NICTの宇宙測地観測点のITRF2020とLocalTie測量との整合性

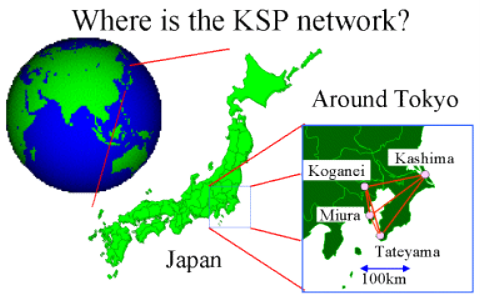
NICT 時空標準研究室

関戸　衛

2023年3月22日　GGOS2023会合

ITRF2020への LocalTieデータ提出

- 提出データ
  - 1996-1999のKSP 測量
    - 鹿島:
      - VLBI: Kas11(4), Kas34(2), Kas26(1)
      - SLR: Kas-SLR(4)
      - GNSS: KSMV(2)
    - 小金井：
      - VLBI:Kog11(4)
      - SLR:Kog-SLR(4), SLR 1.5m(1)
      - GNSS: KGNI(2)
    - 三浦：
      - VLBI]:Miu11(4)
      - SLR:Miu-SLR(4)
      - GNSS:P106(1)
    - 館山:
      - VLBI: Tat11(4)
      - SLR: Tat-SLR(4)
      - GNSS:P108(1)
  - 2013年の小金井測量
    - VLBI:Kog11
    - SLR:Kog-SLR, SLR1.5m
    - GNSS:KGNI



Site: Koganei の例

```
## DESCRIPTION Data is provided from National Institute of Information
##             and Communications Technology (NICT).
## INPUT       Local survey was made by Communications Reseach Laboratory
## CONTACT     sekido@nict.go.jp
## Data format is as follows:
##    DomesNumber(to) DN(from)       X[m]      Y[m]      Z[m]    CDP(to)   CDP(from)    Epoch(YY:DOY)
##    Uncertainty of the local tie vector     X[m]      Y[m]      Z[m]     CDP   CDP     Epoch(YY:DOY)
## Note: Following entries are Eccentricity vector  from site station parmanent ground marker
##       (Site Reference Point:SRP) to SLR telescope reference point
##  KASL <-  21701M002
##  KOGL <-  21704M001
##  MIUL <-  21739M001
##  TATL <-  21740M001
#                          0.0000    0.0000    0.0000
#DomesNum(to) DN(from)    X         Y         Z         CDP(to)   CDP(from)    Epoch
21704S004 21704M001    +3.8008  -18.6282  +39.6088  7327   7328   96:275
                         0.0040    0.0065    0.0056
KOGL      21704M001   -20.2085  -21.0117  +12.9822  7308   7328   96:275
                         0.0040    0.0065    0.0058


21704S004 21704M001    +3.8050  -18.6281  +39.6081  7327   7328   97:275
                         0.0014    0.0032    0.0040
21704S002 21704M001   -78.8965  -71.9469   -4.6390  7308   7328   97:275
                         0.0014    0.0032    0.0040
KOGL      21704M001   -20.2148  -21.0049  +12.9893  KOGL   7328   97:275
                         0.0013    0.0032    0.0043


21704S004 21704M001    +3.8035  -18.6253  +39.6109  7327   7328   98:275
                         0.0040    0.0065    0.0056
KGNI      21704M001    -7.9504  -13.1674  +19.2123  KGNI   7328   98:275
                         0.0023    0.0030    0.0041
KOGL      21704M001   -20.2181  -21.0041  +12.9939  KOGL   7328   98:275
                         0.0023    0.0030    0.0044


21704S004 21704M001    +3.8058  -18.6259  +39.6111  7327   7328   99:305
                         0.0011    0.0030    0.0041
KGNI      21704M001    -7.9450  -13.1683  +19.2115  KGNI   7328   99:305
                         0.0011    0.0030    0.0041
KOGL      21704M001   -20.2134  -21.0039  +12.9951  KOGL   7328   99:305
                         0.0011    0.0030    0.0044


21704S004 21704M001    +3.8044  -18.6288  +39.6159  7327   7328   13:252
```

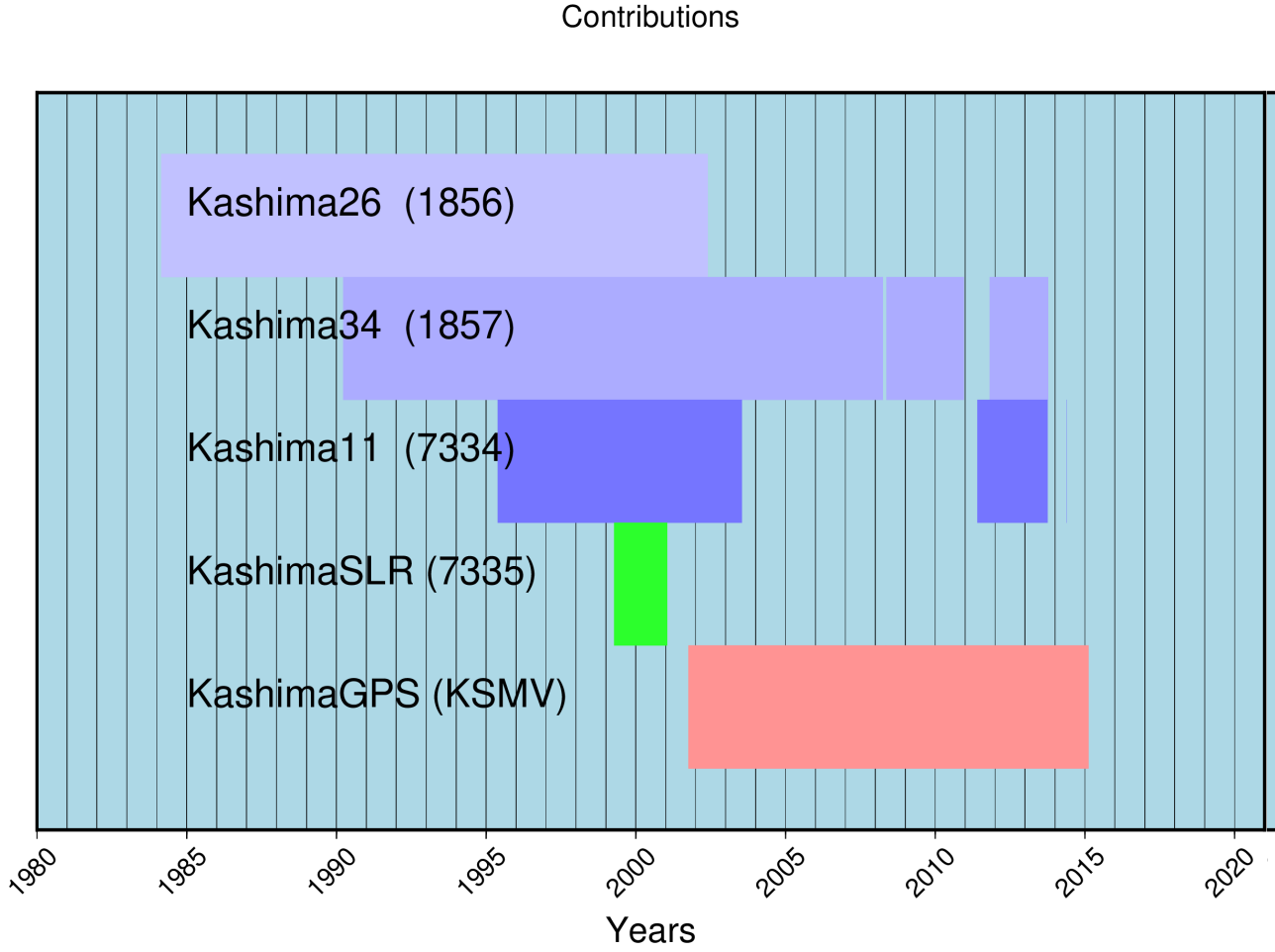
Kog-11m

Kog-SLR

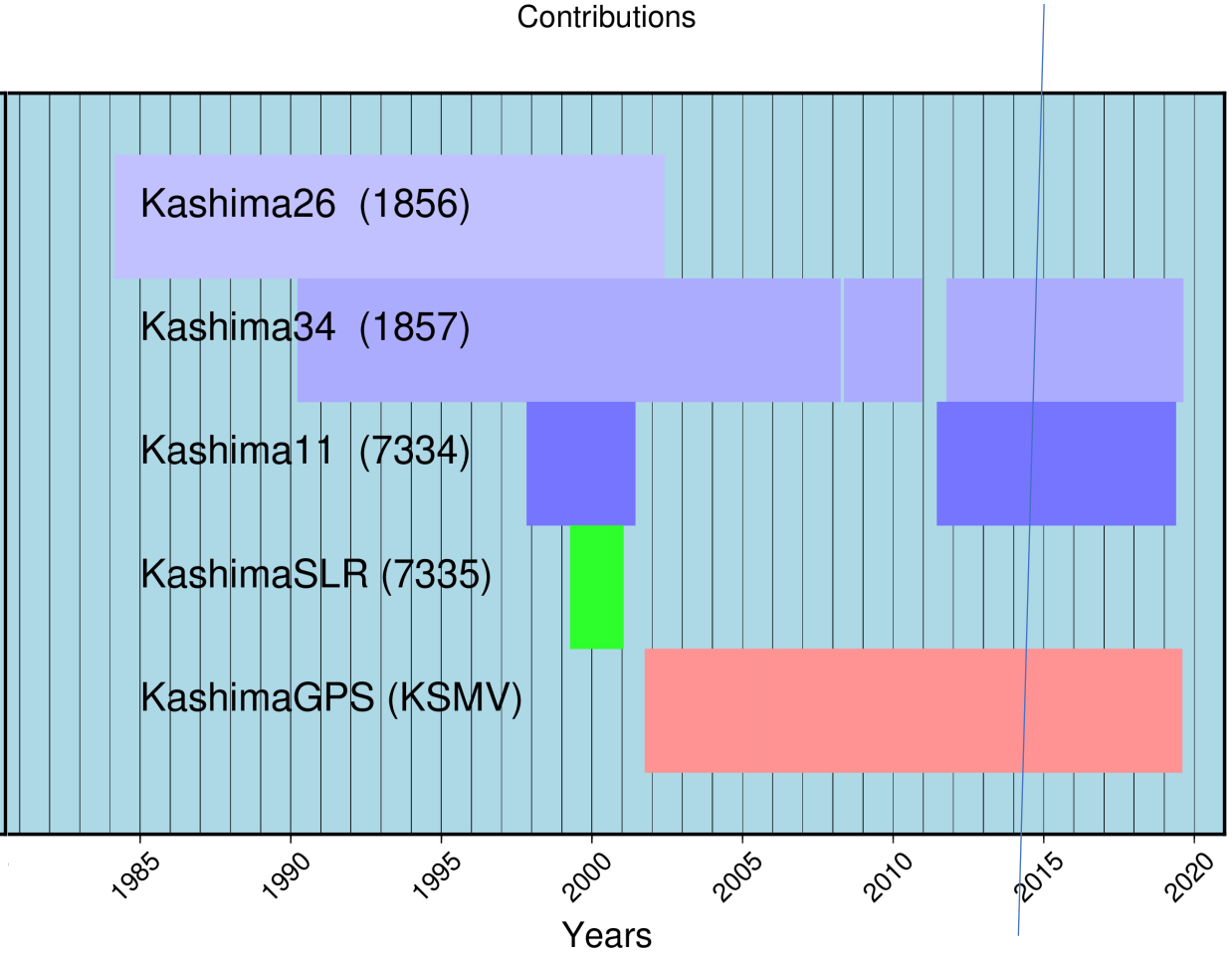
SLR 1.5m

ITRF2014とIRTF2020：寄与時間(Kashima)

