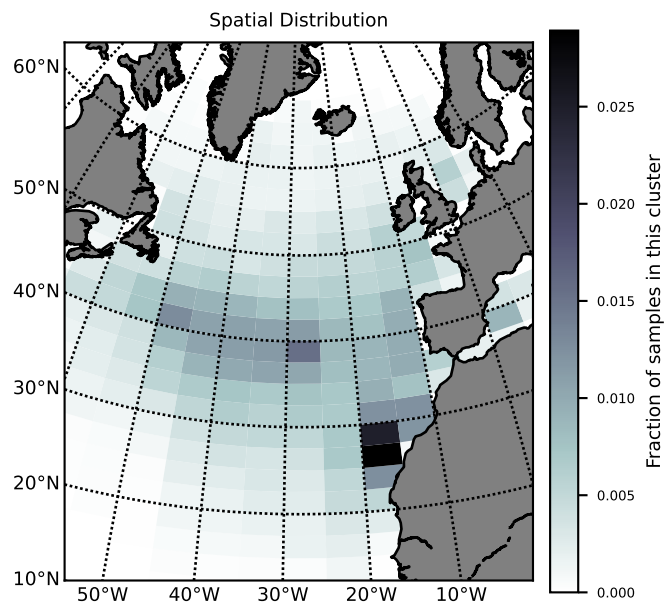
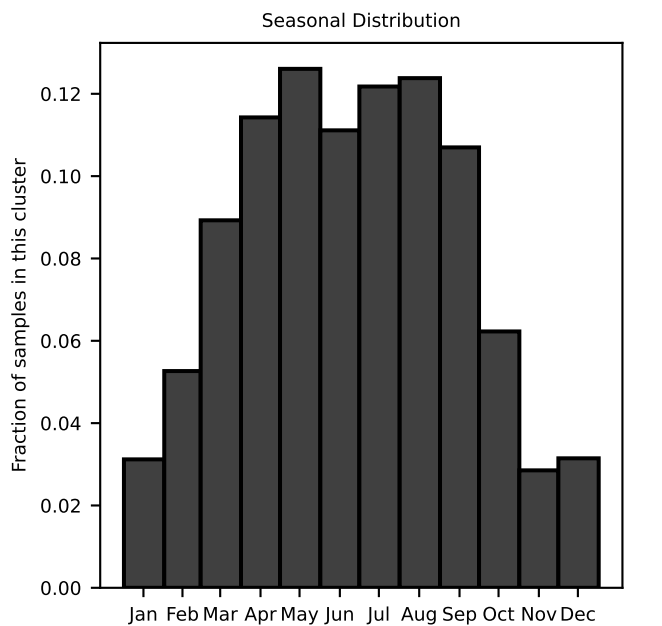
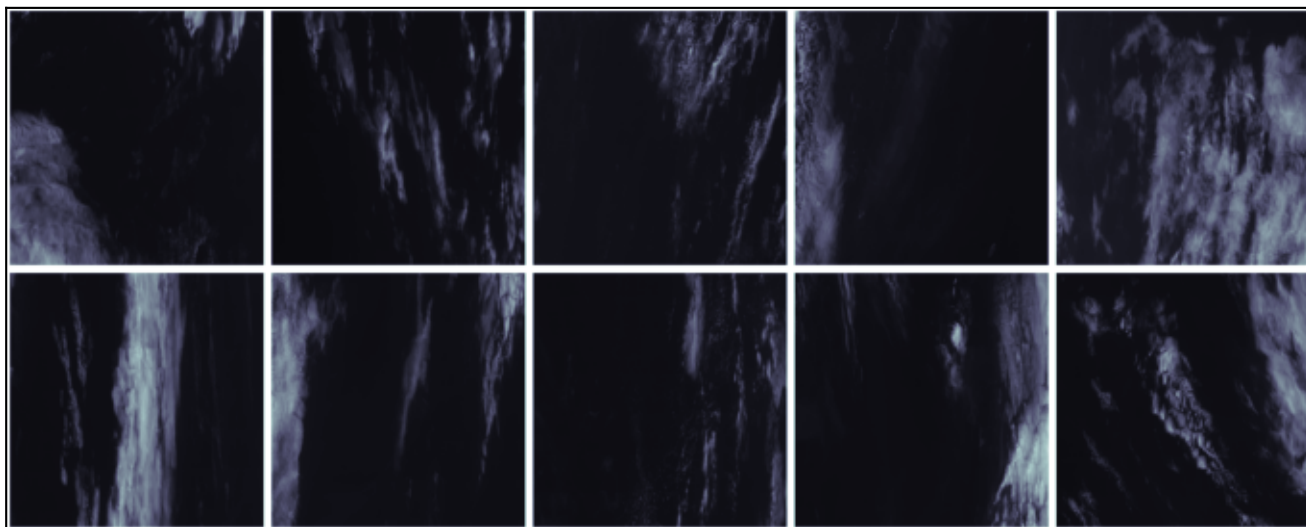


Figure S42, Cluster 42

40K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 282.0 K, Mean CTP: 837.0 hPa, Mean LWP: 74.14 gm^{-2} , Mean Nd: 117.37 cm^{-3} (for cloudy pixels)

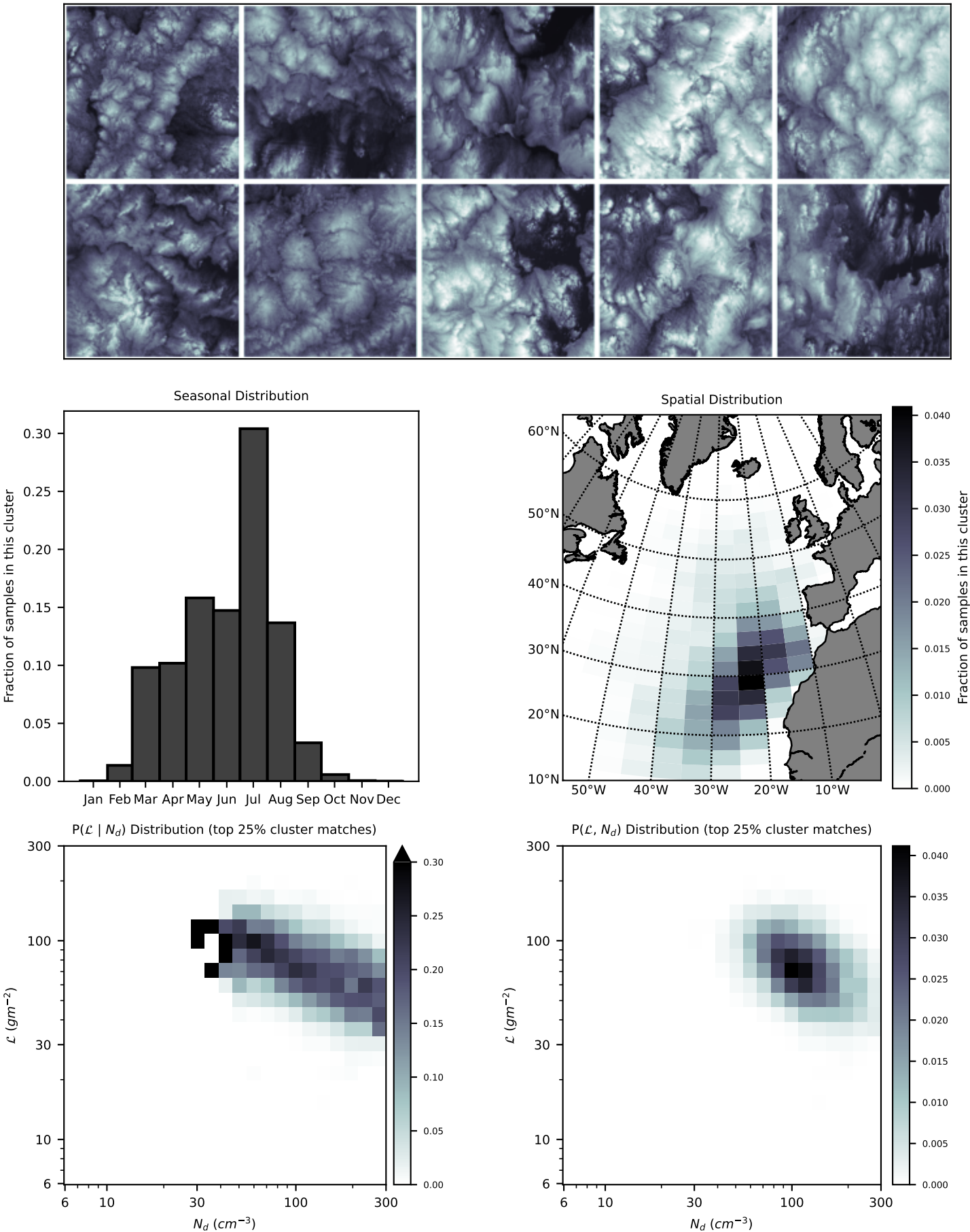


Figure S43, Cluster 43

69K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 280.0 K, Mean CTP: 926.0 hPa, Mean LWP: 52.22 gm^{-2} , Mean Nd: 116.03 cm^{-3} (for cloudy pixels)

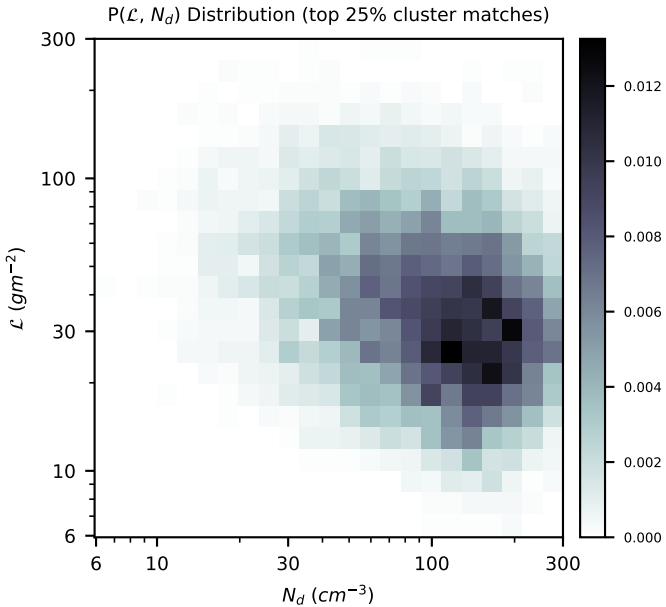
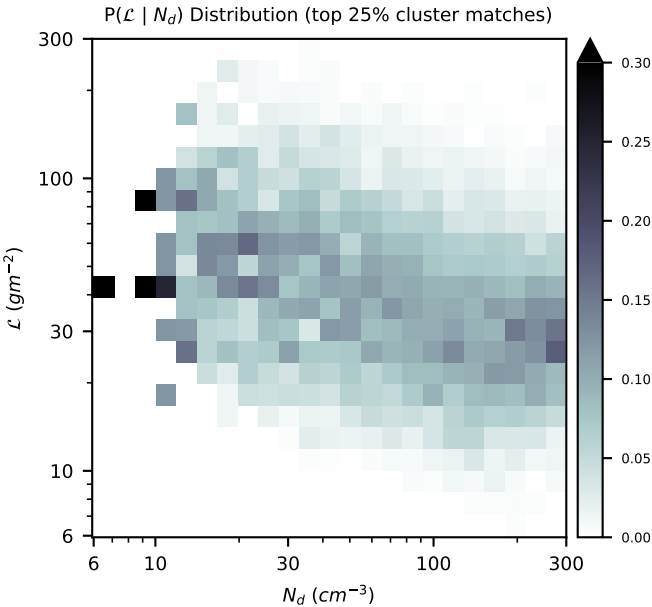
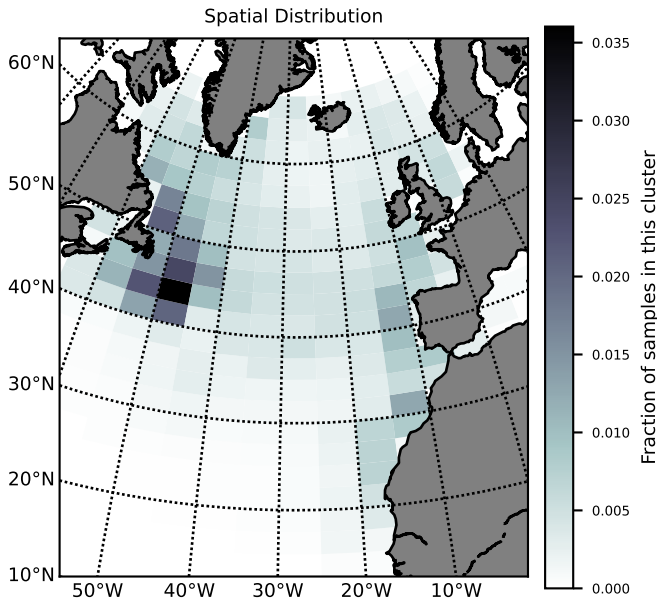
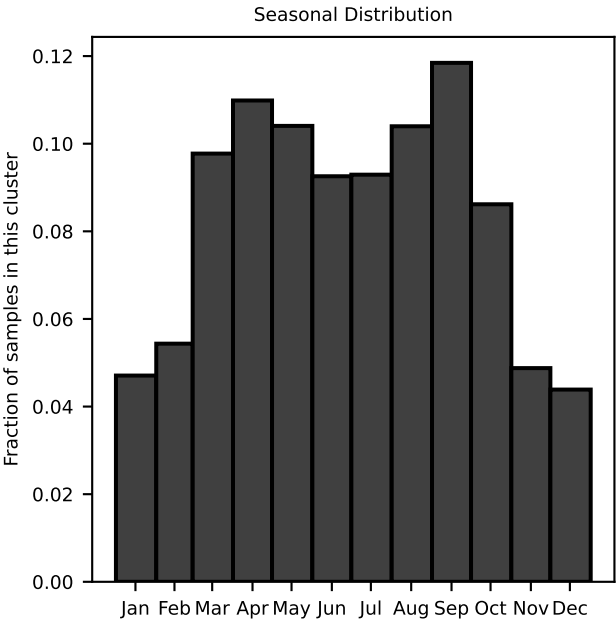
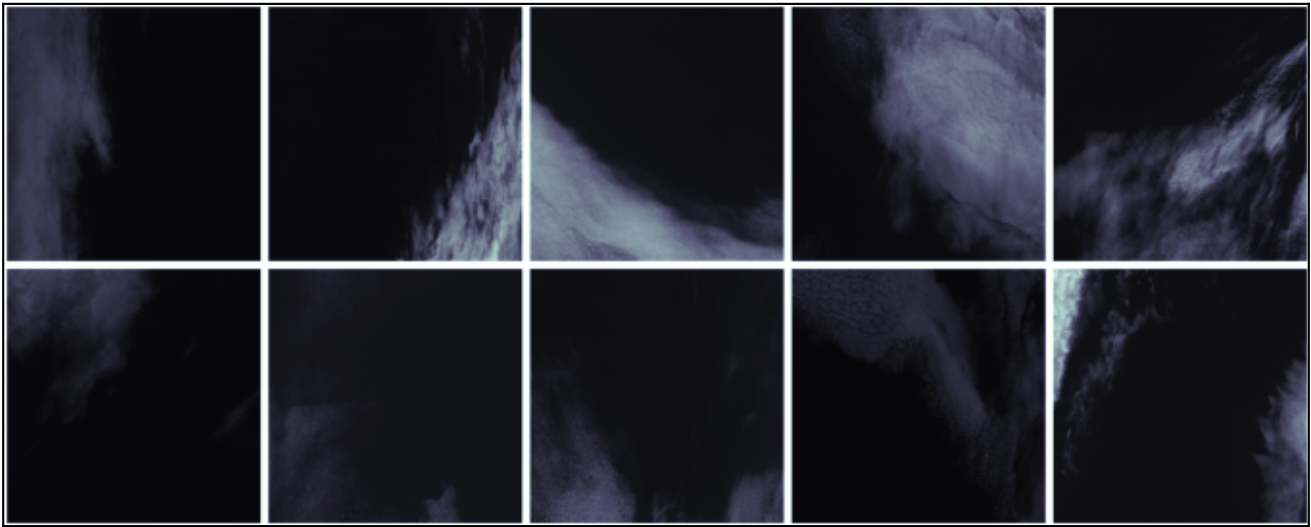


Figure S44, Cluster 44

57K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 282.0 K, Mean CTP: 811.0 hPa, Mean LWP: 121.52 gm^{-2} , Mean Nd: 19.15 cm^{-3} (for cloudy pixels)

