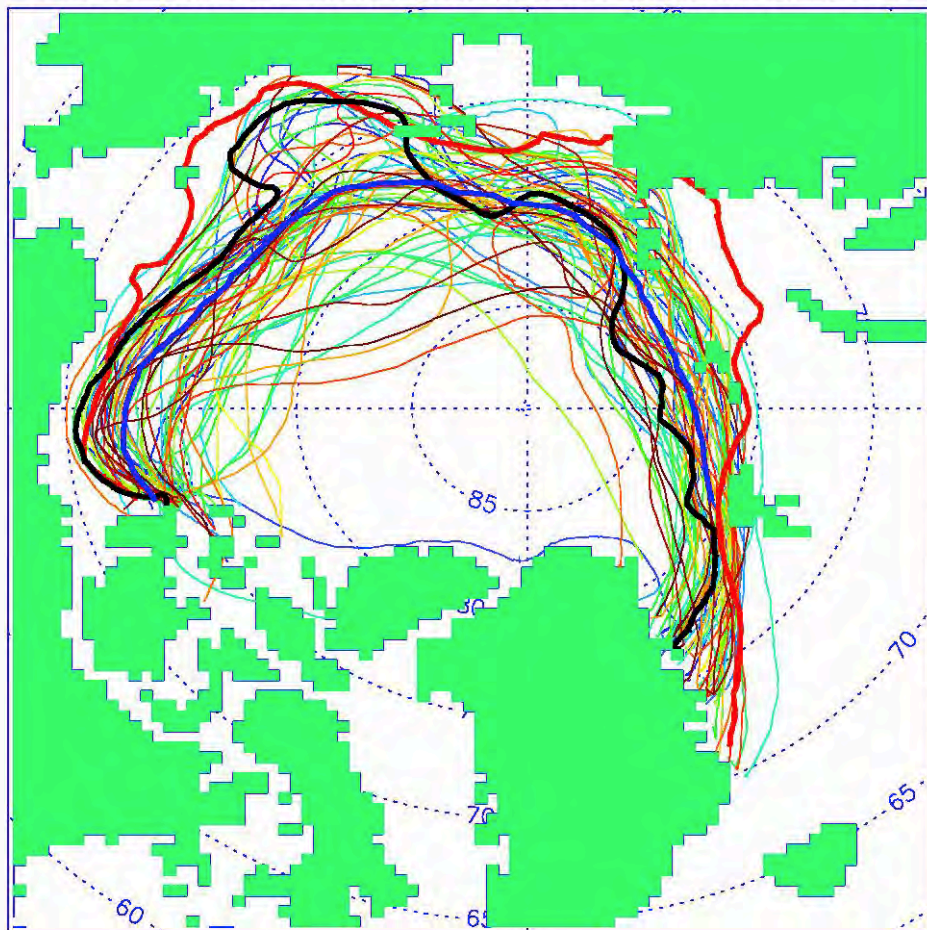


2014 Sea ice outlook competition

61 participants of the 2nd FAMOS workshop (October 22-25, 2013) prepared outlooks for sea ice conditions in 2014, including:

- ❖ Outlooks of spatial distribution of sea ice extent at the date of its minimum
- ❖ Outlooks of the minimum of sea ice extent area
- ❖ Outlooks of the date of sea ice extent minimum

FAMOS outlook: minimum sea ice extent for 2014



- 1978–2010–mean–ice–minimum
- 2014–ice–minimum–mean–outlook
- 2013–observed–ice–minimum

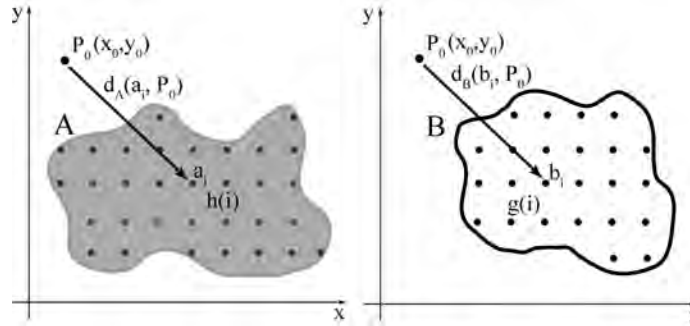
- Allard
- Ashjian
- Bhatrasatapongkul
- B. Tremblay
- Carroll
- Carton
- Castellani
- Chepurin
- Close
- Curry
- Ding
- Dukhovskoy
- Dupont
- Farrel
- Fransner
- Galubeva
- Griewank
- Guthrie
- Haggala
- Haine
- Hato
- Herbaout
- Higginson
- H. Lee
- Houssais
- Isachsen
- Itkin
- Janout
- J–E. Tremblay
- Karcher
- Keen
- Kim
- Komarov
- Kwon
- Lique
- Long
- Lunéva
- Matrai
- Nguyen
- Nummelin
- Olason
- Paquin
- Pemberton
- Peralta–Ferriz
- Perrie
- Plante
- Popova
- Proshutinsky
- Rae
- Renske
- Roberts
- Ruth
- Steele
- Steiner
- Sundford
- Timmermans
- Tsamado
- Whitefield
- Williams
- Y. Lee
- Zhao

4 methodologies are employed to quantify similarity between minimum ice edge contours from 2013 FAMOS individual outlooks and satellite observations

1) Mean Displacement

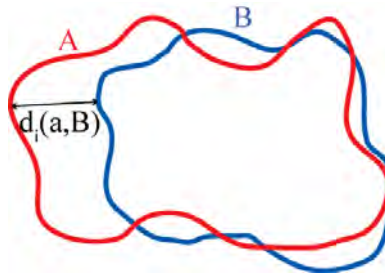
$$D(A) = \frac{1}{n} \sum_{i=1}^n f_i \cdot d_A(P_i, P_0)$$

$$D(B) = \frac{1}{m} \sum_{i=1}^m f_i \cdot d_B(P_i, P_0)$$



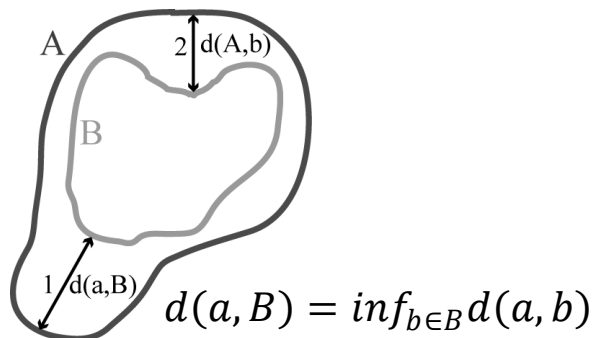
2) Root Mean Square Deviation

$$D_{RMD} = \sqrt{\frac{\sum_{i=1}^n [d_i(A, B)]^2}{n}}$$



3) Hausdorff Distance

$$D_{HD}(A, B) = \max \left\{ \sup_{a \in A} d(a, B), \sup_{b \in B} d(A, b) \right\}$$

