

HUNTING THE DIPOLE

and the MagIC (paleointensity) database

PINT: 1 OF 7 IAGA DATABASES

- GPMDB: paleomagnetic poles
- ARCHEO: archeomagnetic directional data
- MAGST: a reference database for magnetostratigraphic studies
- PINT: for absolute paleointensity data
- PSVRL: directions from lava flows for the last five million years
- SECVR: secular variation (directions) from lake sediments, and
- TRANS: a database for geomagnetic polarity transitions.

IAGA VERSUS MAGIC

- Only some of the IAGA databases were searchable electronic publicly available databases (with data in them)
- Only the data of relevance to each topic were included and there was no “interoperability”
- Only some of the information for each record from the publications was captured.

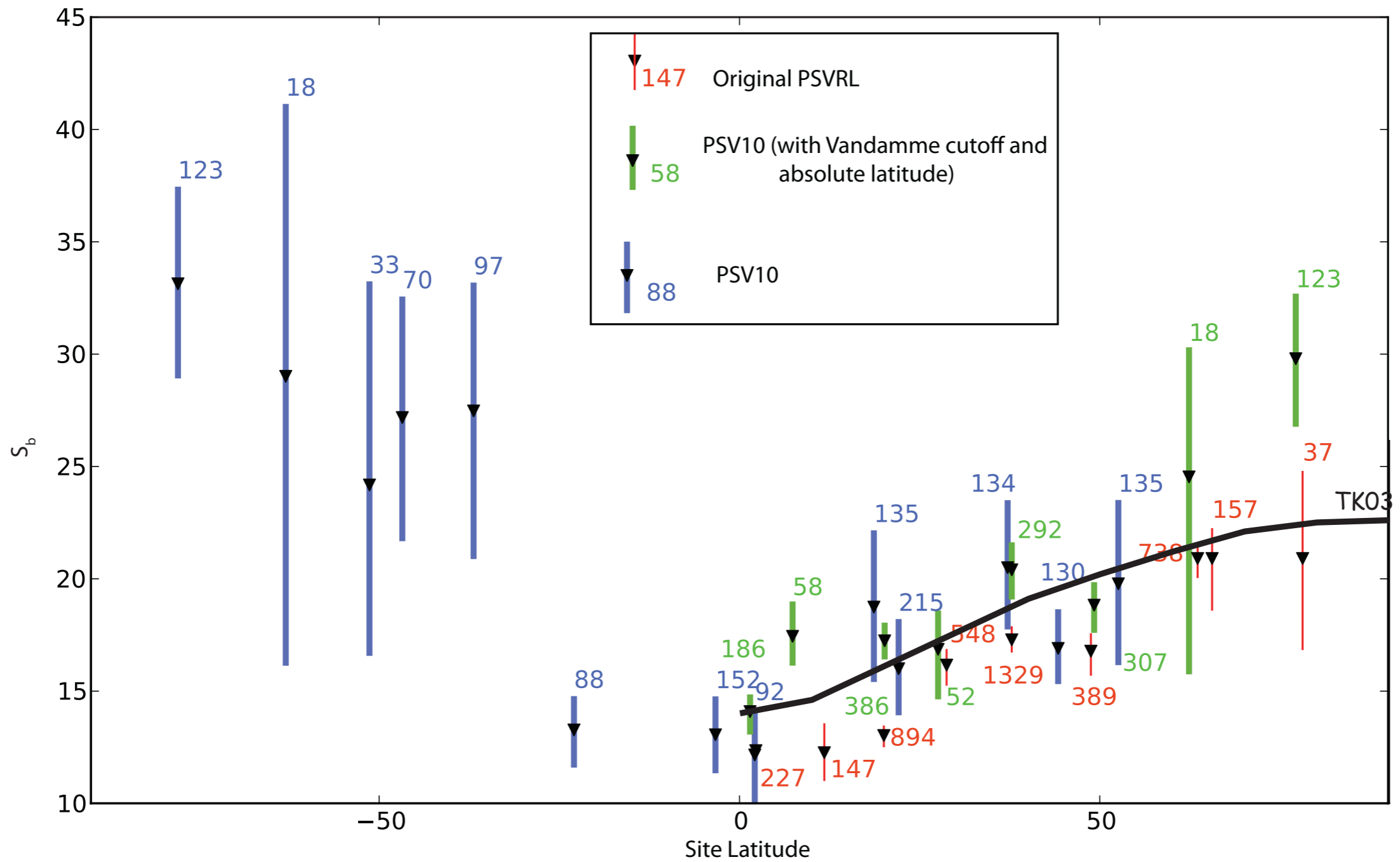
IAGA VERSUS MAGIC

- MagIC is publication based.
- As much detail as possible from the original publication is captured.
- All the data from a given reference is included, not just, say, the paleointensity data.
- All the IAGA topics are united under the MagIC umbrella - and many more