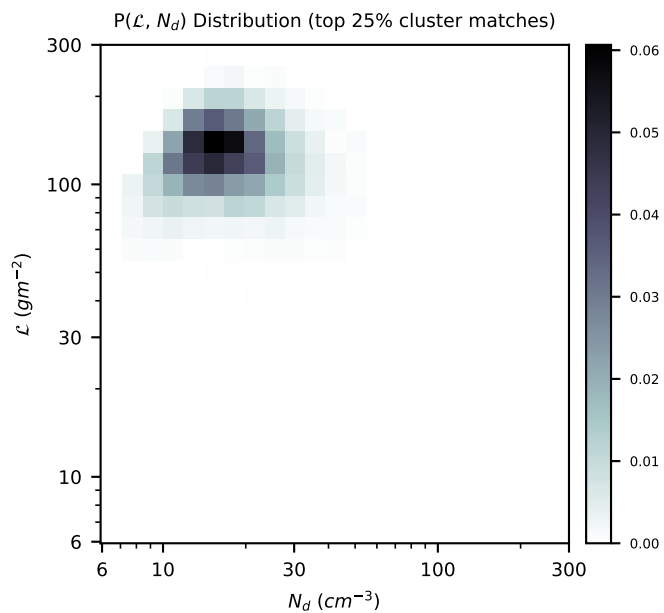
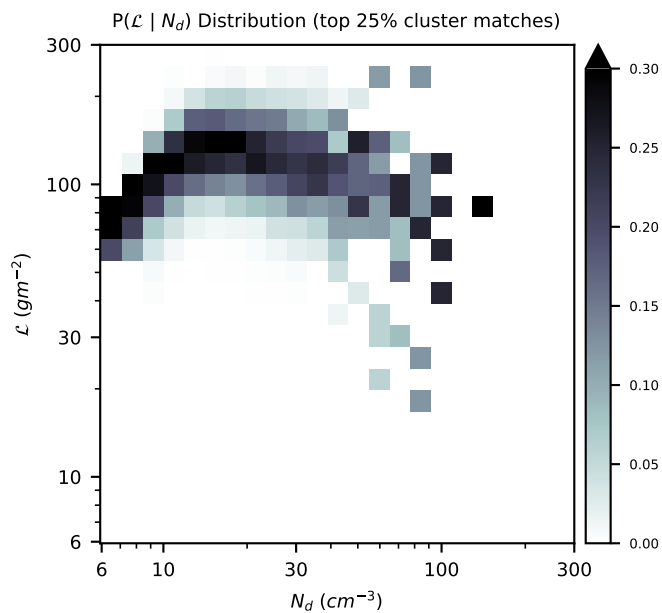
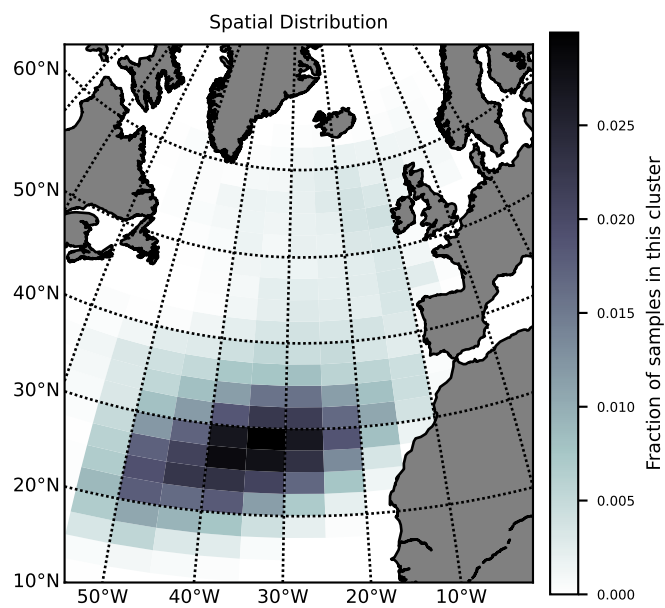
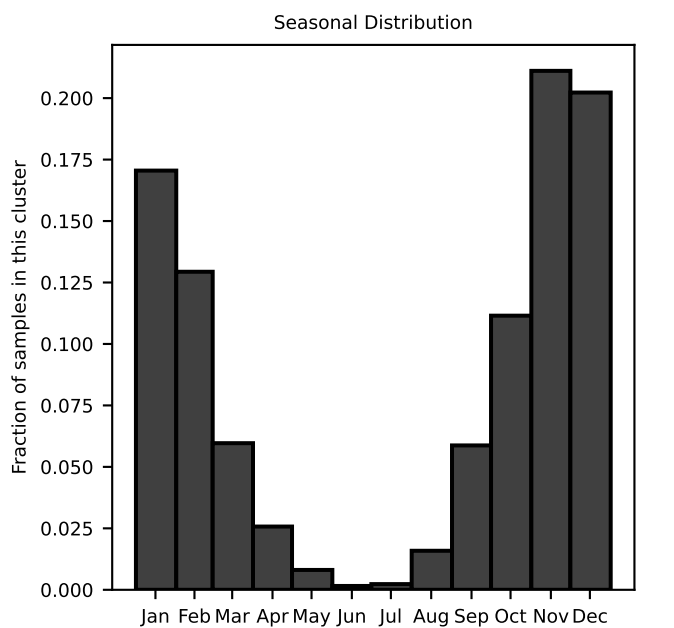
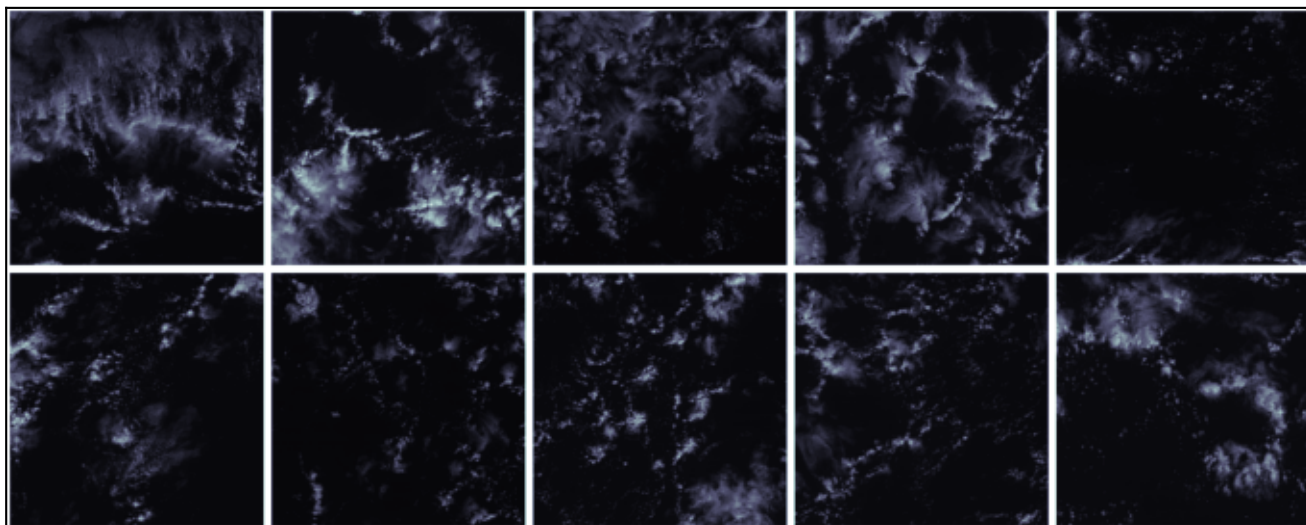


Figure S45, Cluster 45

37K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 276.0 K, Mean CTP: 837.0 hPa, Mean LWP: 138.78 gm^{-2} , Mean Nd: 68.6 cm^{-3} (for cloudy pixels)

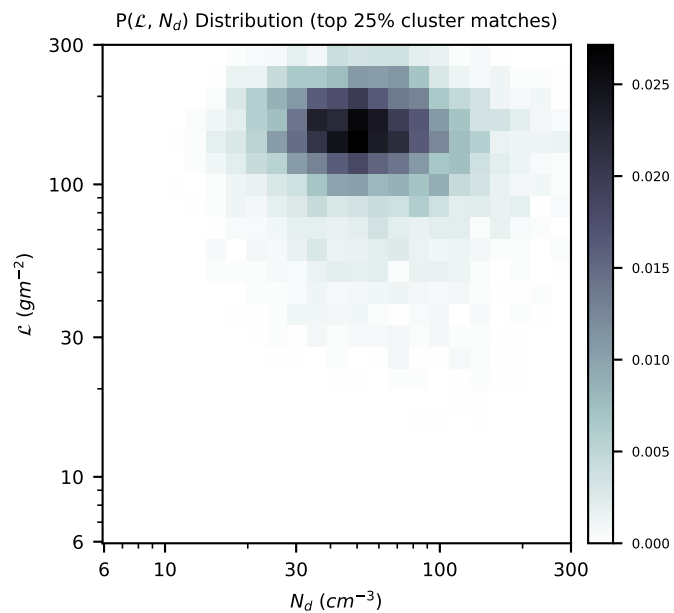
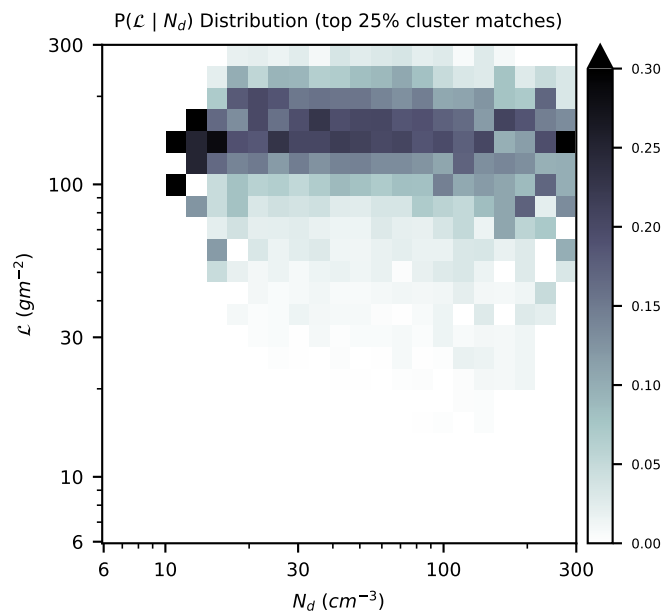
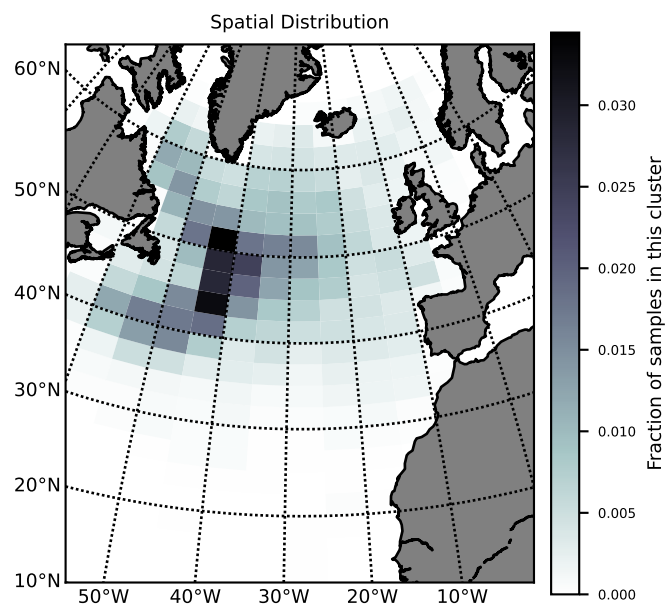
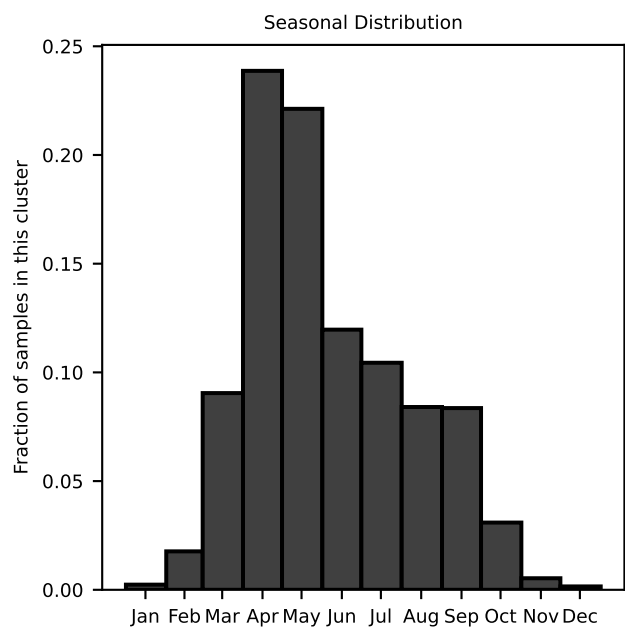
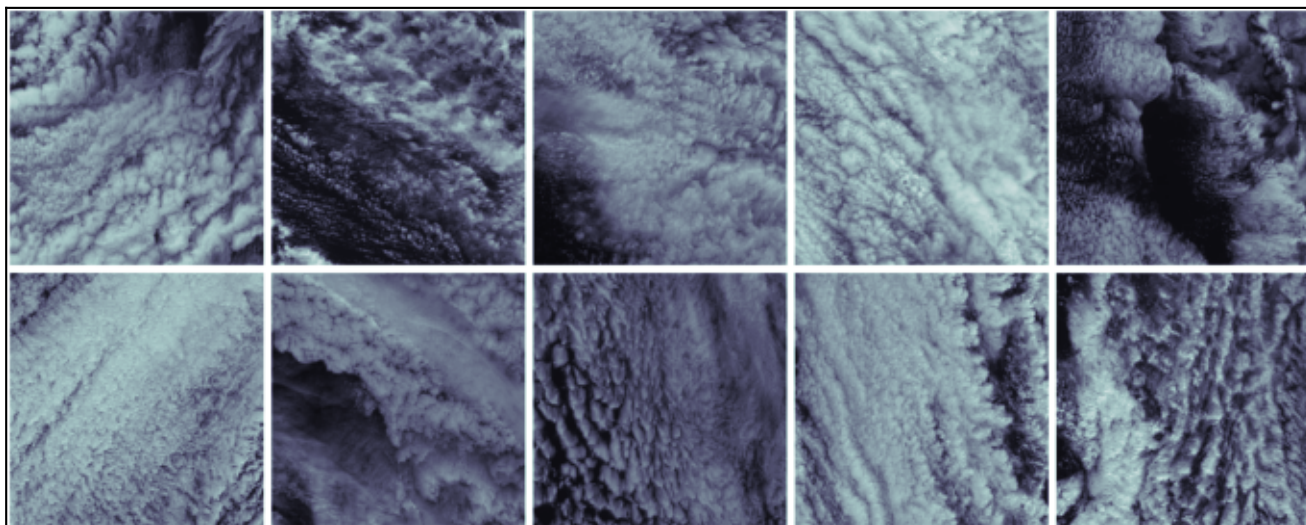


Figure S46, Cluster 46

51K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 278.0 K, Mean CTP: 799.0 hPa, Mean LWP: 108.39 gm^{-2} , Mean Nd: 56.67 cm^{-3} (for cloudy pixels)

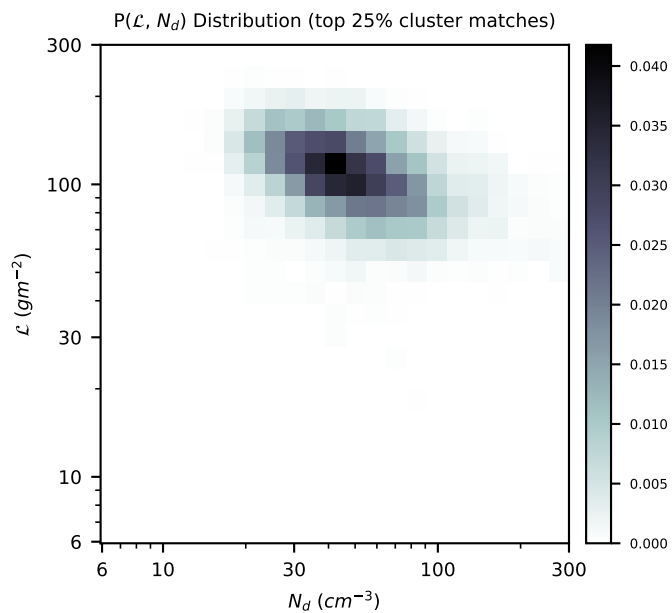
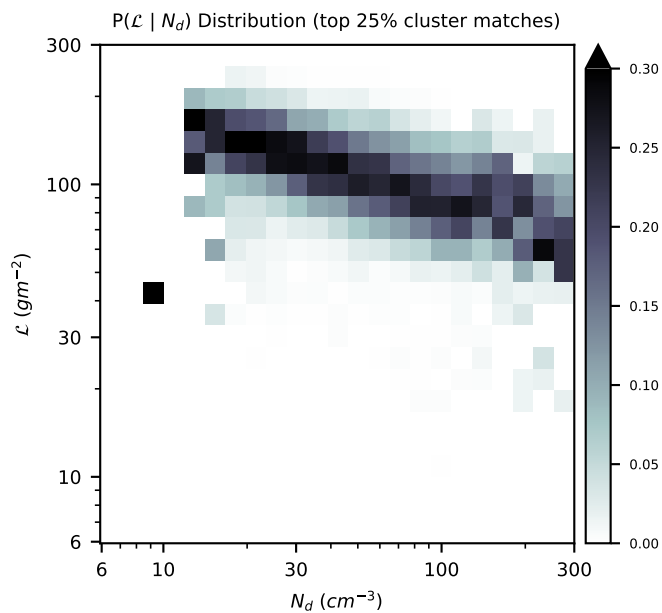
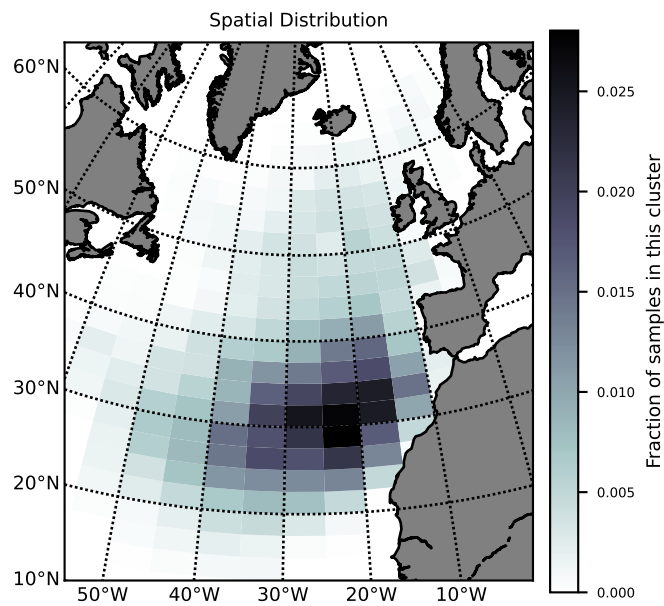
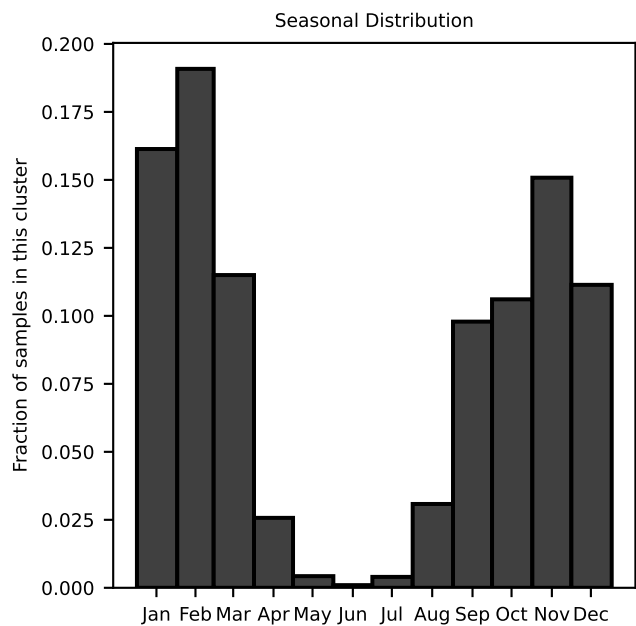
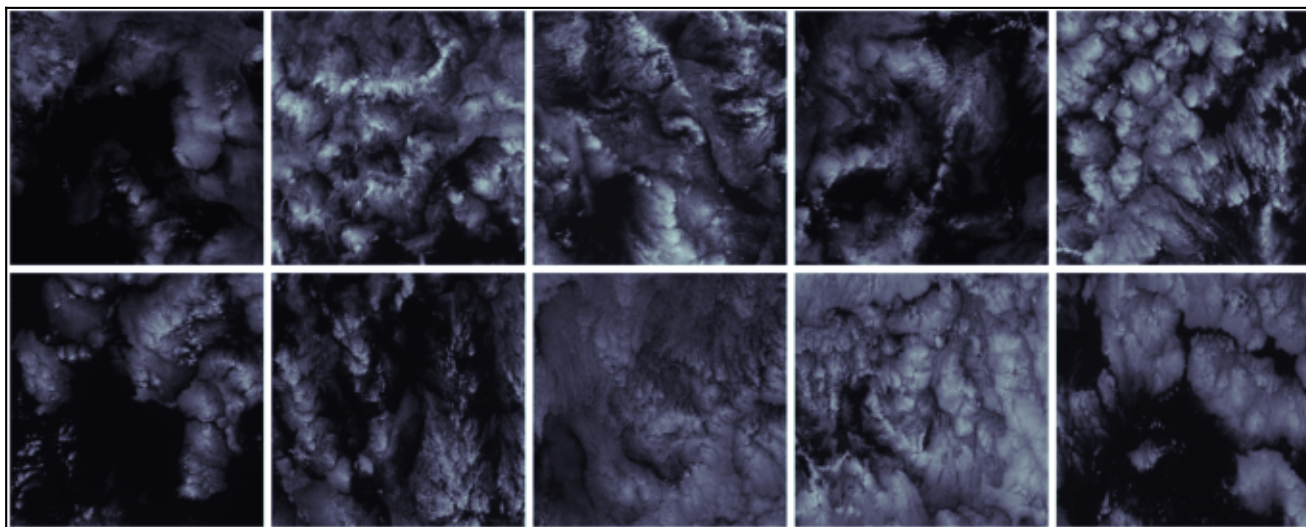


