

**Supplementary Materials:****Table S1.** Sentinel-2 MSI images used for the CNN training between 2018 and 2022.

Sentinel-2	Tile	Date Time (UTC)
S2A	T16QDH	2018/07/16 16:09
S2B	T16QDH	2018/09/19 16:09
S2A	T16QDH	2018/09/24 16:10
S2A	T20PQV	2019/01/29 14:37
S2A	T20PQB	2019/01/29 14:37
S2A	T20PRV	2019/01/29 14:37
S2A	T20PRU	2019/01/29 14:37
S2A	T20PQU	2019/01/29 14:37
S2B	T20PQB	2020/04/08 14:37
S2B	T20PQB	2020/04/08 14:37
S2B	T20PRB	2020/04/08 14:37
S2A	T20PQB	2020/07/02 14:37
S2A	T20PPC	2021/03/02 14:47
S2B	T20PQA	2021/04/03 14:37
S2A	T20PQB	2022/01/13 14:37
S2B	T20PQB	2021/07/12 14:37
S2A	T20PQB	2021/11/04 14:37
S2A	T20PQB	2021/11/14 14:37
S2A	T20PQB	2022/01/13 14:37

Table S2. Sentinel-3 OLCI images of the Lesser Antilles used for the CNN training between 2017 and 2022.

Sentinel-3	Date Time (UTC)
S3A	2017/02/23 13:55
S3A	2019/01/30 13:51
S3A	2020/01/19 14:13
S3B	2020/01/22 13:56
S3A	2020/01/24 13:44
S3A	2020/01/27 14:06
S3A	2020/01/28 13:40
S3B	2020/01/29 14:15
S3B	2020/01/30 13:49
S3B	2021/04/03 13:27
S3B	2021/04/06 13:49
S3A	2021/04/07 14:02
S3A	2022/01/02 14:02
S3A	2022/01/03 13:36
S3A	2022/01/06 13:59

Table S3. Detail of our proposed network architecture for MSI images.

Layer (type:depth-idx)	[input_channel, output_channel, H, W Conv 2D]
└─Sequential: 1-1	
└─Conv2d: 2-1	[12, 32, 128, 128]
└─BatchNorm2d: 2-2	[32, 32, 128, 128]
└─LeakyReLU: 2-3	[32, 32, 128, 128]
└─ResidualBlock2D: 1-2	
└─Sequential: 2-4	
└─Conv2d: 3-1	[32, 32, 128, 128]
└─BatchNorm2d: 3-2	[32, 32, 128, 128]
└─PReLU: 3-3	[32, 32, 128, 128]
└─Conv2d: 3-4	[32, 32, 128, 128]
└─BatchNorm2d: 3-5	[32, 32, 128, 128]
└─MaxPool2d: 1-3	[32, 32, 64, 64]
└─Sequential: 1-4	--
└─Conv2d: 2-5	[32, 64, 64, 64]
└─BatchNorm2d: 2-6	[64, 64, 64, 64]
└─LeakyReLU: 2-7	[64, 64, 64, 64] --
└─ResidualBlock2D: 1-5	--
└─Sequential: 2-8	--
└─Conv2d: 3-6	[64, 64, 64, 64]
└─BatchNorm2d: 3-7	[64, 64, 64, 64]
└─PReLU: 3-8	[64, 64, 64, 64]
└─Conv2d: 3-9	[64, 64, 64, 64]
└─BatchNorm2d: 3-10	[64, 64, 64, 64]
└─ResidualBlock2D: 1-6	
└─Sequential: 2-9	
└─Conv2d: 3-11	[64, 64, 64, 64]
└─BatchNorm2d: 3-12	[64, 64, 64, 64]
└─PReLU: 3-13	[64, 64, 64, 64]
└─Conv2d: 3-14	[64, 64, 64, 64]
└─BatchNorm2d: 3-15	[64, 64, 64, 64]
└─Sequential: 1-7	--
└─Conv2d: 2-10	[64, 32, 64, 64]
└─BatchNorm2d: 2-11	[32, 32, 64, 64]
└─LeakyReLU: 2-12	[32, 32, 64, 64]
└─ResidualBlock2D: 1-8	
└─Sequential: 2-13	
└─Conv2d: 3-16	[32, 32, 128, 128]
└─BatchNorm2d: 3-17	[32, 32, 128, 128]

		└─PReLU: 3-18	[32, 32, 128, 128]
		└─Conv2d: 3-19	[32, 32, 128, 128]
		└─BatchNorm2d: 3-20	[32, 32, 128, 128]
	└─Sequential: 1-9	--	
	└─Conv2d: 2-14	[32, 1, 128, 128]	
	└─BatchNorm2d: 2-15	[32, 1, 128, 128]	

Total params: 226,762

Table S4. Detail of our proposed network architecture for OLCI images.

