波線追跡ツールKARATによるGEONET解析での補正効果

情報通信研究機構
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内容

目的：KARATによる伝搬遅延量補正効果を
１年間のデータで評価
→GEONET68点、1年分、Eikonal EQ.

- KARAT
  - Thayer Model, Eikonal EQ.
- PPP計算結果〜とにかく計算
- まとめ

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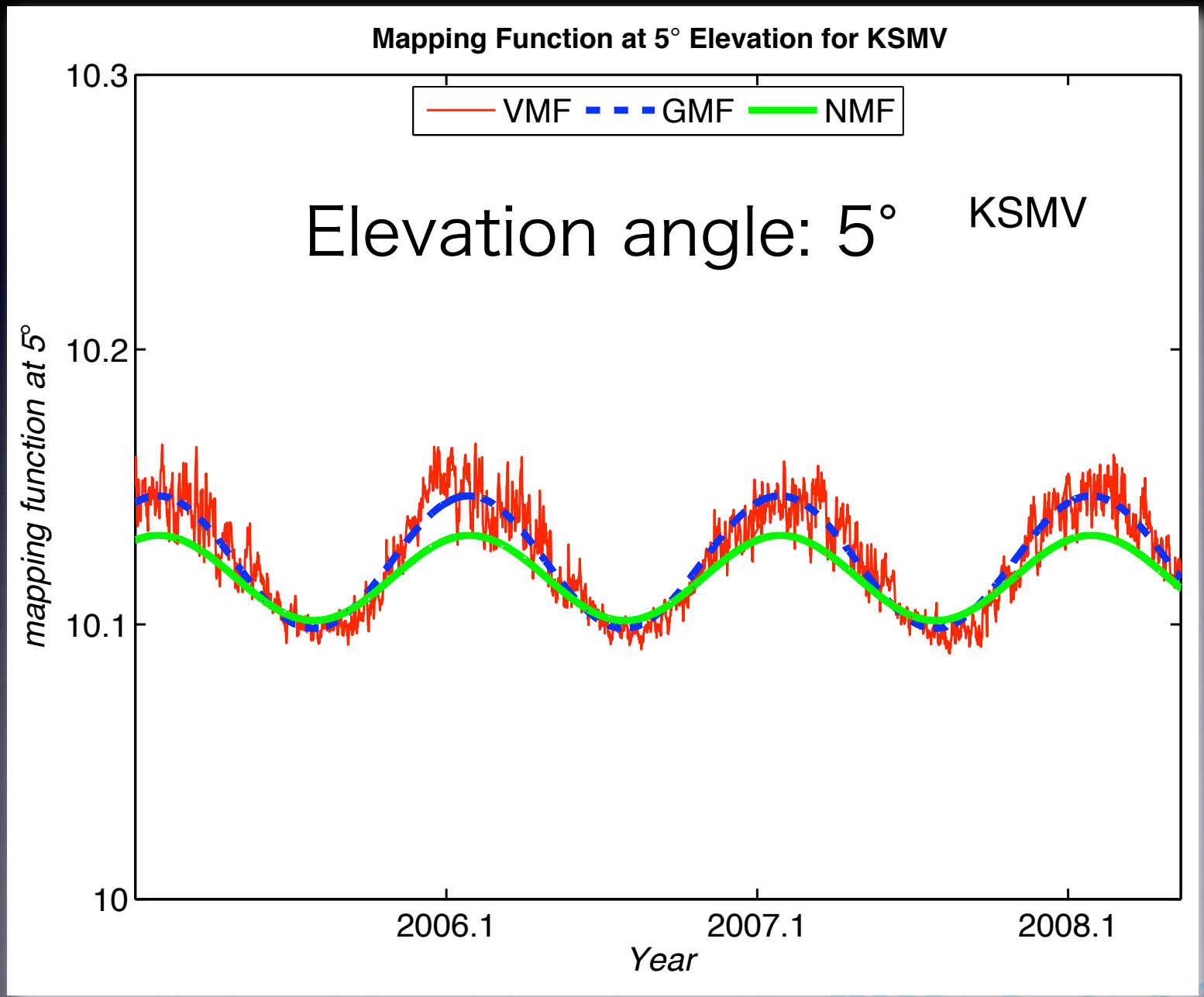
Mapping Functions

		a, b, and c are determined by	NWM
NMF	Niell[1996]	lat, doy, hgt	[none]
IMF	Niell et al.[2001]	NWM	NCEP
GMF	Boehm et al.[2006]	lat, lon, doy, hgt (indirect use of NWM)	ECMWF
VMF	Boehm and Schuh[2004]	NWM	ECMWF

