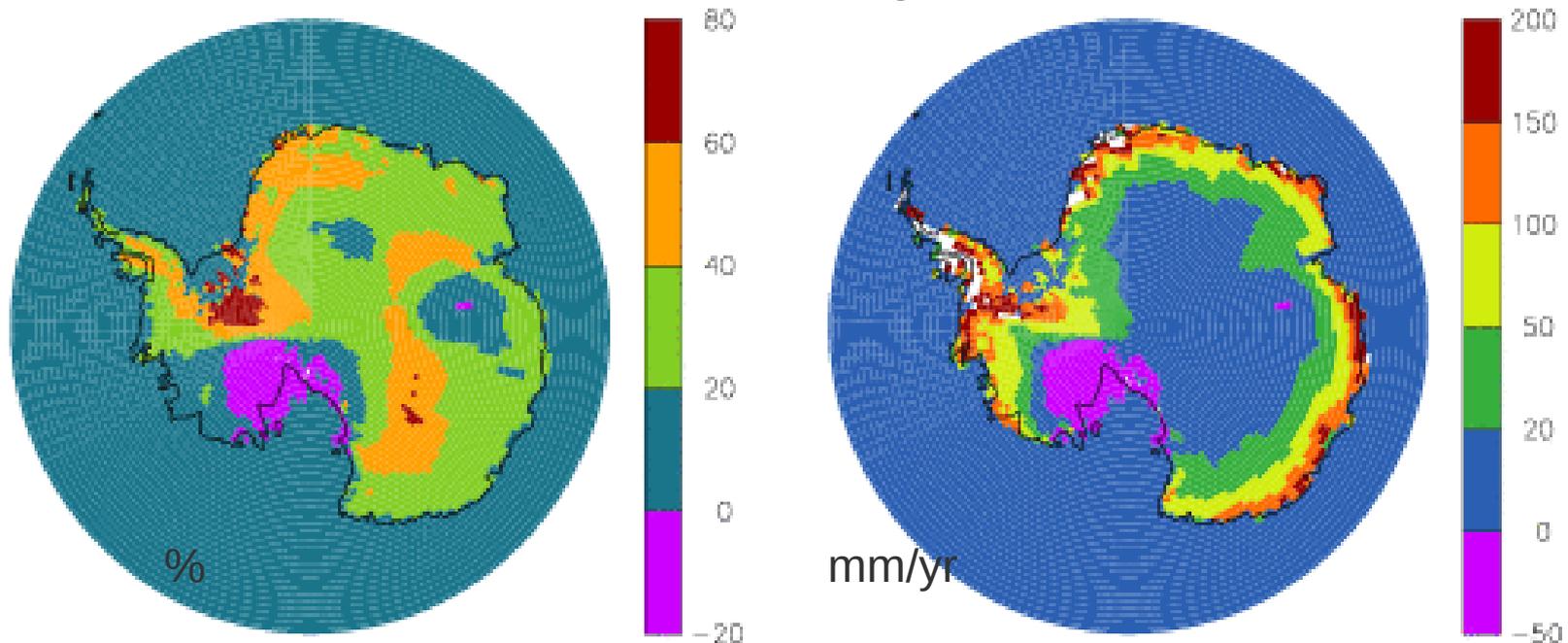


Studies of Antarctic precipitation statistics

Martina Barandum, Christophe Genthon, LGGE

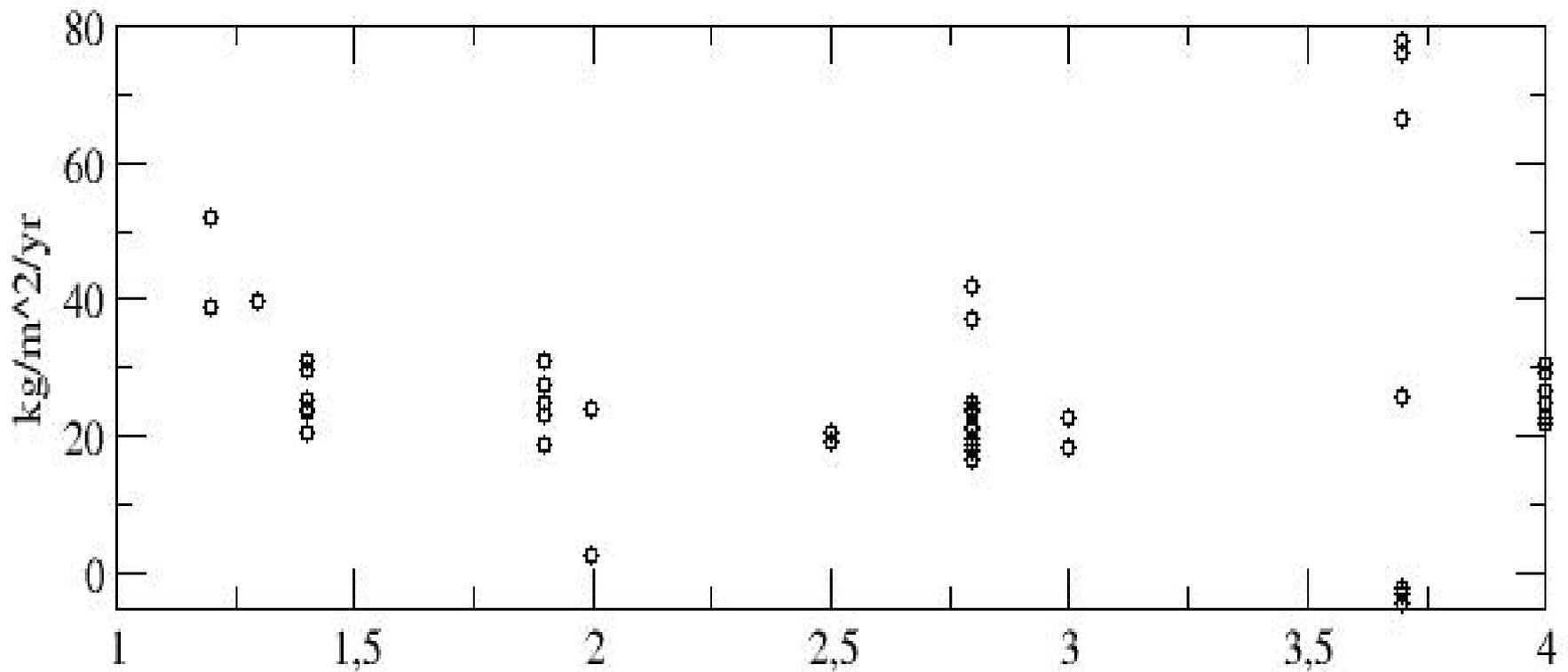


Surface mass balance change, 2100-2000



There are huge differences in the predicted precipitation change in Antarctica by the IPCC models