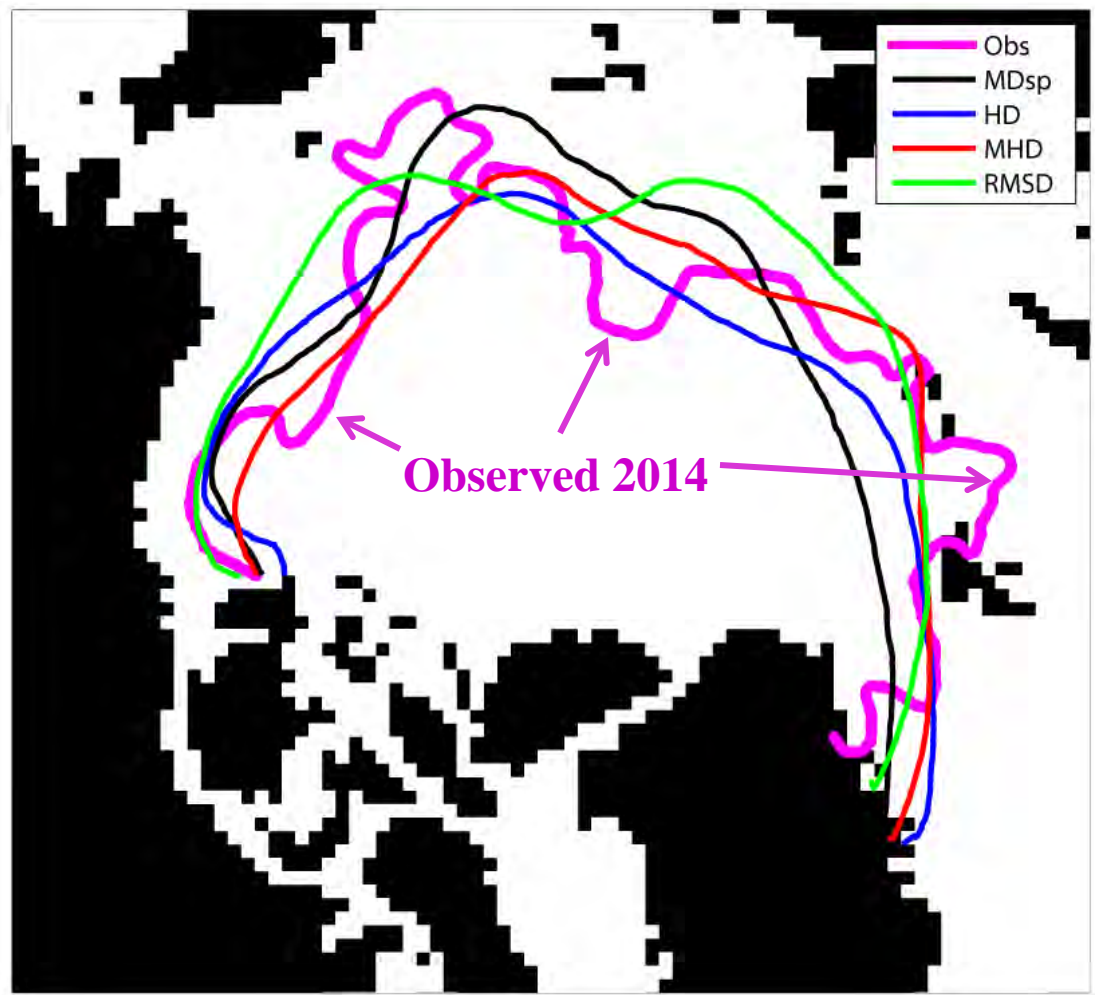


4) Modified Hausdorff Distance

$$D_{MHD} \equiv D(A, B) = \max \{ d(A, B), d(B, A) \}$$

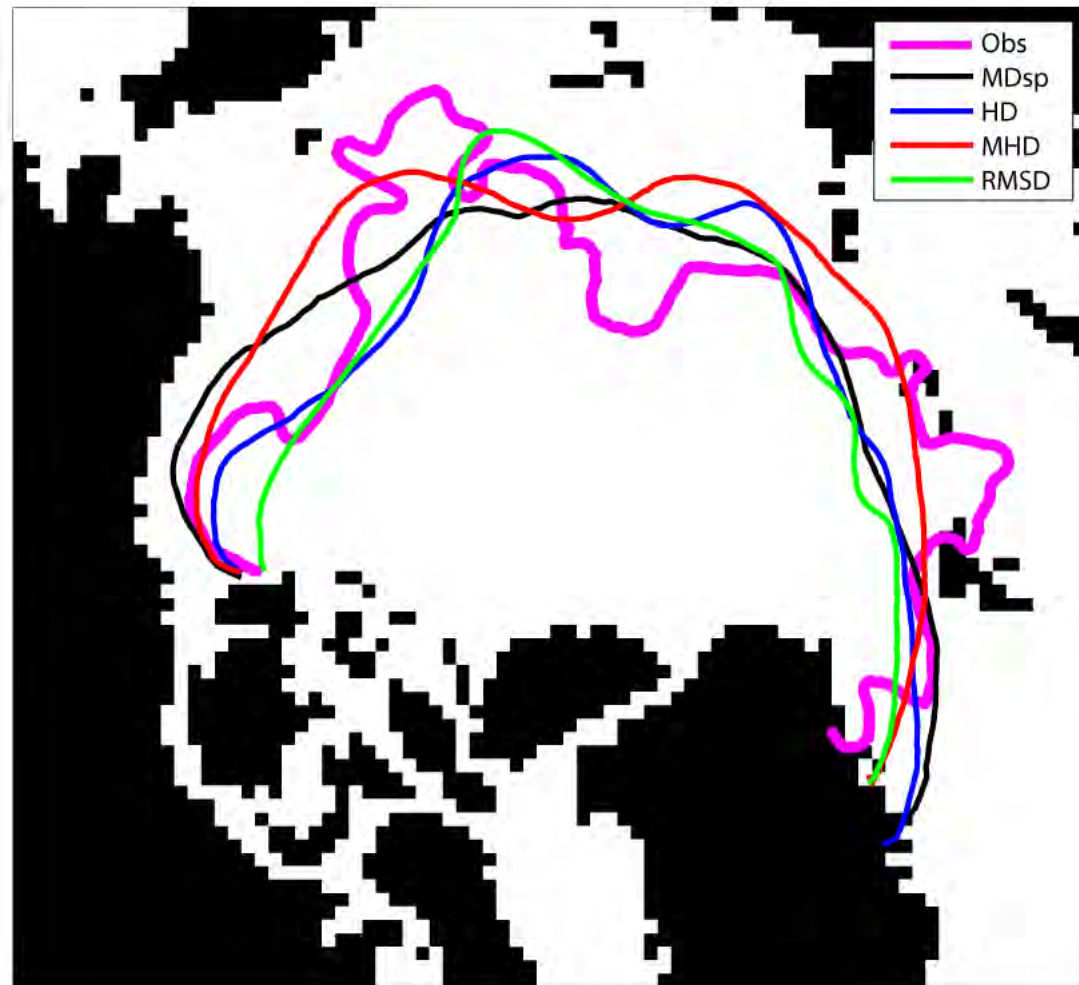
$$d(A, B) = \frac{1}{|A|} \sum_{a \in A} d(a, B)$$

$$d(B, A) = \frac{1}{|B|} \sum_{b \in B} d(A, b)$$



1st Place:

Mean Displacement:	Plante
RMSD:	Luneva
Hausdorff Dist.:	Close
Modified Hausdorff Dist.:	Kwon



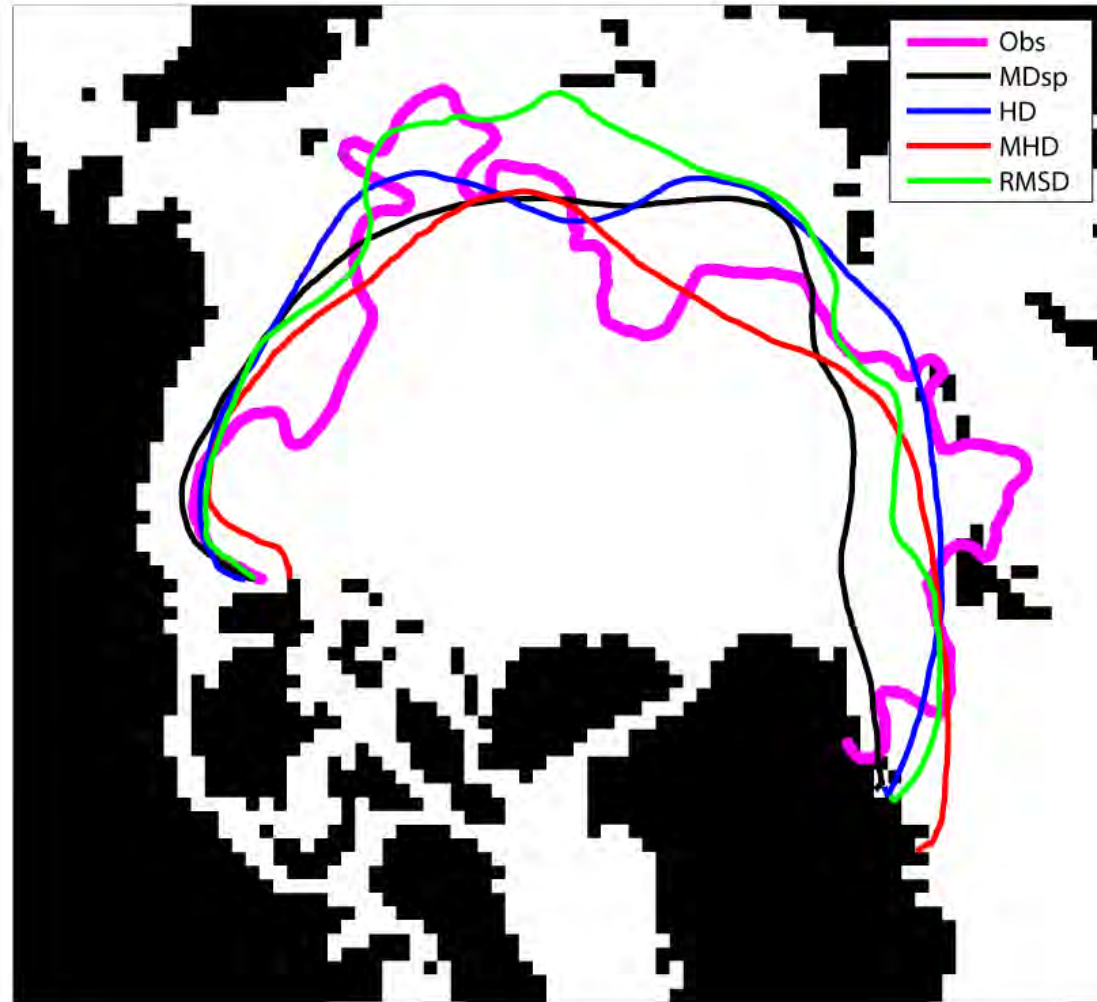
2nd Place:

Mean Displacement: Curry

RMSD: B. Tremblay

Hausdorff Dist.: Ruth

Modified Hausdorff Dist.: Luneva



3rd Place:

Mean Displacement: Timmermans

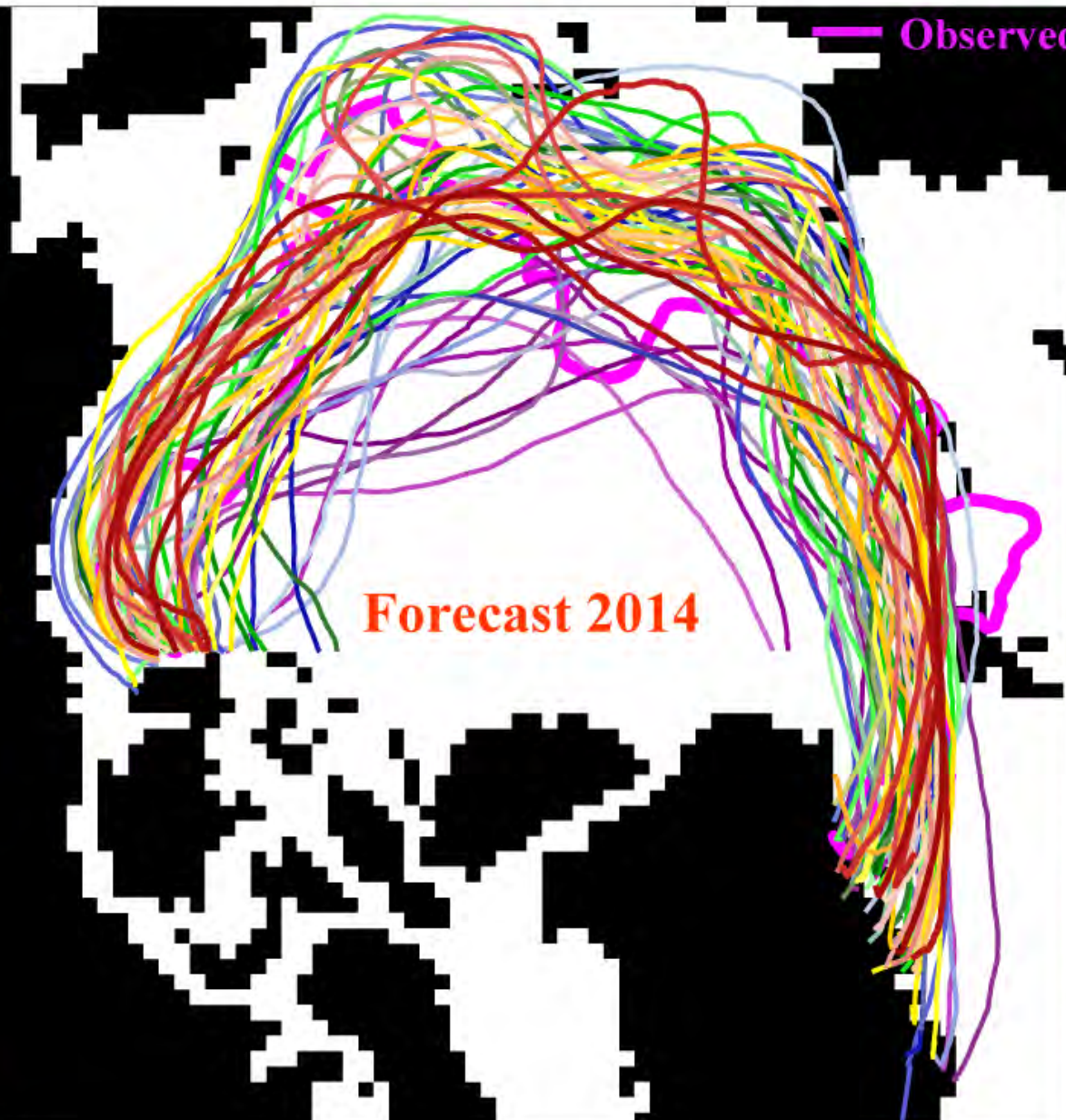
RMSD: Renske

Hausdorff Dist.: Luneva

Modified Hausdorff Dist.: Close

Rankings and scores from the Modified Hausdorff Distance method

- 1: Kwon 3.04
- 2: Luneva 3.06
- 3: Close 3.33
- 4: Dupont 3.44
- 5: Chepurin 3.45
- 6: Bhatra 3.53
- 7: Houssais 3.53
- 8: Ruth 3.61
- 9: Steiner 3.62
- 10: Ashjian 3.65
- 11: Allard 3.65
- 12: Renske 3.68
- 13: Lique 3.70
- 14: Karcher 3.75
- 15: Carrol 3.75
- 16: Golubeva 3.91
- 17: BTremblay 3.92
- 18: Plante 3.92
- 19: Curry 3.95
- 20: Itkin 3.95
- 21: Frasner 3.96
- 22: Steele 3.99
- 23: Janout 4.02
- 24: Keen 4.18
- 25: Ding 4.23
- 26: Kim 4.27
- 27: Carton 4.30
- 28: Olason 4.33
- 29: Nguyen 4.35
- 30: Popova 4.36
- 31: Farrel 4.43



— Observed

- 32: Sundford 4.52
- 33: Castellani 4.54
- 34: Pemberton 4.61
- 35: Zhao 4.61
- 36: Whitefield 4.62
- 37: Timmermans 4.6
- 38: Williams 4.79
- 39: Herbaut 4.84
- 40: Guthrie 4.87
- 41: HjLee 4.96
- 42: Paquin 4.97
- 43: Nummelin 5.01
- 44: Matrai 5.09
- 45: Komarov 5.21
- 46: Proshutinsky 5.29
- 47: Isachsen 5.36
- 48: Higginson 5.45
- 49: Perrie 5.50
- 50: Griewank 5.61
- 51: Tsamados 5.80
- 52: Haine 5.92
- 53: Peralta-periz 6.2
- 54: Haapala 6.68
- 55: YLee 6.72
- 56: Hata 6.75
- 57: Rabe 6.76
- 58: Dukhovskoy 6.88
- 59: JETremblay 7.37
- 60: Roberts 8.17
- 61: Long 8.96

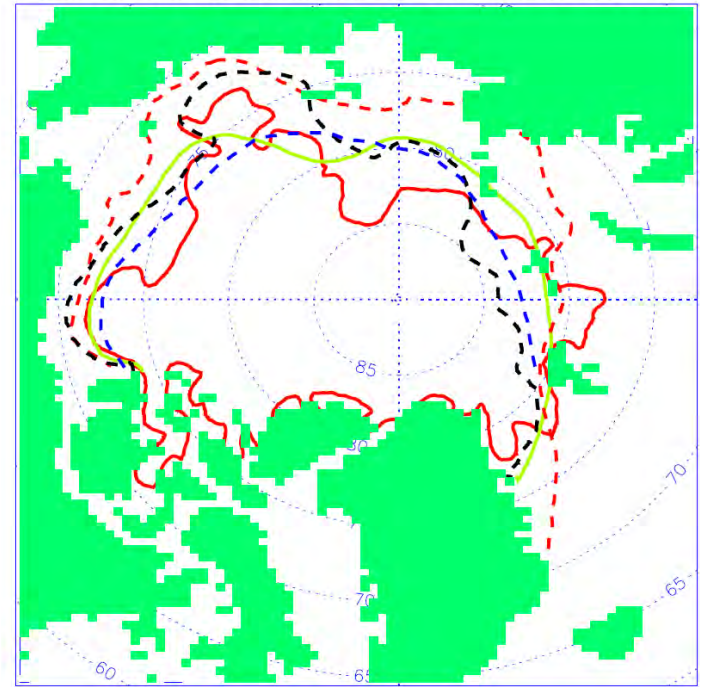
and now:

The Winners!!!

2014 SEA ICE DISTRIBUTION



FAMOS outlook: minimum sea ice extent in 2014



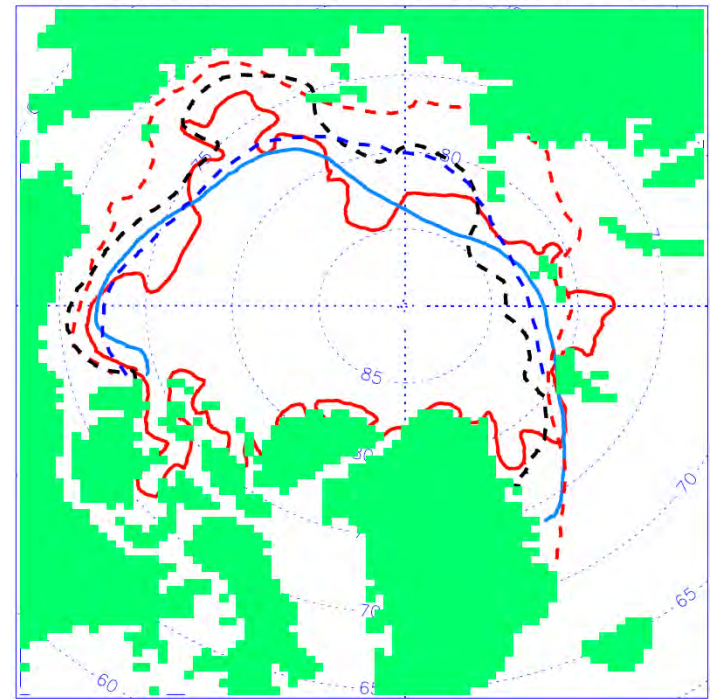
- 1978-2010-mean-ice-minimum
- 2014-ice-minimum-mean-outlook
- 2013-observed-ice-minimum
- 2014-observed-ice-minimum
- Luneva

Maria Luneva

2014 SEA ICE DISTRIBUTION



FAMOS outlook: minimum sea ice extent in 2014



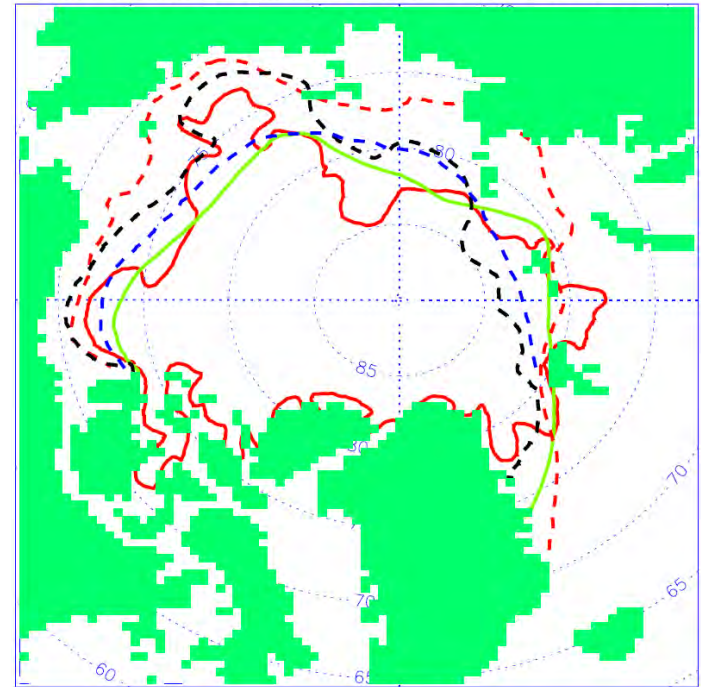
- 1978-2010-mean-ice-minimum
- - - 2014-ice-minimum-mean-outlook
- - - 2013-observed-ice-minimum
- 2014-observed-ice-minimum
- Close

Sally Close

2014 SEA ICE DISTRIBUTION



FAMOS outlook: minimum sea ice extent in 2014



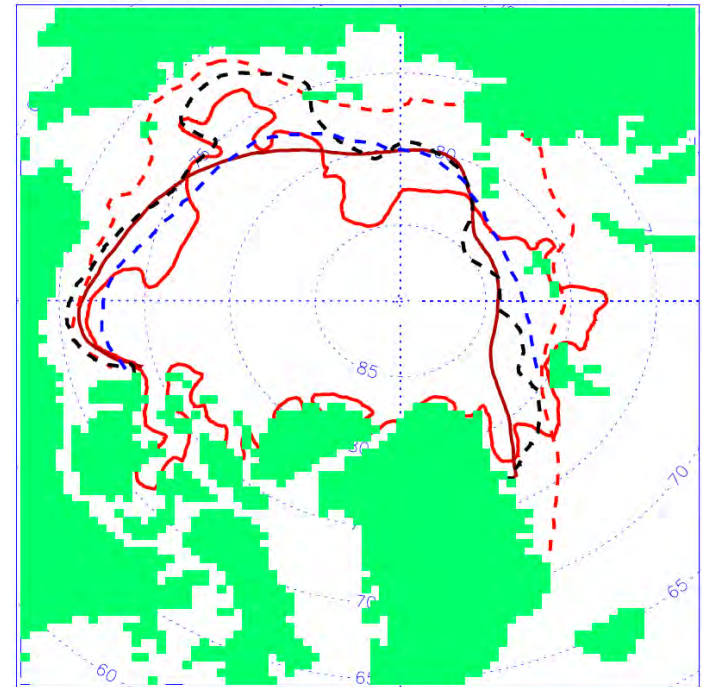
- 1978-2010-mean-ice-minimum
- 2014-ice-minimum-mean-outlook
- 2013-observed-ice-minimum
- 2014-observed-ice-minimum
- Kwon