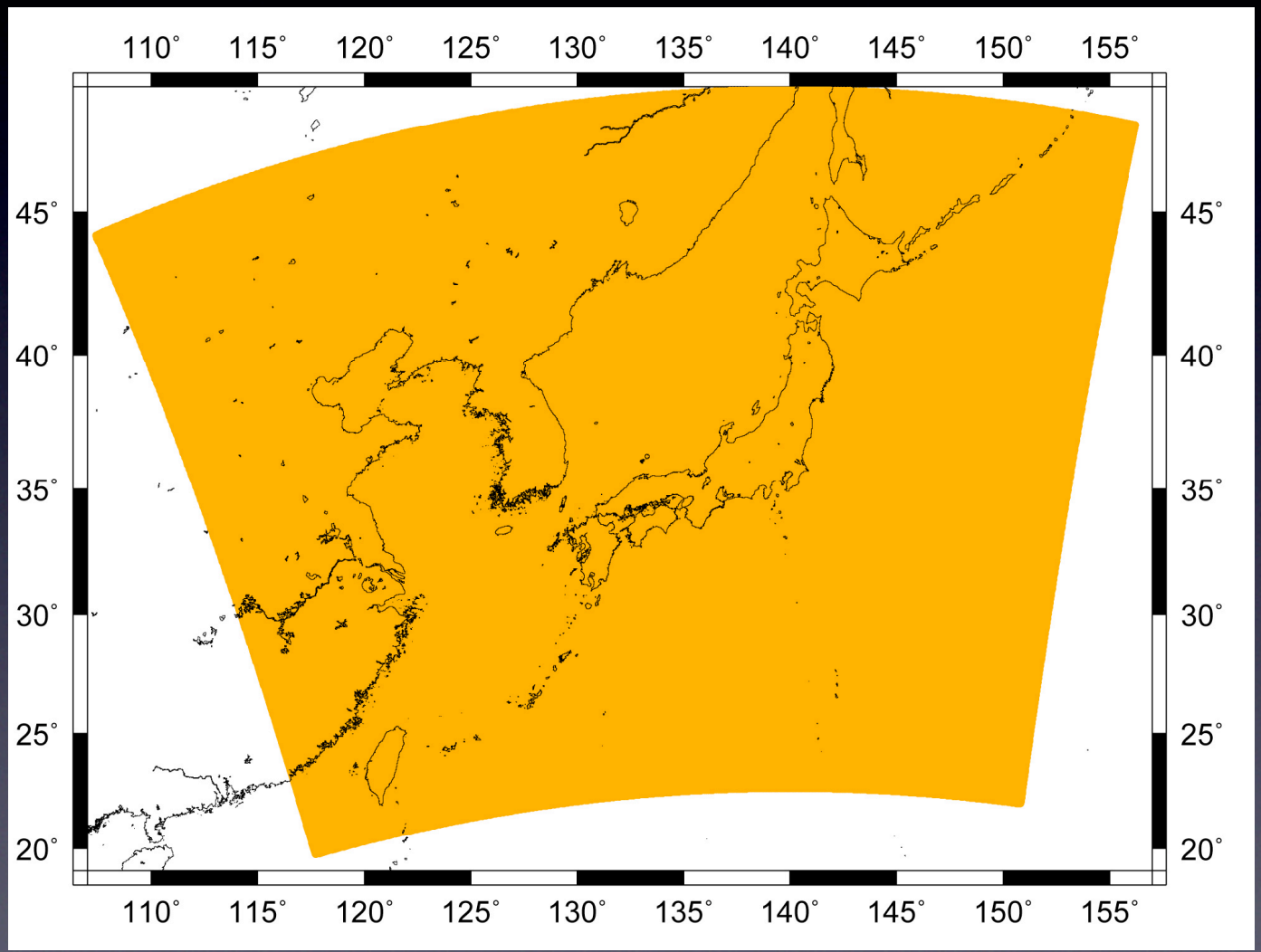
VMF1: GPStools Ver.0.64で実装

Mapping Functions -cont'd-



covered area by JMA/MANAL

Mesoscale ANALysis Data by JMA



lon: 107°-157°E
lat: 19°-49°N

Countries covered:
- Japan (100%)
- Korea (100%)
- Taiwan (100%)
- China (partly)

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GPS/PPP Analysis

- DATA: GEONET/RINEX
  - KARAT reduced and Original
- period: 2008.1.1-12.31 (interval: 300sec.)
- Stations: 68 GEONET Stations
- mapping functions: VMF1, GMF
  - with gradient & w/o gradient
- processing: GPStools Ver. 0.64(Takasu and Kasai [2003])