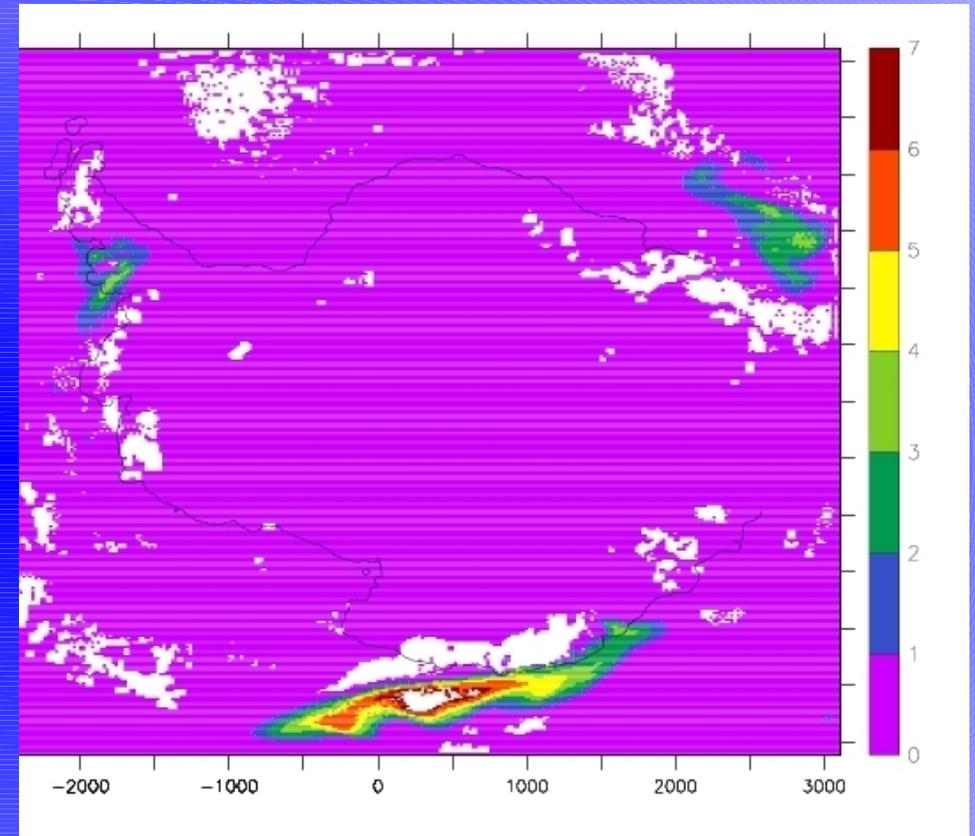
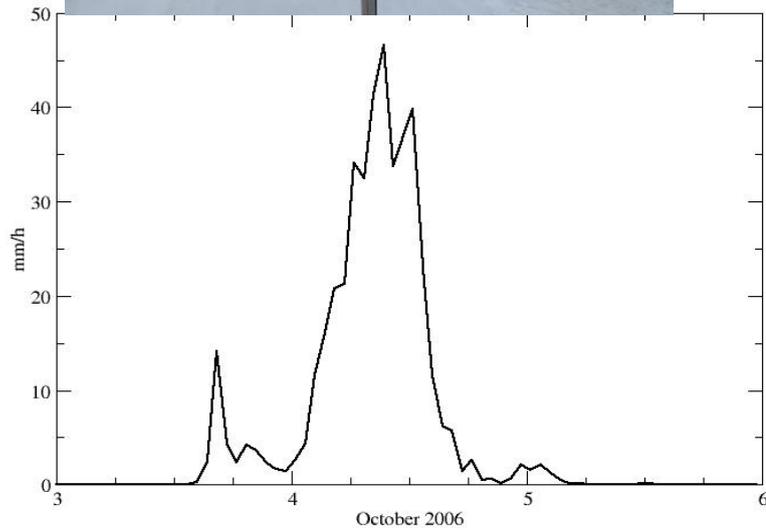
Precipitation change



IPCC model (resolution)

Can we measure precipitation in Antarctica?

BIRAL



ECMWF

Event detection is probably more accessible than quantities

Acoustic snow accumulation gauge

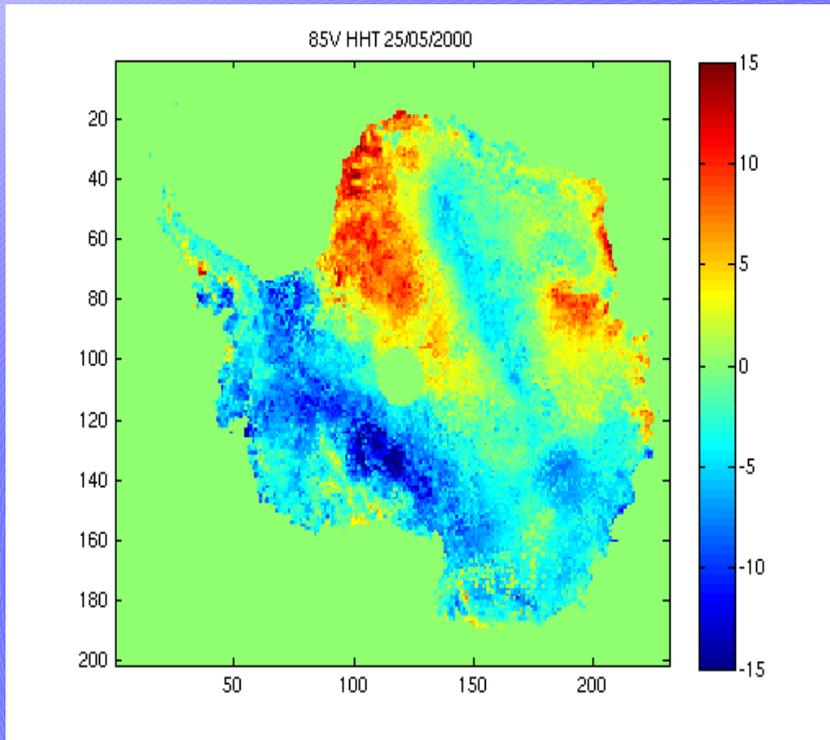


Blowing snow is an issue

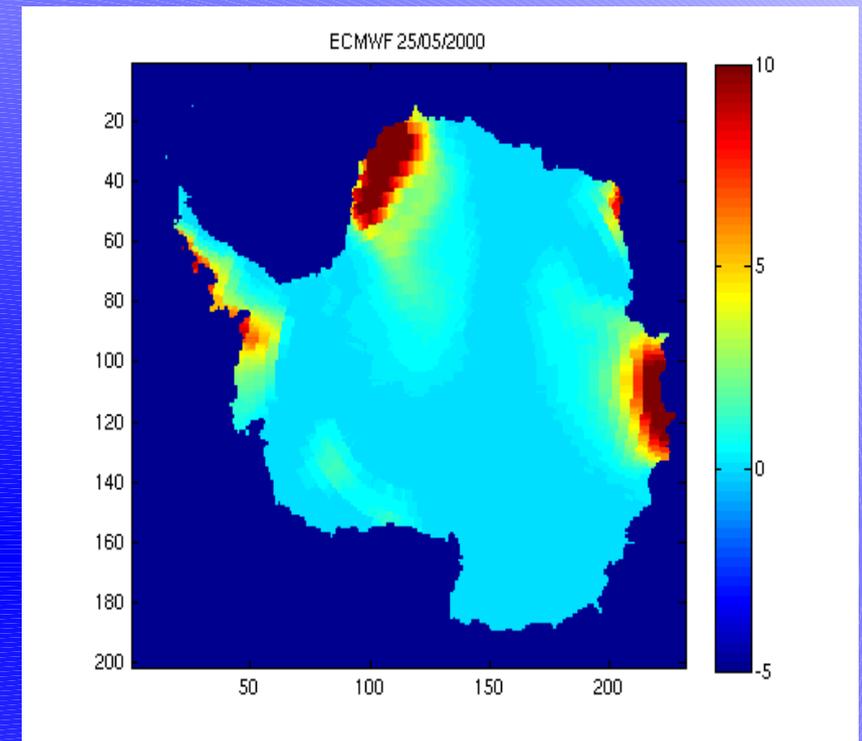


FLOWCAPT

Precipitation events may also be detected by satellite micro-wave data



Passive microwaves 85V
HHT-filtered (BindSchadler et
al. 2005)

