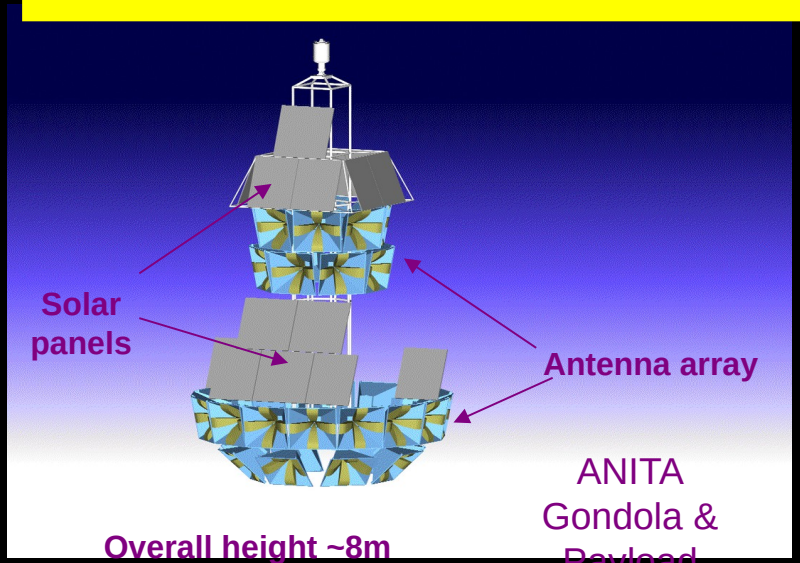
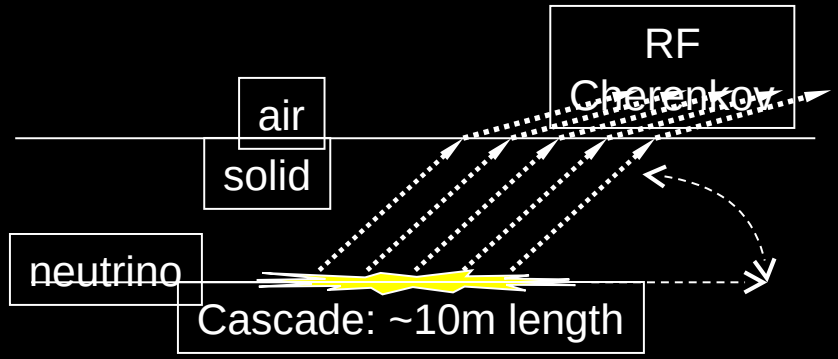
ANITA

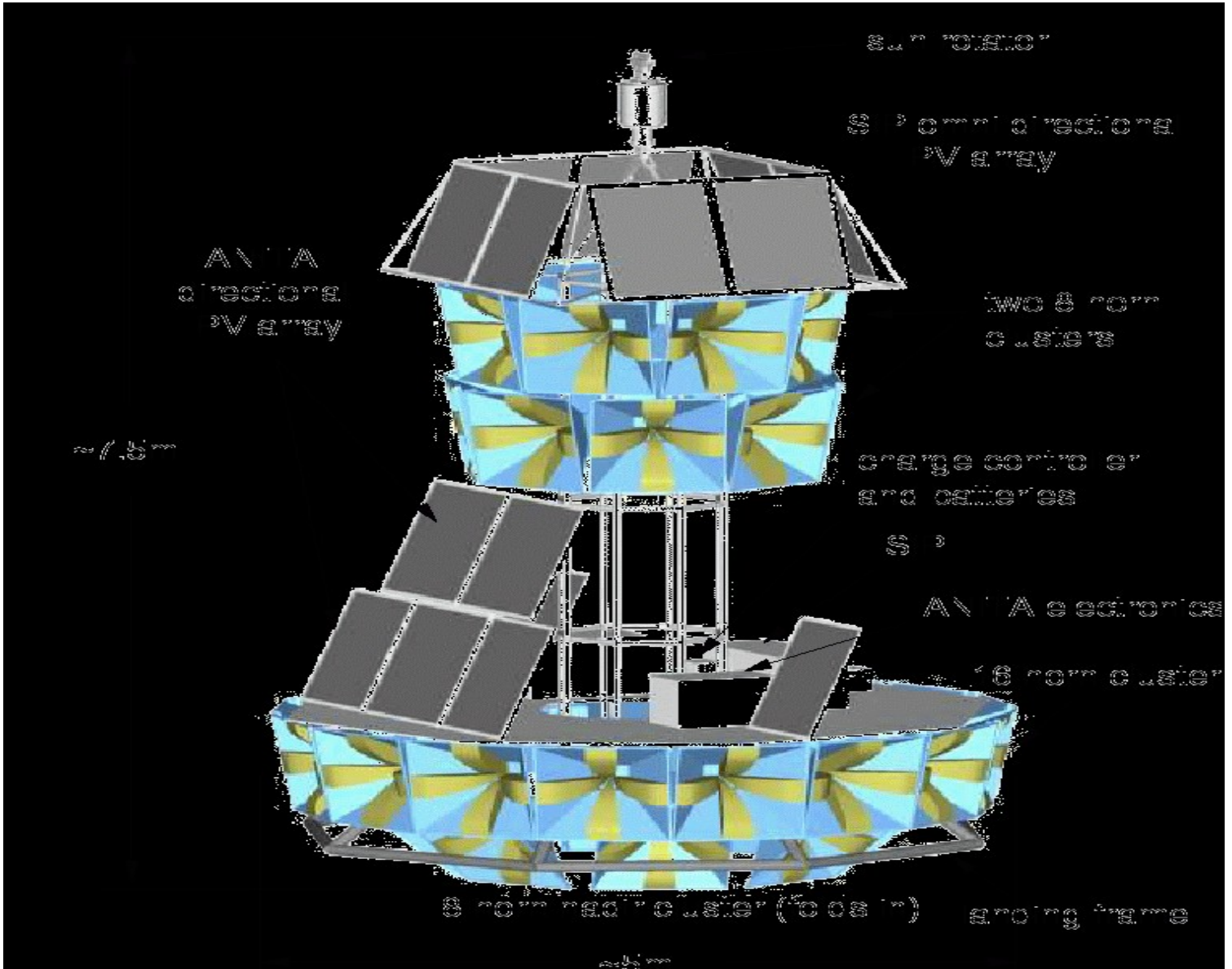
Antarctic Impulsive Transient Antenna Experiment

2004-2020-balloon borne CR astronomy



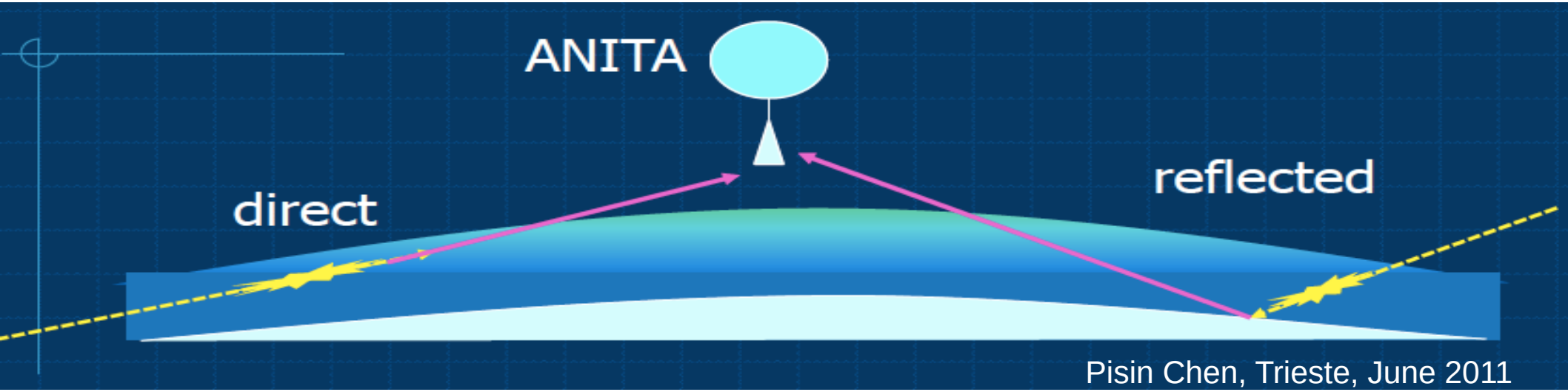
searching for GZK neutrinos with radio detection in Antarctic ice



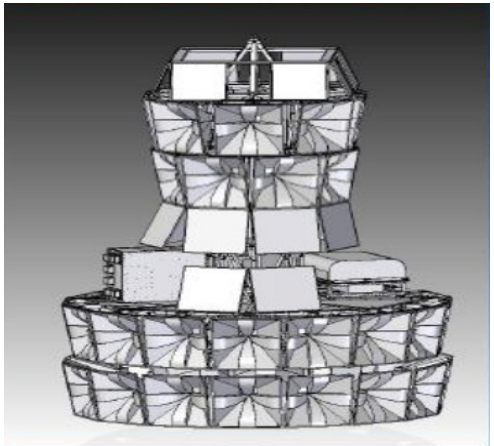


ANITA Experiment

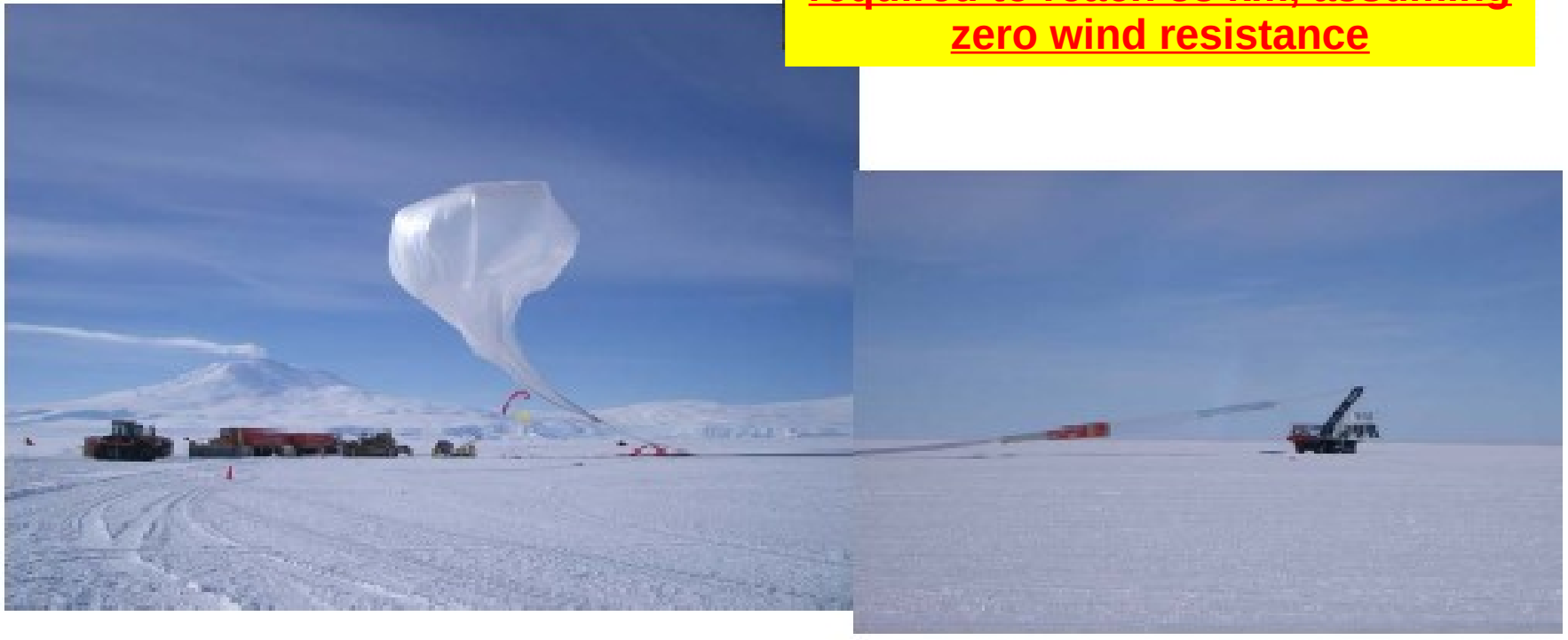
ANITA detects ~10^{19} eV CR and neutrinos