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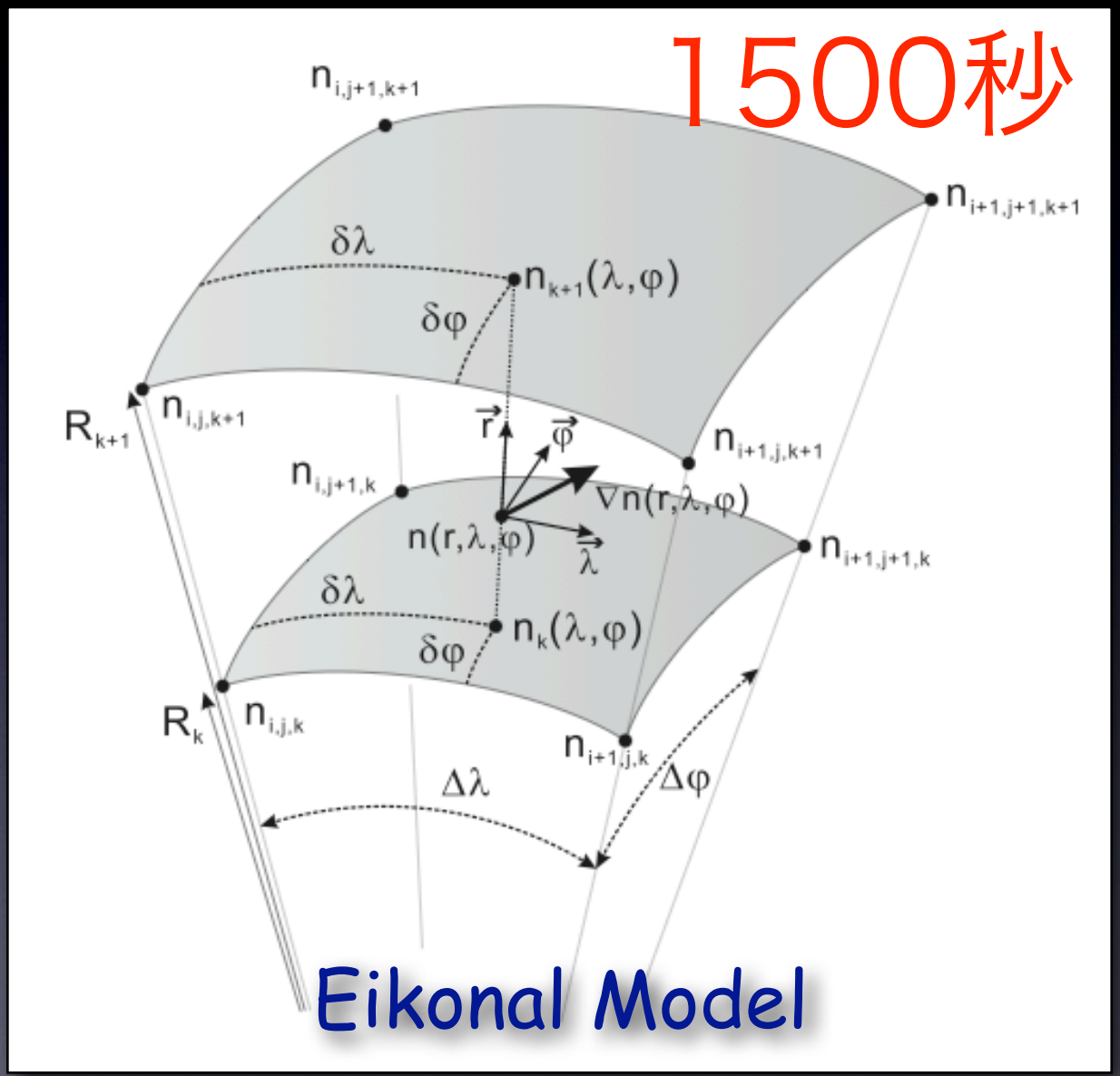
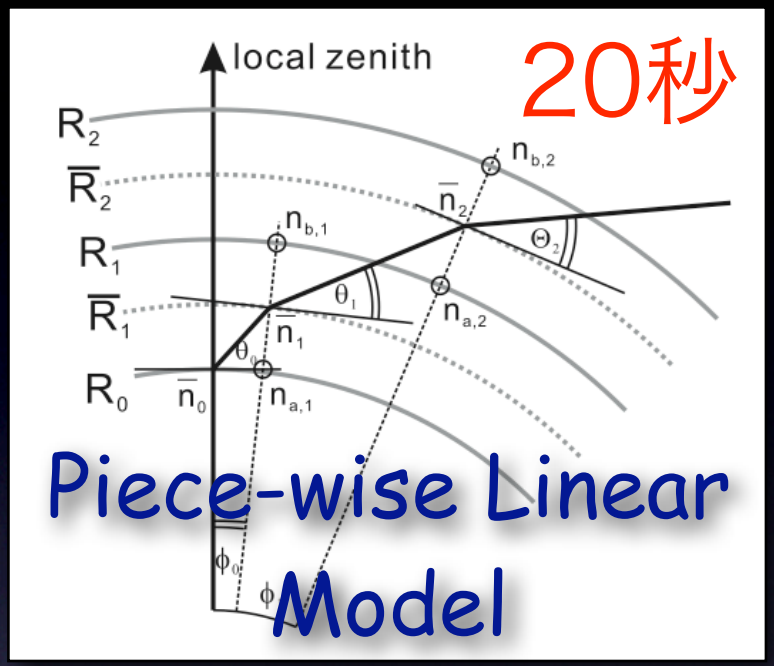
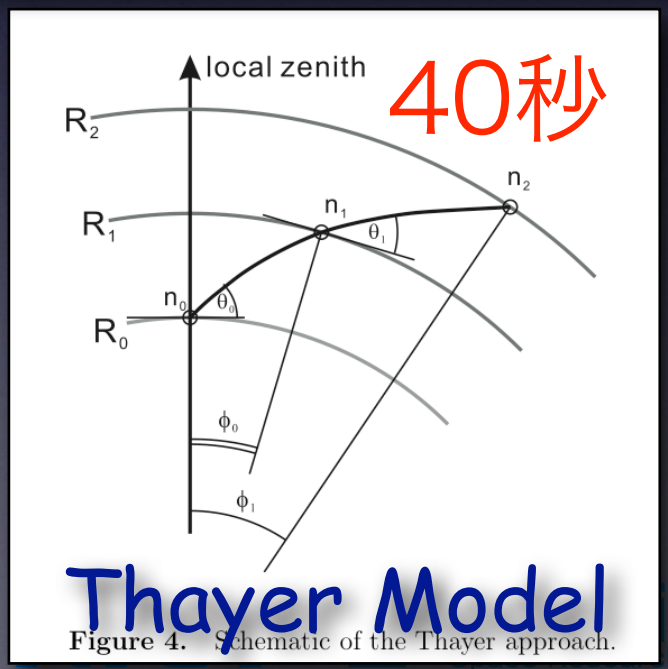
KARAT calculation schemes