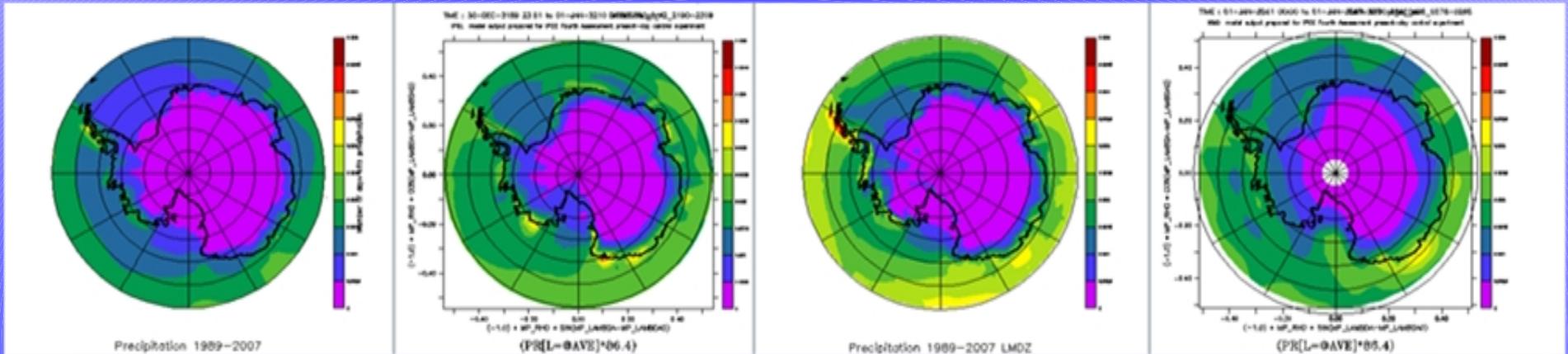


ECMWF

Do models differ wr precipitation events statistics?

YES!

Mean daily precipitation (mm/day)

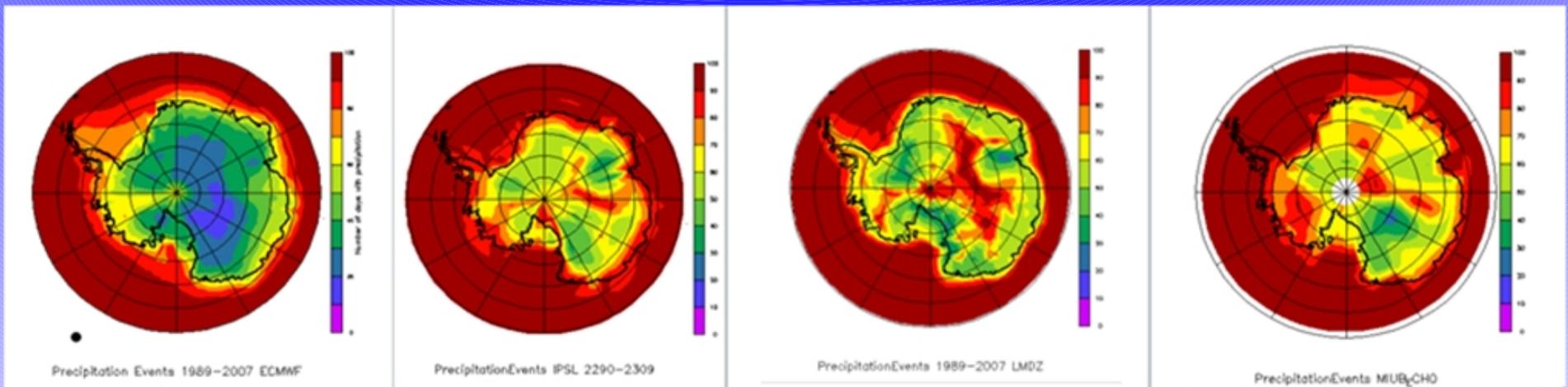


ECMWF

IPSLCM4

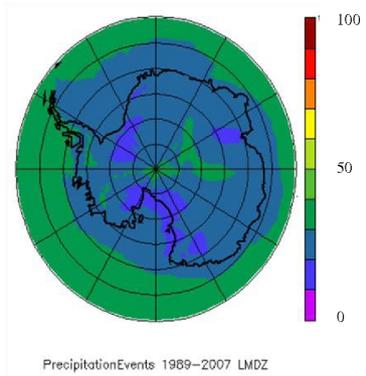
LMDZ

MIUB

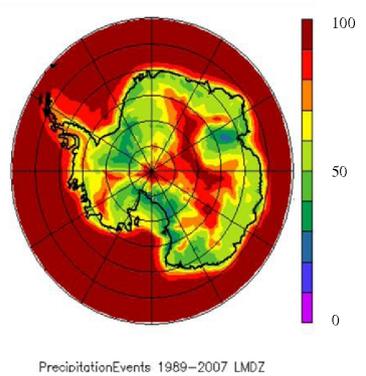


Fraction of days with precipitation above 1% of daily mean (%)
(as a proxy for fraction of days with precipitation)

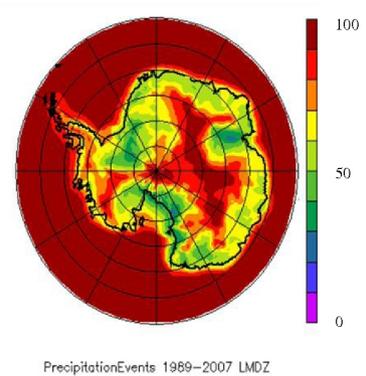
LMDZ



PrecipitationEvents 1989-2007 LMDZ

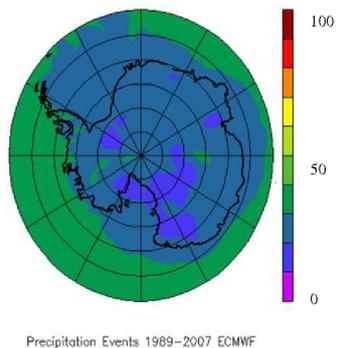


PrecipitationEvents 1989-2007 LMDZ

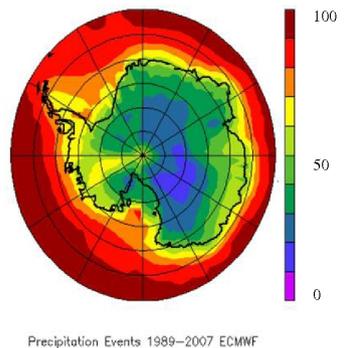


PrecipitationEvents 1989-2007 LMDZ

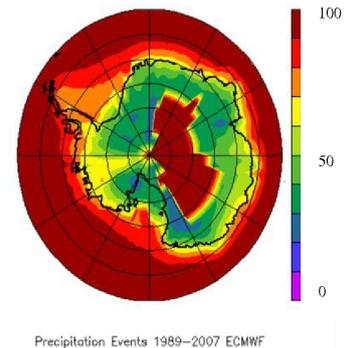
Precipitation events 1989-2007 (LMDZ)



