The concurrence of Atmospheric Rivers and explosive cyclogenesis in the North Atlantic and North Pacific basins

Jorge Eiras-Barca[1], Alexandre M. Ramos[2*], Joaquim G. Pinto[3], Ricardo M. Trigo[2], Margarida L.R. Liberato[2,3], and Gonzalo Miguez-Macho[1]

[1] Non-Linear Physics Group, Universidade de Santiago de Compostela, Galicia, Spain
[2] Instituto Dom Luiz, Faculdade de Ciências, Universidade de Lisboa, Lisbon, Portugal;
[3] Institute for Meteorology and Climate Research (IMK-TRO), Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany
[4] Escola de Ciências e Tecnologia, Universidade de Trás-os-Montes e Alto Douro, Vila Real, Portugal.

Supplementary Material

Supplementary Table

Table S1. The number of explosive cyclones (EC) and non-explosive cyclones (NEC) used for each time step in the computation of Figure 3 to 5 and S1, S3 and to S4 for the North Atlantic domain (a) and for the North Pacific domain (b).

a)

North Atlantic	Step (h)	Events	North Atlantic	Step (h)	Events
EC	-36	309	NEC	-36	1918
EC	-30	387	NEC	-30	2545
EC	-24	527	NEC	-24	3988
EC	-18	733	NEC	-18	7315
EC	-12	733	NEC	-12	7315
EC	-6	733	NEC	-6	7315
EC	0	733	NEC	0	7315
EC	6	733	NEC	6	7315
EC	12	669	NEC	12	6012
EC	18	619	NEC	18	5051
EC	24	566	NEC	24	4361
EC	30	505	NEC	30	3770
EC	36	441	NEC	36	2895

b)

North Pacific	Step (h)	Events	North Pacific	Step (h)	Events
EC	-36	486	NEC	-36	2616
EC	-30	641	NEC	-30	3619
EC	-24	835	NEC	-24	5706
EC	-18	1115	NEC	-18	10890
EC	-12	1115	NEC	-12	10890
EC	-6	1115	NEC	-6	10890
EC	0	1115	NEC	0	10890
EC	6	1115	NEC	6	10890
EC	12	1031	NEC	12	8812
EC	18	960	NEC	18	7402
EC	24	898	NEC	24	6336
EC	30	836	NEC	30	5496
EC	36	744	NEC	36	4115

