2007/10/16秋季気象学会(札幌)

GMS-5/VISSRデータ再解析
～エアロゾル光学特性の導出～

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R-VISSR

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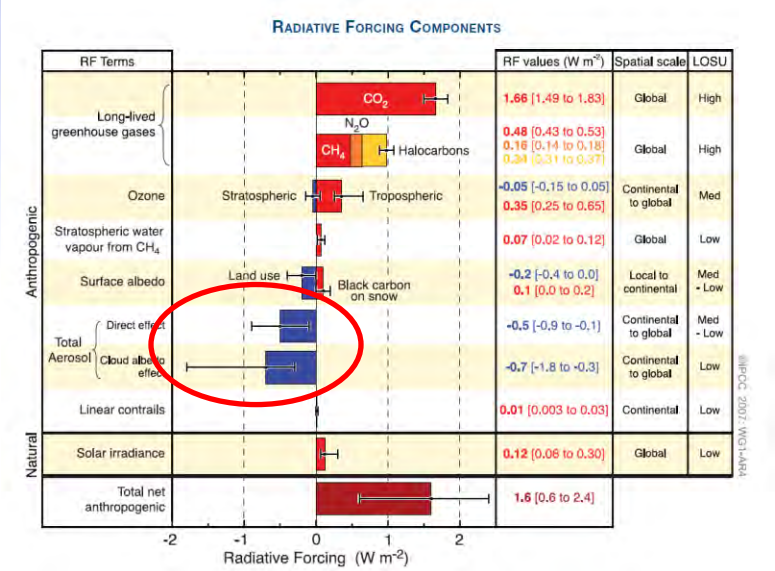
研究背景

- エアロゾルは直接、間接的に気候に影響を及ぼすが、その不確定性は大きい(IPCC-AR4)。衛星搭載センサを用いたエアロゾルリモートセンシングは有力な観測手法の一つ。
- GMS-5/VISSRは極軌道衛星搭載センサと比べて高時間分解能なデータが収得可能。
- ただし、AVHRRやMODISと比べて、使用できるチャンネル数が少ないので導出可能な物理量は限定的。



IPCC-AR4, SPM

エアロゾルで霞んだ空気(北京郊外)

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目的

- 気象衛星センター、東京大学CCSR、千葉大学CEReSでは共同でGMS-5/VISSRの可視データ再処理、校正技術の開発、再校正データセットの作成が実施中。 (**R-VISSR**プロジェクト)
  => 長期間にわたり定量解析が可能
- A308(奥山他)の手法で得られた校正テーブルを用いてのエアロゾルの光学特性を導出、解析
- 他衛星(MODIS)のプロダクトと比較

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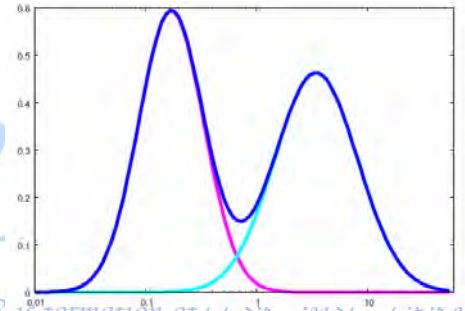
エアロゾルモデル

- 粒形分布関数:2モード対数正規分布関数
- r_1=0.17um, r_2=3.44um, s_1=1.96, s_2=2.37
- 散乱位相関数として、球形カーネルと半経験的非球形カーネル(Pollack & Cuzzi, 1980)の2つを用意。
- 半経験的非球形カーネルの非球形パラメタは

  (x_0, G, r) = (7.0, 10.0, 1.1)

  (Masuda et al., 2002, Nakajima et al., 1989)

$$\frac{dV}{d\ln r} = \sum_{n=1}^{2} c_n \exp\left\{-\frac{1}{2}\left[\frac{\ln(r/r_{m,n})}{\ln s_n}\right]^2\right\}$$



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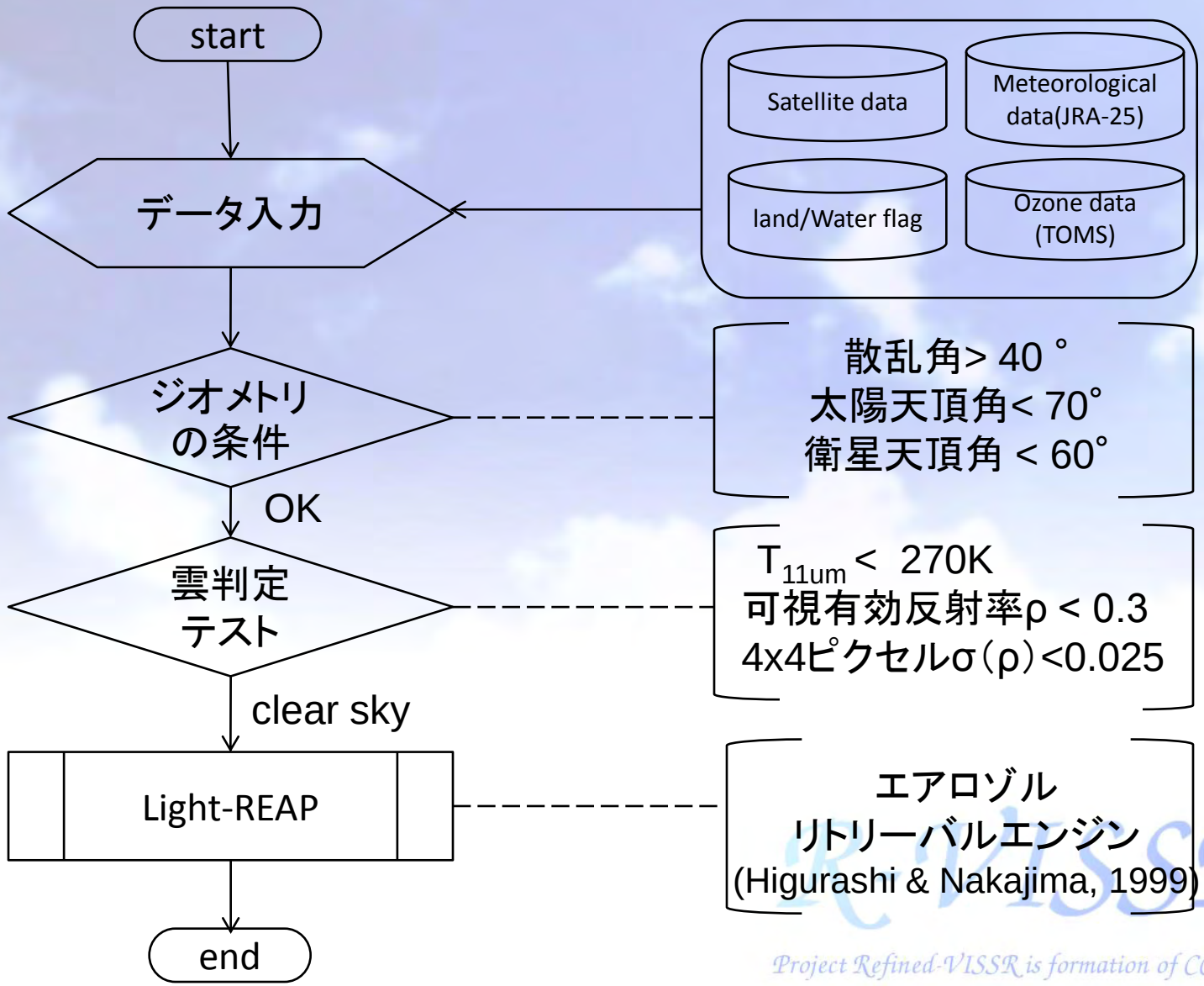
アルゴリズムフローチャート



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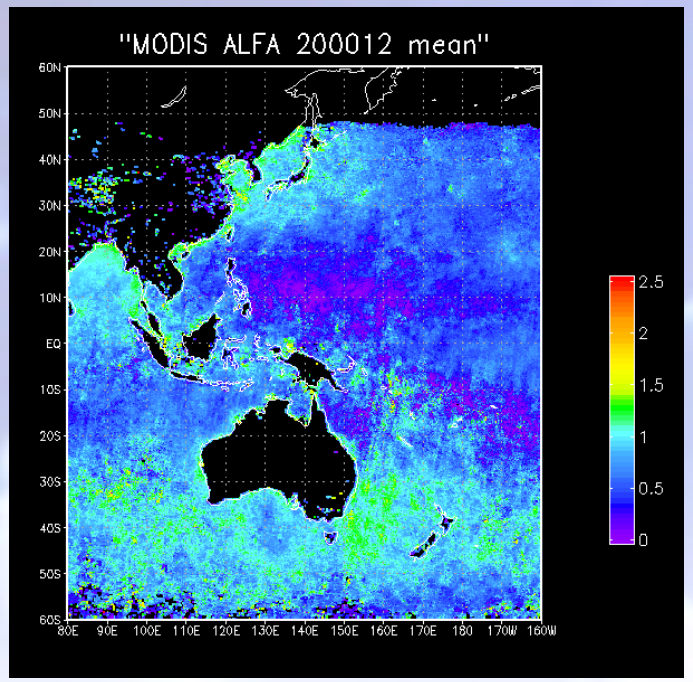
MODISの月平均α