ITRF2014



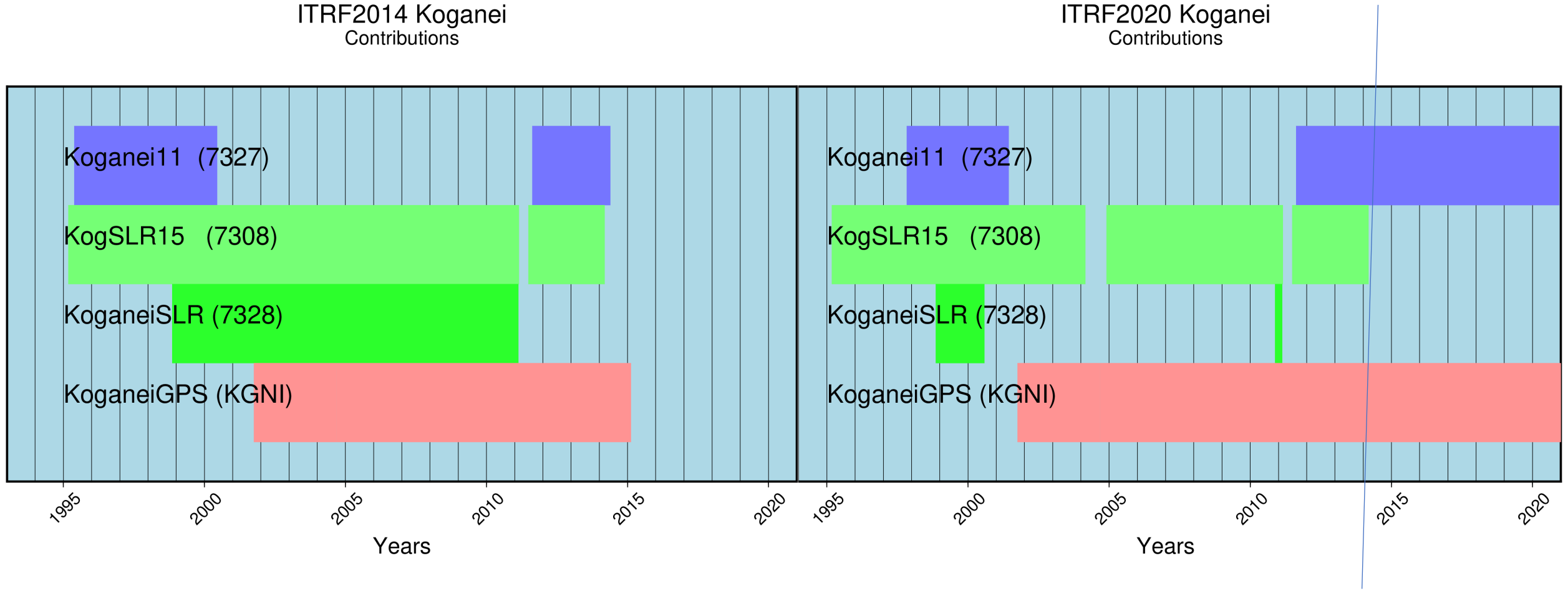
ITRF2020



ITRF2014とIRTF2020：寄与時間(Koganei)

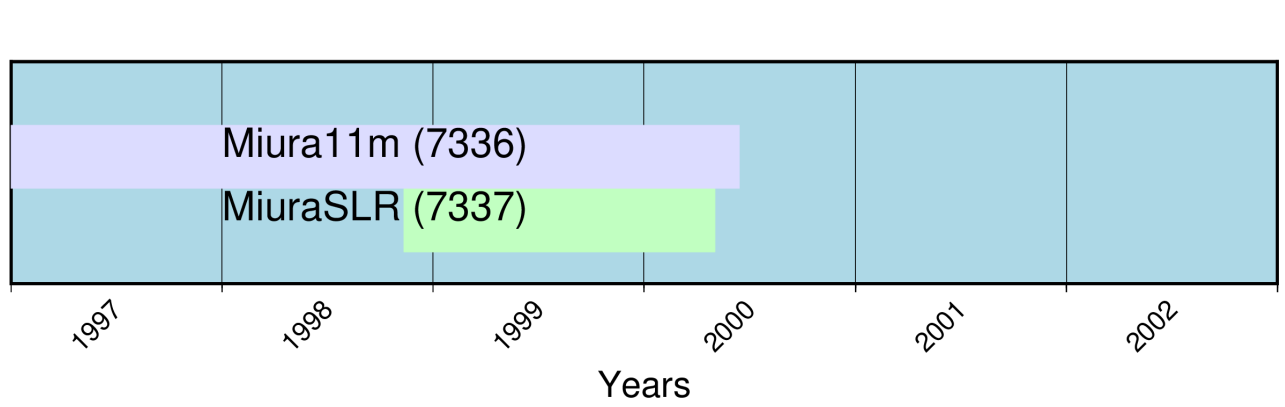
ITRF2014

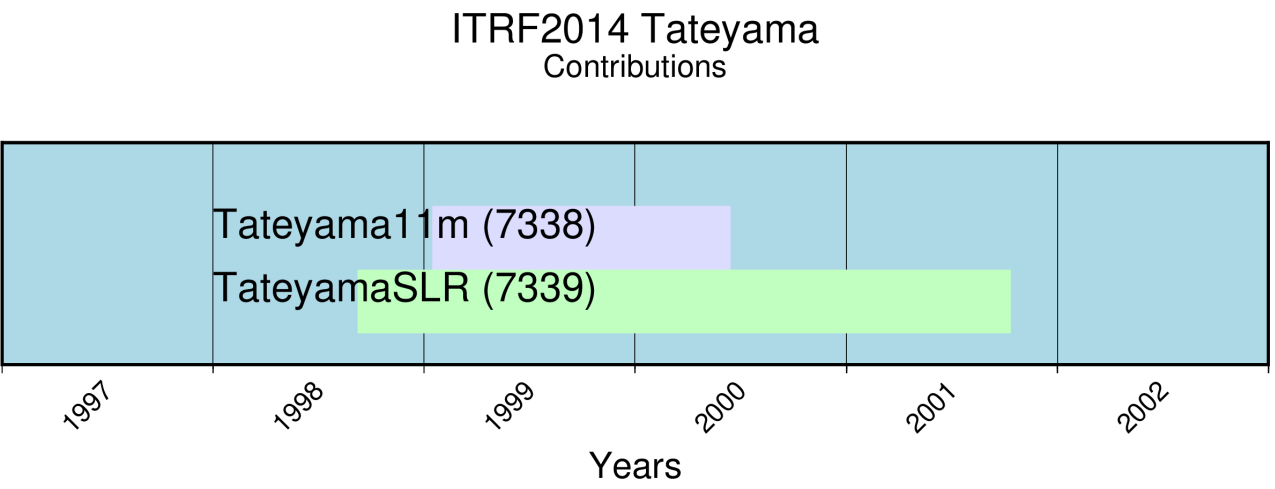
ITRF2020



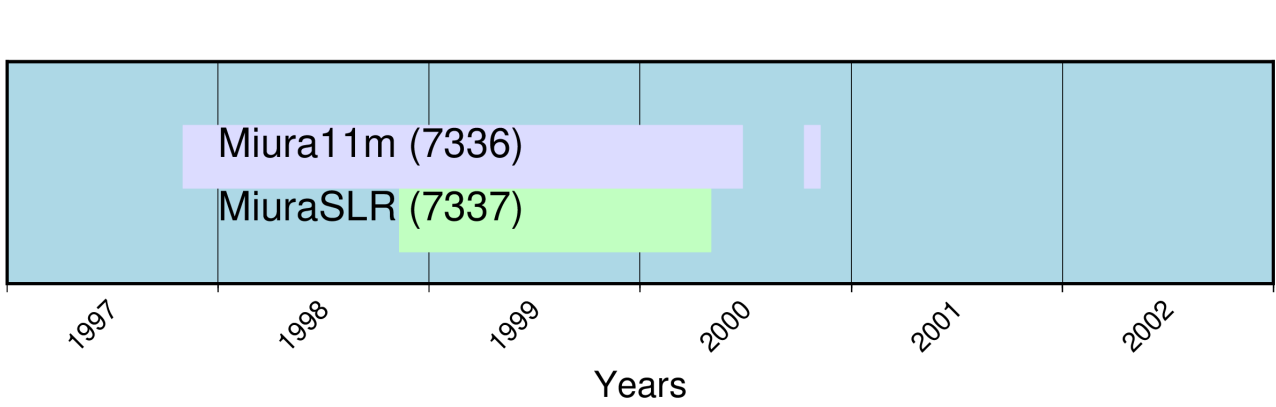
ITRF2014とIRTF2020：寄与時間(Miura,Tateyama)

