# Global Distribution of CO2 in Mid Troposphere from the Atmospheric Infrared Sounder (AIRS) Measurements Reveal Cross Equator Exchange

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3. *Research Center for Environmental Changes, Academia Sinica, 128 Sec. 2, Academia Rd., Nankang, Taipei, 115, Taiwan*
4. *Science Division, Jet Propulsion Laboratory, California Institute of Technology, USA, Science Division, Jet Propulsion Laboratory, Pasadena, CA 91109*

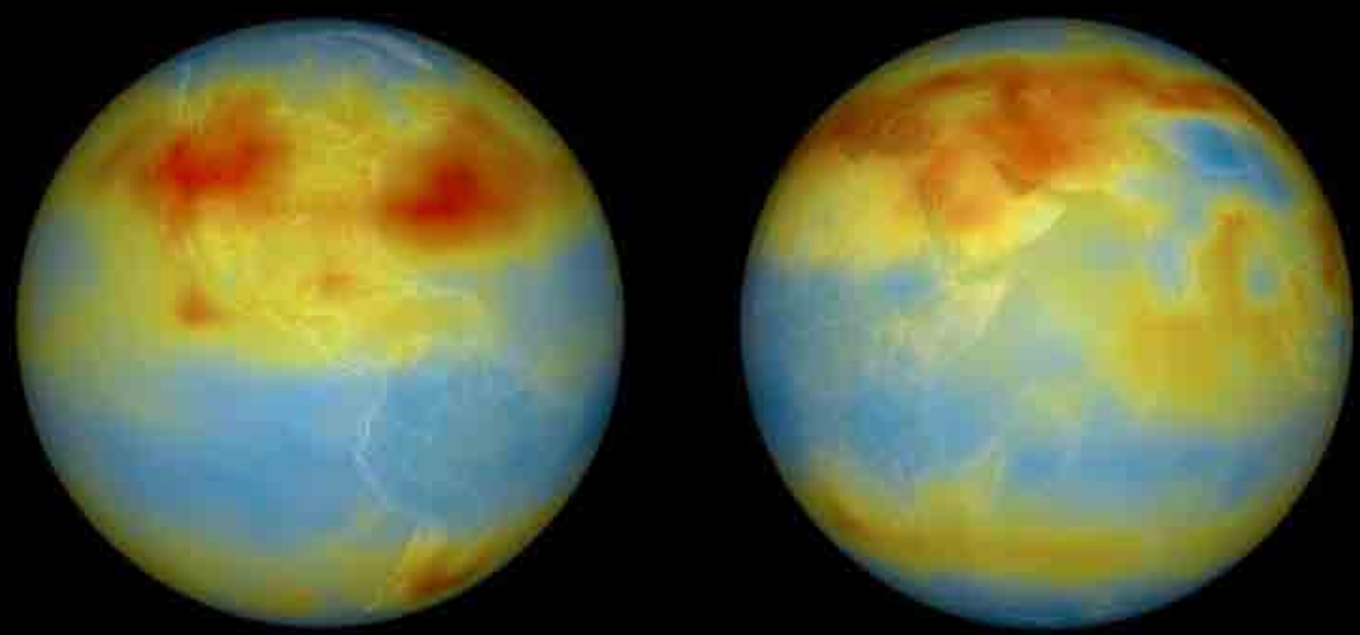
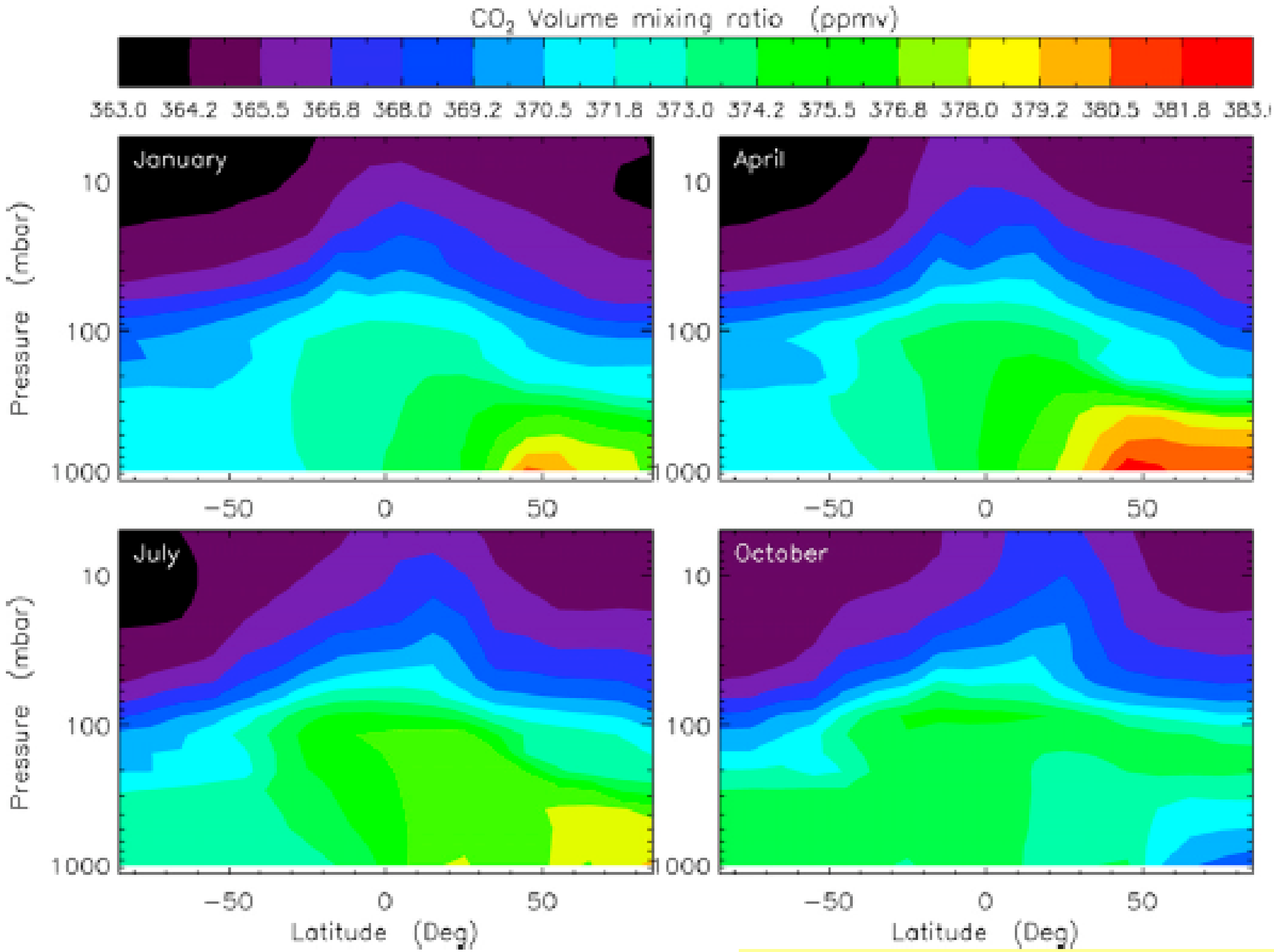


Photo: Aqua/AIRS Global Carbon Dioxide
http://svs.gsfc.nasa.gov/vis/a000000/a003400/a003440/index.html

# Outline

- Models
- Data
- Transport

# Seasonal Cycles




Shia, Liang, Miller, Yung, GRL 2006

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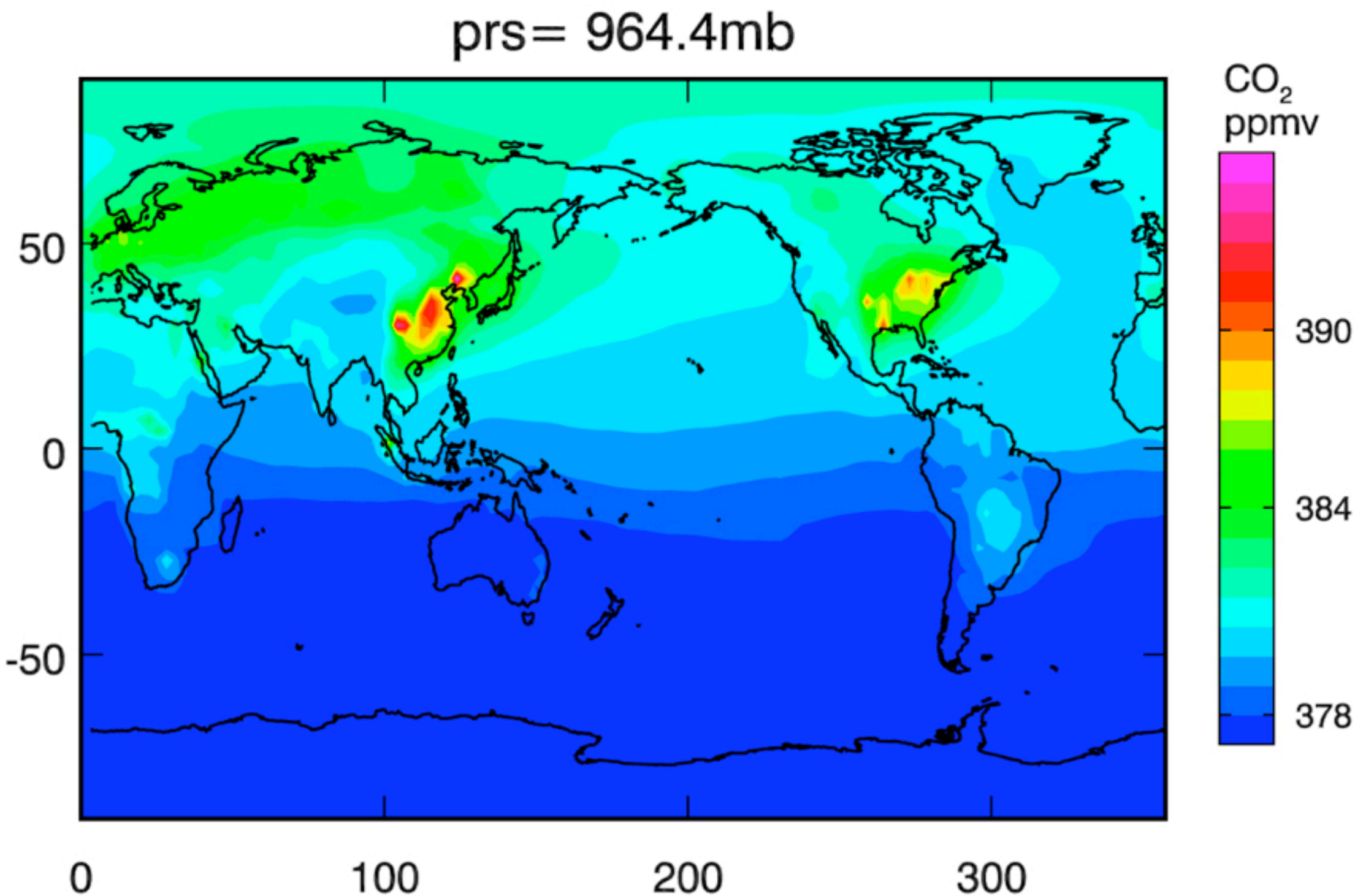

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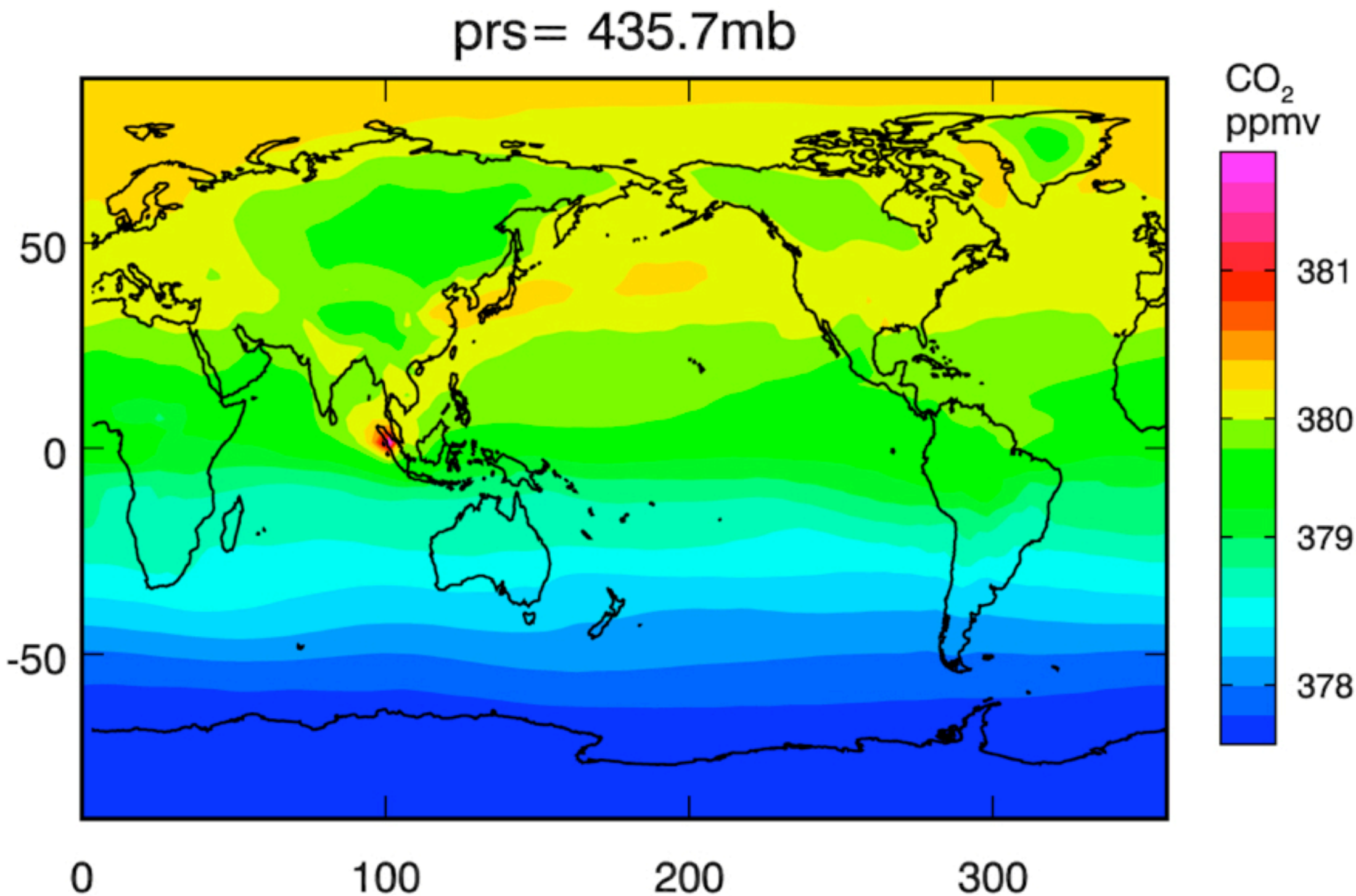