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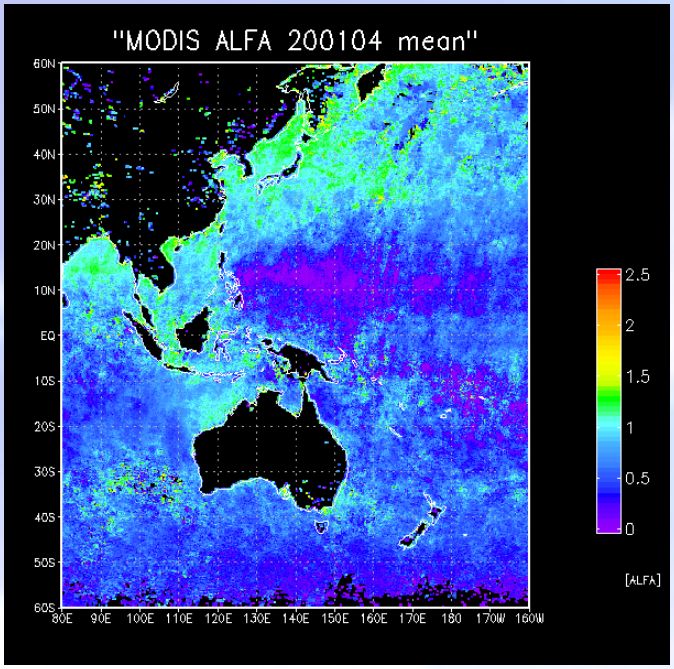
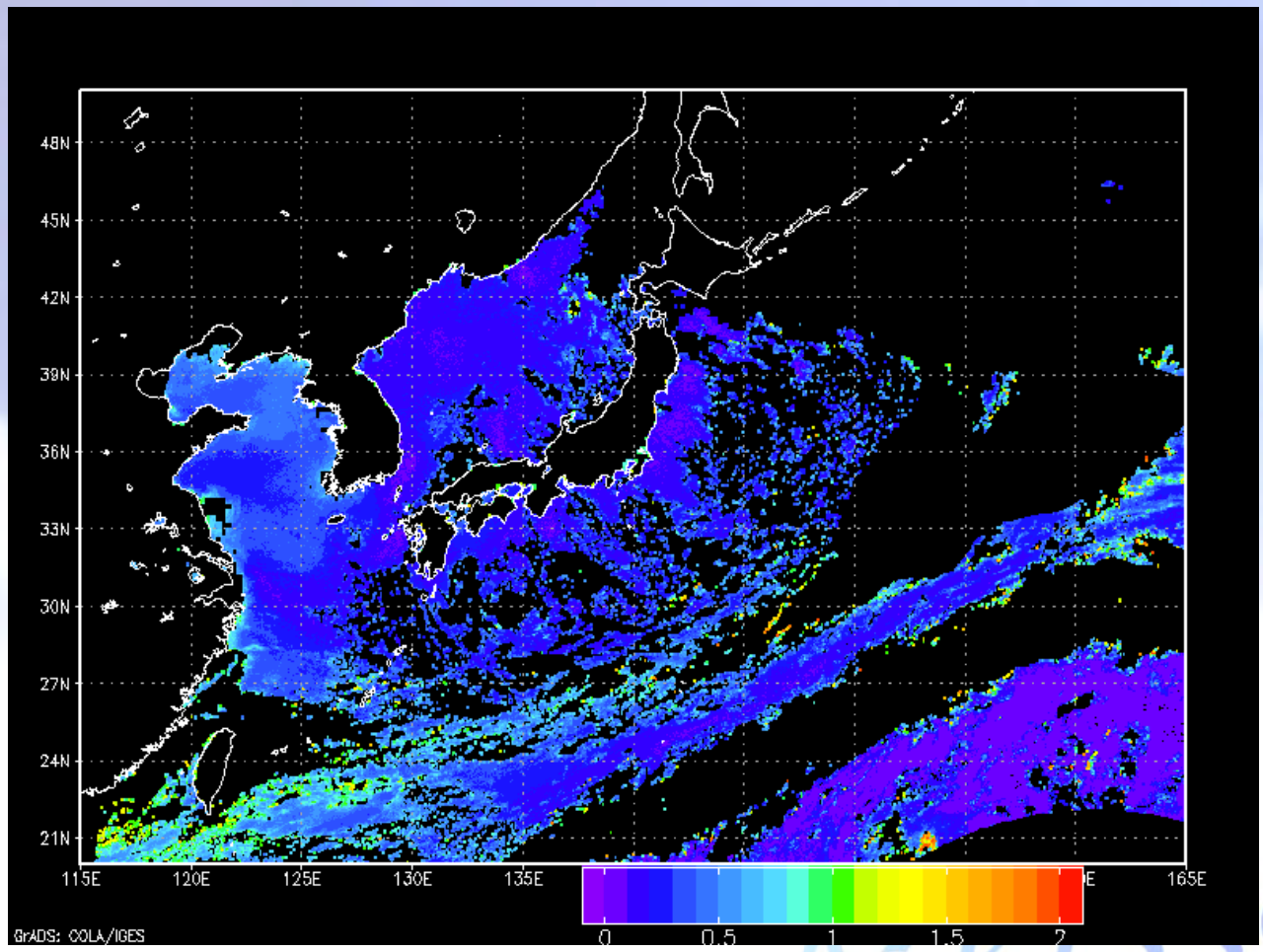


2001年4月

αが大きい=>小粒子卓越
αが小さい=>大粒子卓越
大陸の近傍ではαが小さい。
VISSRではαは求められないのでMODISの月平均値を気候値的にもちいる

(MOIDSデータはNIES日暮博士提供)

解析結果の例



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τの時間変化のカーネル依存性
(球形カーネル)

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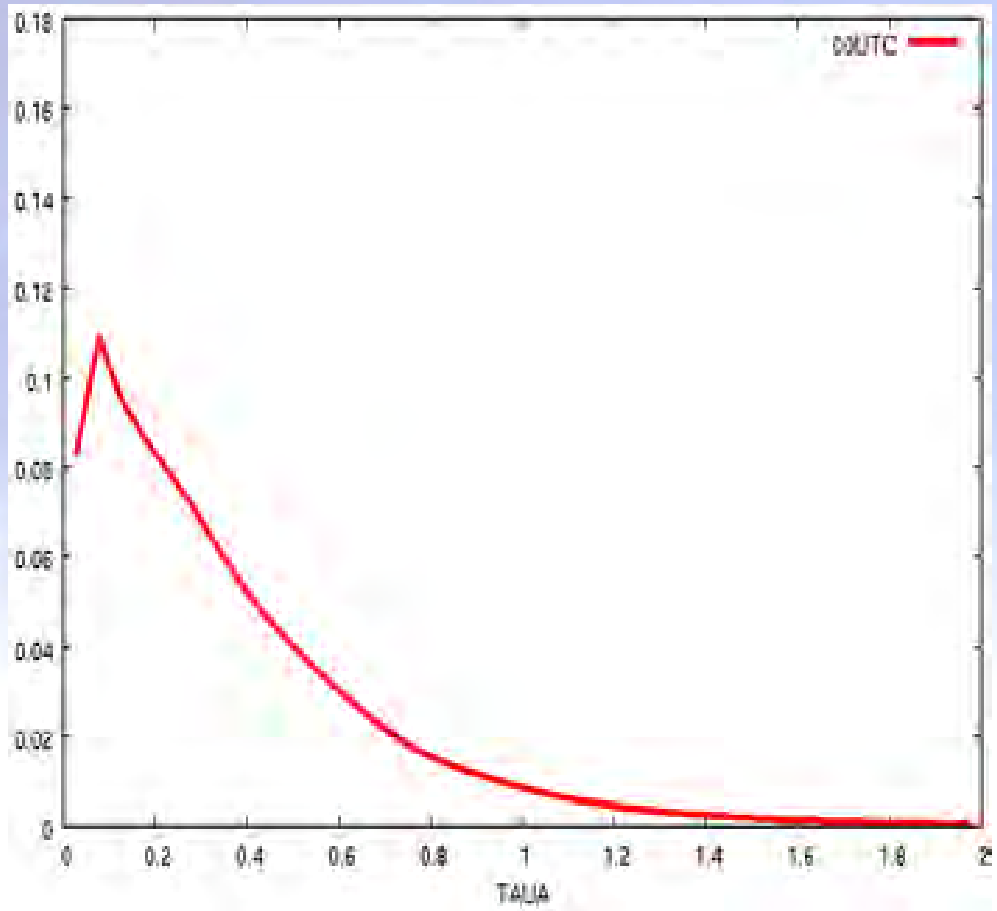

出現頻度

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2001/04 球形カーネル

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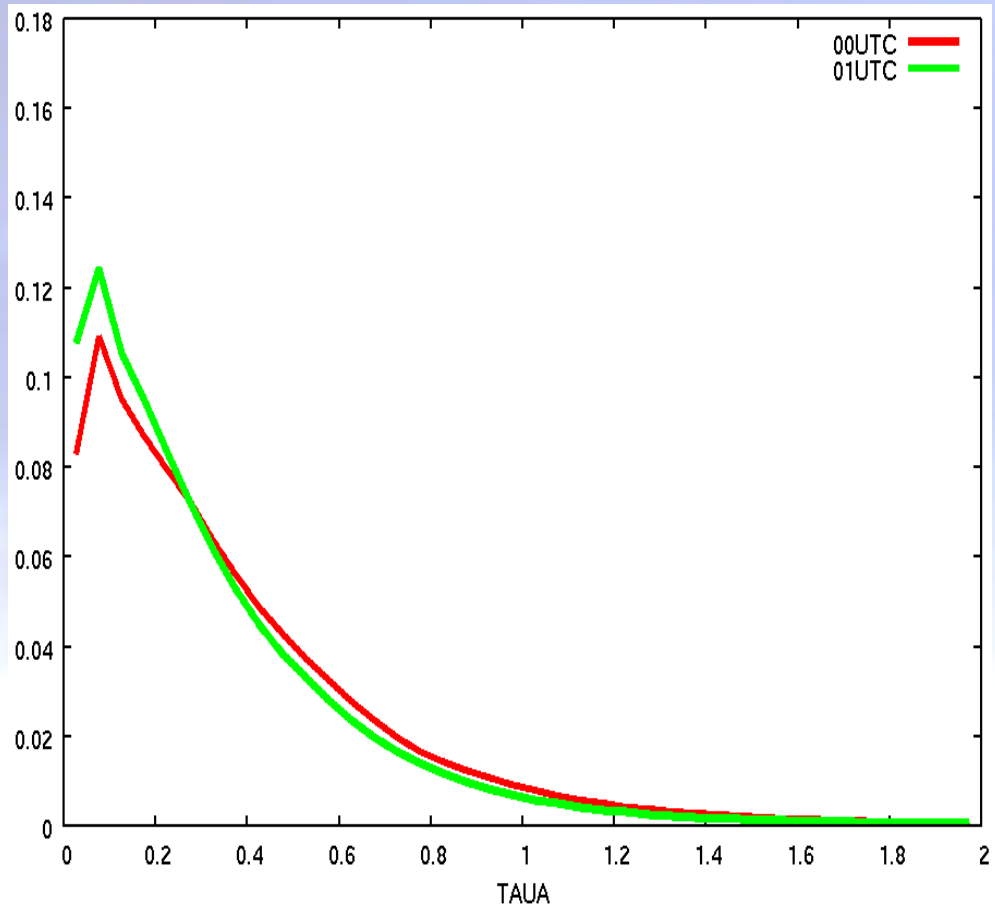

