

Supplement of Earth Syst. Dynam., 9, 611–625, 2018  
<https://doi.org/10.5194/esd-9-611-2018-supplement>  
© Author(s) 2018. This work is distributed under  
the Creative Commons Attribution 4.0 License.



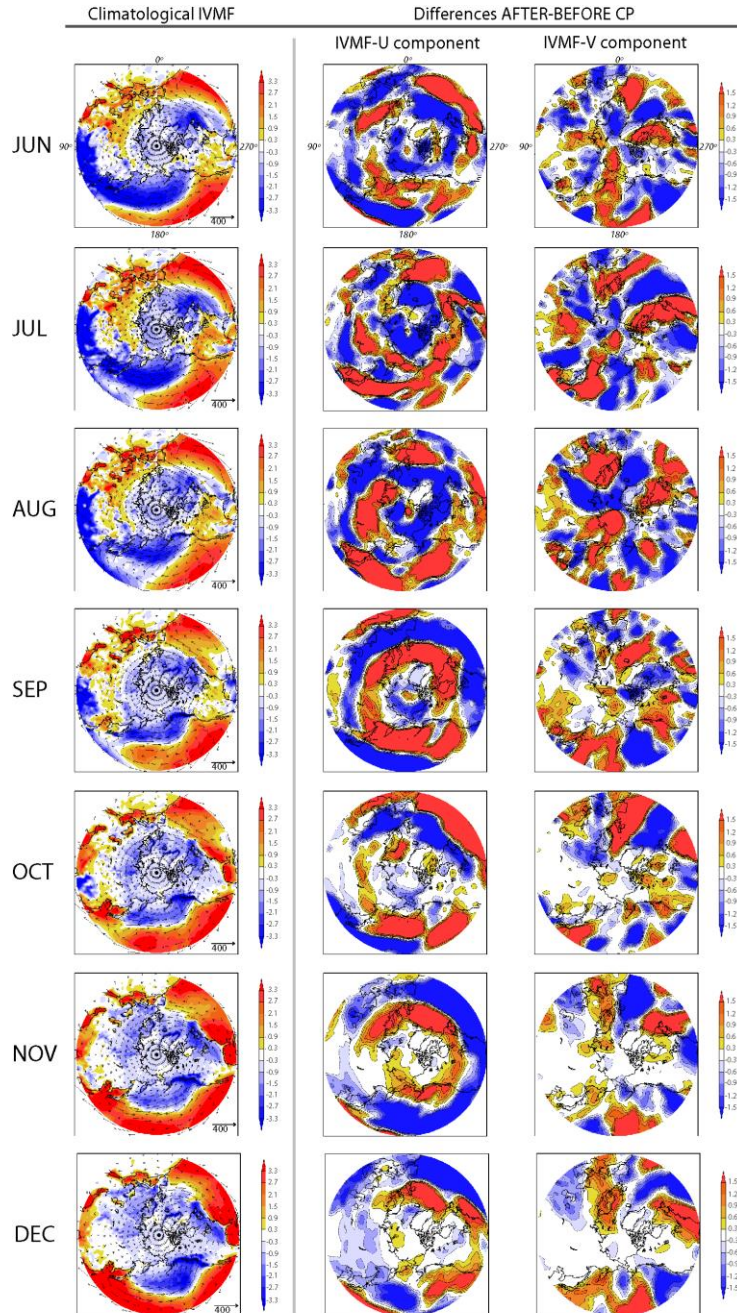
*Supplement of*

## **A new pattern of the moisture transport for precipitation related to the drastic decline in Arctic sea ice extent**

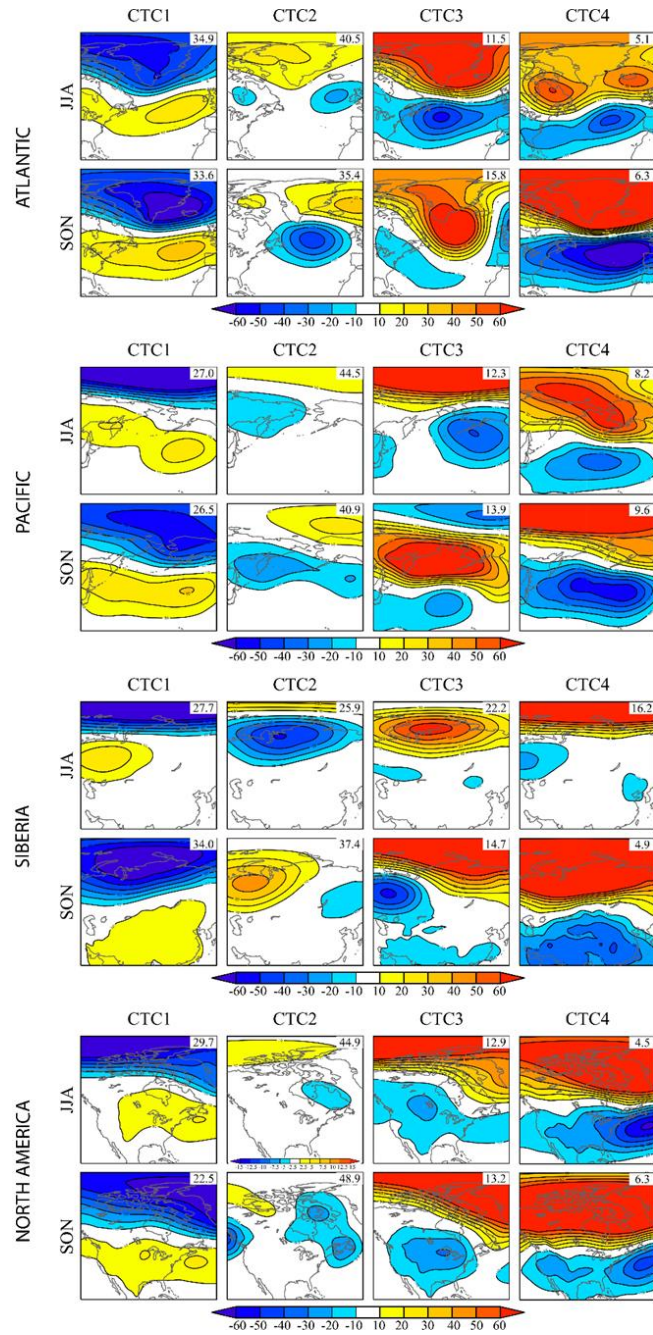
**Luis Gimeno-Sotelo et al.**

*Correspondence to:* Luis Gimeno ([l.gimeno@uvigo.es](mailto:l.gimeno@uvigo.es))

The copyright of individual parts of the supplement might differ from the CC BY 4.0 License.



5 **Figure S1.** Left) The climatological vertical integrated moisture flux (VIMF) (vector, kg/m/s) and its divergence (shaded, mm/yr) by month from June to December, middle) the difference between the periods after vs before the CP for the zonal component of VIMF, and right) as in the middle panel but for the meridional component of VIMF.