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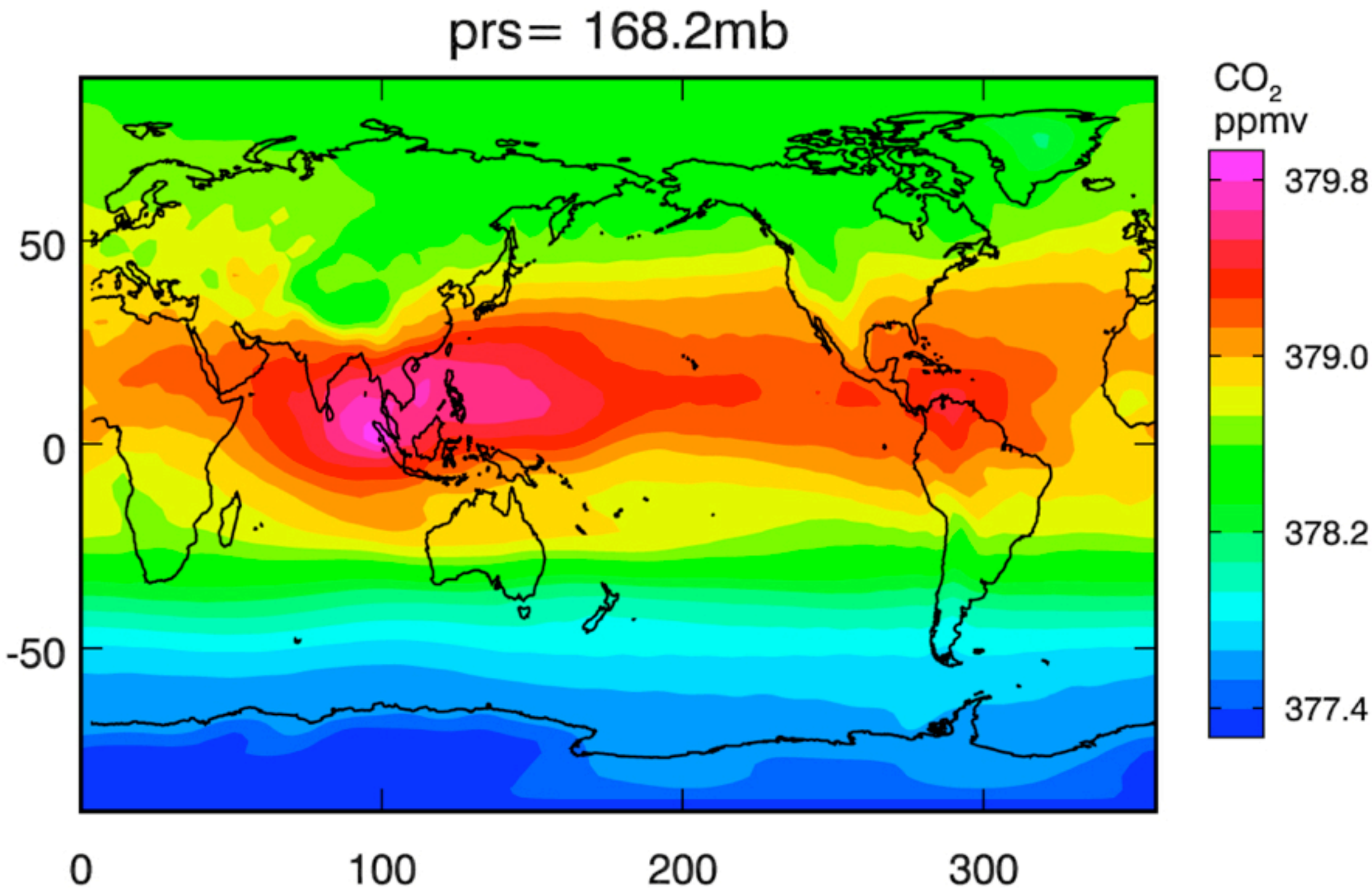

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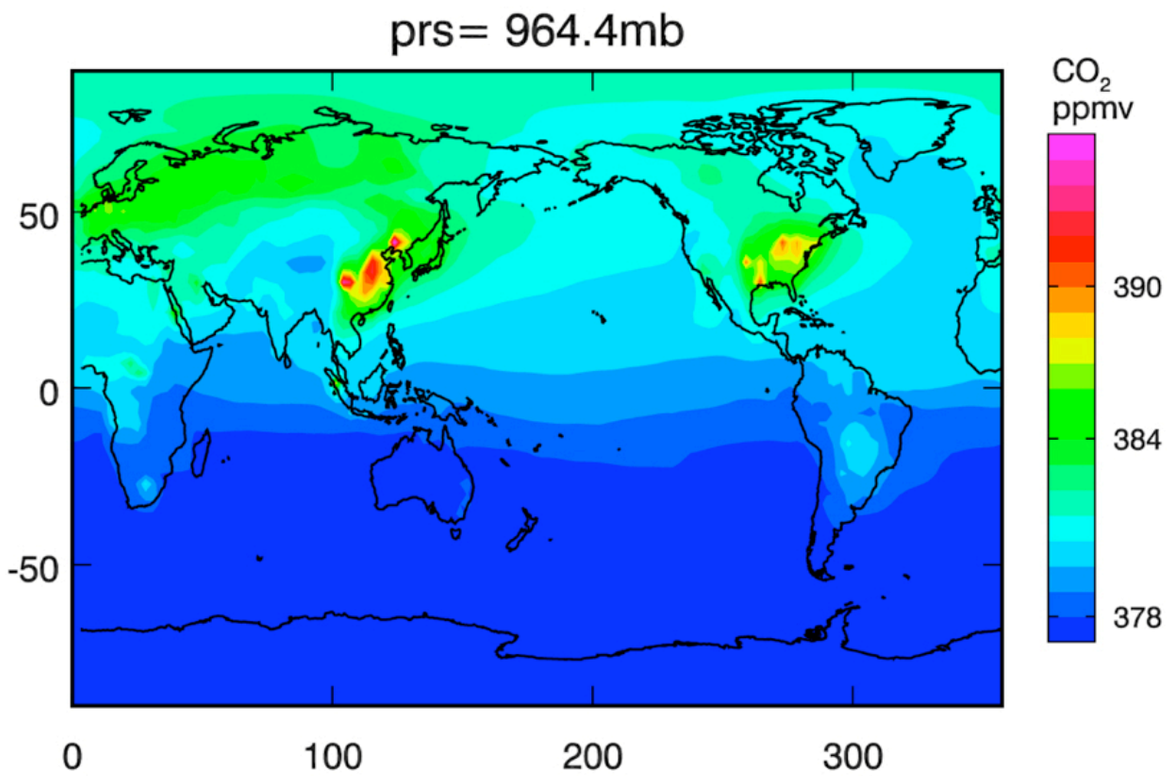


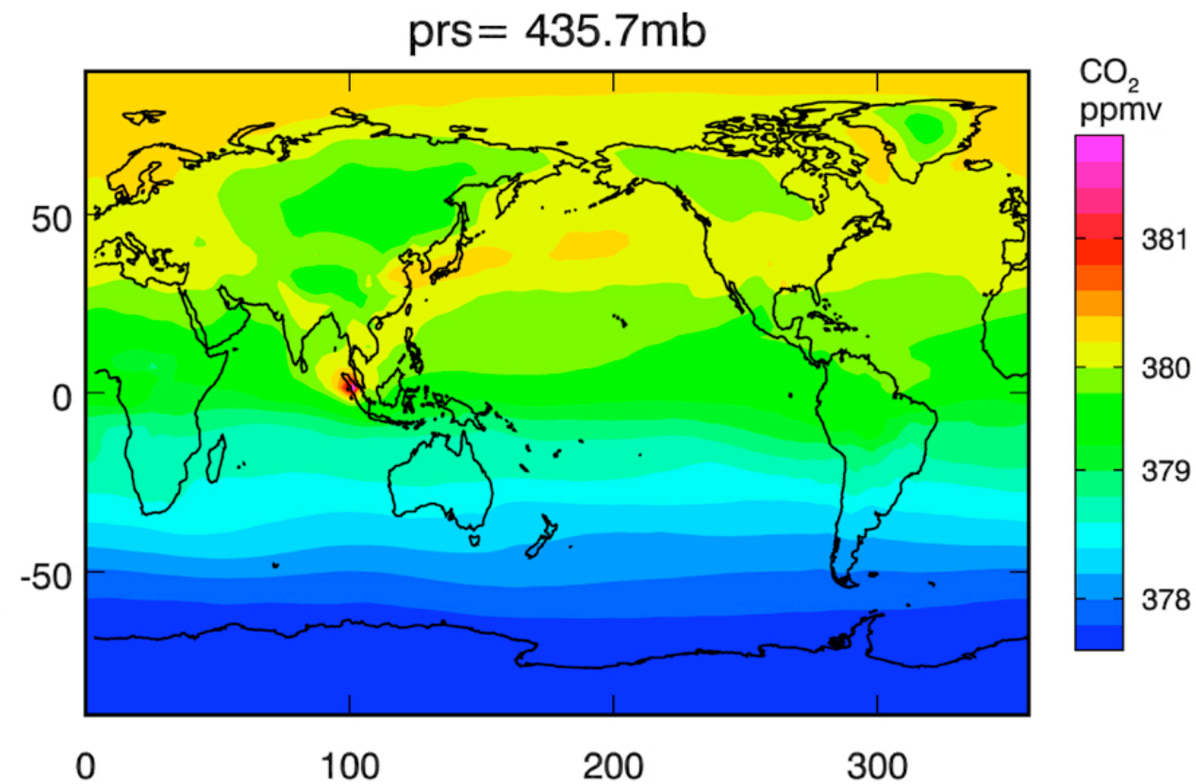


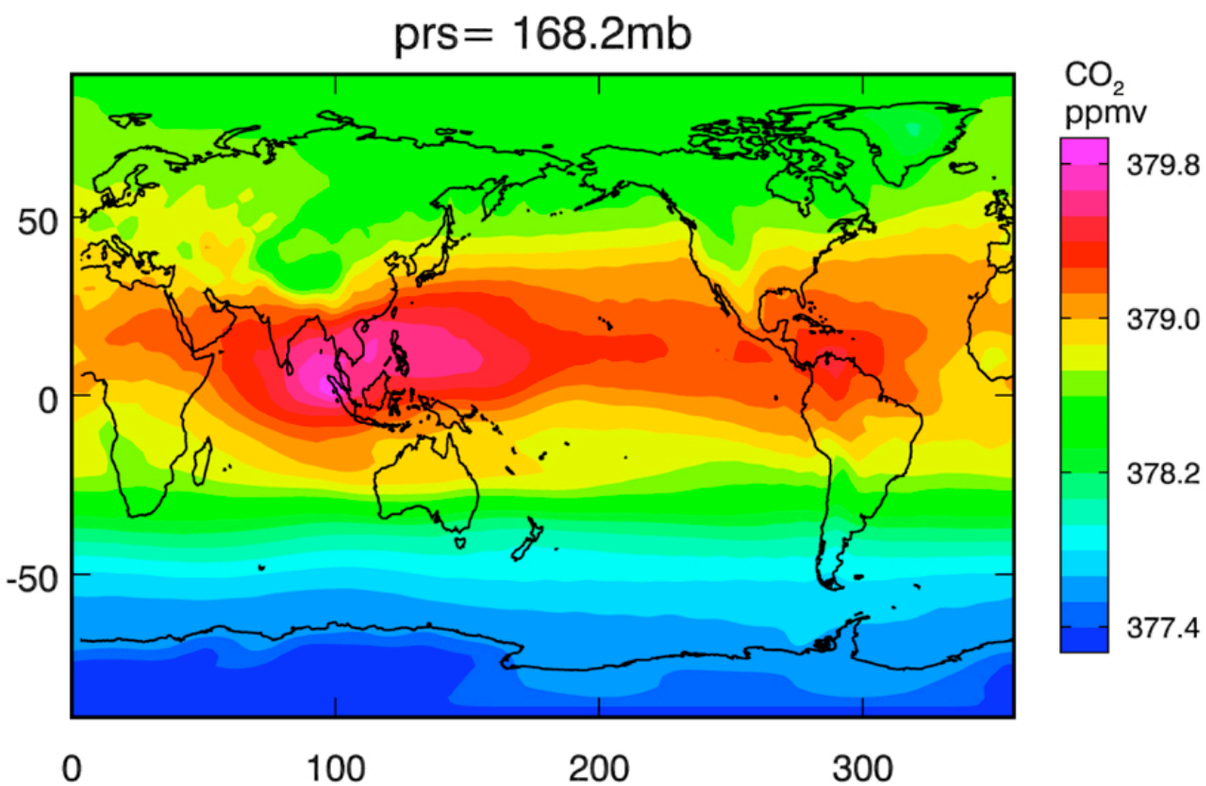


Mozart (3D)