Precipitation Events 1989-2007 ECMWF



Precipitation Events 1989-2007 ECMWF



Precipitation Events 1989-2007 ECMWF

Precipitation events 1989-2007 (ECMWF)

ECMWF

1

1/100

1/10000

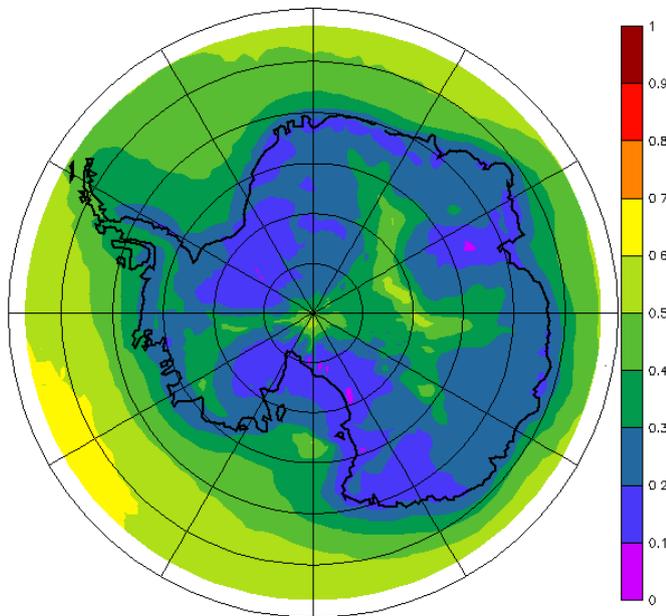
of daily mean

Threshold matters to define a precipitation event

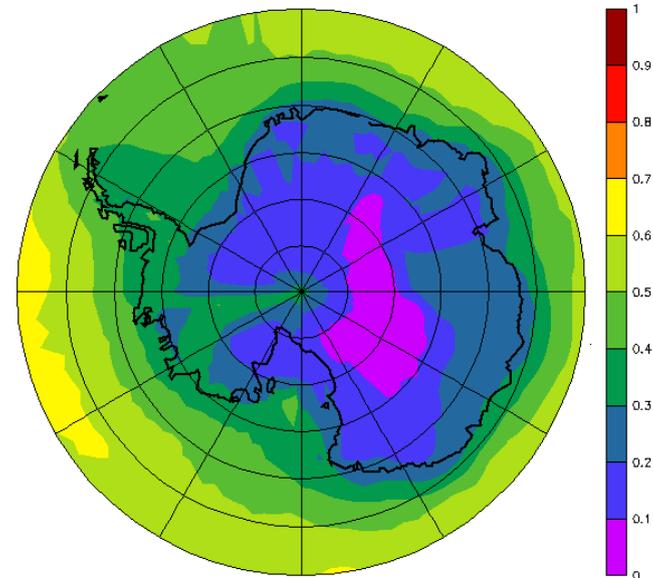
Fraction of total precipitation accounted for by daily events $>2x$ daily mean

LMDZ

ECMWF



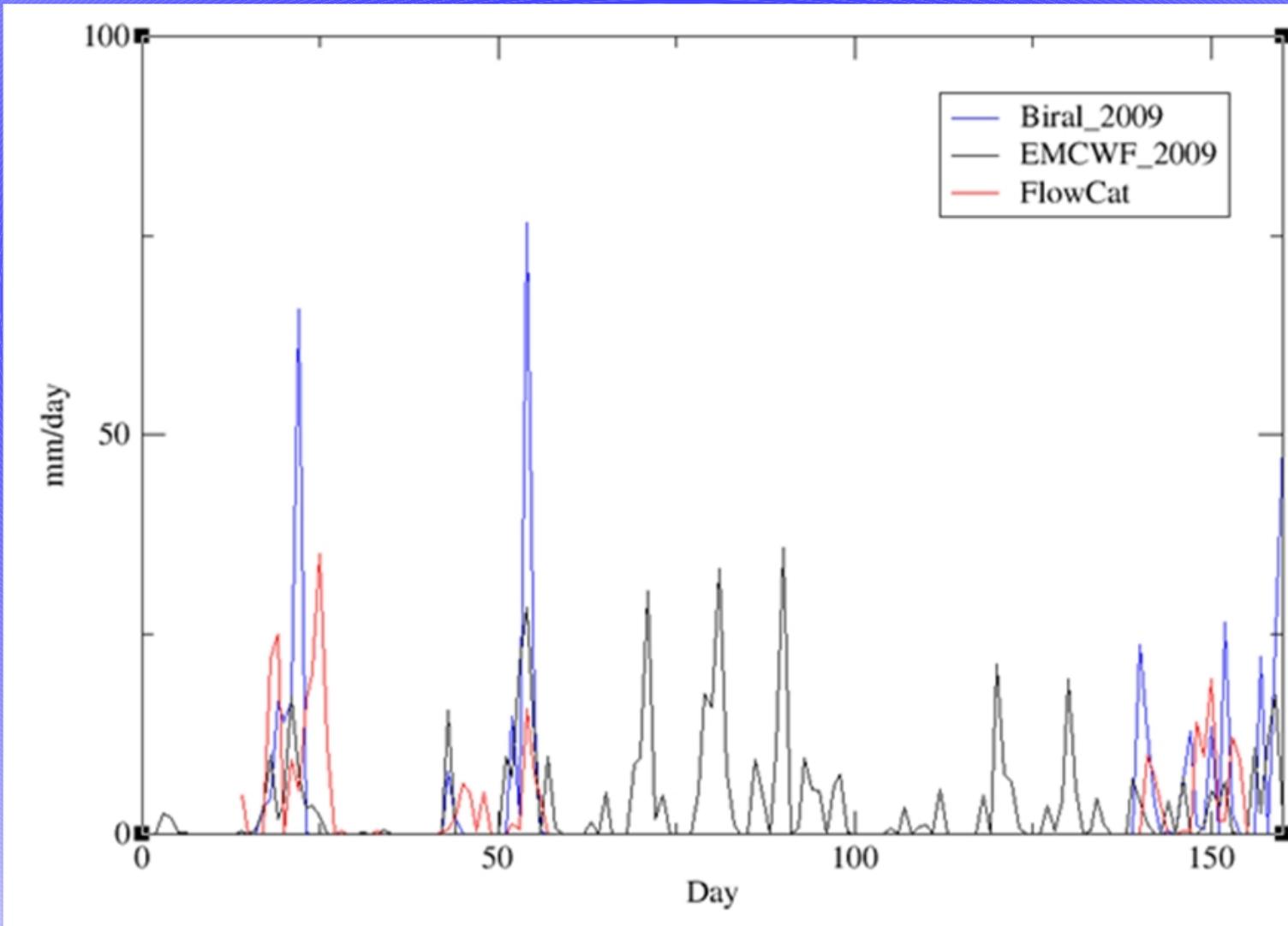
Precipitation 1989–2007 LMDZ s.2



Precipitation 1989–2007 ECMWF s 2

Observation on the field:

- > Do record events
- > Can (partially) discriminate between blowing snow and precipitation