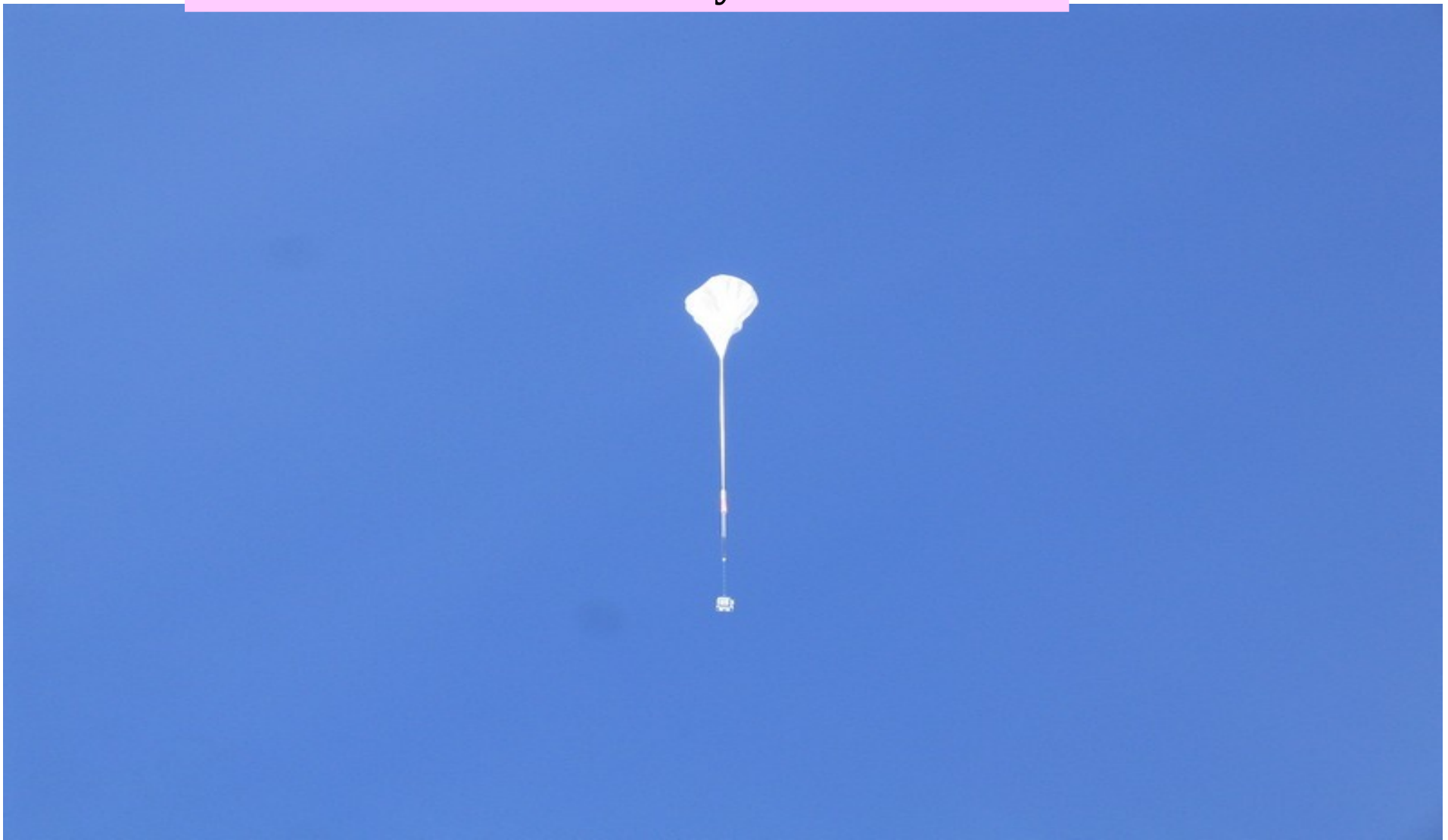
Pisin Chen, Trieste, June 2011



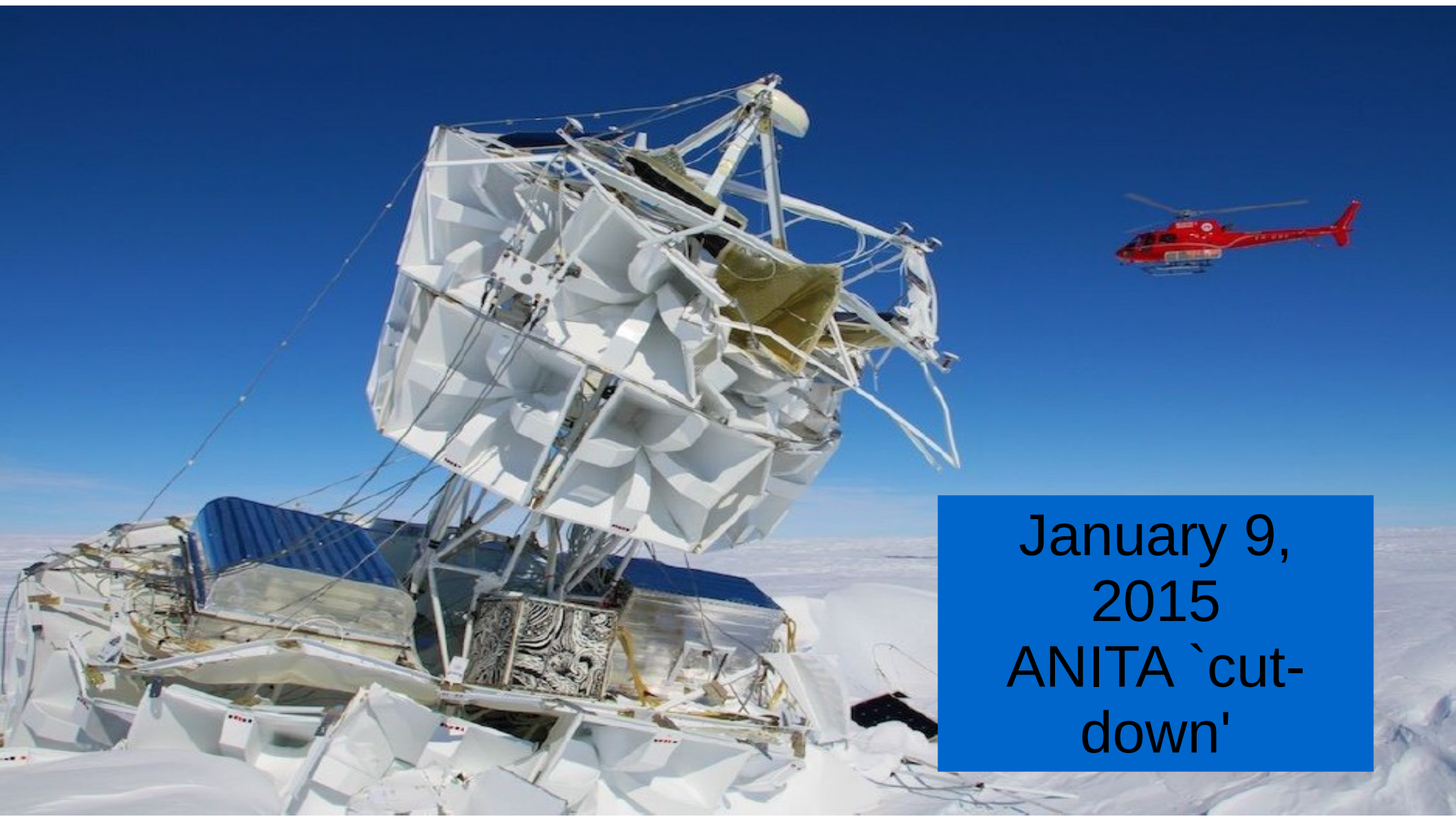
Estimate the amount of time required to reach 38 km, assuming zero wind resistance