Figure S47, Cluster 47

67K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 280.0 K, Mean CTP: 814.0 hPa, Mean LWP: 114.21 gm^{-2} , Mean Nd: 21.73 cm^{-3} (for cloudy pixels)

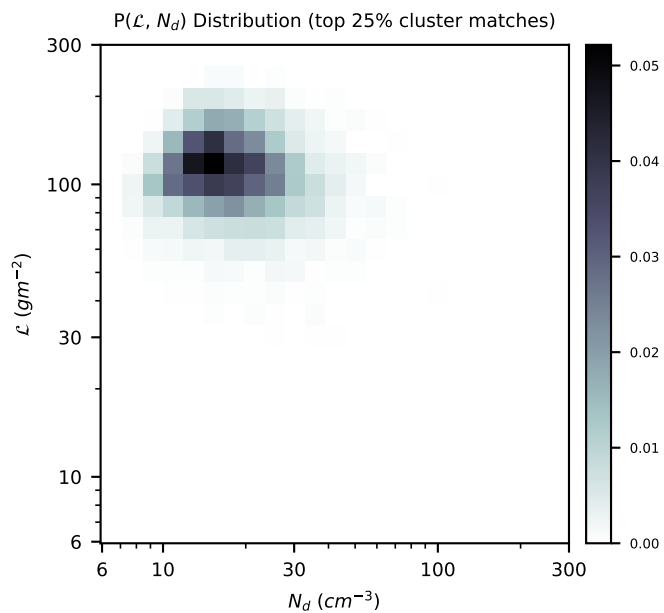
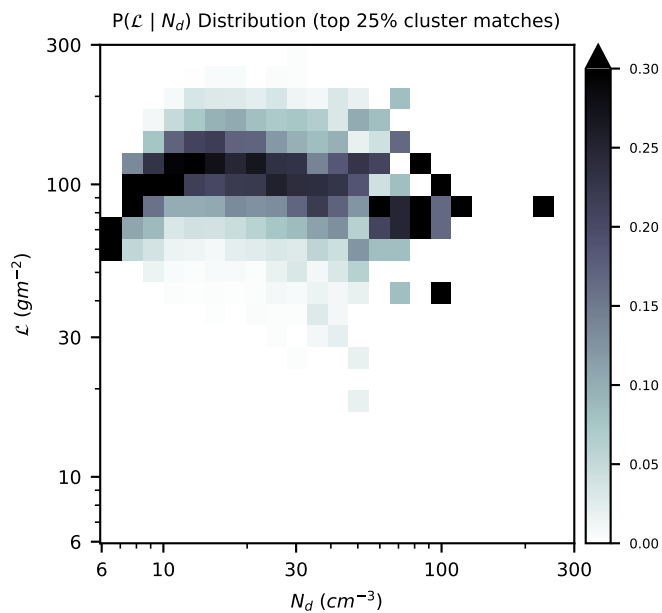
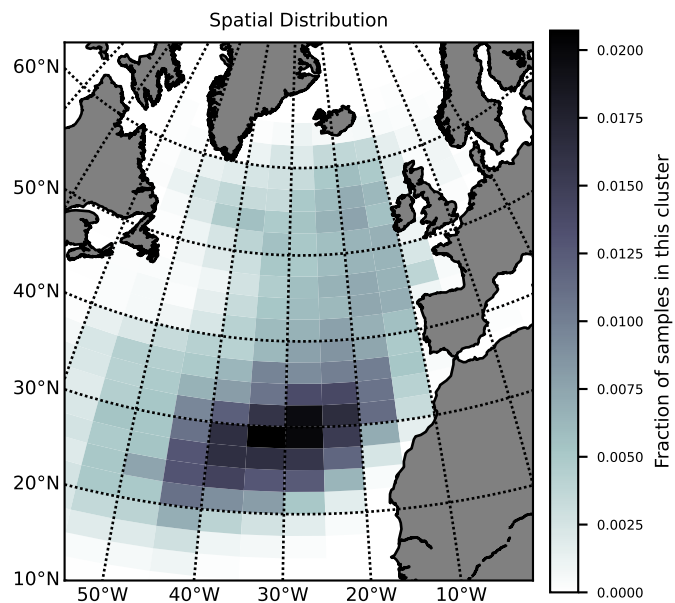
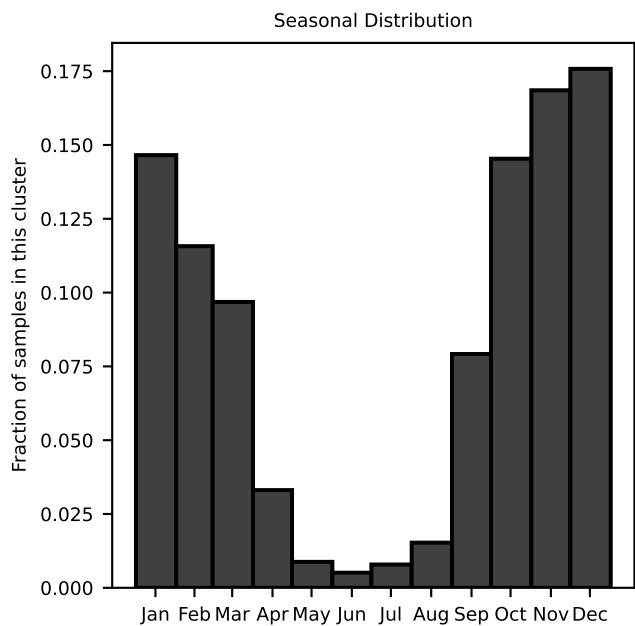
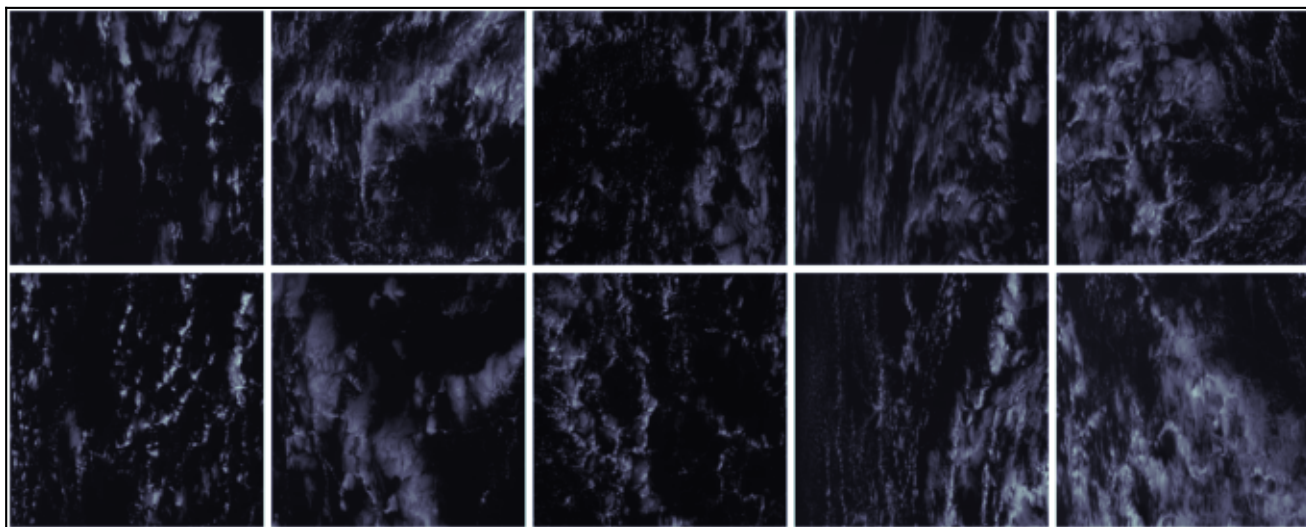


Figure S48, Cluster 48

53K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 279.0 K, Mean CTP: 952.0 hPa, Mean LWP: 73.68 gm^{-2} , Mean Nd: 119.17 cm^{-3} (for cloudy pixels)

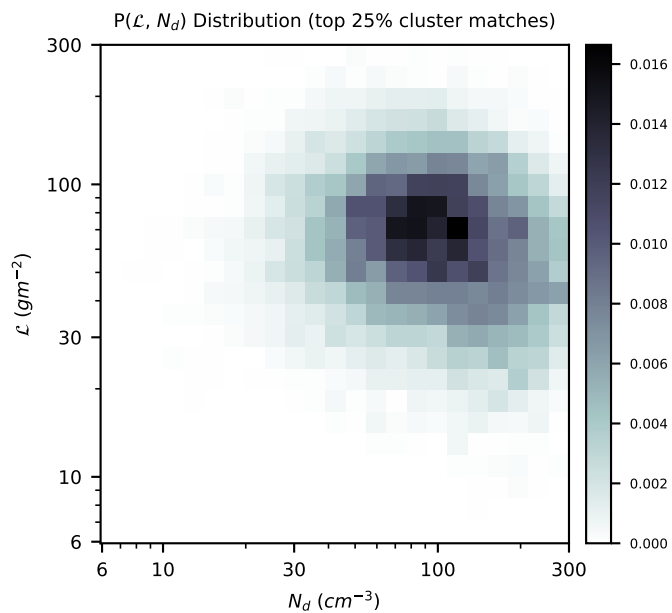
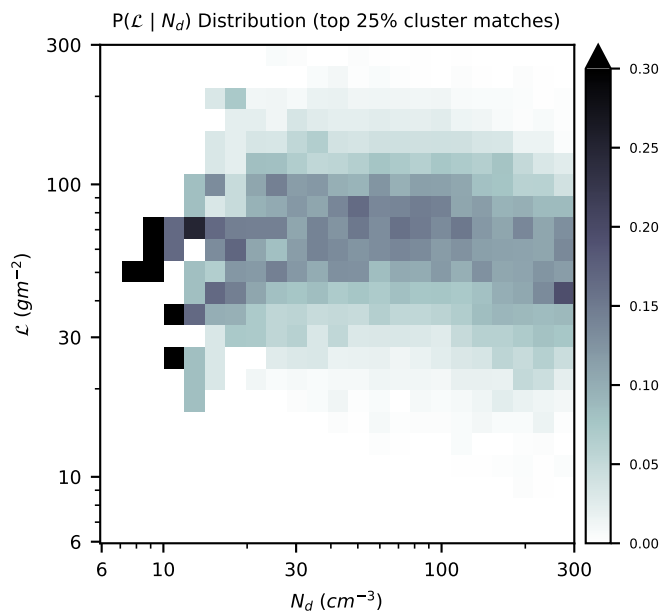
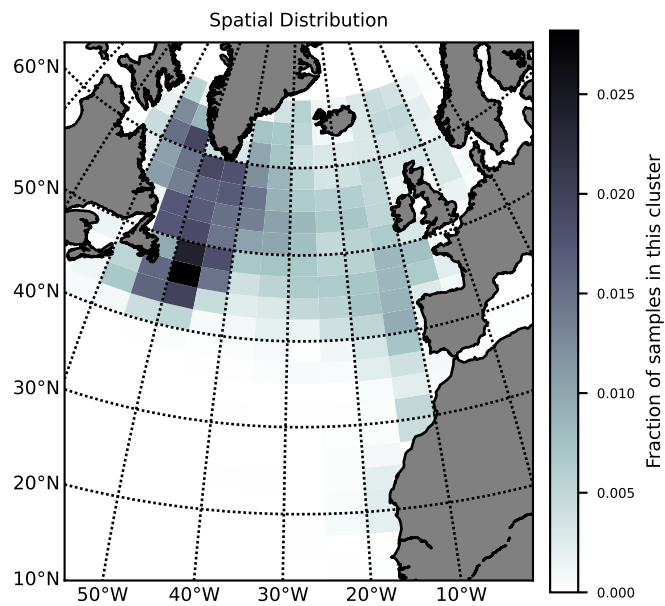
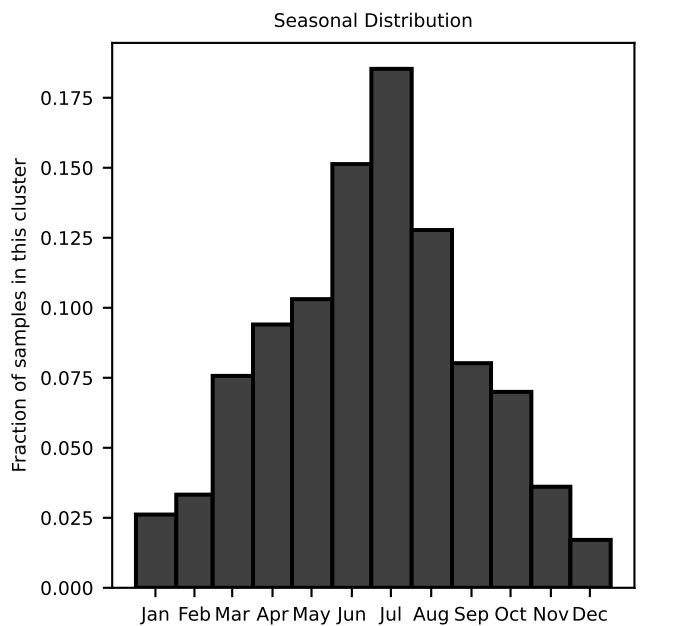
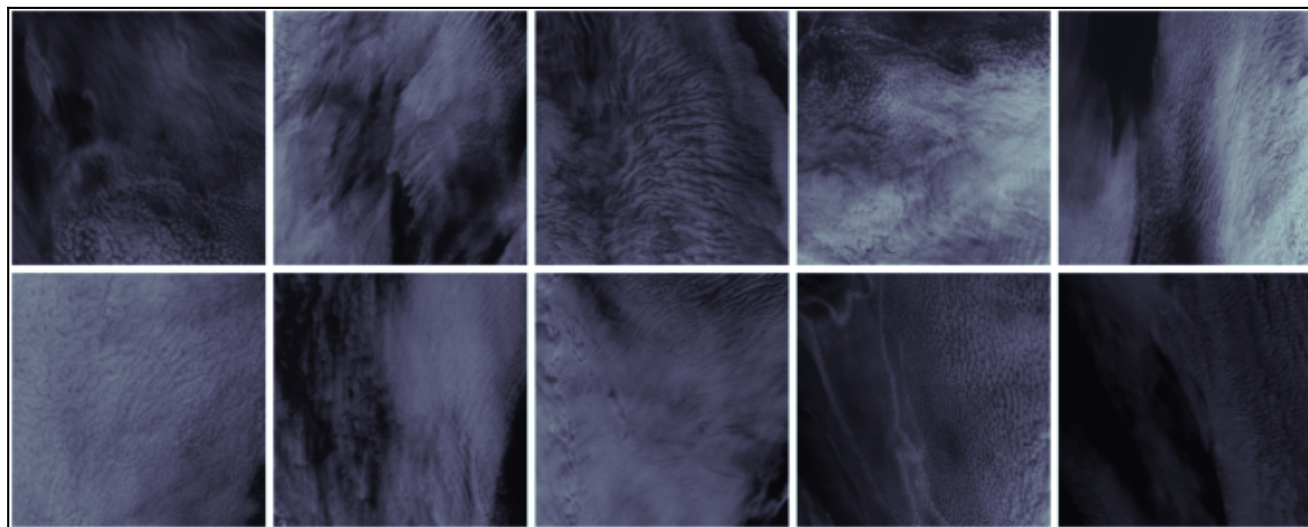
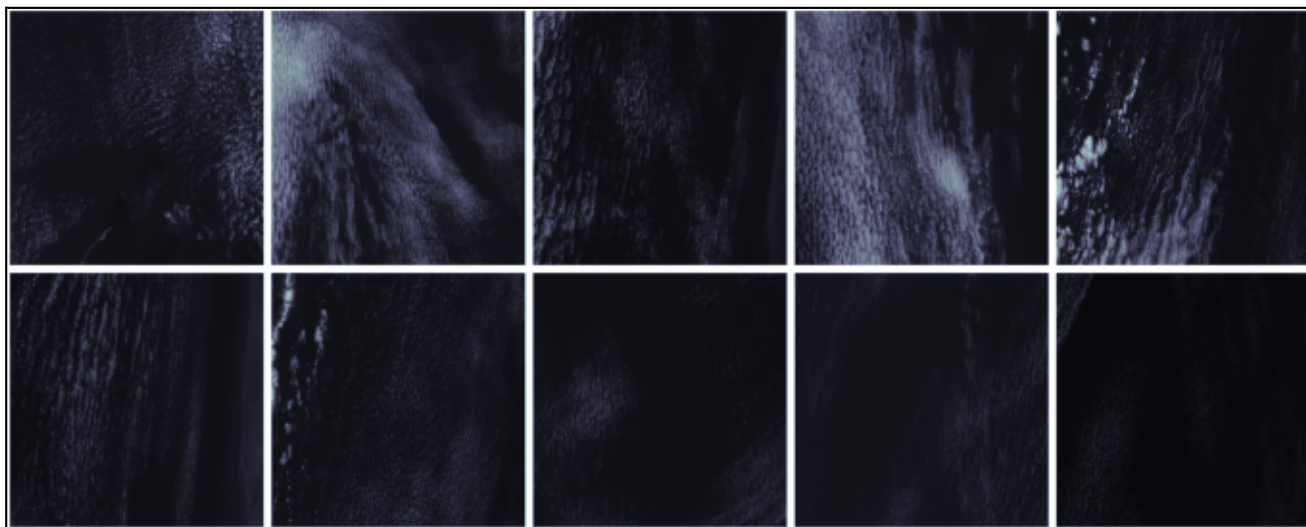