- Boundary Condition

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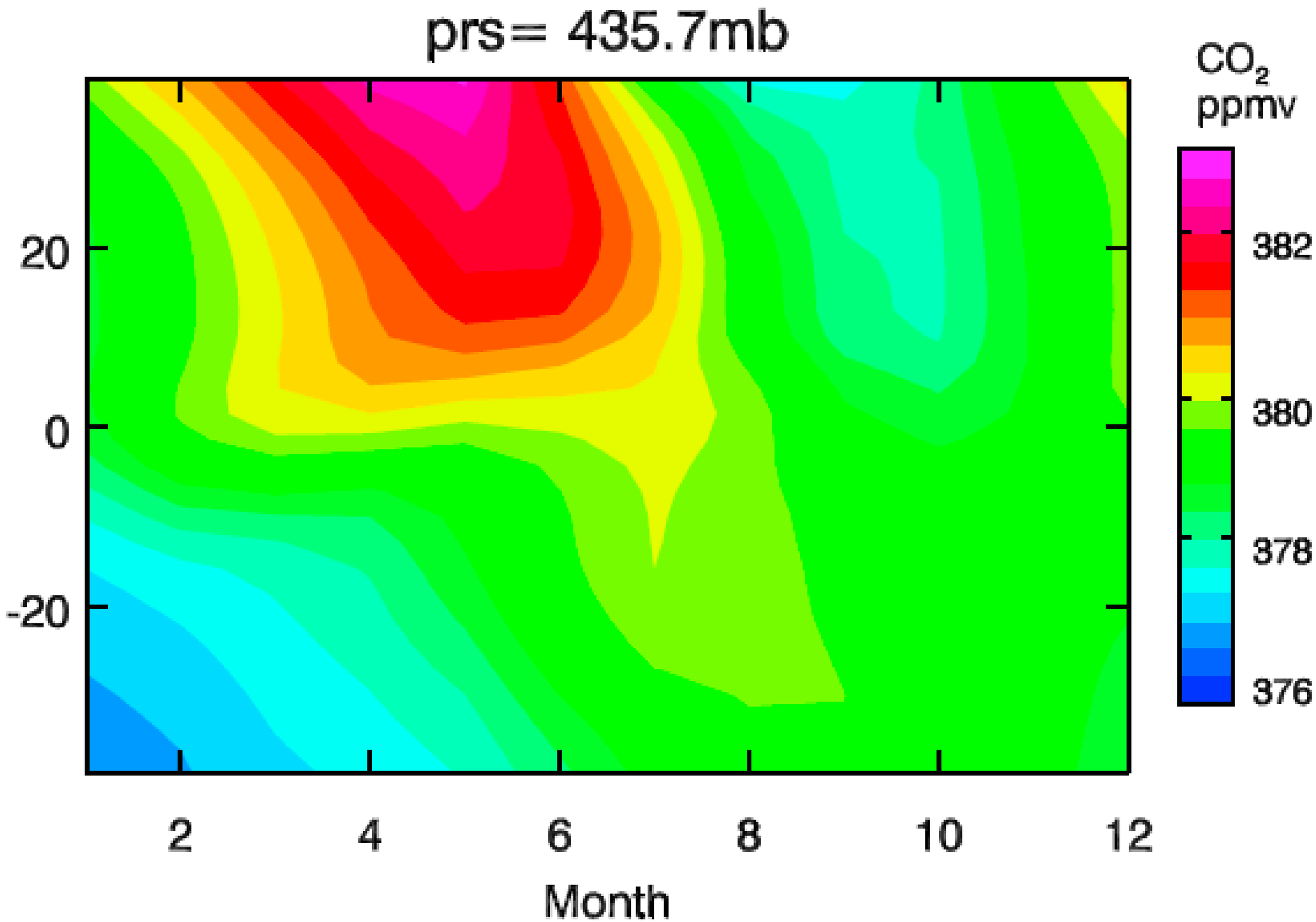