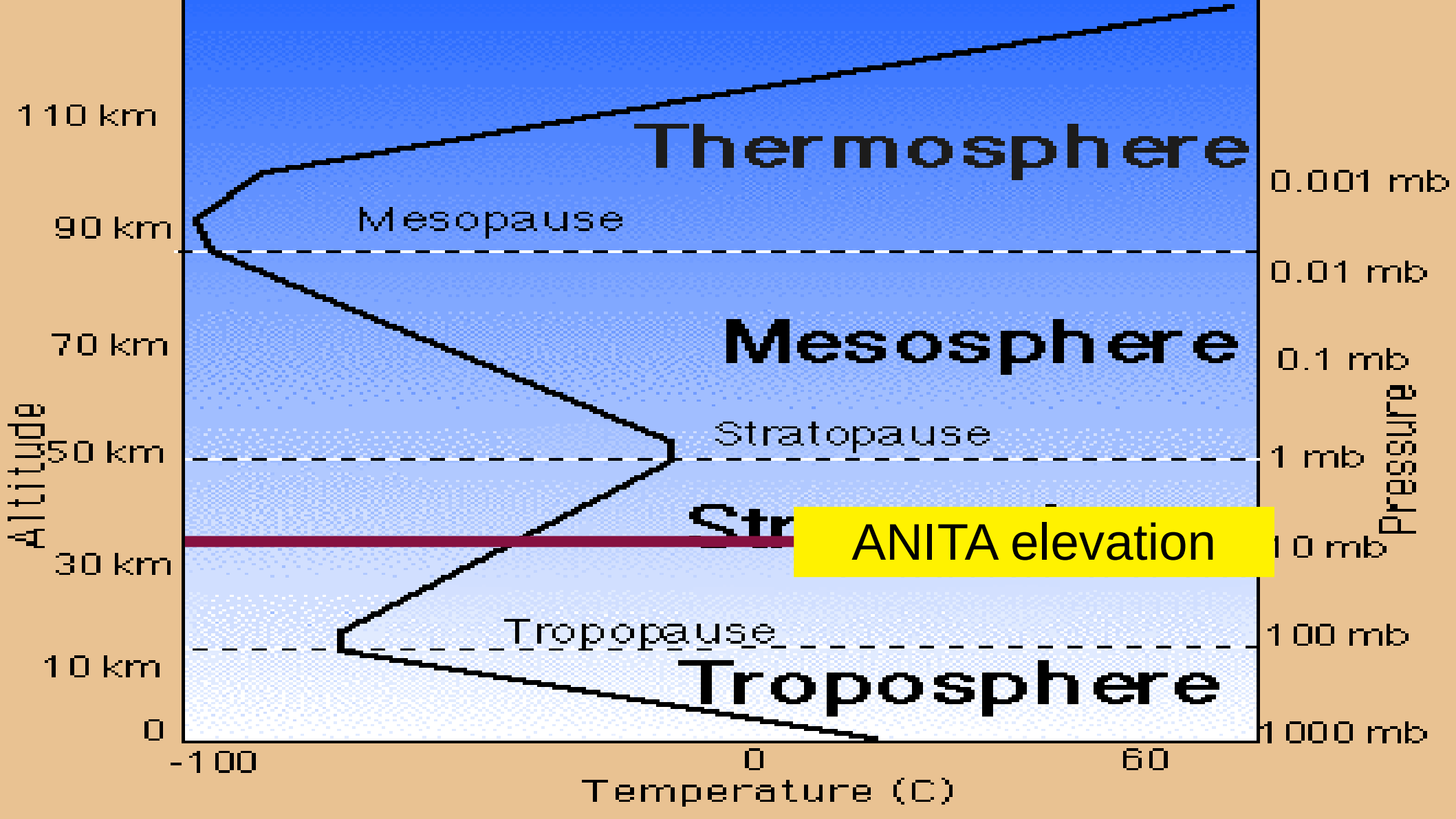


После выпуска

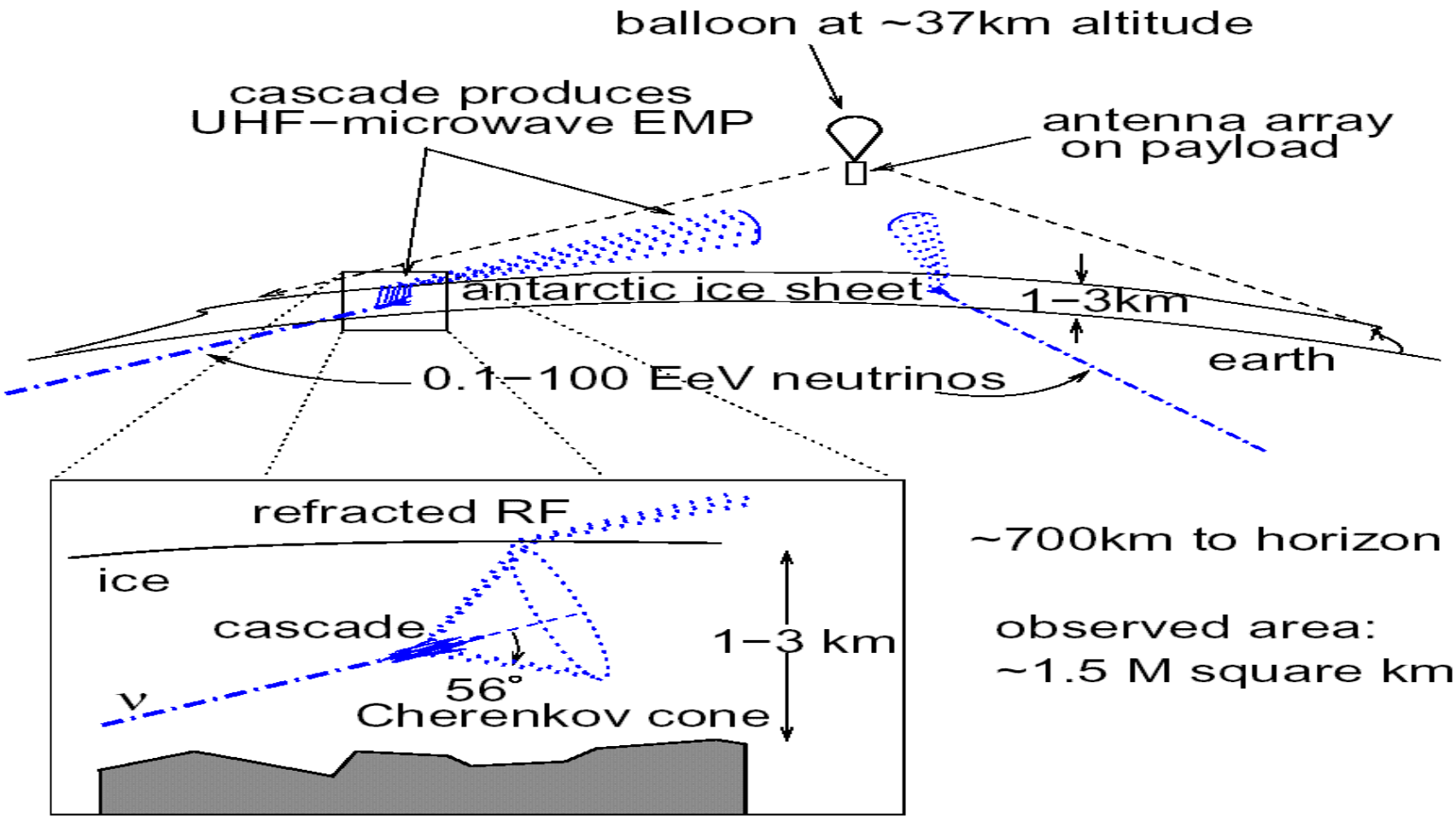


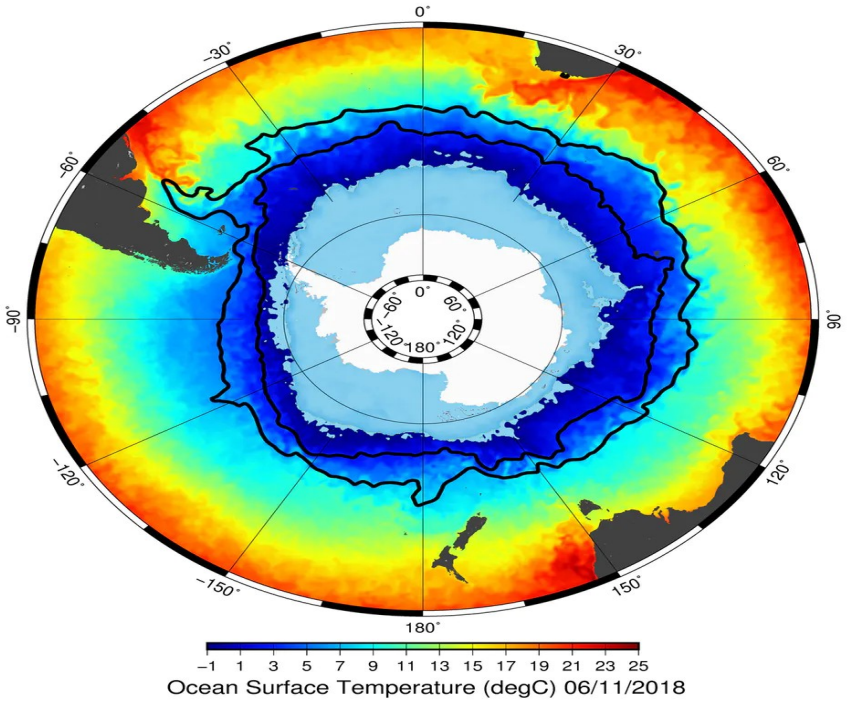
ANITA launch


January 9, 2015
ANITA `cut-down'

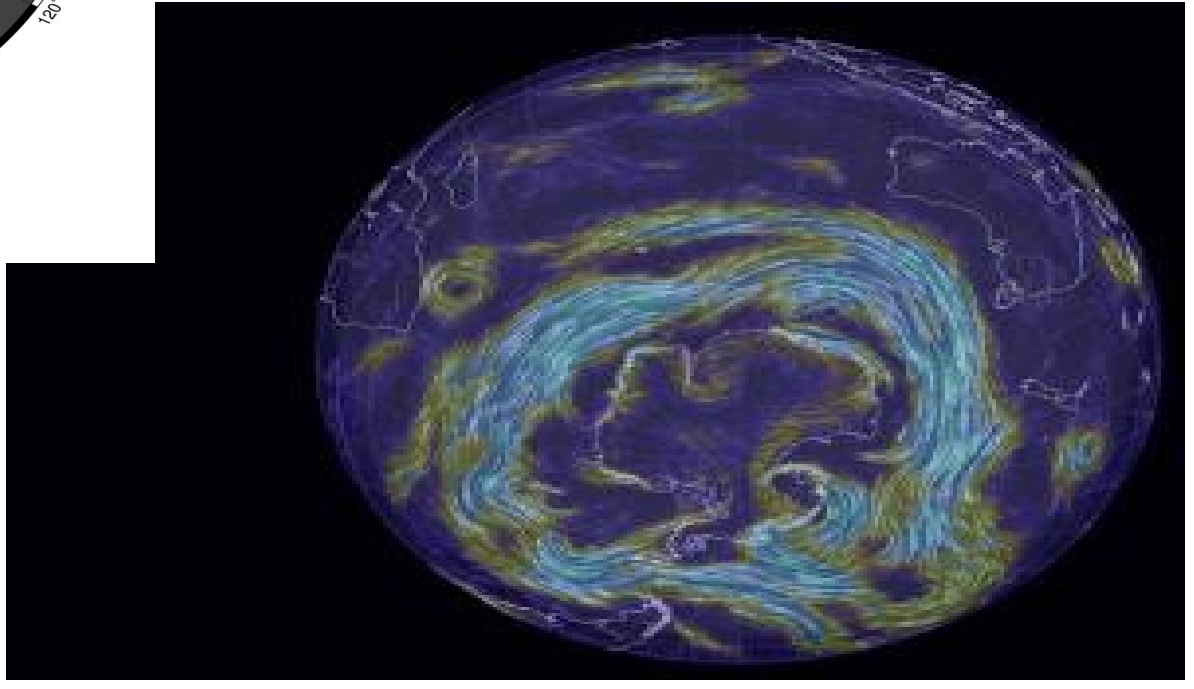

110 km
90 km
70 km
50 km
30 km
10 km
0
Altitude
Thermosphere
Mesopause
Mesosphere
Stratopause
Str
ANITA elevation
Tropopause
Troposphere
0.001 mb
0.01 mb
0.1 mb
1 mb
10 mb
100 mb
1000 mb
Presura
-100
0
60
Temperature (C)

view ice from above: ANITA concept



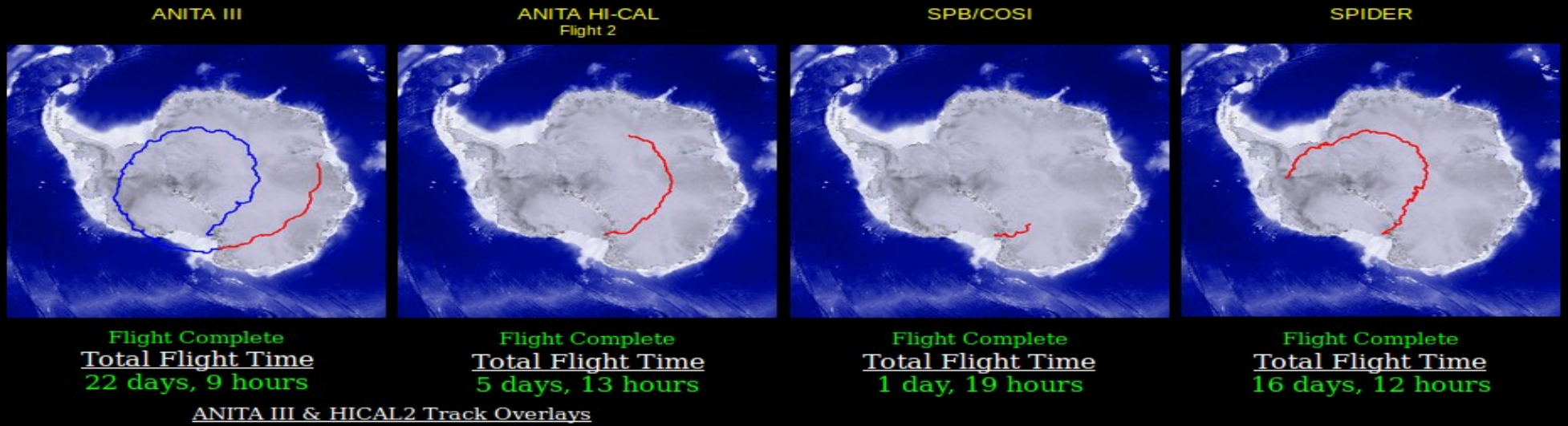


Satellite temperature map (12/2014)



