Servicio de Hidrografía Naval
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SECRETARÍA DE CIENCIA, TECNOLOGÍA Y PRODUCCIÓN

Ministerio de Defensa
Presidencia de la Nación

Sea Ice Extension and Concentration from SAC-D MWR Data

Project N 24/10

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10th Aquarius/SAC-D Science Meeting 2015
17-19 November 2015- CONAE - Buenos Aires

Lecturer: **Federico Carballo**

Objectives

Since, this product is of relevance in the study of Antarctic climate environment.

This work is focus in:

- Evaluate the performance of the MWR SIC product.
- Evaluate the improves derived from the upgrade of the algorithm version 1(old) to the algortihm version 2 (new).

Sea Ice Concentration (SIC) data sources used to evaluate the MWR derived SIC product

Model/Algorithm	Sensor	Satellite	Institution	Spatial Resolution	Band	References
Bootstrap method (1)	AMSR2	GCOM-W1	JAXA	25 km	C, K , Ka	Comiso (1986), Comiso and Sullivan (1986)
SSMIS, ECMWF forecast for atmospheric correction (2)	SSMIS	DMSP F17	OSI SAF	10 km	K , Ka	Breivik et al (2001) and Andersen (1998, 2000)
NASA Team algorithm (3)	SSMR/SSM-I/SSMIS	Nimbus 7/DMSP	NSIDC	25 km	K , Ka	Swift and Cavalieri (1985)
NASA Team algorithm and Bootstrap method (4)	SSM-I/SSMIS	DMSP	NOAA/ NSIDC	25 km	K , Ka	Cavalieri et al, (1984), Corniso, (1986)

(1) Referred as JAXA, 2 different products are provided by JAXA, one related with Ascending passes of the GCOM-W1 and the other one with Descending passes.
(2) Referred as ASCAT.
(3) Referred as NSIDC.
(4) Referred as NOAA.

Methodology

Data used correspond to South Hemisphere SIC (Antartic area).

IC Data coming from different sources were resampled, obtaining values for the MWR SIC product grid positions.

Sequence:

1. Inverse Distance (0,75 Lat/Long radius) resampling method was used.
2. After resampling, the corresponding weekly average was obtained, in order to compare with the MWR SIC product (using CONAE v1 & 2 algorithms), and between the different satellite products.
3. Maps showing SIC spatial distribution were generated, and relations with the different SIC products were calculated.

Results

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Spatial Distribution of the SIC values