Layer (type:depth-idx)	[input_channel, output_channel, H, W	Conv 2D]
└─Sequential: 1-1	-	
└─Conv2d: 2-1	[21, 32, 128, 128]	
└─BatchNorm2d: 2-2	[32, 32, 128, 128]	
└─LeakyReLU: 2-3	[32, 32, 128, 128]	
└─ResidualBlock2D: 1-2		
└─Sequential: 2-4		
└─Conv2d: 3-1	[32, 32, 128, 128]	
└─BatchNorm2d: 3-2	[32, 32, 128, 128]	
└─PReLU: 3-3	[32, 32, 128, 128]	
└─Conv2d: 3-4	[32, 32, 128, 128]	
└─BatchNorm2d: 3-5	[32, 32, 128, 128]	
└─MaxPool2d: 1-3	[32, 32, 64, 64]	
└─Sequential: 1-4		
└─Conv2d: 2-5	[32, 64, 64, 64]	
└─BatchNorm2d: 2-6	[64, 64, 64, 64]	
└─LeakyReLU: 2-7	[64, 64, 64, 64]	
└─ResidualBlock2D: 1-5		
└─Sequential: 2-8		
└─Conv2d: 3-6	[64, 64, 64, 64]	
└─BatchNorm2d: 3-7	[64, 64, 64, 64]	
└─PReLU: 3-8	[64, 64, 64, 64]	
└─Conv2d: 3-9	[64, 64, 64, 64]	
└─BatchNorm2d: 3-10	[64, 64, 64, 64]	
└─MaxPool2d: 1-6	[64, 64, 32, 32]	
└─Sequential: 1-7		
└─Conv2d: 2-9	[64, 128, 32, 32]	
└─BatchNorm2d: 2-10	[128, 128, 32, 32]	
└─LeakyReLU: 2-11	[128, 128, 32, 32]	
└─ResidualBlock2D: 1-8		

	└─Sequential: 2-12	
	└─Conv2d: 3-11	[128, 128, 32, 32]
	└─BatchNorm2d: 3-12	[128, 128, 32, 32]
	└─PReLU: 3-13	[128, 128, 32, 32]
	└─Conv2d: 3-14	[128, 128, 32, 32]
	└─BatchNorm2d: 3-15	[128, 128, 32, 32]
	└─ResidualBlock2D: 1-9	
	└─Sequential: 2-13	
	└─Conv2d: 3-16	[128, 128, 32, 32]
	└─BatchNorm2d: 3-17	[128, 128, 32, 32]
	└─PReLU: 3-18	[128, 128, 32, 32]
	└─Conv2d: 3-19	[128, 128, 32, 32]
	└─BatchNorm2d: 3-20	[128, 128, 32, 32]
	└─Sequential: 1-10	
	└─Conv2d: 2-14	[128, 64, 32, 32]
	└─BatchNorm2d: 2-15	[64, 64, 32, 32]
	└─LeakyReLU: 2-16	[64, 64, 32, 32]
	└─Attention_block: 1-11	[64, 64, 64, 64] x * psi
	└─Sequential: 2-17	
	└─Conv2d: 3-21	[64, 32, 64, 64]
	└─BatchNorm2d: 3-22	[32, 32, 64, 64]
	└─Sequential: 2-18	
	└─Conv2d: 3-23	[32, 32, 64, 64]
	└─BatchNorm2d: 3-24	[32, 32, 64, 64]
	└─ReLU: 2-19	[32, 32, 64, 64]
	└─Sequential: 2-20	--
	└─Conv2d: 3-25	[32, 2, 64, 64]
	└─BatchNorm2d: 3-26	[2, 2, 64, 64]
	└─Sigmoid: 3-27	[2, 2, 64, 64]
	└─ResidualBlock2D: 1-12	
	└─Sequential: 2-21	
	└─Conv2d: 3-28	[64, 64, 64, 64]
	└─BatchNorm2d: 3-29	[64, 64, 64, 64]
	└─PReLU: 3-30	[64, 64, 64, 64]
	└─Conv2d: 3-31	[64, 64, 64, 64]
	└─BatchNorm2d: 3-32	[64, 64, 64, 64]
	└─Sequential: 1-13	--
	└─Conv2d: 2-22	[64, 32, 64, 64]
	└─BatchNorm2d: 2-23	[64, 32, 64, 64]
	└─LeakyReLU: 2-24	[64, 32, 64, 64]