STATUS IN MAGIC

- GPMDB: These are all there - but just the poles
- PSVRL: all in and reviewed. updated as per MagIC standards. see poster
- PINT: all in, but most have not been reviewed or updated.
- ARCHEO and SECVR: combined under CALS efforts - some data are in MagIC
- TRANS: just started on this - talk to Jarboe....

PSVRL next generation (PSV10): after review

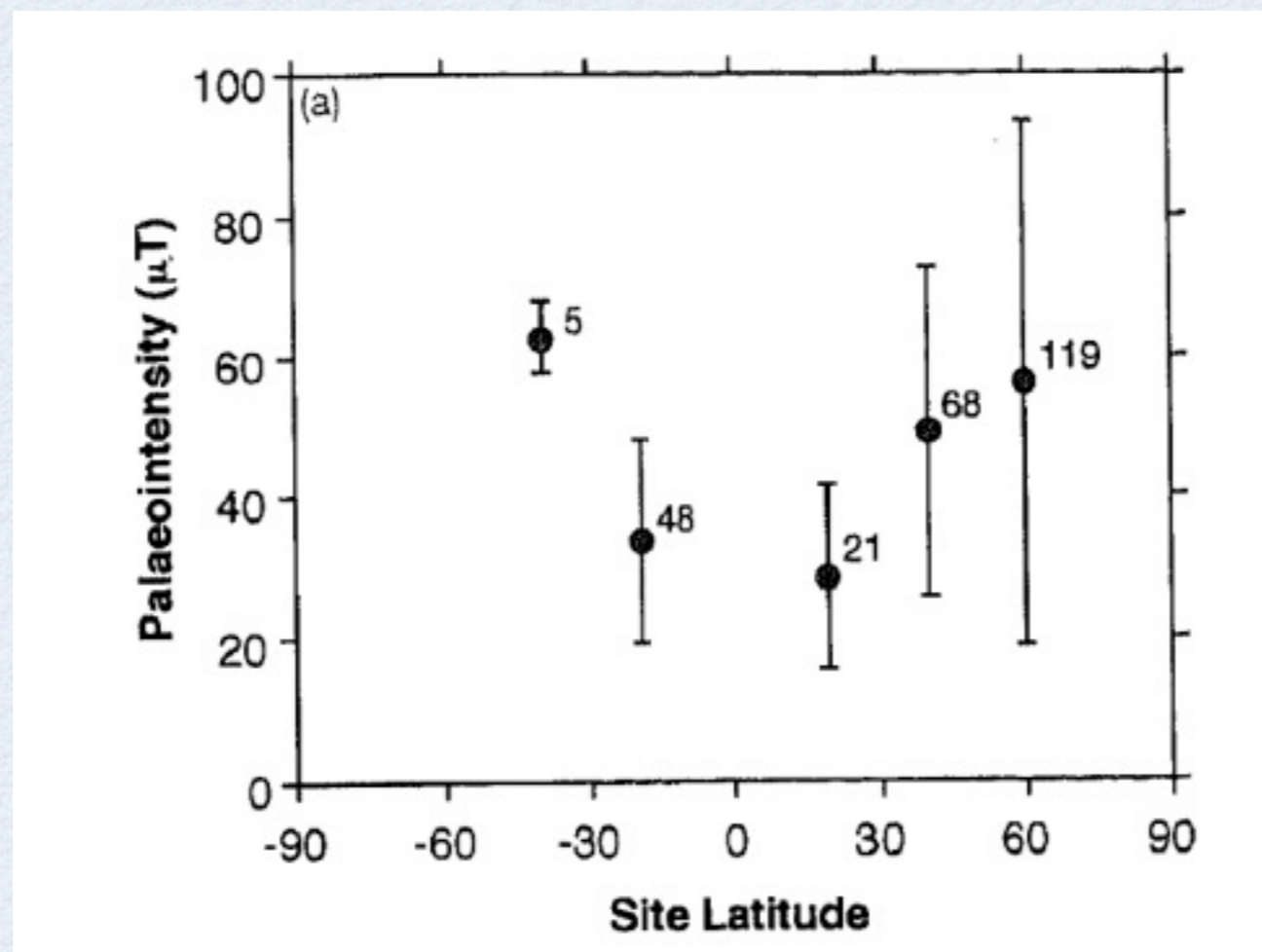


REVIEW OF PINT

in MagIC

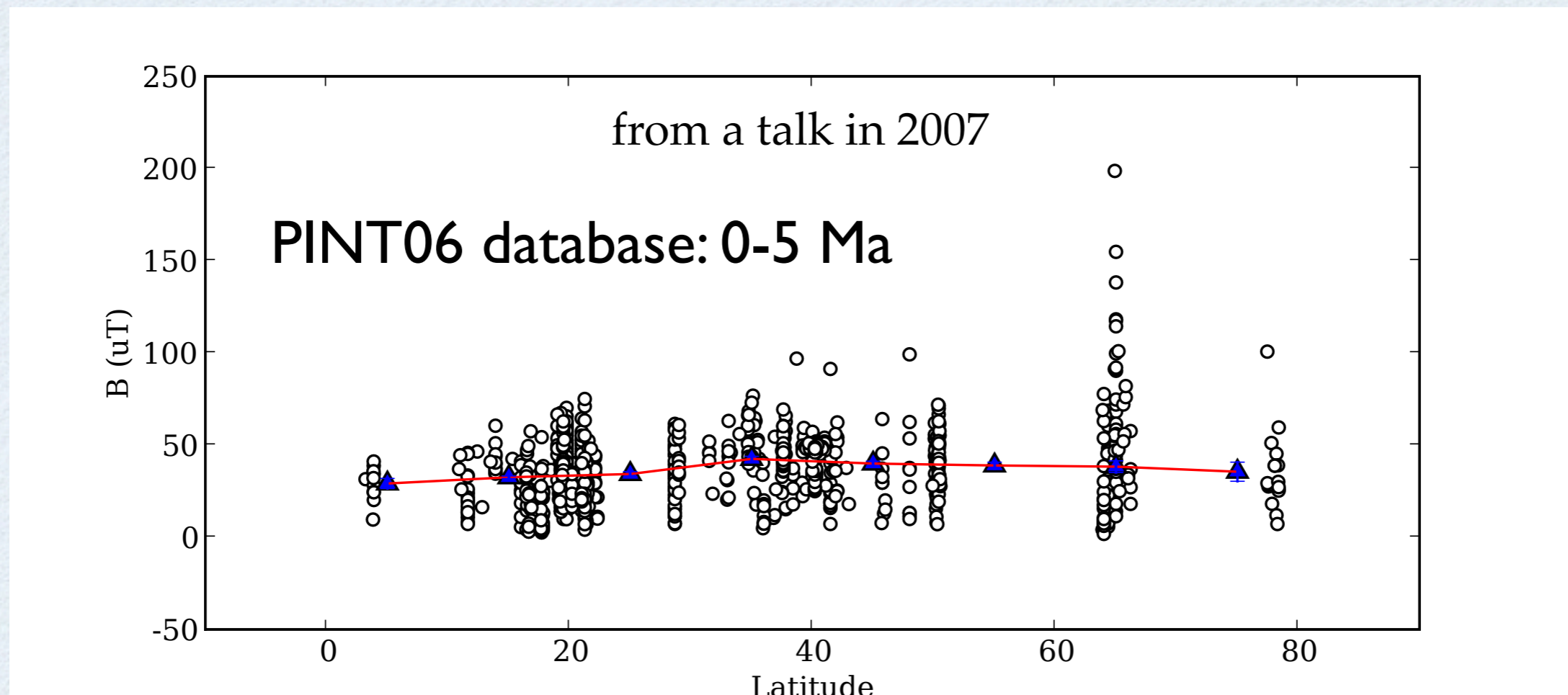
PINT: A GROWING DATABASE

Tanaka et al. 1995 started with paleointensity data from 1123 lava flows in 83 publications.