Supplementary Figures
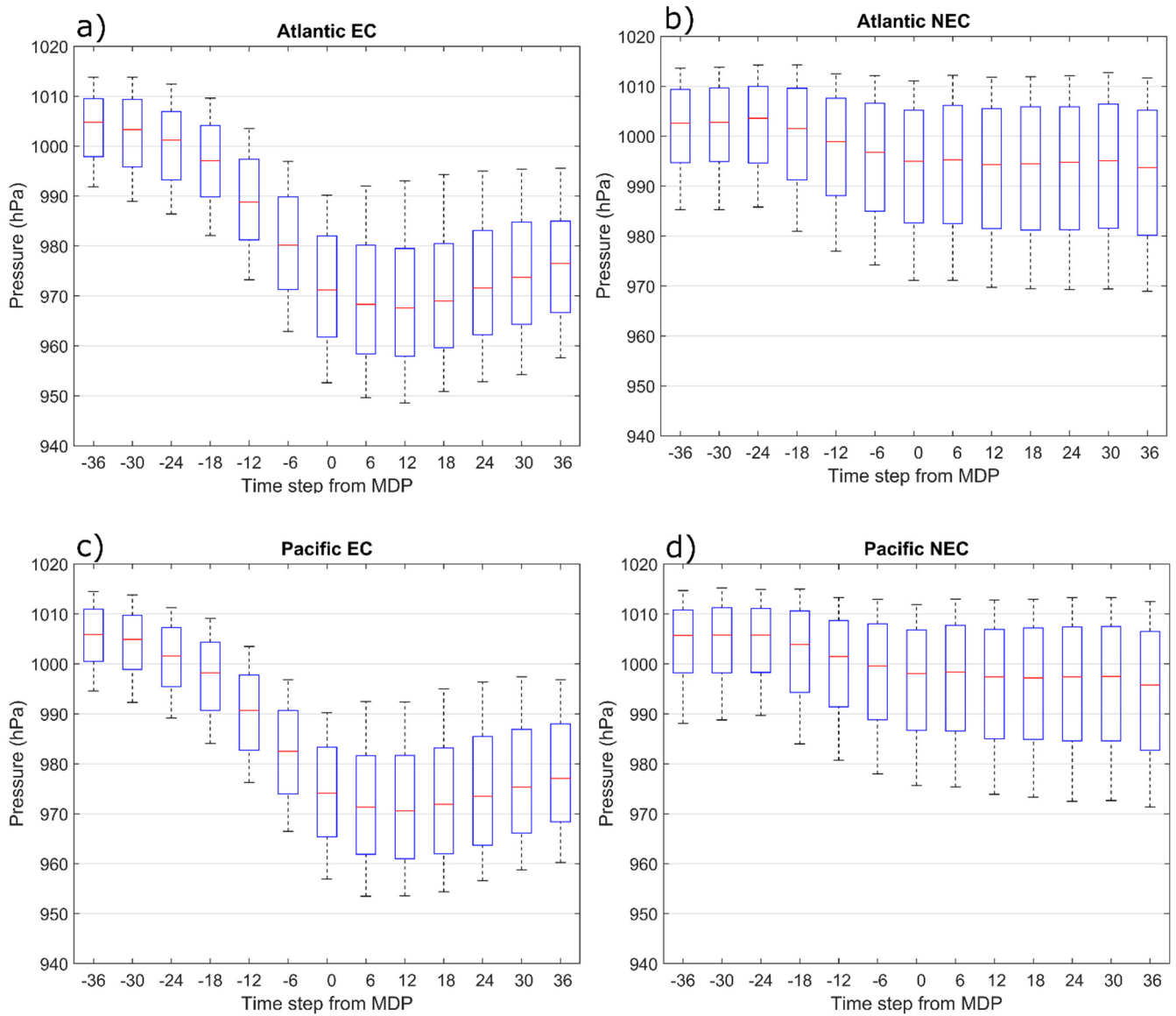
Figure S1. Distribution of core pressure values (a) for explosive cyclogenesis (EC) and the North Atlantic. Data is depicted as box-plots with the median (red line), 10th, 25th 75th and 90th percentiles of the distributions of cyclone core pressure in every time step from -36h until +36h. Number of samples is indicated in Table S1. (b) as for a) but for Non-explosive