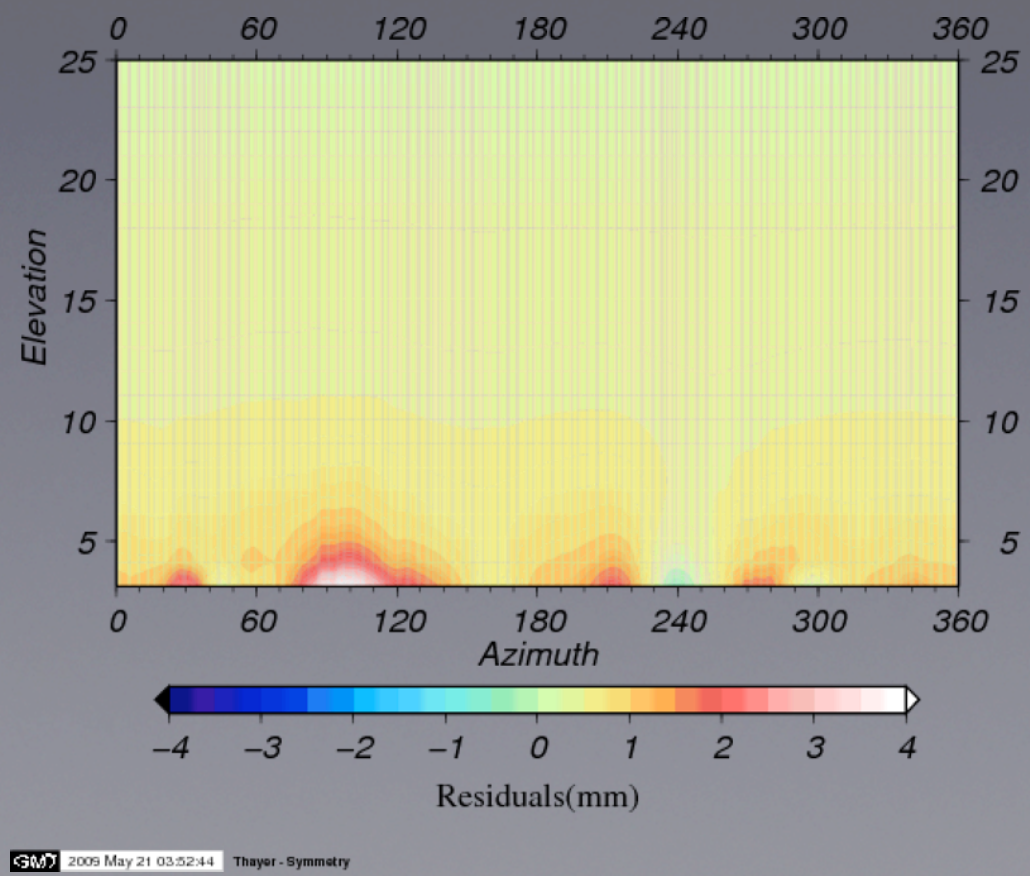




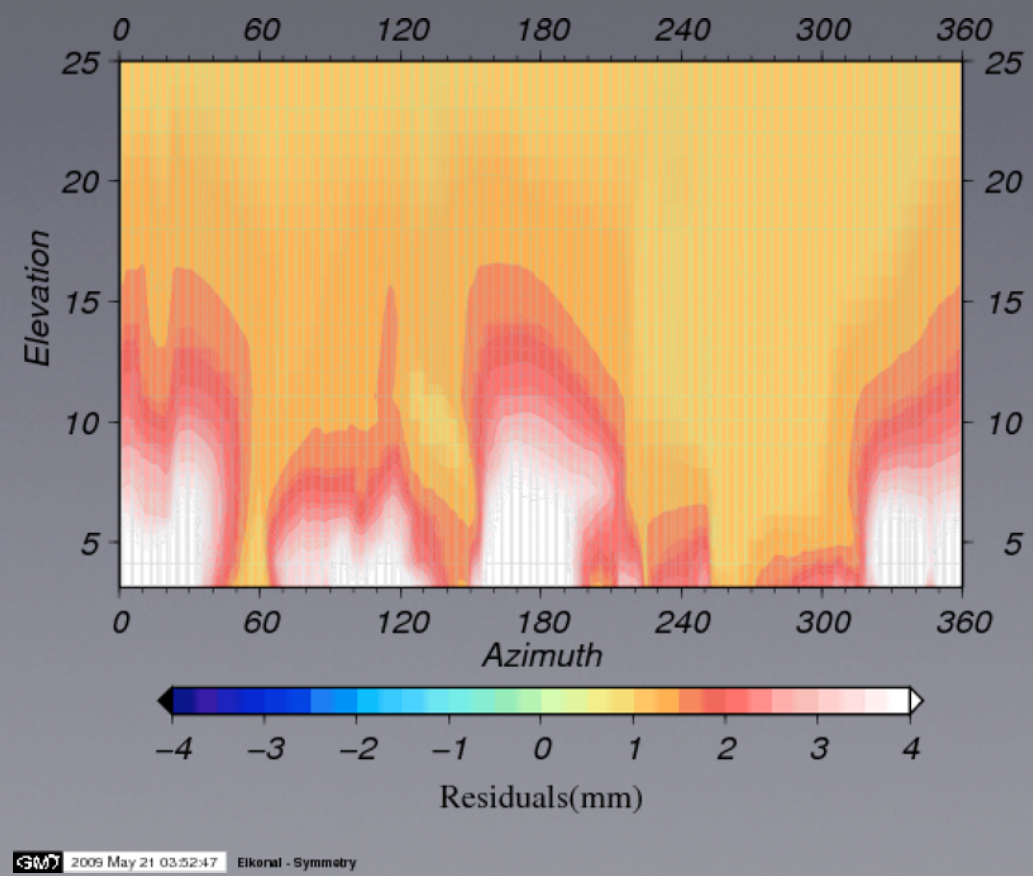


Azimuthal Residuals

Thayer - Symmetry



Eikonal - Symmetry



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