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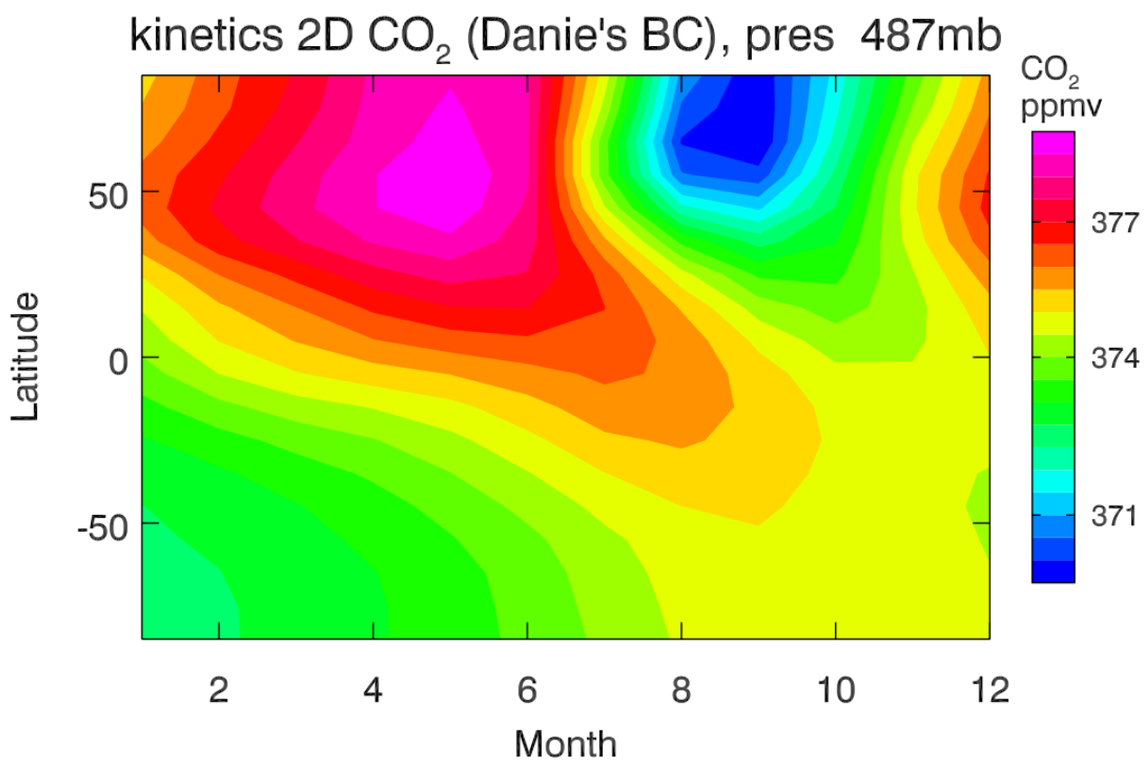
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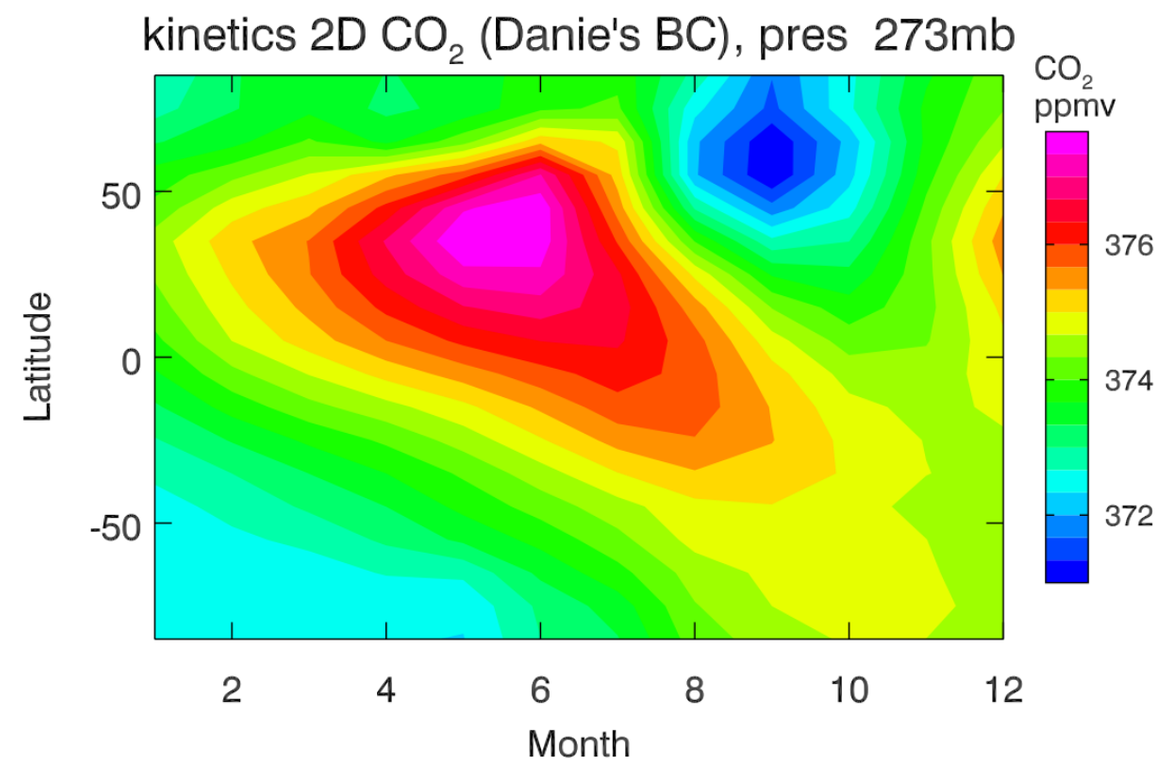
$CO_2$ ppmv
377
374
371
Latitude
50
0
-50
2
4
6
8
10
12
Month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$CO_2$ ppmv
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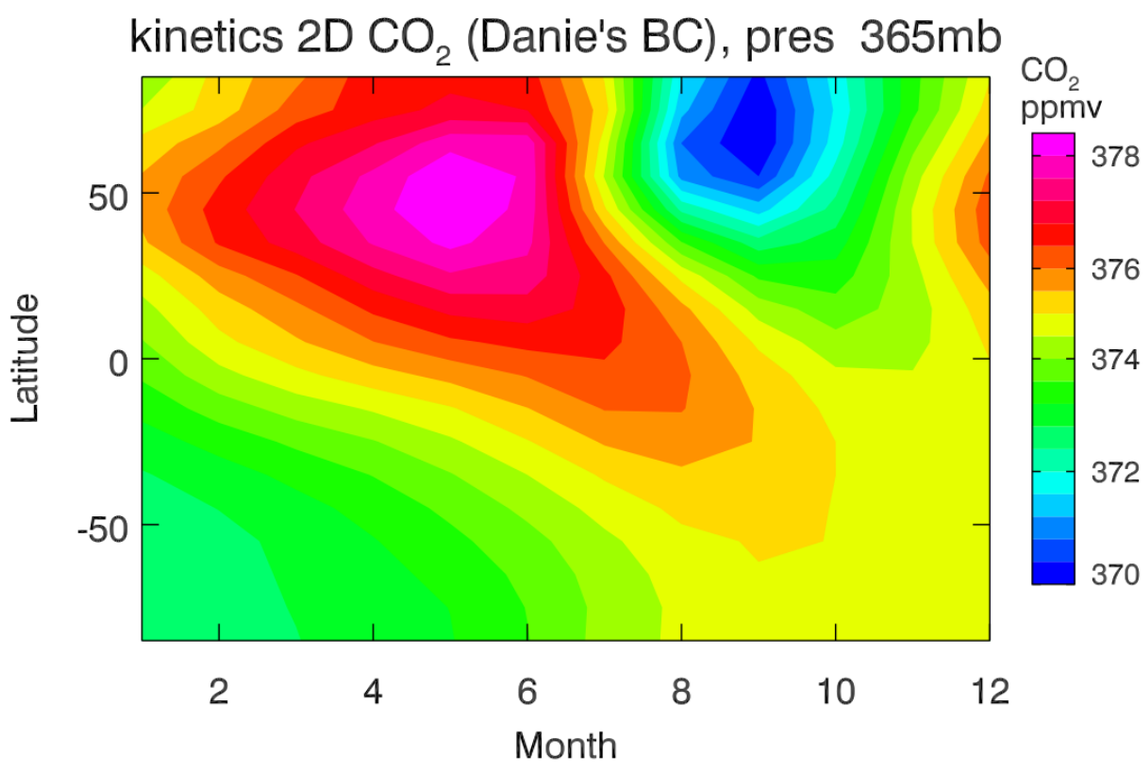
374
372
Latitude
50
0
-50
2
4
6
8
10
12
Month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$CO_2$ ppmv
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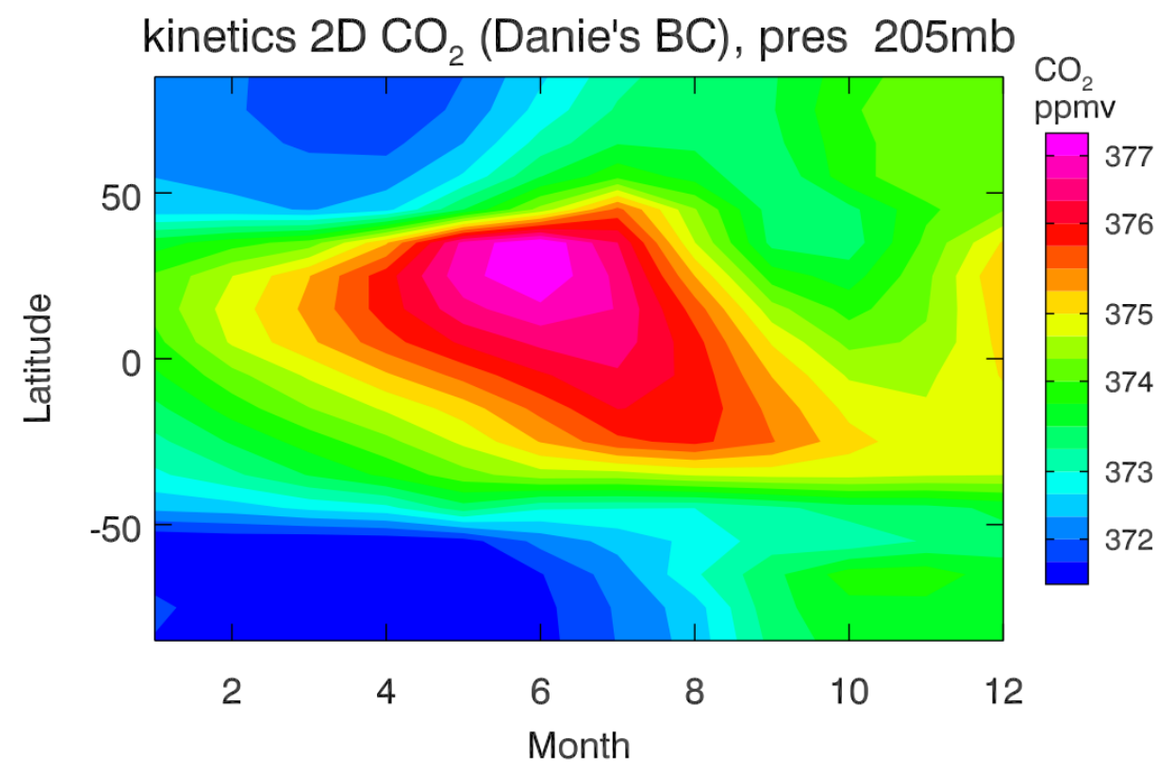
376
374
372
370
Latitude
50
0
-50
2
4
6
8
10
12
Month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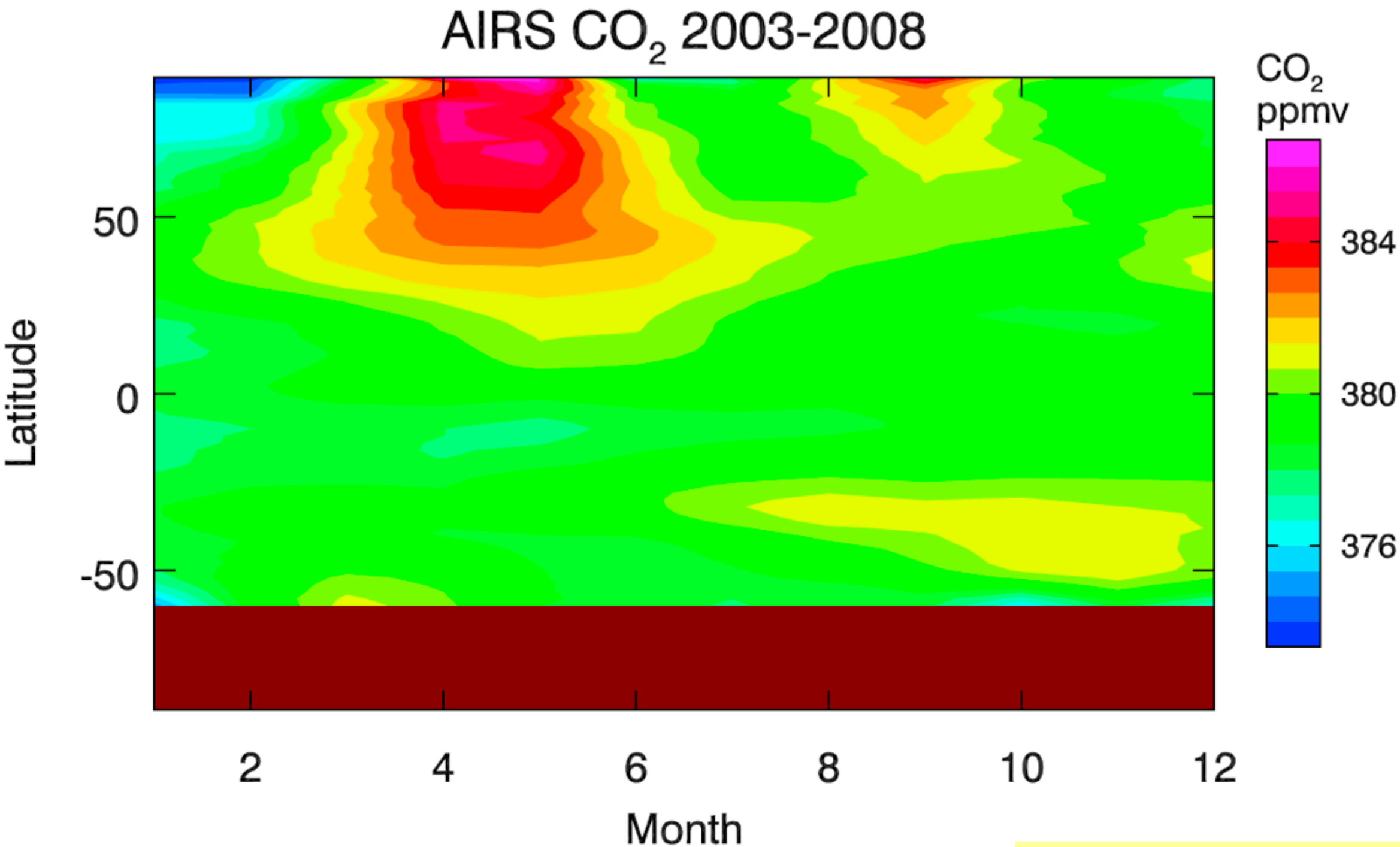
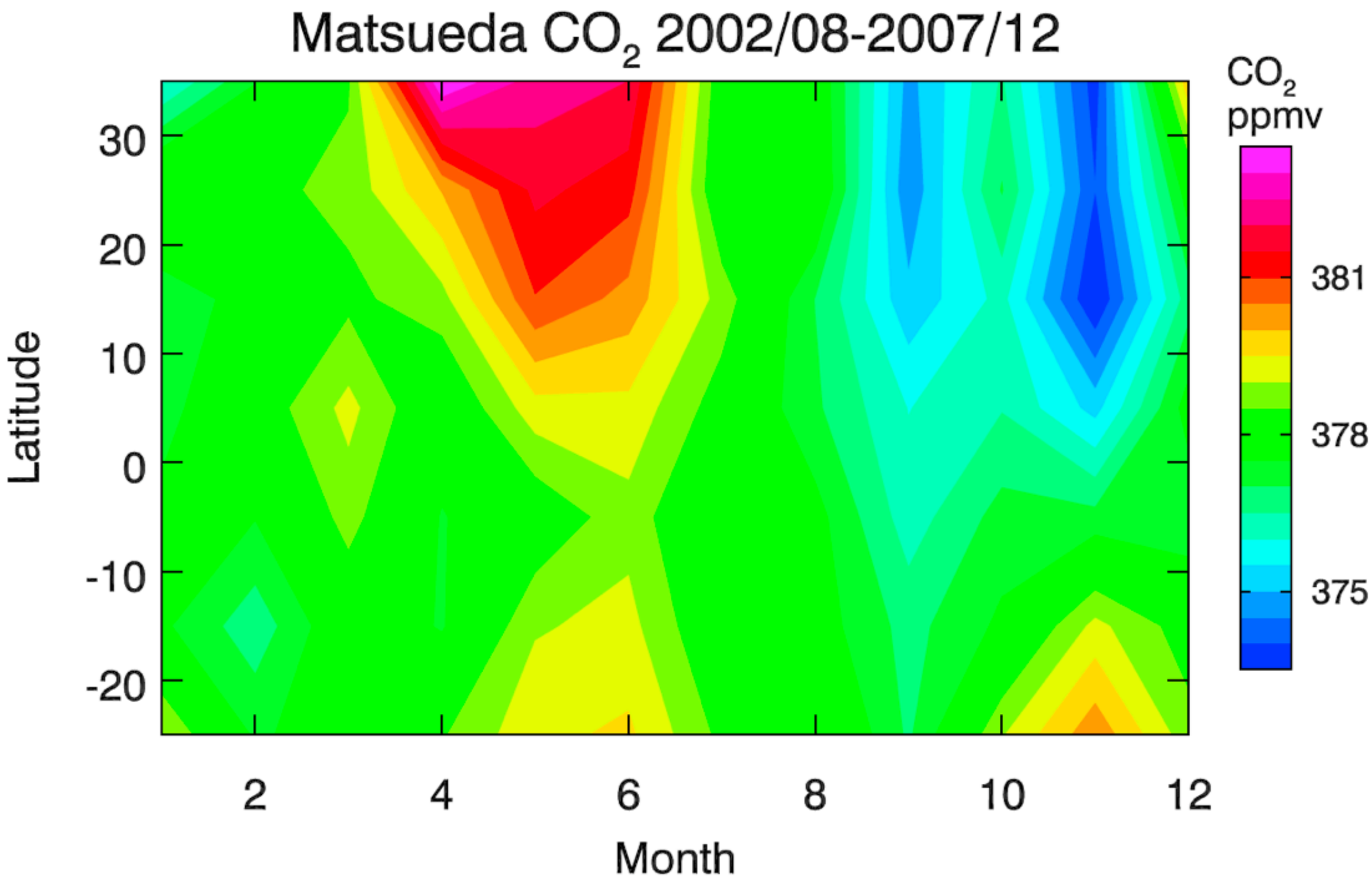
$CO_2$ ppmv
377
376
375
374
373
372
Latitude
50
0
-50
2
4
6
8
10
12
Month

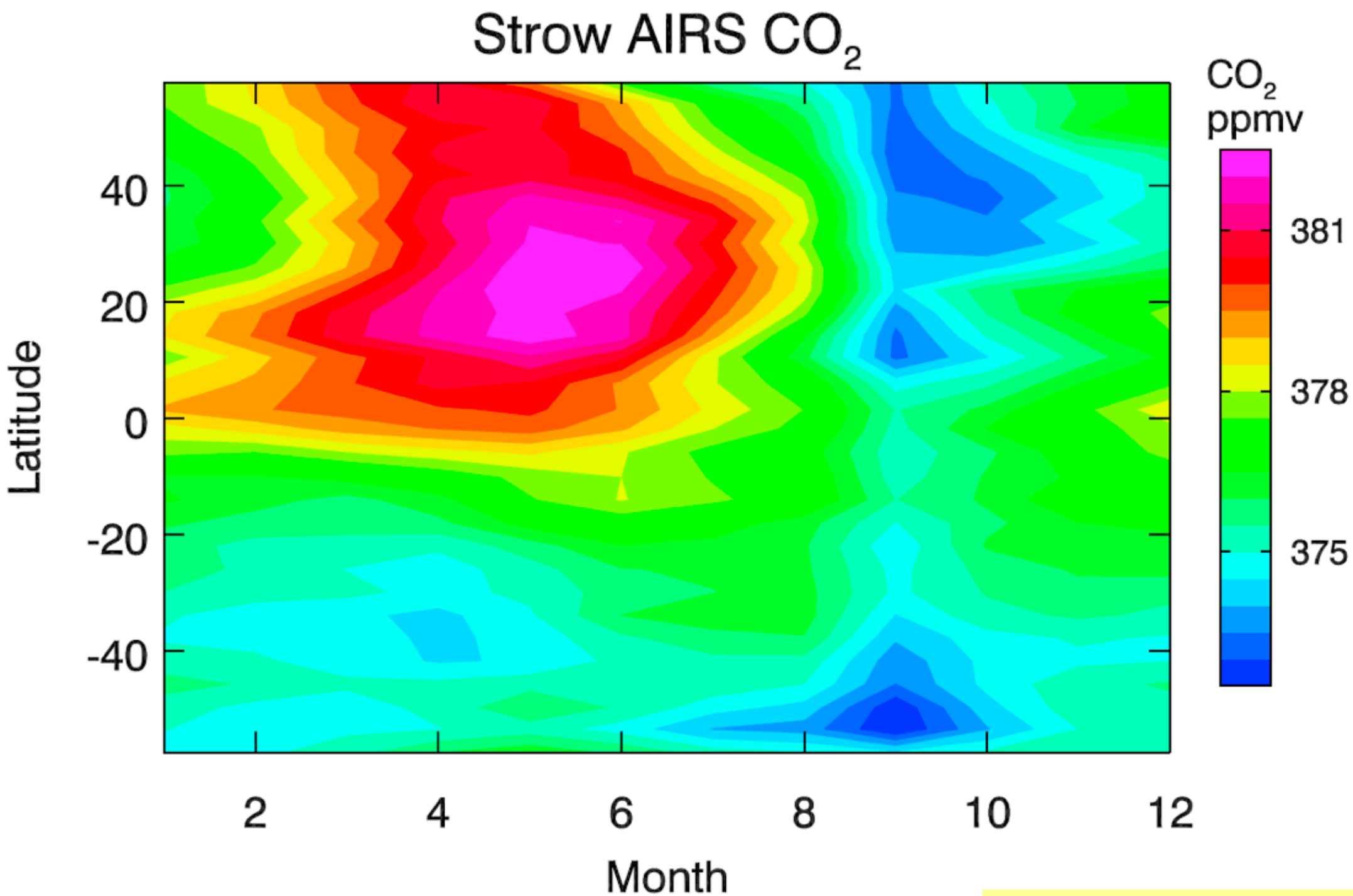
# Outline

- Models
- Data
- Transport




Chahine et al. 2008


Matsueda $CO_2$ 2002/08-2007/12
$CO_2$ ppmv
381
378
375
30
20
10
0
-10
-20
Latitude
2
4
6
8
10
12
Month