5 Figure S2. Anomalies of geopotential height at 850 hPa (Z850) for the four classes representing types of circulation (classes CTC1 to CTC4), and sector centred on the major source together with the percentage of days grouped in each class

	<b>Atlantic Ocean</b>	<b>Pacific Ocean</b>	<b>North America</b>	<b>Siberia</b>
<b>BAFFIN</b>	<b>40613</b>	<b>32785</b>	<b>141067</b>	<b>6184</b>
<b>BARENTS</b>	<b>9256</b>	<b>3902</b>	<b>15336</b>	<b>17235</b>
<b>BEAUFORT</b>	<b>534</b>	<b>11023</b>	<b>9249</b>	<b>9831</b>
<b>BERING</b>	<b>1829</b>	<b>60348</b>	<b>6659</b>	<b>41223</b>
<b>CANADIAN ISLAND</b>	<b>421</b>	<b>4662</b>	<b>10426</b>	<b>2829</b>
<b>CENTRAL ARCTIC</b>	<b>4716</b>	<b>11059</b>	<b>21129</b>	<b>22220</b>
<b>CHUKCHI</b>	<b>572</b>	<b>10358</b>	<b>3415</b>	<b>12078</b>
<b>EAST SIBERIAN</b>	<b>1102</b>	<b>9275</b>	<b>21880</b>	<b>3421</b>
<b>GREENLAND</b>	<b>36900</b>	<b>17773</b>	<b>69134</b>	<b>7211</b>
<b>HUDSON</b>	<b>2961</b>	<b>18675</b>	<b>59233</b>	<b>4303</b>
<b>KARA-B</b>	<b>2733</b>	<b>1698</b>	<b>4706</b>	<b>16358</b>
<b>LAPTEV</b>	<b>1300</b>	<b>2938</b>	<b>3510</b>	<b>17030</b>
<b>OKHOTSK</b>	<b>4157</b>	<b>33112</b>	<b>4794</b>	<b>79120</b>