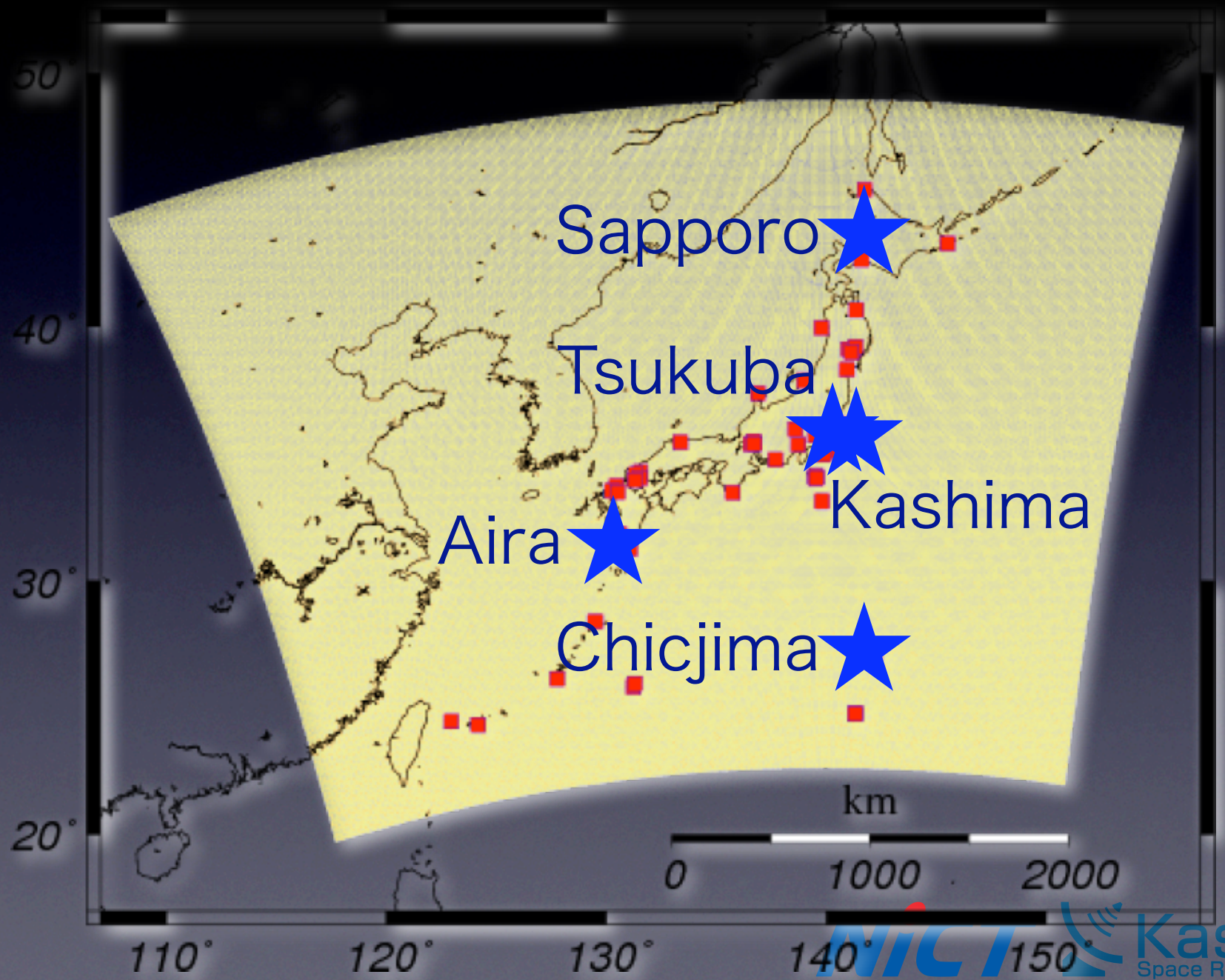
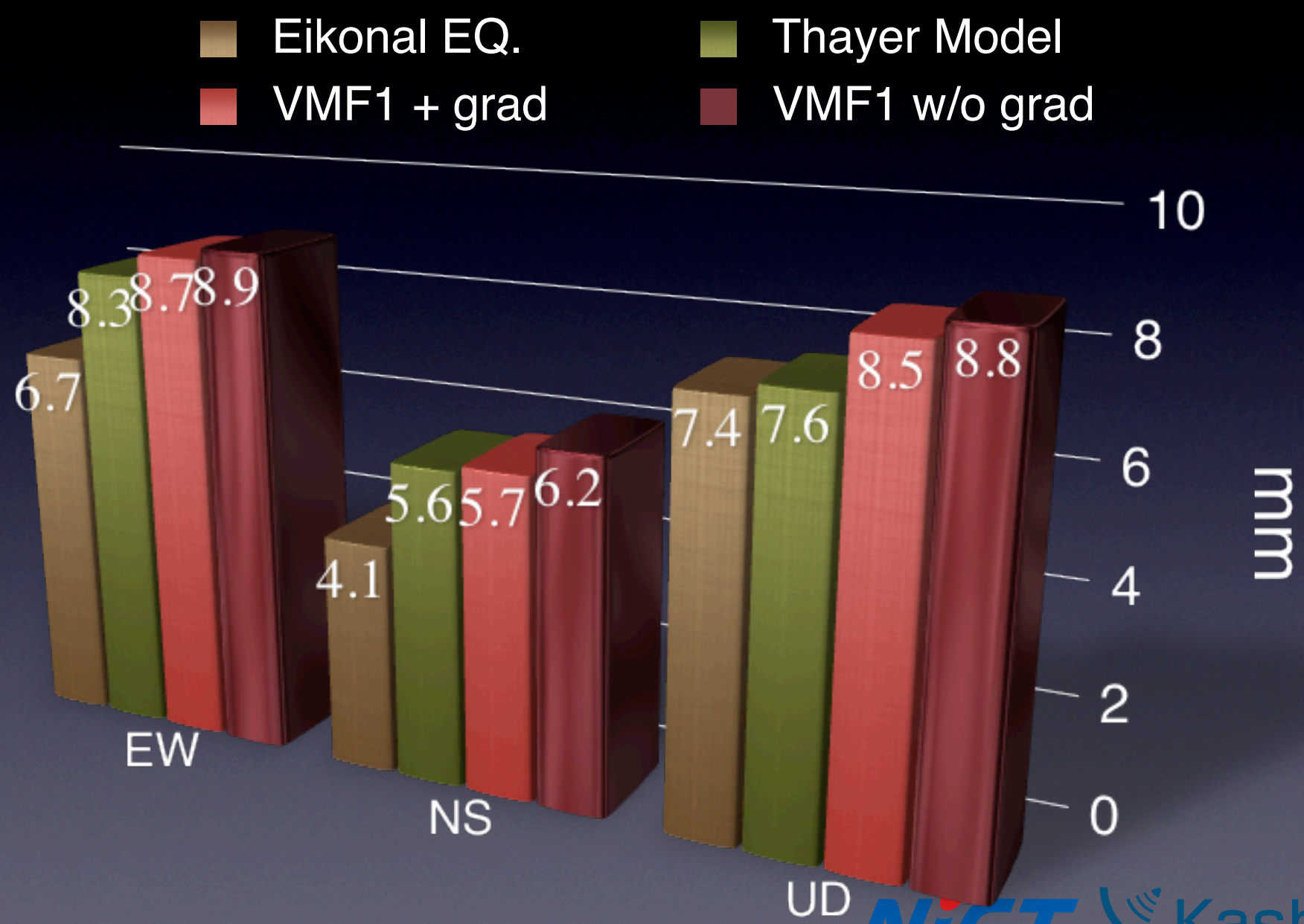
解析に用いた観測点


Sapporo
Tsukuba
Kashima
Aira
Chicjima
km
0
1000
2000
50°
40°
30°
20°
110°
120°
130°
140°
150°

repeatability(5 sites)



