乗鞍岳におけるミューオンの精密測定

宗像、加藤、安江、中野、石崎、宮崎（信州大理）、青木（ICRR）、小島（愛工大）

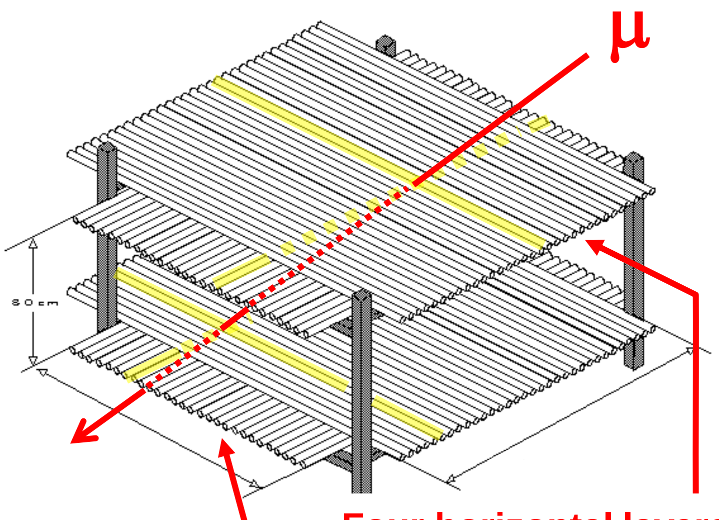
校費：400千円 （破損パネル交換用太陽電池パネル3枚）
旅費：150千円 （松本～乗鞍、松本～柏）

SK & Tibet空気シャワーアレイによる 10 TeV宇宙線強度の恒星時日周変動の観測

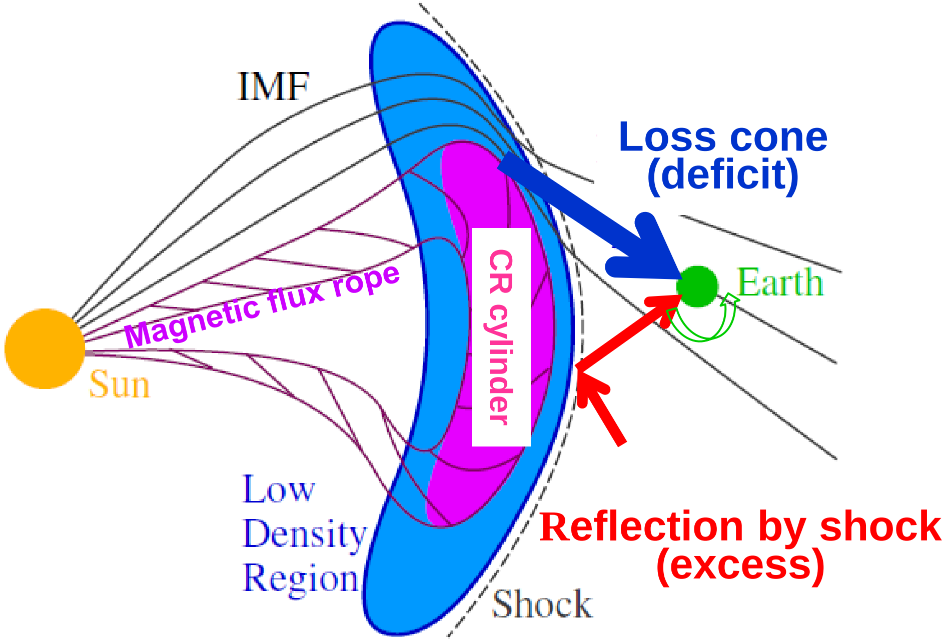
宗像、加藤、安江、中野、石崎、宮崎（信州大理）、瀧田（ICRR）

旅費（松本⇔柏）：50千円（SK）/ 150千円（Tibet）

乗鞍ミューオン計



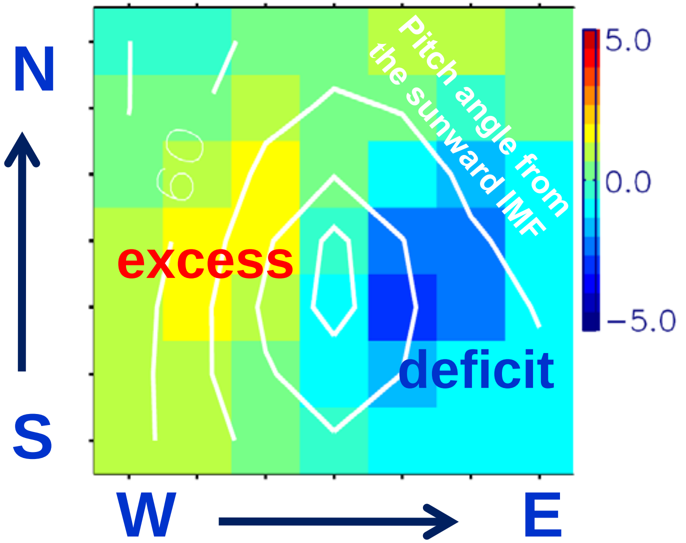
Four horizontal layers of Proportional Counter tubes