Strow et al. 2007

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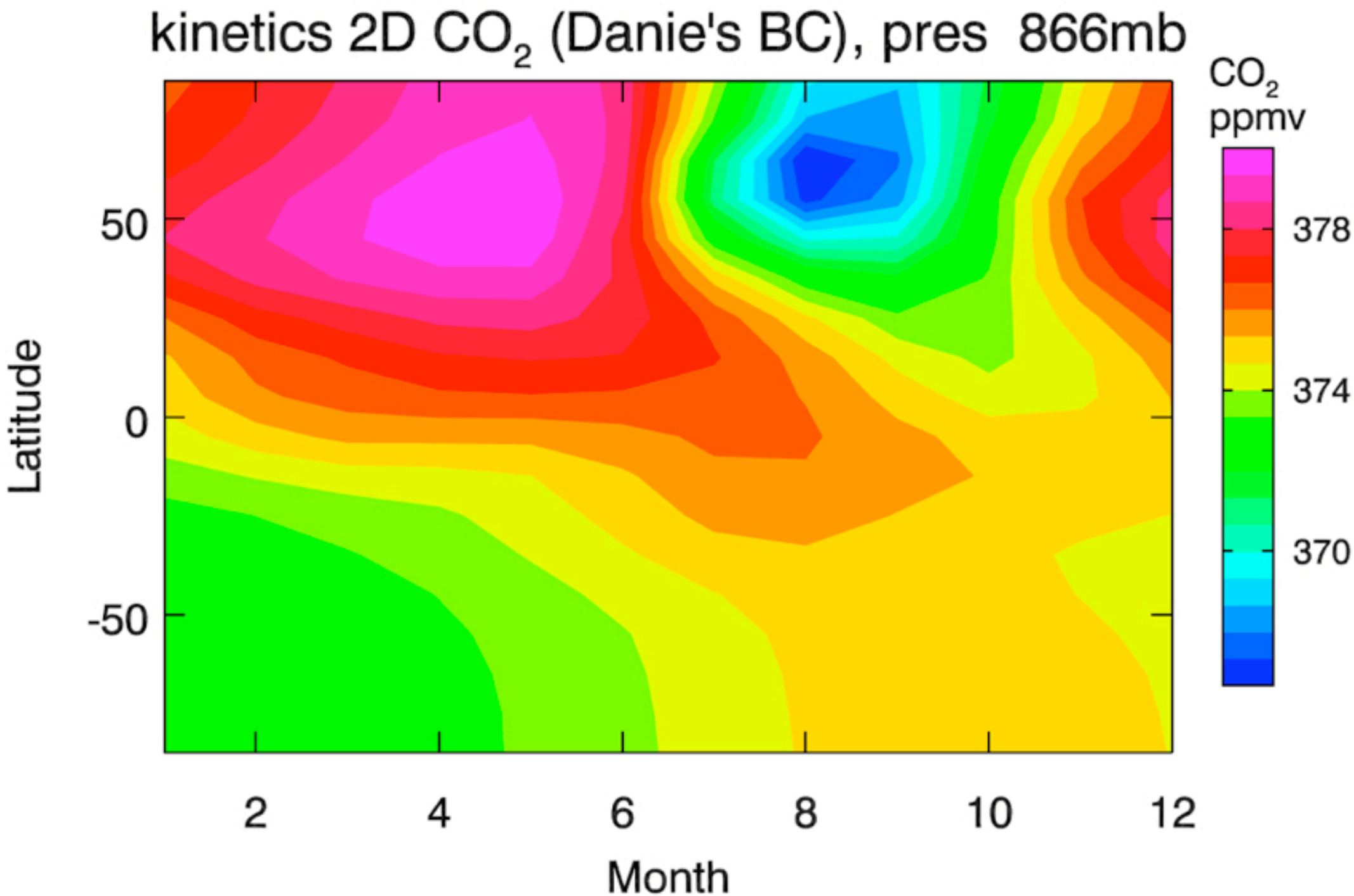
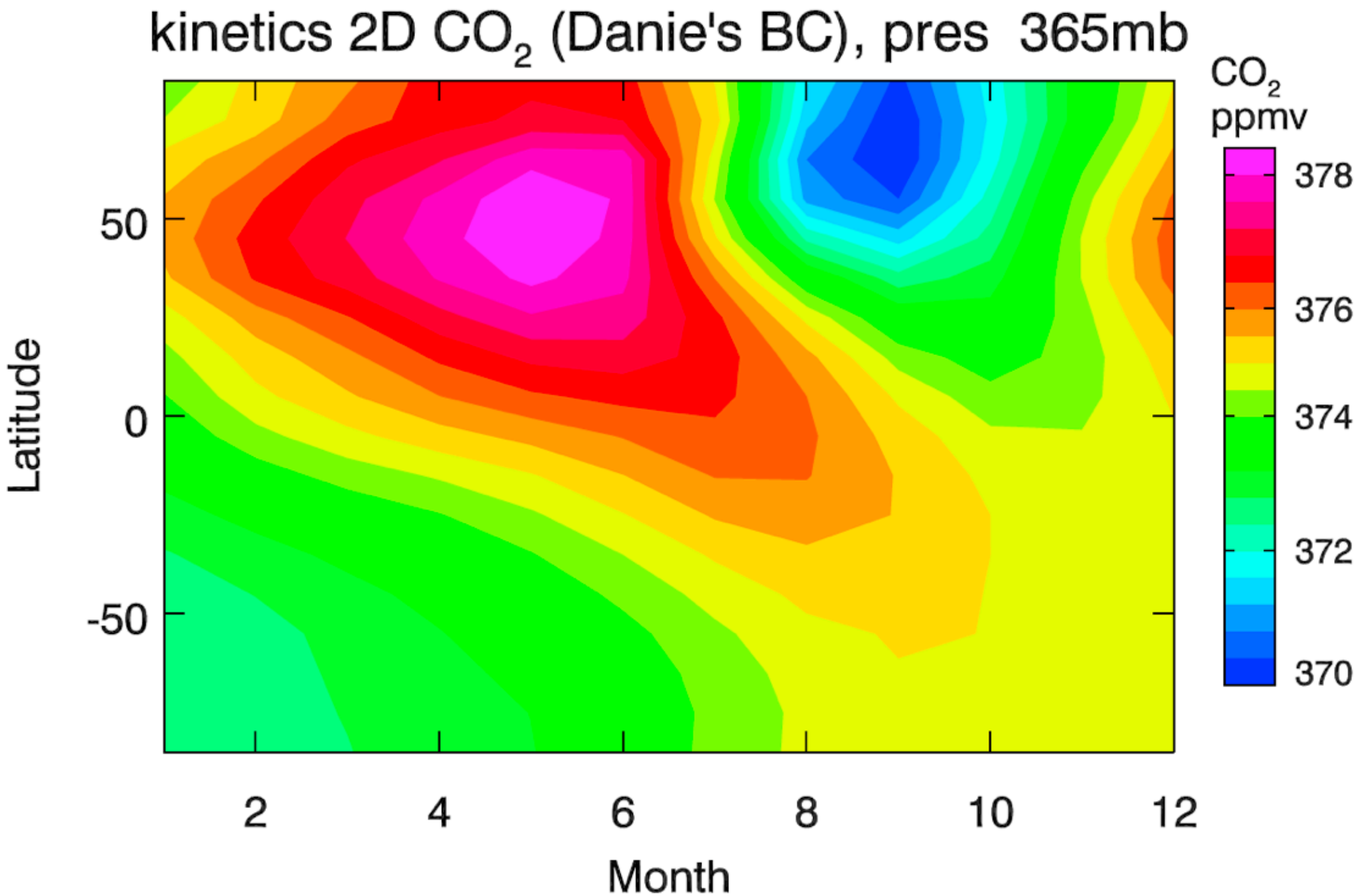

kinetics 2D $CO_2$ (Danie's BC), pres 866mb
$CO_2$
ppmv
378
374
370
50
0
-50
Latitude
2
4
6
8
10
12
Month


kinetics 2D $CO_2$ (Danie's BC), pres 365mb
$CO_2$ ppmv
378
376
374
372
370
Latitude
50
0
-50
2
4
6
8
10
12
Month

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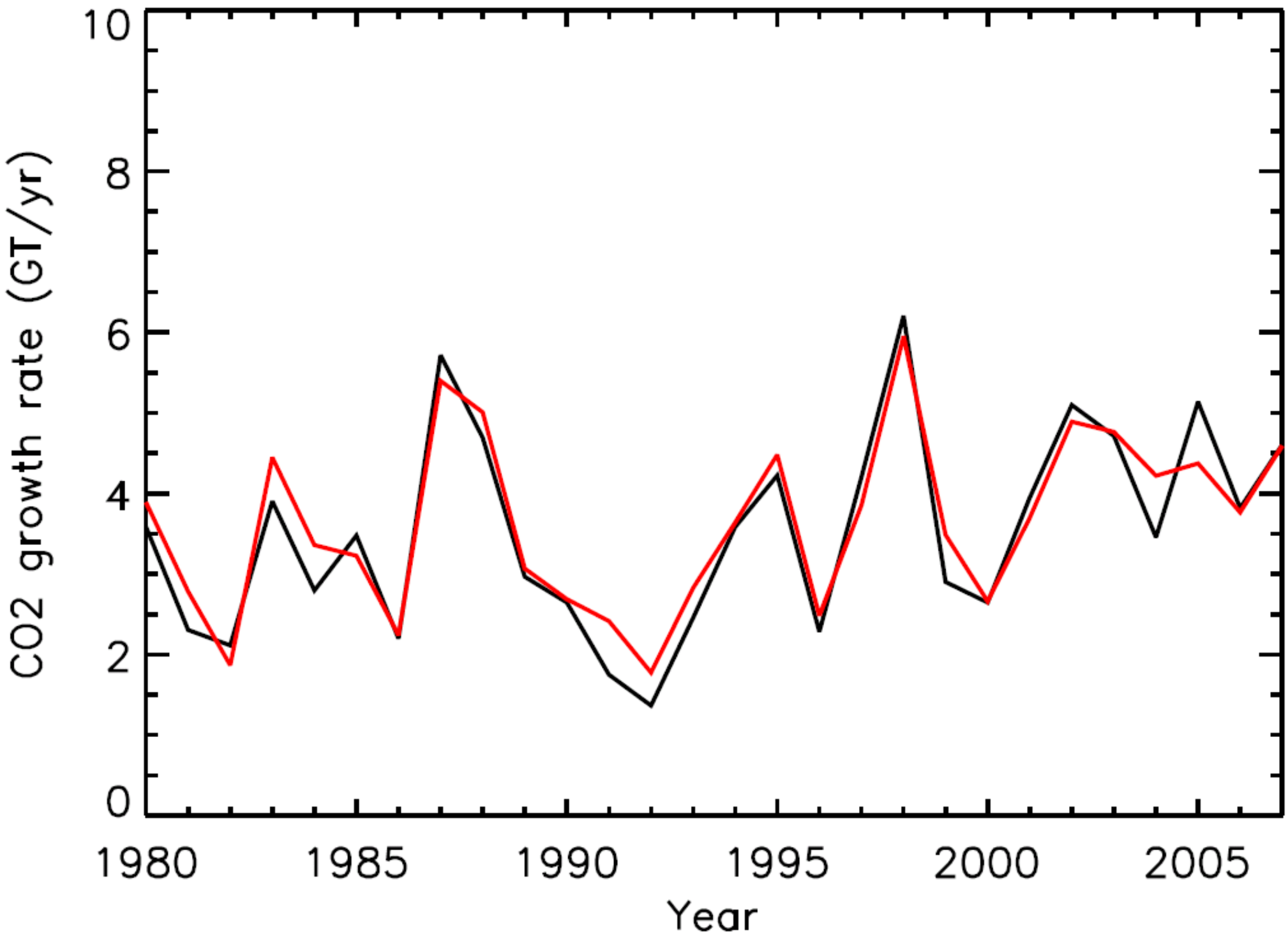
10
8
6
4
2
0
CO2 growth rate (GT/yr)
1980
1985
1990
1995
2000
2005
Year