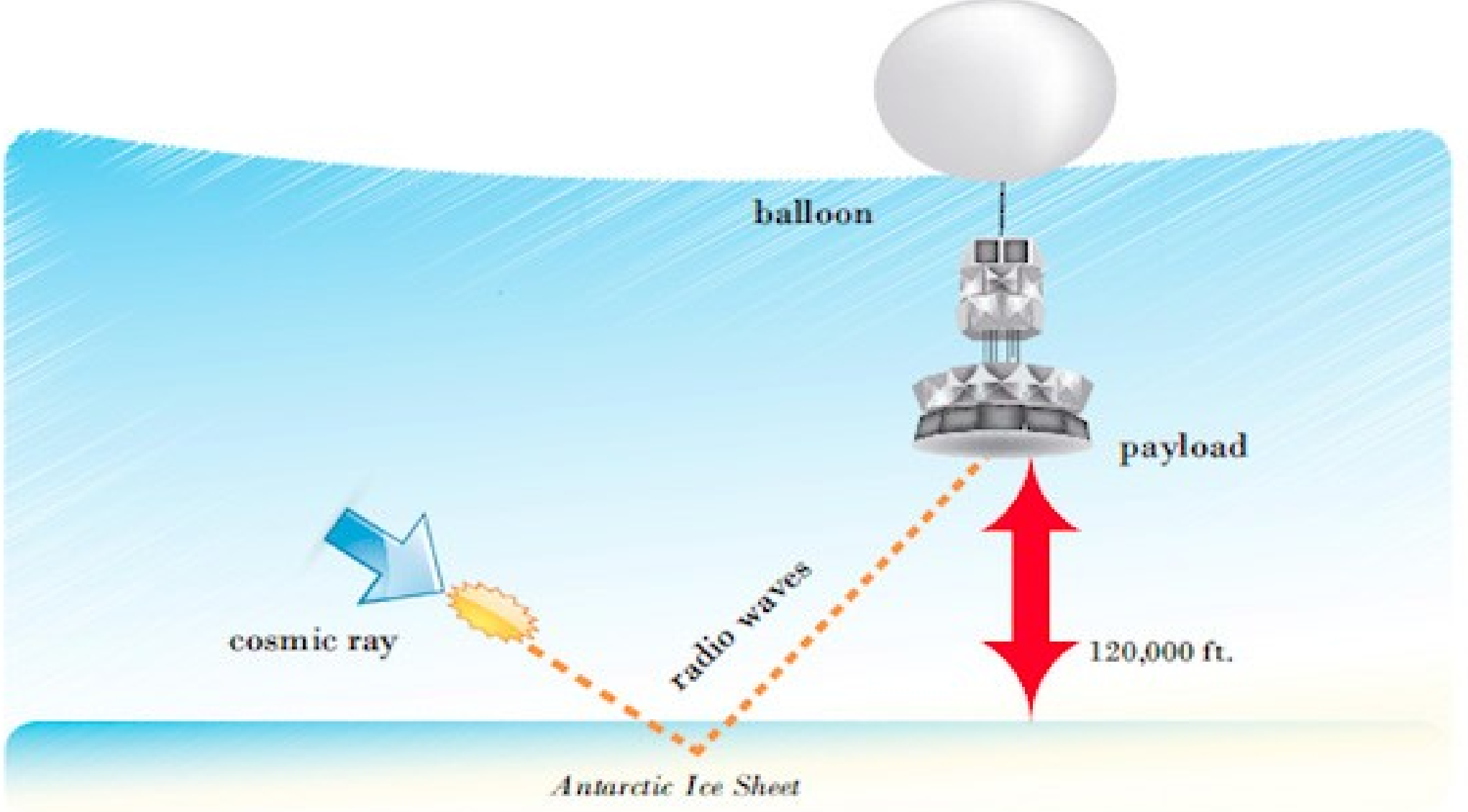
NASA Long Duration Balloon (LDB) Site at Willy Field, McMurdo Station
2014-2015 Antarctica Operations
(With Support from NSF and USAP)

Balloon Tracking
Current Revolution in Red

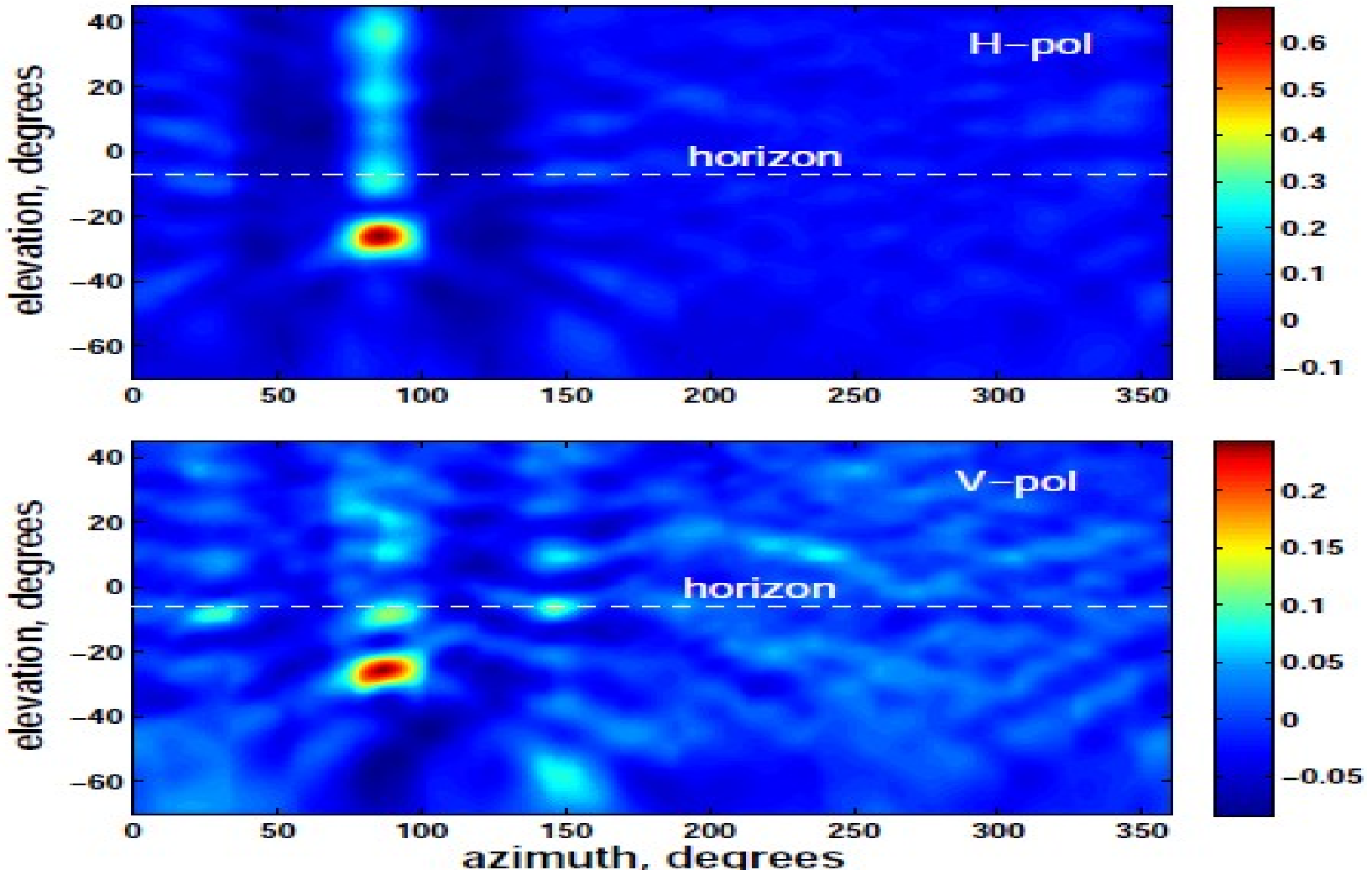


SPB=super-pressure balloon – V constant in PV=NkT => heavier, rugged material

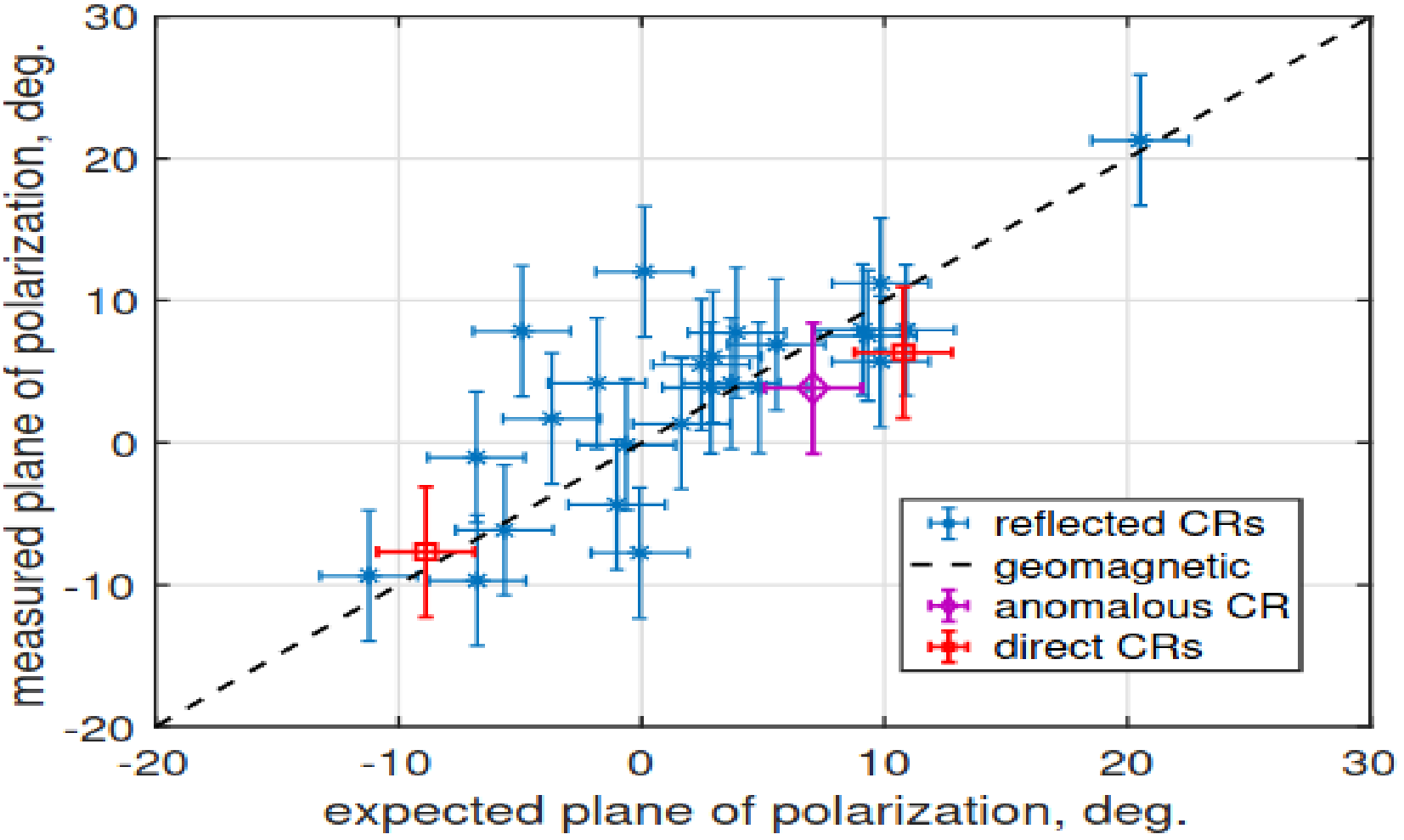
Variable-volume balloon: solar heating=>temperature rise/fall=>elevation changes


balloon
payload
cosmic ray
radio waves
120,000 ft.
Antarctic Ice Sheet

Interferometric observation of Ultra-High Energy Cosmic Rays (10 EeV) with ANITA



Correlation with local magnetic field



SLAC T-510 testbeam experiment

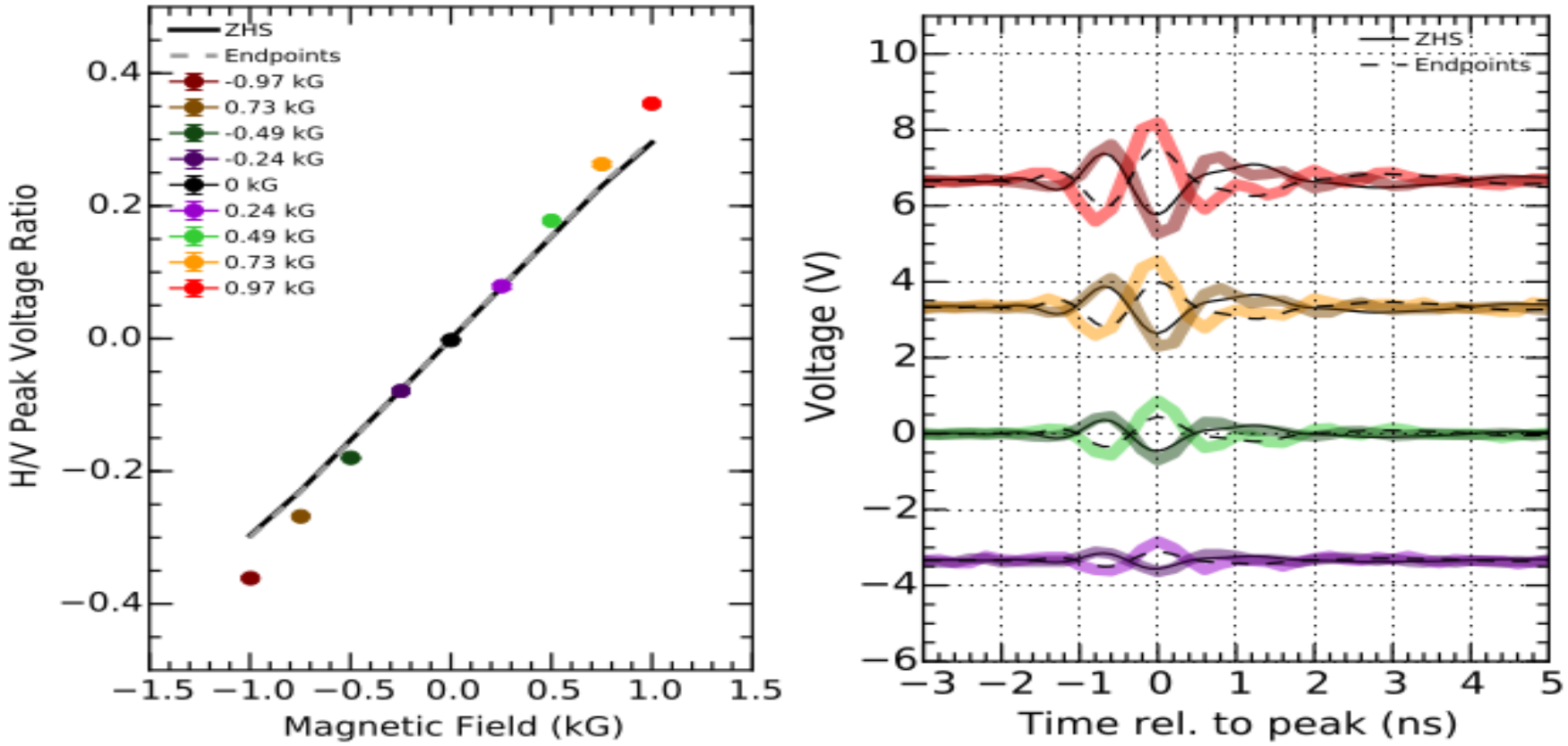


FIG. 6. Left: horizontally polarized signal normalized by vertical showing the expected linear behavior vs. magnetic field.