IMF
Magnetic flux rope
Sun
CR cylinder
Earth
Low Density Region
Shock

Loss cone (deficit)

Reflection by shock (excess)

2D map of 1 hour data (2006 12/14 08:30UT)

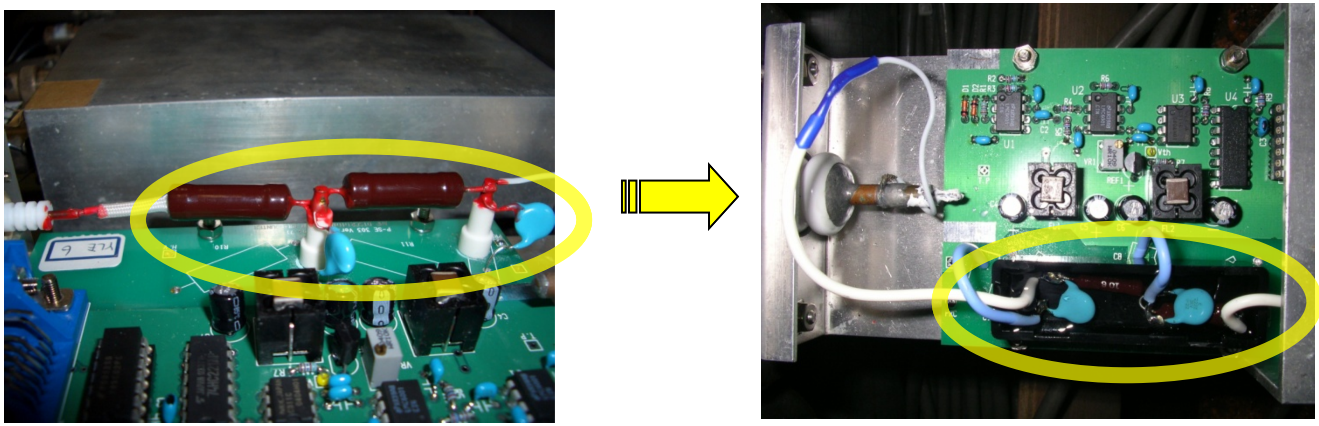


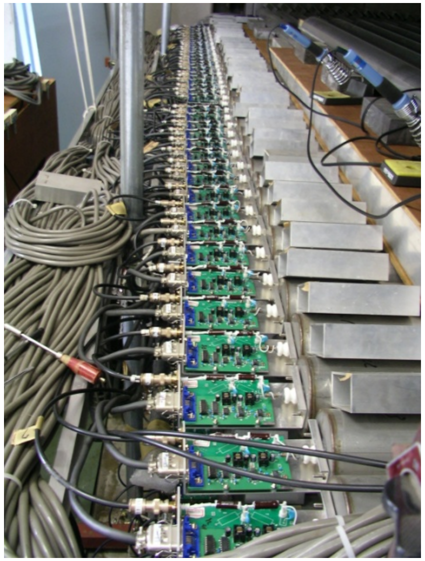
excess

deficit

2012年度作業内容

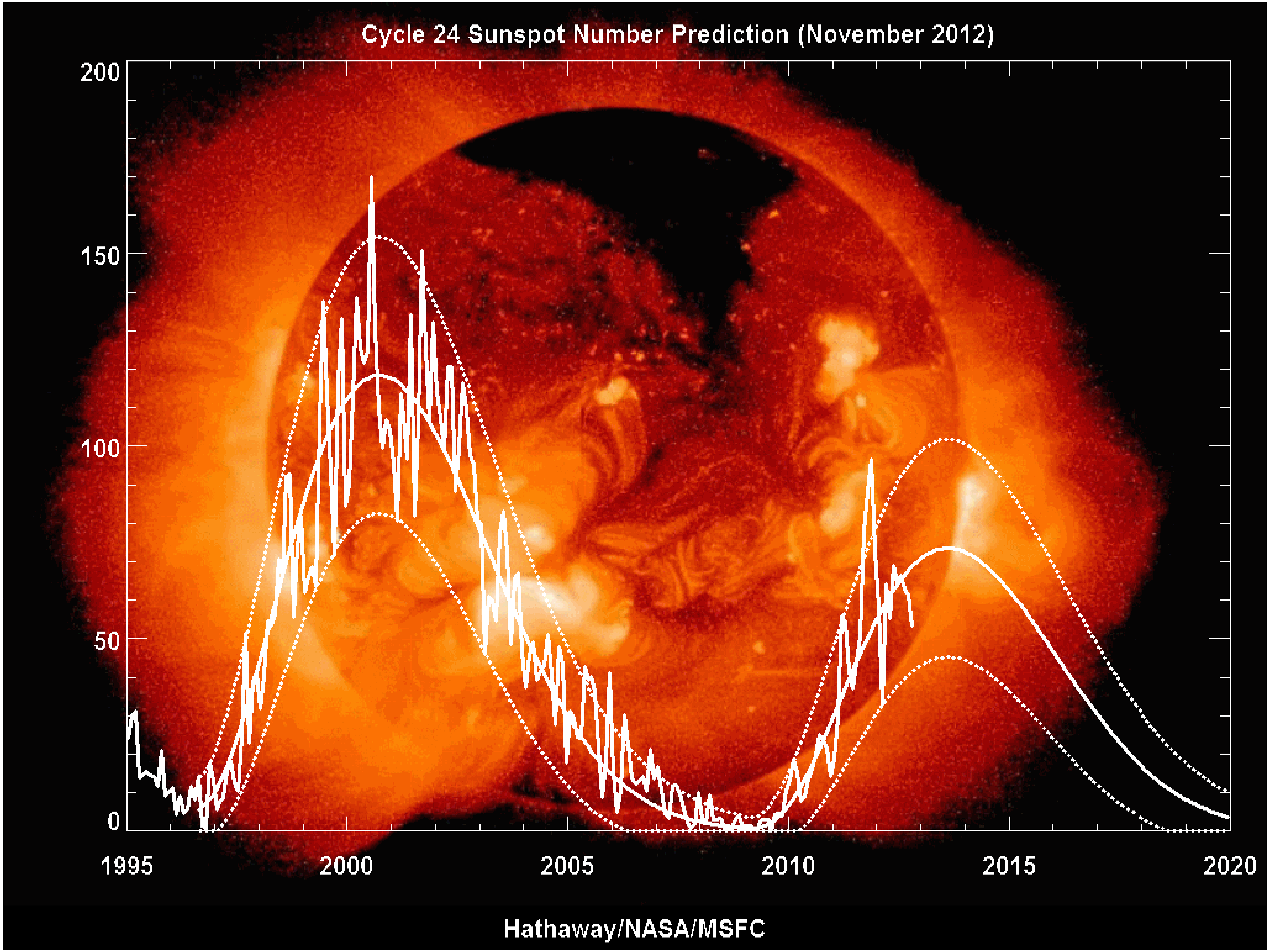
- アンプ基板上の高圧絶縁対策

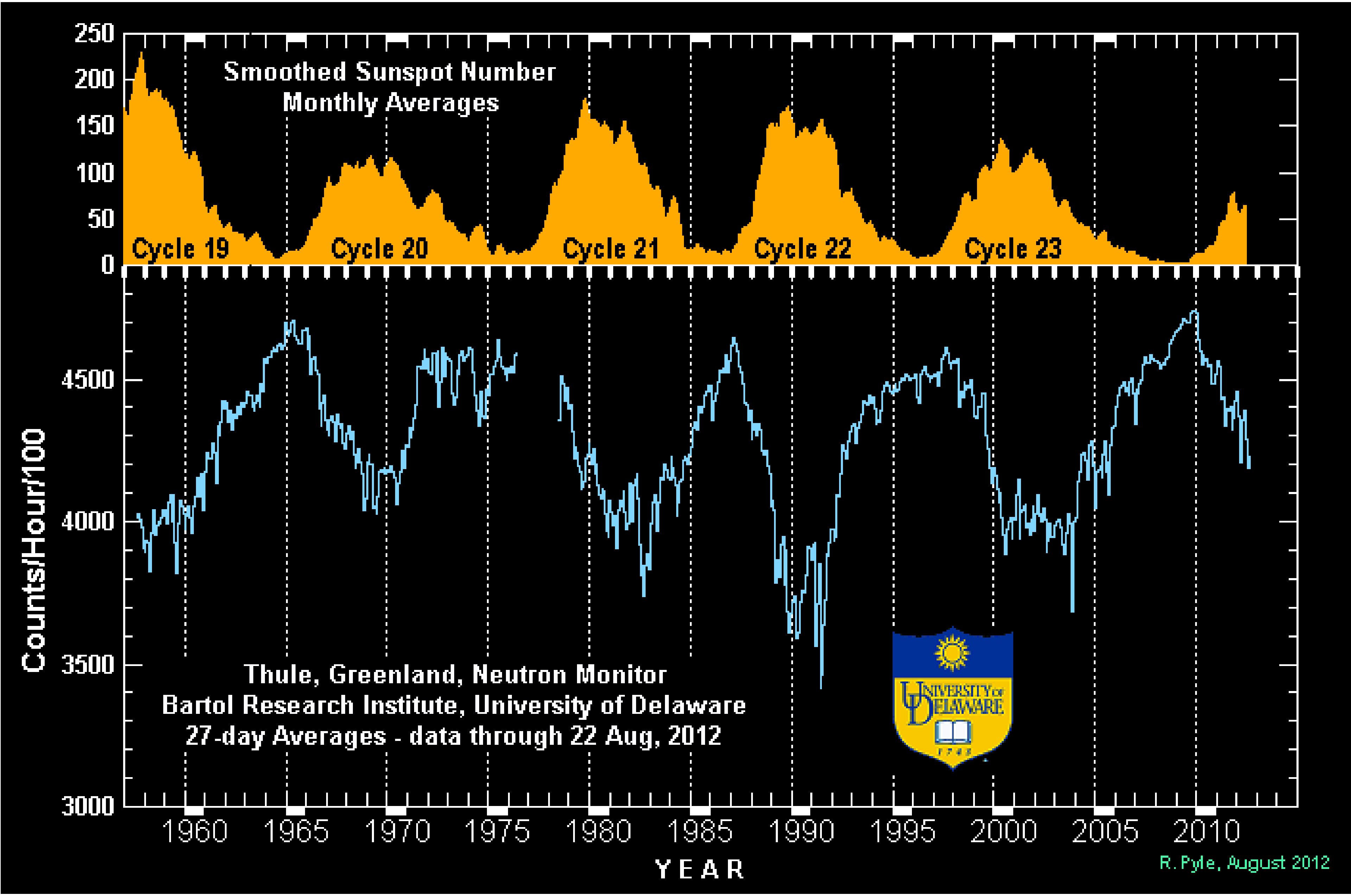