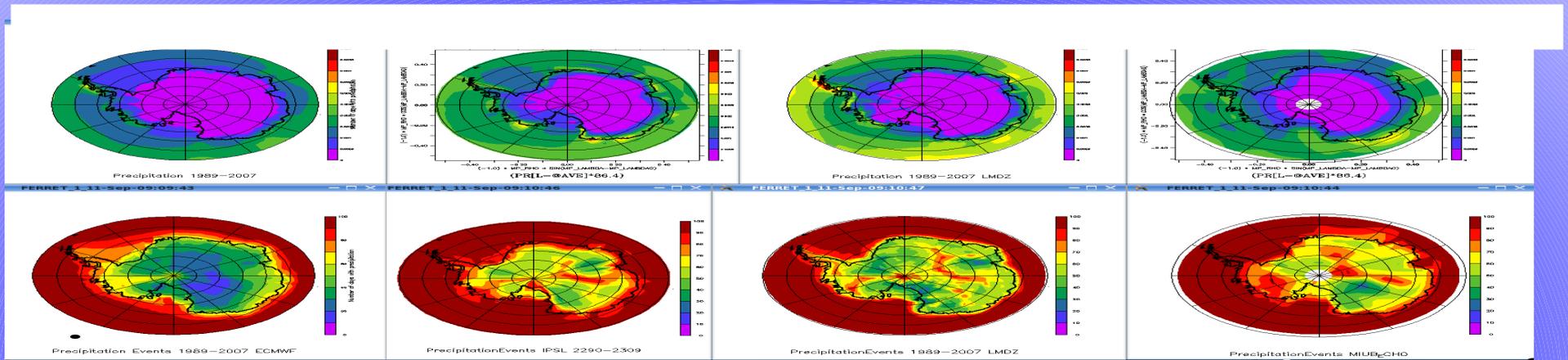
Co-occurrence ECMWF / field data 2009, precipitation events

Threshold on ECMWF precipitation event	0	0.5 mm/day	1.0 mm/day
ECMWF – precipitation gauge	52%	54%	55%
ECMWF- precip gauge after correction for blowing snow	65%	70%	86%

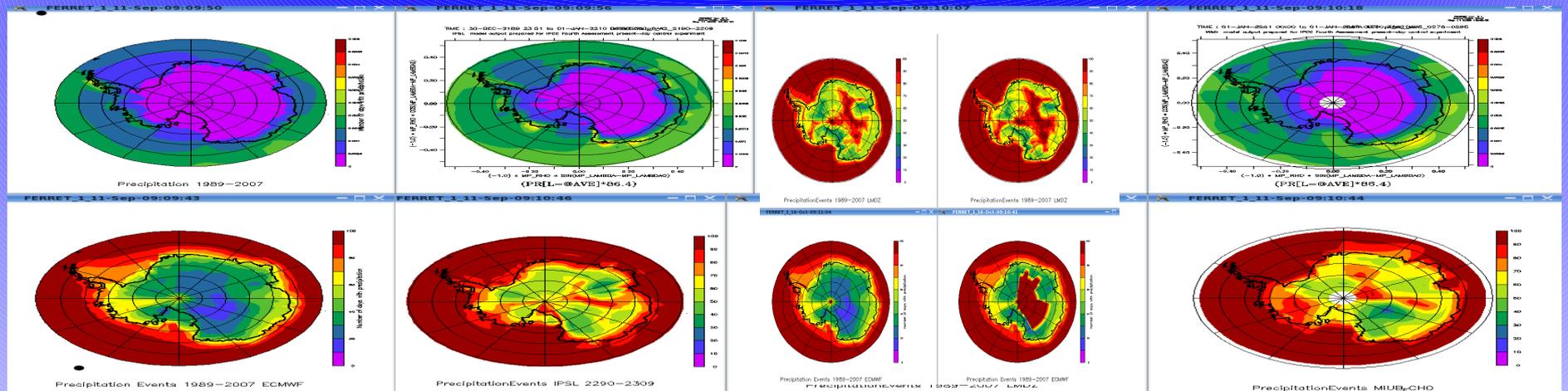
Statistics of precipitation events in Antarctica

- A new” handle” on meteorological and climate models evaluation
- Observable on the field (?)
- Meteorological significance (time scales, sensitivity), should be particularly appropriate for meteorological model / assimilation evaluation
- Next step: satellite observation / event detection