THE MYSTERY EVENTS!

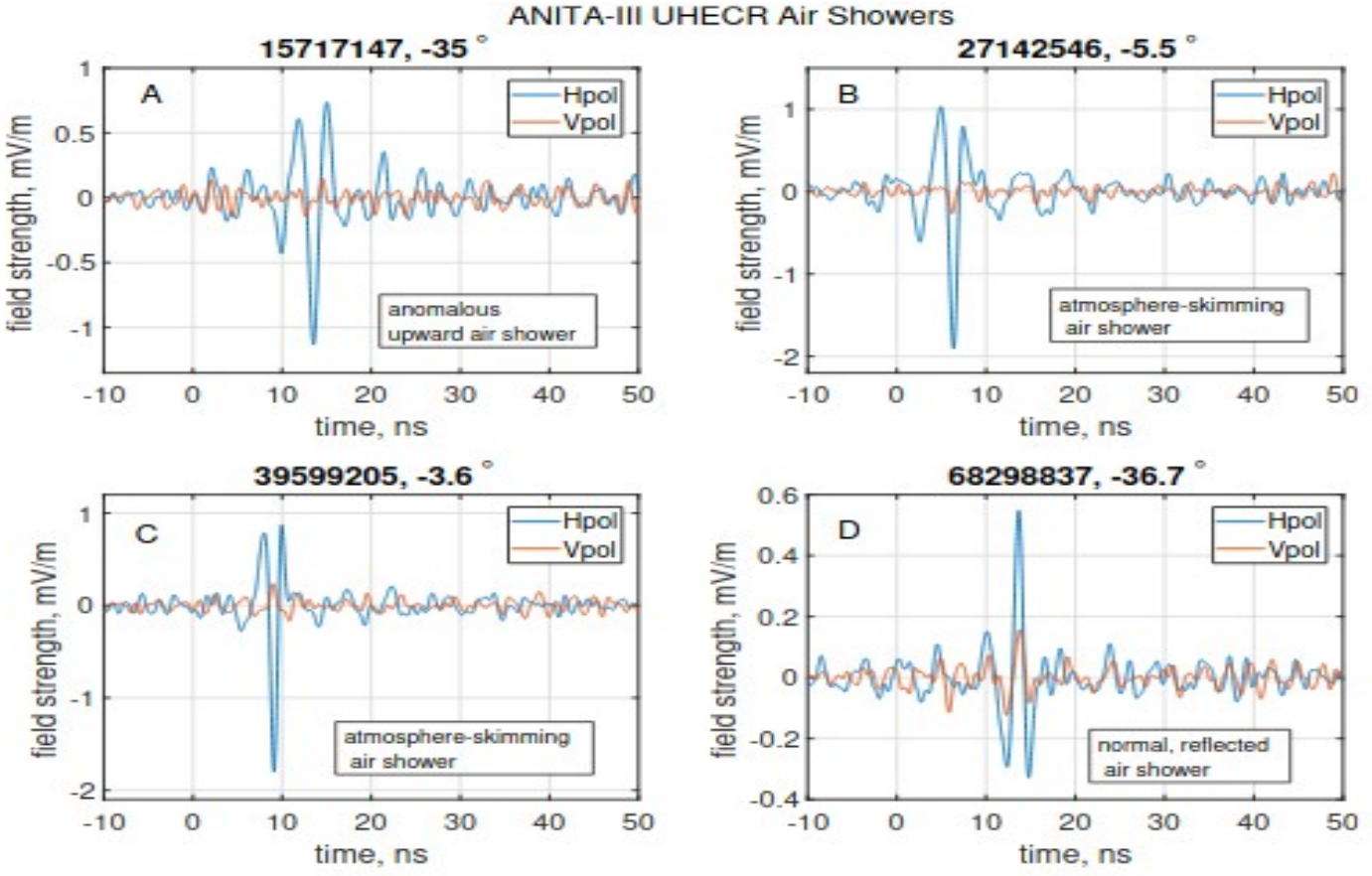
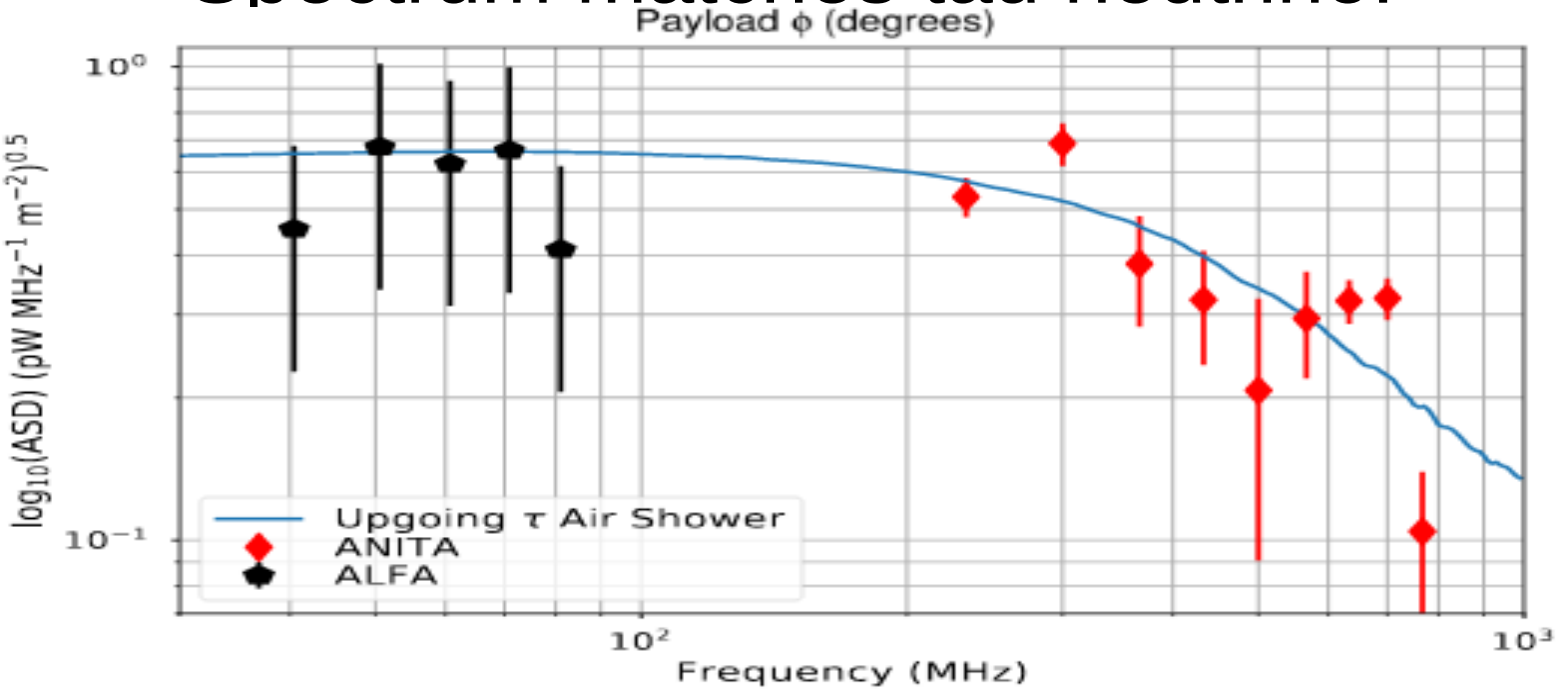


FIG. 3: *The three non-inverted polarity events are shown in panels A,B,C. Panel A shows the anomalous event, with the same polarity*

What is it, what is it, what is it?
Spectrum matches tau neutrino!



Other Possibilities: Surface Roughness (Dasgupta & Jain, 2019)
BSM models (people in this room right now)
Transition Radiation Backlobe (Prohira & deVries)
Triboelectric Effect (dzb, alisa nozdrina (KU), masha mikhailova (MEPhI)

Tau neutrinos? Must break standard model!

Possible (SM) explanations of mystery events:

1) Surface Roughness?
2) Tribo-electric effect?
3) Backwards-directed transition radiation?
4) Sub-surface reflectors?

surface roughness from stereoscopic photos

FIG. 1: *Antarctic topography along Vostok route (I)*

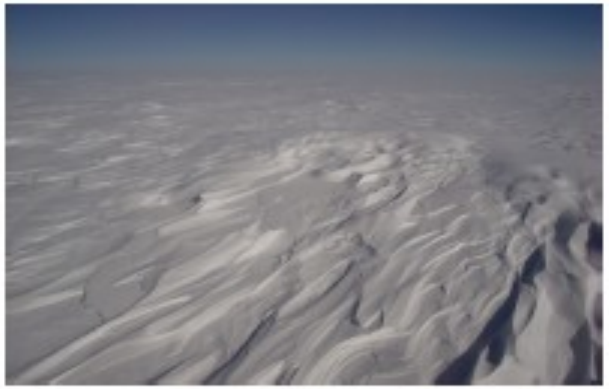
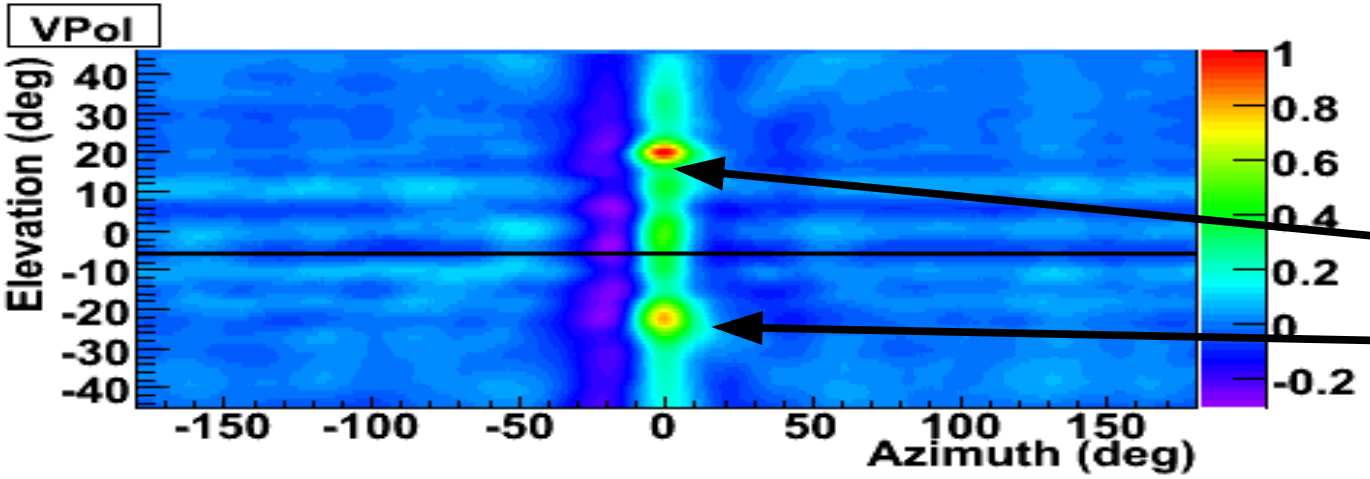