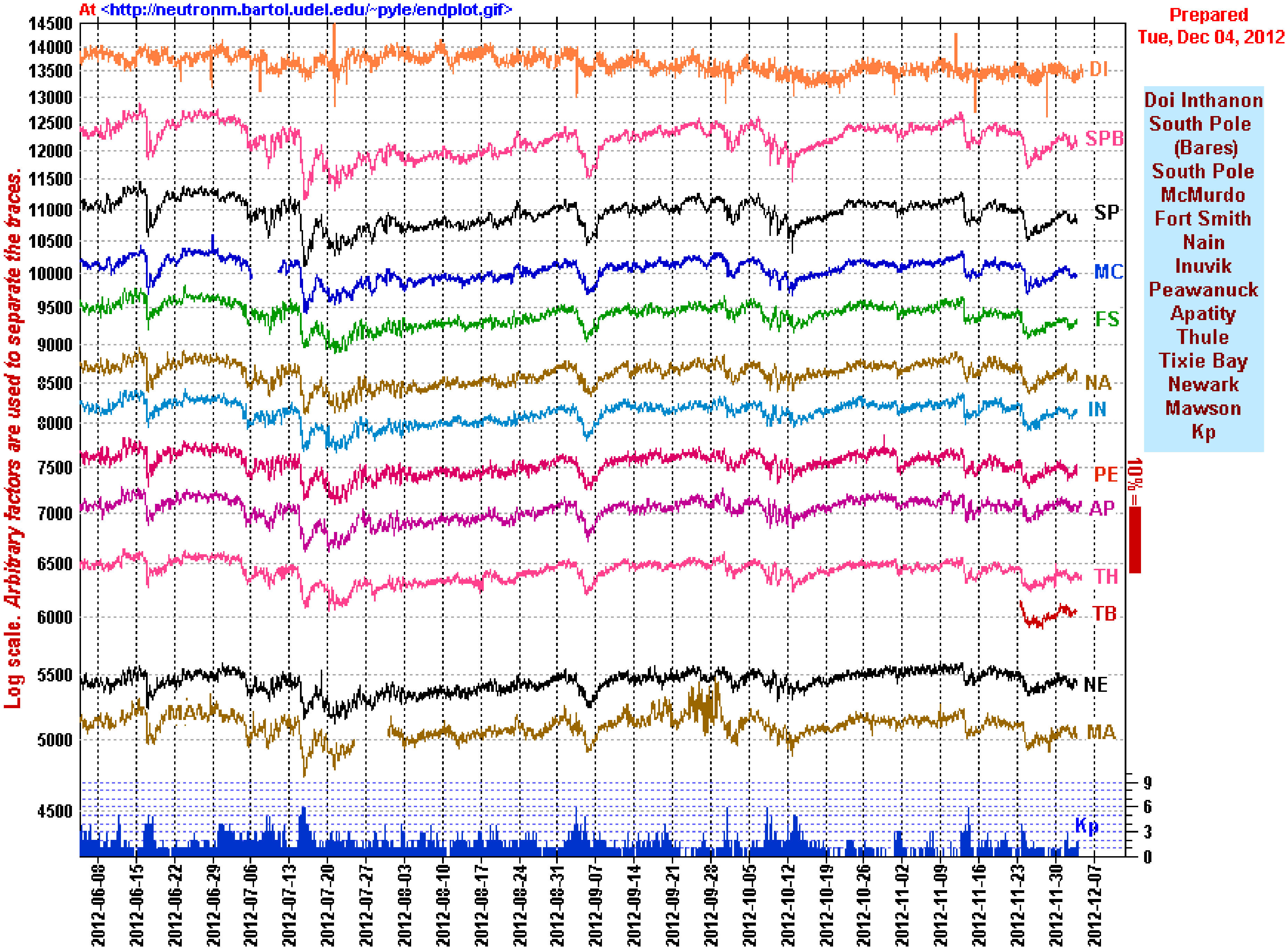
- 太陽電池架台の再設計
（H25年度に改修予定）

- GHz帯データ通信開始
（宇宙線研）


Cycle 24 Sunspot Number Prediction (November 2012)
200
150
100
50
0
1995
2000
2005
2010
2015
2020
Hathaway/NASA/MSFC



R. Pyle, August 2012

At <http://neutronm.bartol.udel.edu/~pyle/endplot.gif>
Prepared
Tue, Dec 04, 2012