Mi Ok Kwon

2014 SEA ICE DISTRIBUTION



FAMOS outlook: minimum sea ice extent in 2014



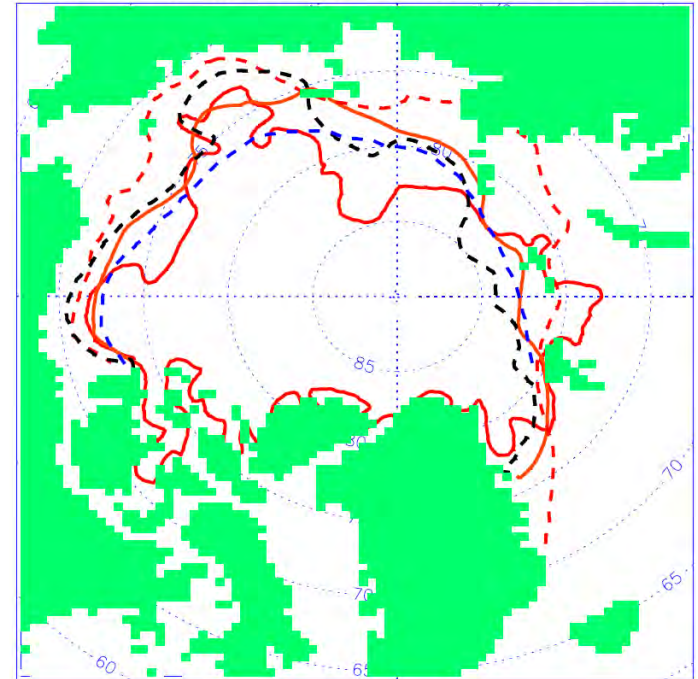
- 1978-2010-mean-ice-minimum
- 2014-ice-minimum-mean-outlook
- 2013-observed-ice-minimum
- 2014-observed-ice-minimum
- Timmermans

Mary-Louise Timmermans

2014 SEA ICE DISTRIBUTION



FAMOS outlook: minimum sea ice extent in 2014



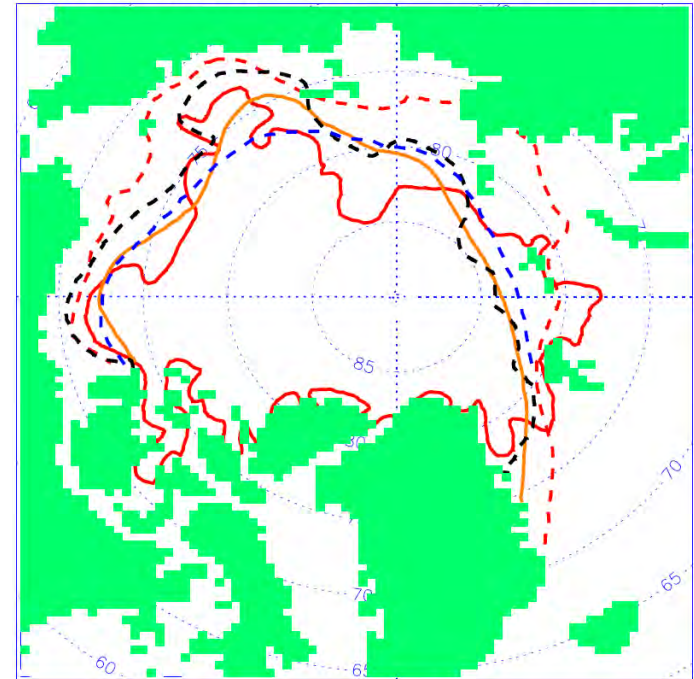
- 1978-2010-mean-ice-minimum
- 2014-ice-minimum-mean-outlook
- 2013-observed-ice-minimum
- 2014-observed-ice-minimum
- Renske

Renske Gelderloos

2014 SEA ICE DISTRIBUTION



FAMOS outlook: minimum sea ice extent in 2014

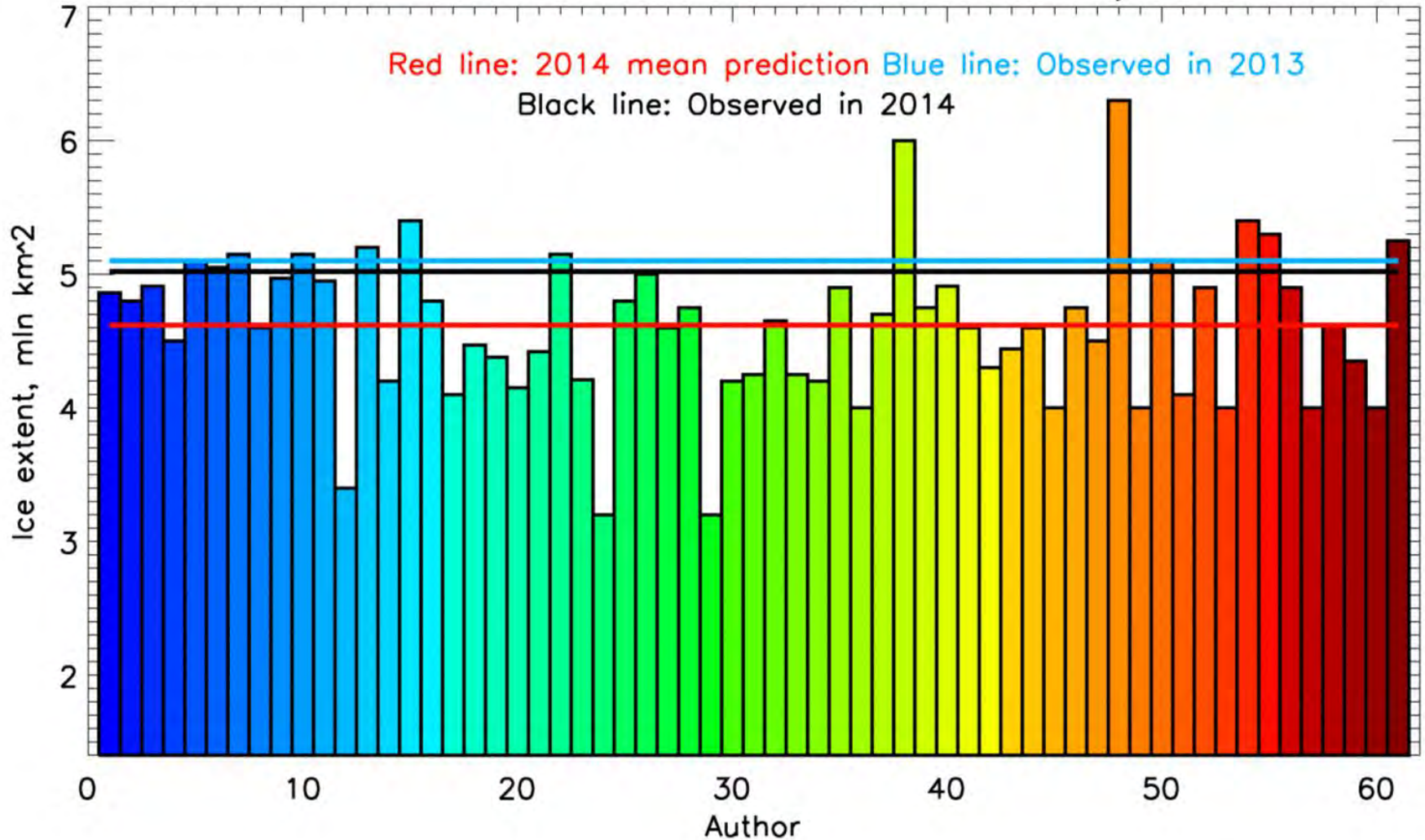


- 1978-2010-mean-ice-minimum
- 2014-ice-minimum-mean-outlook
- 2013-observed-ice-minimum
- 2014-observed-ice-minimum
- Plante