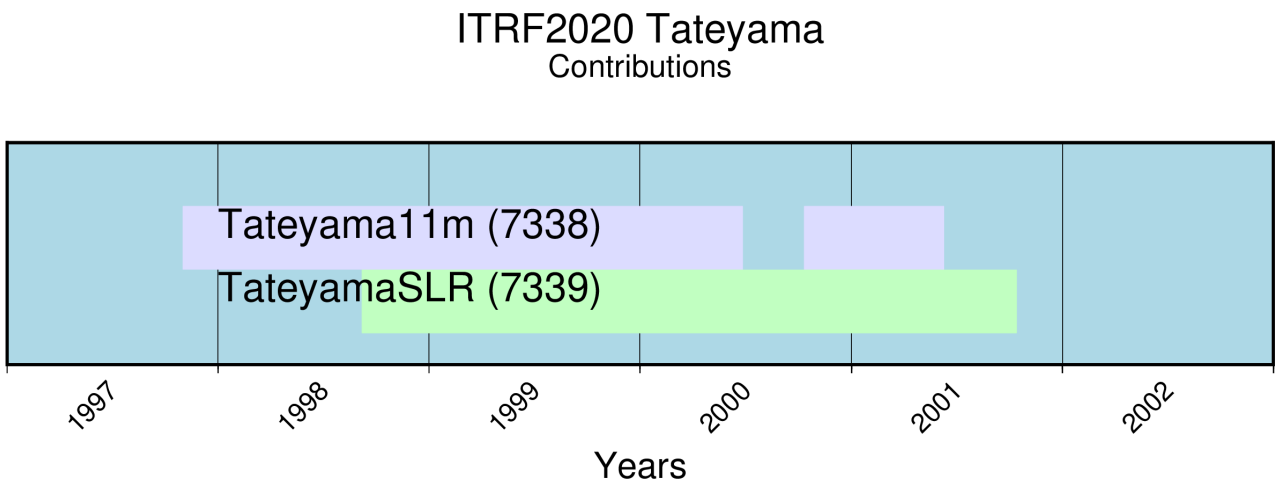
ITRF2014



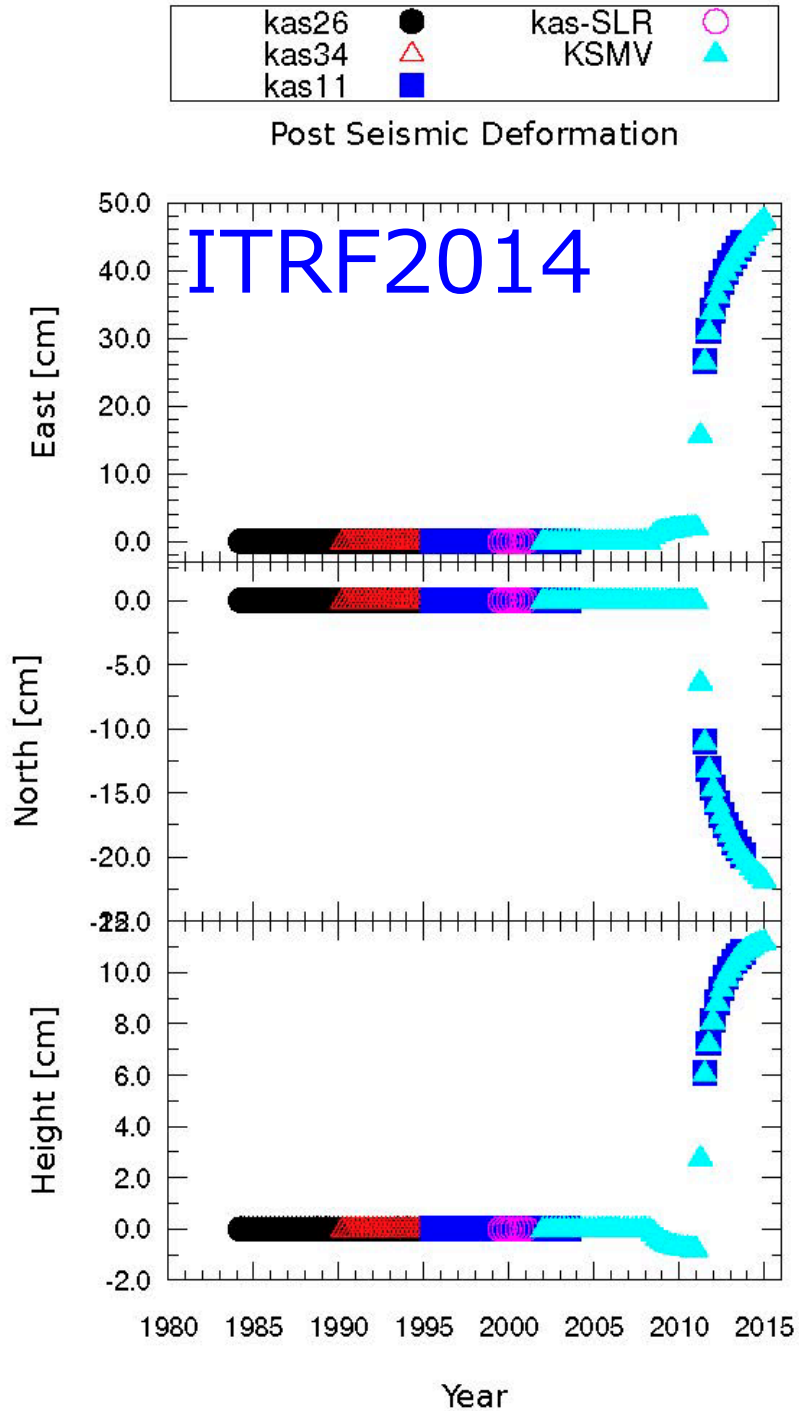


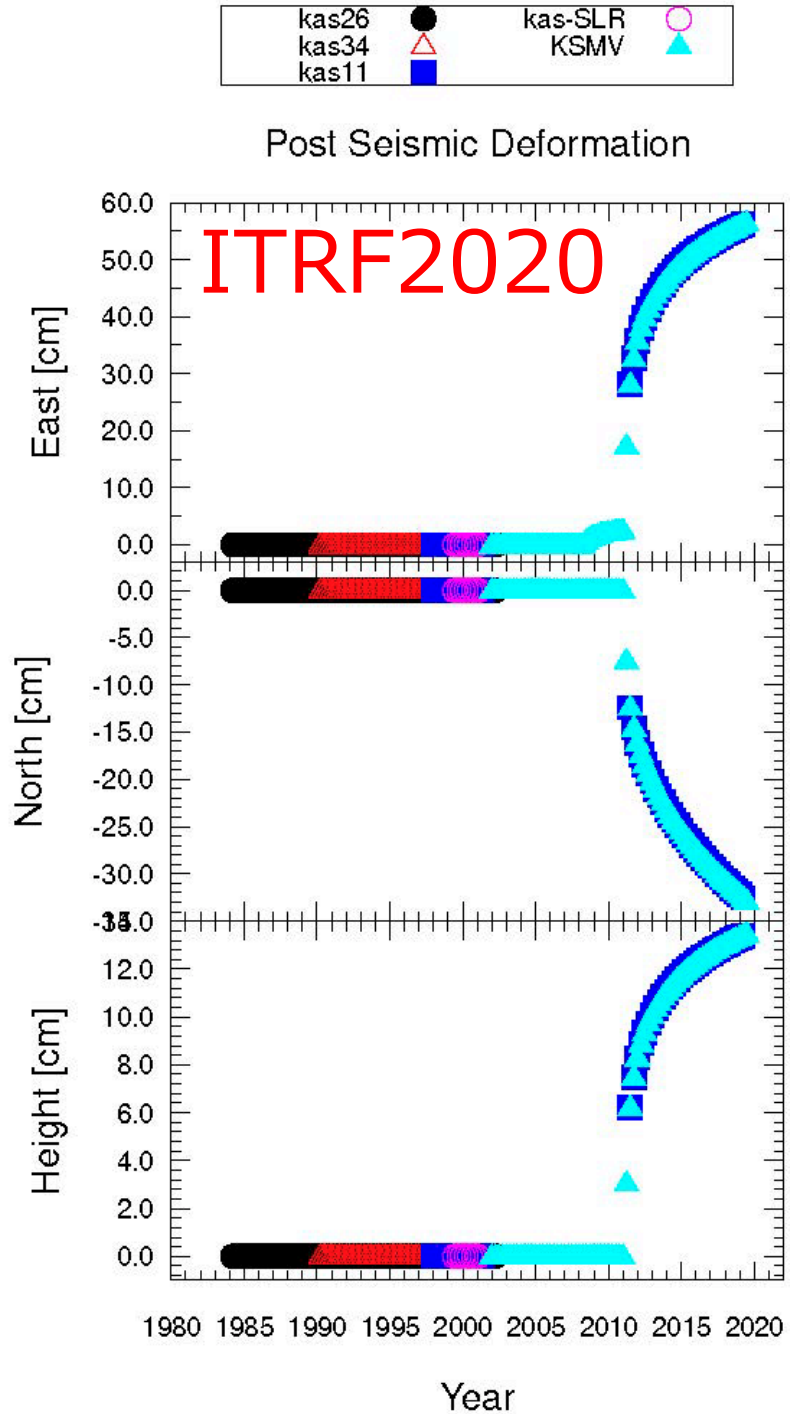
ITRF2020



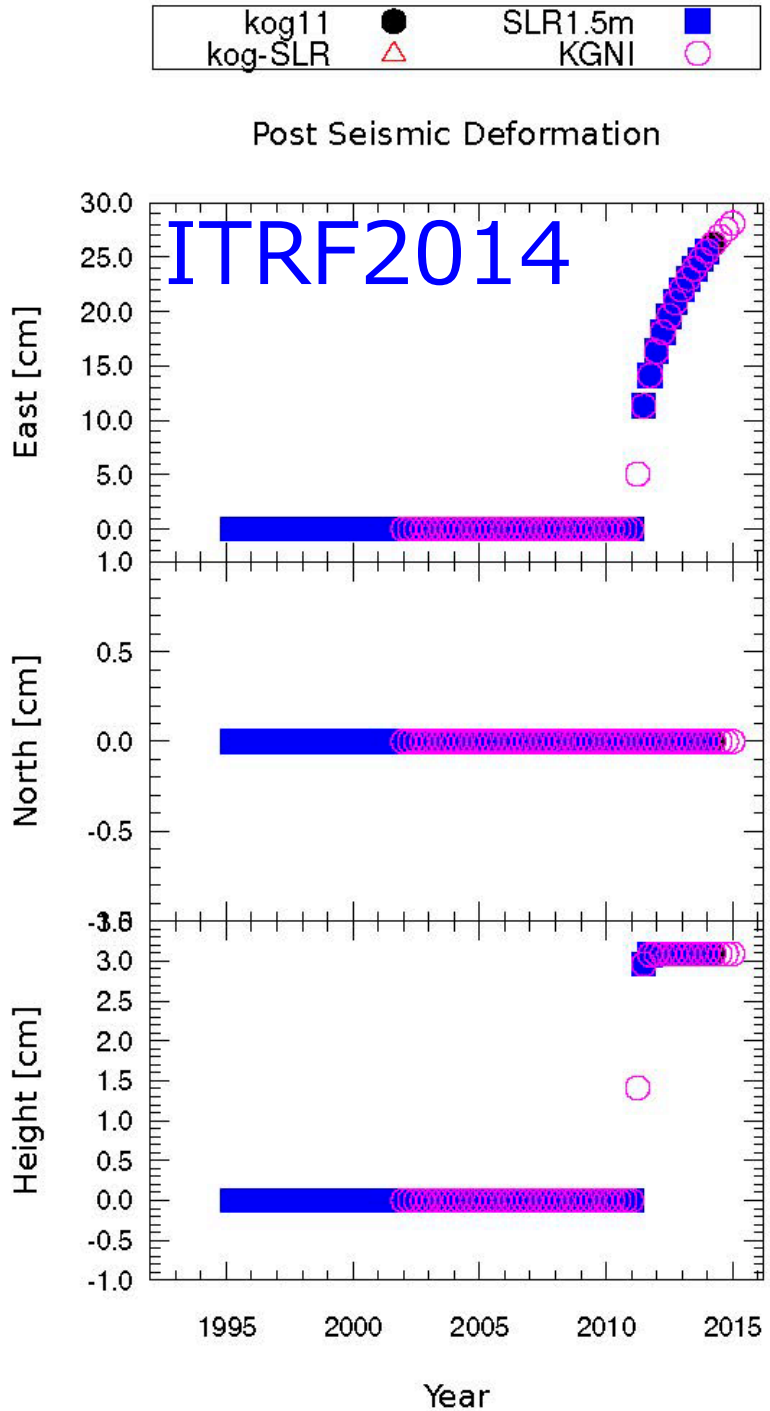


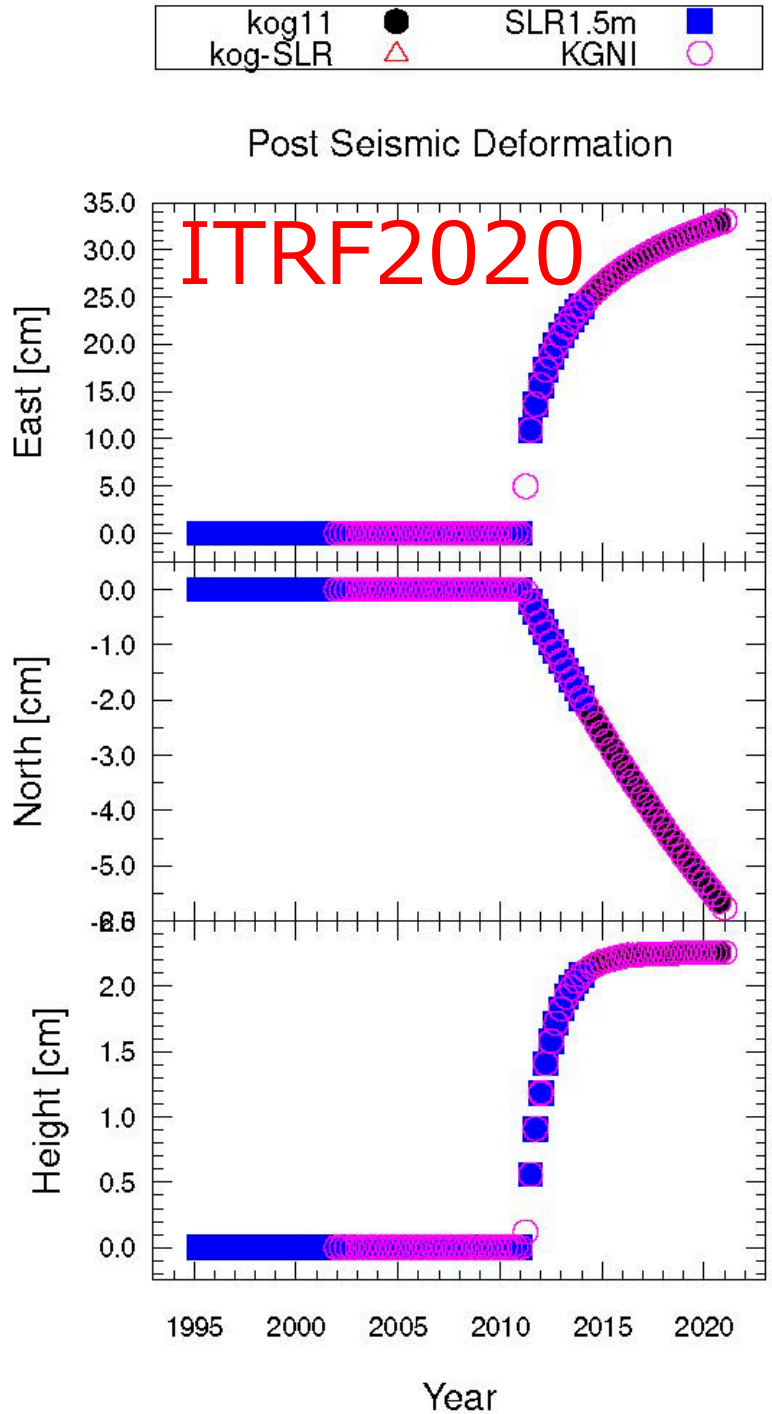