Log scale. Arbitrary factors are used to separate the traces.
14500
14000
13500
13000
12500
12000
11500
11000
10500
10000
9500
9000
8500
8000
7500
7000
6500
6000
5500
5000
4500
DI
SPB
SP
MC
FS
NA
IN
PE
AP
TH
TB
NE
MA
Kp
Doi Inthanon
South Pole
(Bares)
South Pole
McMurdo
Fort Smith
Nain
Inuvik
Peawanuck
Apatity
Thule
Tixie Bay
Newark
Mawson
Kp
10% =
9
6
3
0
2012-06-08
2012-06-15
2012-06-22
2012-06-29
2012-07-06
2012-07-13
2012-07-20
2012-07-27
2012-08-03
2012-08-10
2012-08-17
2012-08-24
2012-08-31
2012-09-07
2012-09-14
2012-09-21
2012-09-28
2012-10-05
2012-10-12
2012-10-19
2012-10-26
2012-11-02
2012-11-09
2012-11-16
2012-11-23
2012-11-30
2012-12-07

チベット実験による恒星時異方性

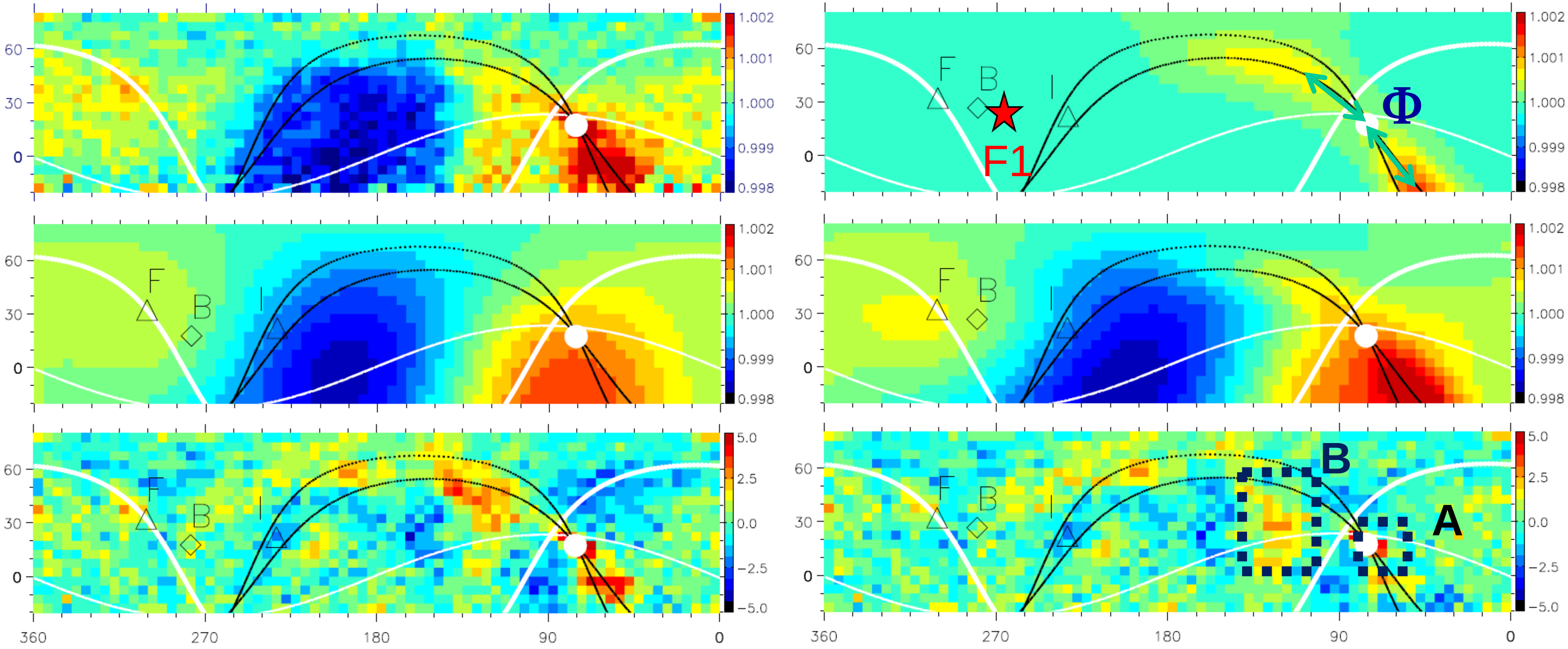
Predicted/observed ISMF (B) orientations

