# The perfect pattern of moisture transport for precipitation for Arctic sea ice melting
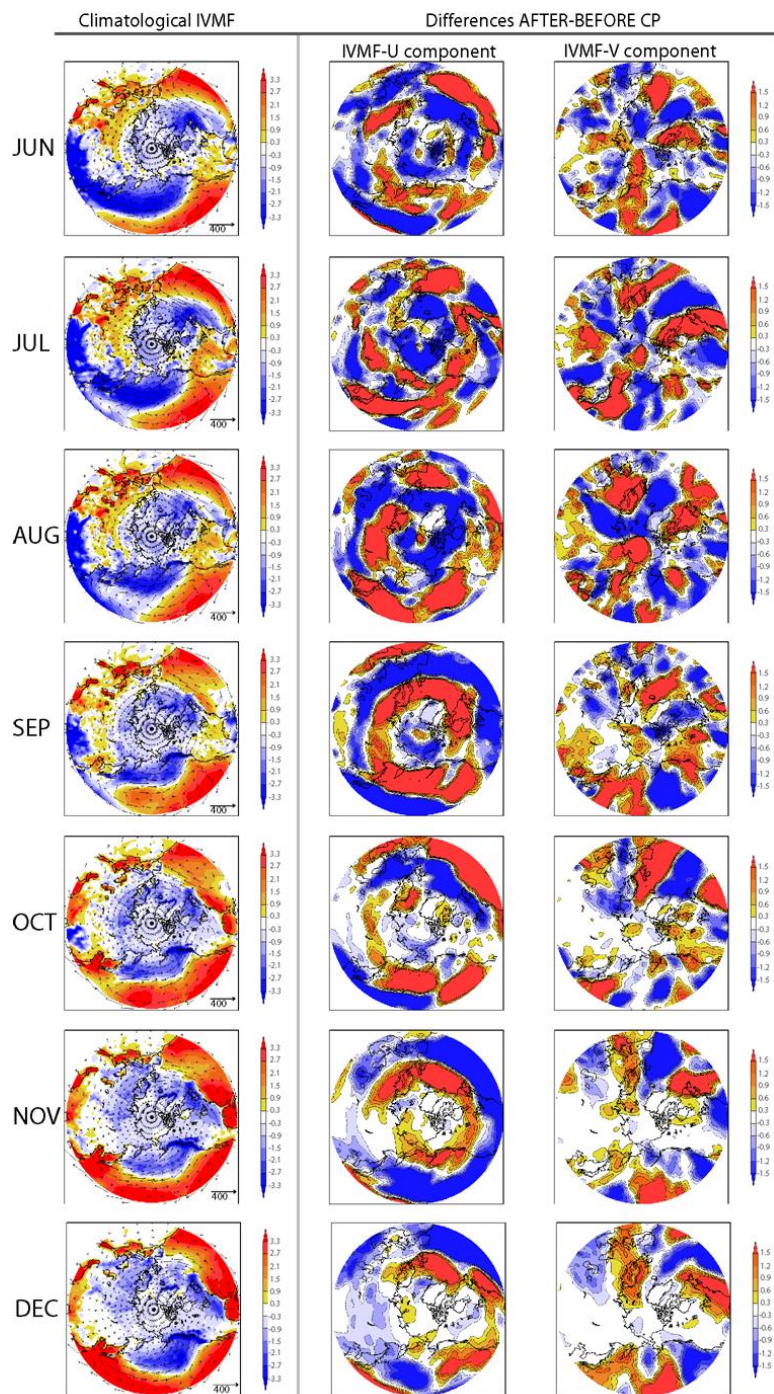
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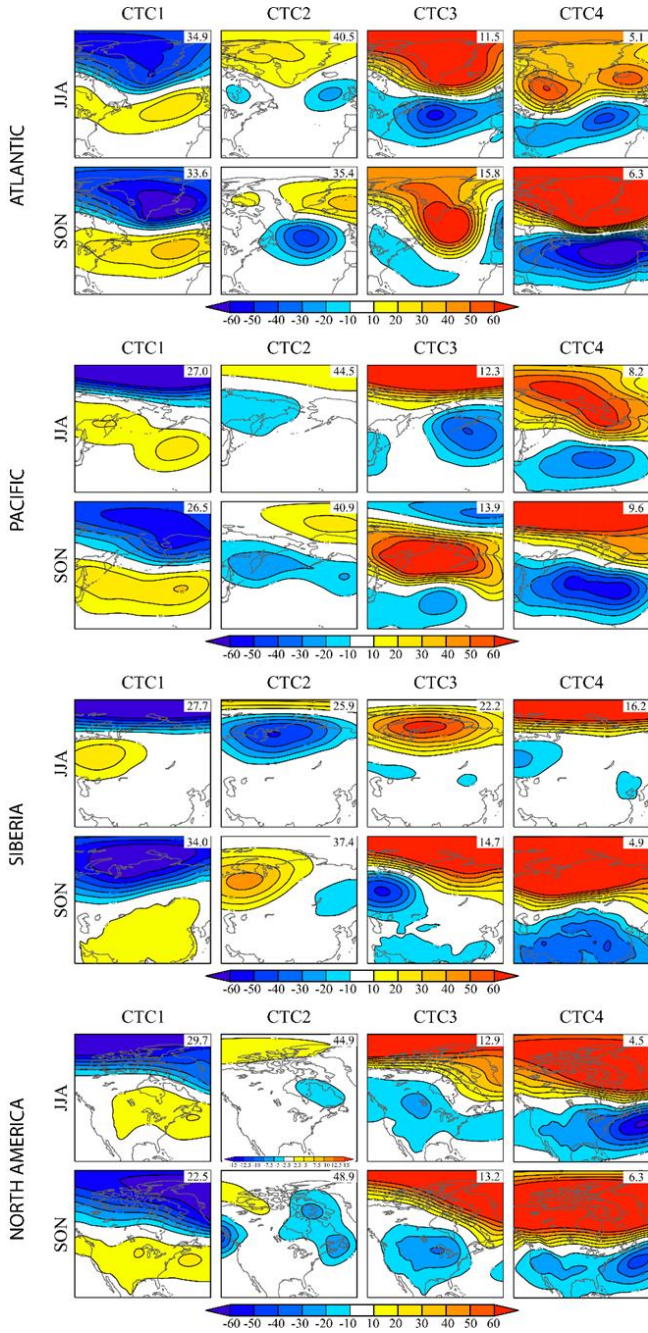5   [2]Environmental Physics Laboratory (EphysLab), Universidade de Vigo, Ourense, 32004, Spain

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*(Supplementary material)*

**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 November, 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.**

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

| 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 |

5 **Table S1. Average moisture transport for precipitation (MTP) 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 S2. 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).**