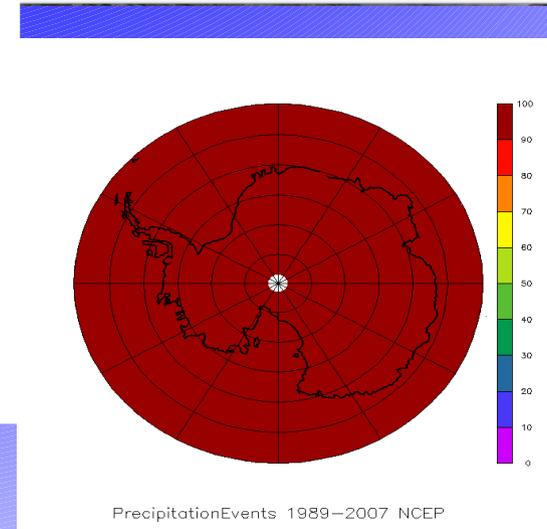
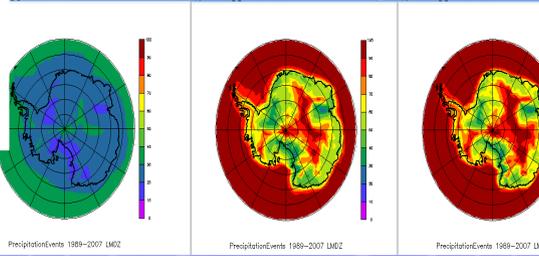
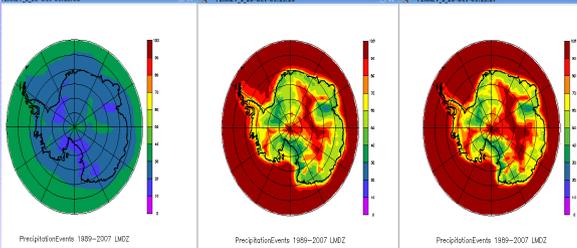
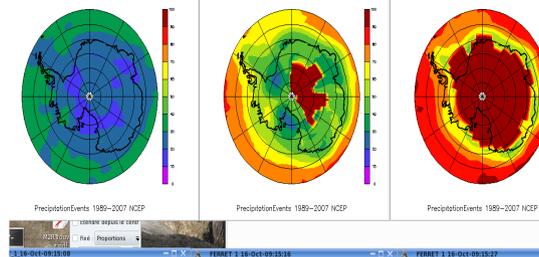
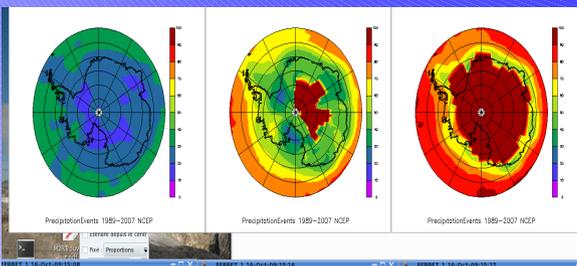
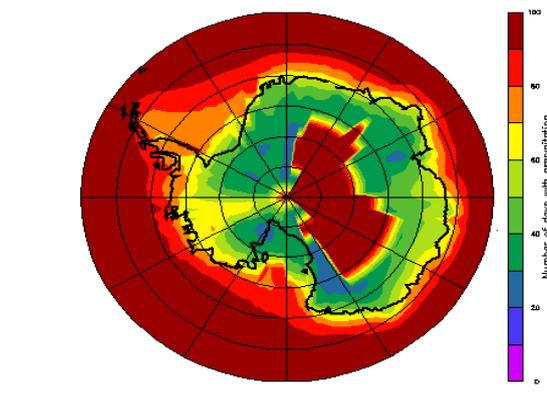
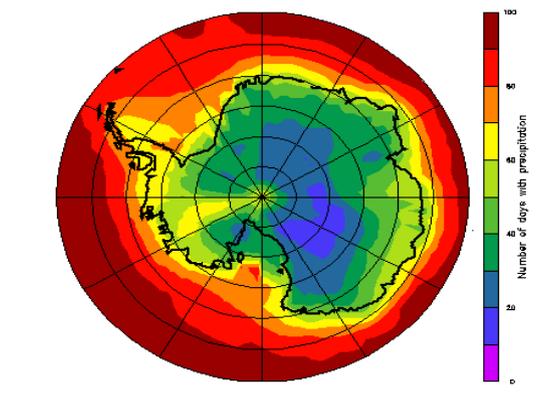
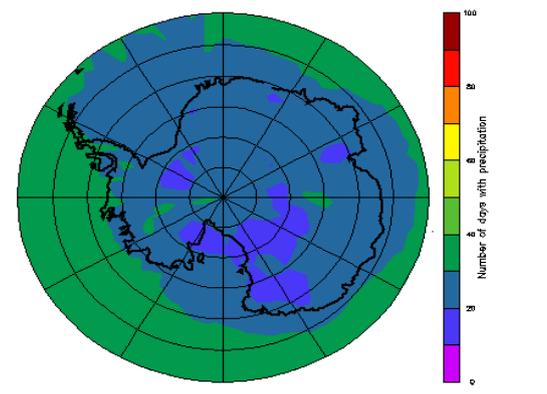
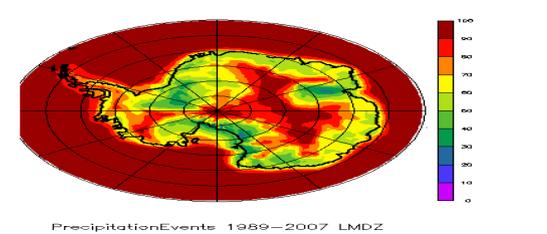
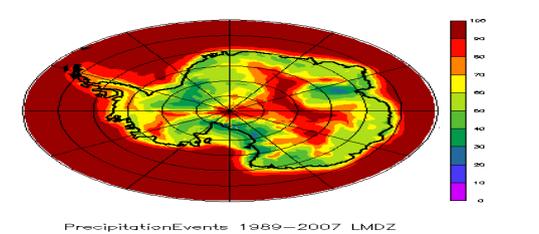
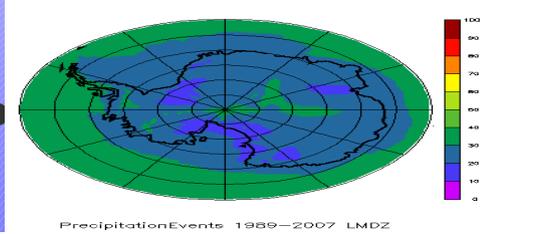
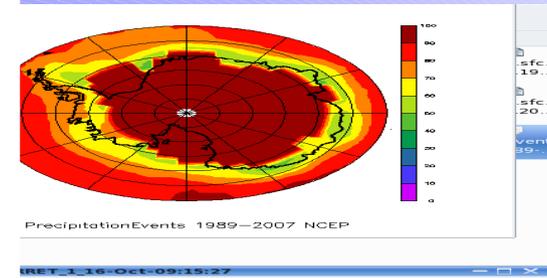
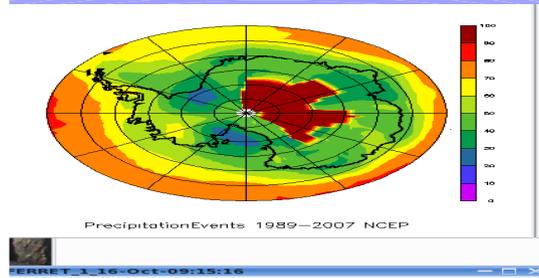
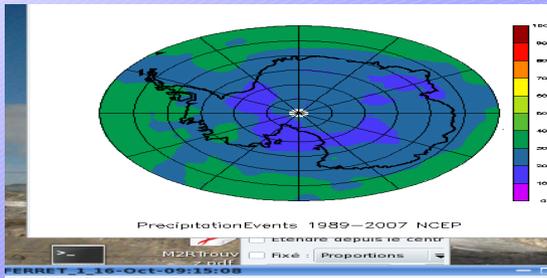
Les Modèles



Moyenne journalier de la quantité de la précipitation pour la période de 1989 à 2007

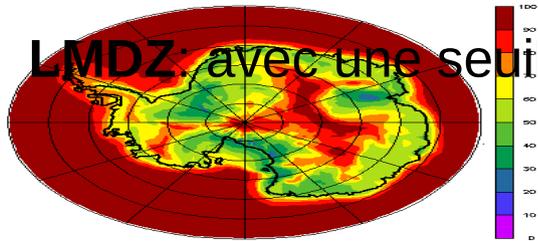


es événements journaliers de la précipitation en pourcentage pour la période de 1989 à 20



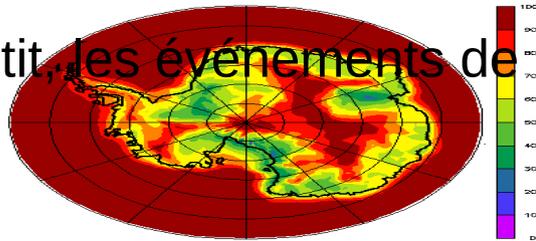
LMDZ - ECMWF

LMDZ: avec une seuil plus petit, les événements de la précipitation sur le plateau



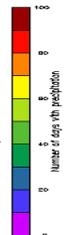
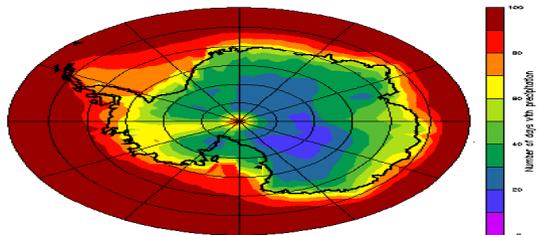
PrecipitationEvents 1989-2007 LMDZ

FERRET_1_16-Oct-09:11:04

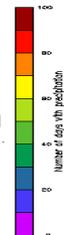
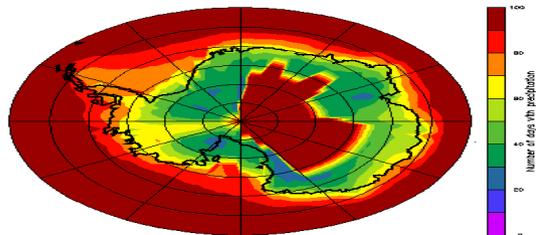


PrecipitationEvents 1989-2007 LMDZ

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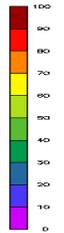
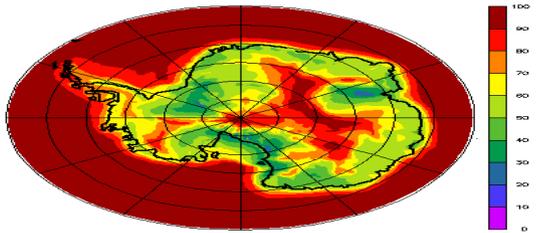