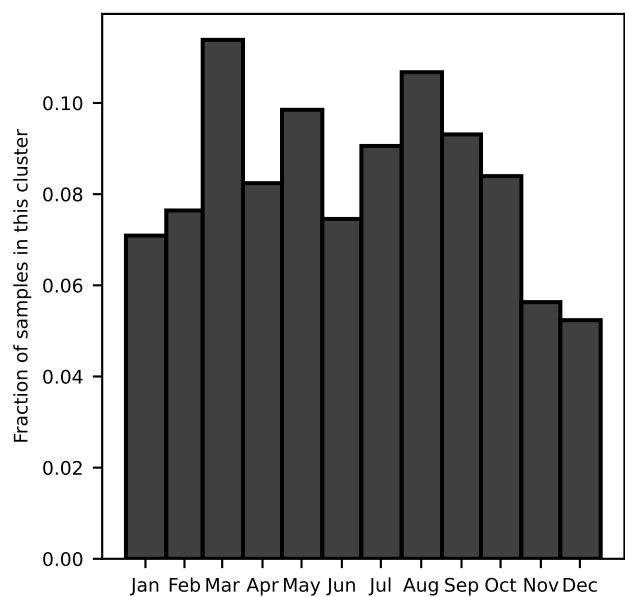
Figure S49, Cluster 49

51K out of 3.7M low cloud images and 10.8M total images

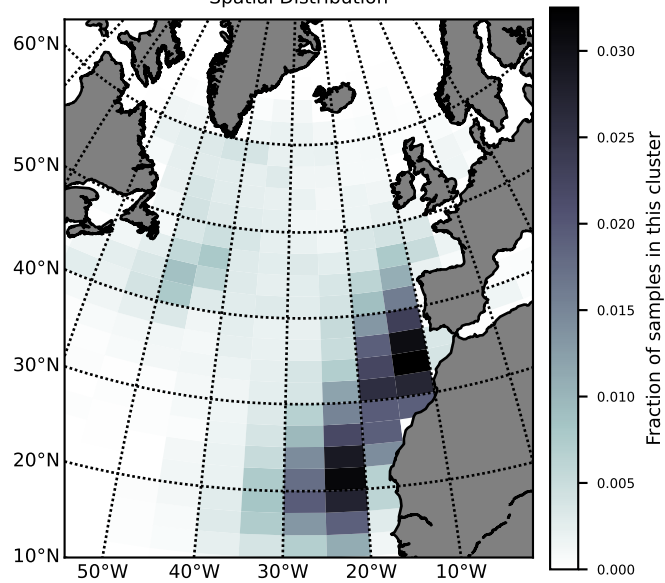
Mean CTT: 286.0 K, Mean CTP: 917.0 hPa, Mean LWP: 33.48 gm^{-2} , Mean Nd: 106.4 cm^{-3} (for cloudy pixels)



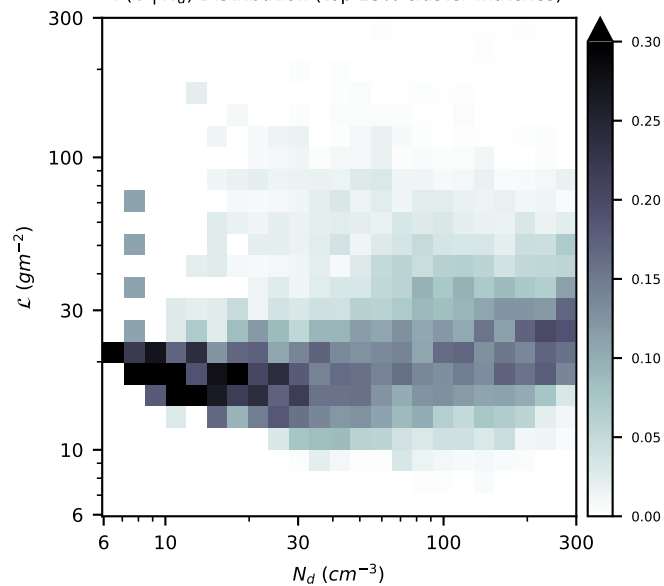
Seasonal Distribution



Spatial Distribution



$P(\mathcal{L} | N_d)$ Distribution (top 25% cluster matches)



$P(\mathcal{L}, N_d)$ Distribution (top 25% cluster matches)

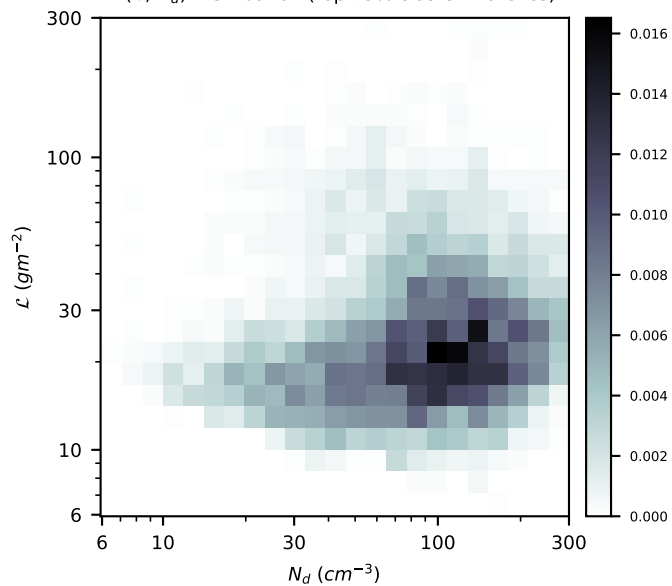


Figure S50, Cluster 50

63K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 288.0 K, Mean CTP: 894.0 hPa, Mean LWP: 47.09 gm^{-2} , Mean Nd: 54.19 cm^{-3} (for cloudy pixels)

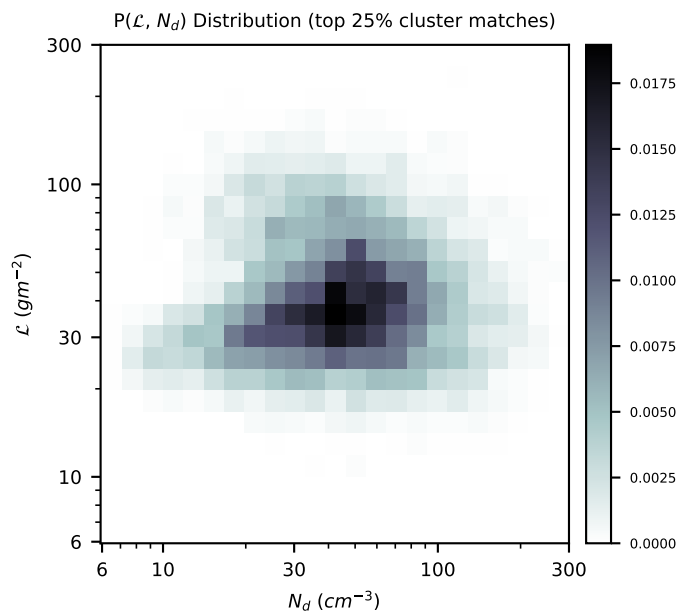
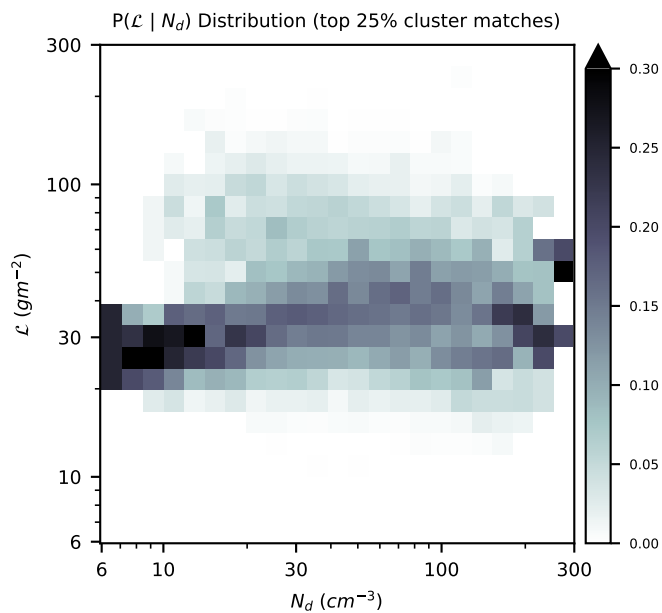
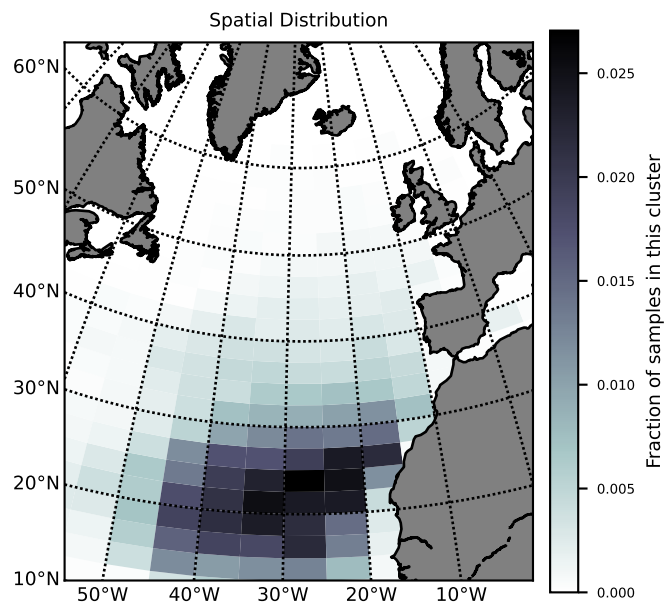
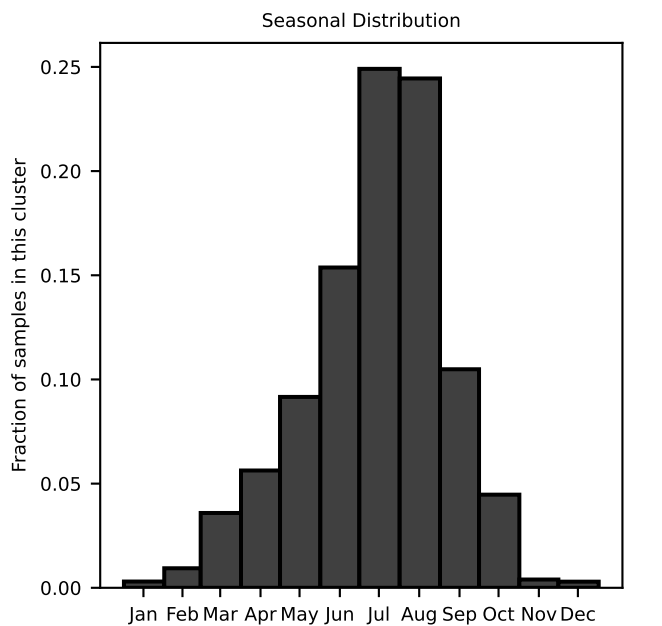
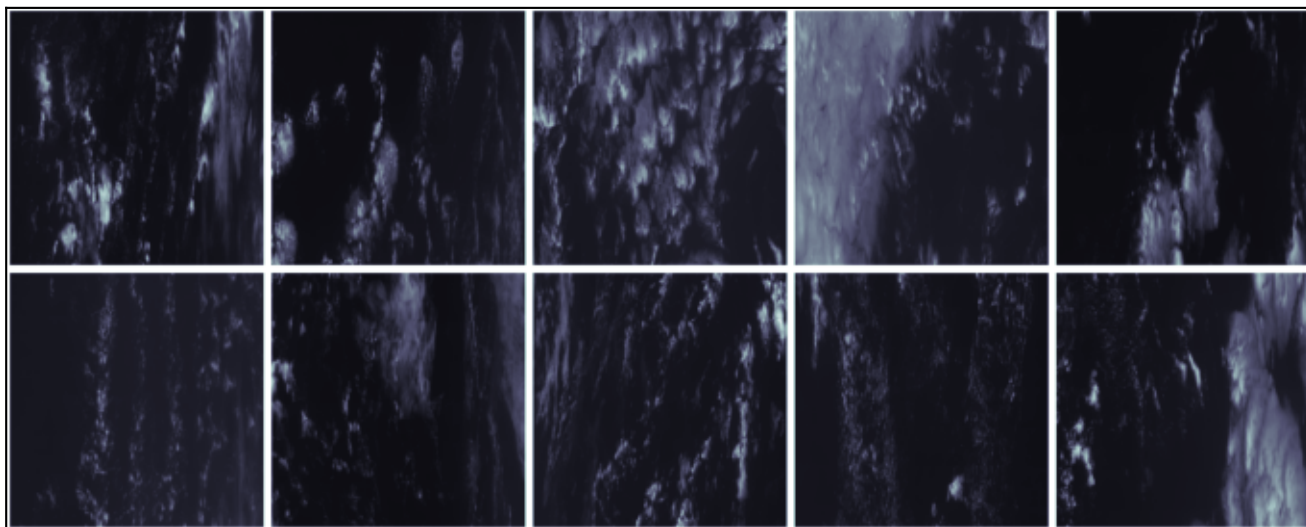
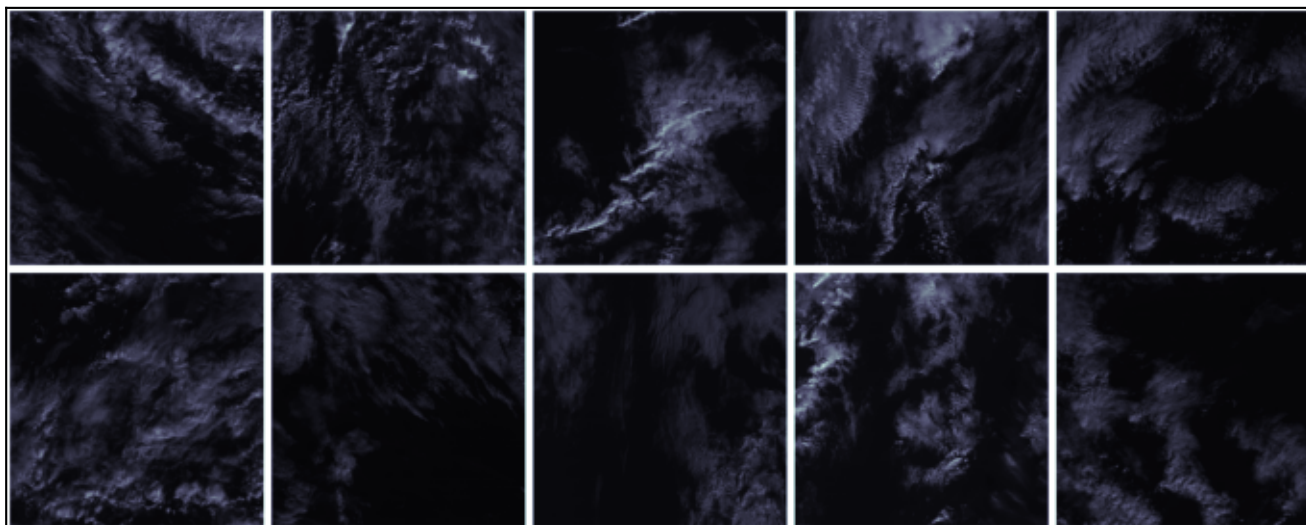


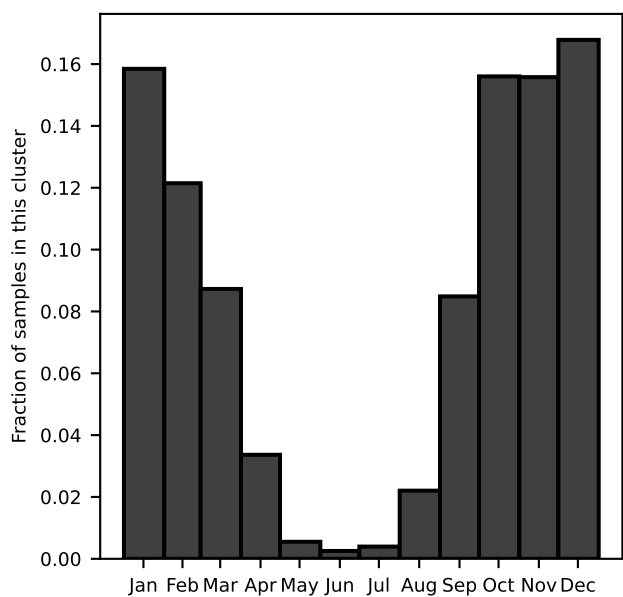
Figure S51, Cluster 51

65K out of 3.7M low cloud images and 10.8M total images

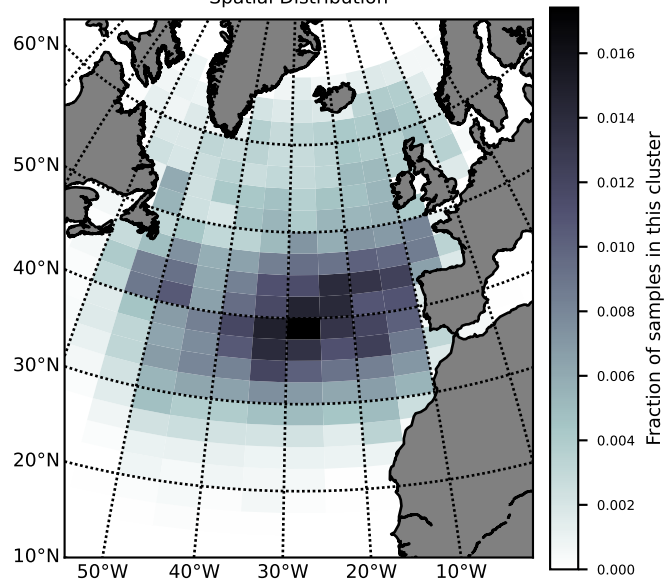
Mean CTT: 280.0 K, Mean CTP: 877.0 hPa, Mean LWP: 85.43 gm^{-2} , Mean Nd: 50.04 cm^{-3} (for cloudy pixels)



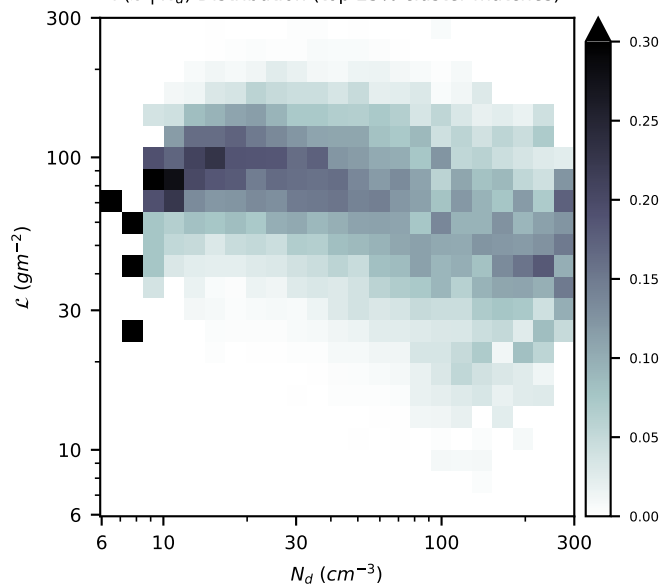
Seasonal Distribution



Spatial Distribution



$P(\mathcal{L} | N_d)$ Distribution (top 25% cluster matches)