Global + Midscale anisotropy model: **B** (Amenomori et al., Astrophys. Space Sci. Trans, **6**, 49, 2010)

Faraday rotation measure: **F** (Frisch, Space Sci. Rev., **78**, 213, 1996)

ENA ribbon by IBEX: **I** (Frisch, Space Sci. Rev., **78**, 213, 1996)

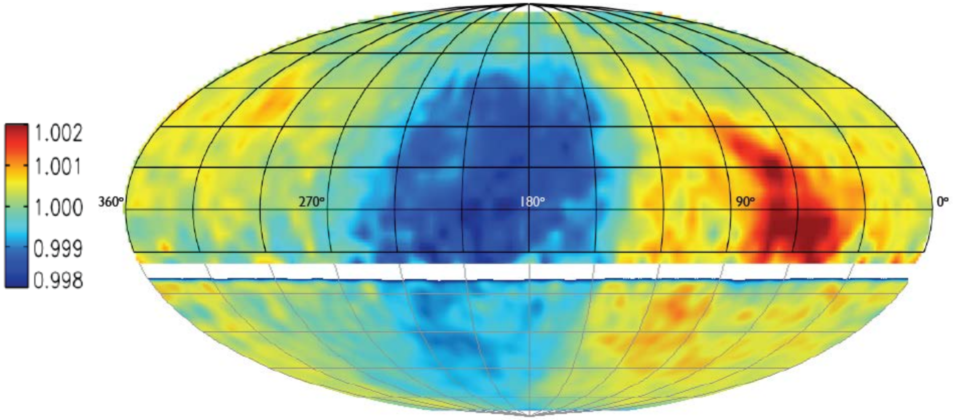
Starlight polarization by magnetized dust: **F1** (Astrophys. J., **760**, 106, 2012)



Miraglo “hot” regions (Abdo et al., PRL, 101, 2008)

Local magnetic turbulence model

(Giacinti & Sigl, Phys. Rev. Lett., 109, 071101, 2012)


1.002
1.001
1.000
0.999
0.998
360°
270°
180°
90°
0°

Tibet ASγ (E_{mode} = 7 TeV)

(Amenomori et al., Science, 314, 2006)

Ice Cube (E_{mode} = 20 TeV)

(Abbasi et al., ApJL, 718, 2010)

“Energy dependent smaller scale (≤10°) anisotropies naturally arise from the local concrete realization of the turbulent magnetic field within the cosmic ray scattering length.”