FIG. 2: *Antarctic topography along Vostok route (II)*

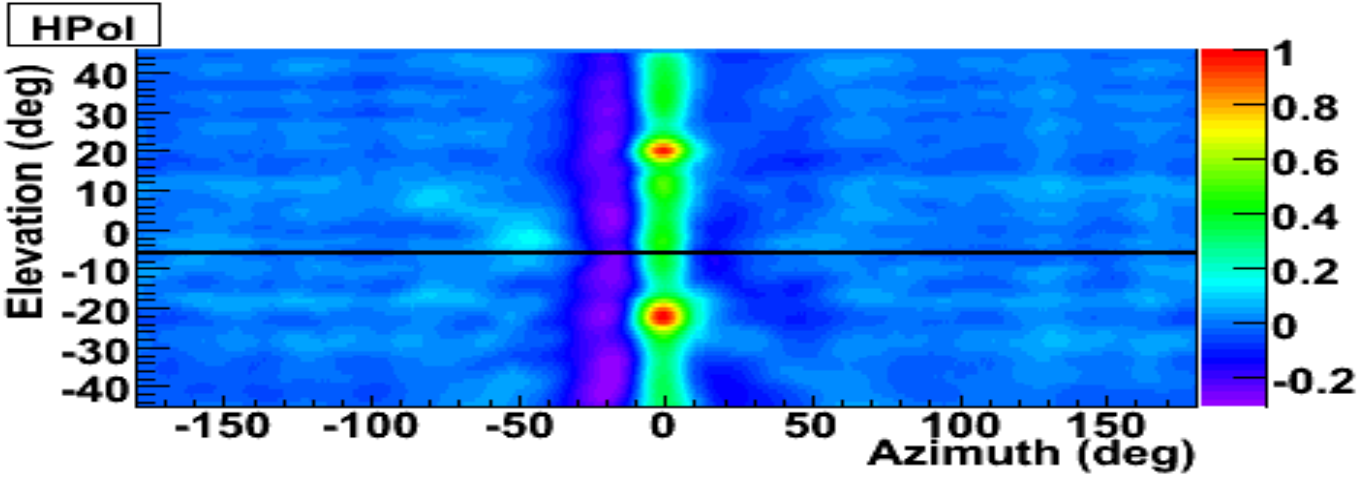
FIG. 3: *Antarctic topography along Vostok route (III)*

1/14 Data taken by AARI, St. Petersburg – reconstruction of point-clouds in progress

Calibrating surface roughness via Solar albedo

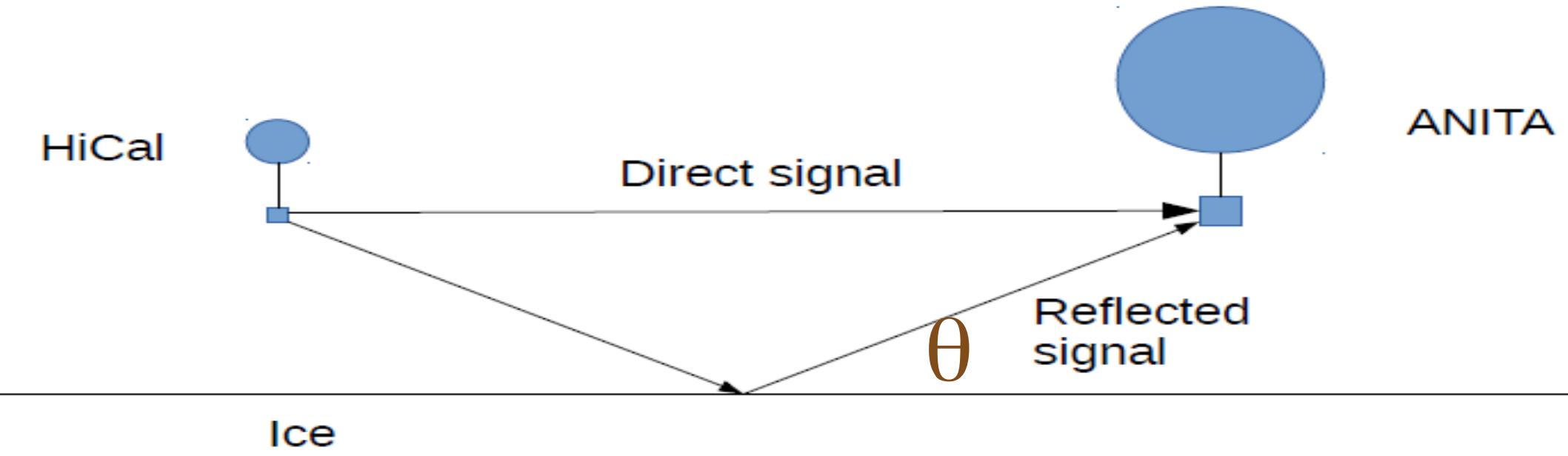


Vpol,
Direct Sun
v. Reflection



Hpol,
Direct Sun
v. Reflection

HiCal-trailer balloon to measure roughness



The Problem:

- On a 5 kg payload, hanging from a balloon, include:
  - Low-cost transmitter capable of generating ~10 kV signal amplitude signals, with duration 10 ns (Kansas U.)
  - Hardware to measure azimuthal orientation of payload, with capability for measuring signal amplitude and provide GPS time stamp (MEPhI)

Low-cost, high-voltage transmitter

Piezo-ceramics

G. Staines*, Helmut Hofmann*,
L.L. Altgilbers**, Ya. Tkach***
*Diehl Munitionssysteme GmbH & Co. KG,
Nuremberg, Germany
**U.S. Army Space and Missile Defense Command,
Huntsville, AL, 35807
***Gomez Research Associates,
Huntsville, Al

"Электромагнитные Явления", Т.3, №3 (11), 2003 г.

Tkach Ya., Shkuratov S., Talentsev E.F., Dickens J.C., Kristiansen M. , Altgilbers L.L., and Tracy P.T., Theoretical Treatment of Explosive-Driven Ferroelectric Generators // IEEE Transactions on Plasma Science. – 2002. – V. 30(5). – P. 1665–1673.

Compact Piezo-Based High Voltage Generator - Part I: Quasi-Static Measurements

This paper presents the results of an effort to develop and test a piezo-based high voltage generator (HVG). A theoretical model was developed and, in order to verify this model, quasi-static measurements were conducted using a 15 mm diameter and 20 mm long cylindrical PZR-5A piezoelectric element and an electric press driven by a rotating screw. Measurements were made using various load capacitances and resistances and using single and multiple piezo elements. The results of these measurements will be presented. A prototype piezo-based HVG with a diameter of 65 mm and a length of 275 mm was also built and tested and the results will be presented in a follow-on paper. This generator produced almost 400 kV with 3 J of energy stored in the generator.

RF transmitter

www.homedepot.com/p/Brinkmann-Universal-Push-Button-Ignitor-812-7221-S/203016481

home depot piezo barbeque lighter

Tool & Truck Rental | Installation Services and Repair | Gift Cards | Help | Cart

PRO SITE

More saving. More doing.

Your Store: **Cumberland #121**
Use Current Location or find store

Local Ad | Store Finder | Credit Center | Specials & Offers

Shop By Department | Search All | What can we help you find? | DIY Projects & Ideas | Sign In or Register Your Account

Home > Outdoors > Grills & Grill Accessories > Grill Replacement Parts > Other Replacement Parts

Brinkmann | Model # 812-7221-S | Internet # 203016481 | Store SKU # 211787

Universal Push Button Ignitor

★★★★☆ (11) | Customer Images (3) | Write a Review + | Questions & Answers (6) +

$12.97 / each

Ship to Home FREE with $45 Order
Estimated Arrival: APR 22 - APR 24
See Shipping Options