ITRF2014と IRTF2020: PSD Kashima



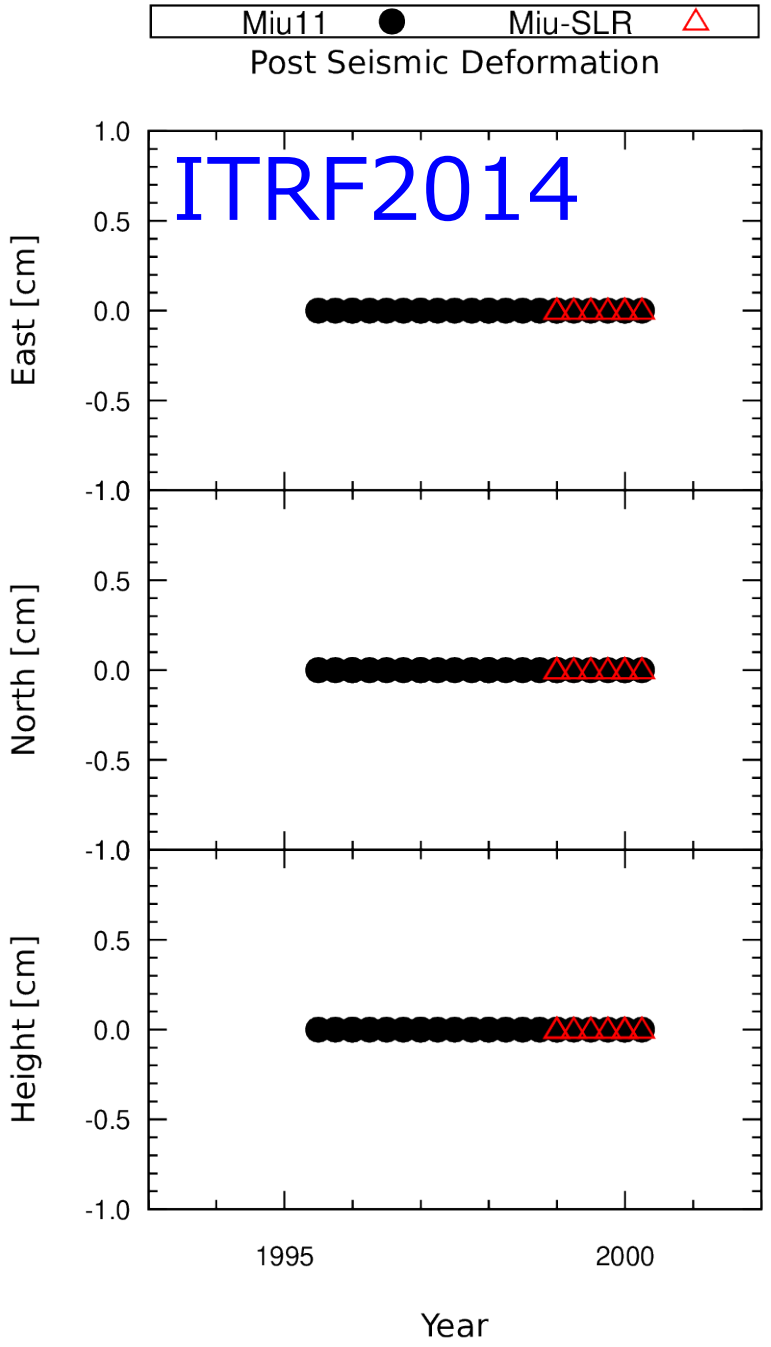


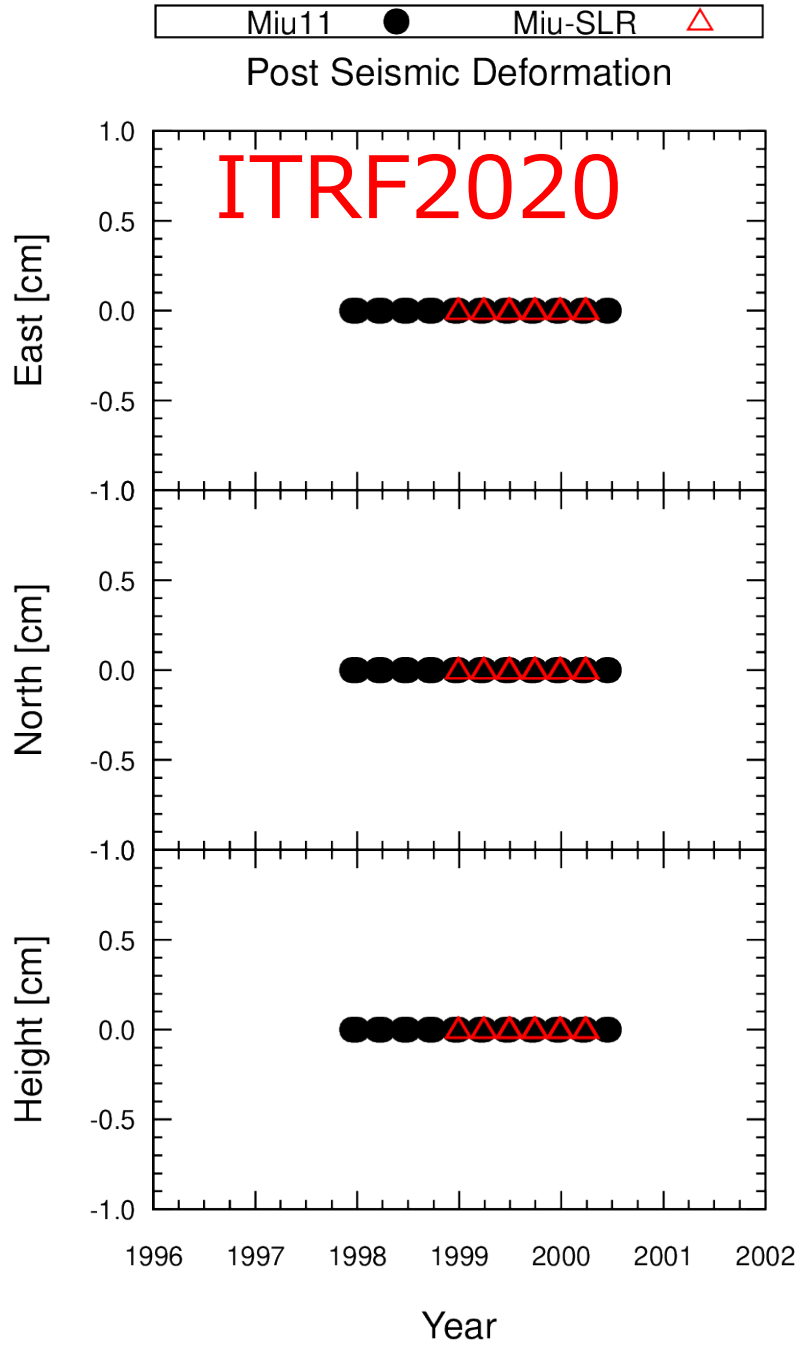
ITRF2014と IRTF2020: PSD Koganei



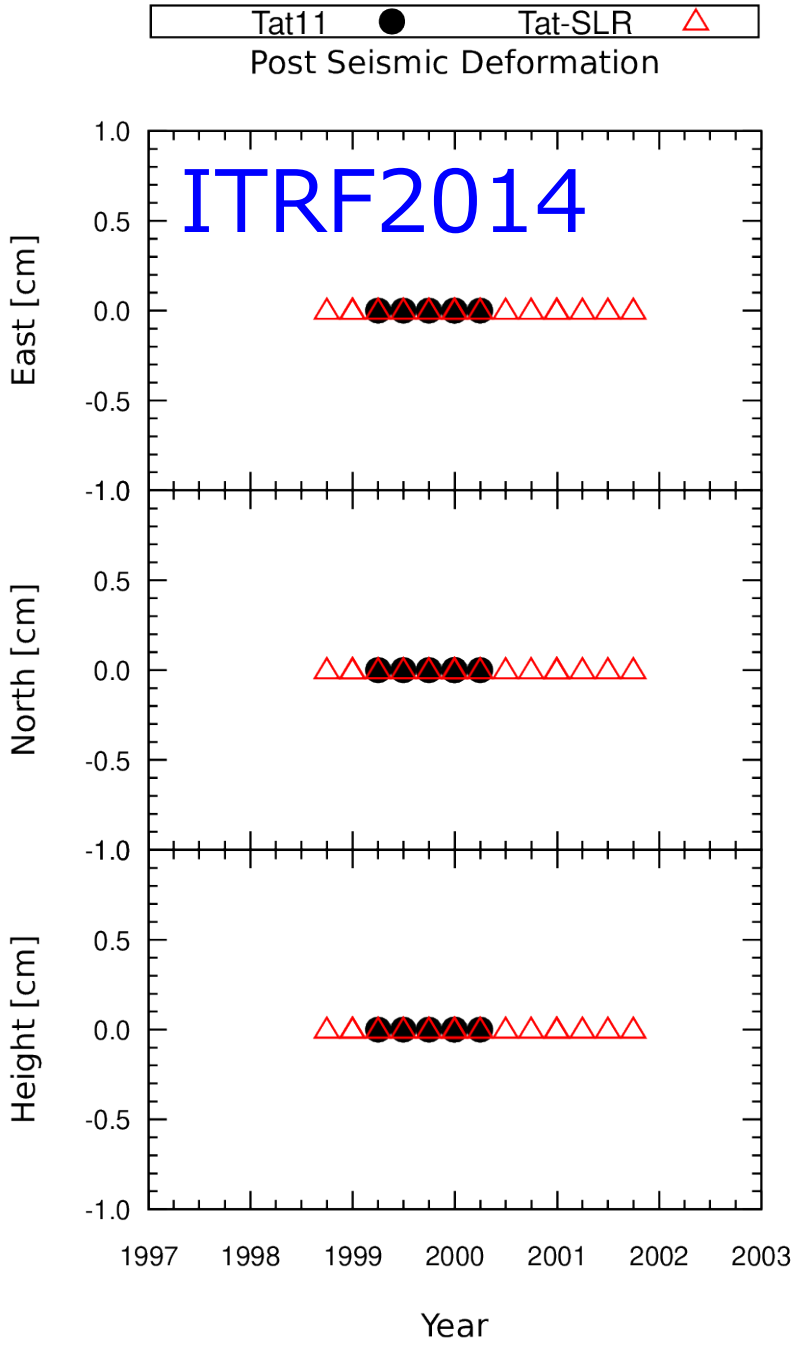


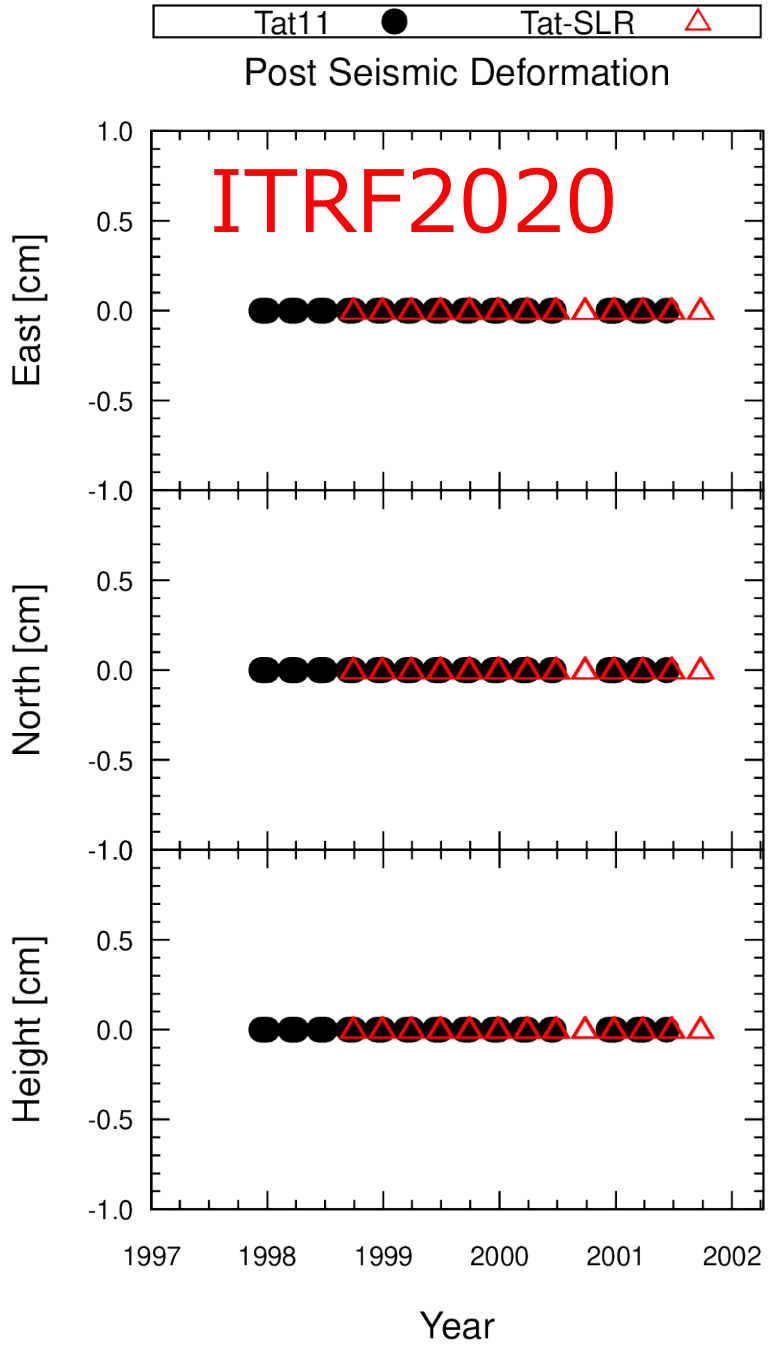