$P(\mathcal{L}, N_d)$ Distribution (top 25% cluster matches)

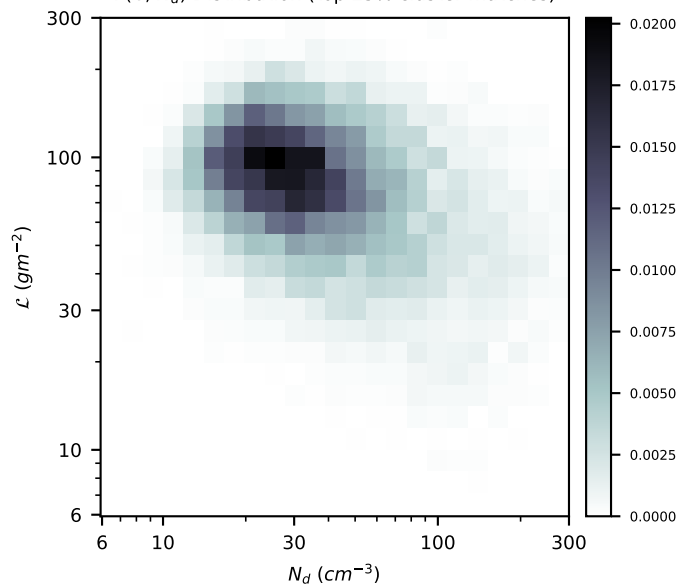


Figure S52, Cluster 52

104K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 278.0 K, Mean CTP: 912.0 hPa, Mean LWP: 116.34 gm^{-2} , Mean Nd: 88.55 cm^{-3} (for cloudy pixels)

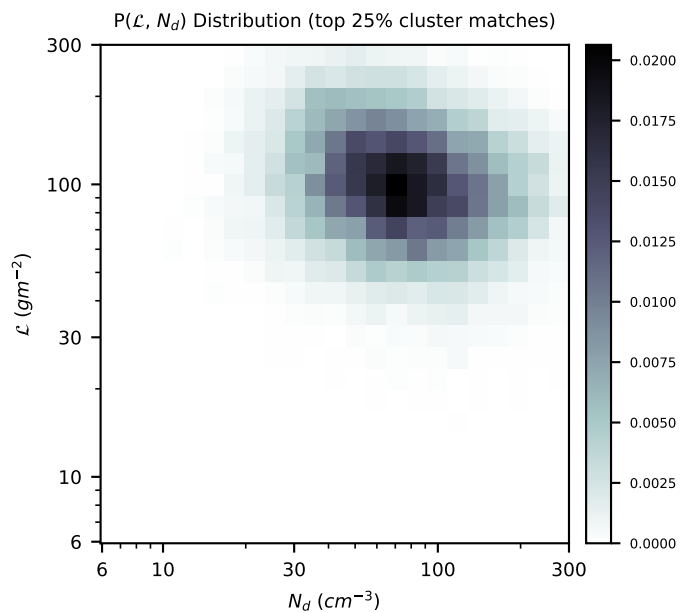
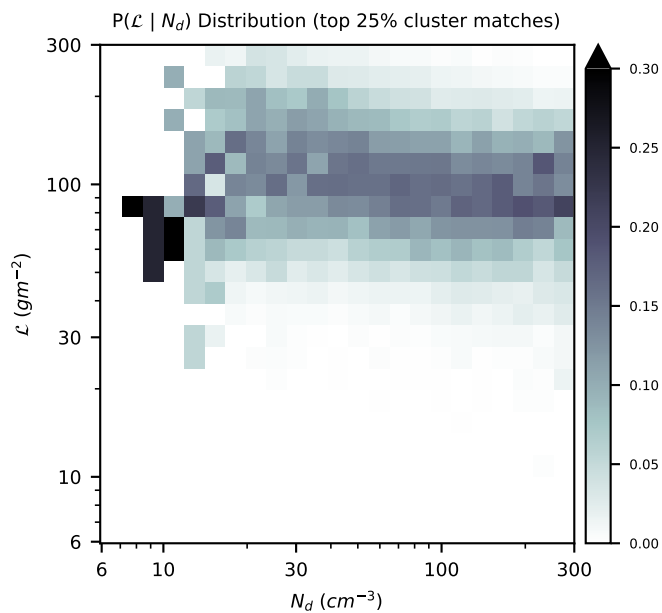
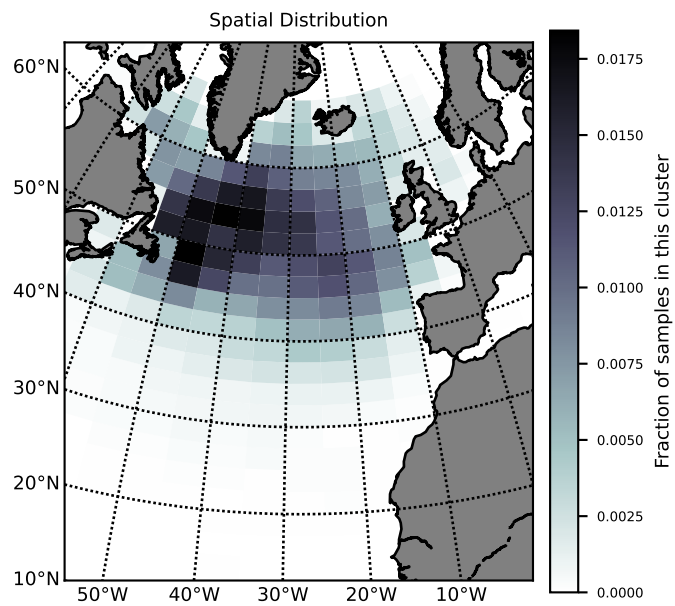
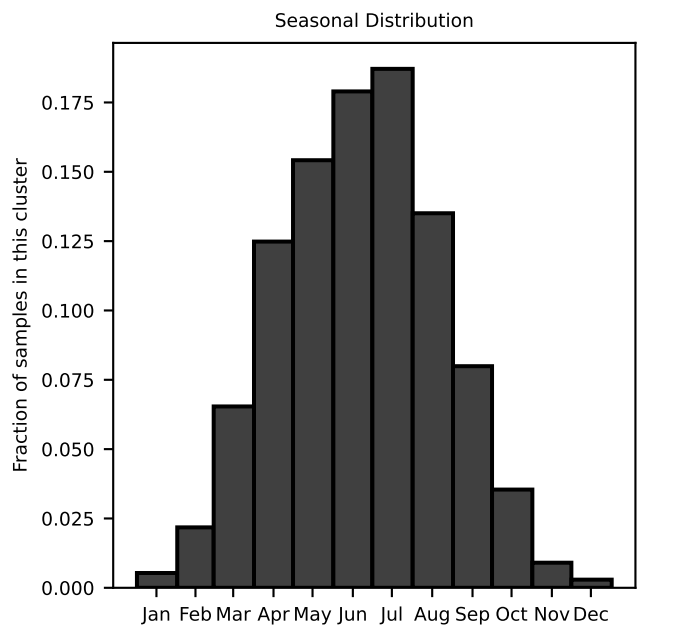
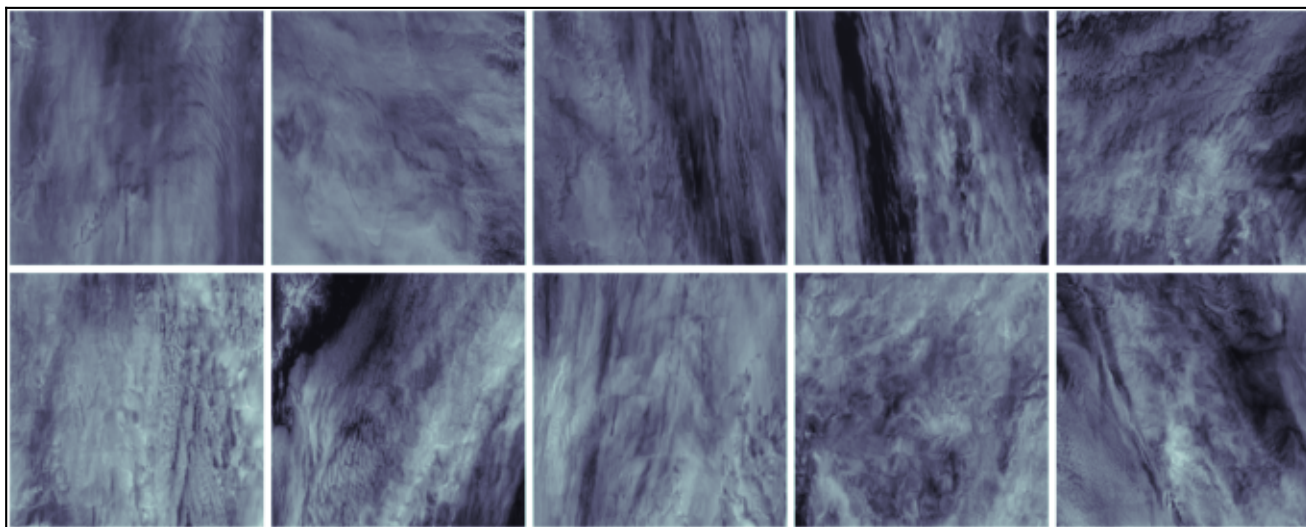


Figure S53, Cluster 53

72K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 283.0 K, Mean CTP: 809.0 hPa, Mean LWP: 103.4 gm^{-2} , Mean N_d : 26.7 cm^{-3} (for cloudy pixels)

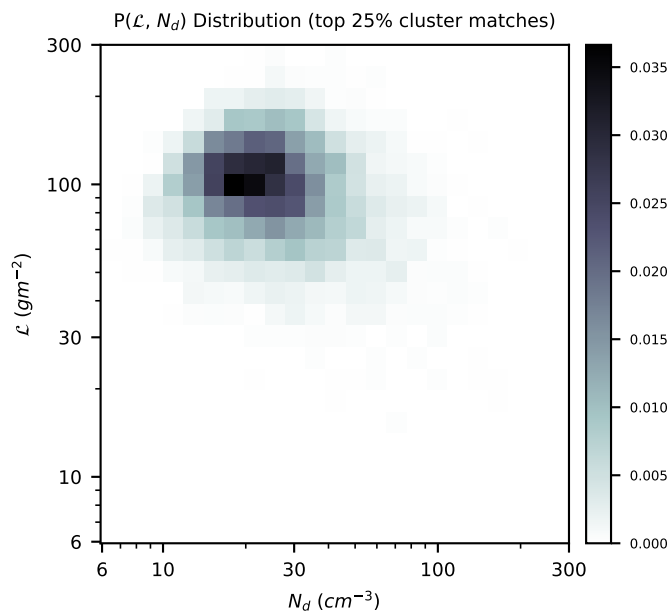
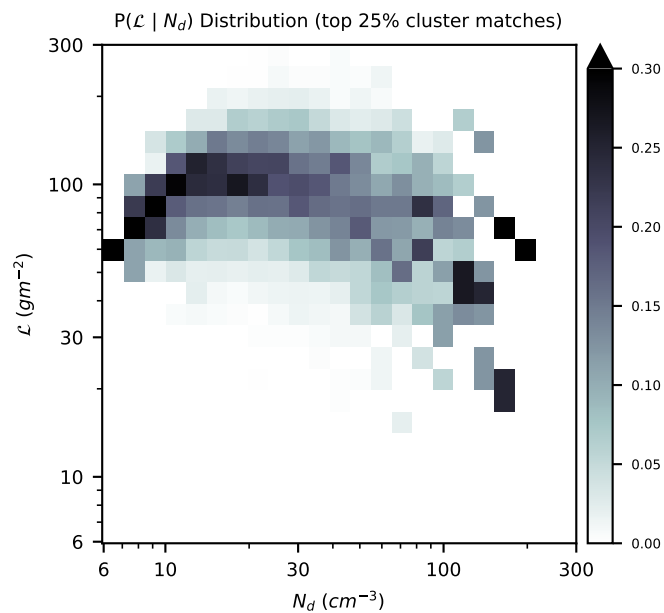
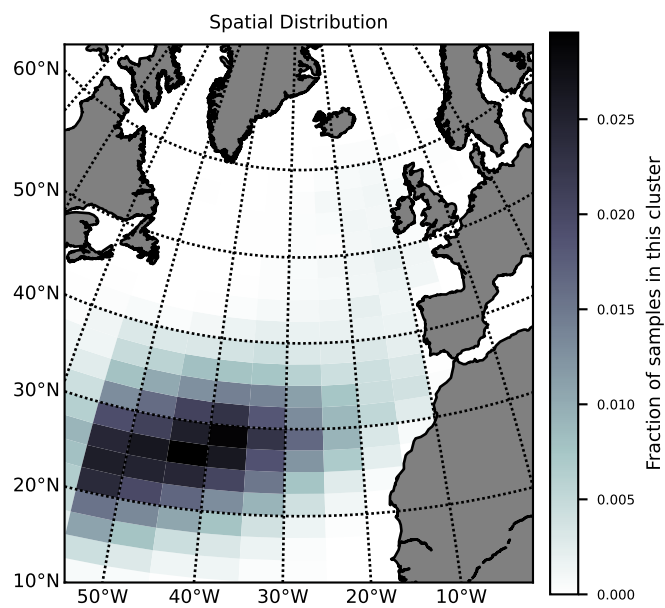
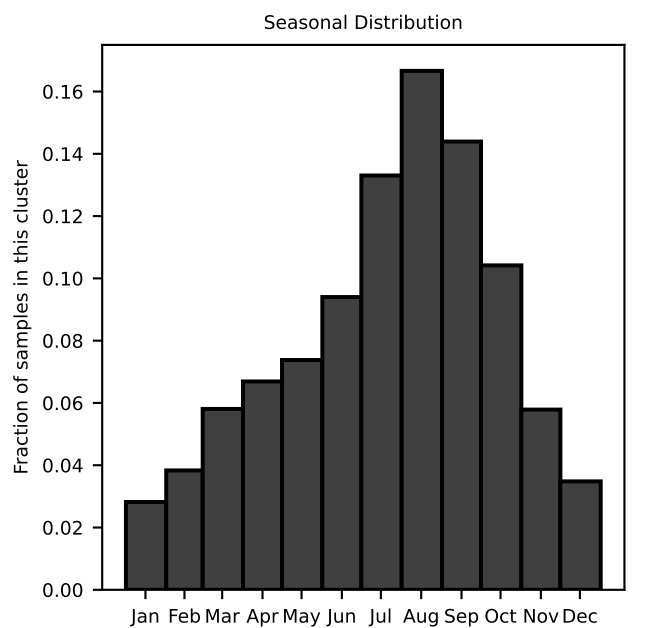
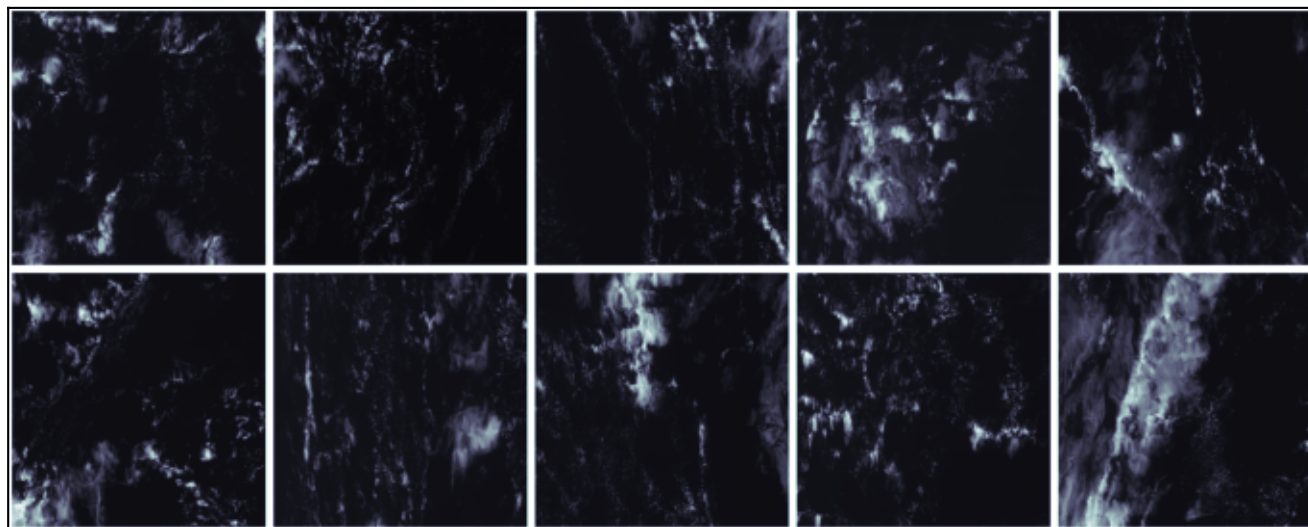


Figure S54, Cluster 54

39K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 284.0 K, Mean CTP: 879.0 hPa, Mean LWP: 66.78 gm^{-2} , Mean Nd: 74.39 cm^{-3} (for cloudy pixels)