5 Table S1. Average number of particles by source that reached daily the target regions

Month	Mode	Atlantic Before/After	Mode	Pacific Before/After	Mode	Siberian Before/After	Mode	North America Before/After
June	CTC1	3903/3552	CTC1	8961/8436	CTC1	8034/7237	CTC1	10450/9289
	CTC2	3626/2907	CTC2	10028/9016	CTC2	8371/8530	CTC2	10140/9962
	CTC3	4196/2919	CTC3	8895/8463	CTC3	8348/7431	CTC3	10016/10473
	CTC4	3200/3276	CTC4	9918/7881	CTC4	9422/8055	CTC4	8918/10746
July	CTC1	4184/3820	CTC1	1354/13634	CTC1	9122/8767	CTC1	11475/12694
	CTC2	4088/3550	CTC2	12983/11148	CTC2	10662/8853	CTC2	11278/12008
	CTC3	3980/2669	CTC3	12666/12940	CTC3	9381/8200	CTC3	11563/12502
	CTC4	3427/3424	CTC4	12996/9504	CTC4	10224/9430	CTC4	9363/11271
August	CTC1	4018/4659	CTC1	15962/14527	CTC1	9771/8707	CTC1	13017/13145
	CTC2	3763/4021	CTC2	14467/13273	CTC2	11564/10554	CTC2	12258/12211
	CTC3	3559/3530	CTC3	14714/11736	CTC3	9884/9195	CTC3	12852/10896
	CTC4	3731/4383	CTC4	13338/13179	CTC4	10660/10466	CTC4	11864/11193
Month	Mode	Atlantic Before/After	Mode	Pacific Before/After	Mode	Siberian Before/After	Mode	North America Before/After
September	CTC1	4827/4955	CTC1	11648/10974	CTC1	8091/9588	CTC1	11863/13180
	CTC2	4877/5255	CTC2	10401/10737	CTC2	8324/8306	CTC2	11865/12180
	CTC3	4865/5145	CTC3	12545/10308	CTC3	8479/8762	CTC3	11302/11433
	CTC4	4316/4655	CTC4	9760/8969	CTC4	7848/9054	CTC4	11125/11095
October	CTC1	3854/4270	CTC1	8009/8121	CTC1	6703/6429	CTC1	9474/8931
	CTC2	4097/4545	CTC2	7792/7600	CTC2	6321/6524	CTC2	9343/9328
	CTC3	4132/4710	CTC3	8904/7721	CTC3	6952/6728	CTC3	9541/9394
	CTC4	3097/4076	CTC4	7712/7157	CTC4	5785/5520	CTC4	8386/8715
November	CTC1	4182/4447	CTC1	6418/6869	CTC1	4472/5181	CTC1	6484/7059
	CTC2	4080/4467	CTC2	6275/6214	CTC2	3859/4578	CTC2	6684/6796
	CTC3	5052/4025	CTC3	7551/8996	CTC3	4319/4361	CTC3	6336/6618
	CTC4	3600/4493	CTC4	6408/7374	CTC4	3008/2990	CTC4	6105/6612

**Table S2. Average moisture transport for precipitation (MTP) ( mm/day), for each class representing circulation types before and after the 2003 change point**