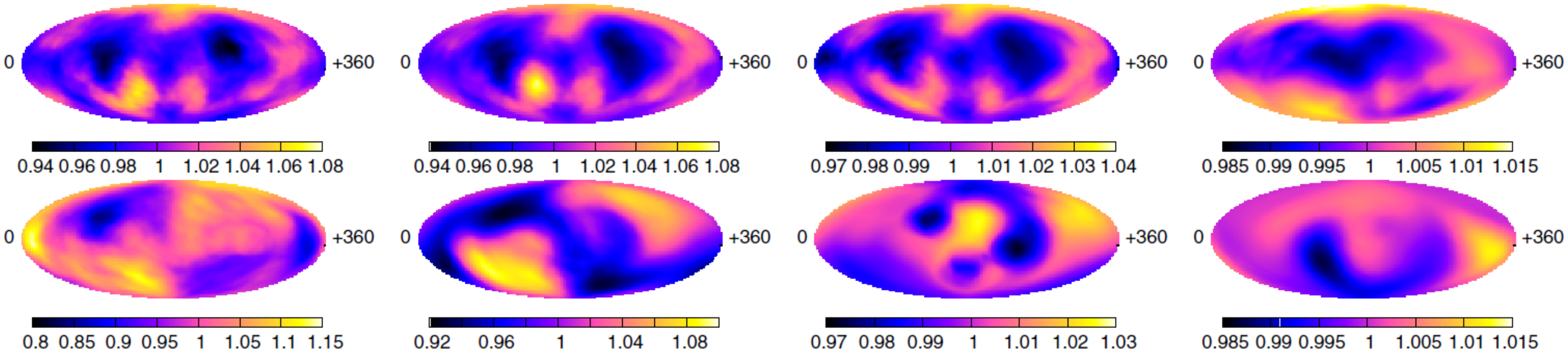
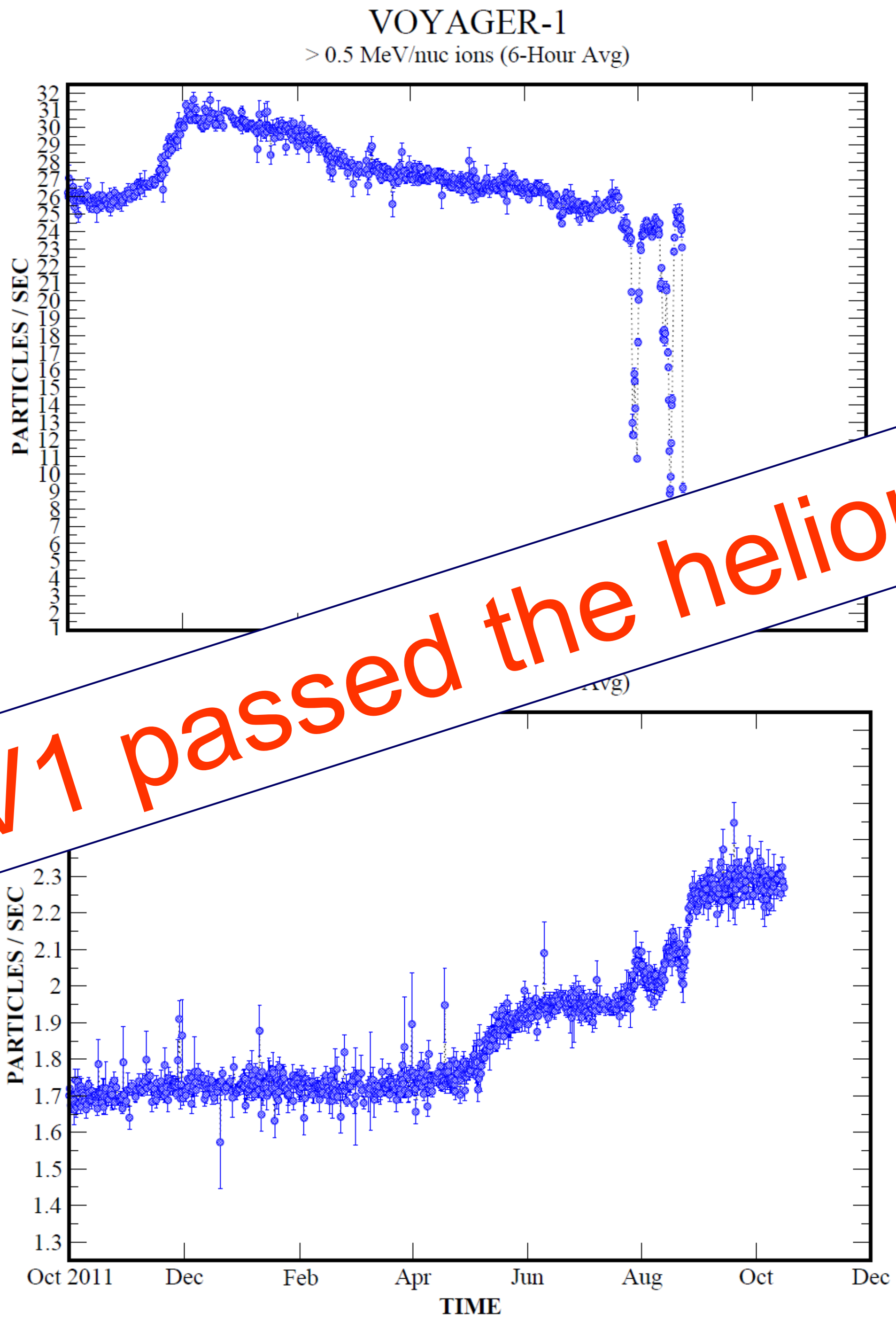

0
+360
0.94 0.96 0.98 1 1.02 1.04 1.06 1.08
0.94 0.96 0.98 1 1.02 1.04 1.06 1.08
0.97 0.98 0.99 1 1.01 1.02 1.03 1.04
0.985 0.99 0.995 1 1.005 1.01 1.015
0.8 0.85 0.9 0.95 1 1.05 1.1 1.15
0.92 0.96 1 1.04 1.08
0.97 0.98 0.99 1 1.01 1.02 1.03
0.985 0.99 0.995 1 1.005 1.01 1.015

FIG. 2 (color online). Same as Fig. 1, for boundary conditions imposed on concentric spheres around Earth with radii $R = 100$, 50, 25, 10 pc (respectively, first, second, third, and fourth columns). Upper row: $p/Z = 10^{16}$ eV. Lower row: $p/Z = 5 \times 10^{16}$ eV.