└─Attention_block: 1-14	[32, 32, 128, 128] x * psi
└─Sequential: 2-25	
└─Conv2d: 3-33	[32, 16, 128, 128]
└─BatchNorm2d: 3-34	[16, 16, 128, 128]
└─Sequential: 2-26	--
└─Conv2d: 3-35	[16, 16, 128, 128]
└─BatchNorm2d: 3-36	[16, 16, 128, 128]
└─ReLU: 2-27	[16, 16, 128, 128]
└─Sequential: 2-28	
└─Conv2d: 3-37	[16, 2, 128, 128]
└─BatchNorm2d: 3-38	[2, 2, 128, 128]
└─Sigmoid: 3-39	[2, 2, 128, 128]
└─ResidualBlock2D: 1-15	
└─Sequential: 2-29	
└─Conv2d: 3-40	[32, 32, 128, 128]
└─BatchNorm2d: 3-41	[32, 32, 128, 128]
└─PReLU: 3-42	[32, 32, 128, 128]
└─Conv2d: 3-43	[32, 32, 128, 128]
└─BatchNorm2d: 3-44	[32, 32, 128, 128]
└─Sequential: 1-16	
└─Conv2d: 2-30	[32, 1, 128, 128]
└─BatchNorm2d: 2-31	[1, 1, 128, 128]

Total params: 973,145

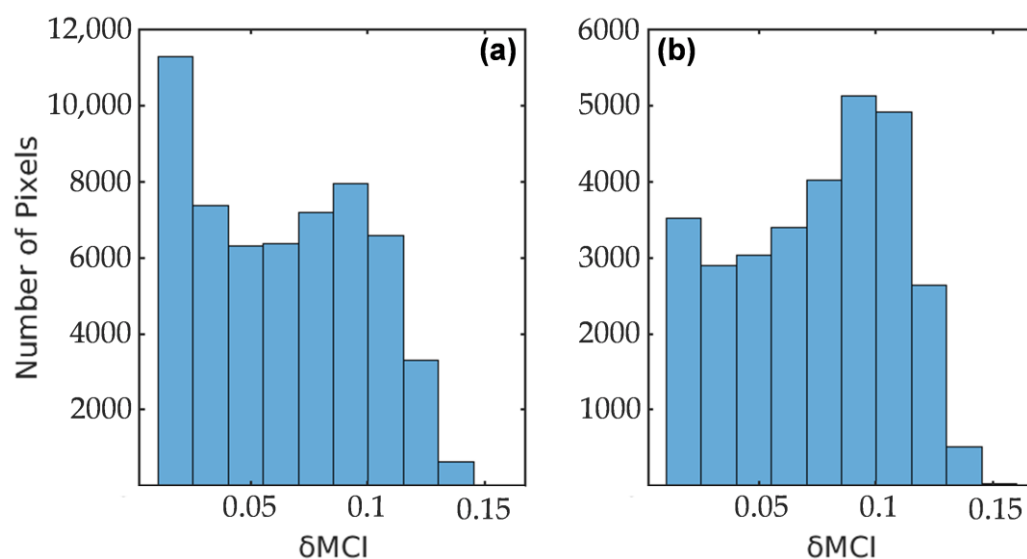


Figure S1. Distribution of δMCI computed by the CNN of (a) all OLCI pixels and (b) of OLCI pixels

overlaying with MSI pixels. MSI image, PRV tile and OLCI image from 29 January 2019 at 14:37 and 13:38 respectively (Figure 8).