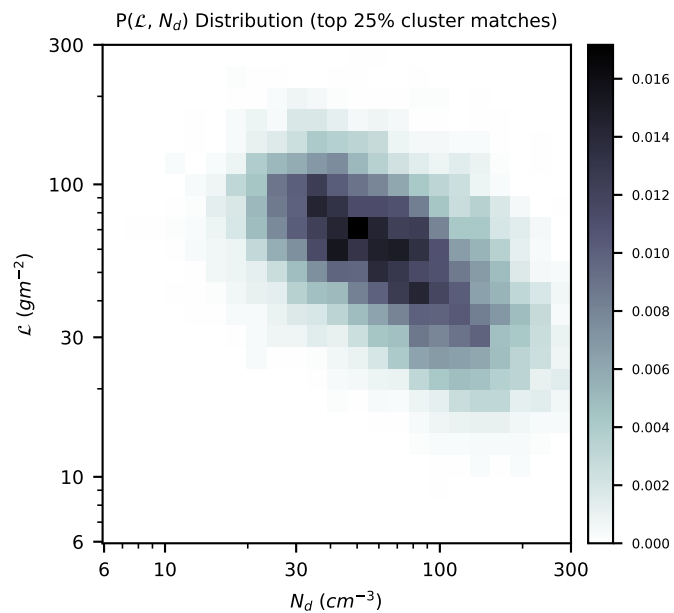
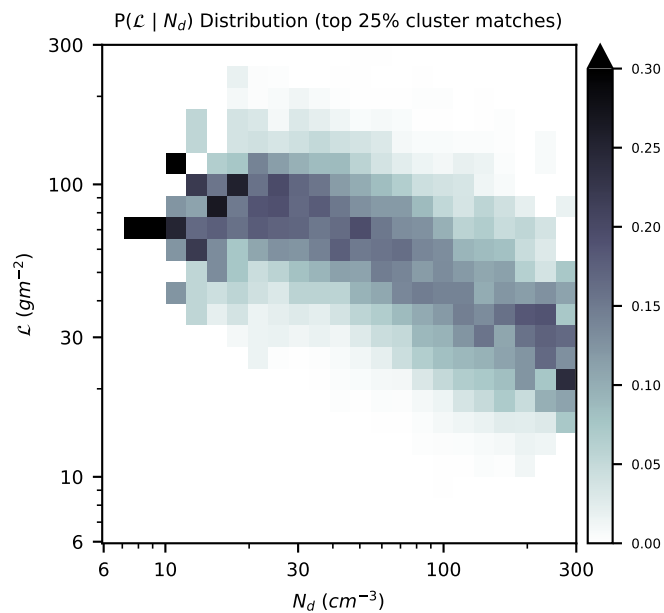
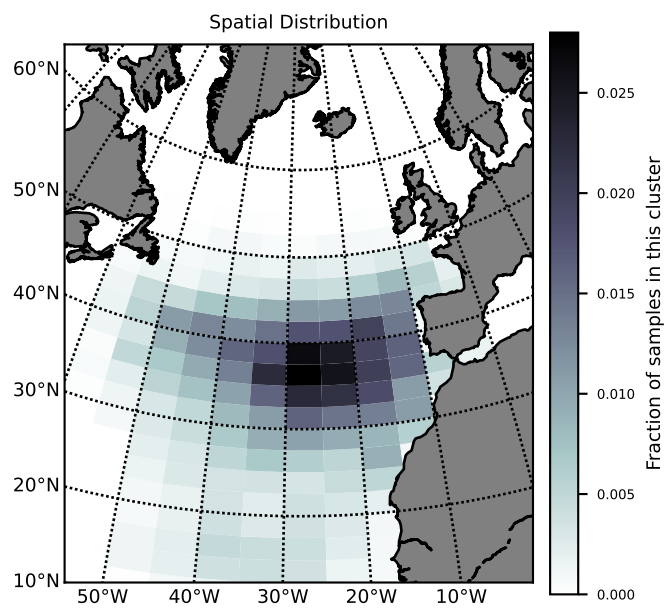
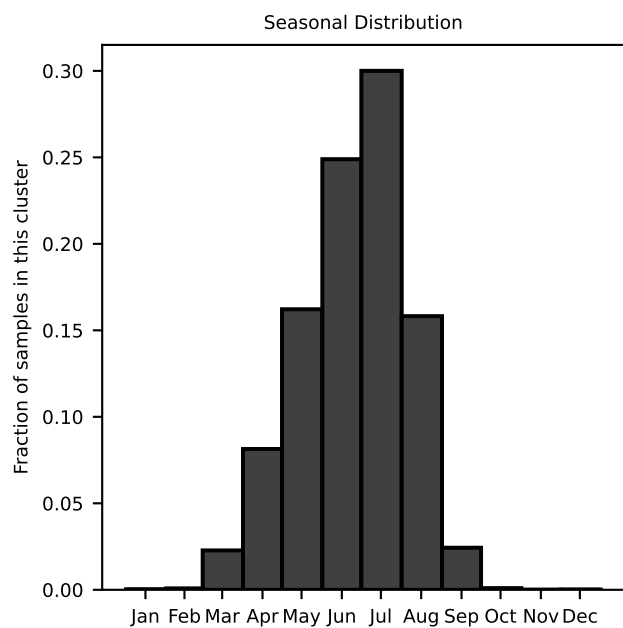
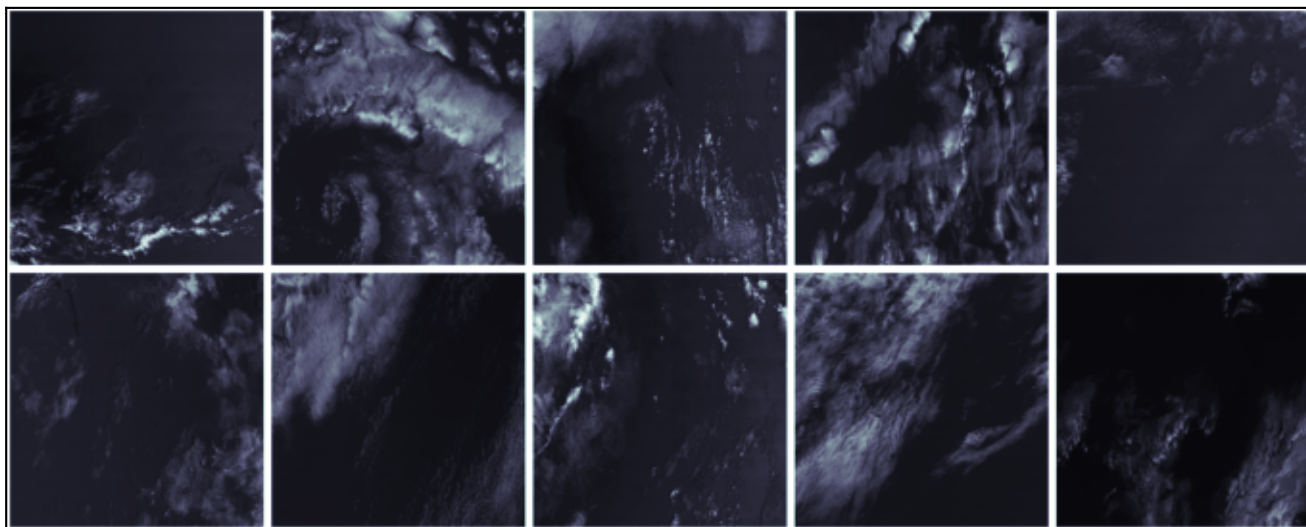


Figure S55, Cluster 55

63K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 275.0 K, Mean CTP: 799.0 hPa, Mean LWP: 127.82 gm^{-2} , Mean Nd: 29.86 cm^{-3} (for cloudy pixels)

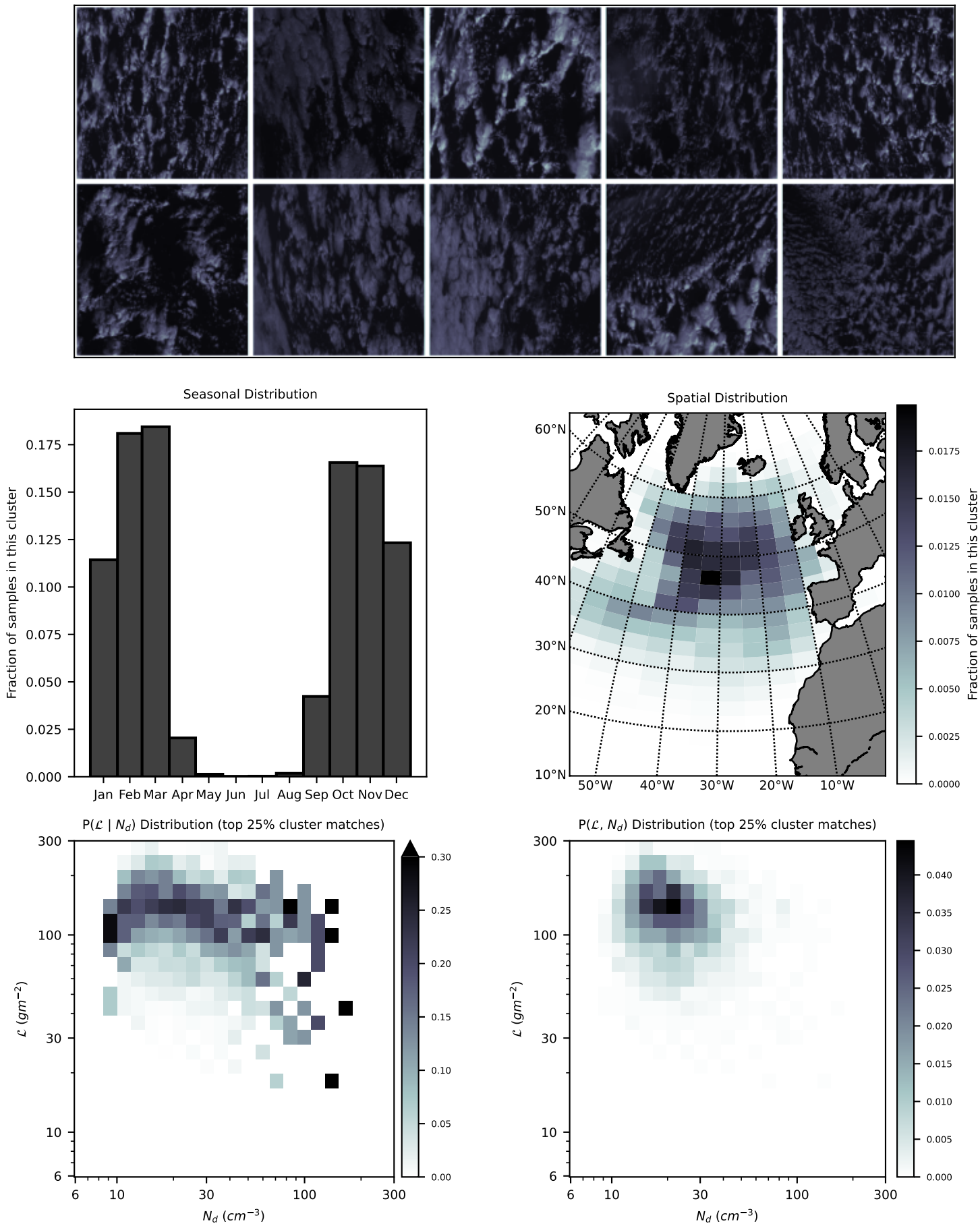


Figure S56, Cluster 56

63K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 280.0 K, Mean CTP: 798.0 hPa, Mean LWP: 95.33 gm^{-2} , Mean Nd: 69.16 cm^{-3} (for cloudy pixels)

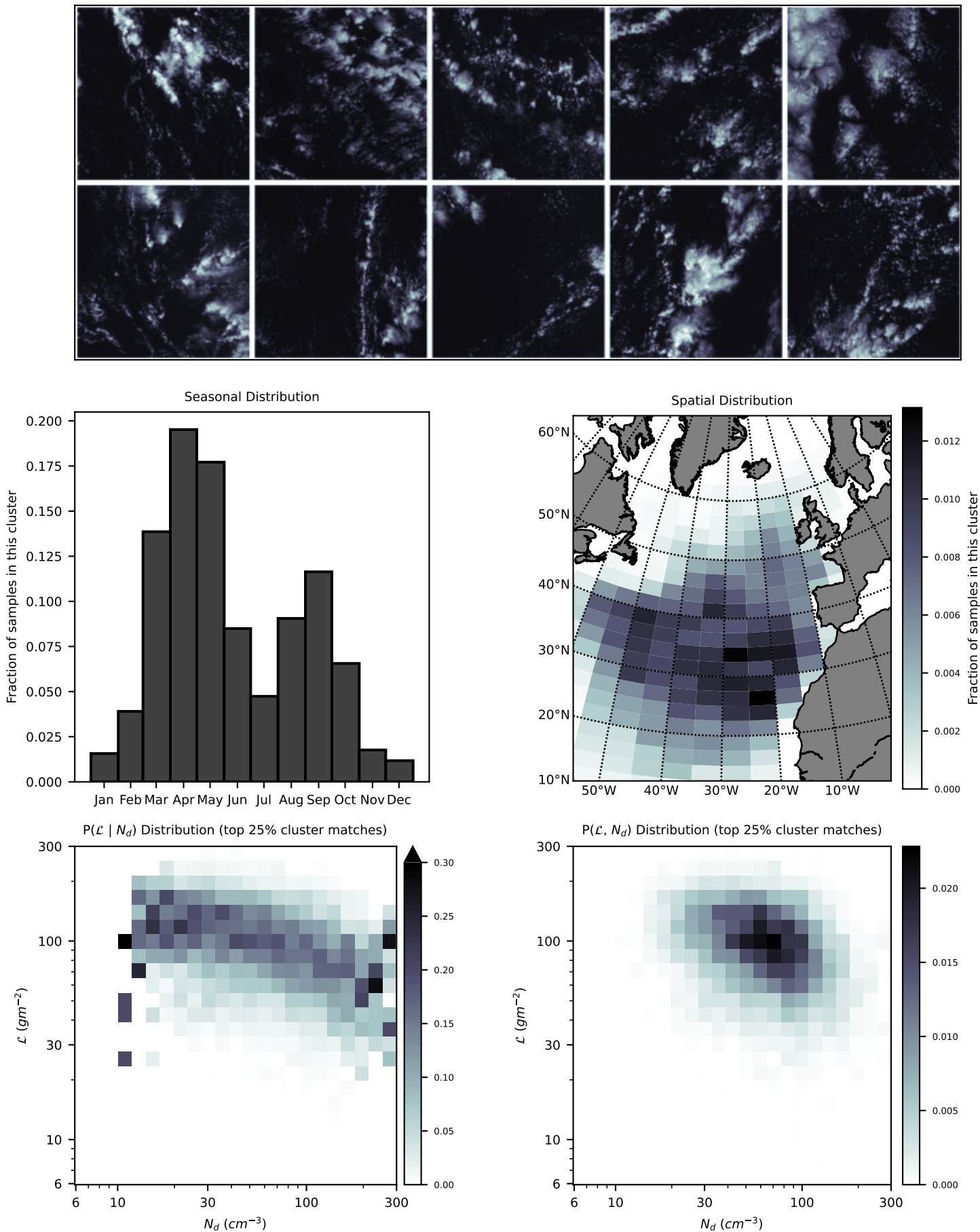


Figure S57, Cluster 57

76K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 283.0 K, Mean CTP: 804.0 hPa, Mean LWP: 97.35 gm^{-2} , Mean Nd: 37.97 cm^{-3} (for cloudy pixels)

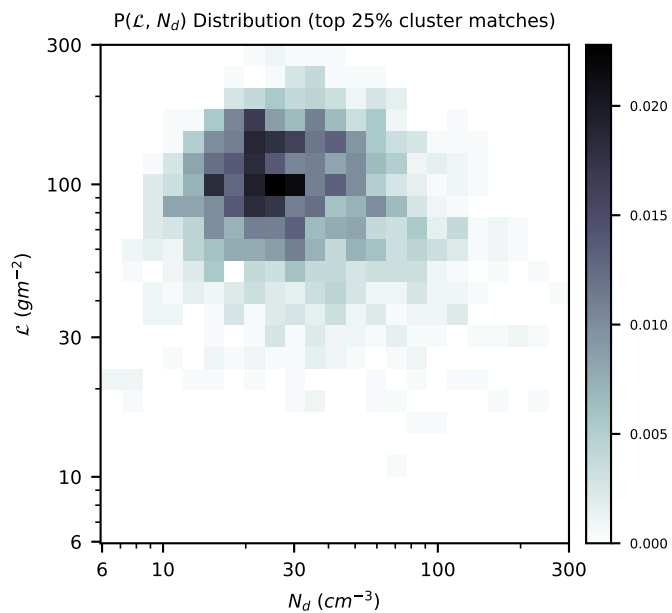
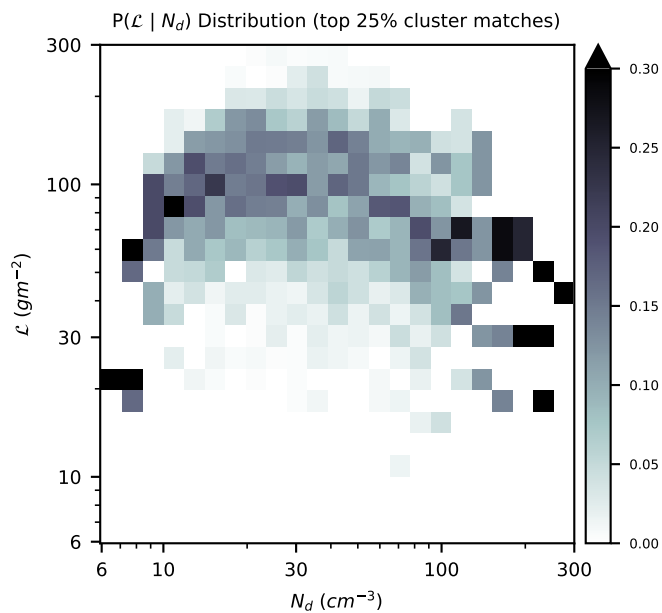
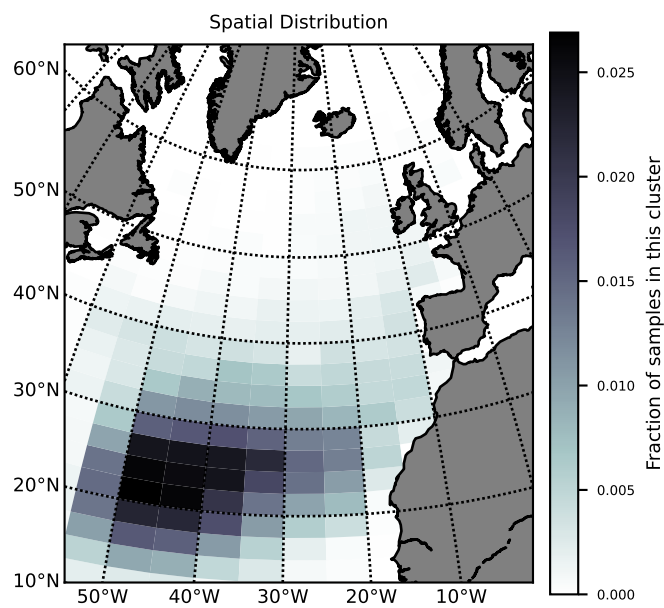
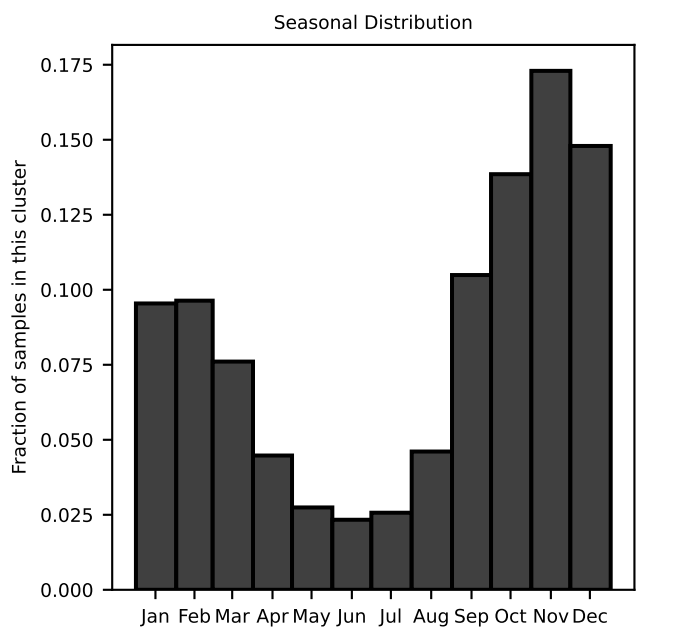
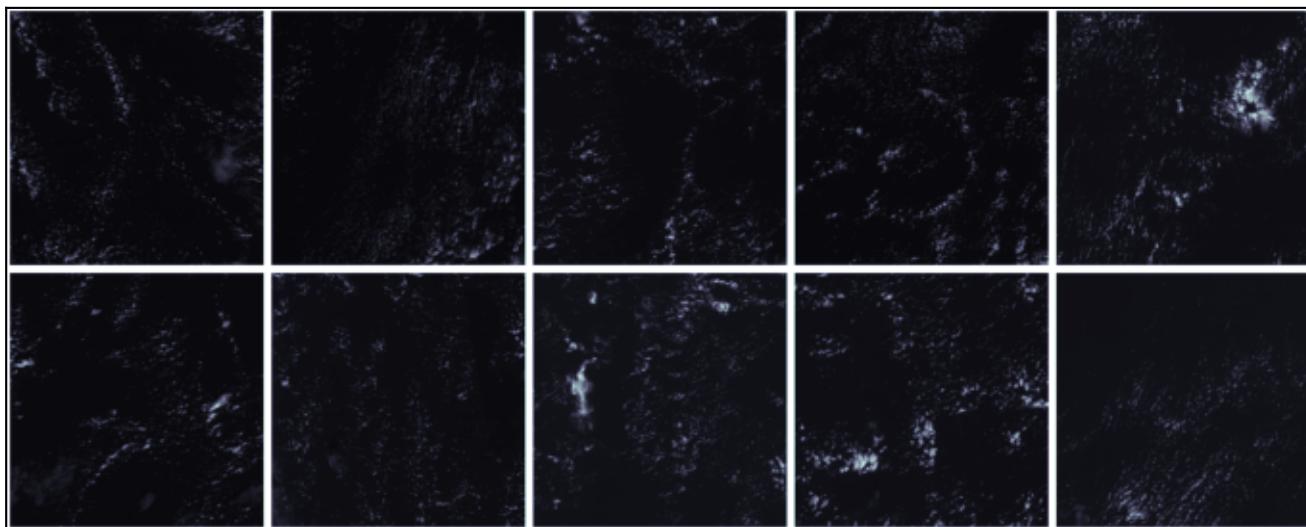