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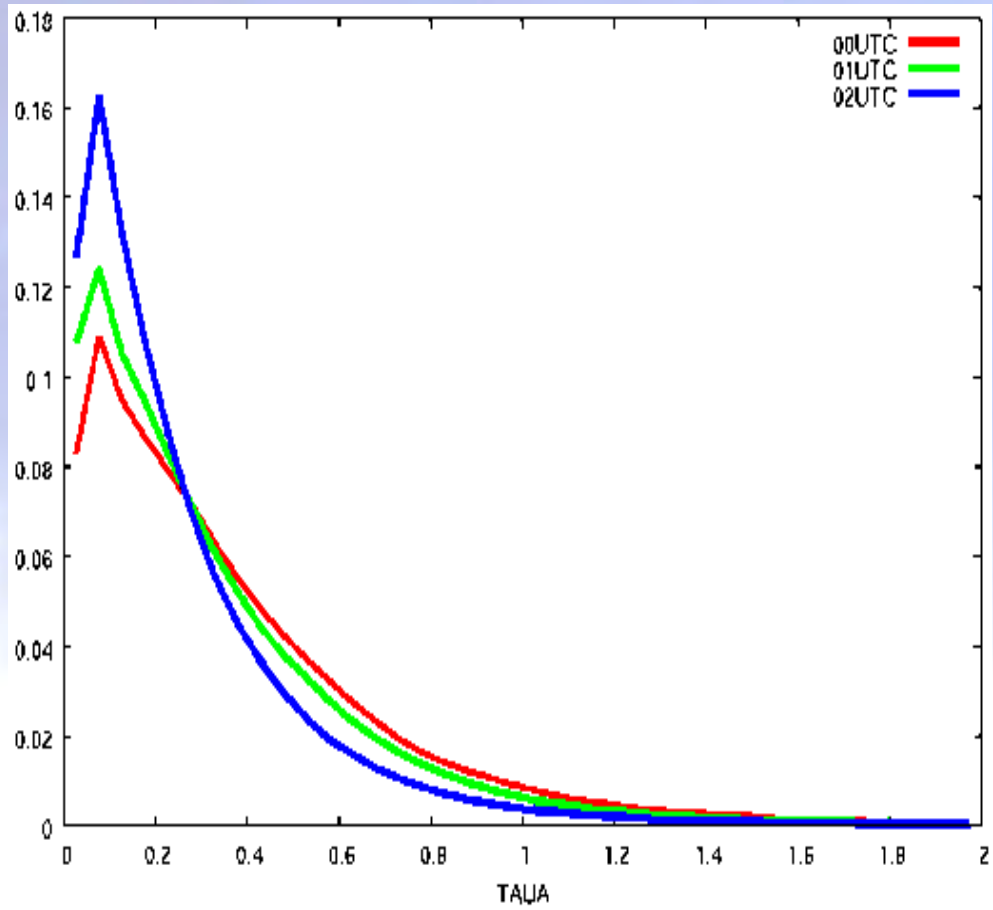

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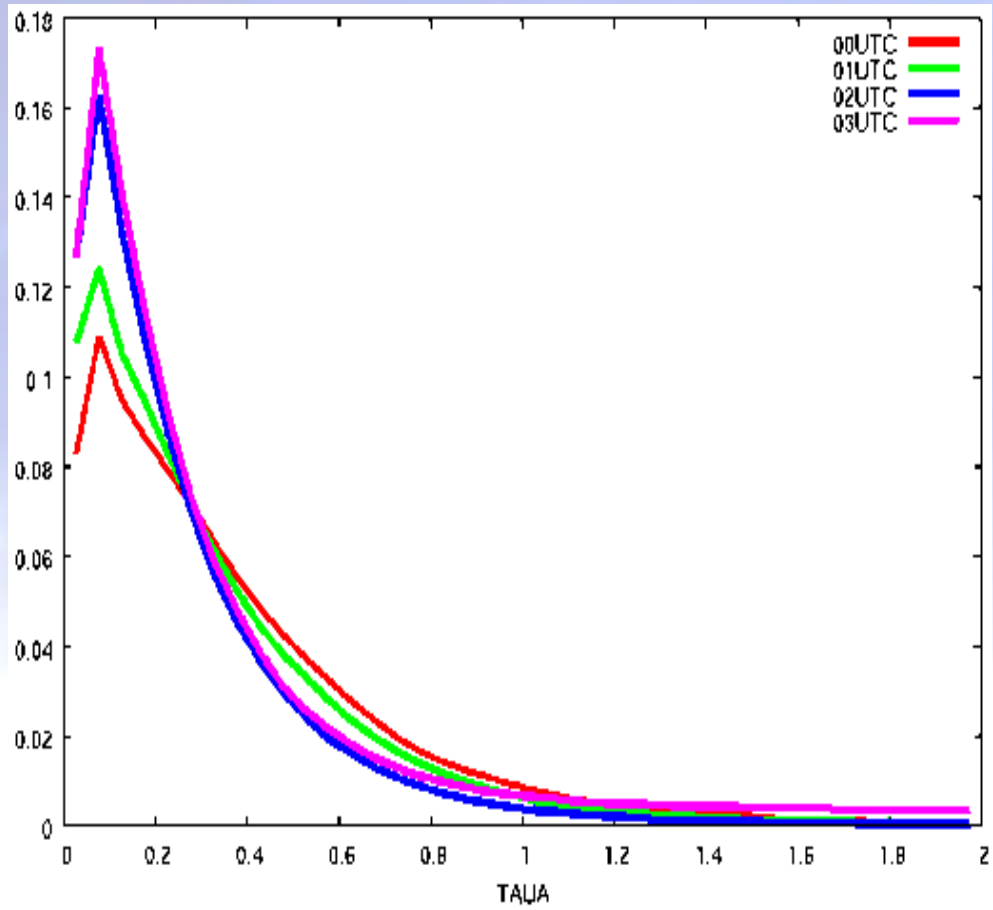

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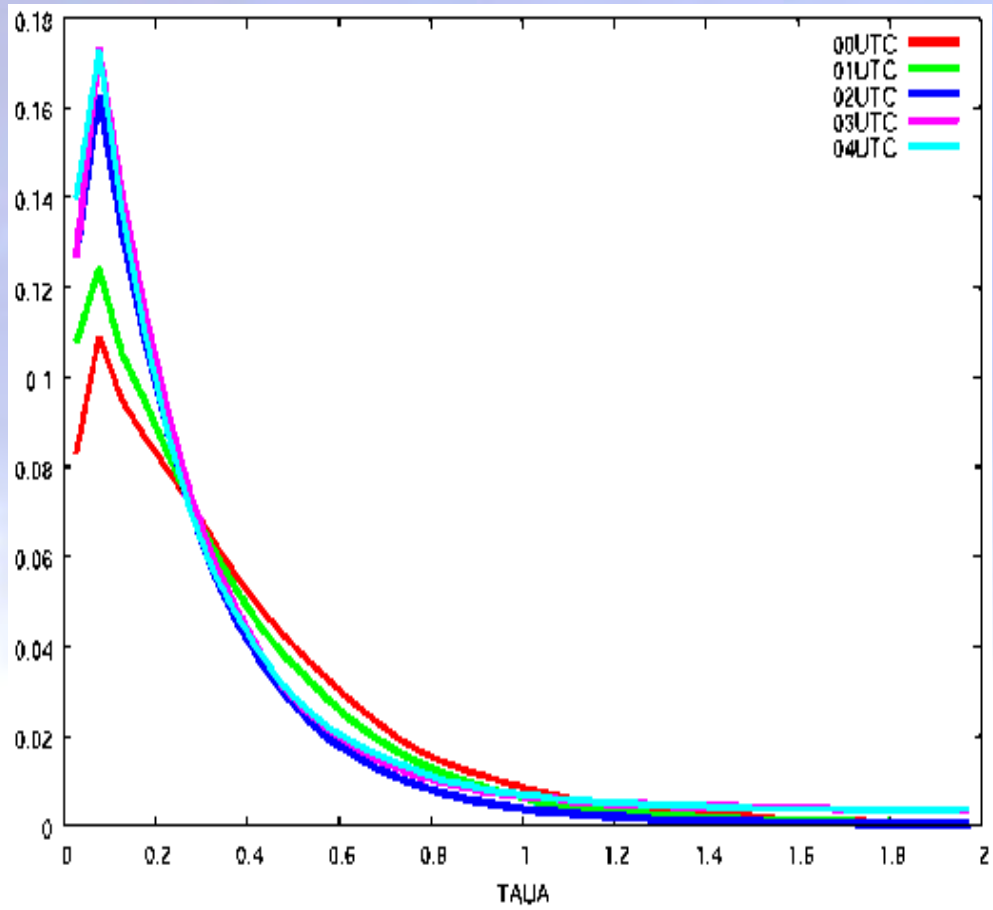

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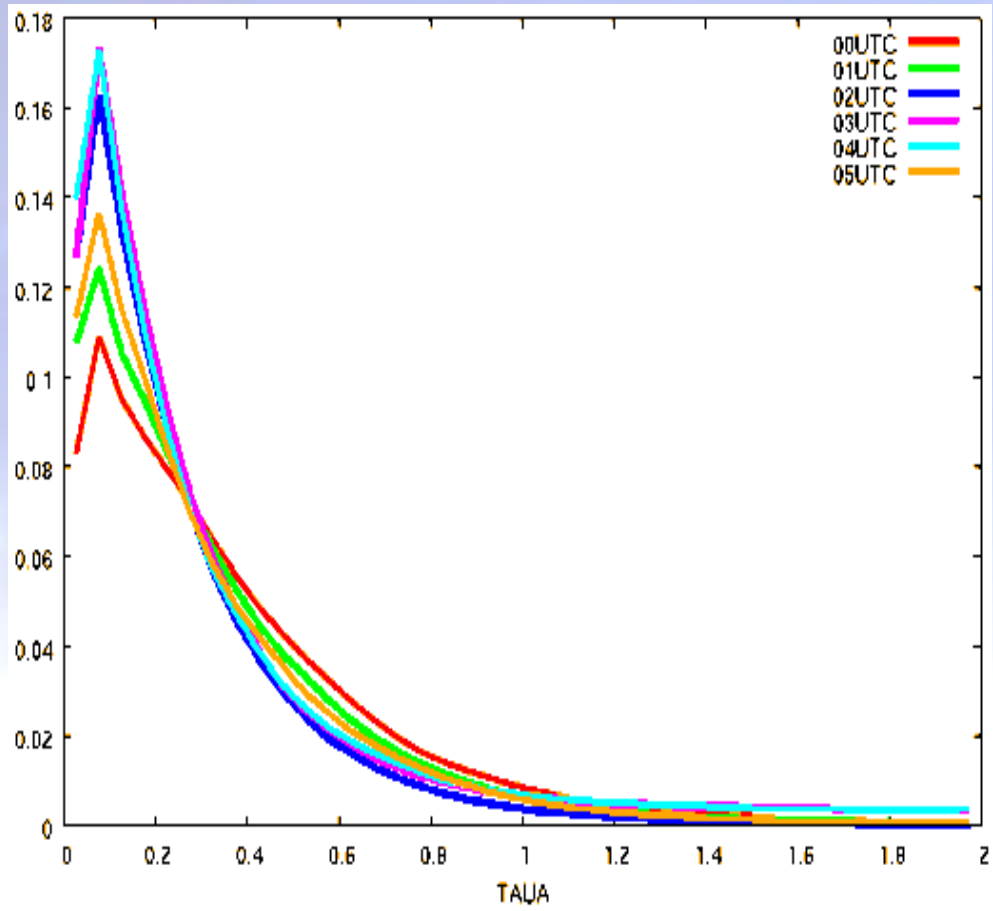