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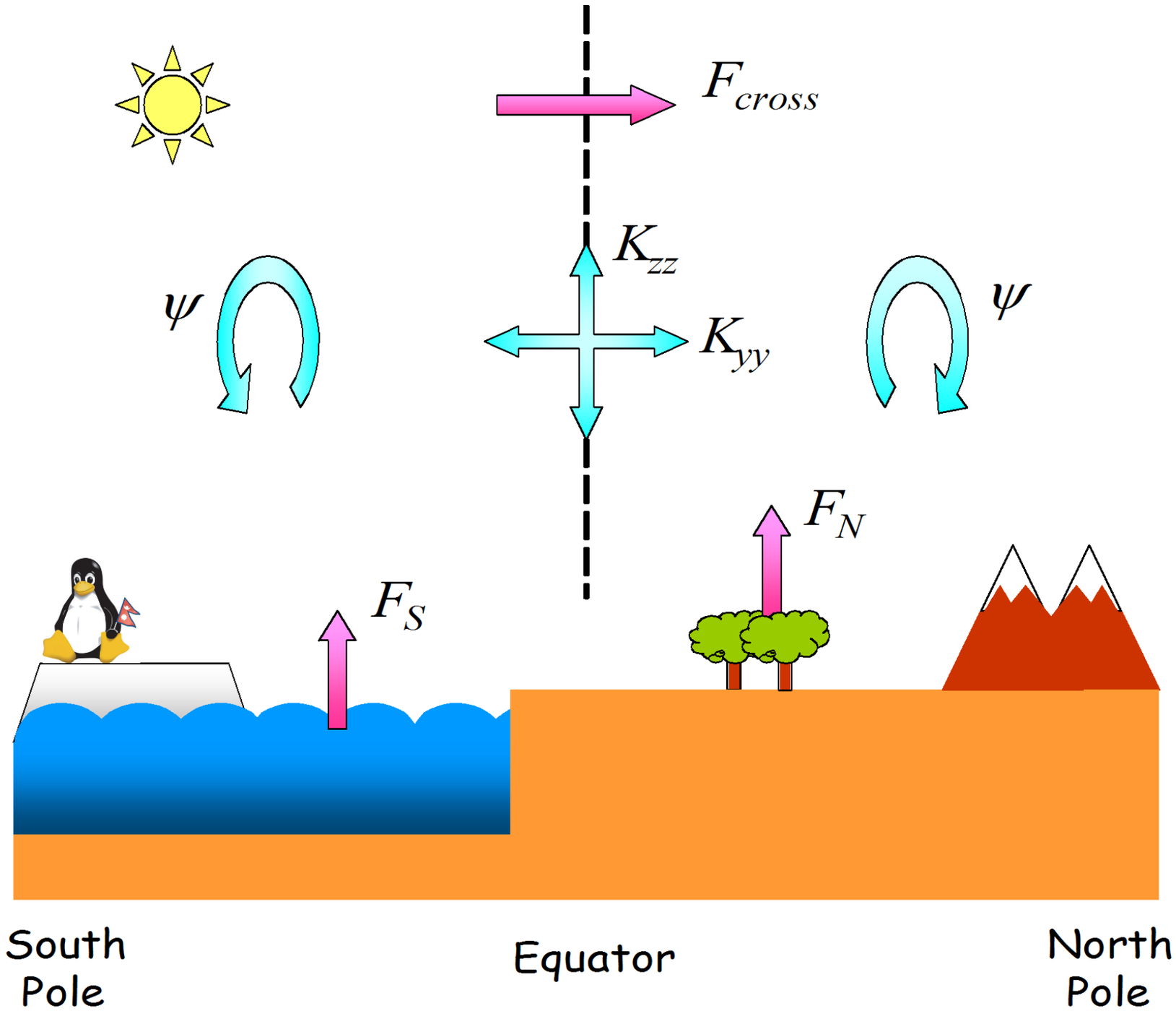

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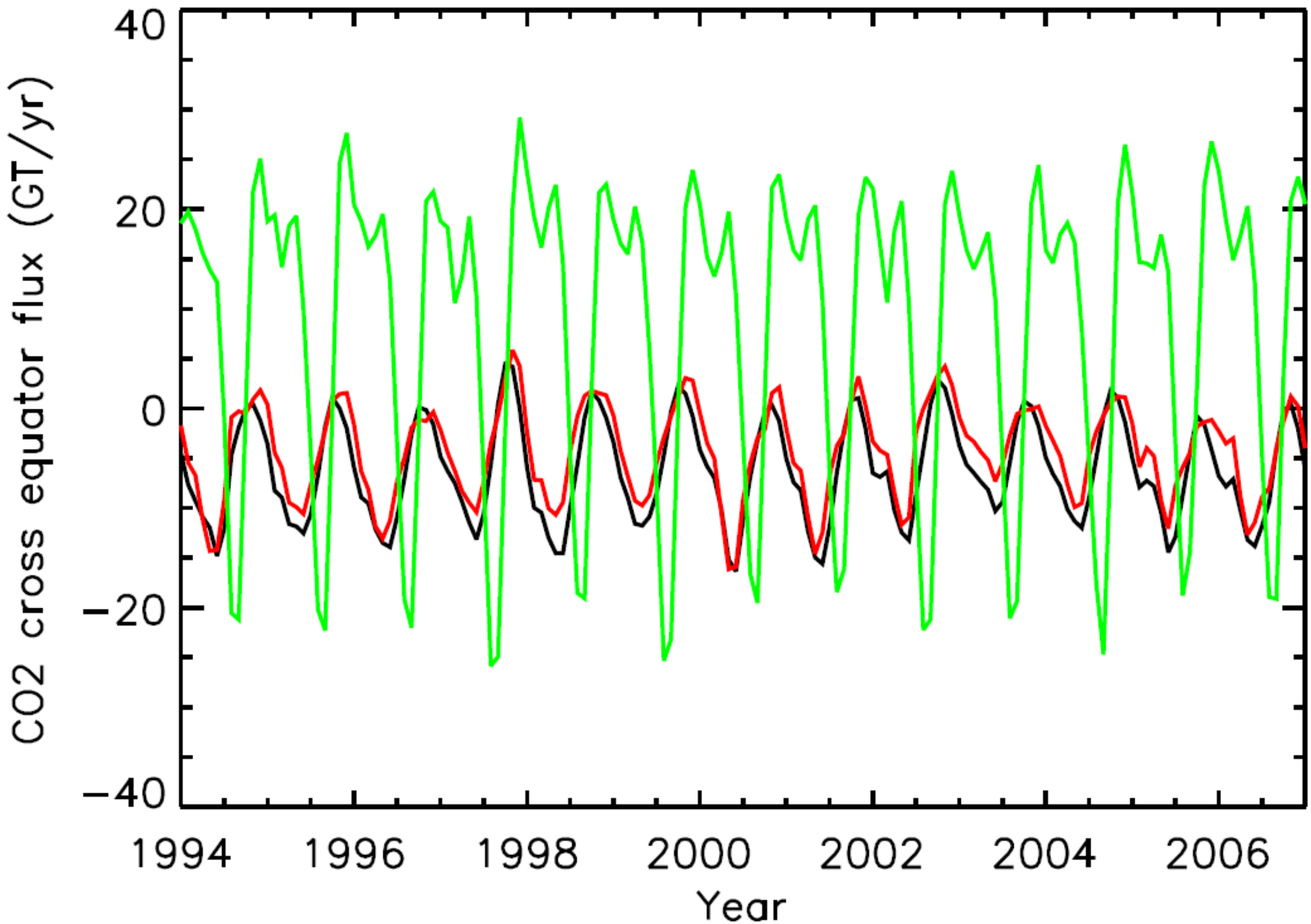
40
20
0
−20
−40
CO2 cross equator flux (GT/yr)
1994
1996
1998
2000
2002
2004
2006
Year

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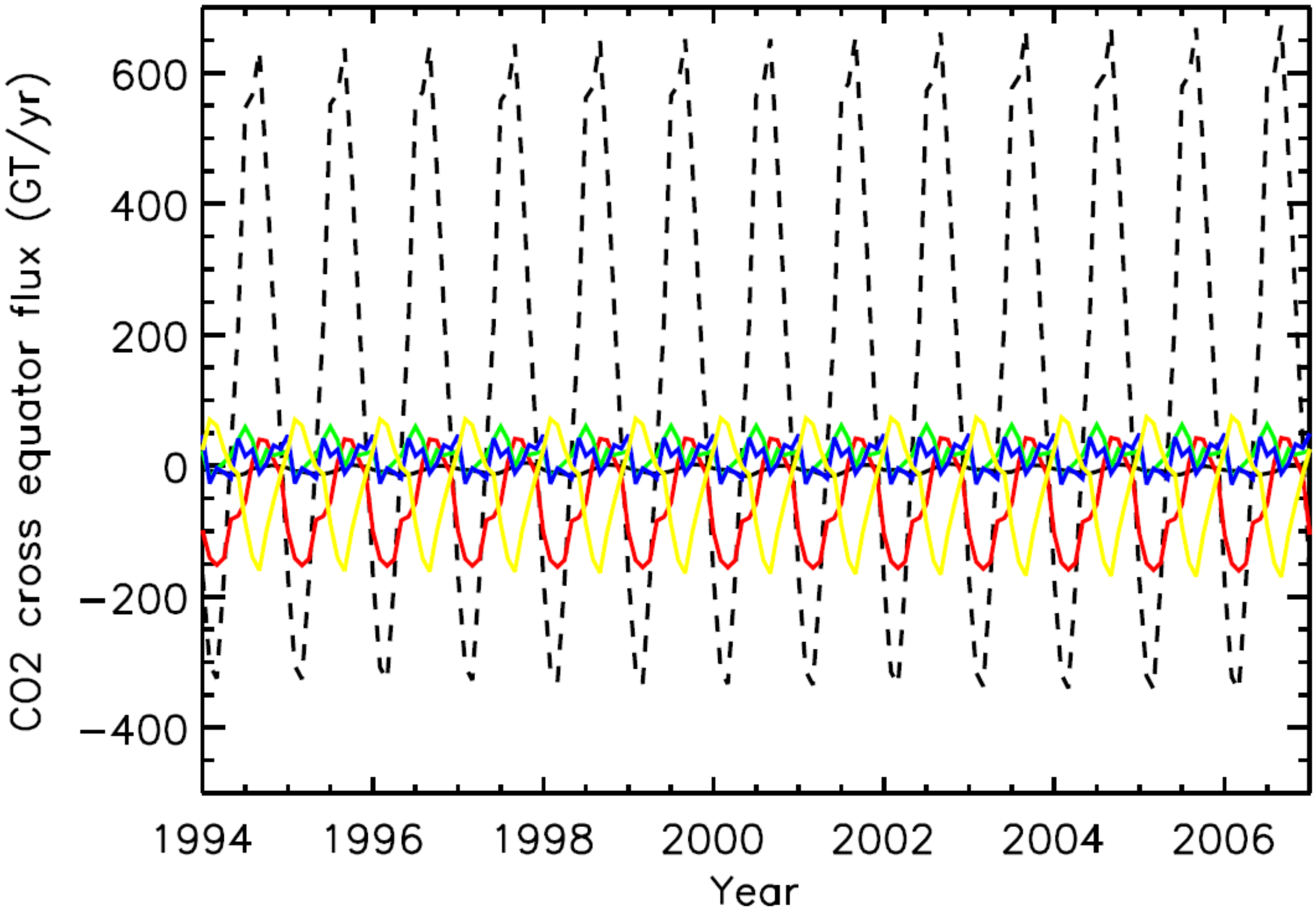
600
400
200
0
−200
−400
CO2 cross equator flux (GT/yr)
1994
1996
1998
2000
2002
2004
2006
Year