Figure S58, Cluster 58

55K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 277.0 K, Mean CTP: 798.0 hPa, Mean LWP: 126.17 gm^{-2} , Mean Nd: 30.79 cm^{-3} (for cloudy pixels)

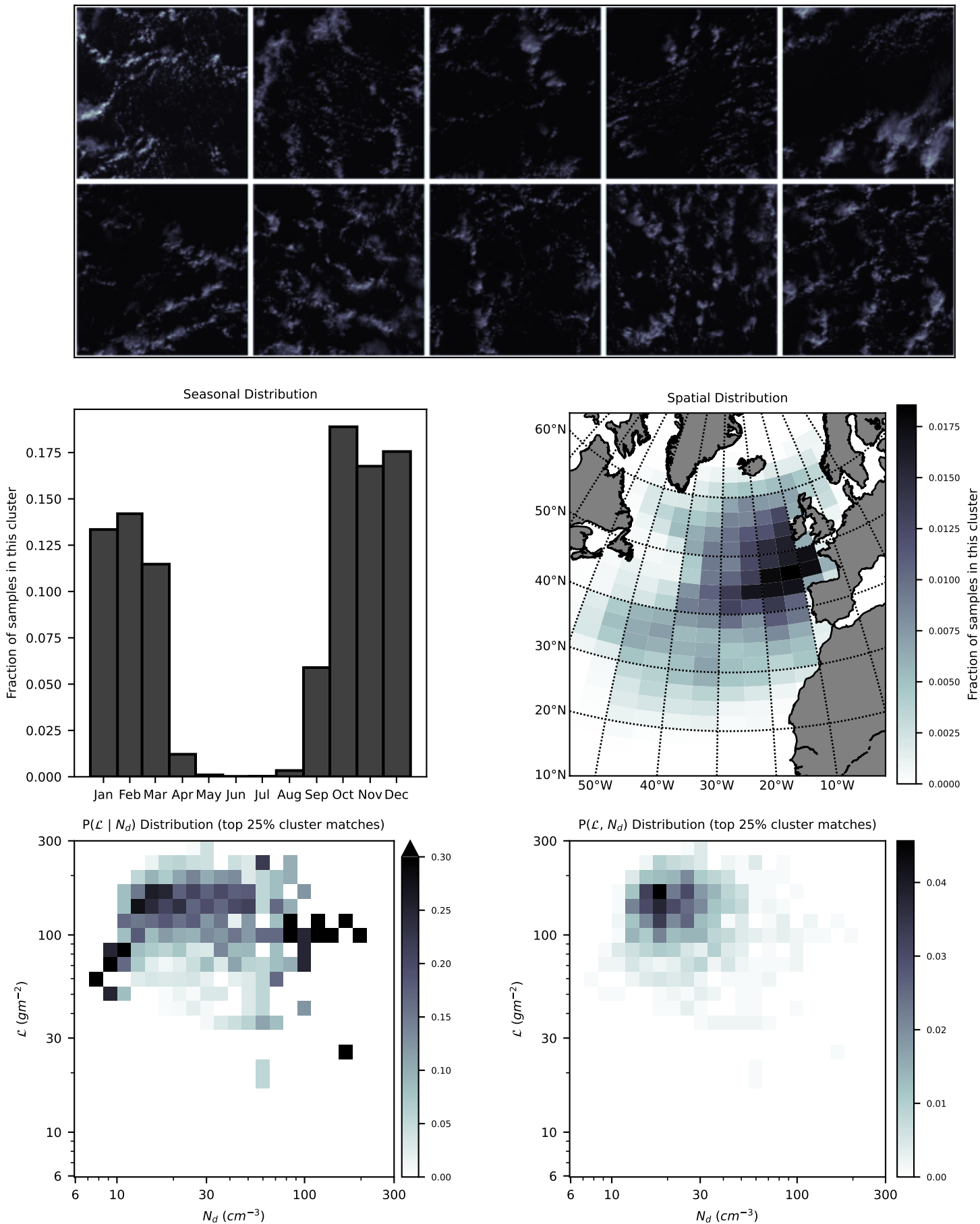


Figure S59, Cluster 59

52K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 278.0 K, Mean CTP: 876.0 hPa, Mean LWP: 78.56 gm^{-2} , Mean Nd: 119.72 cm^{-3} (for cloudy pixels)

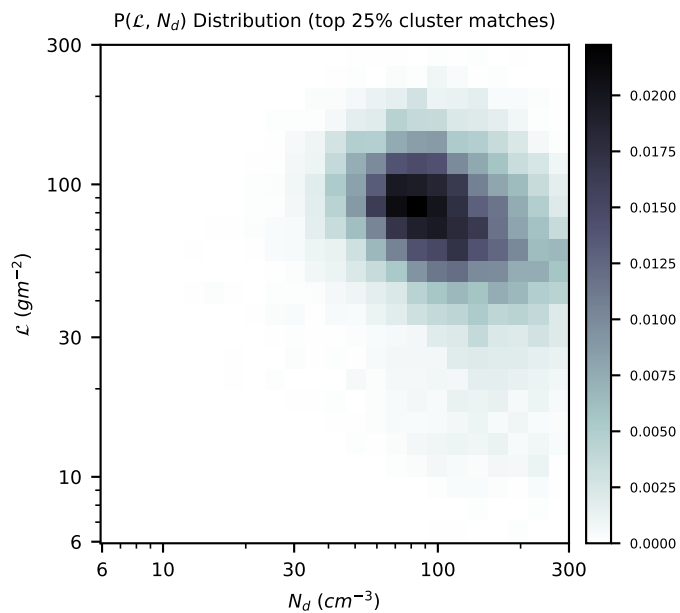
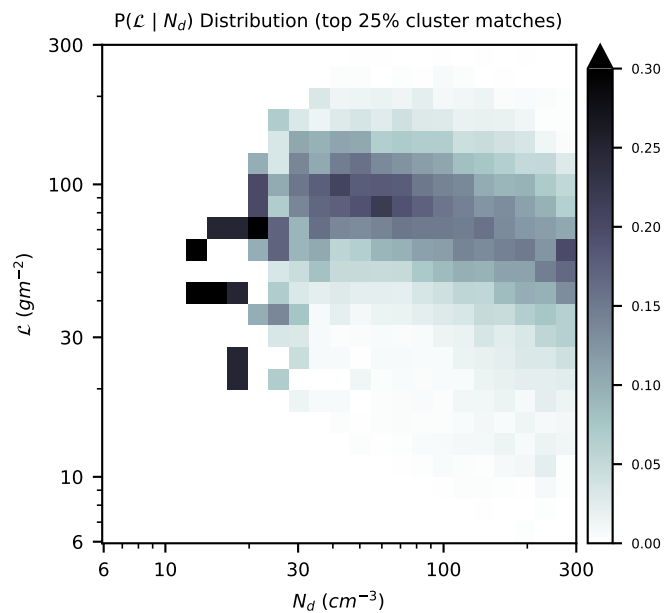
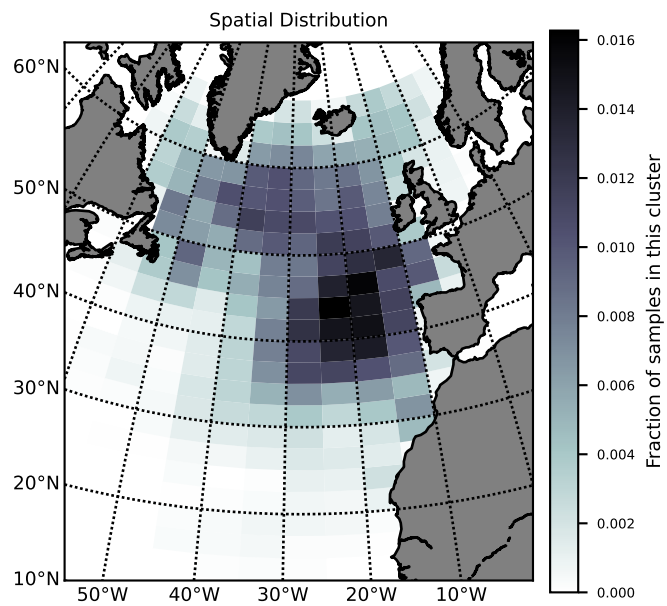
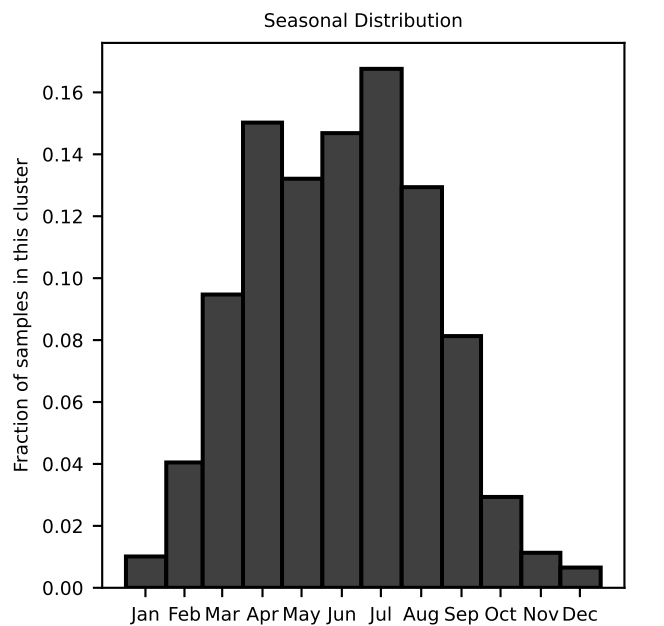
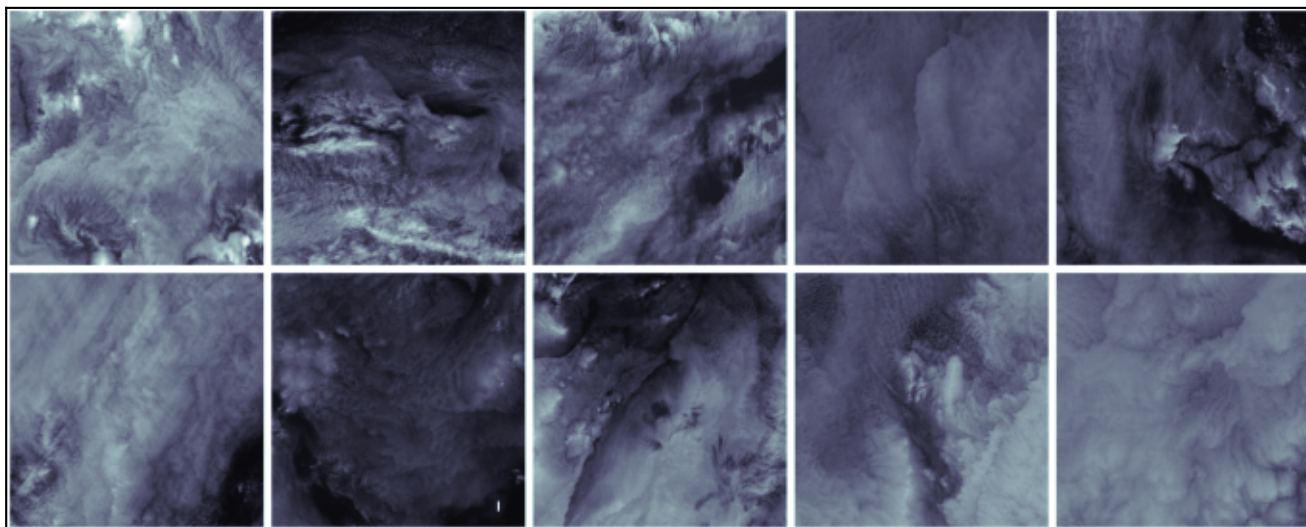


Figure S60, Cluster 60

89K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 280.0 K, Mean CTP: 909.0 hPa, Mean LWP: 69.2 gm^{-2} , Mean Nd: 85.3 cm^{-3} (for cloudy pixels)

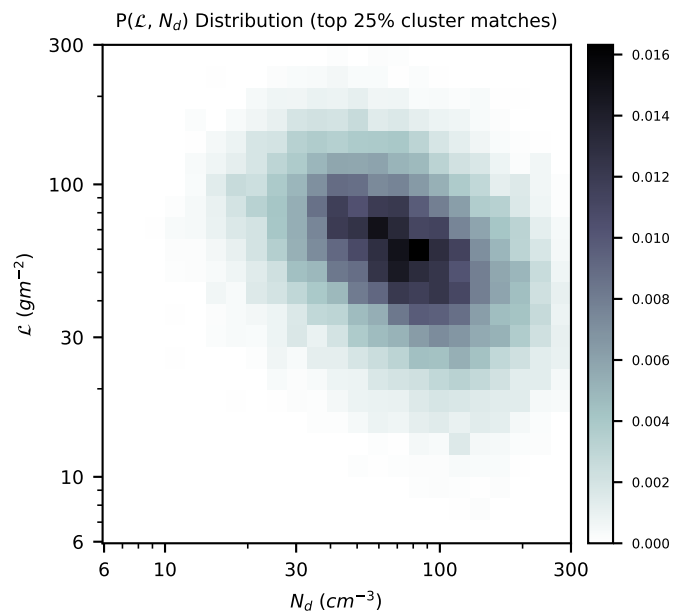
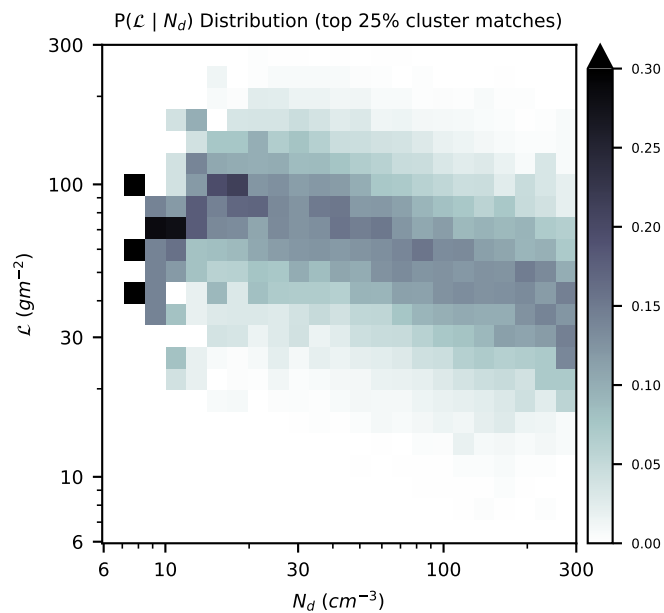
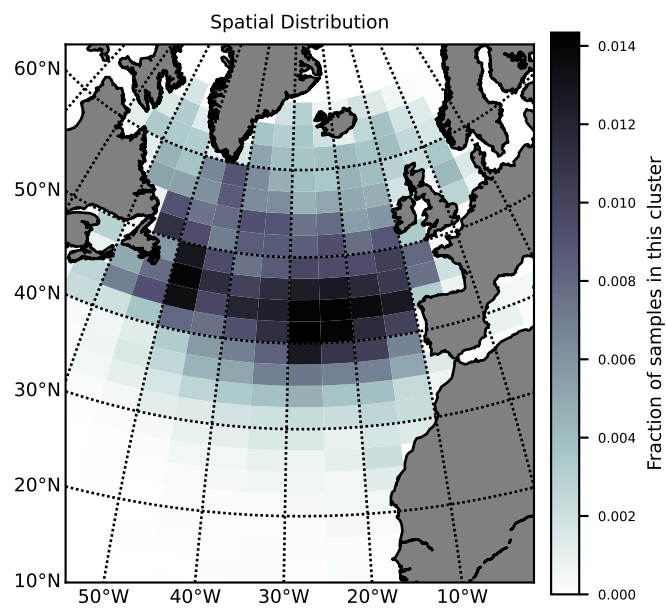
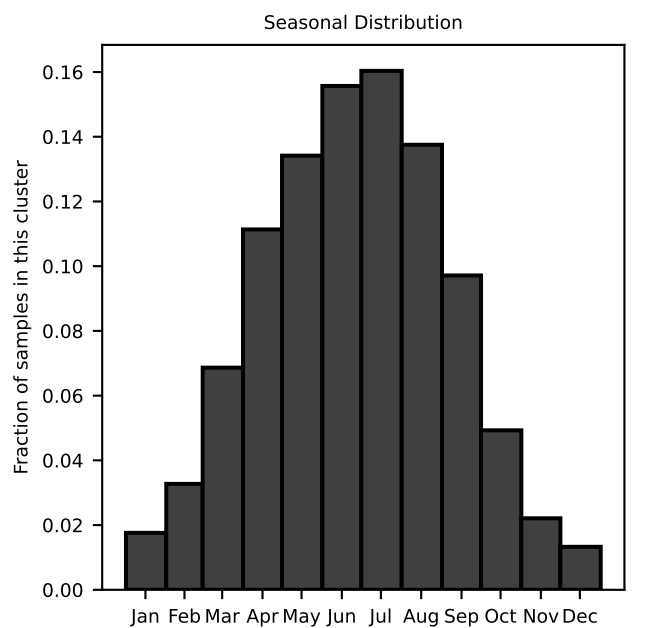
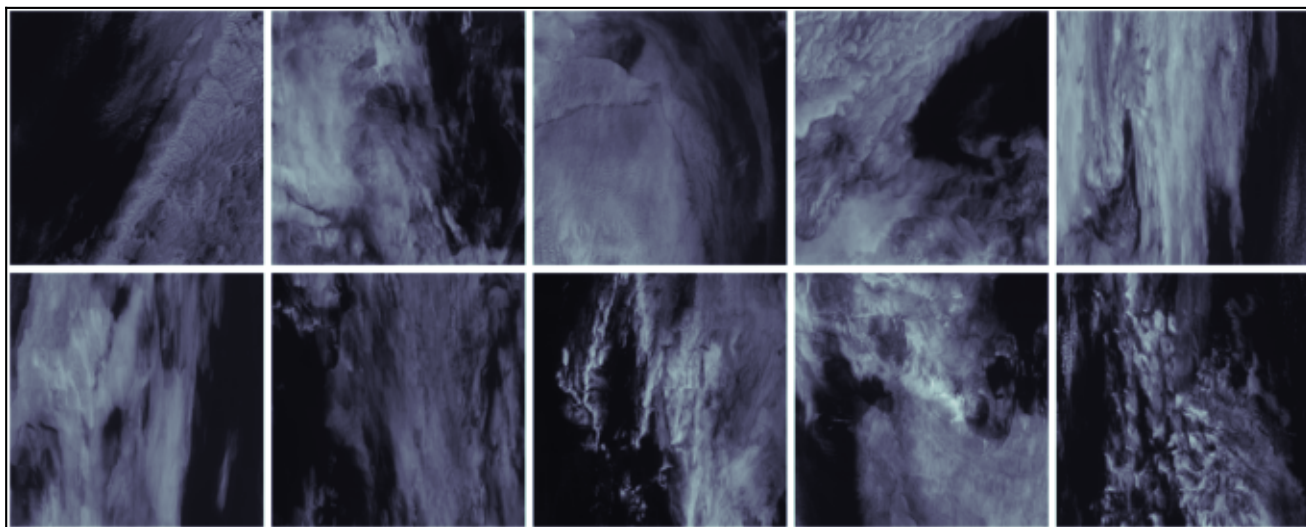