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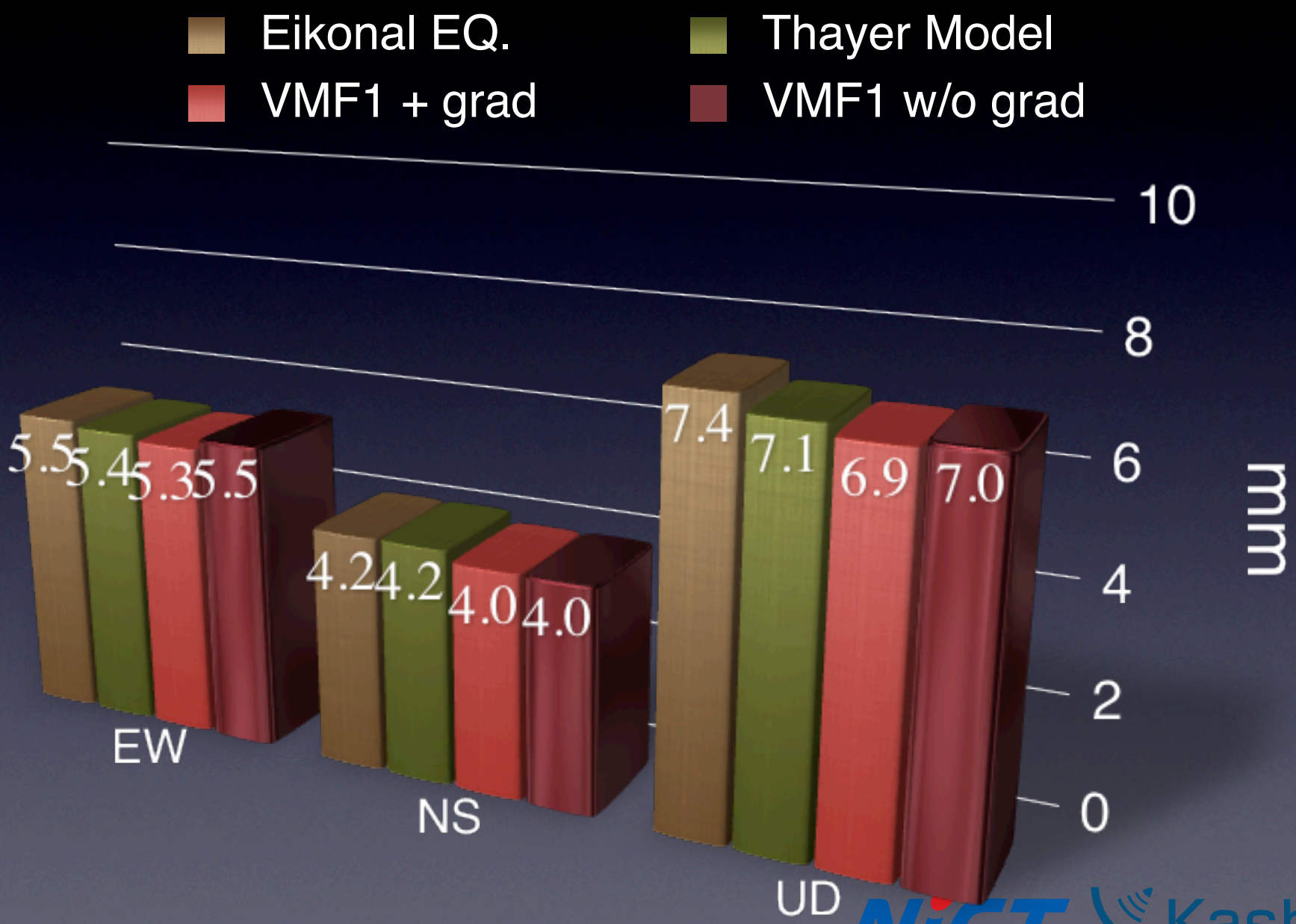
940128(Sapporo)



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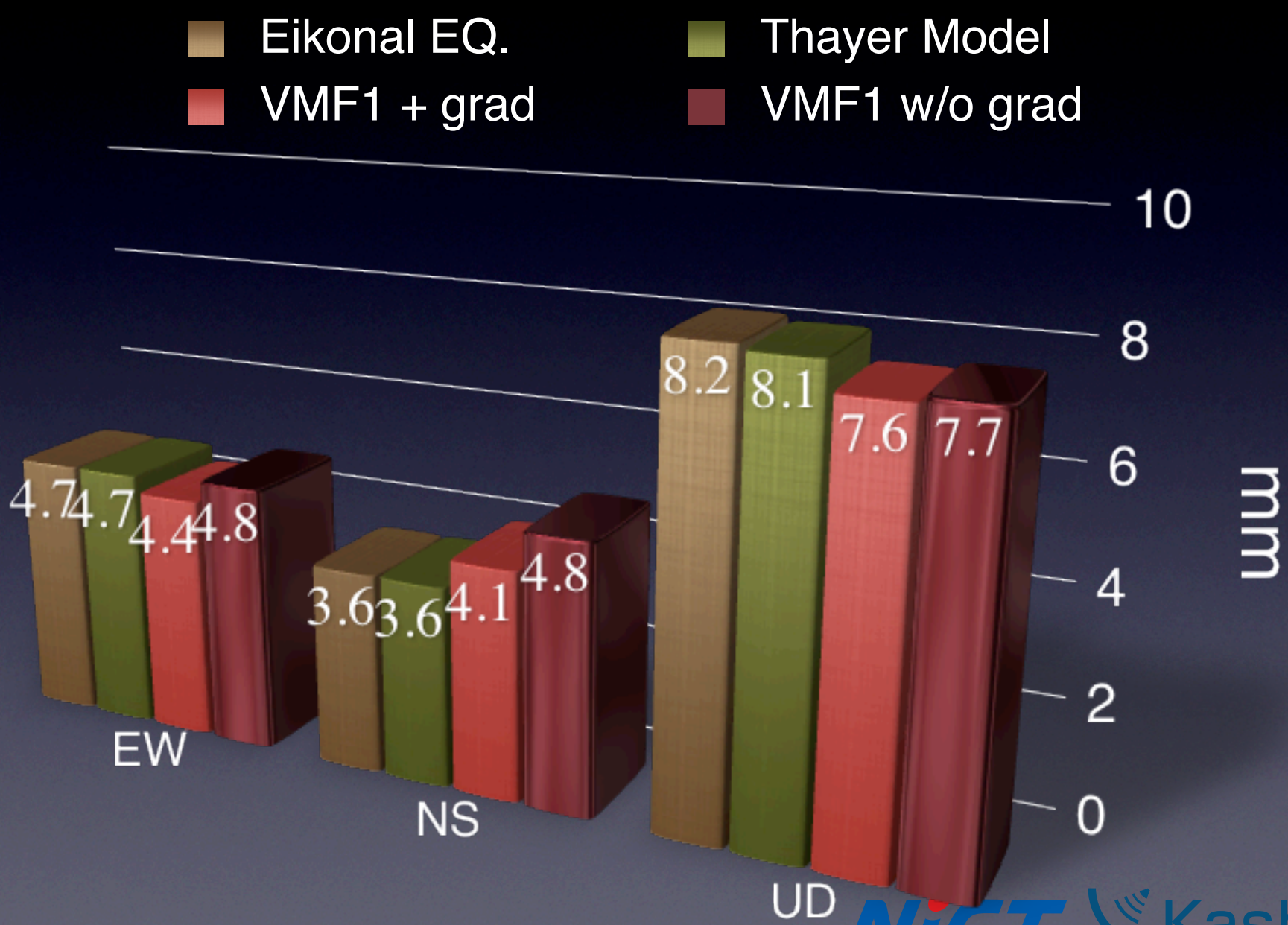
92110(Tsukuba)