ITRF2014とIRTF2020: PSD Miura



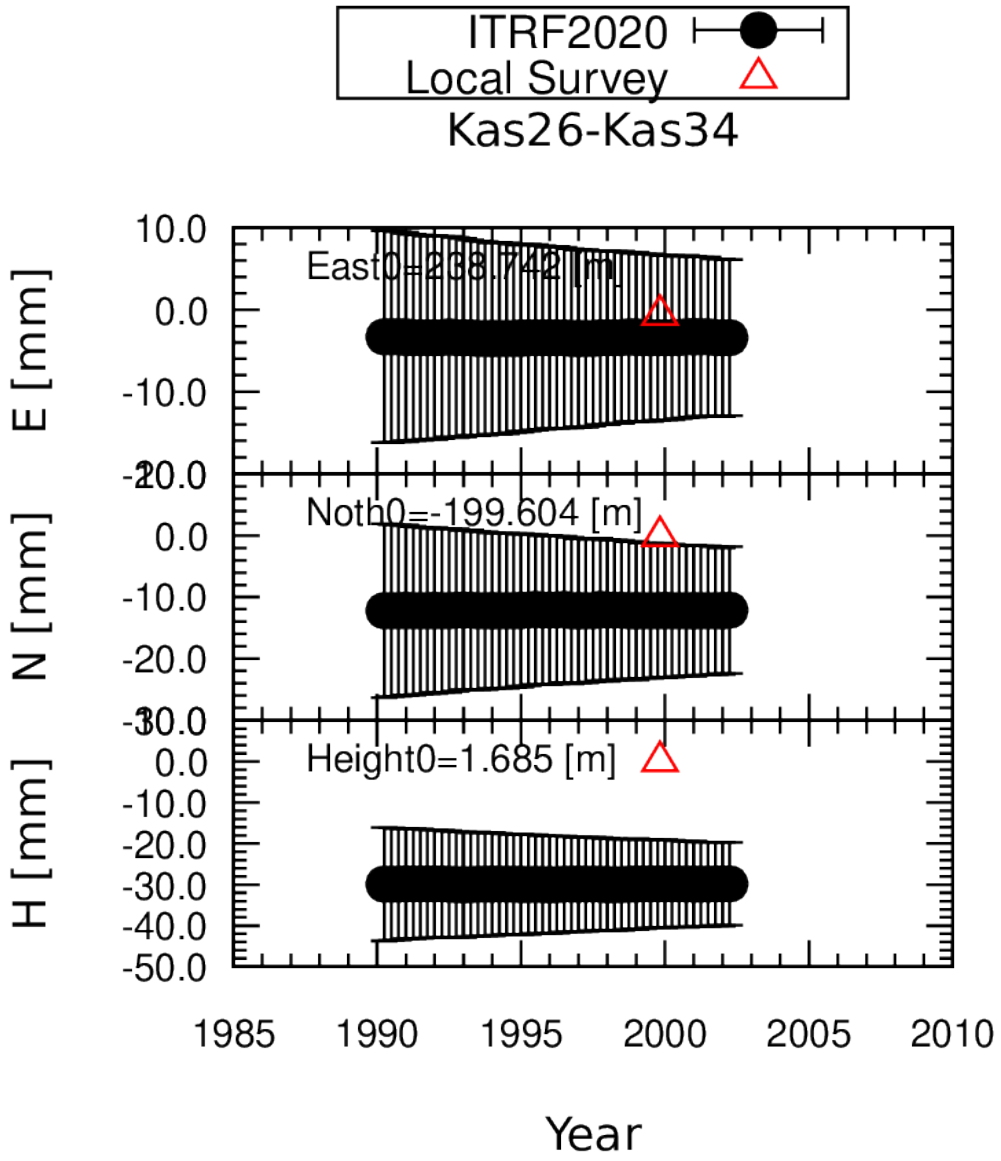


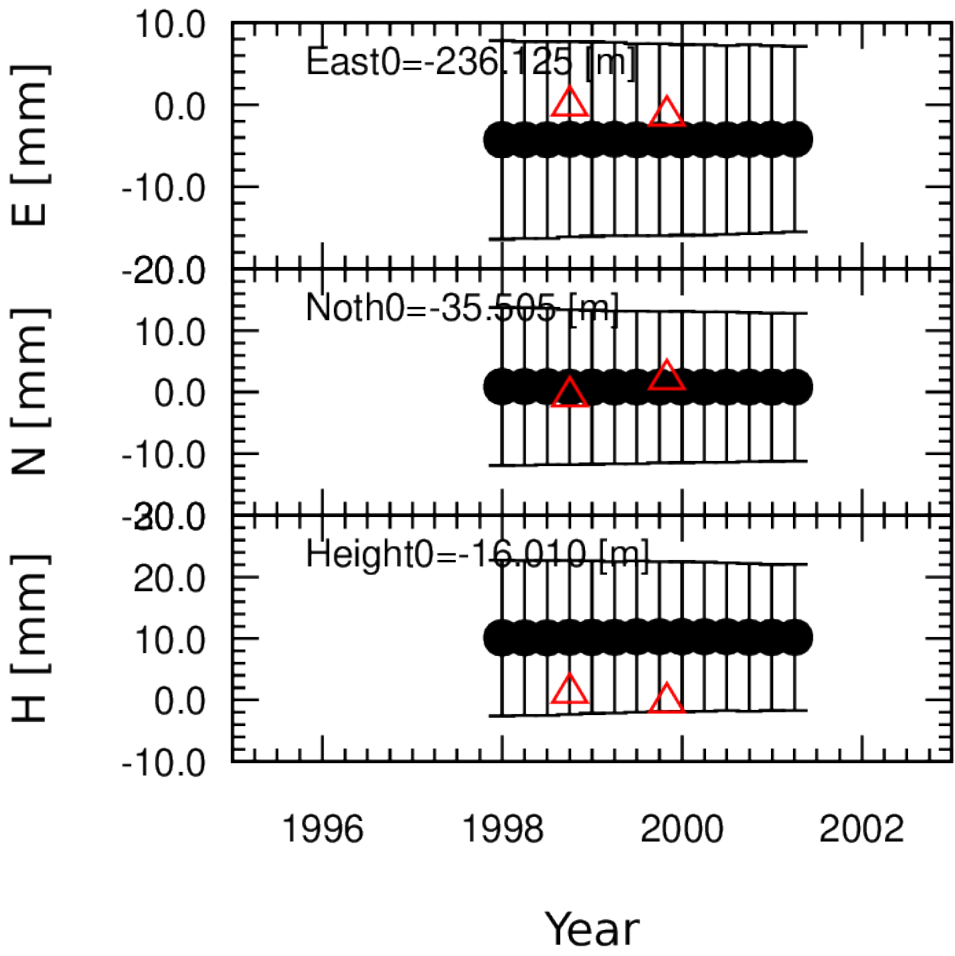
ITRF2014とIRTF2020: PSD Tateyama



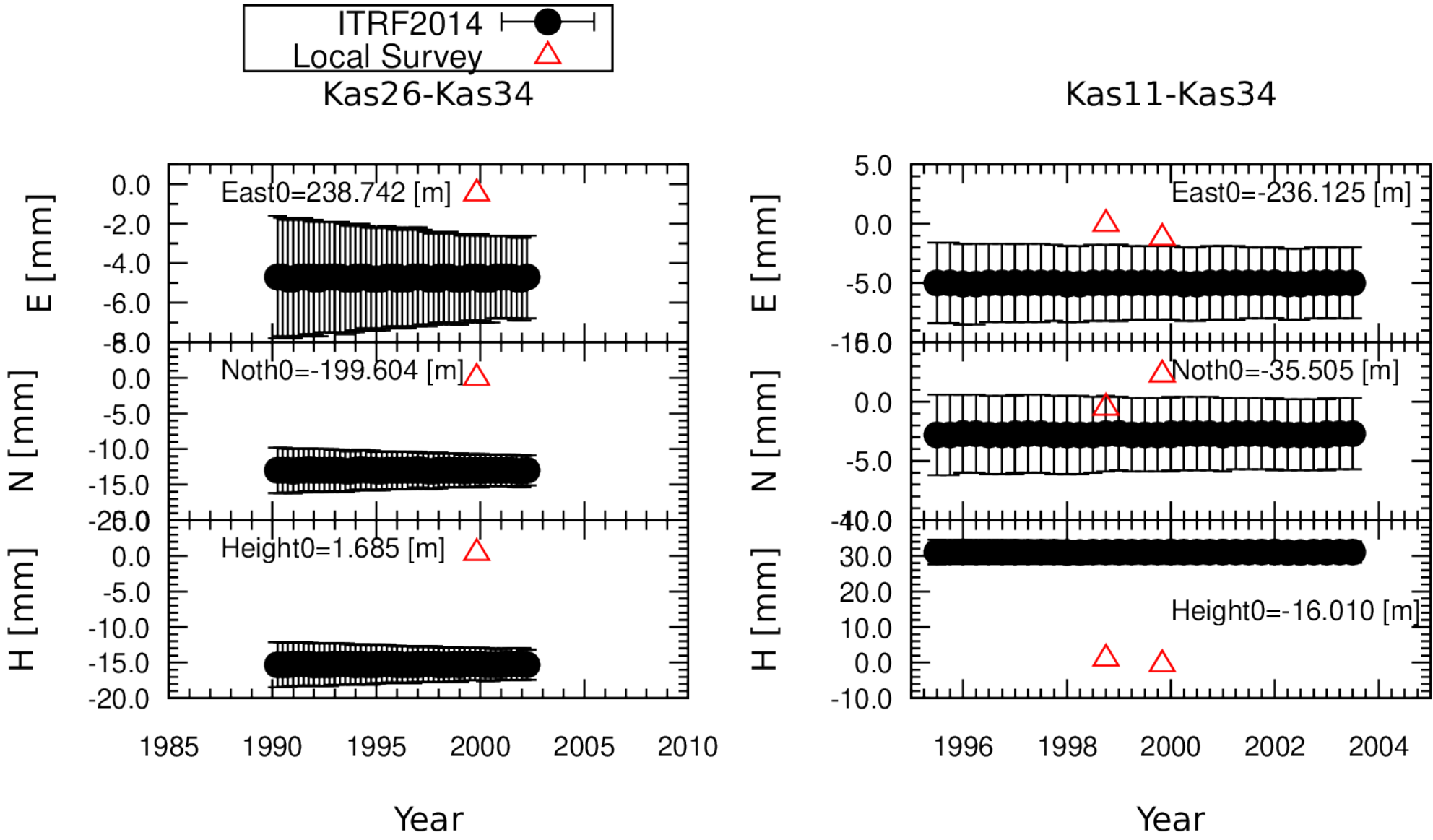


IRTF2020:相対ベクトル比較　Kashima (26,34 : 11)