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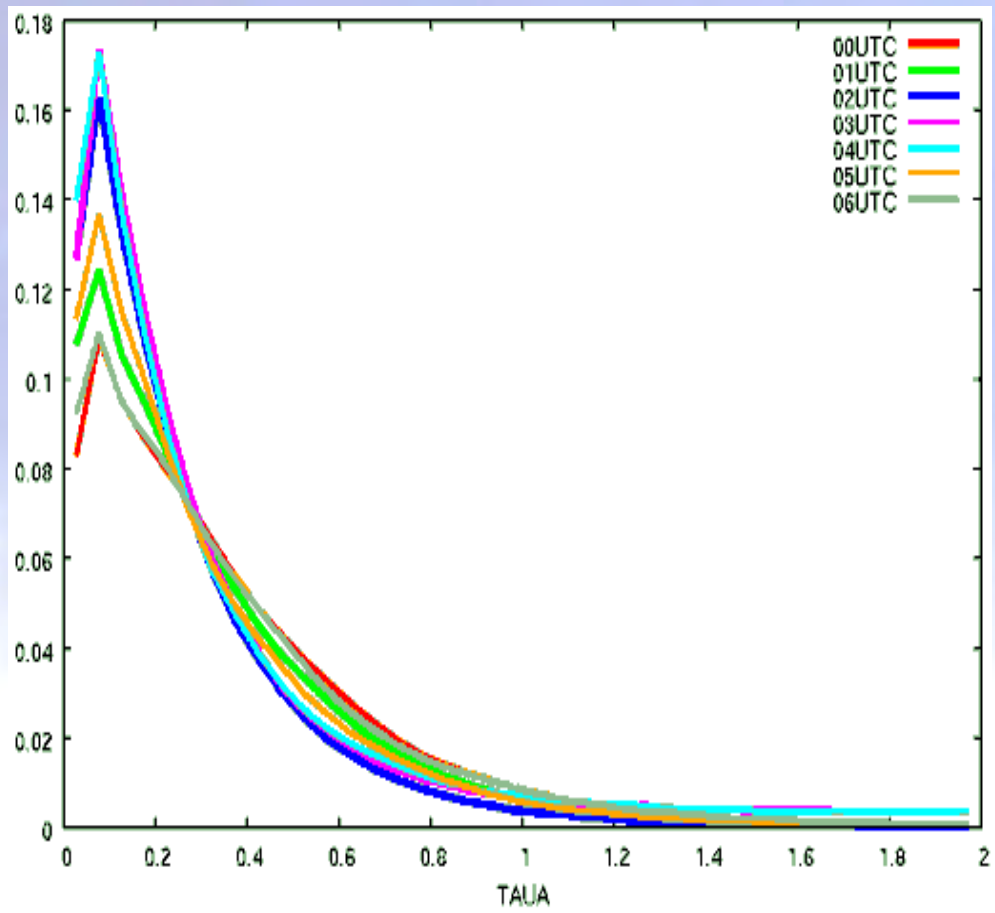

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2001/04 球形カーネル

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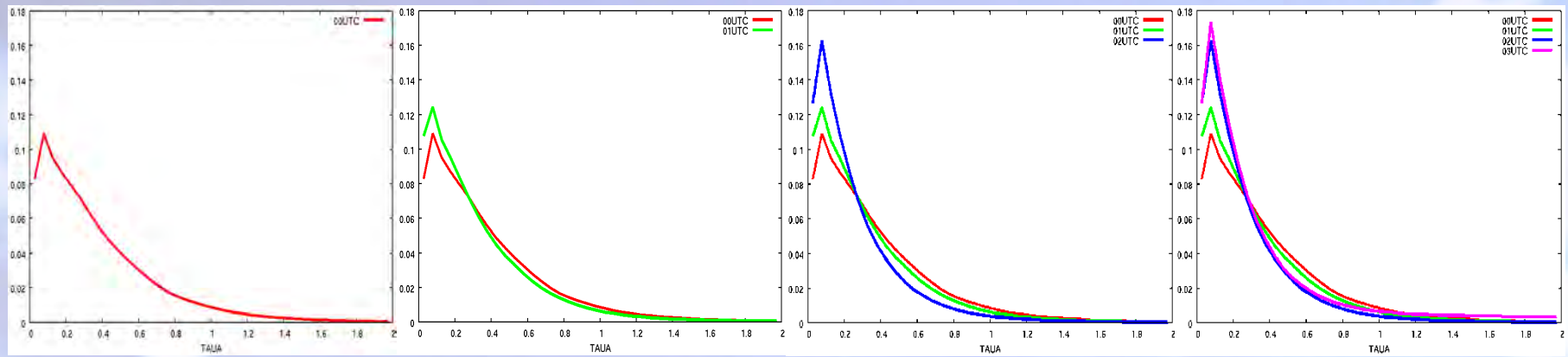
τのカーネル依存性(球形カーネル)



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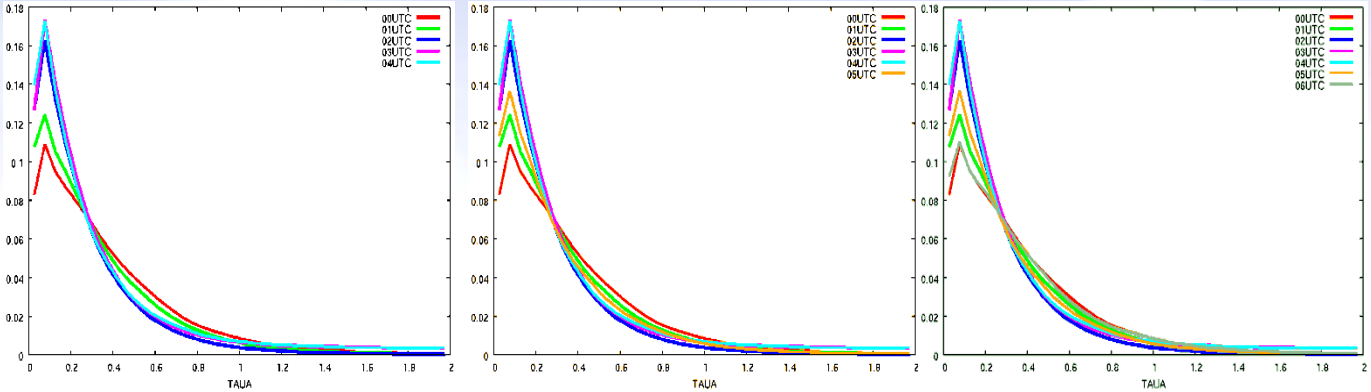

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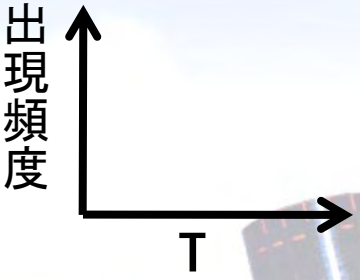

2001/04 球形カーネル

日中に減少するバイアス

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τの時間変化のカーネル依存性
(非球形カーネル)

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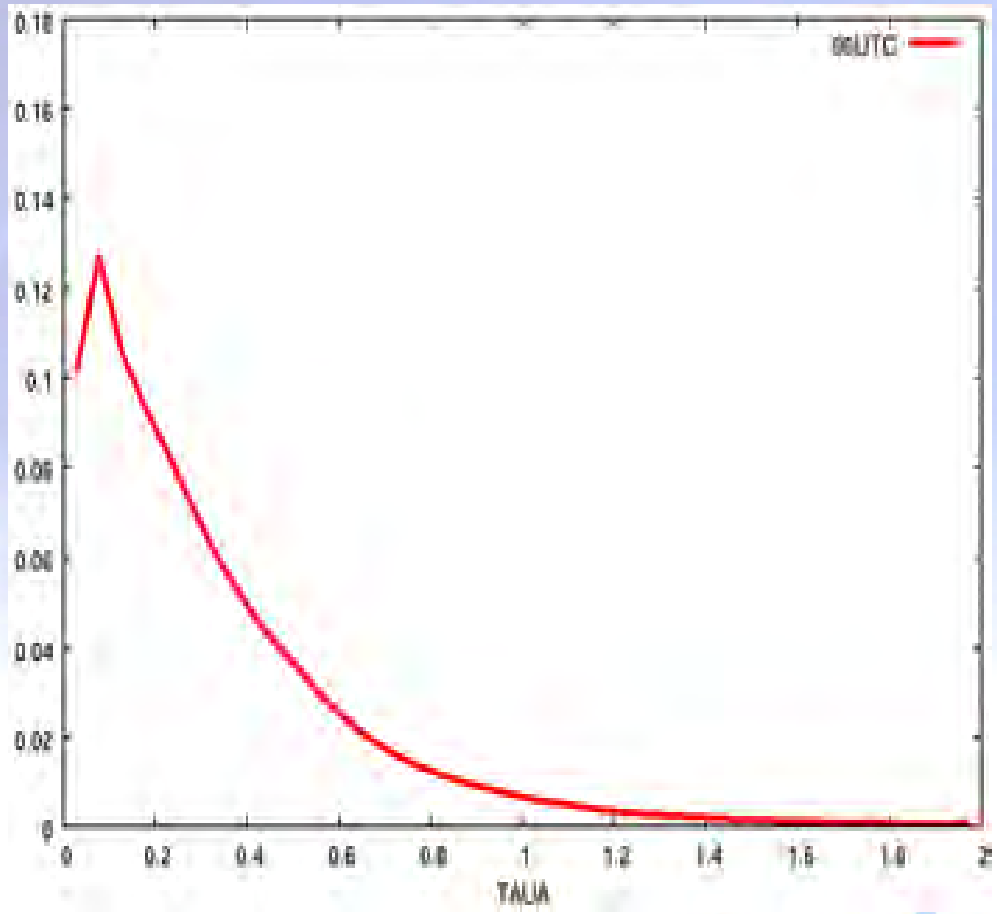