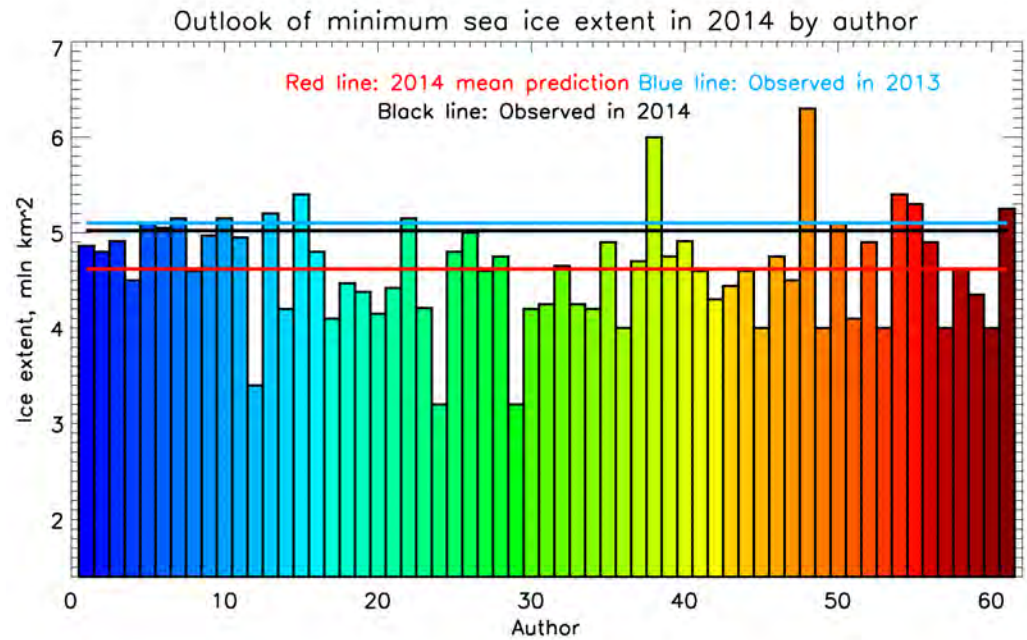
Mathie Plante

❖ Outlooks of the minimum of sea ice extent area

Outlook of minimum sea ice extent in 2014 by author

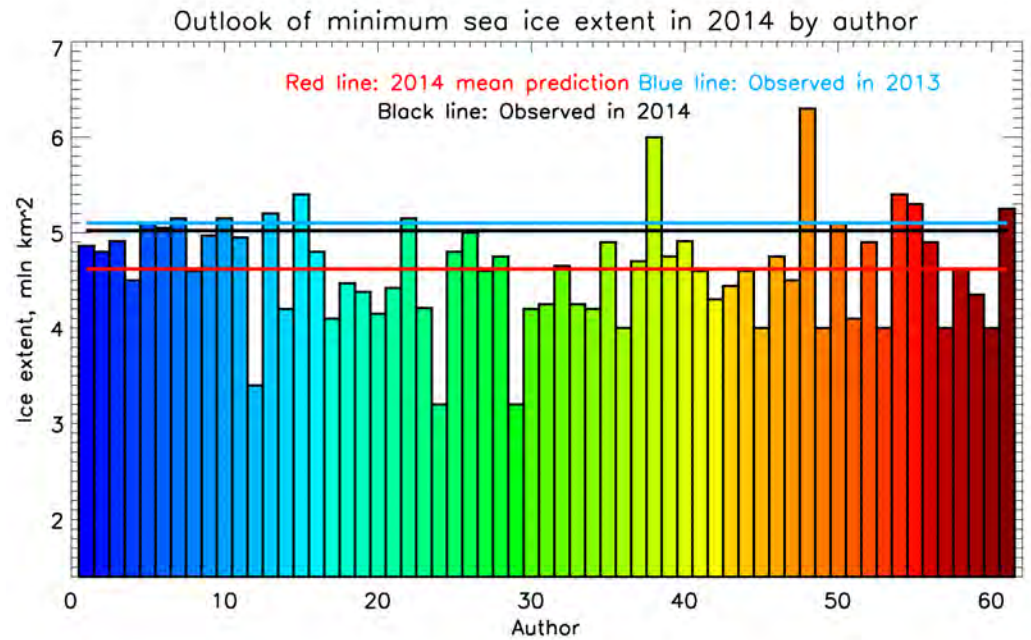


2014 SEA ICE EXTENT



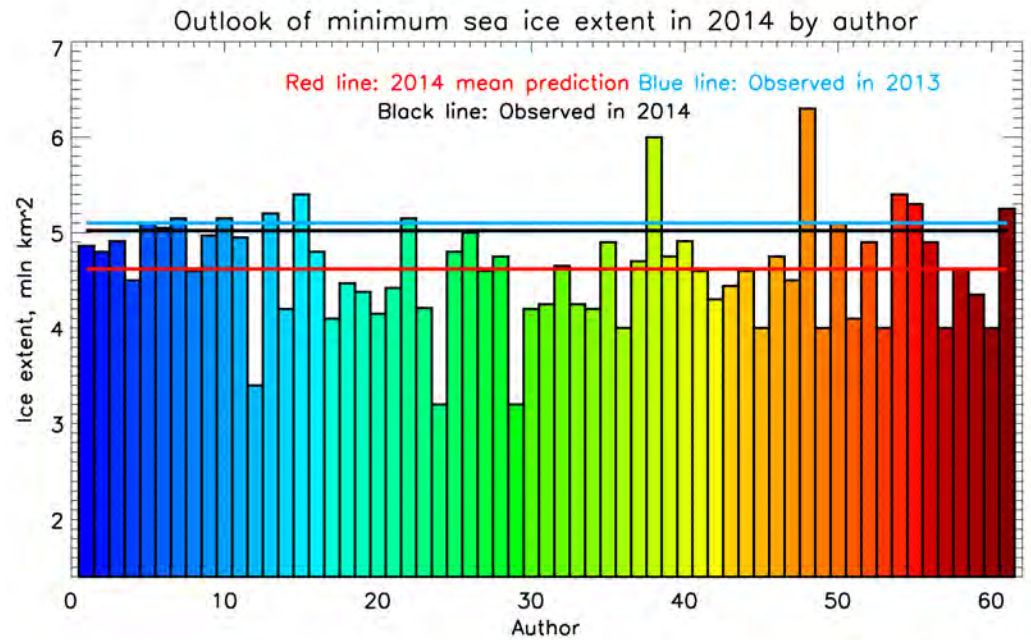
Pal Erik Isachsen

2014 SEA ICE EXTENT



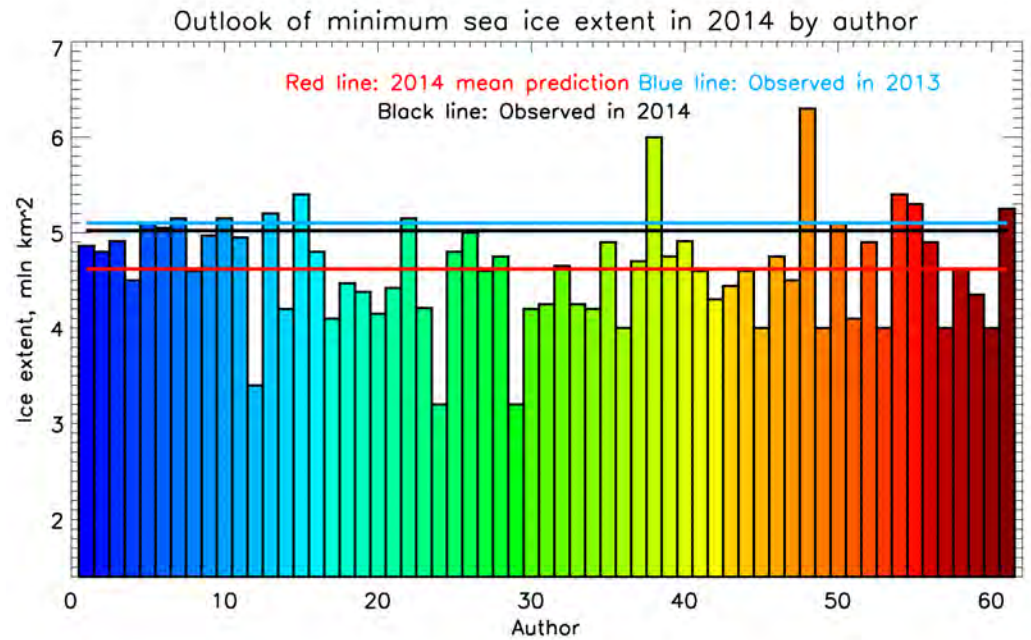
Jim Carton

2014 SEA ICE EXTENT