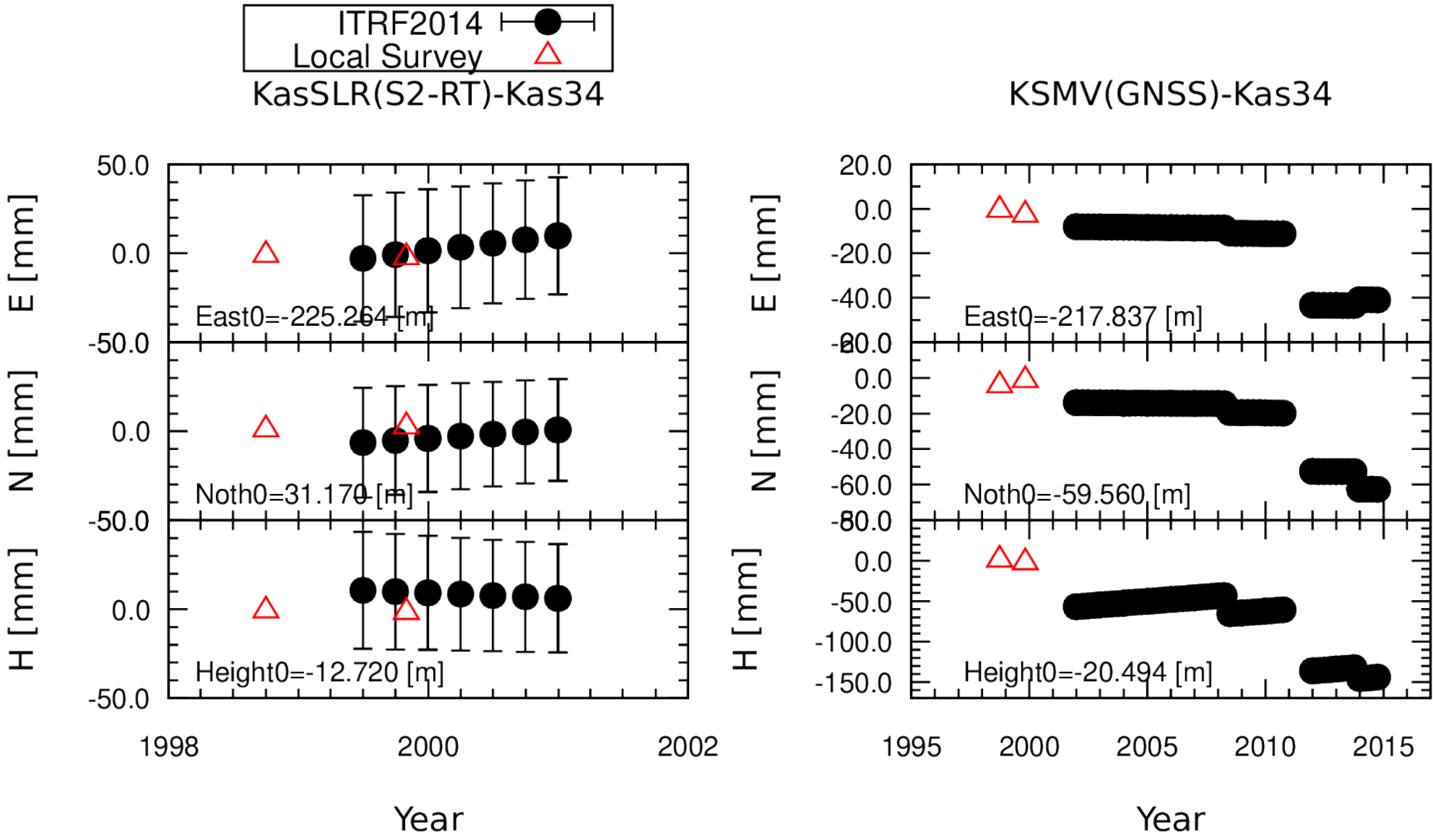




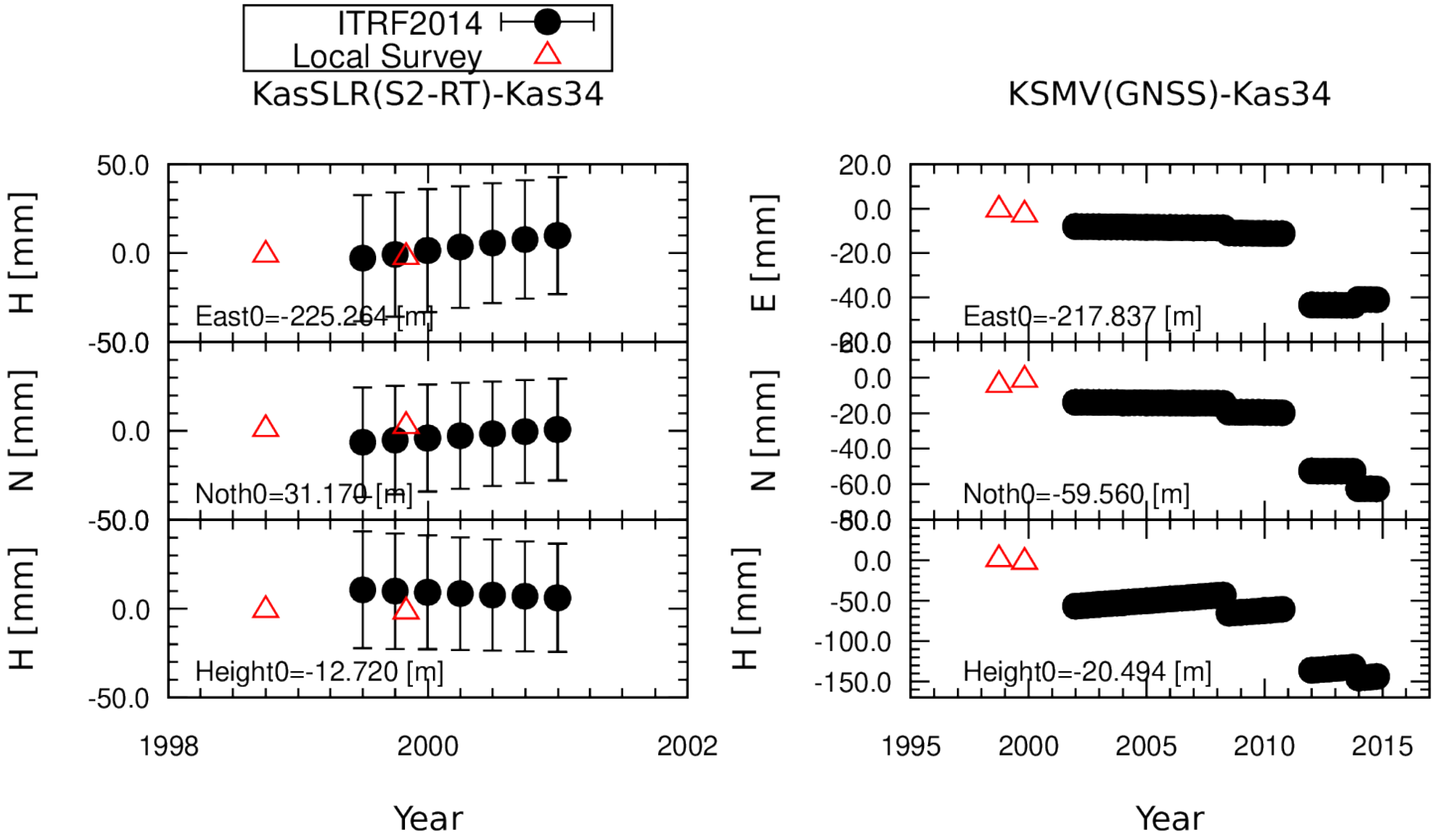
IRTF2014:相対ベクトル比較　Kashima (26,34 : 11)



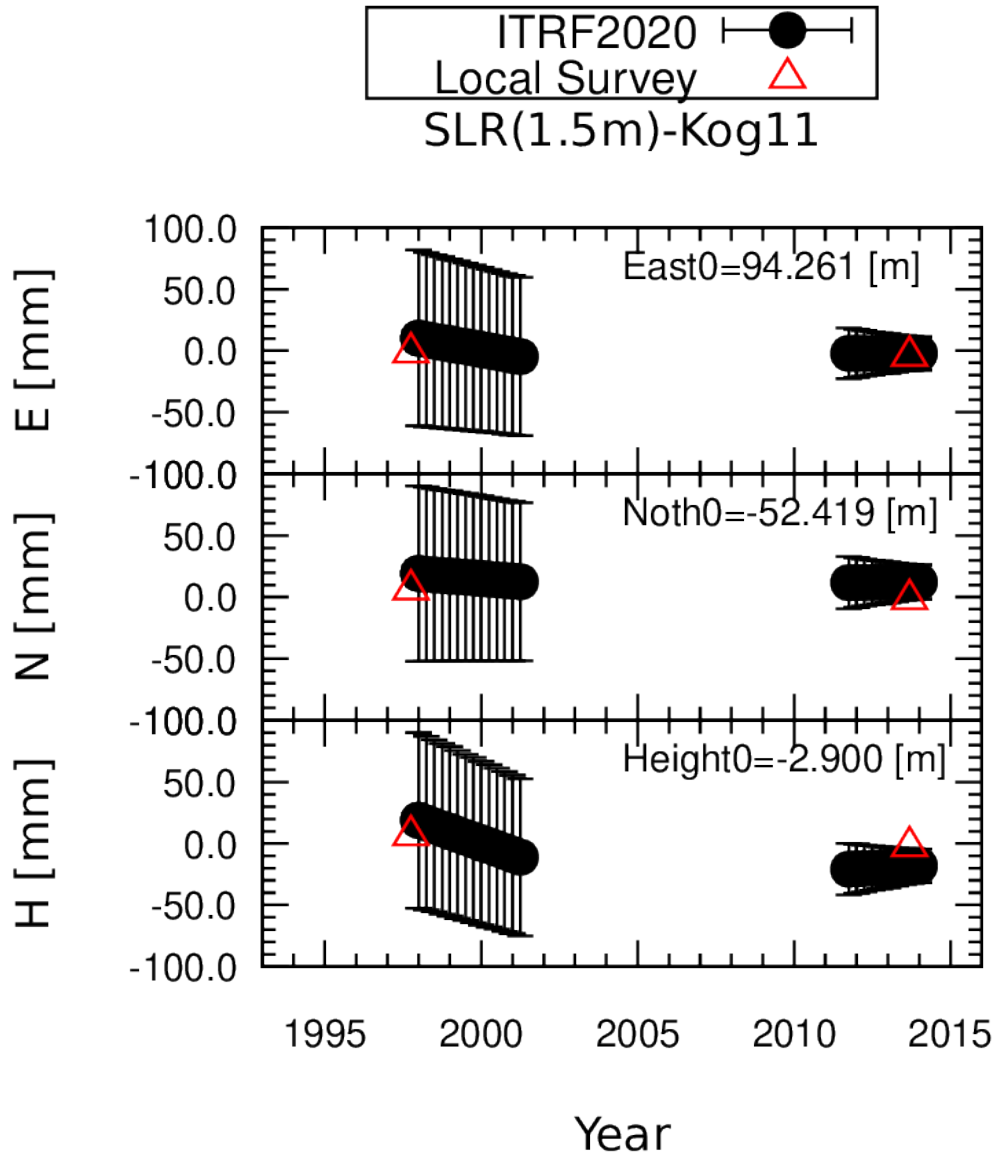
IRTF2020:相対ベクトル比較 Kashima (SLR, KSMV: 11)

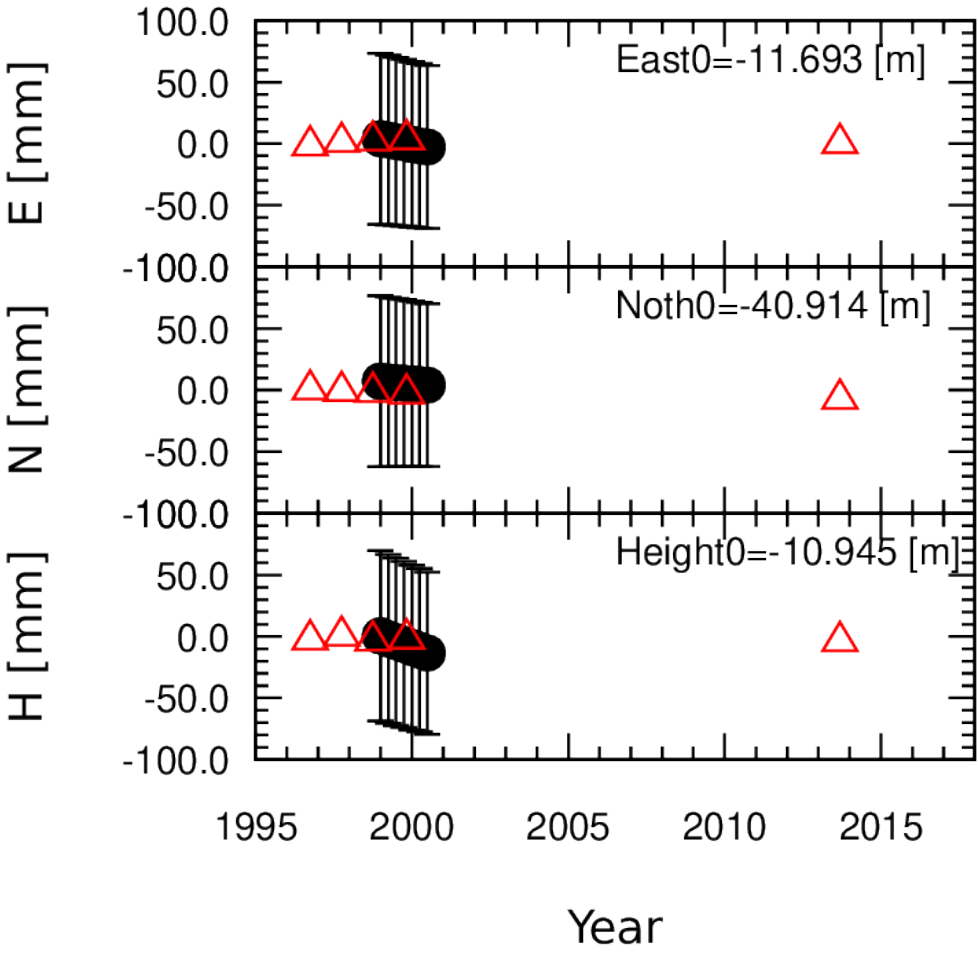


IRTF2014:相対ベクトル比較 Kashima (SLR, KSMV: 11)