Has V1 passed the heliopause?

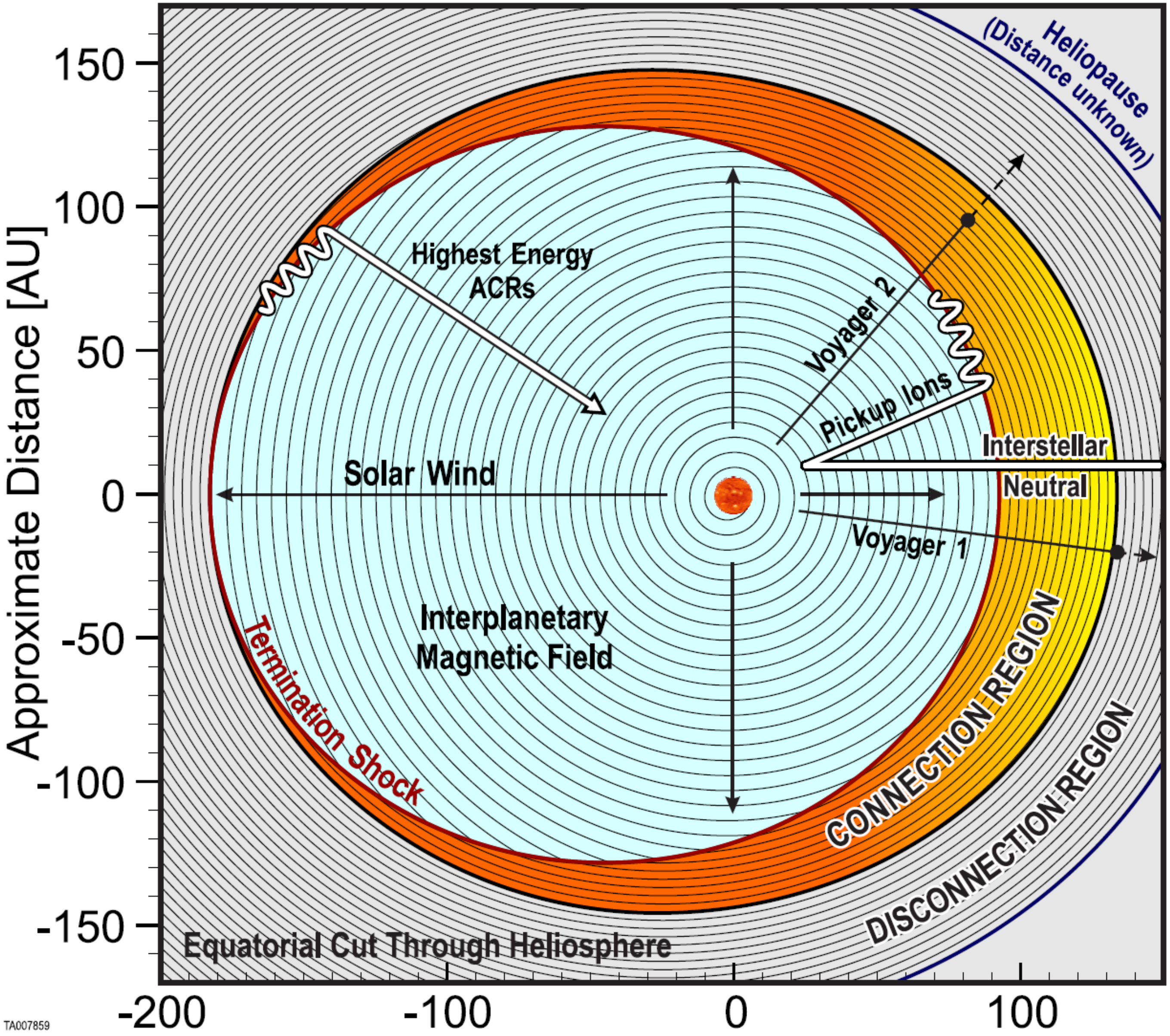

Approximate Distance [AU]
150
100
50
0
-50
-100
-150
-200
-100
0
100
Heliopause (Distance unknown)
Highest Energy ACRs
Voyager 2
Pickup Ions
Interstellar Neutral
Solar Wind
Voyager 1
Interplanetary Magnetic Field
Termination Shock
CONNECTION REGION
DISCONNECTION REGION
Equatorial Cut Through Heliosphere
TA007859

Figure 1. Schematic diagram of global magnetic connection throughout the heliosphere. Inside the Connection Region, termination shock accelerated ACRs have access both directions along the field lines (through parallel diffusion), while GCRs do not. Beyond the disconnection boundary (dark black line), in the Disconnection Region, the opposite is true, with GCRs able to stream in along the field from the interstellar medium and no direct access from the termination shock.