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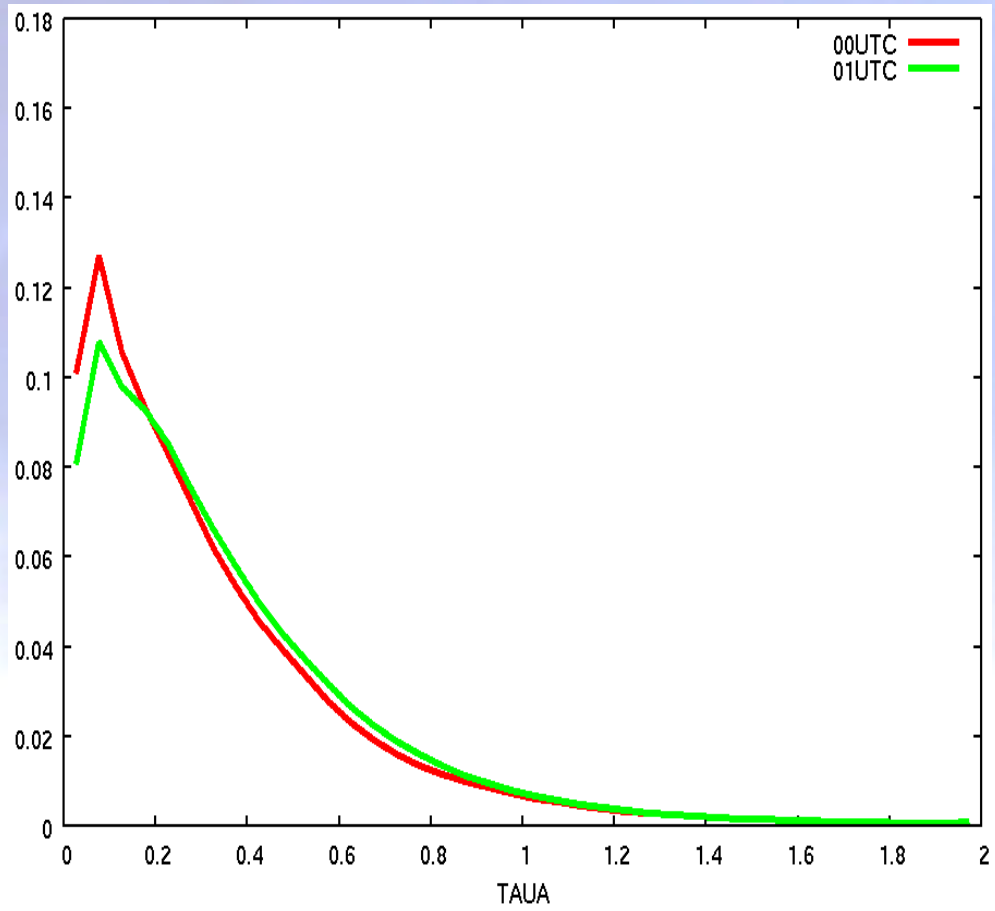

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2001/04 非球形カーネル

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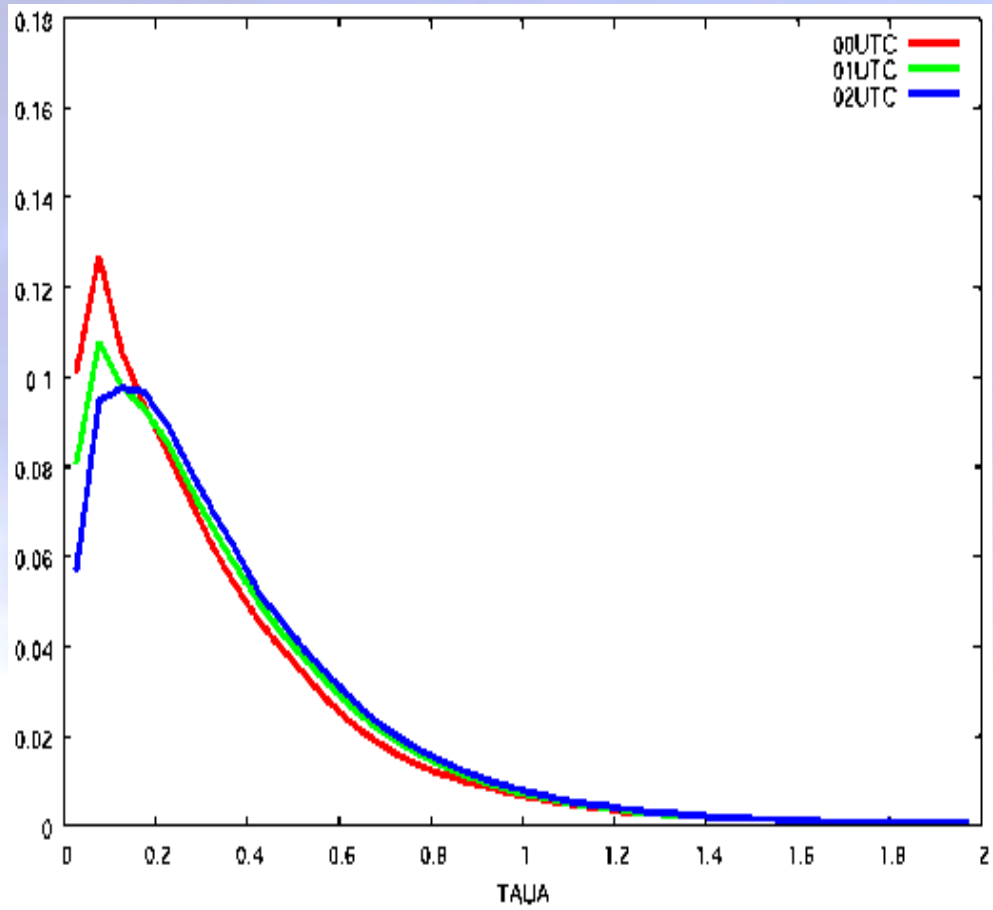

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2001/04 非球形カーネル

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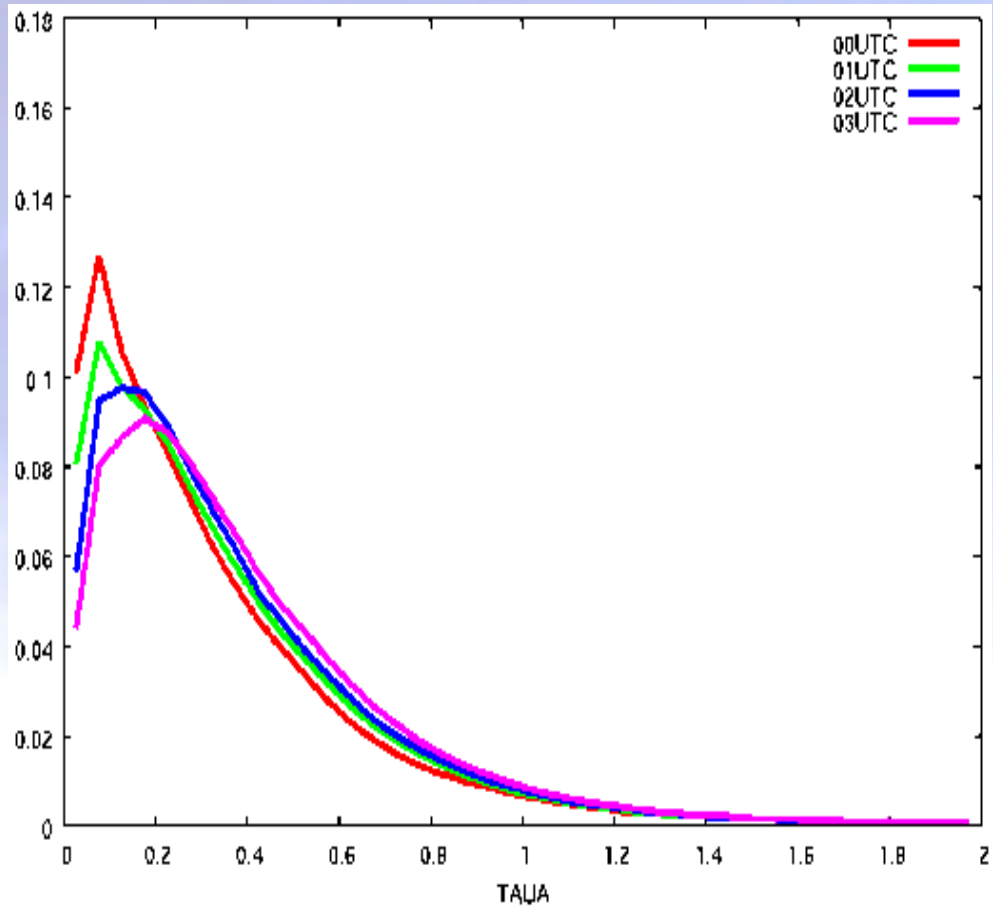