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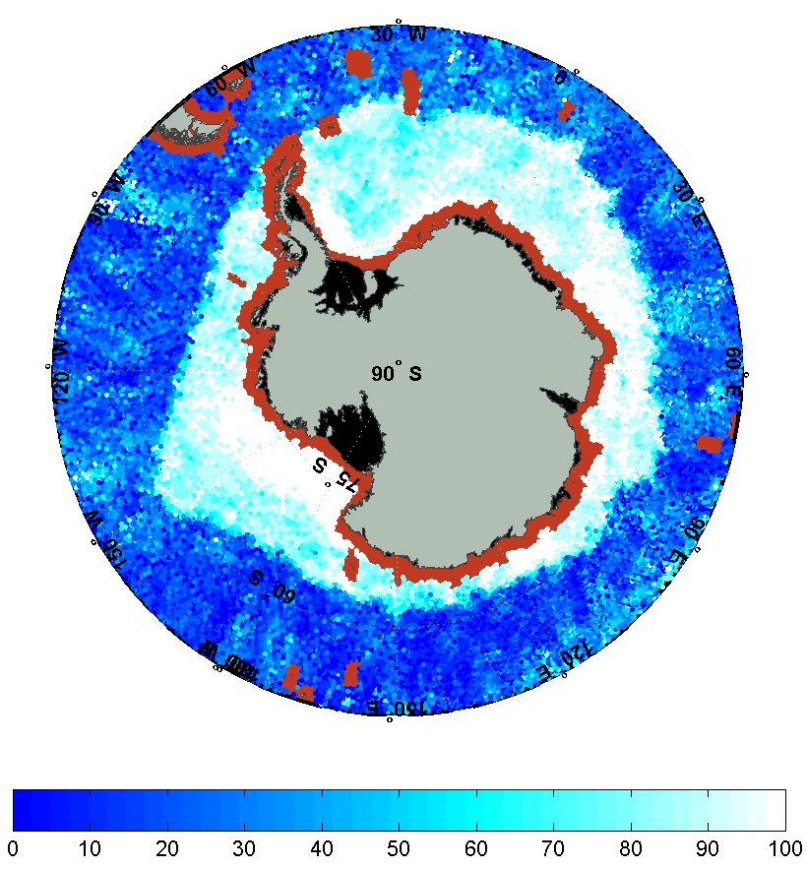
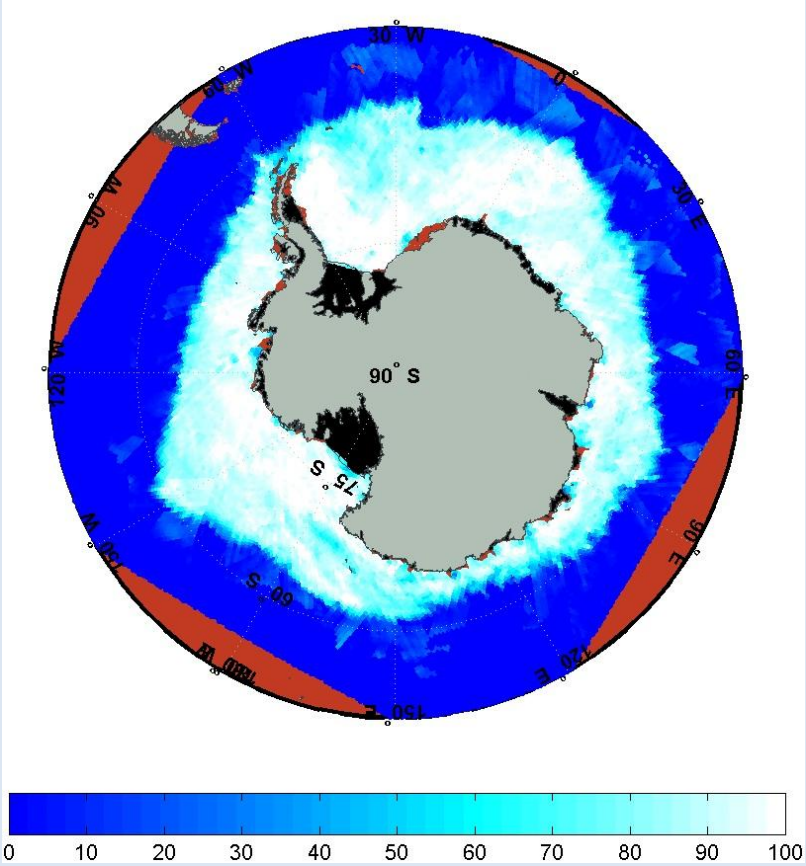
MWR OLD ALGORITHM
12-18 Aug 2013



MWR NEW ALGORITHM
11-17 Aug 2013



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Relations between MWR and other SIC products

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Austral Winter

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Mean Δ	ASCAT	NSIDC	JAXA asc	JAXA desc	NOAA	MWR (old)*1	MWR (new)*2
ASCAT						14,480	6,186
NSIDC	4,871					14,298	5,322
JAXA asc	4,054	8,009		0,951	1,997	11,978	7,669
JAXA desc	4,309	8,275			2,205	12,112	7,859
NOAA	2,796	6,780				13,371	7,104

R^2	ASCAT	NSIDC	JAXA asc	JAXA desc	NOAA	MWR (old)*1	MWR (new)*2
ASCAT						0,804	0,947
NSIDC	0,980					0,791	0,951
JAXA asc	0,965	0,934		0,995	0,978	0,708	0,895
JAXA desc	0,963	0,930			0,976	0,728	0,897
NOAA	0,990	0,973				0,786	0,934

RMSE	ASCAT	NSIDC	JAXA asc	JAXA desc	NOAA	MWR (old)*1	MWR (new)*2
ASCAT						20,260	9,272
NSIDC	6,855					20,268	8,240
JAXA asc	6,120	10,412		1,958	4,307	17,171	10,877
JAXA desc	6,496	10,732			4,587	17,258	11,176
NOAA	4,202	8,938				18,942	10,295