Number of days with precipitation



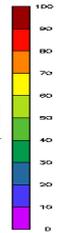
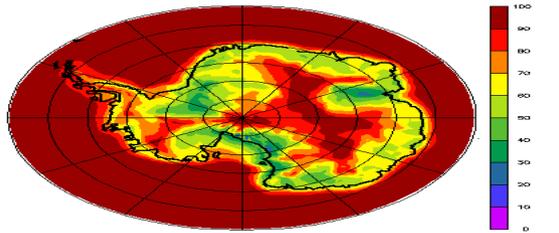
Number of days with precipitation

jamais les détails de la topographie sur le plateau mais avec une seuil plus et plus petite, l



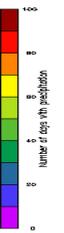
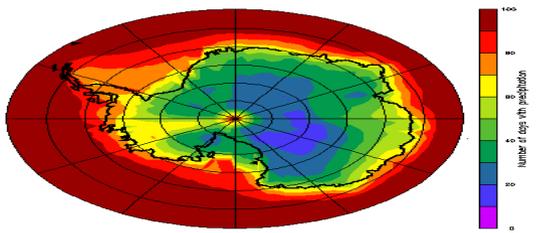
PrecipitationEvents 1989-2007 LMDZ

FERRET_1_16-Oct-09:11:04



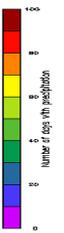
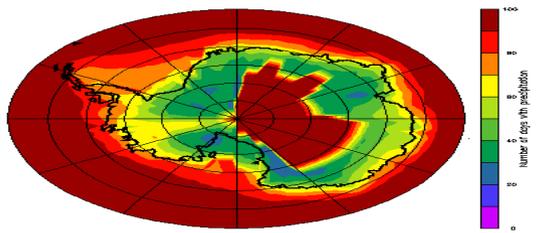
PrecipitationEvents 1989-2007 LMDZ

FERRET_1_16-Oct-09:10:41



Number of days with precipitation

Precipitation Events 1989-2007 ECMWF

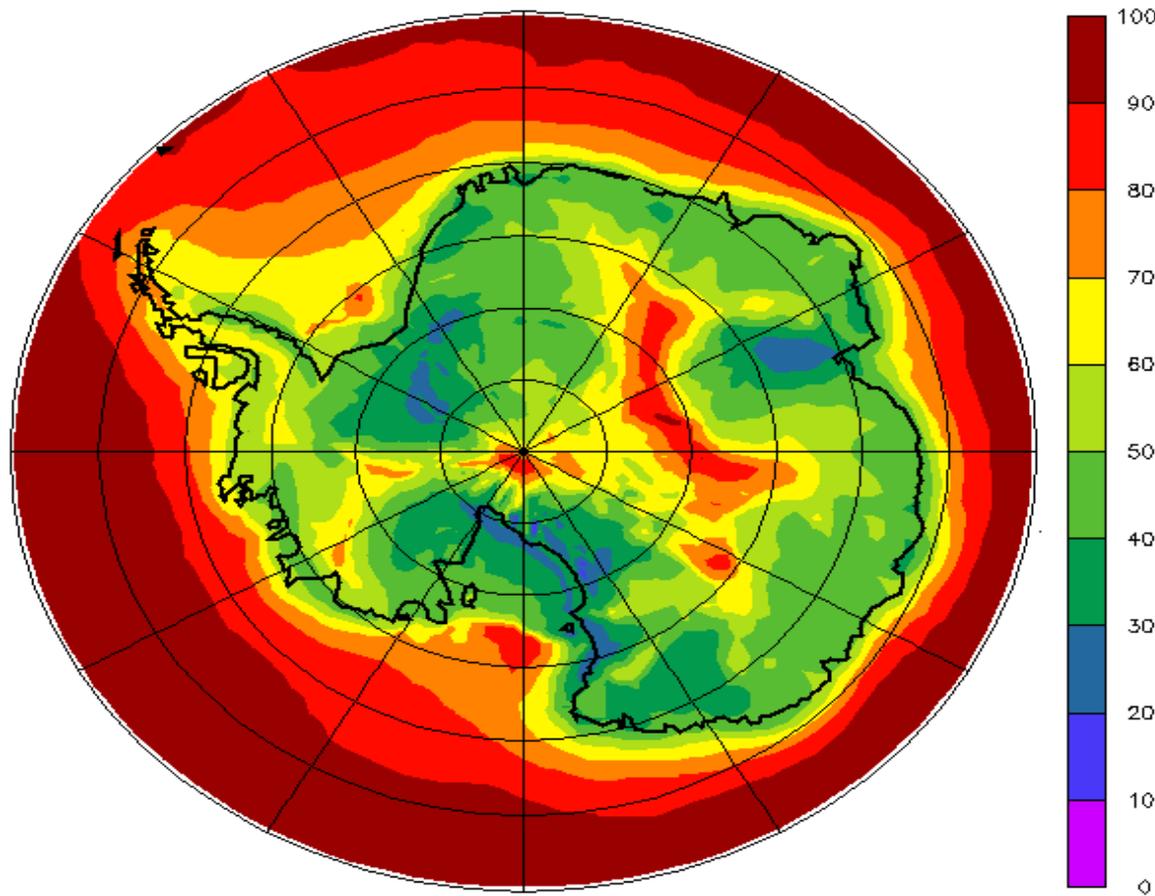


Number of days with precipitation

Precipitation Events 1989-2007 ECMWF

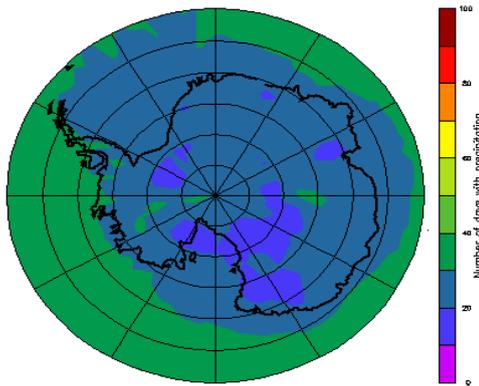
Effet de la Topographie

de la température pendant la surface froids et l'atmosphère, le point de condensation peu