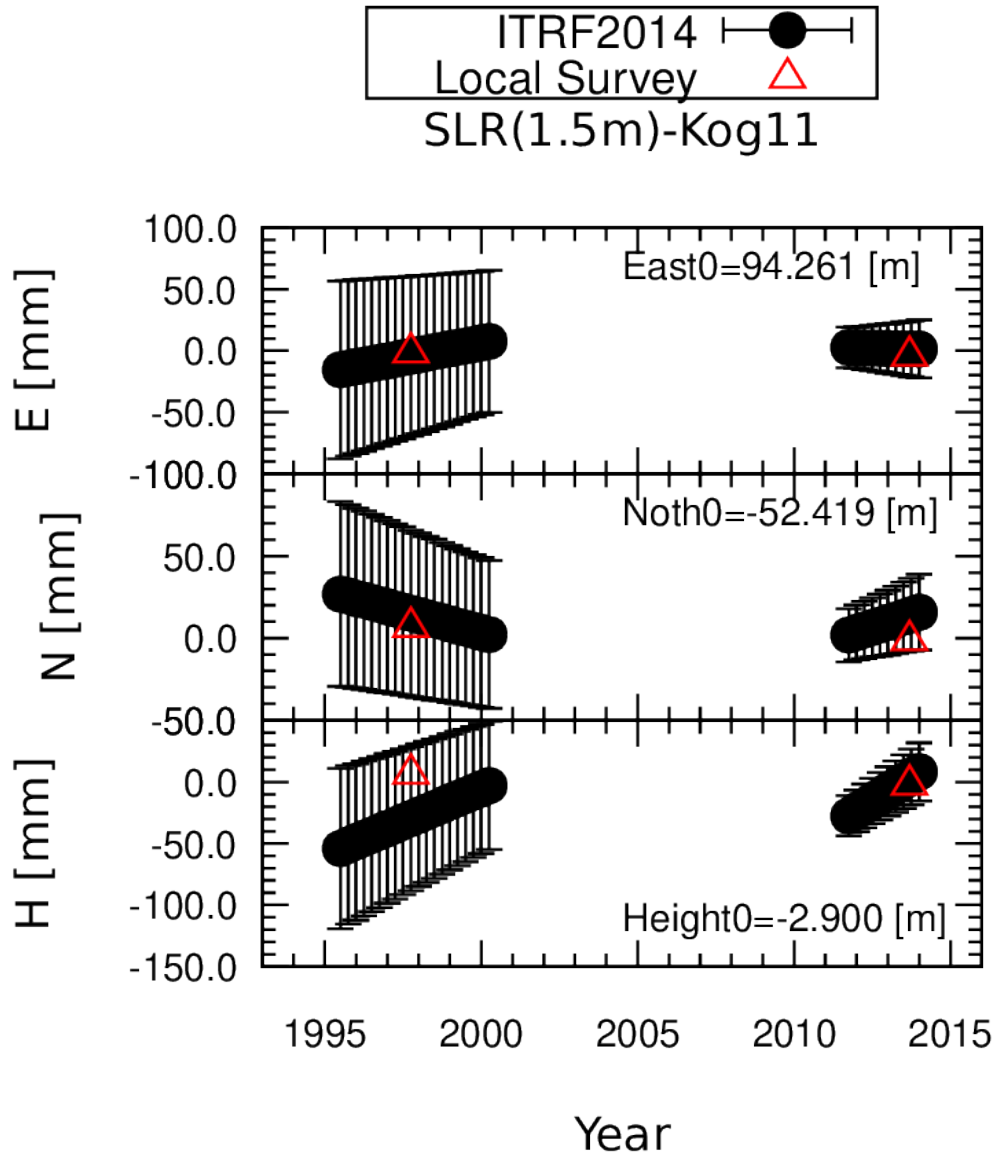


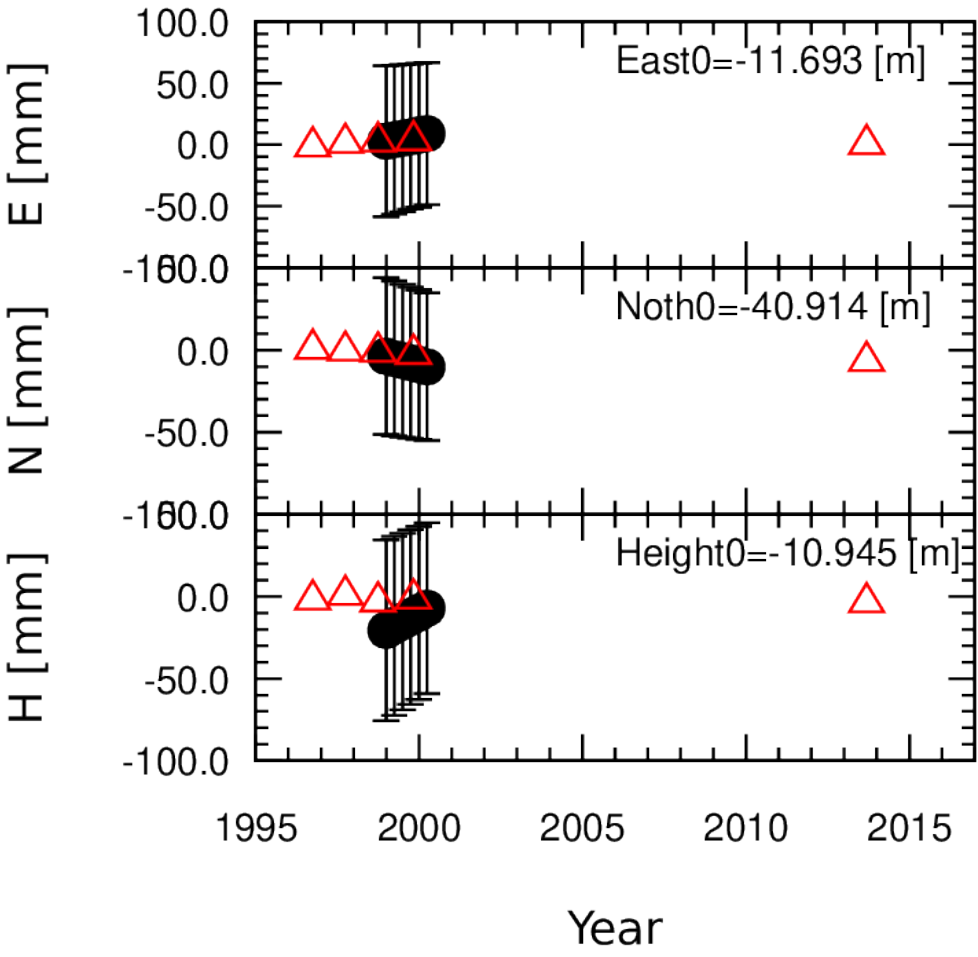
IRTF2020: 相対ベクトル比較 Koganei (SLR1.5m, SLR: 11)





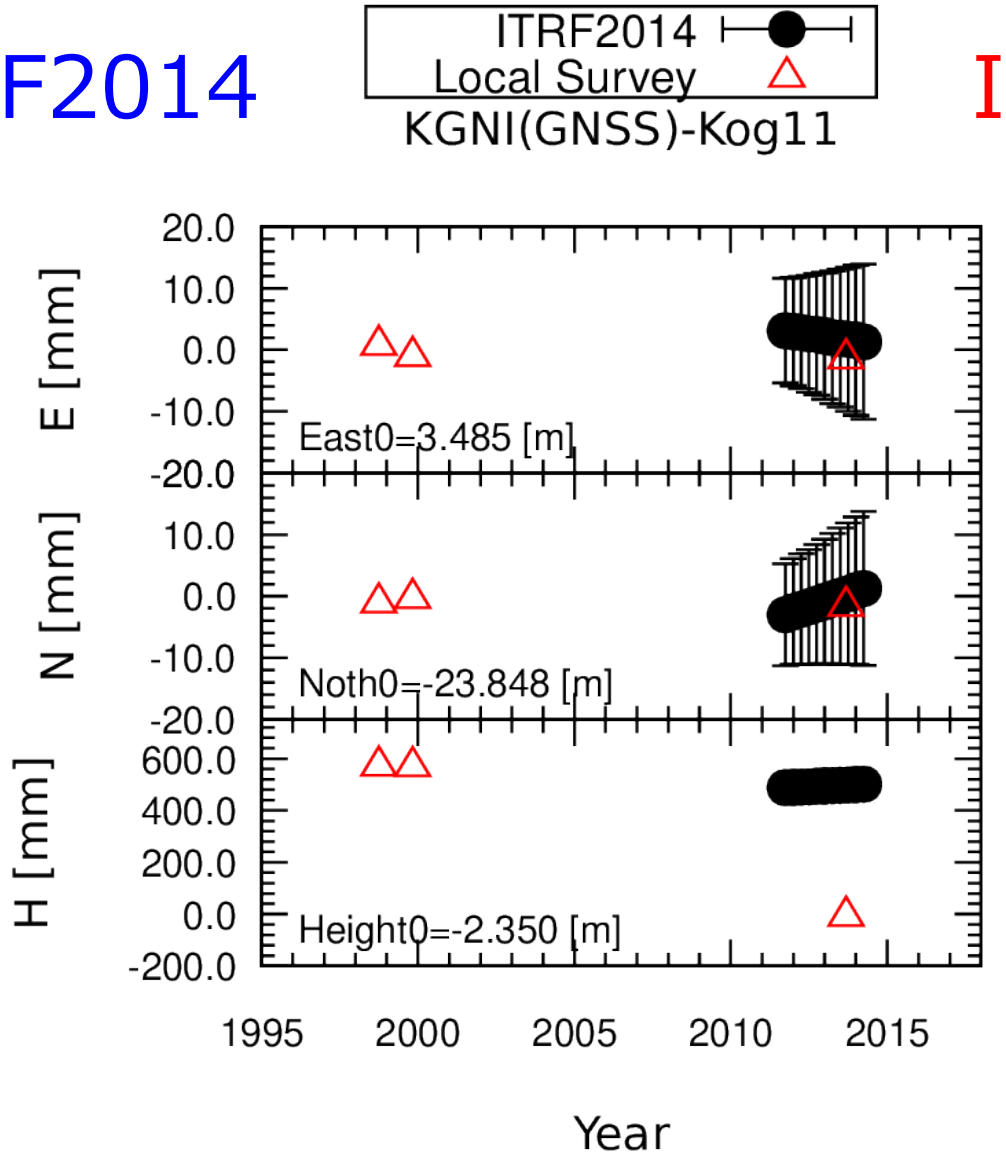
IRTF2014: 相対ベクトル比較 Koganei (SLR1.5m, SLR: 11)



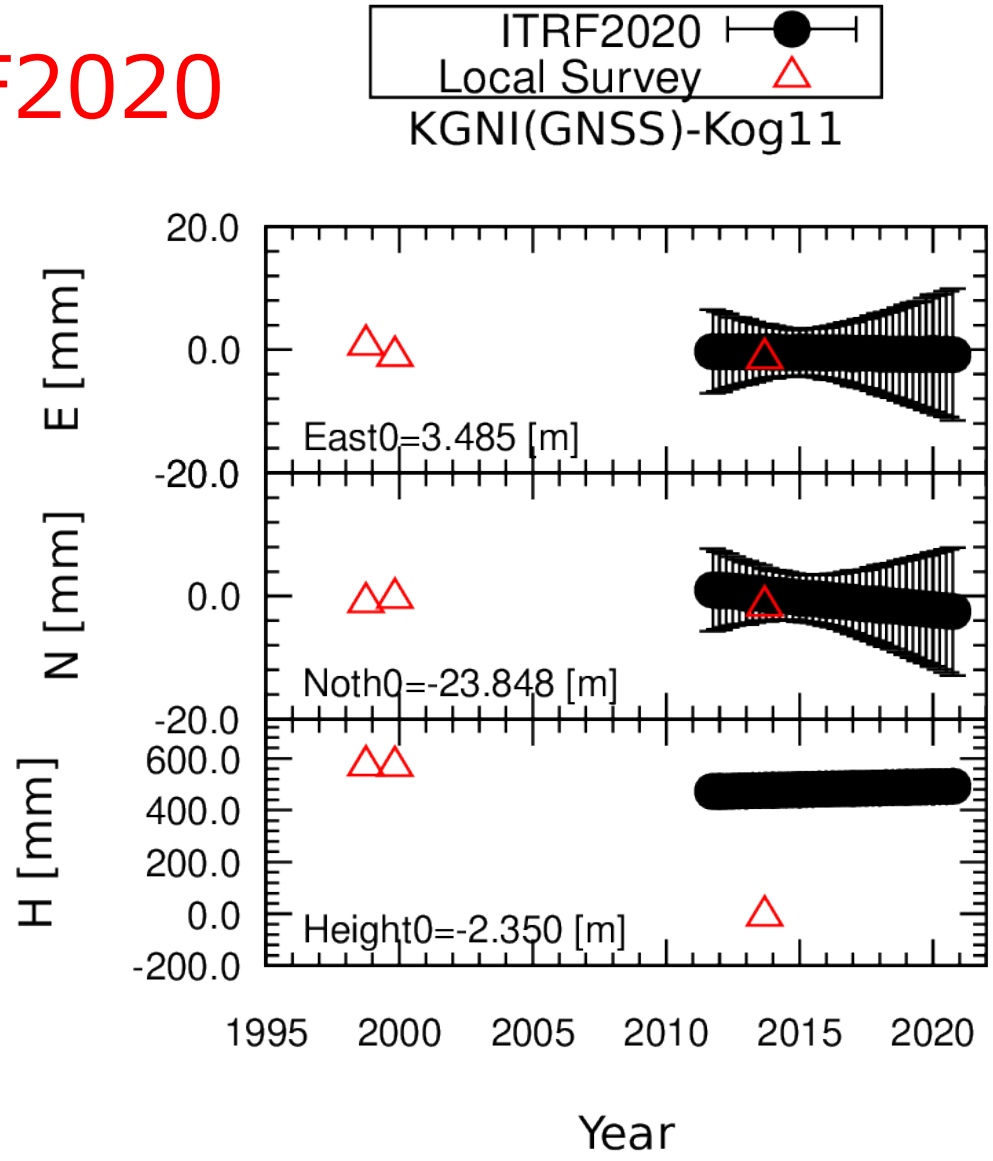


相対ベクトル比較 Koganei (KGNI: 11)