Pick Up In Store FREE
Available for Pick Up: Today

1 | ADD TO CART | SAVE TO MY LIST

OR Buy now with PayPal

Item cannot be shipped to the following state(s): AK,GU,HI,PR,VI

IN STOCK AT YOUR SELECTED STORE

Cumberland #121
Atlanta, GA 30339
Change Pick Up Store +

7 In Stock
Aisle 51, Bay 012

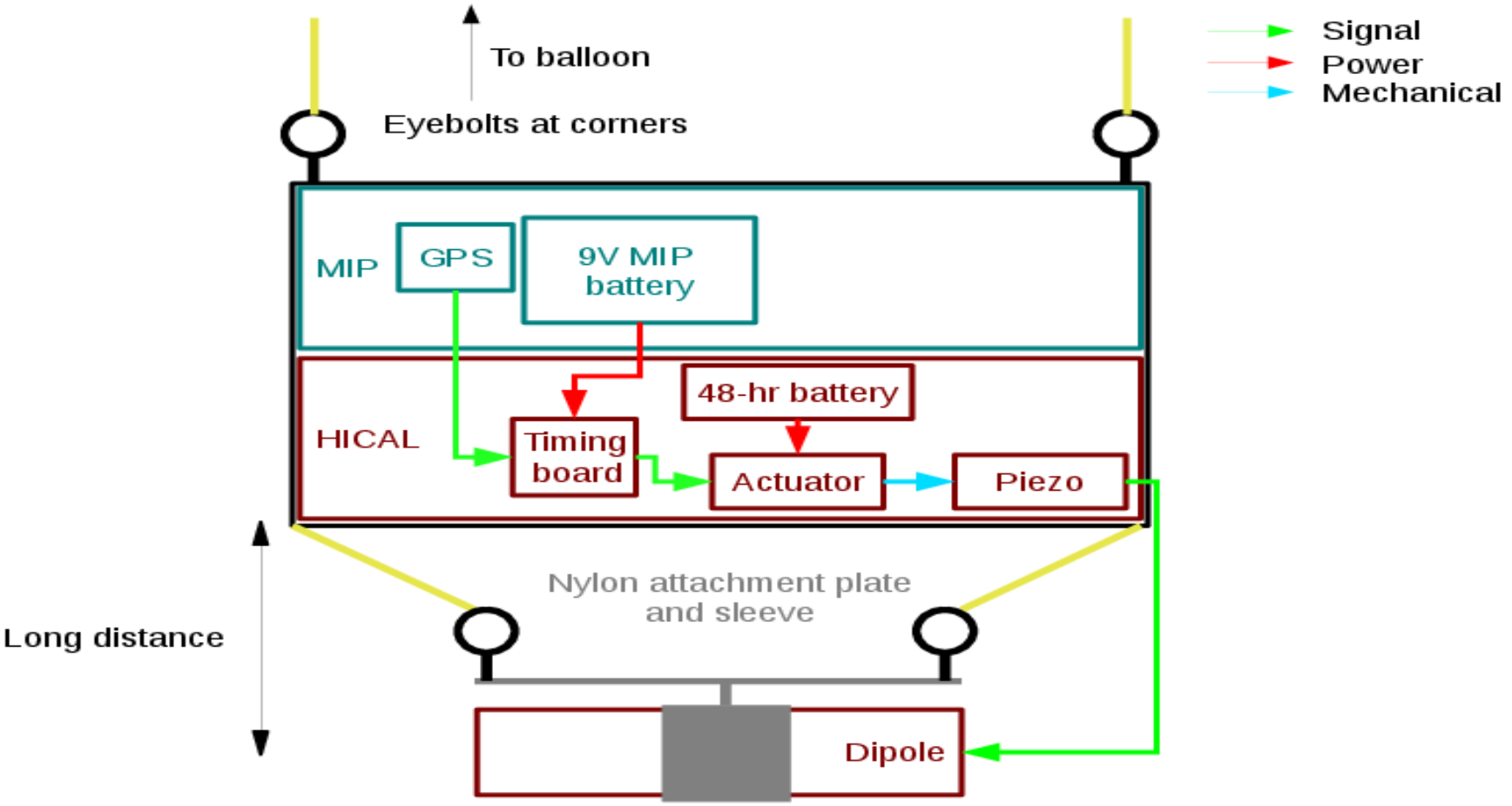
Feedback

More precise surface reflectivity probe

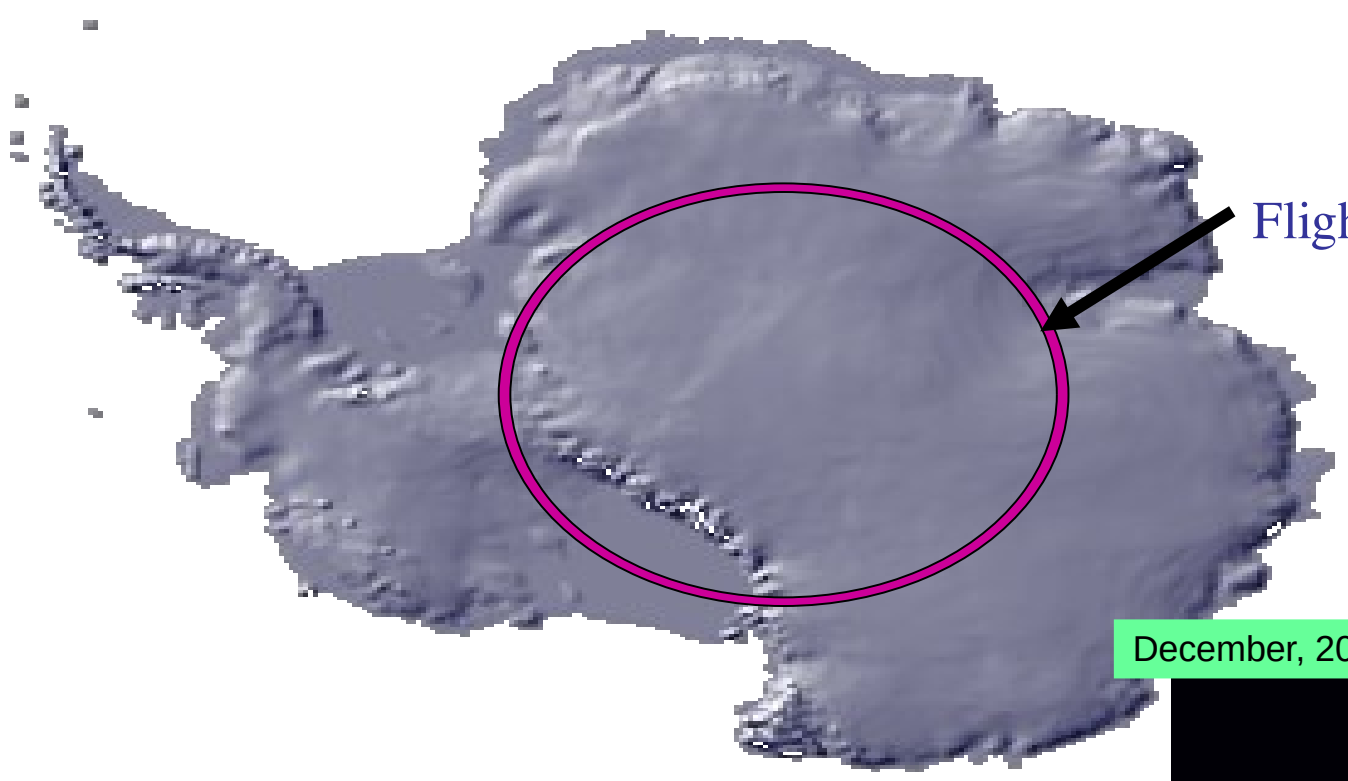
- 12/14: ANITA HiCal: Pathfinder class balloon, launched after main ANITA-3 launch
  - Tx emits both direct + surface-reflected signal
- Hardware:
  - “custom” transmitter that mimics EAS spectrum (ignition coil or piezo sparker [$10 from WalMart]) fed into a RICE-type dipole antenna

HiCal sparker at 5 mB

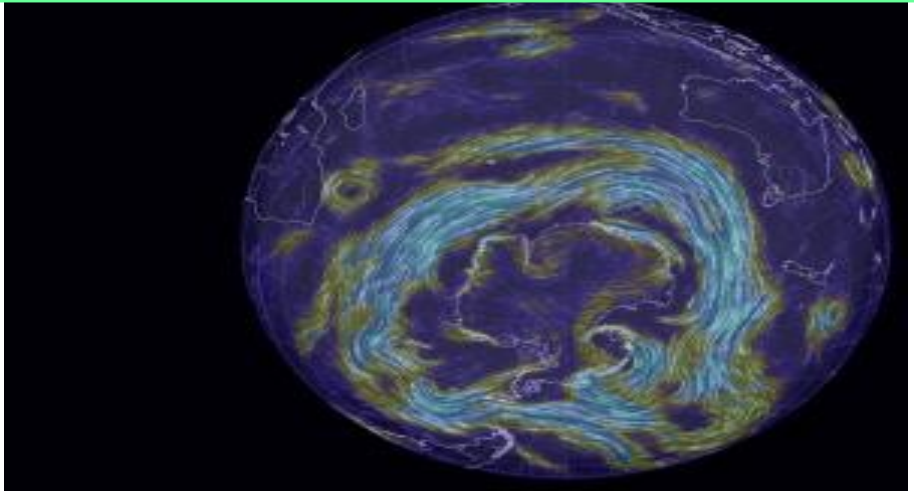
HiCal schematic



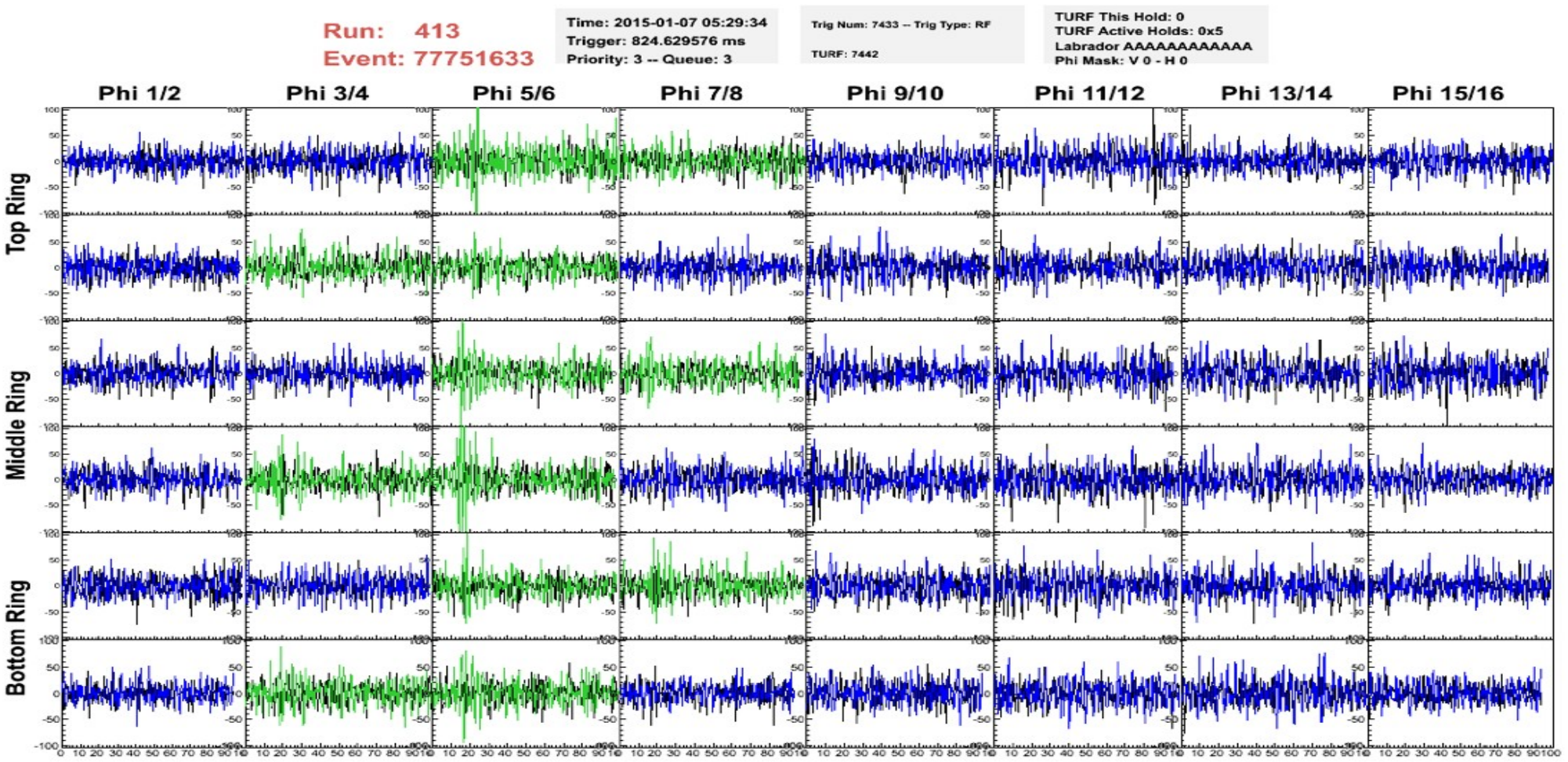
HiCal Launch (Jan. 5, 2015)