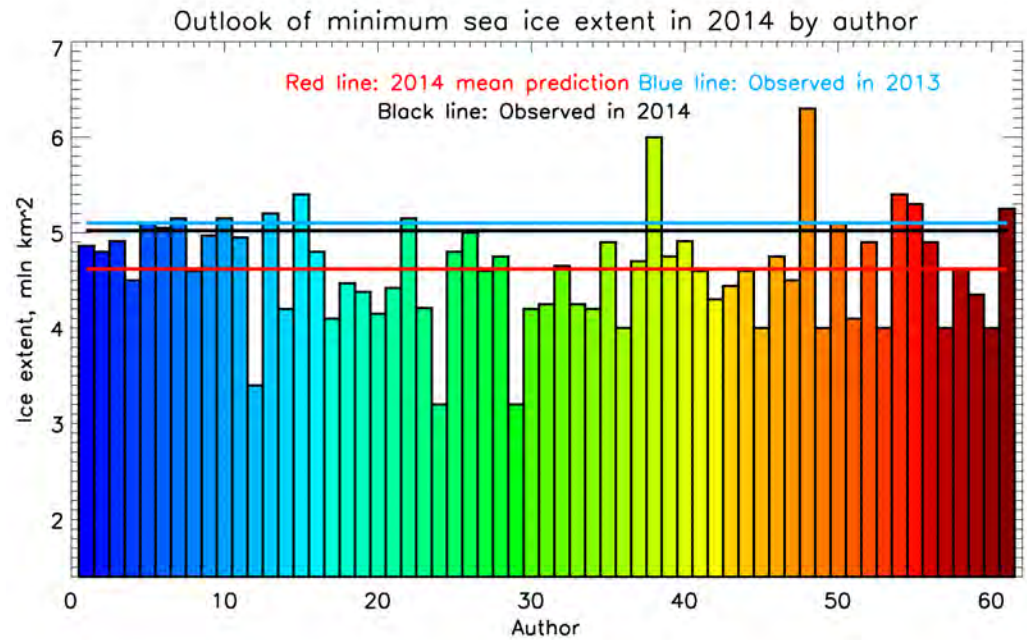
Sally Close

2014 SEA ICE EXTENT



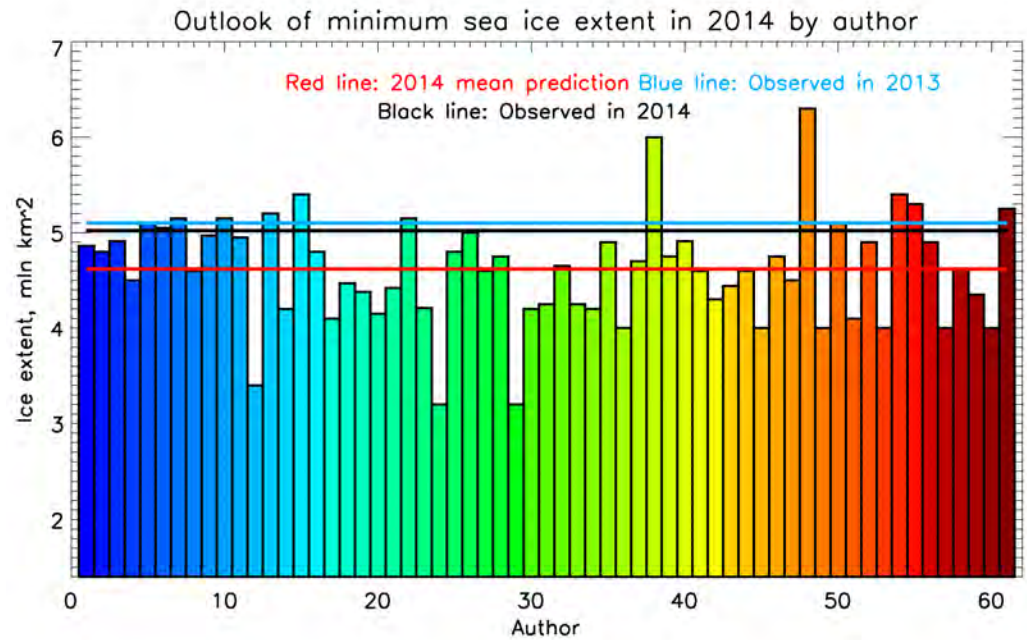
Yanni Ding

2014 SEA ICE EXTENT



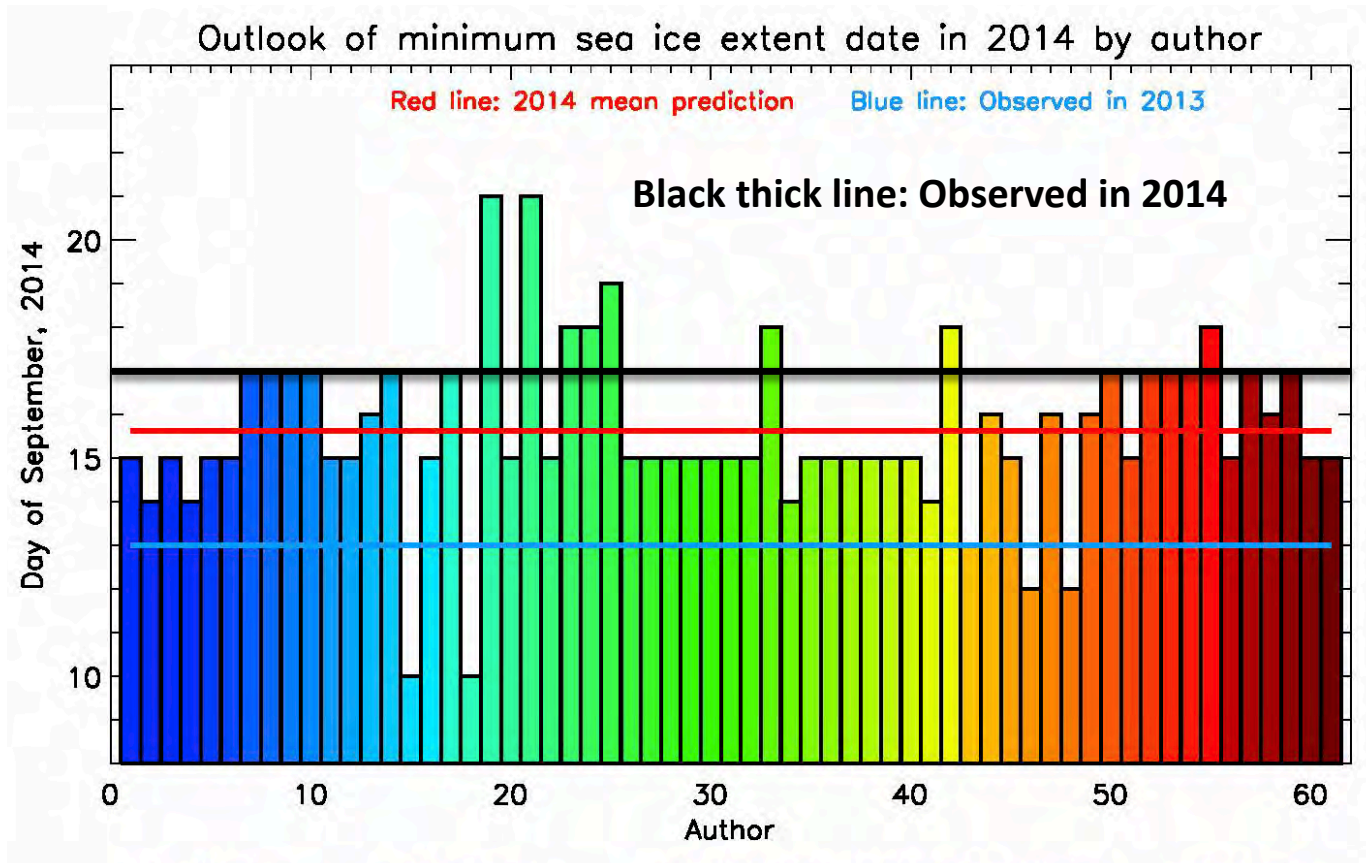
Dustin Carrol

2014 SEA ICE EXTENT



Renske Gelderloos

❖ Outlooks of the date of minimum of sea ice extent



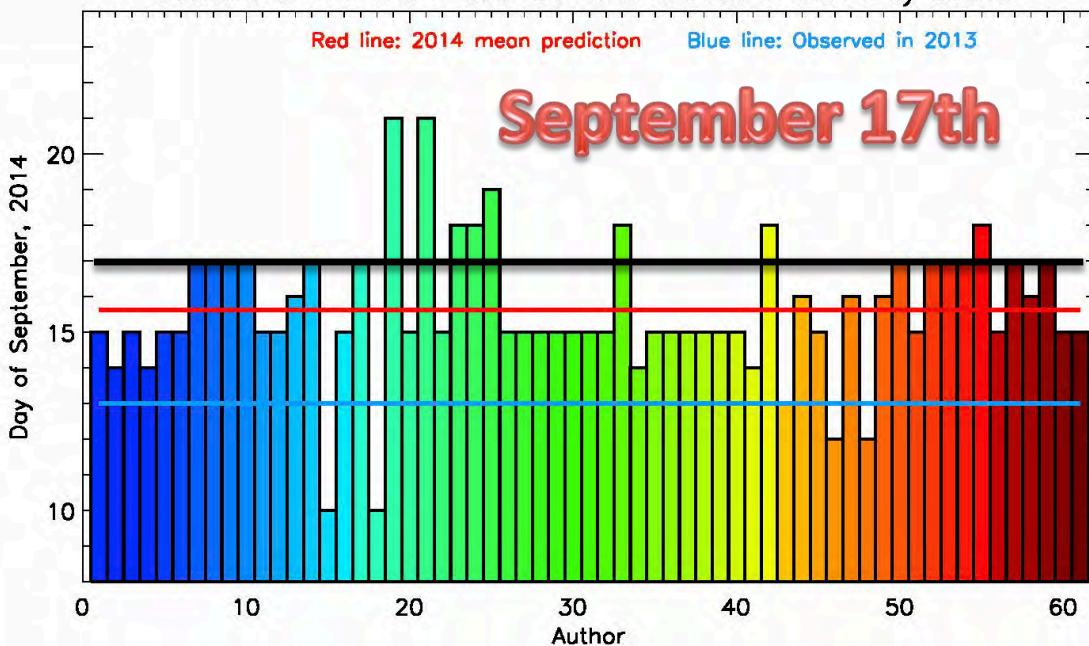
We have **12 WINNERS** in this competition and the winners are:



2014 DATE OF SEA ICE EXTENT MINIMUM



Outlook of minimum sea ice extent date in 2014 by author



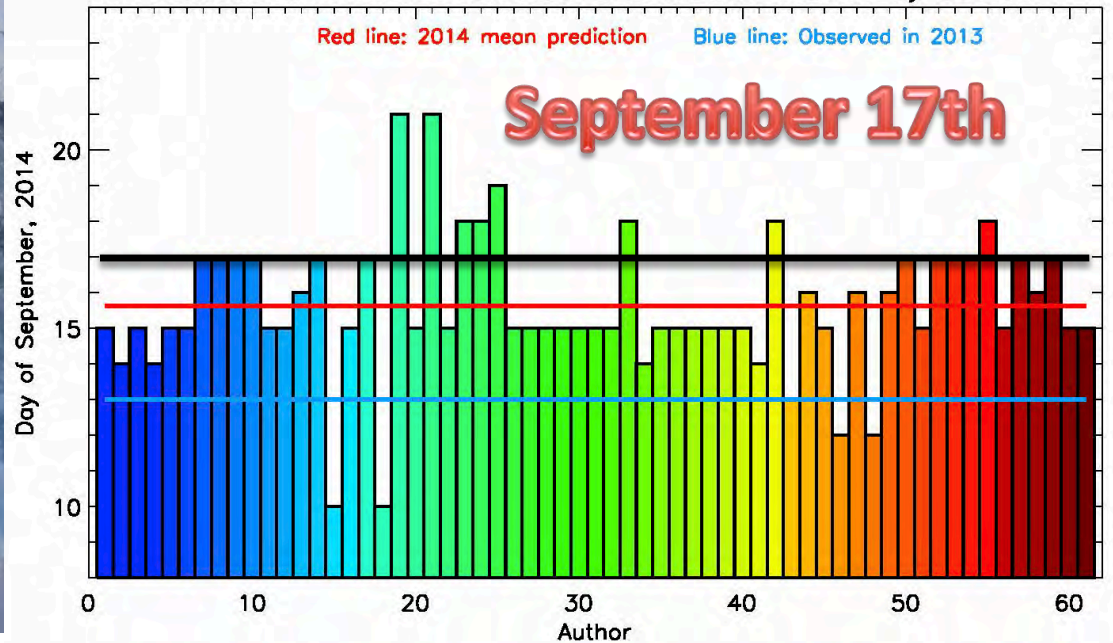
Gennady Chepurin



2014 DATE OF SEA ICE EXTENT MINIMUM



Outlook of minimum sea ice extent date in 2014 by author



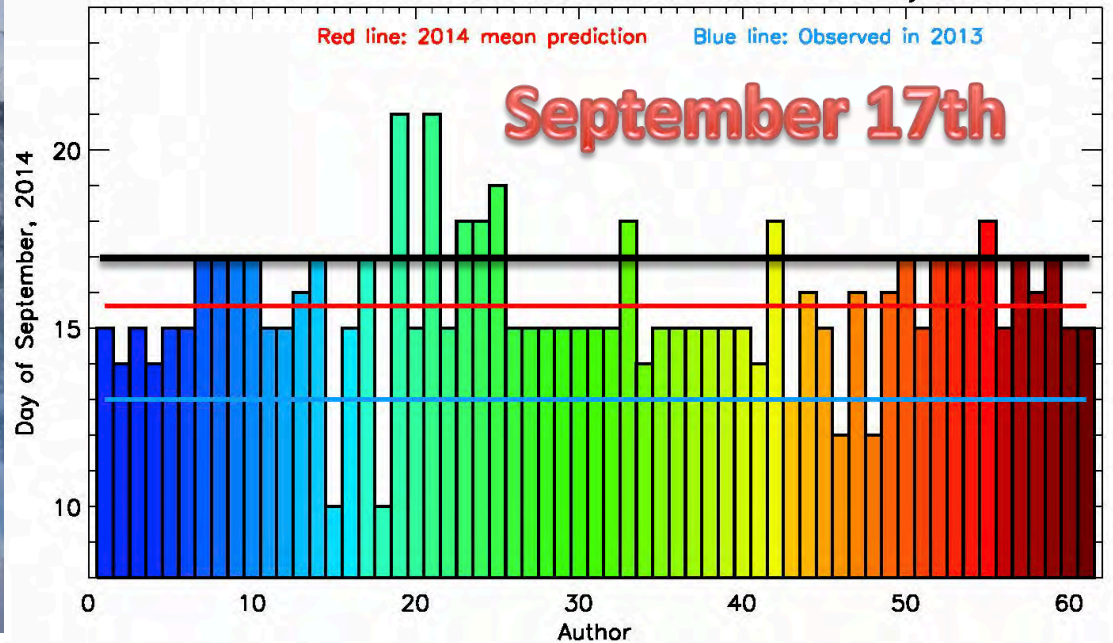
Sally Close



2014 DATE OF SEA ICE EXTENT MINIMUM



Outlook of minimum sea ice extent date in 2014 by author



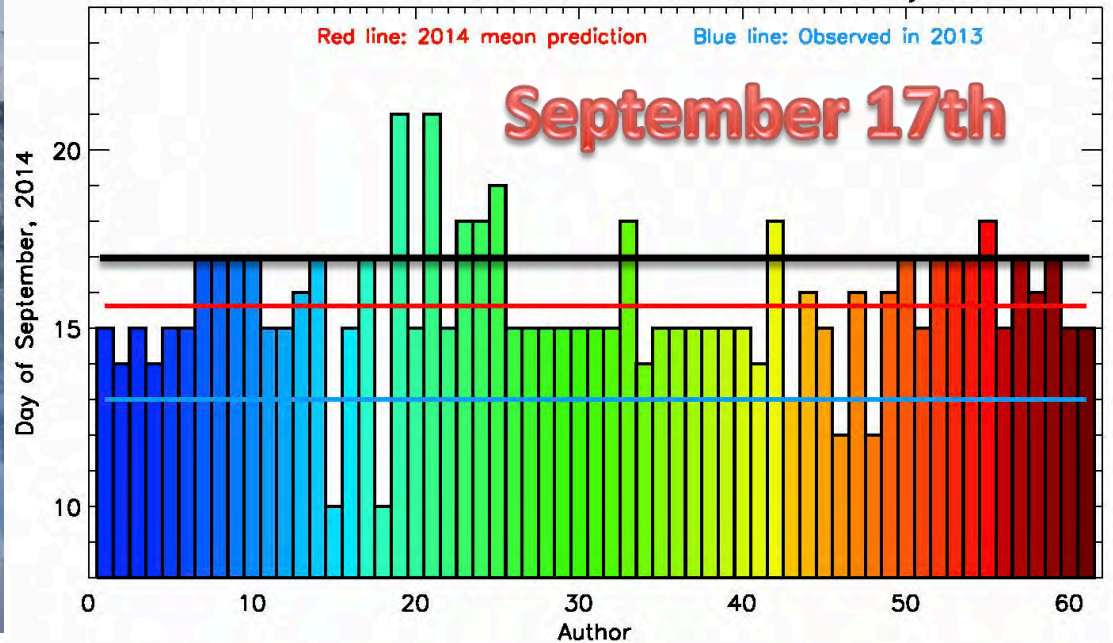
Beth Curry



2014 DATE OF SEA ICE EXTENT MINIMUM



Outlook of minimum sea ice extent date in 2014 by author



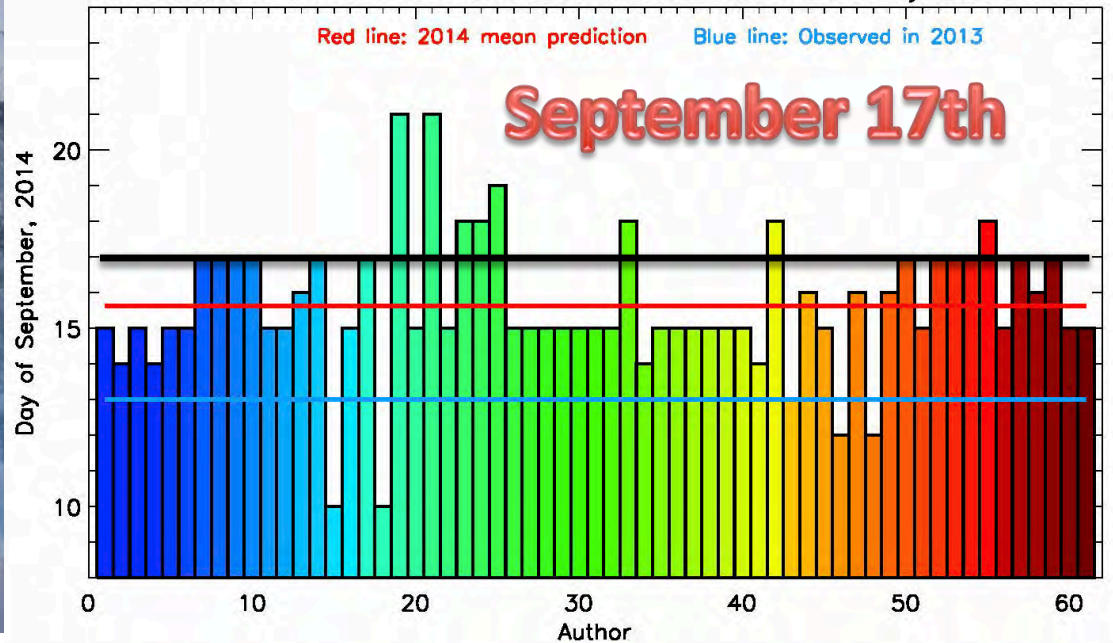
Sinead Farrel



2014 DATE OF SEA ICE EXTENT MINIMUM



Outlook of minimum sea ice extent date in 2014 by author



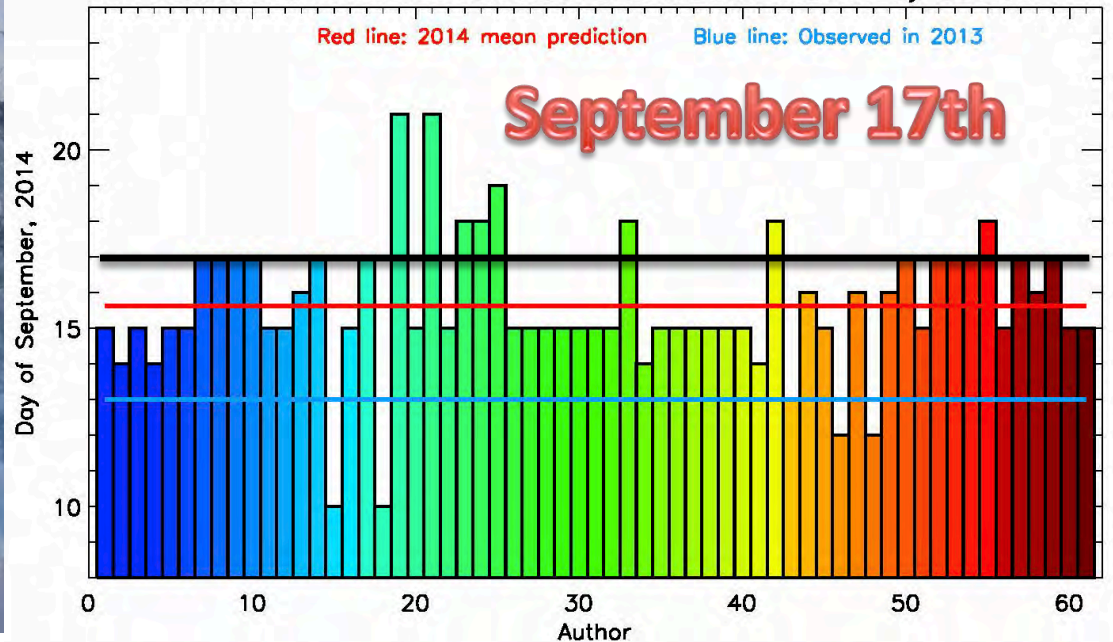
Nathan Grivault



2014 DATE OF SEA ICE EXTENT MINIMUM



Outlook of minimum sea ice extent date in 2014 by author



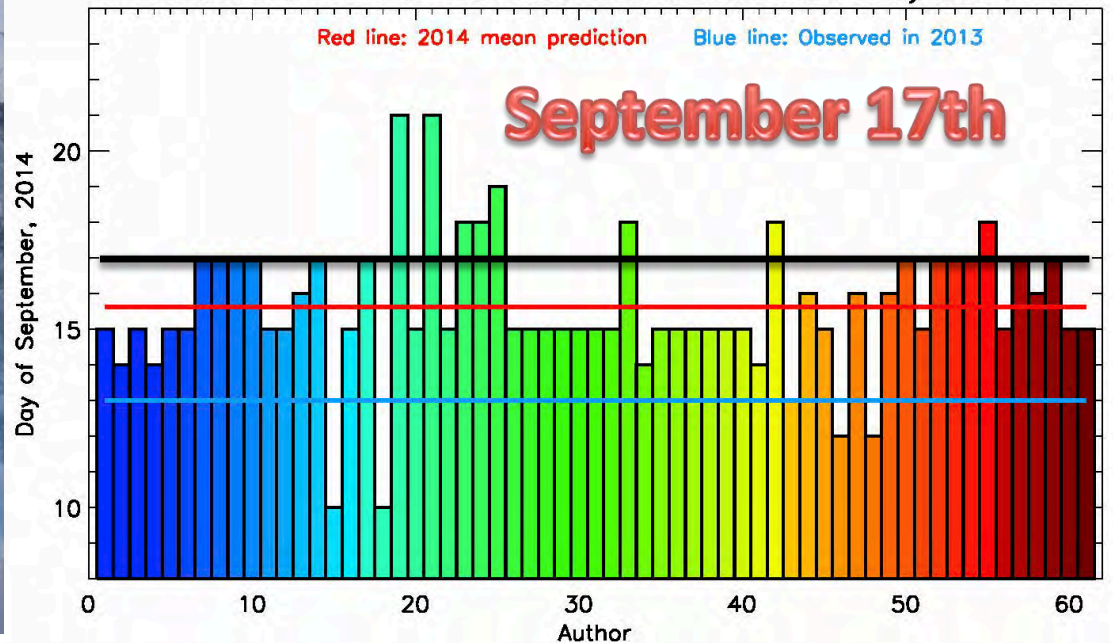
Renske Gelderloos



2014 DATE OF SEA ICE EXTENT MINIMUM