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2001/04 非球形カーネル

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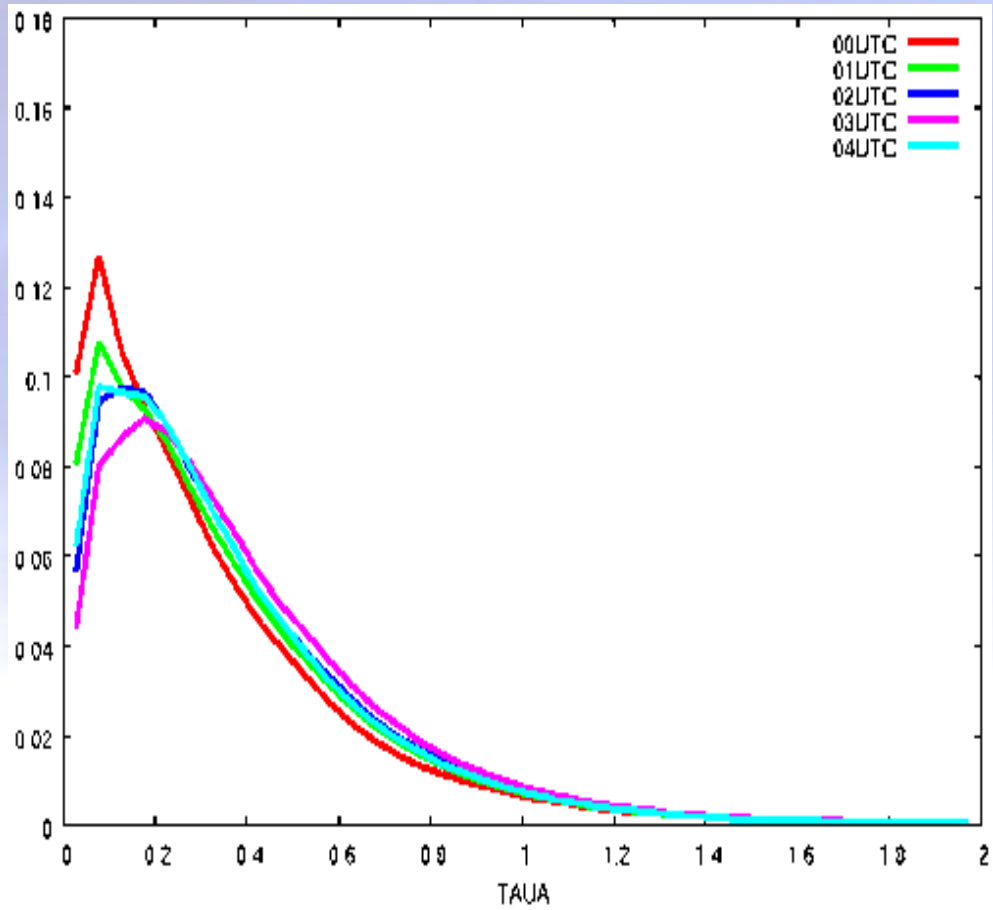

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2001/04 非球形カーネル

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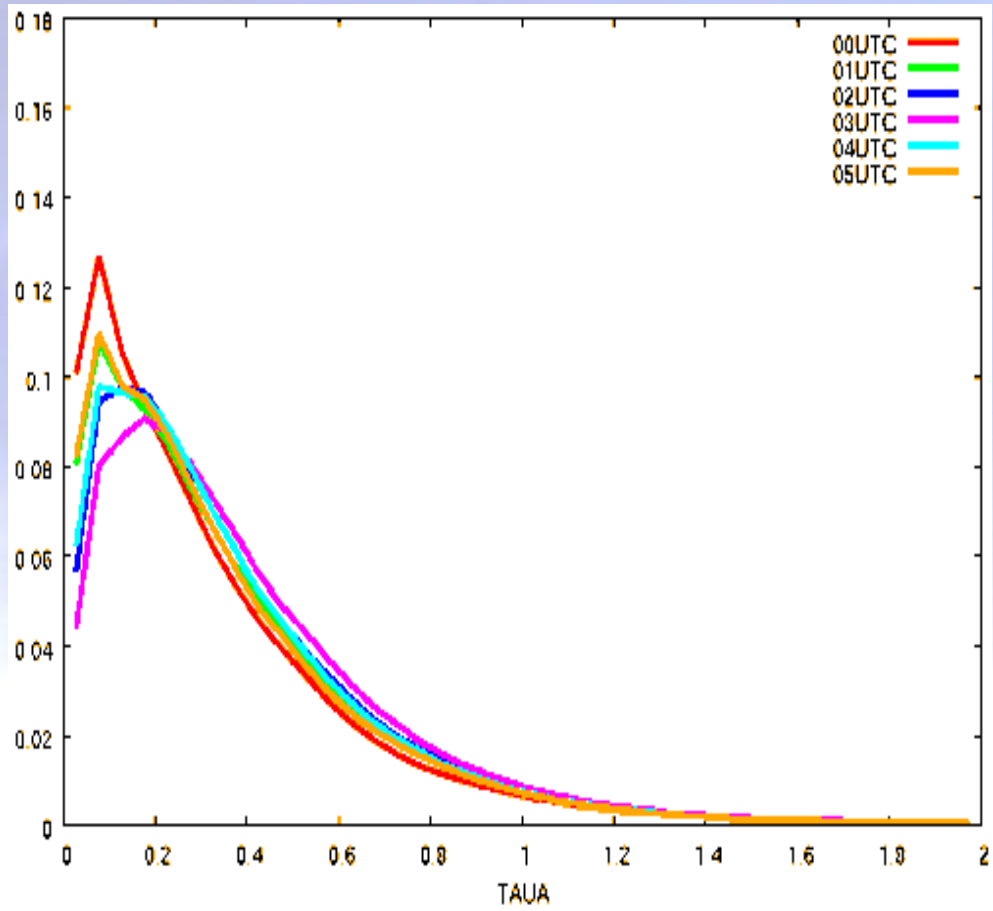

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2001/04 非球形カーネル

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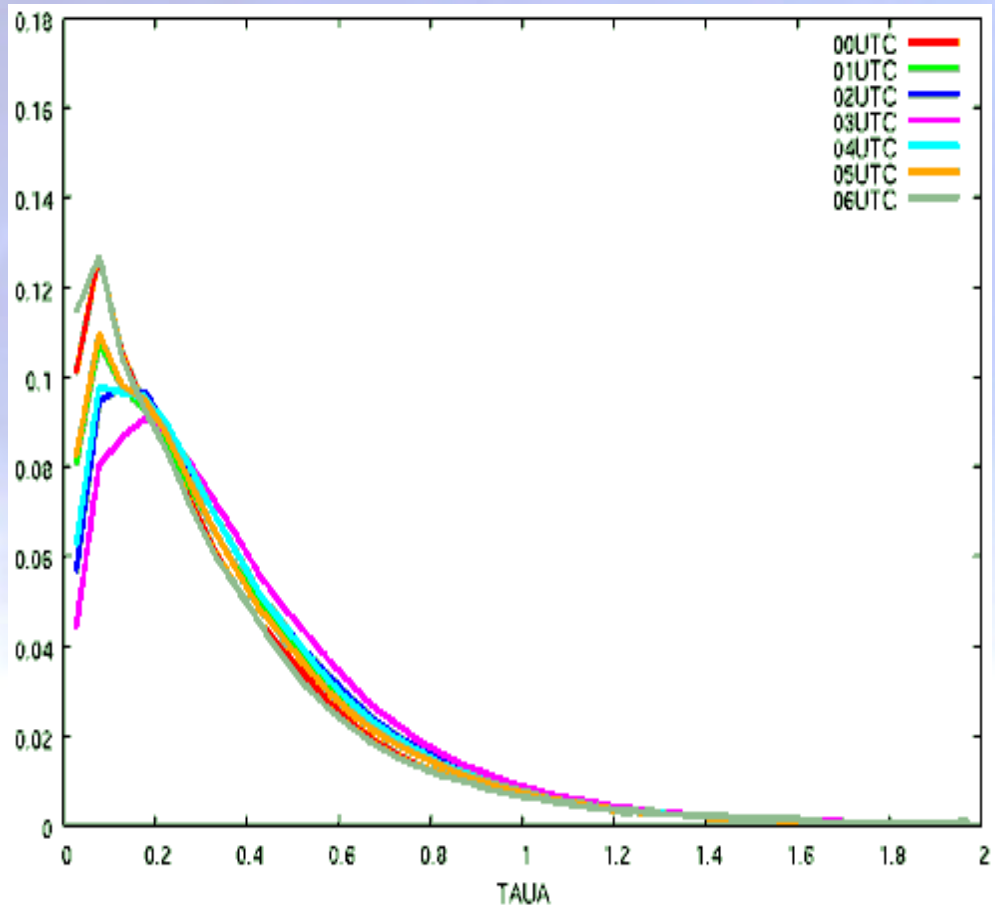

出現頻度

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2001/04 非球形カーネル

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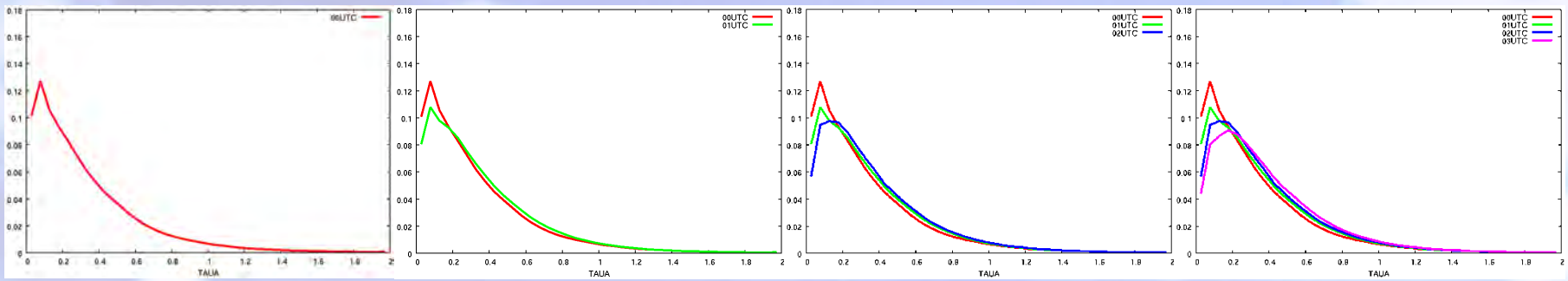
τのカーネル依存性(非球形カーネル)



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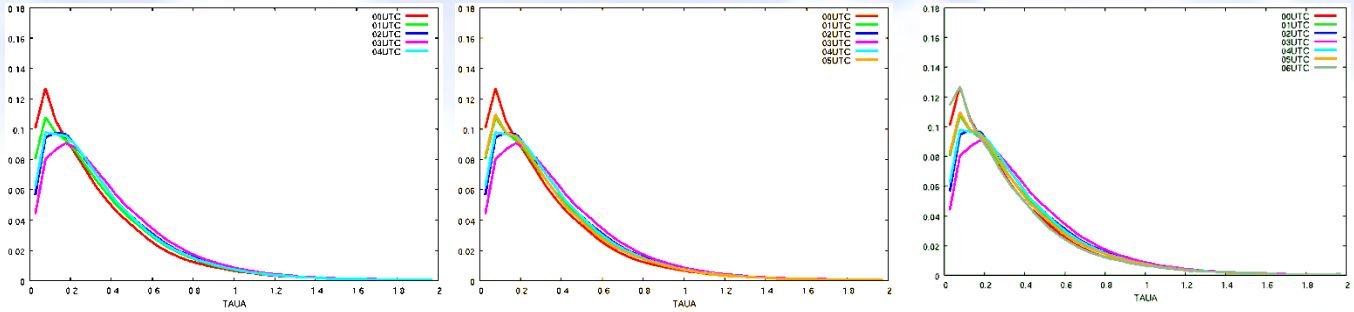