cyclogenesis (NEC) (c) as a) but for North Pacific. (d) as b) but for North Pacific.
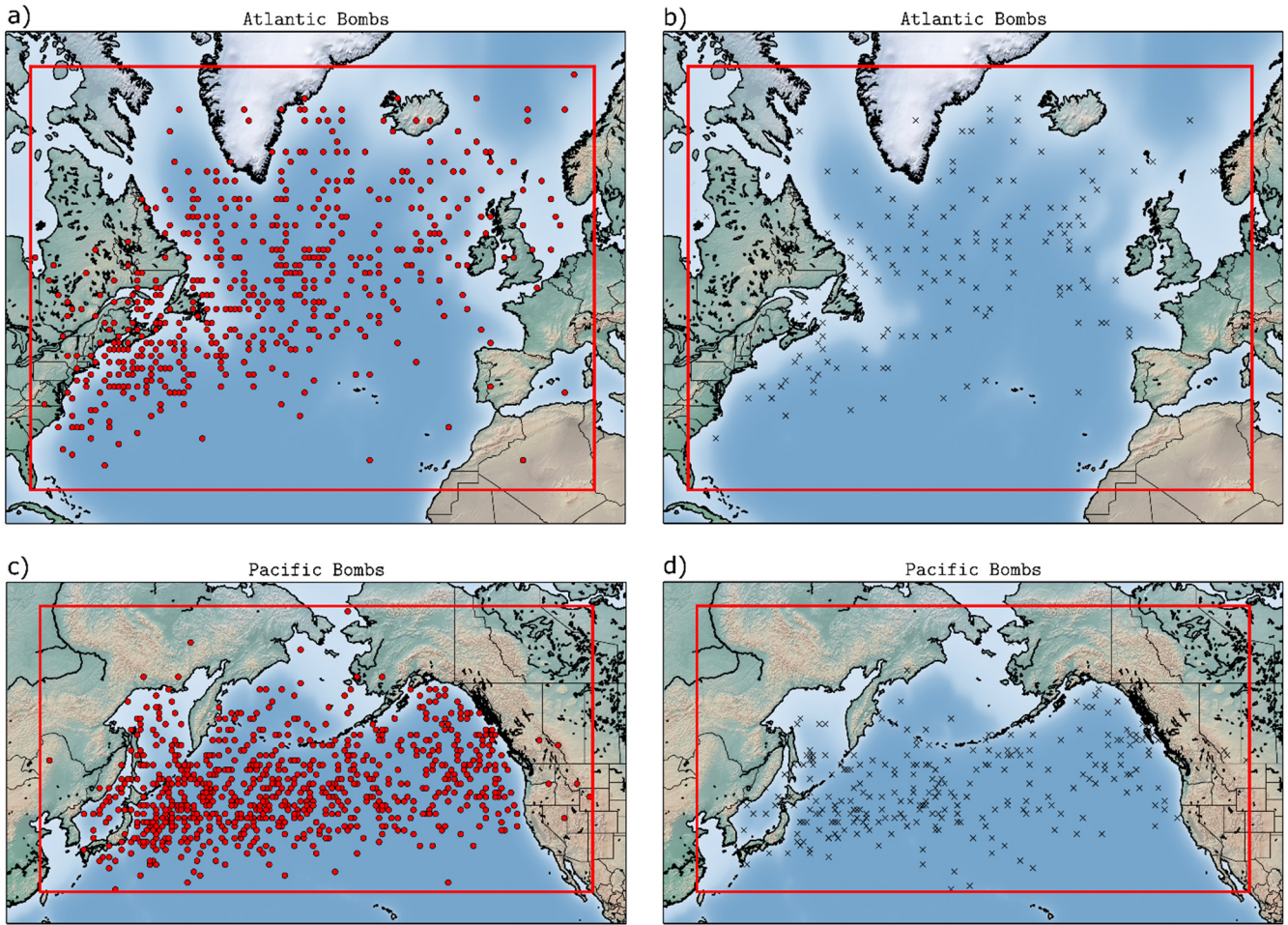
Figure S2. Location of explosive cyclogenesis (EC) during the maximum deepening point (MDP) (a) concurrent with an AR for the North Atlantic (red dots) (b) as a) but AR was not detected (black crosses) (c) as a) but for North Pacific (d) as b) but for North Pacific.
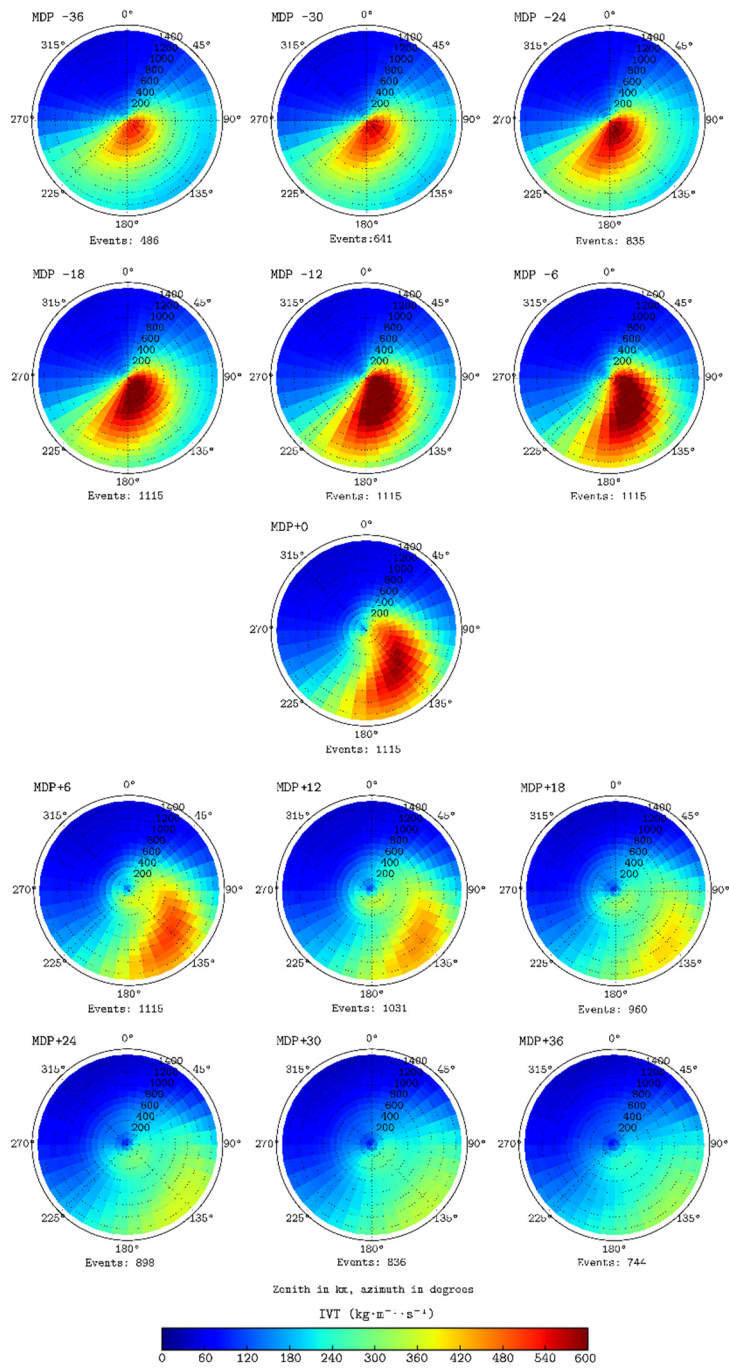