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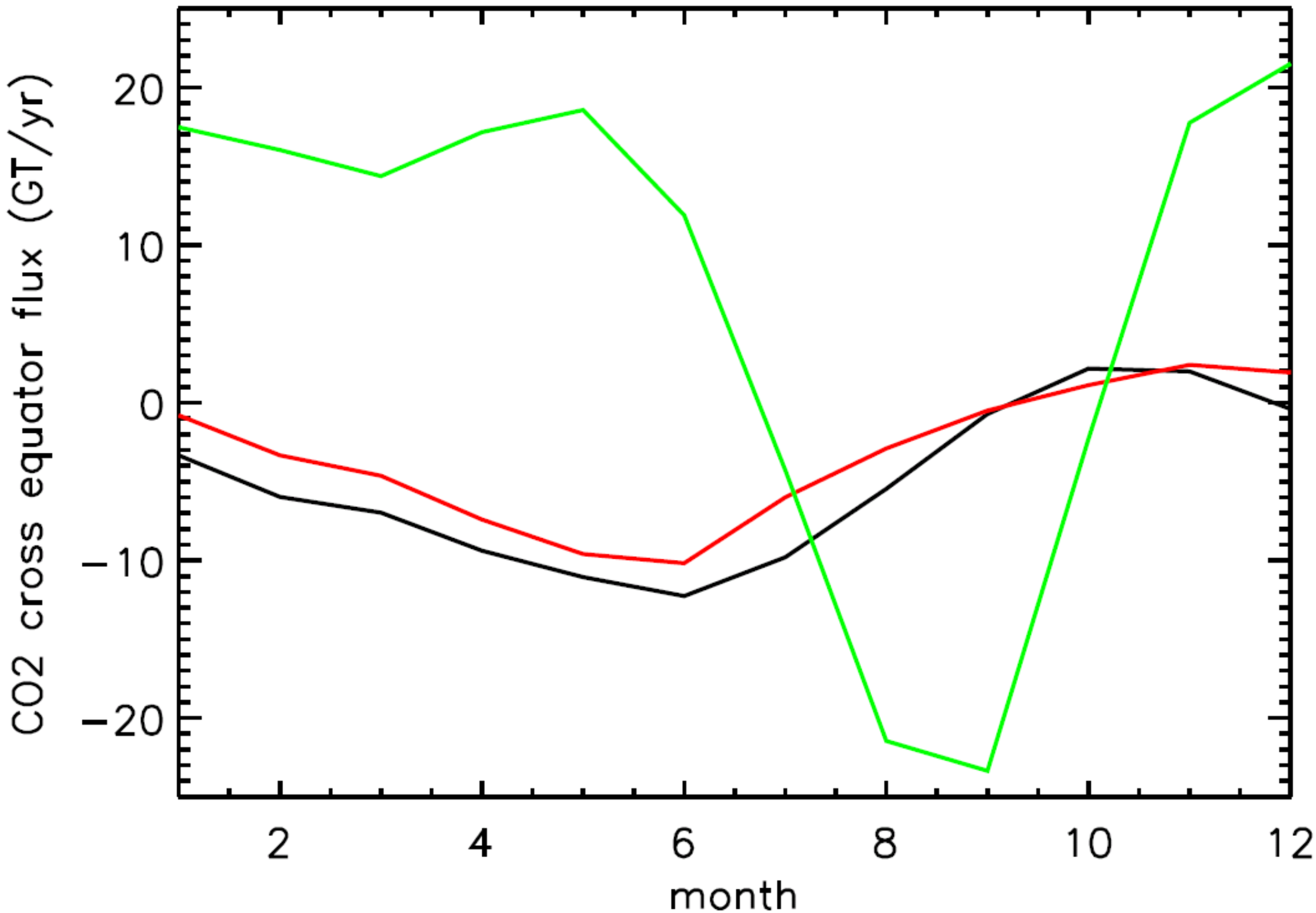
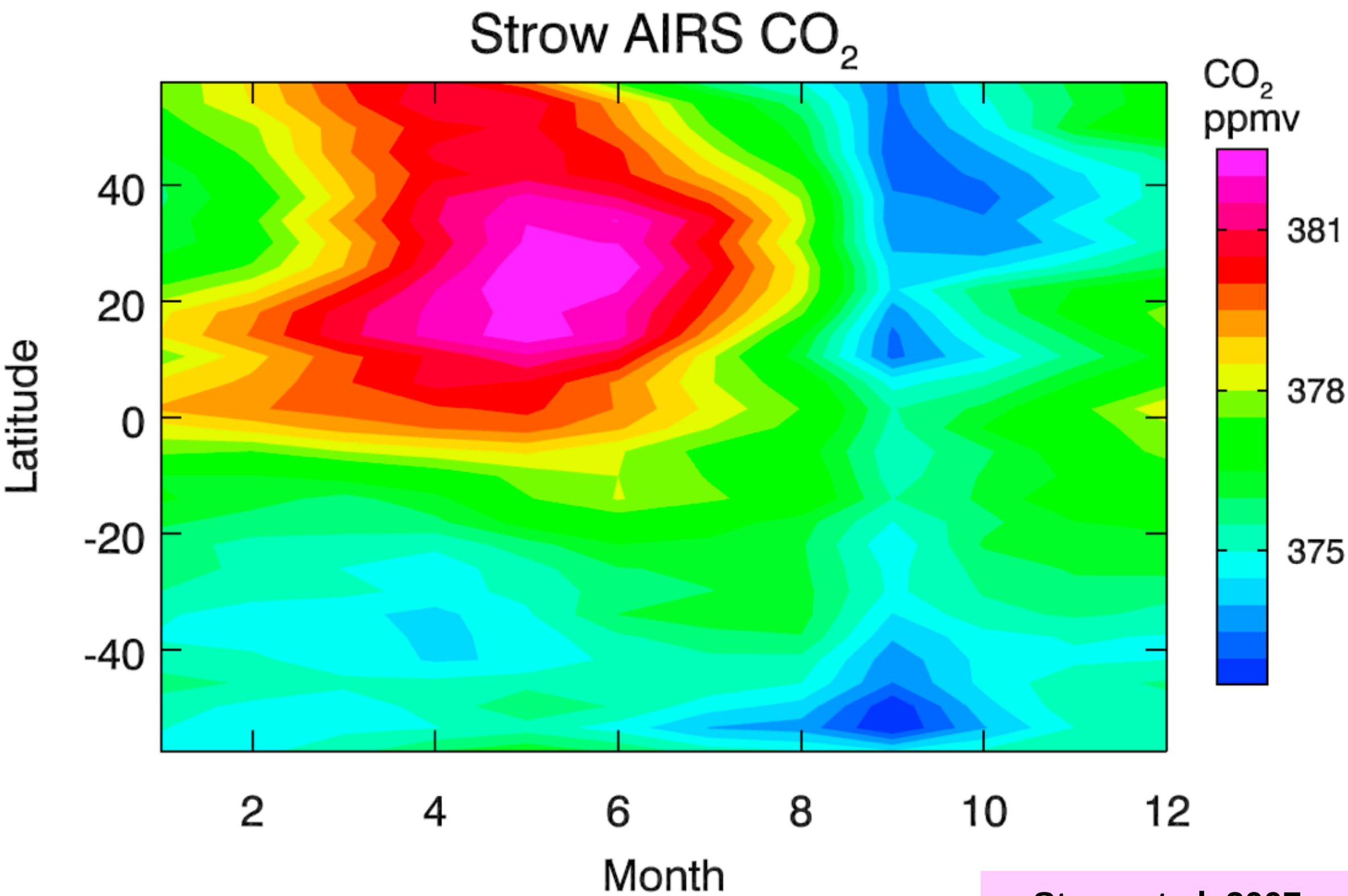


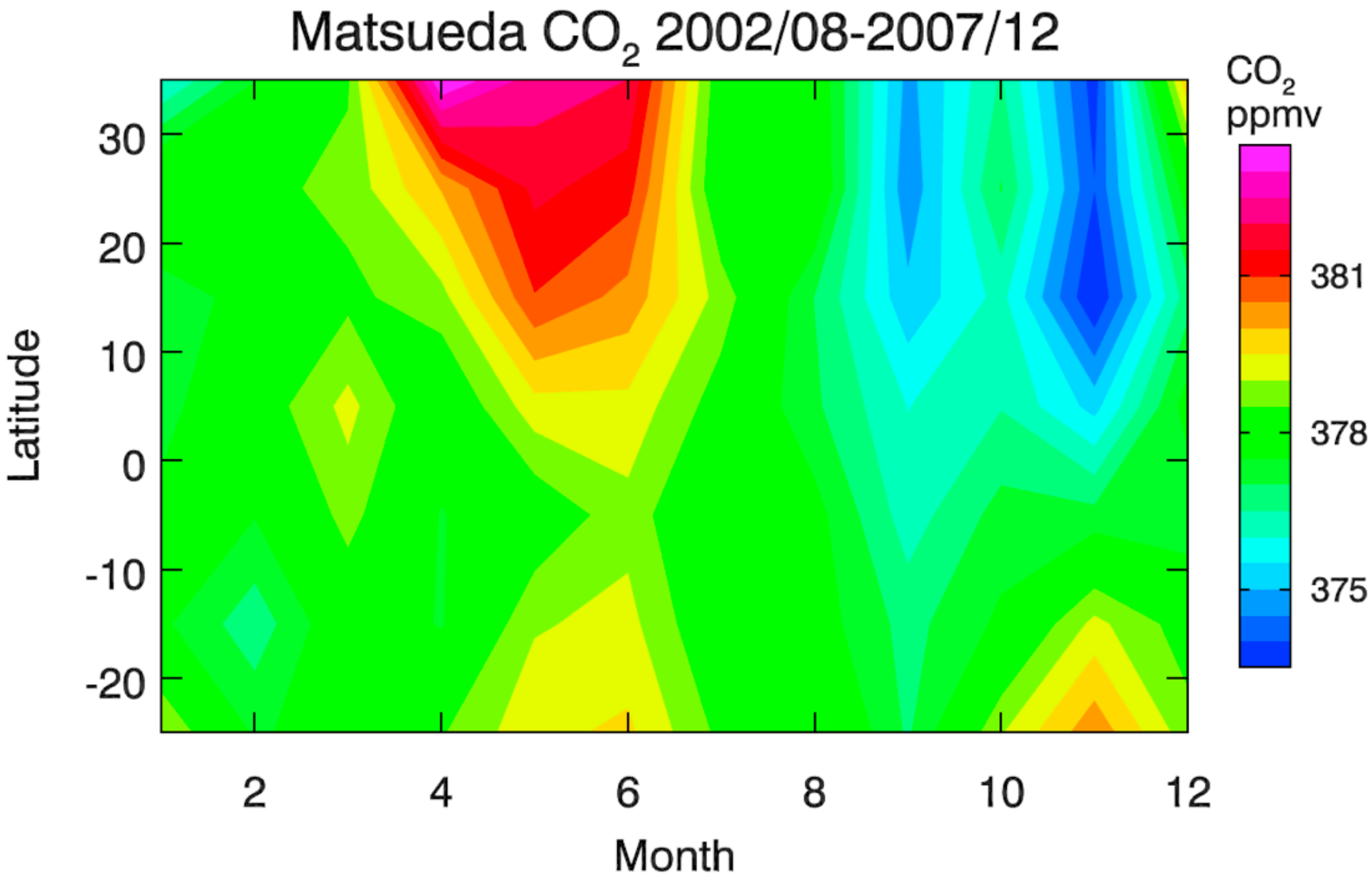
## Summary

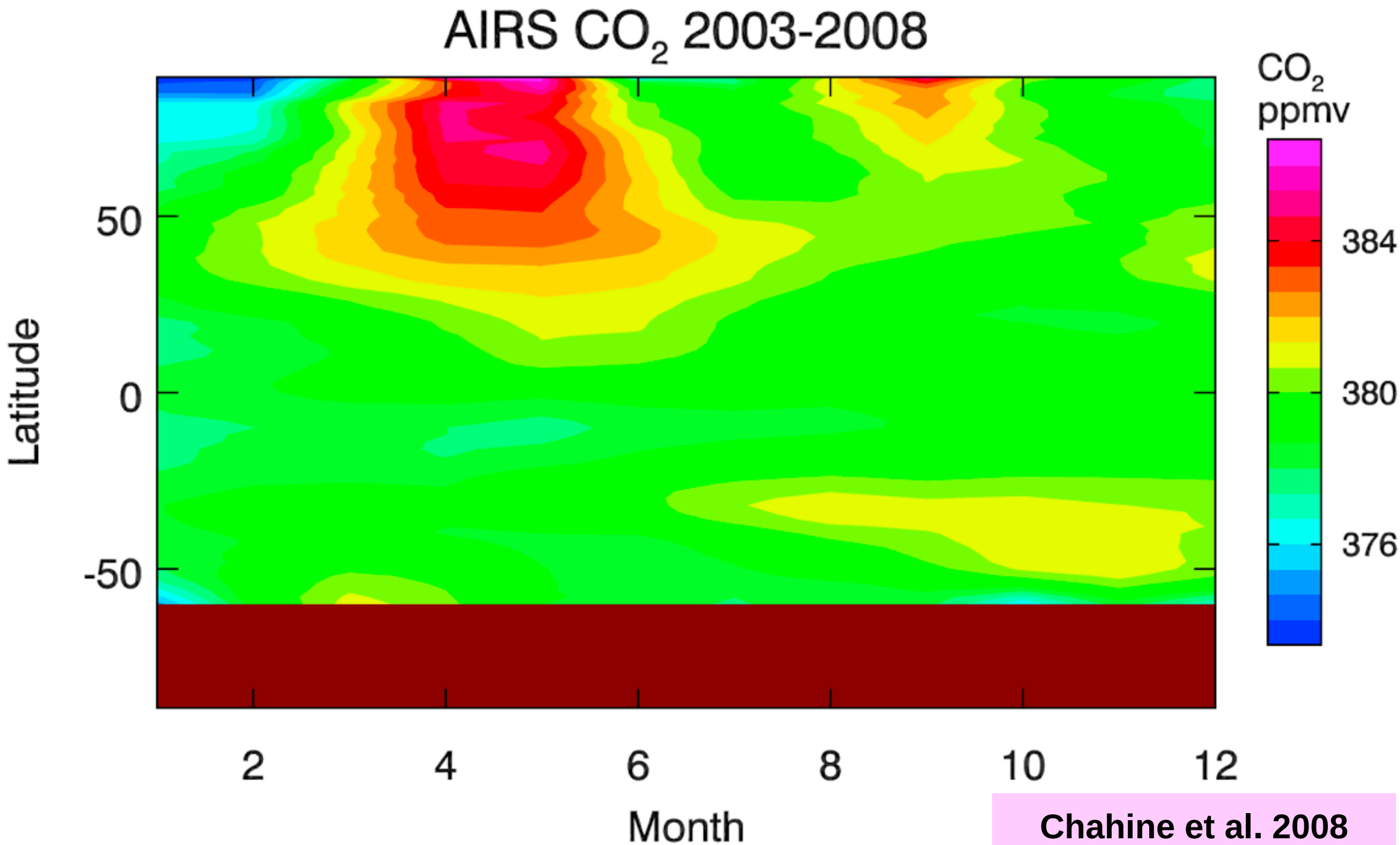
- Models shows $CO_2$ transport in high troposphere
- Data shows evidence for enhanced transport
- SH appears to be efficient sink
- Transport sensitive to $K_{yy}$