Figure S61, Cluster 61

53K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 277.0 K, Mean CTP: 850.0 hPa, Mean LWP: 123.6 gm^{-2} , Mean Nd: 31.21 cm^{-3} (for cloudy pixels)

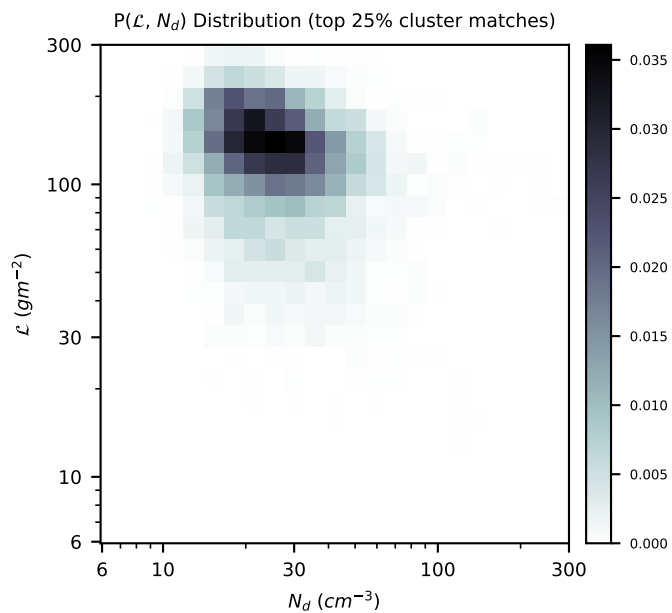
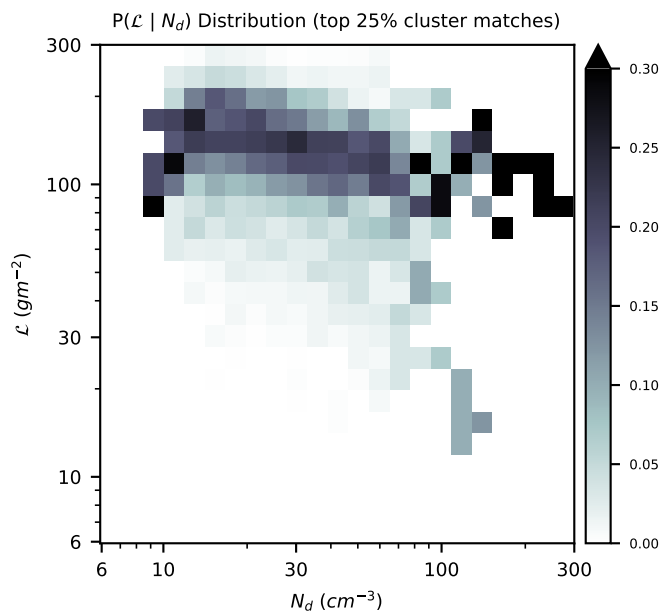
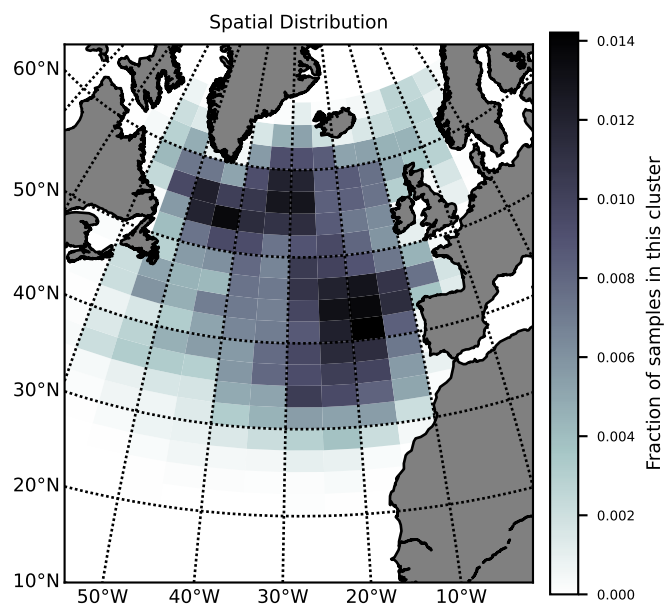
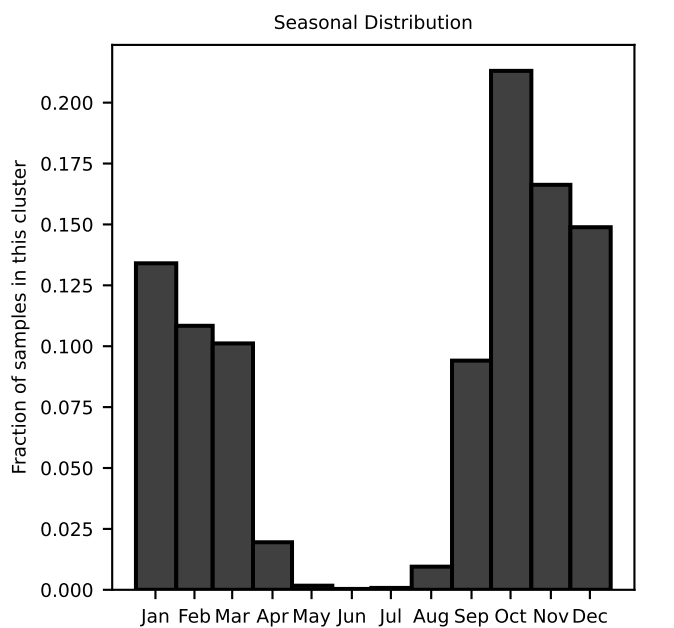
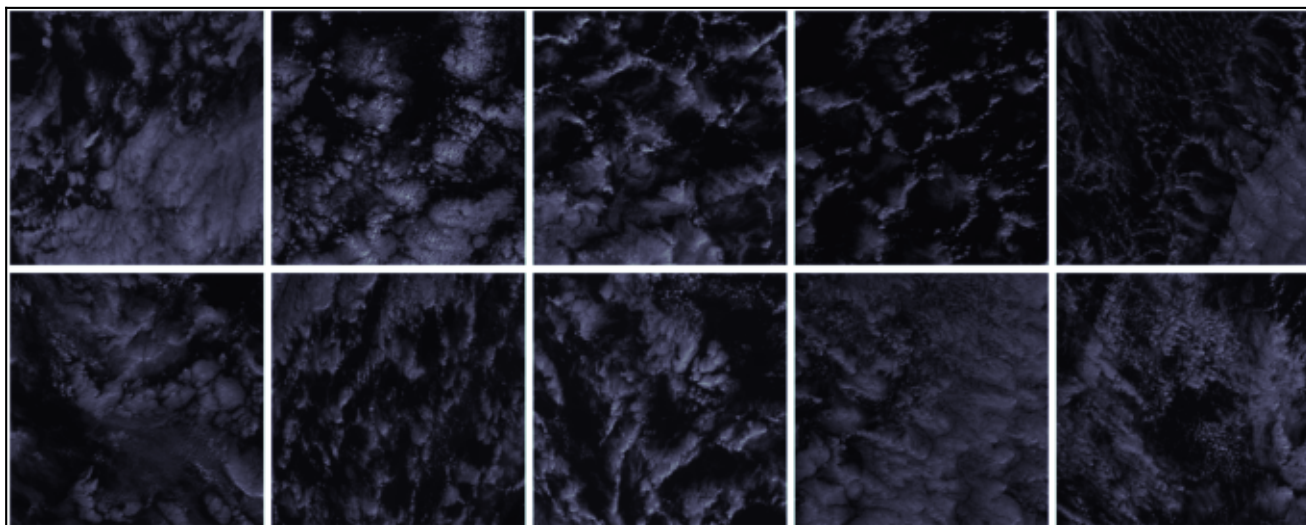


Figure S62, Cluster 62

47K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 288.0 K, Mean CTP: 943.0 hPa, Mean LWP: 27.04 gm^{-2} , Mean Nd: 120.44 cm^{-3} (for cloudy pixels)

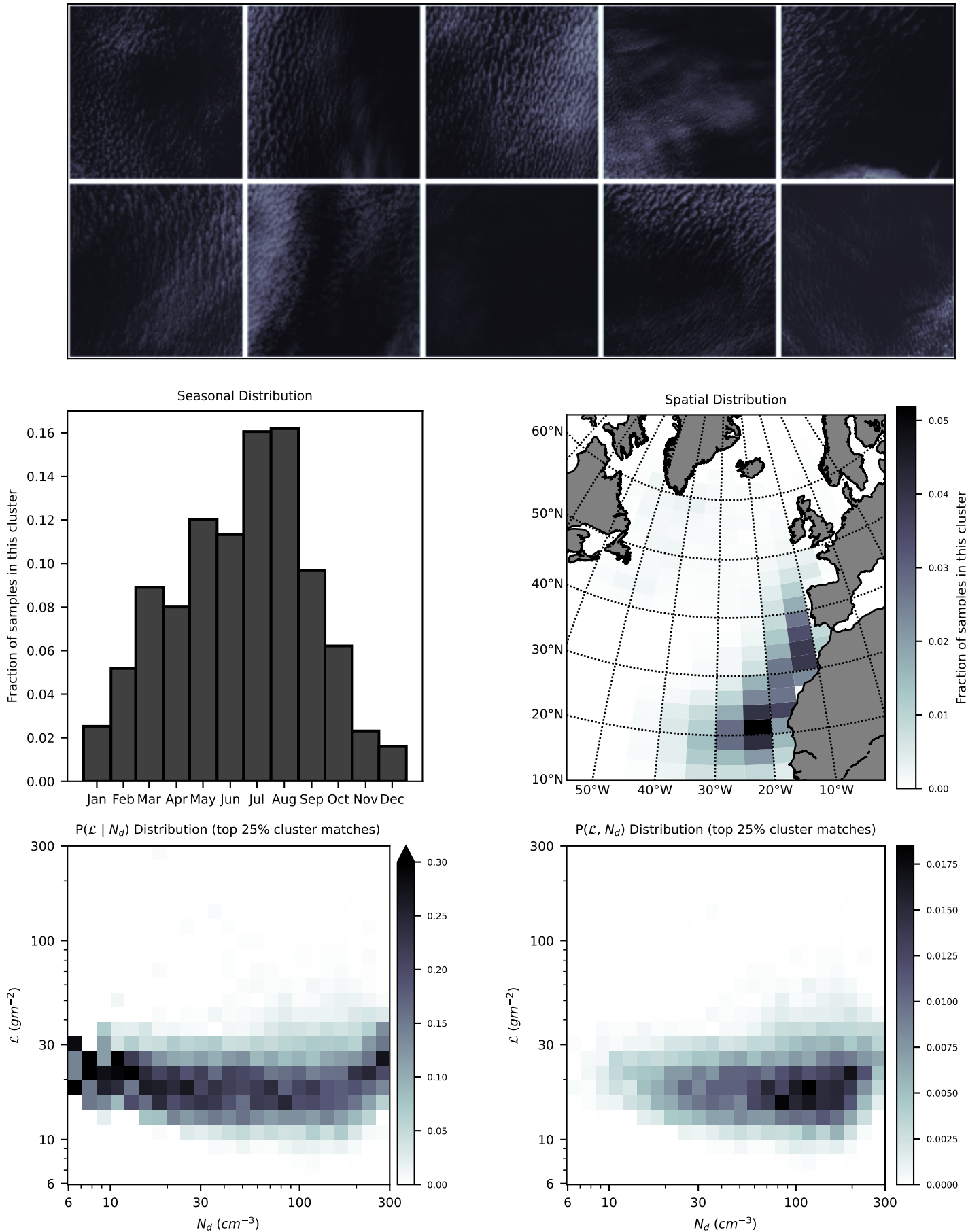


Figure S63, Cluster 63

37K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 280.0 K, Mean CTP: 813.0 hPa, Mean LWP: 84.27 gm^{-2} , Mean Nd: 73.69 cm^{-3} (for cloudy pixels)

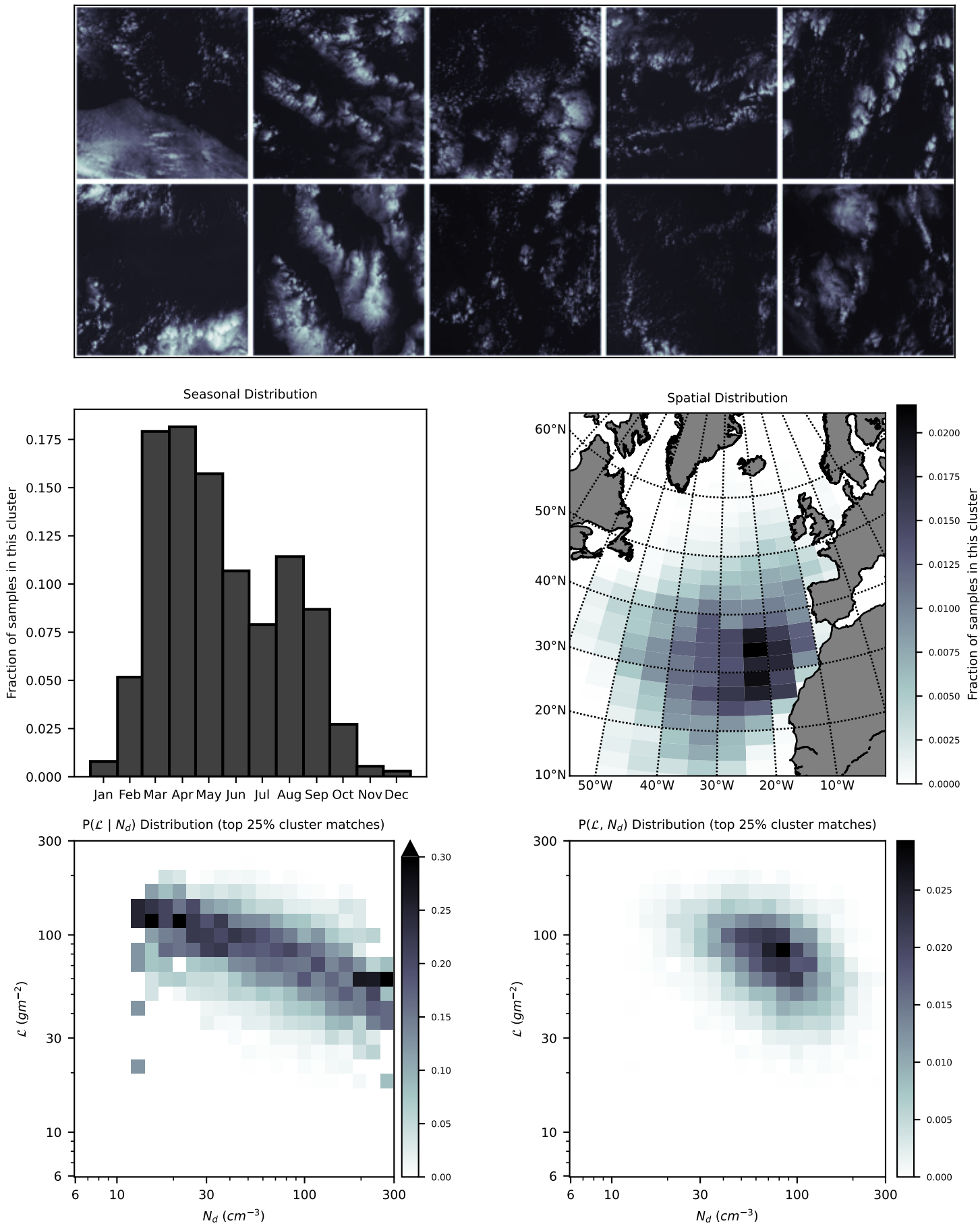


Figure S64, Cluster 64

31K out of 3.7M low cloud images and 10.8M total images

Mean CTT: 275.0 K, Mean CTP: 792.0 hPa, Mean LWP: 93.96 gm^{-2} , Mean Nd: 36.0 cm^{-3} (for cloudy pixels)