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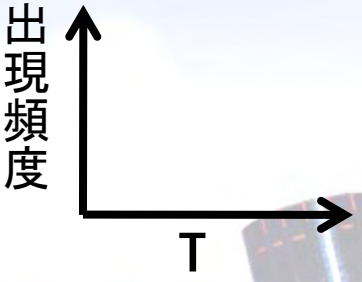

2001/04 非球形カーネル

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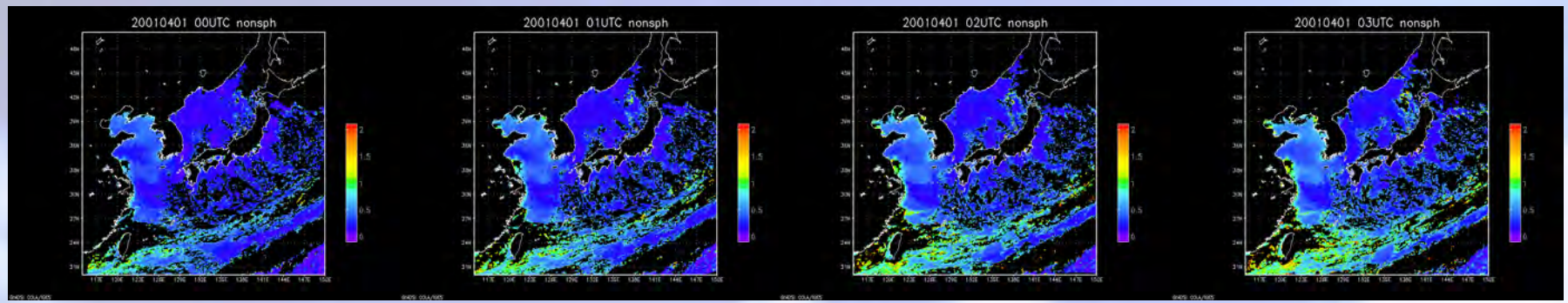
2001/04/01



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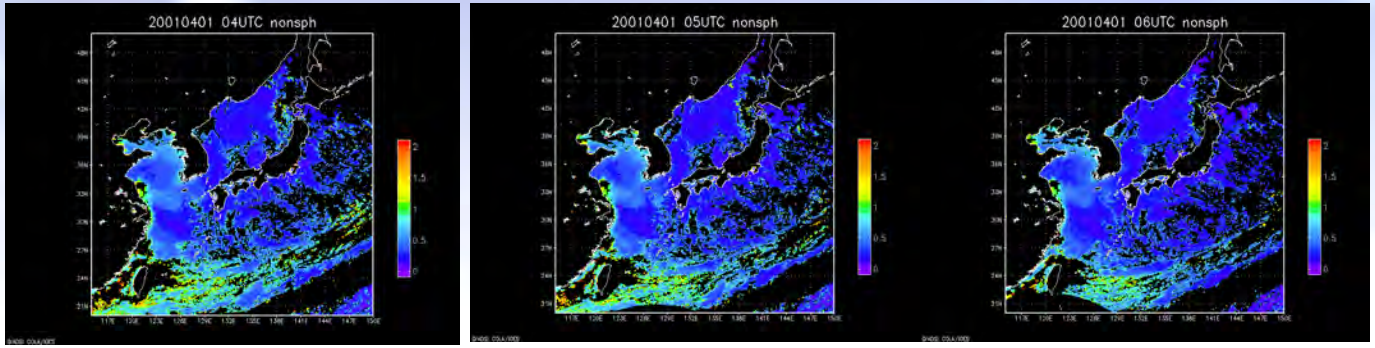

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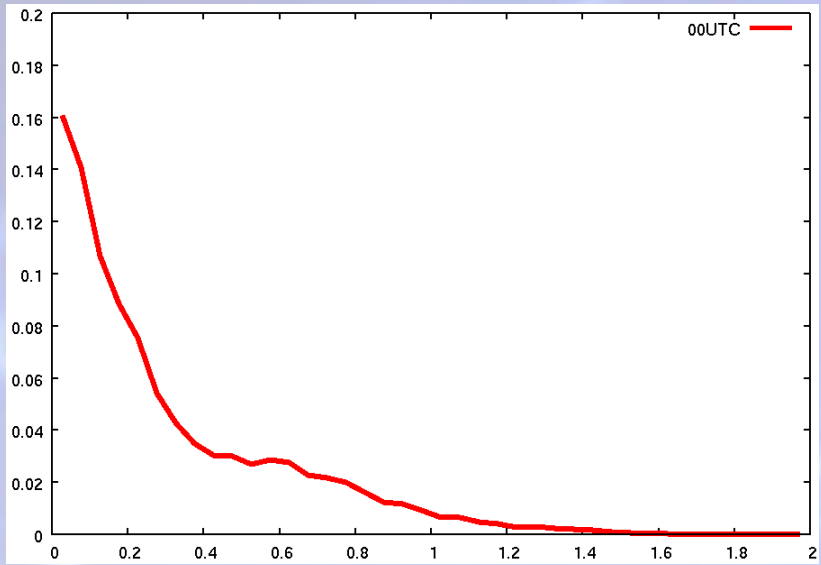
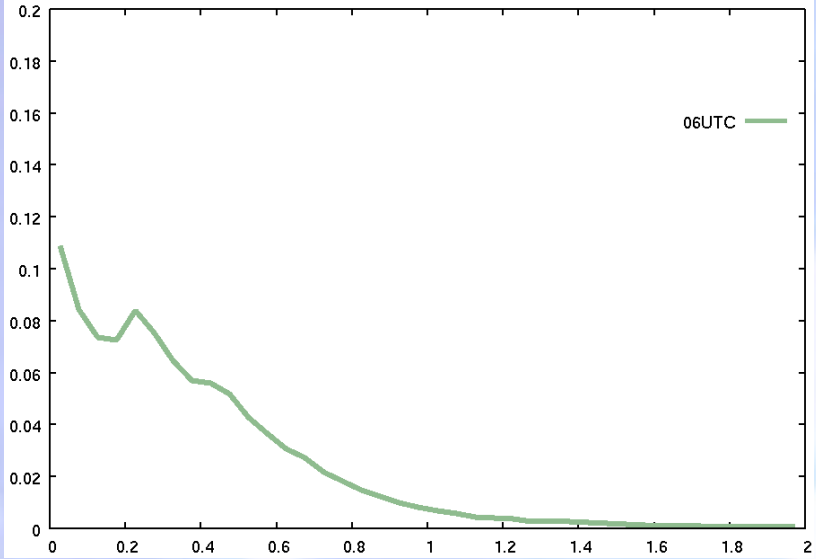
00UTCと06UTCの比較

球形





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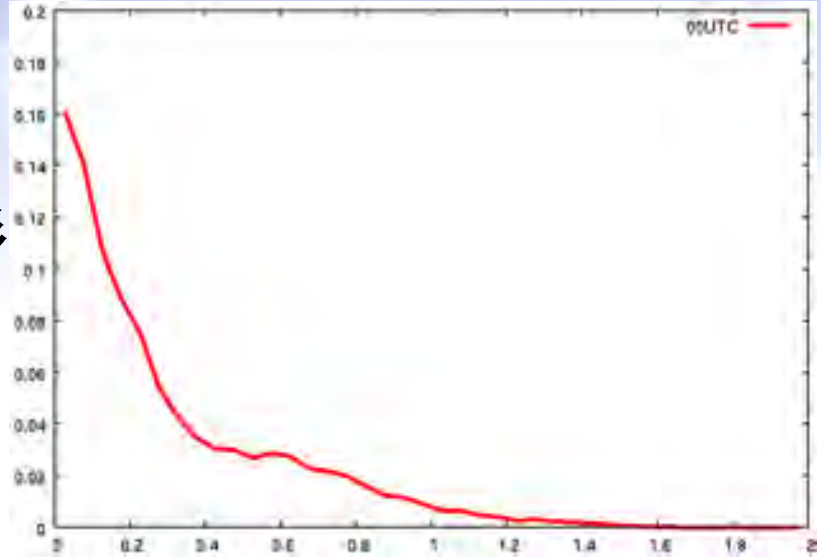

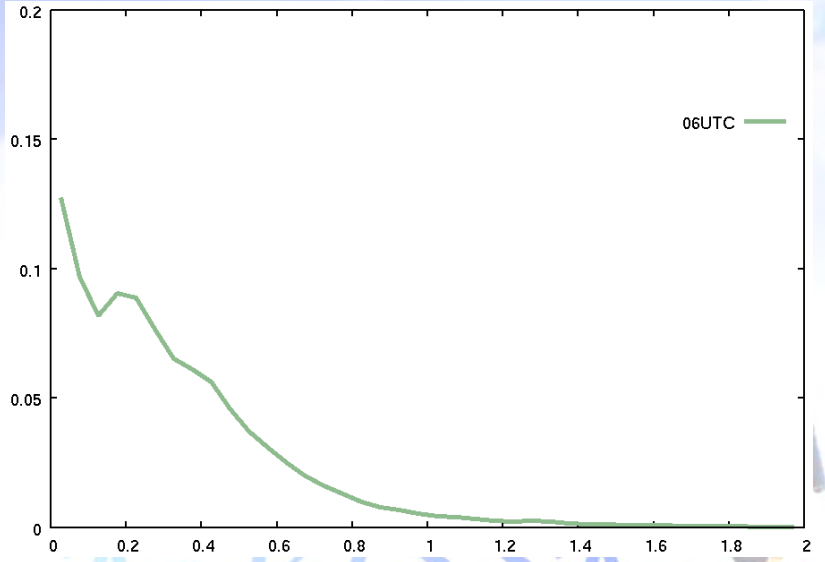

出現頻度

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カーネルによらず増加のセンス

CCSR is formation of CCSR - MSC - CEReS

MODISとの比較

TAUA(500nm)