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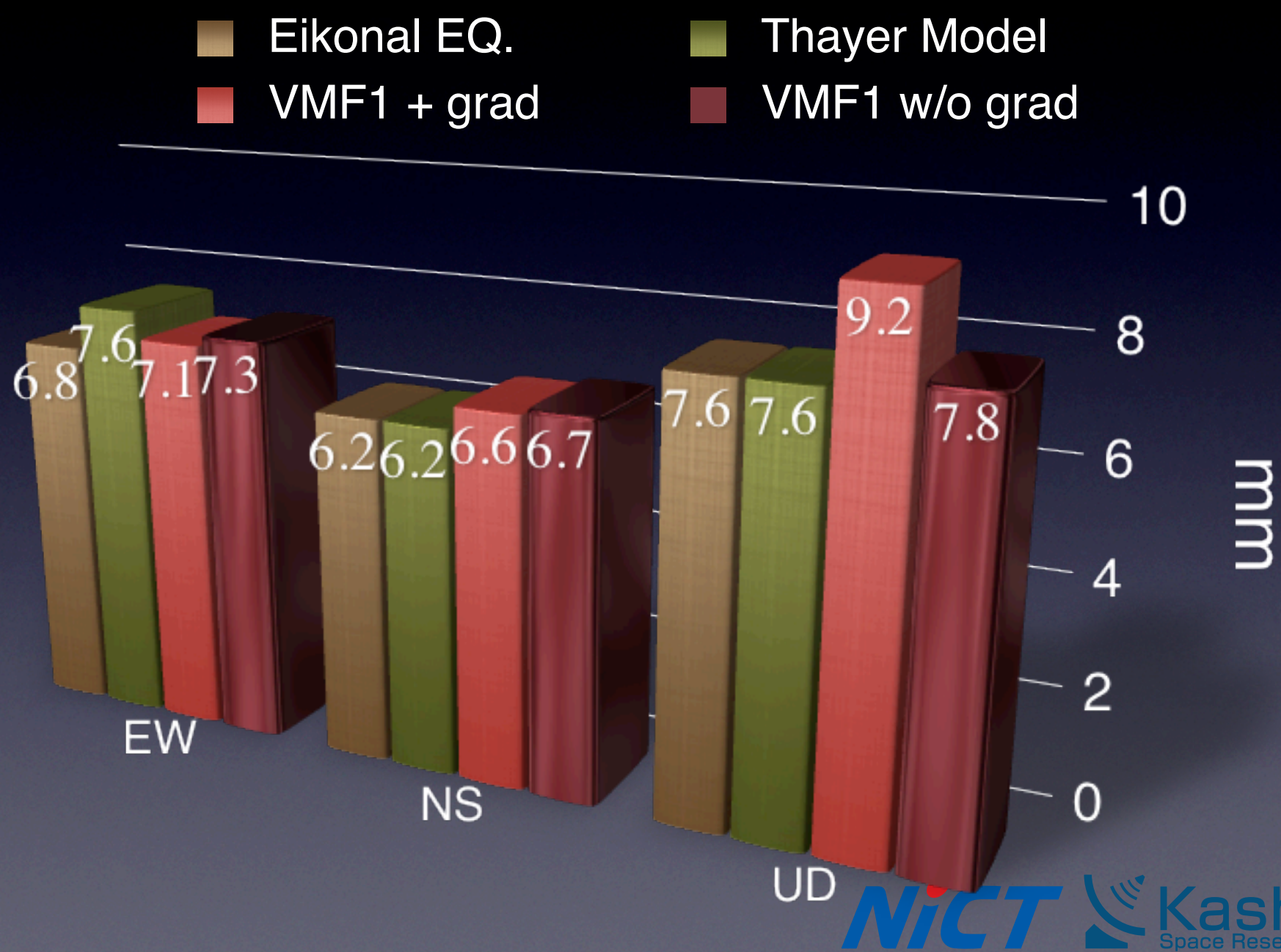
970837(Aira)


Eikonal EQ.
Thayer Model
VMF1 + grad
VMF1 w/o grad
10
8
6
4
2
0
mm
6.8
7.6
7.1
7.3
6.2
6.2
6.6
6.7
7.6
7.6
9.2
7.8
EW
NS
UD

まとめ

- 2008.1.1-12.31のGEONET68局のデータを用いてPPP解析
- 三次元測位解の再現性(RMS)で評価すると
  - Eikonal EQ. < Thayer Model ≦ VMF1+勾配 < VMF1のみ
- JMA 10km MANALでもマッピング関数に勝てる!?