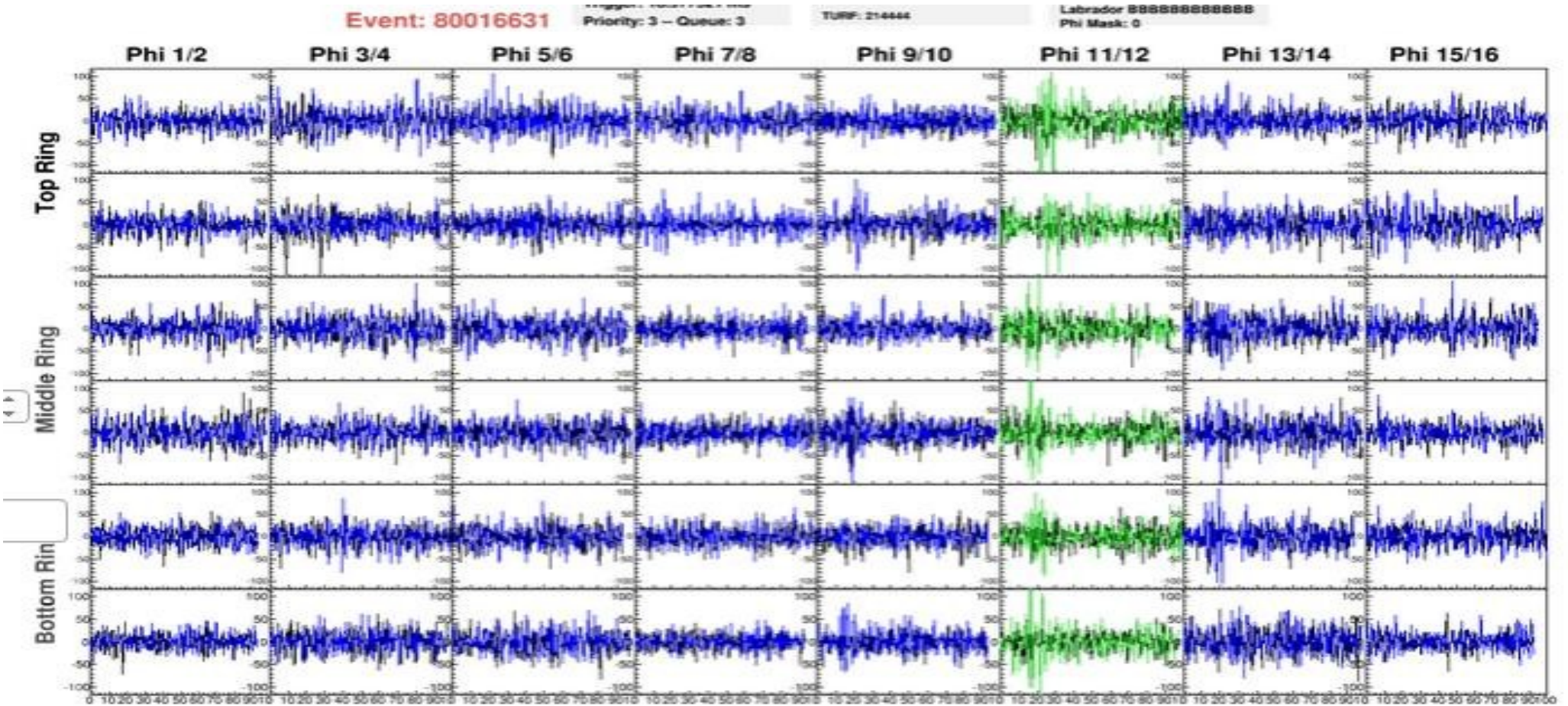
December, 2014 circumpolar wind vortex



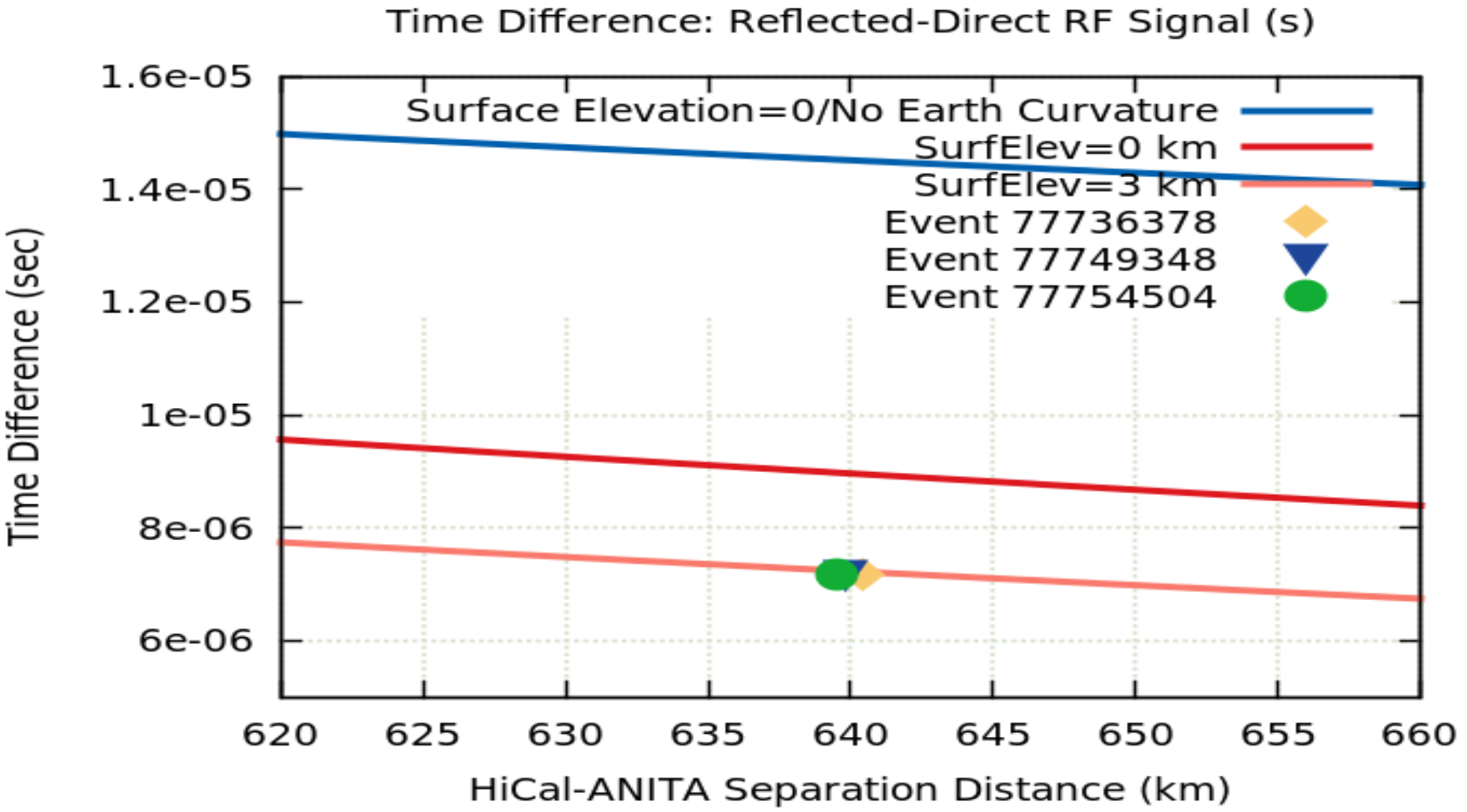
Event 1-HiCal observed from 750 km!



HiCal Event-2 (at float)



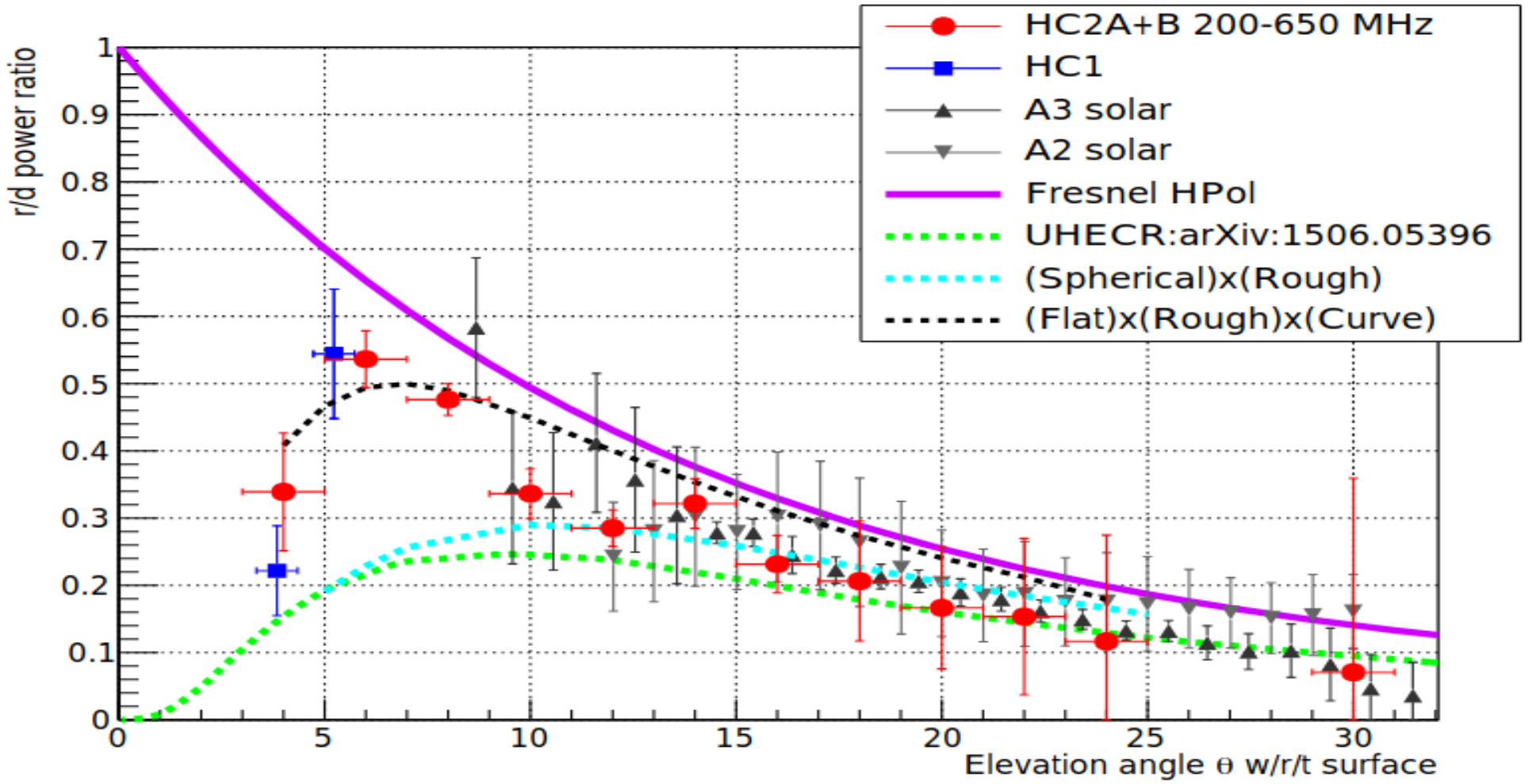
Time signature of δt(D,R)

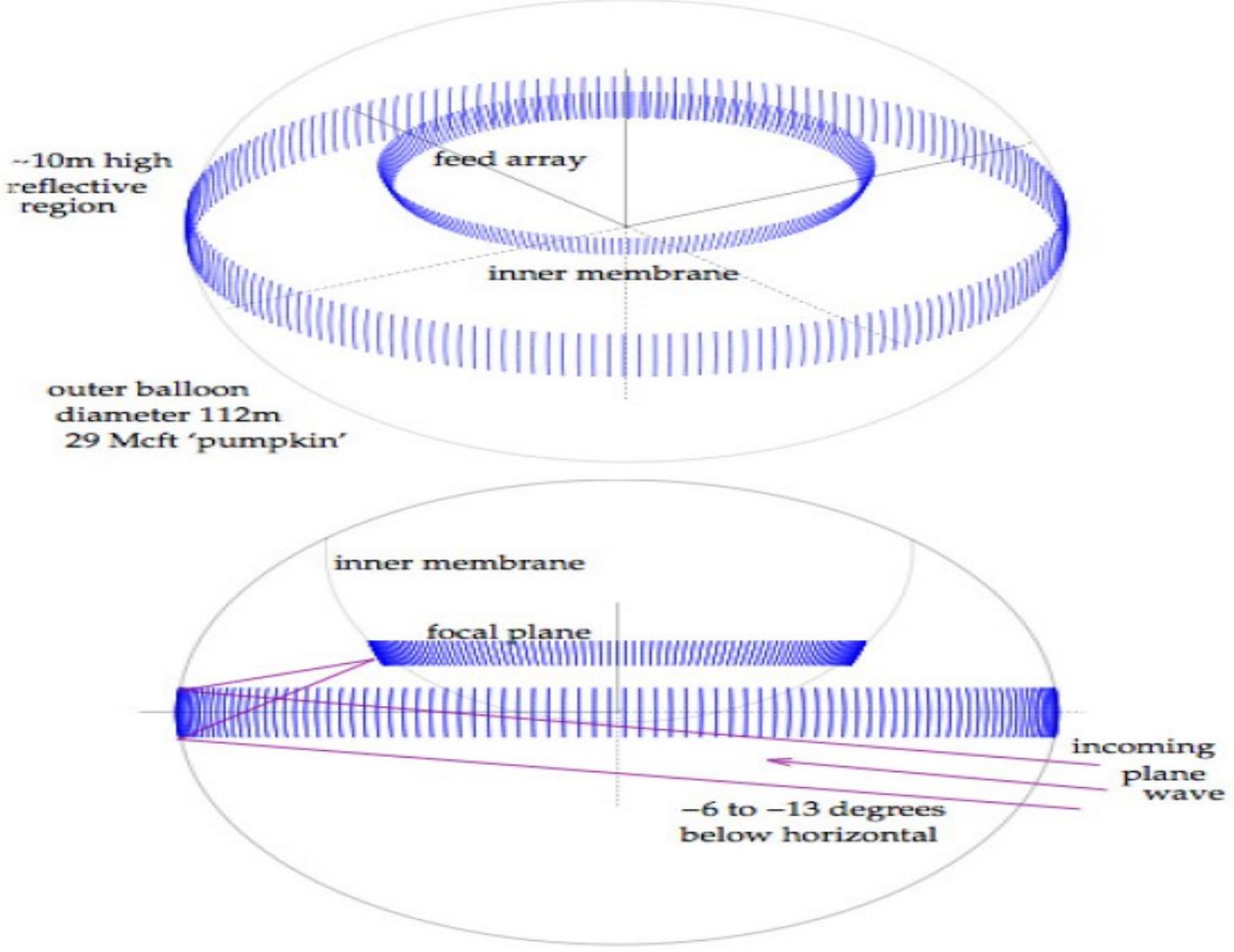


Antarctic Surface Reflectivity Calculations and Measurem
and HiCal-2 Experiments

S. Prohira[f], A. Novikov[f,r], P. Dasgupta[q], P. Jain[q], S. Nande[q], P. Allison[b,m],

Recall partial wave expansion of incoming plane wave...





EVA – the future: the medium is the message