# ■*Backup Slides*

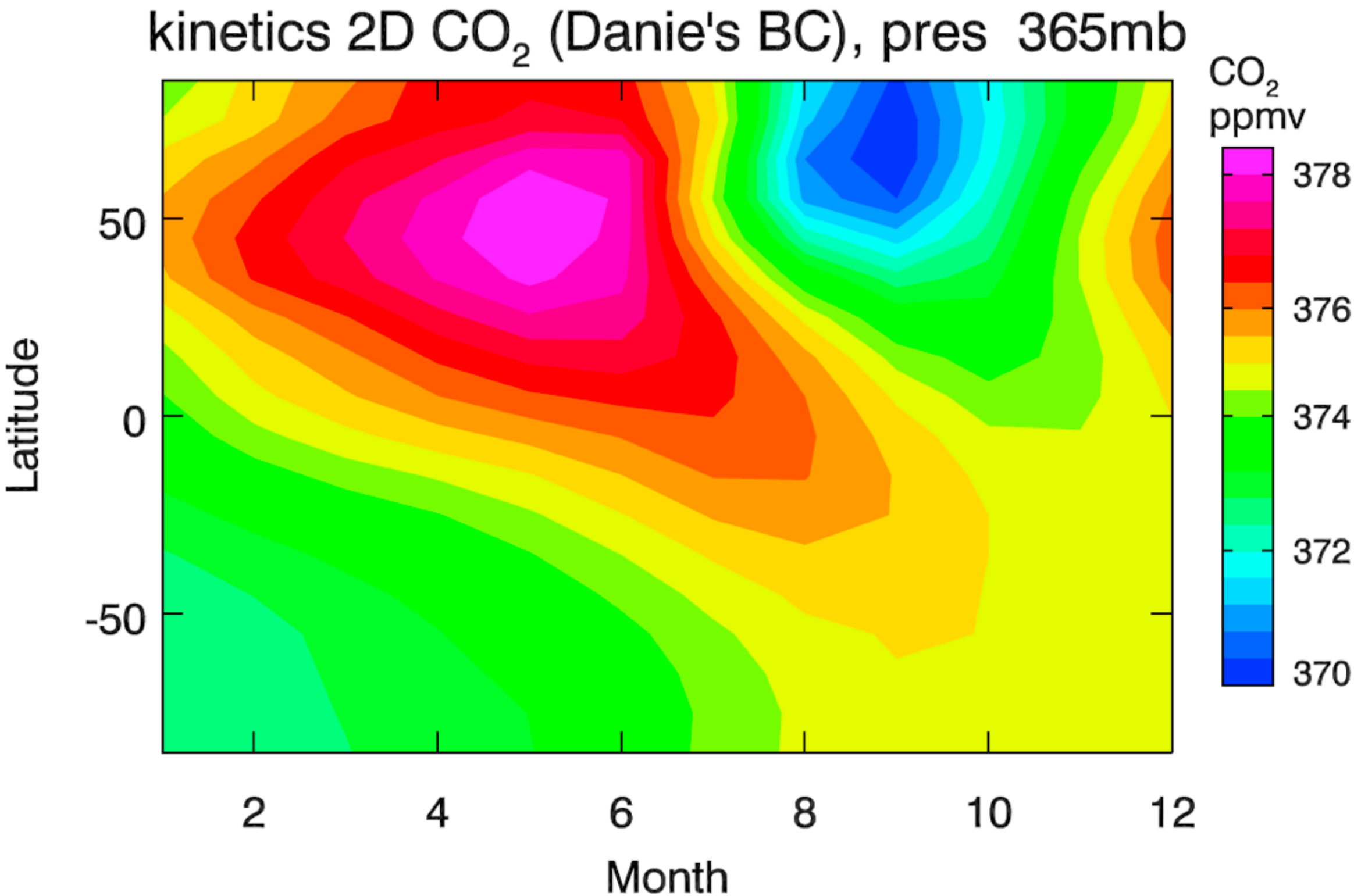



Strow et al. 2007


Matsueda $CO_2$ 2002/08-2007/12
Latitude
30
20
10
0
-10
-20
2
4
6
8
10
12
Month
$CO_2$
ppmv
381
378
375




Chahine et al. 2008


kinetics 2D $CO_2$ (Danie's BC), pres 365mb
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376
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Latitude
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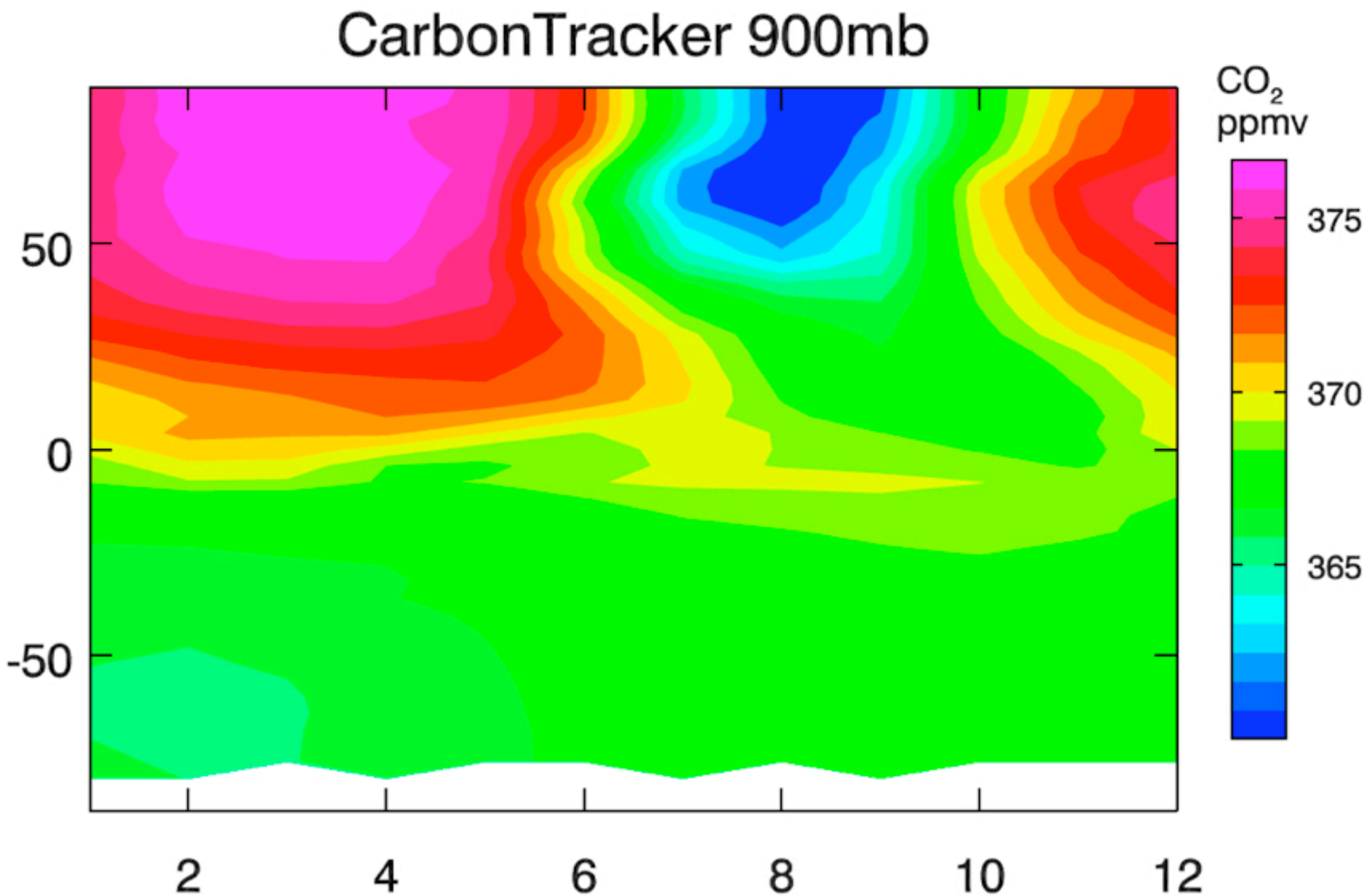
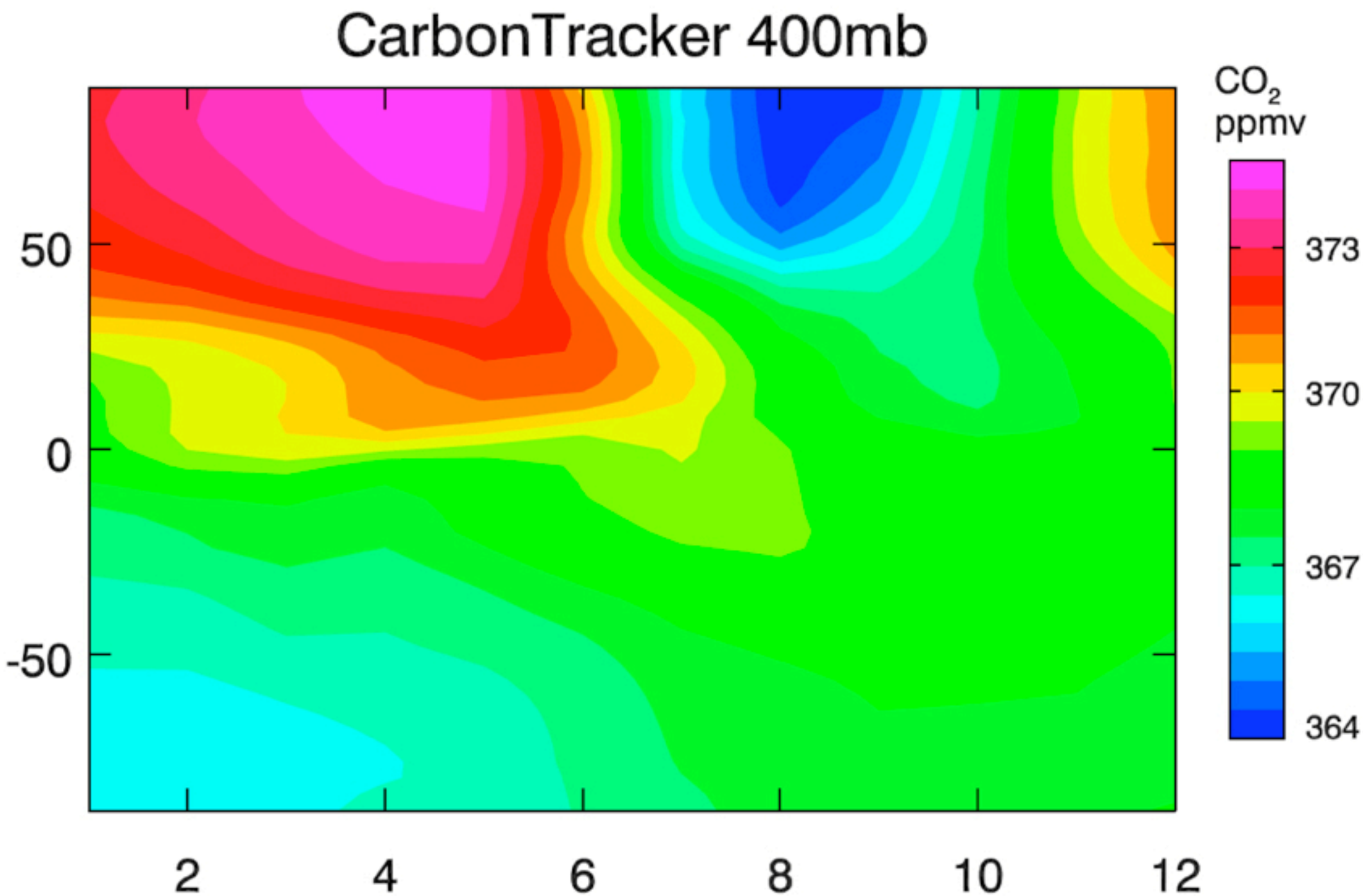

CarbonTracker 900mb
$CO_2$
ppmv
375
370
365
50
0
-50
2
4
6
8
10
12


CarbonTracker 400mb
$CO_2$
ppmv
373
370
367
364
50
0
-50
2
4
6
8
10
12