	CTC	Atlantic	Mode	Pacific	Mode	Siberian	Mode	North America
June	CTC1	9.30/5.31*	CTC1	6.5/6.69	CTC1	9.38/8	CTC1	7.75/4.92*
	CTC2	12.67/13.61	CTC2	16.29/14.61	CTC2	10.41/9.85	CTC2	14.71/13.54
	CTC3	5.38/7.38*	CTC3	4.54/6.46*	CTC3	5.62/6.77	CTC3	4.5/8.46*
	CTC4	2.67/3.69	CTC4	2.67/2.23	CTC4	4.58/5.38	CTC4	3.04/3.08
July	CTC1	14.08/9.85*	CTC1	11.17/8.62*	CTC1	9.04/6.23*	CTC1	10.63/7.85*
	CTC2	14.17/16.23*	CTC2	13.13/14.62	CTC2	6.63/7.23	CTC2	16.83/16.31
	CTC3	1.75/3.54*	CTC3	3.79/5.54*	CTC3	9.54/10.38	CTC3	3/6.23*
	CTC4	1/1.38	CTC4	2.92/2.23	CTC4	5.79/7.15	CTC4	0.54/0.62
August	CTC1	16.63/10.38*	CTC1	10.92/8.77*	CTC1	9.83/12.54*	CTC1	15.58/9.08*
	CTC2	11/15.62*	CTC2	13.92/17.46*	CTC2	8.17/10*	CTC2	13/15.69*
	CTC3	2.45/4.24*	CTC3	2.63/2.77	CTC3	7.67/4*	CTC3	1.83/4.92*
	CTC4	0.96/0.77	CTC4	3.54/2*	CTC4	5.33/4.46	CTC4	0.58/1.31*
Summer	CTC1	40/25.50*	CTC1	28.58/24.08*	CTC1	28.25/26.77	CTC1	33.96/21.84*
	CTC2	37.79/45.46*	CTC2	43.33/46.69*	CTC2	25.21/27.08	CTC2	44.54/45.53
	CTC3	9.58/15.15*	CTC3	10.96/14.77*	CTC3	22.83/21.15	CTC3	9.33/19.61*
	CTC4	4.62/5.85	CTC4	9.12/6.46*	CTC4	15.71/17	CTC4	4.17/5
September	CTC1	11.13/16.08*	CTC1	7.83/10.46*	CTC1	6.29/5.38	CTC1	6.38/8.31*
	CTC2	12.67/9.08*	CTC2	12.17/12.54	CTC2	12.5/13.54	CTC2	16.67/16.54
	CTC3	5.08/4.46	CTC3	7.75/5.46*	CTC3	7.21/7.84	CTC3	4.92/3.61
	CTC4	1.12/0.38*	CTC4	2.25/1.54	CTC4	4.00/3.23	CTC4	2.04/1.54
October	CTC1	11.17/8.46*	CTC1	10.33/11.08	CTC1	15.38/14.23	CTC1	8.25/5.31*
	CTC2	12.00/12.84	CTC2	13.88/13.15	CTC2	11.25/12.15	CTC2	15.75/15.23
	CTC3	5.50/5.00	CTC3	4.17/2.46*	CTC3	3.67/3.85	CTC3	4.46/7.23*
	CTC4	2.33/4.69*	CTC4	2.62/4.31*	CTC4	0.71/0.77	CTC4	2.54/3.23
November	CTC1	10.21/11.08	CTC1	6.71/8.08	CTC1	12.33/14.31*	CTC1	7.92/8.92
	CTC2	12.37/10.38*	CTC2	15.71/13.69*	CTC2	13.46/12.08	CTC2	16.67/16.84
	CTC3	4.67/7.23*	CTC3	2.59/5.00*	CTC3	4.00/2.77*	CTC3	3.08/3.77
	CTC4	2.75/1.31*	CTC4	5.00/3.23*	CTC4	0.21/0.85*	CTC4	2.33/0.46*
Autumn	CTC1	32.51/35.62*	CTC1	24.87/29.62*	CTC1	34.00/33.92	CTC1	22.55/22.54
	CTC2	37.04/32.26*	CTC2	41.76/39.38	CTC2	37.35/37.77	CTC2	49.09/48.61
	CTC3	15.25/16.83	CTC3	14.51/12.92	CTC3	14.88/14.46	CTC3	12.46/14.61
	CTC4	6.20/6.38	CTC4	9.87/9.08	CTC4	4.92/4.85	CTC4	6.91/5.23*

Table S3. Changes in the frequency of each class (days per month) before and after the CP. Blue/red coloured numbers indicate decreased/increased frequency of the class after the CP. Colours in the CTC cells are related to the order relationship of the 1980–2016 average MTP value for each CTC (in decreasing order: red, orange, green, and blue).

5 Asterisks indicate statistical significance at the 95% confidence level using a z-test to compare two sample proportions (Sprinthal, 2011).