Outlook of minimum sea ice extent date in 2014 by author



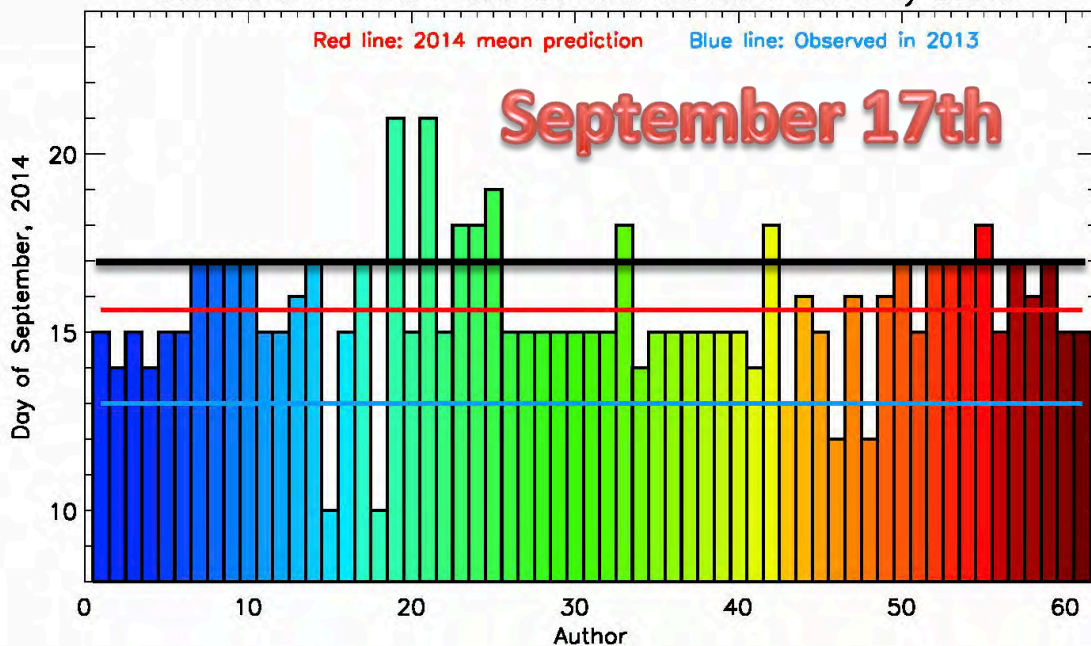
Dustin Carroll



2014 DATE OF SEA ICE EXTENT MINIMUM



Outlook of minimum sea ice extent date in 2014 by author



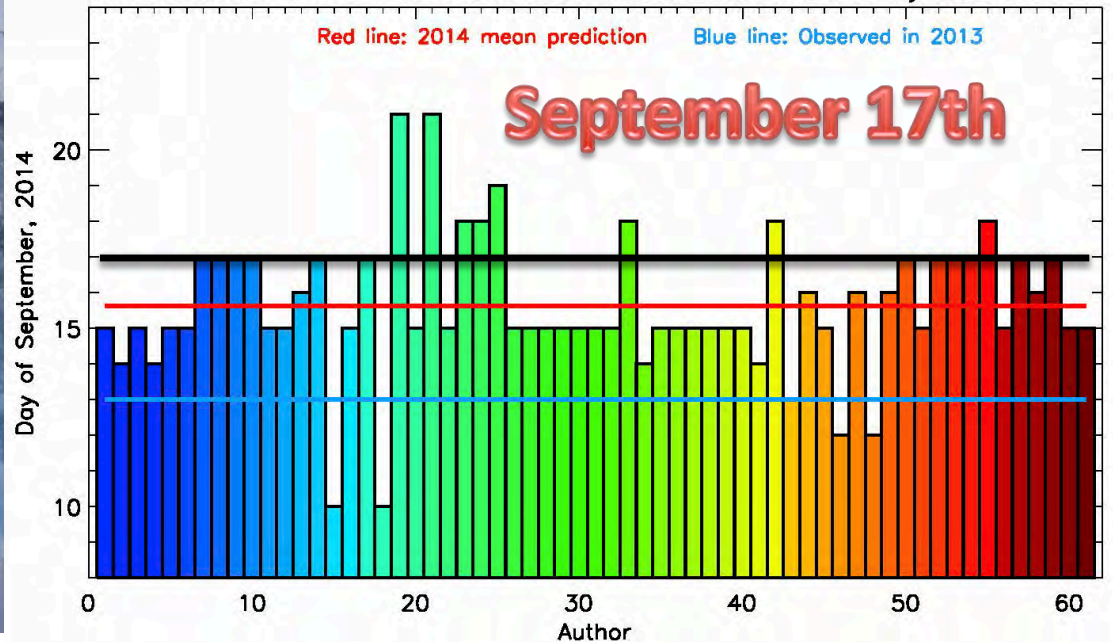
Mike Steele



2014 DATE OF SEA ICE EXTENT MINIMUM



Outlook of minimum sea ice extent date in 2014 by author



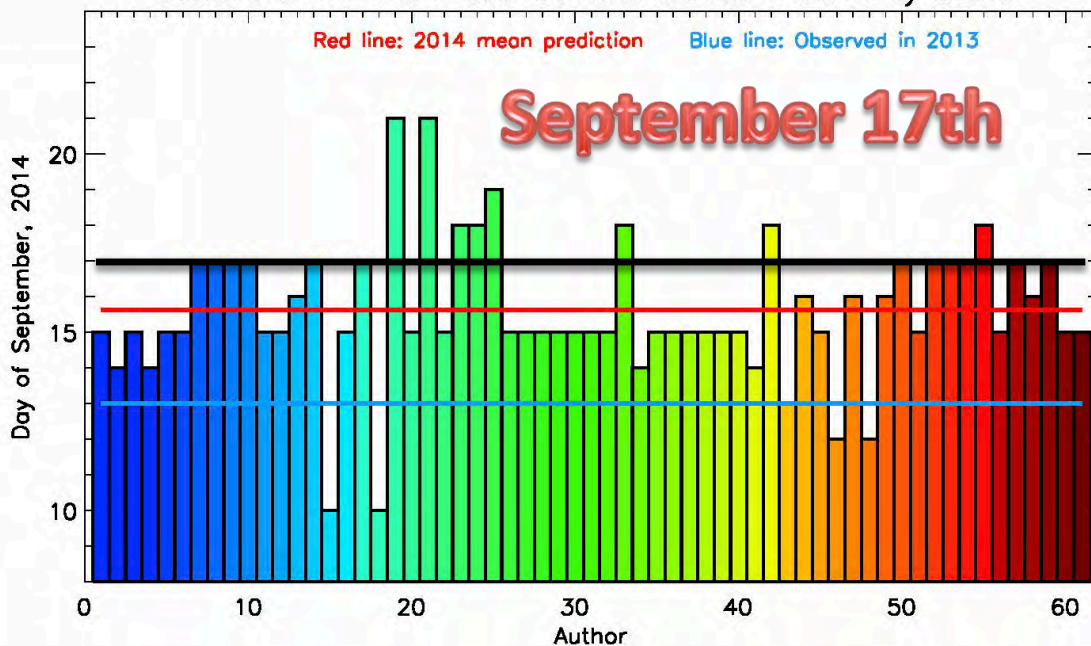
Nadja Steiner



2014 DATE OF SEA ICE EXTENT MINIMUM



Outlook of minimum sea ice extent date in 2014 by author



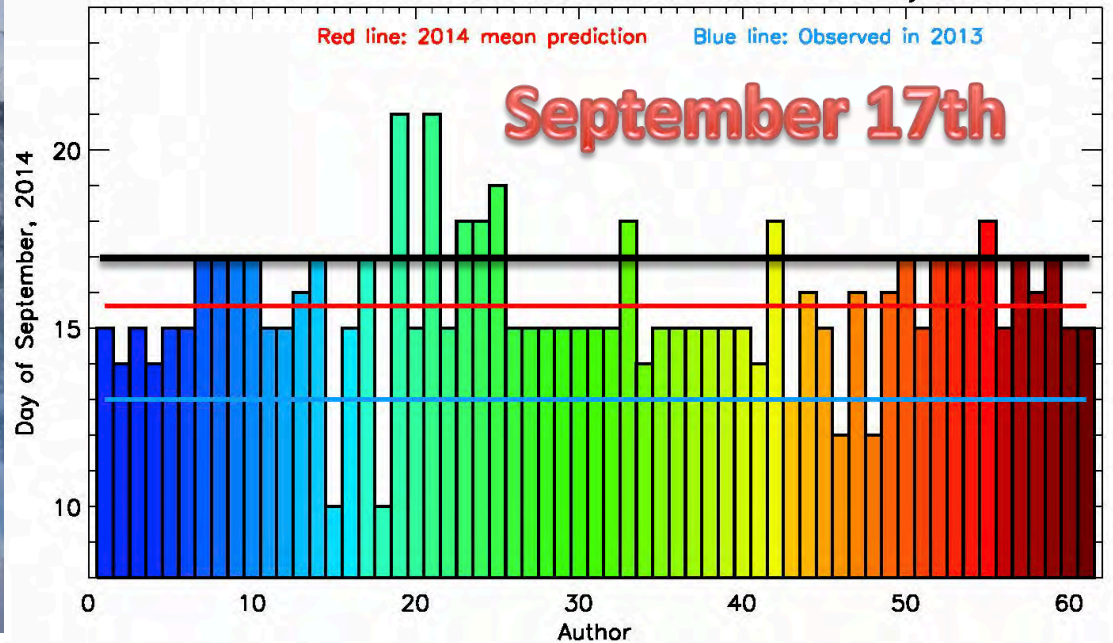
Michel Tsamados



2014 DATE OF SEA ICE EXTENT MINIMUM



Outlook of minimum sea ice extent date in 2014 by author



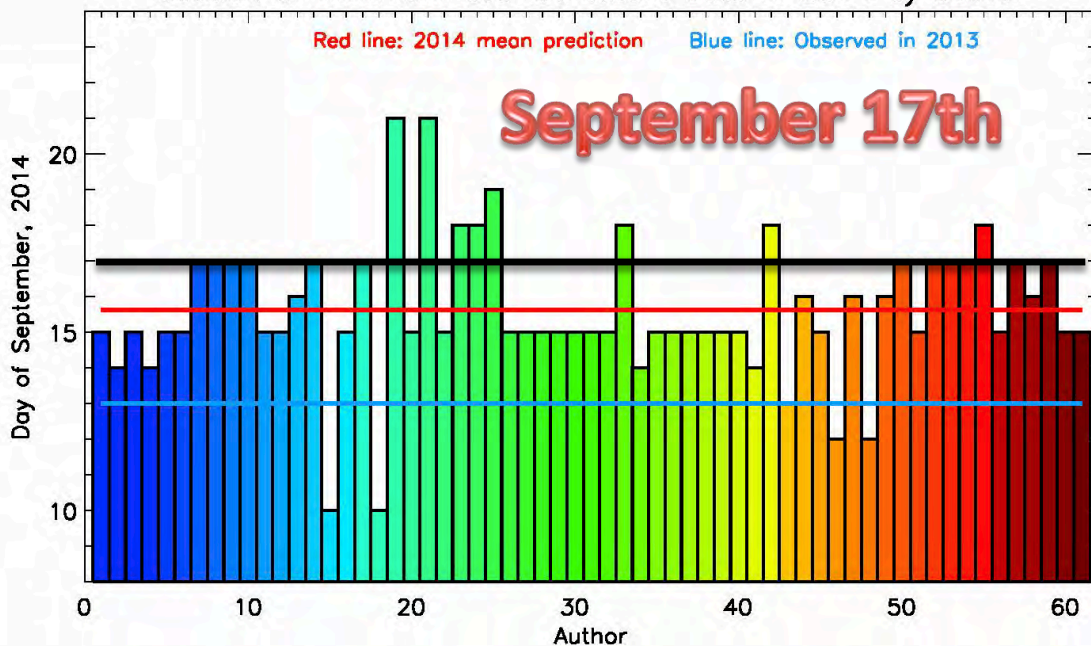
Bill Williams



2014 DATE OF SEA ICE EXTENT MINIMUM



Outlook of minimum sea ice extent date in 2014 by author



Giulia Castellani



**WE HAVE 2 ABSOLUTE
WINNERS IN ALL 3
OUTLOOKS AND THEY
ARE:**

**SALLY CLOSE
RENSKE GELDERLOOS**

CONGRATULATIONS!