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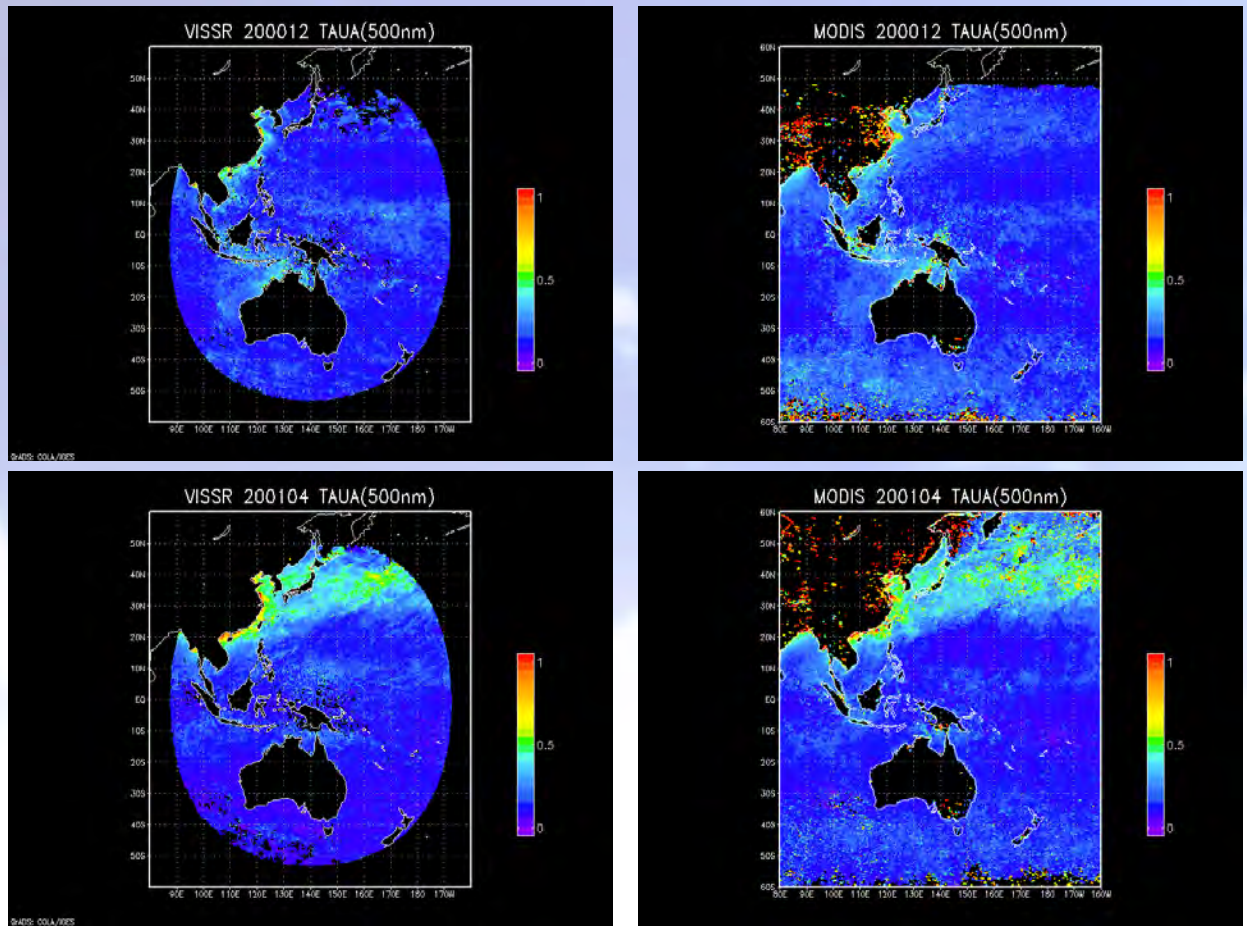
2001/04



GMS-5/VISSR　　Terra/MODIS

(MODISデータは日暮博士提供)

まとめ

- 新しい校正テーブルをもちいてのエアロゾルの光学的厚さの導出
- 高時間分解能であることをいかした解析
- MODISプロダクトとの比較ではまずまずの類似性

課題

- 長期の解析(予定)
- 新しい非球形カーネルの組み込み

R-VISSR

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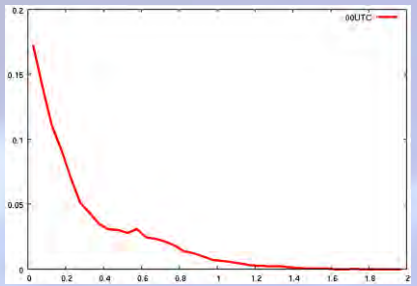
2001/04/01 τの時間変化 (非球形カーネル)



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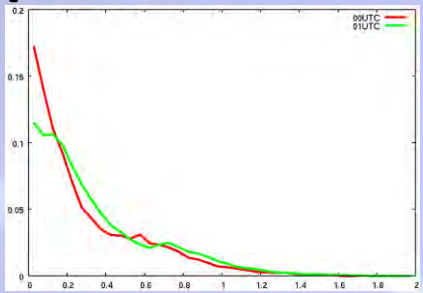

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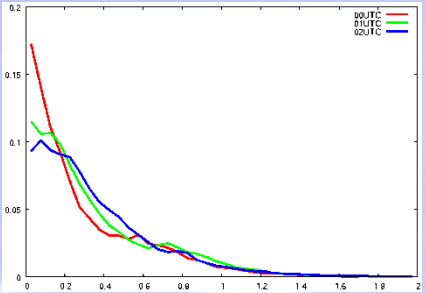

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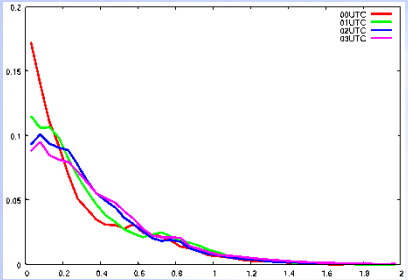

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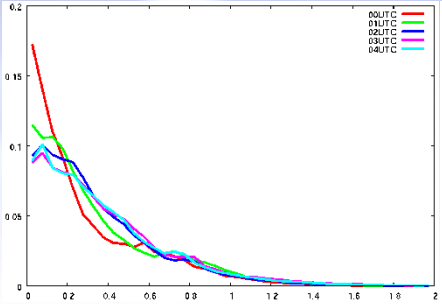

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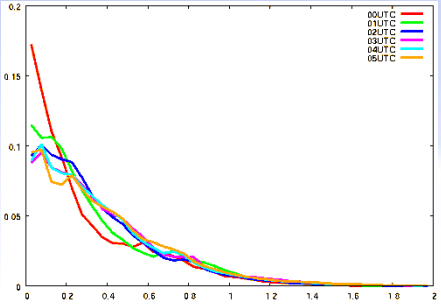

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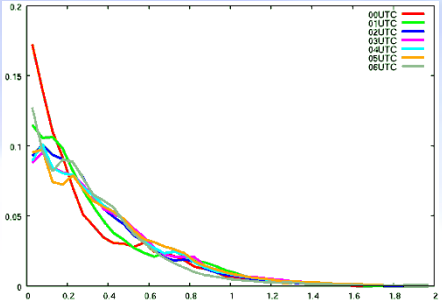

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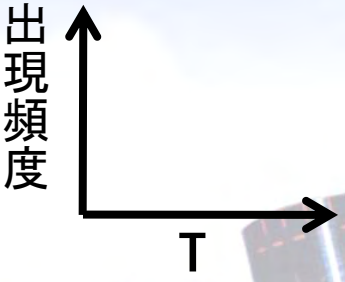
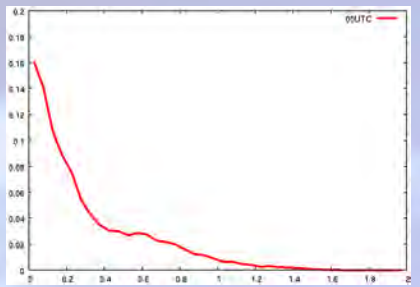


R-VISSR
Project Refined-VISSR is formation of CCSR - MSC - CEReS

2001/04/01 τの時間変化 (球形カーネル)



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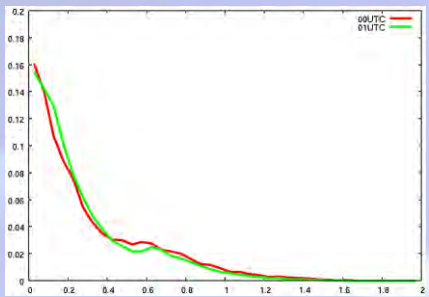

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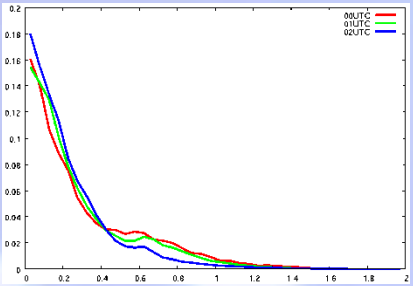

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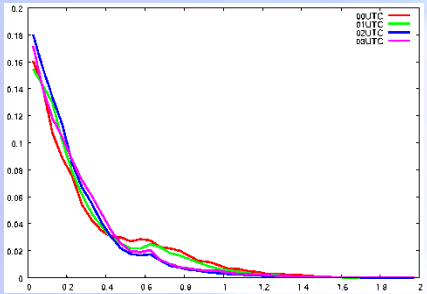

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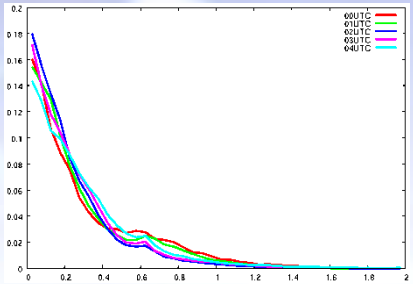

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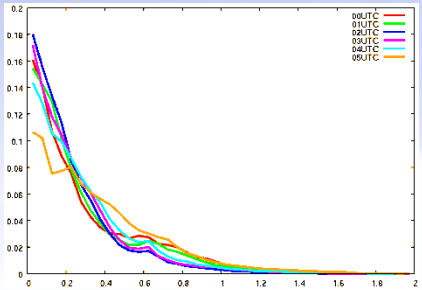

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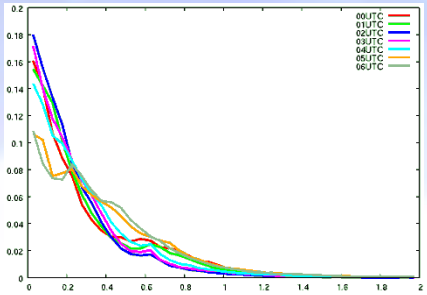

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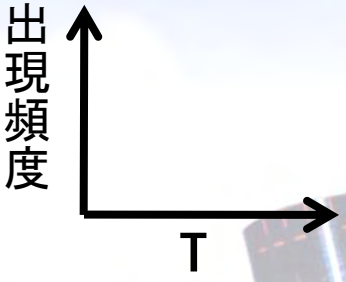

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