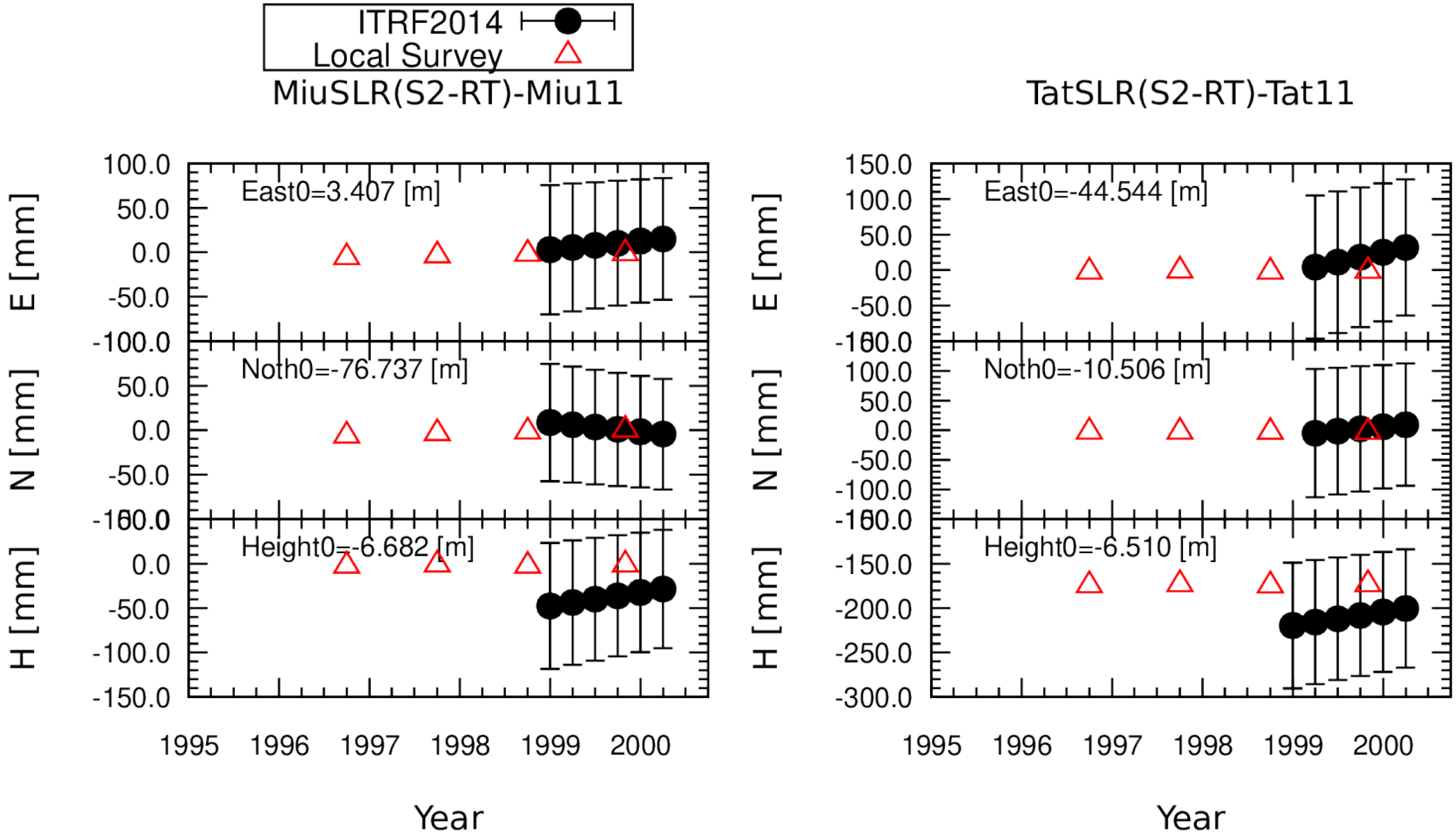
ITRF2014



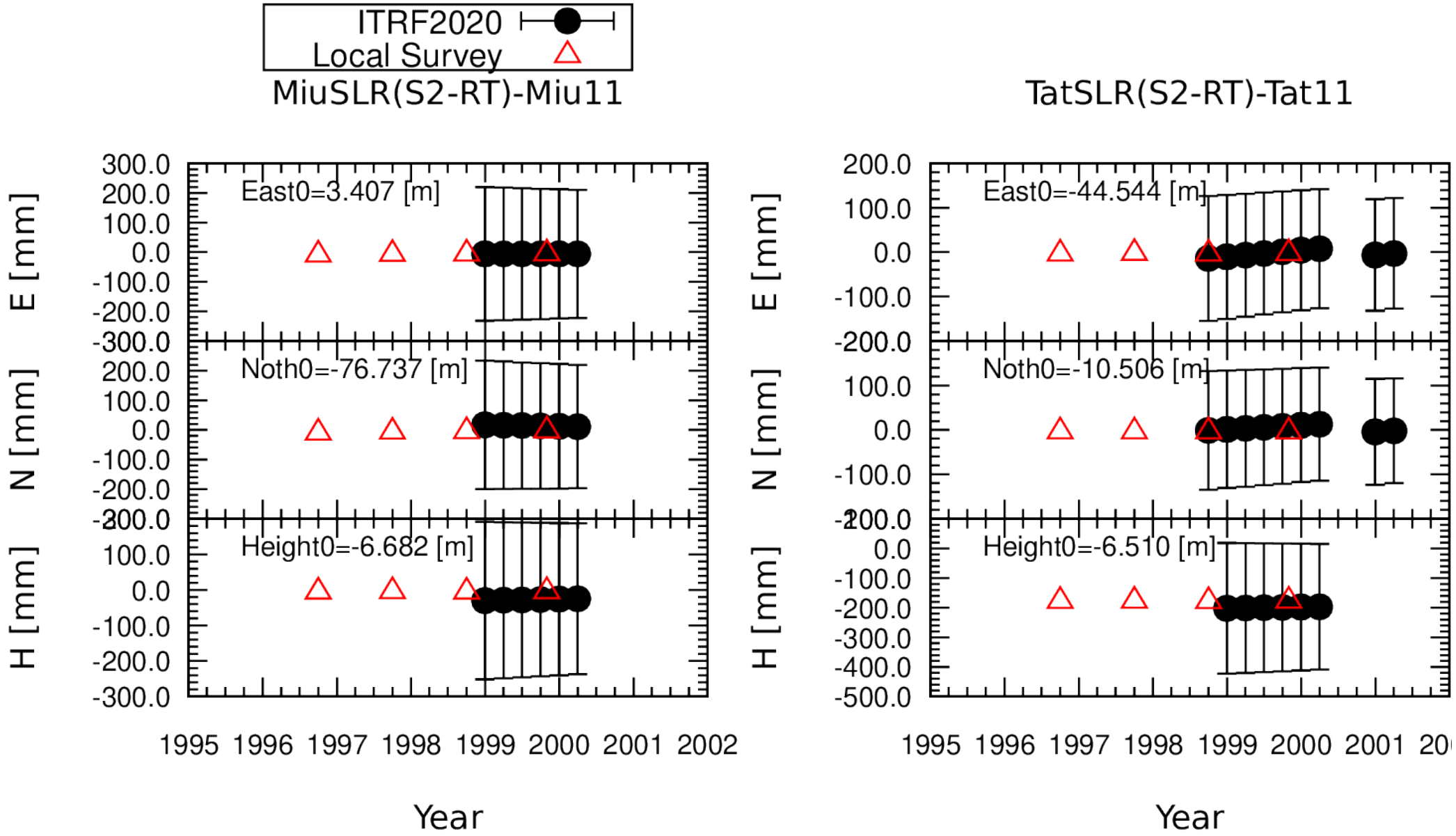
ITRF2020



ITRF2014相対ベクトル比較 Miura,Tateyama (SLR- 11)



ITRF2020相対ベクトル比較 Miura,Tateyama (SLR- 11)



まとめ

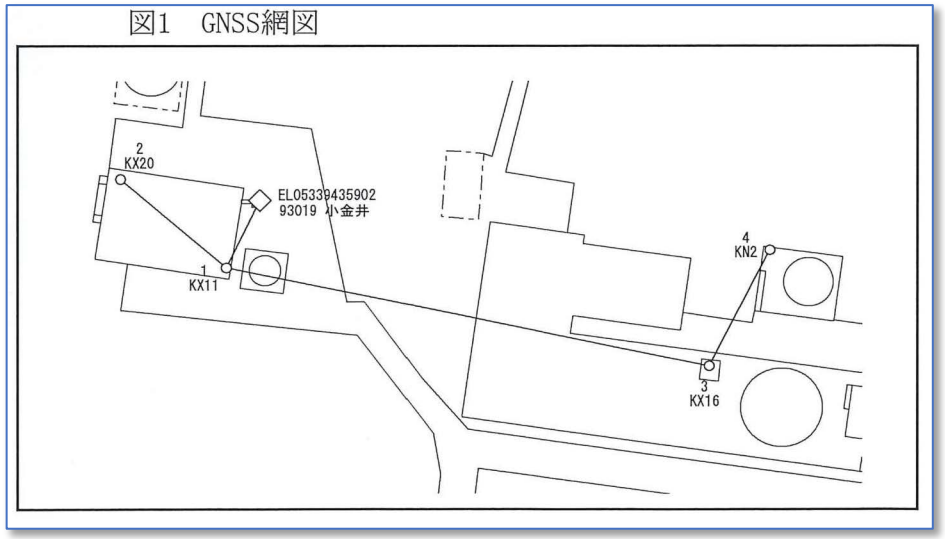
- ITRF2014からITRF2020へ寄与データが増えている(Kas34,Kas11,Kog11,KSMV,KGNI)
- 不確かさの範囲内で提出したLocal Surveyと一致するように重み（不確かさ）が調整されているようである。
- しかし、一致の度合いはあまり変わっておらず、提出したLocalTie結果の重みは軽いと思われる。
- 2022年度　小金井（KogSLR,Kog11,KGNI,SLR1.5m ）のLocalTieサーベイが行われた。次回のITRFに寄与できるよう準備する。

謝辞

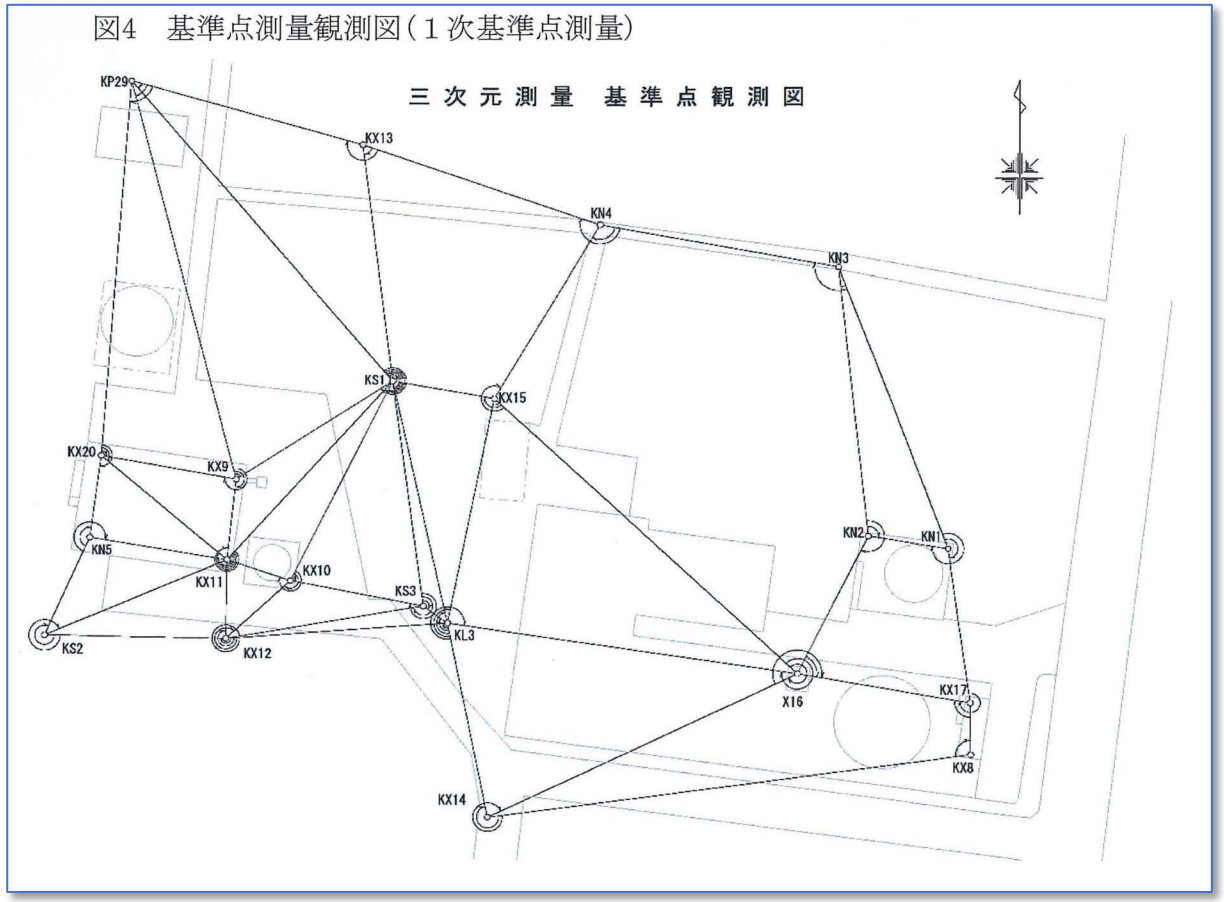
NICTのGNSS, SLR, VLBIの観測施設はそれぞれ、市川隆一、國森裕生、関戸衛が運用・維持を行っています。特にLocal Tie観測は國森さんの予算と実行努力によります。

２０２２年NICT小金井構内で実施されたLocal Tie 測量

GNSS測量



トータルステーションを使った測量



水準測量