Figure S3. Composite of the integrated vapour transport (IVT, colours, kg.m-1.s-1) within a 1500km radius around the cyclone core of an explosive cyclogenesis (EC) cyclone for the North Pacific basin for the period 1979-2011. The maximum deepening point (MDP) is fixed as time-reference and results are shown for ±36 hours of the MDP.
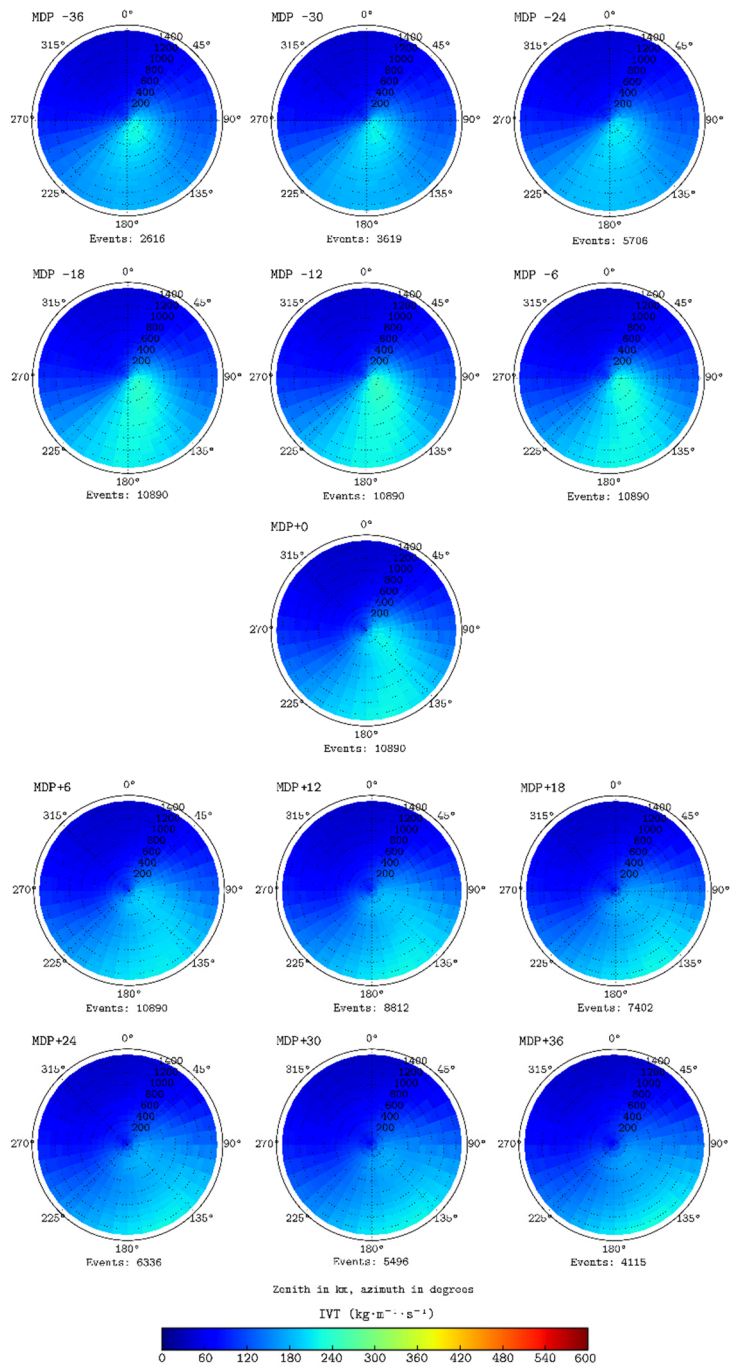
Figure S4. Same as Figure S3, but for Non-Explosive cyclogenesis (NEC).