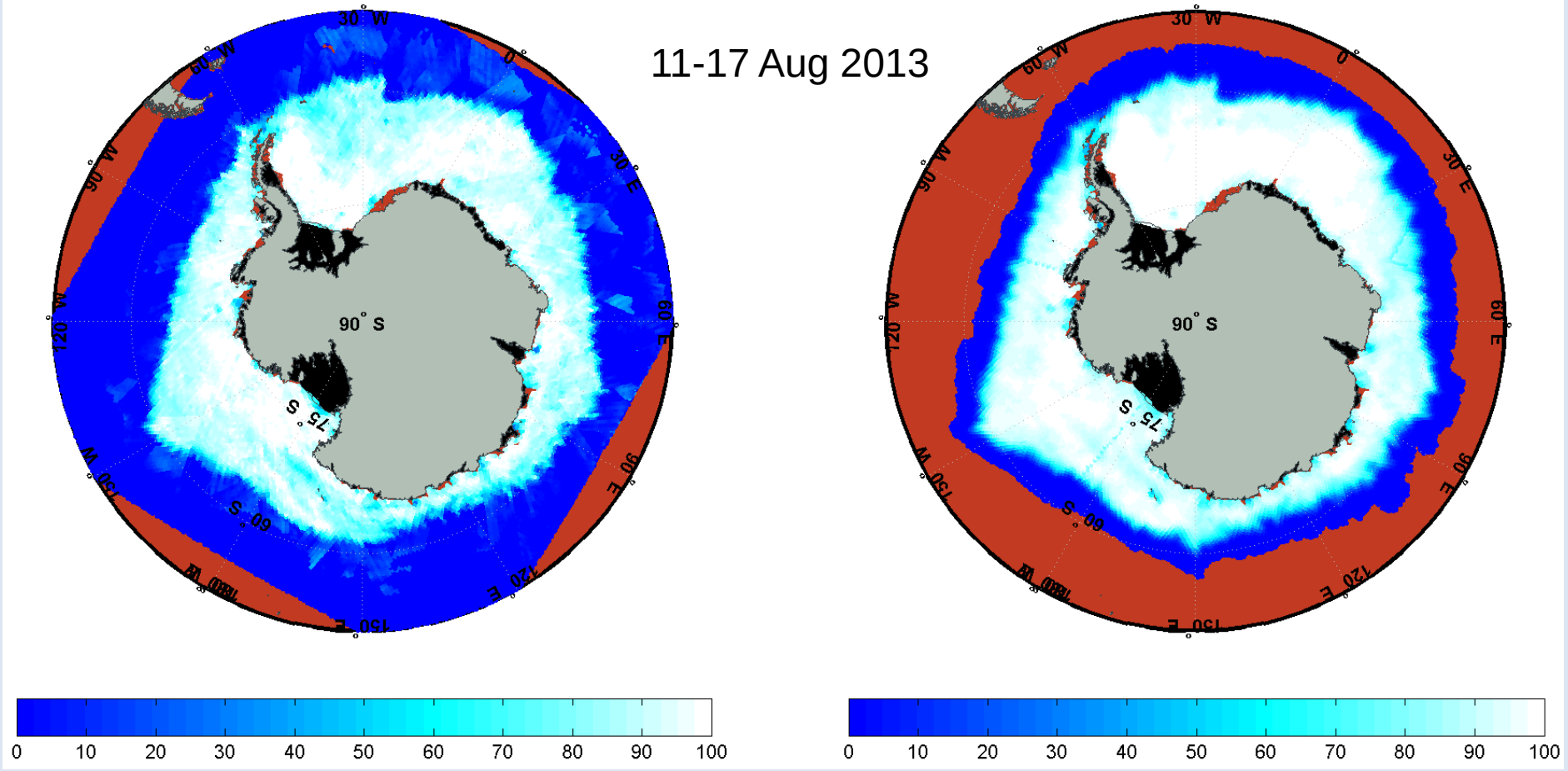
*1 Algorithm v1 (Old) – Statistics relations with SIC Products – Week 12 – 18 August 2013

*2 Algorithm v2 (New) - Statistics relations with SIC Products - Week 11 – 17 August 2013

MWR SIC NEW ALGORITHM [%]

ASCAT SIC [%]