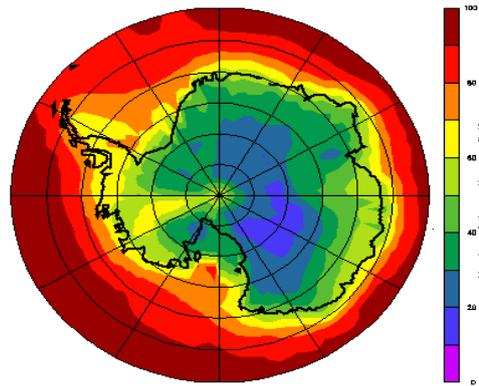


PrecipitationEvents 1989–2007 LMDZ

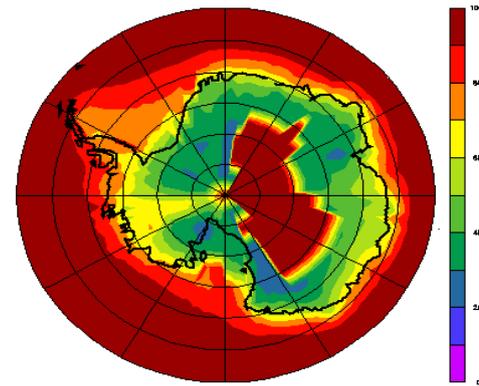
GPCP



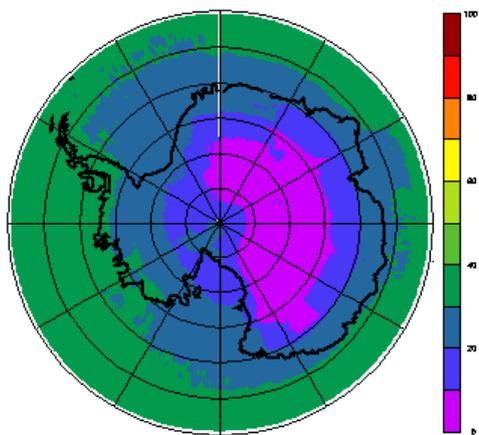
Precipitation Events 1989–2007 ECMWF



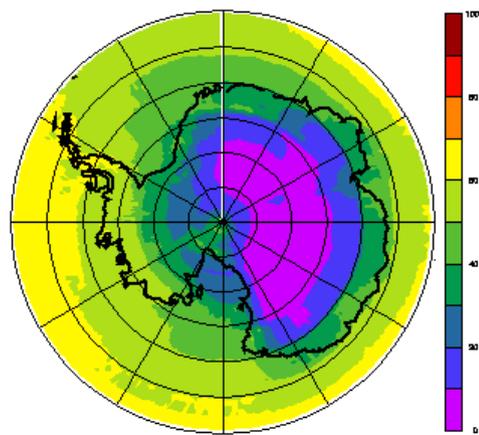
Precipitation Events 1989–2007 ECMWF



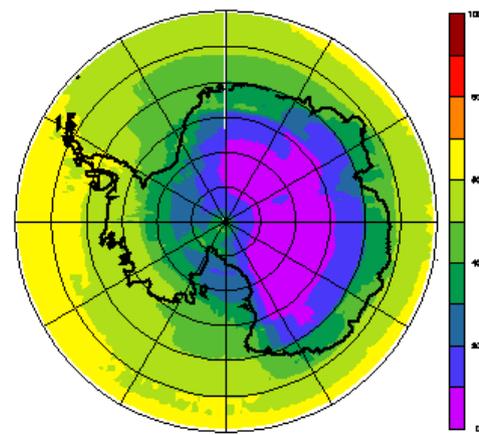
Precipitation Events 1989–2007 ECMWF



Precipitation Events 1996–2009 GPCP



Precipitation Events 1996–2009 GPCP



Precipitation Events 1996–2009 GPCP

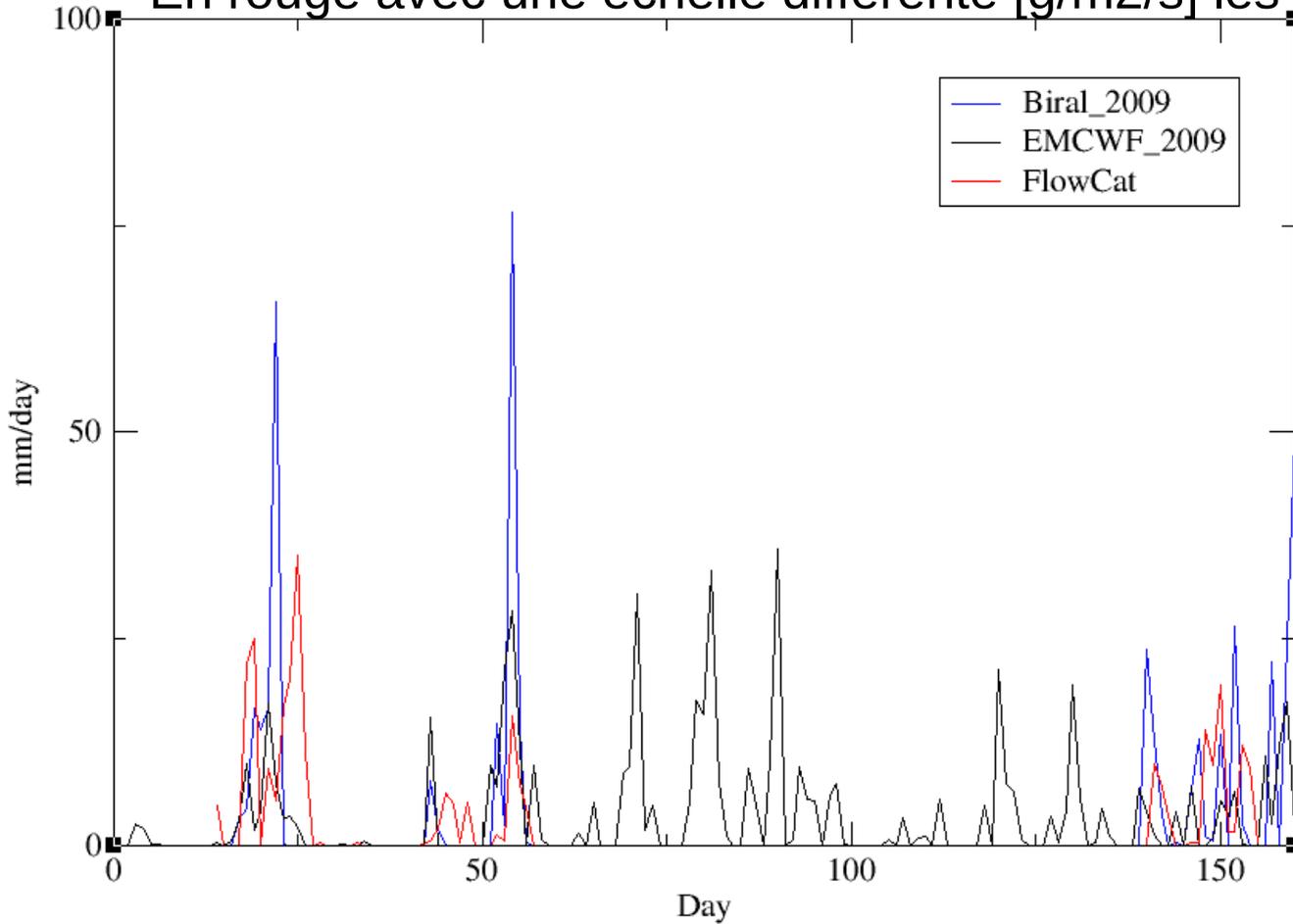
ECMWF-BIRAL-FLOWCAT

à Cup Prud'homme

Les observations de la **Biral** montrez en bleu une très grand amplitude de la précipitation

En noir, les événements de la précipitation prédire par le **ECMWF** monte une bon

En rouge avec une échelle différente [g/m2/s] les dates de la **FlowCat** donne une



ECMWF-Biral-FlowCat

Coefficient de Corrélation

	Coefficient pur	Seuil pour ECMWF	Seuil pour ECMWF
		0.5 mm/jour	1.0 mm/jour
ECMWF-Biral	0.52	0.54	0.55
ECMWF-Biral corrigé avec FlowCat	0.65	0.70	0.86
(Seuil pour FlowCat: 1mm/jour)			