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今後

- 何とか夏頃までにKARATSサービスを始める予定で作業中
- Eikonal計算の高速化→GPGPU技術が使えるか？
- より高時空分解能NWMの適用

- 謝辞：GPStoolsの利用について高須知二氏に、またGEONETデータの提供について国土地理院に深く感謝いたします

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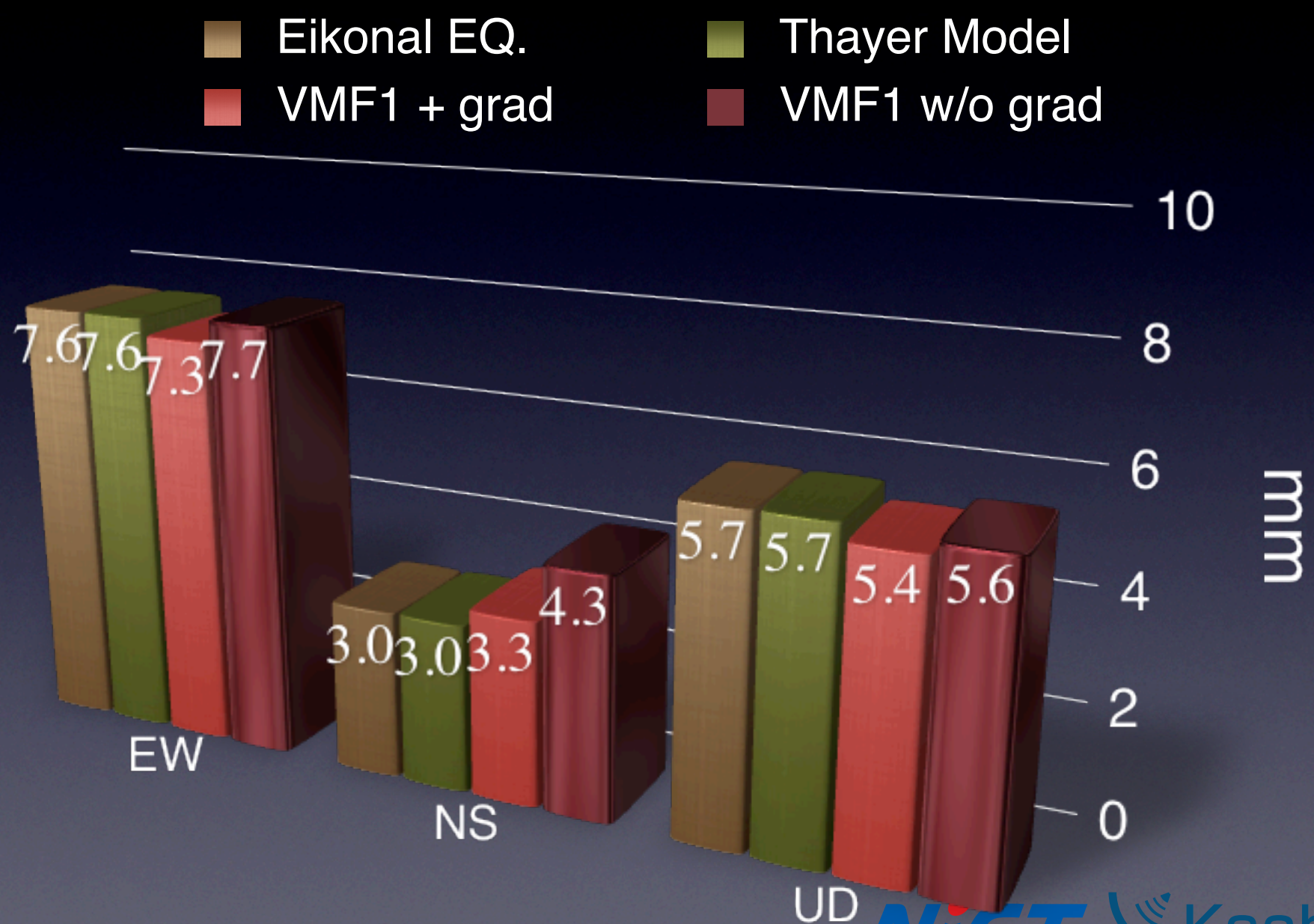
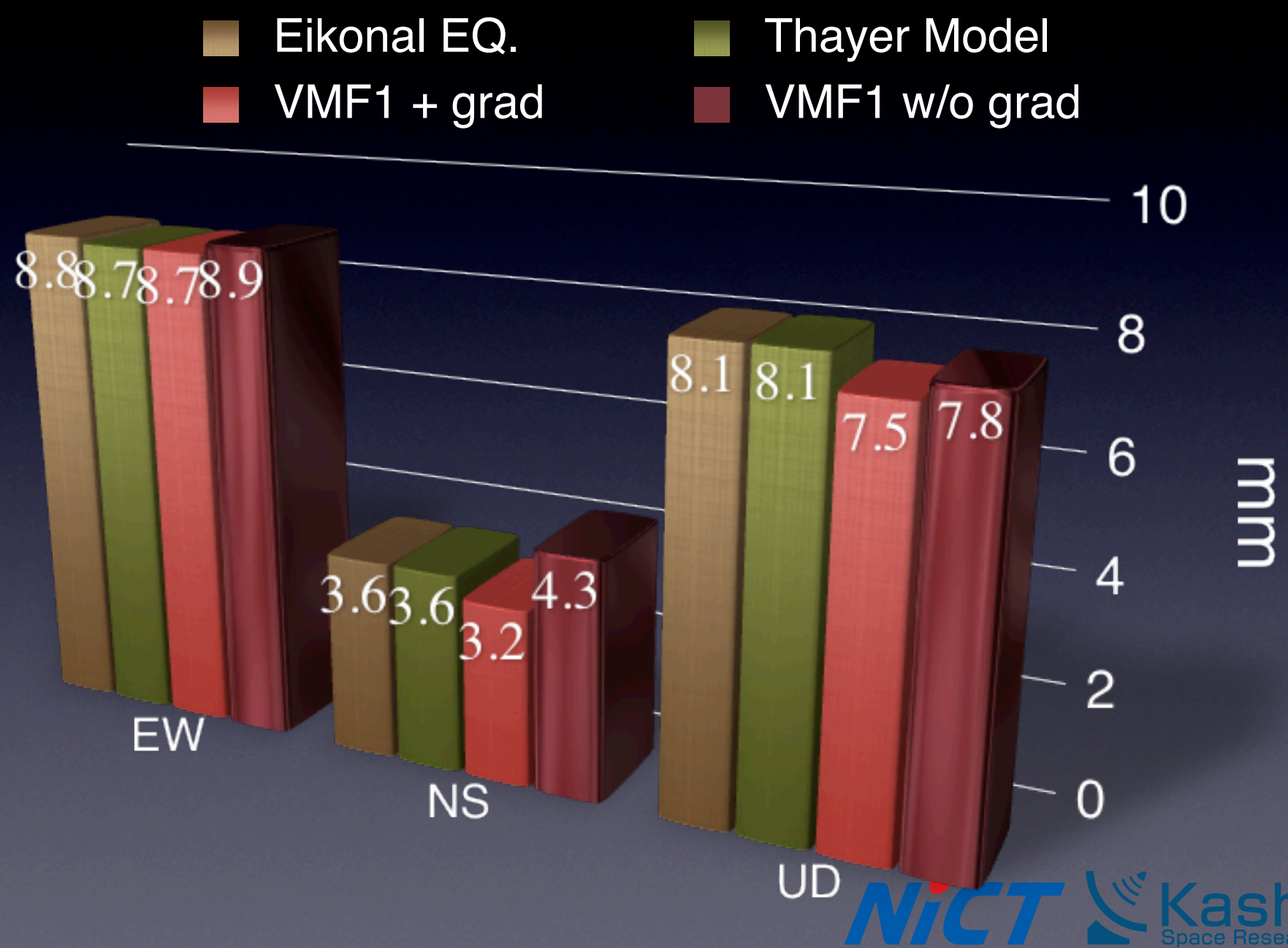
93009(Kashima)



942003(Chichijima)