11-17 Aug 2013



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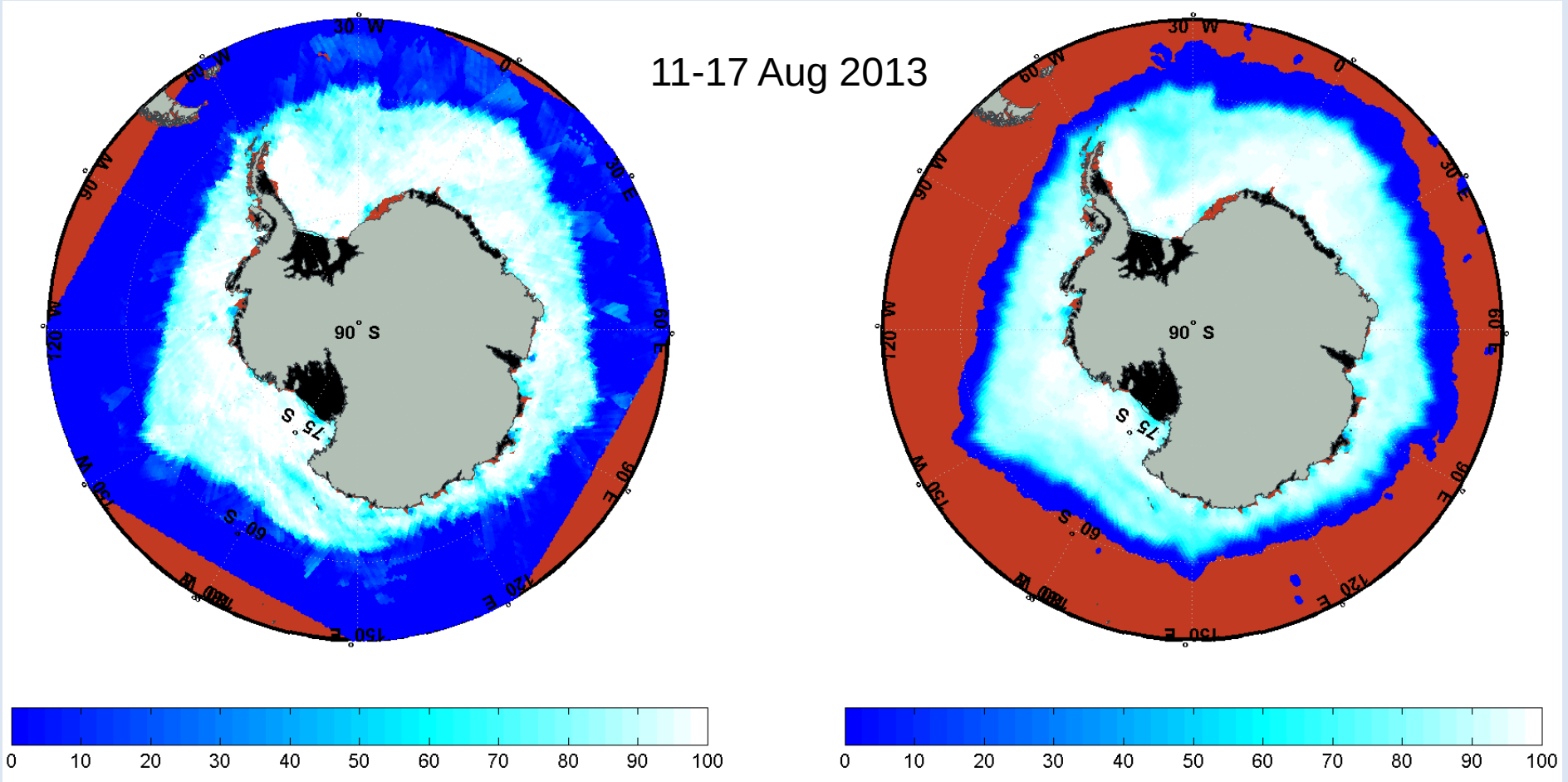
MWR SIC NEW ALGORITHM [%]

NSIDC SIC [%]

11-17 Aug 2013



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Conclusions

Open water noise present in the old algorithm is now reduced with the new one.
New Algorithm shows better adjustment than the Old one.
Improves performance over half (for example RMSE from 20% → 8% NSIDC, and from 20% → 9% ASCAT).

All the SIC products show good correlation among them (R^2 ~0,95)

All the SIC products show good adjustments. With R^2 in the order of ~0,9 and RMSE of ~10.
Best performance is observed with NSIDC and ASCAT SIC products.

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Thank you for your attention!!!

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GCOM-W1 (Global Change Observation Mission - Water "SHIZUKU")

SSMIS (Special Sensor Microwave Imager/Sounder)