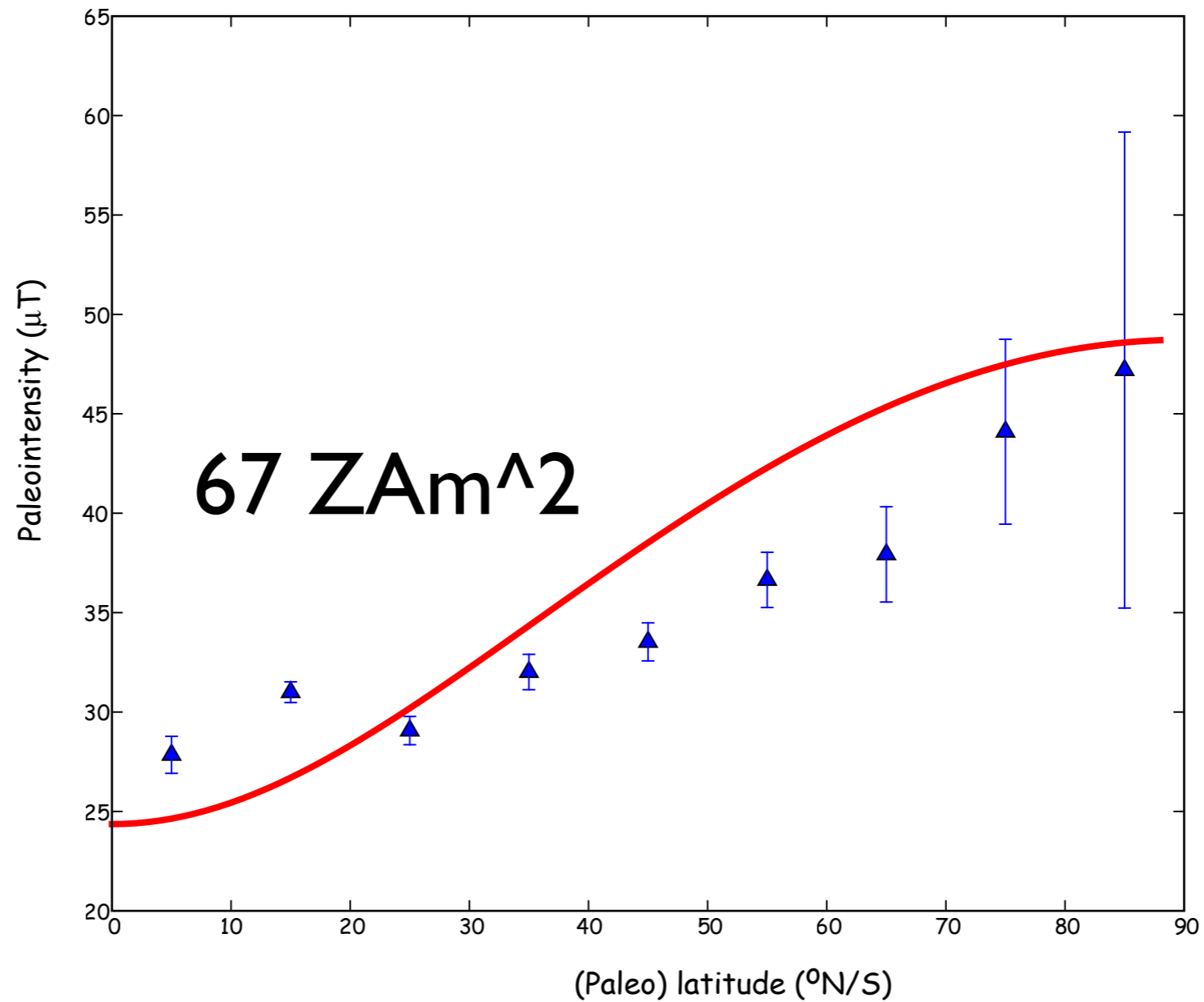
Found a clear dipolar signal for data 0-10 Ma

- Perrin et al. 2004 updated to 3128 data points from 215 references - made available as Excel spreadsheet: PINT03
- Tauxe and Yamazaki 2007 updated through 2006 (3895 data points from 234 publications); input everything into MagIC



Where's the dipole?

200 Myr, plate recontstructed, selected

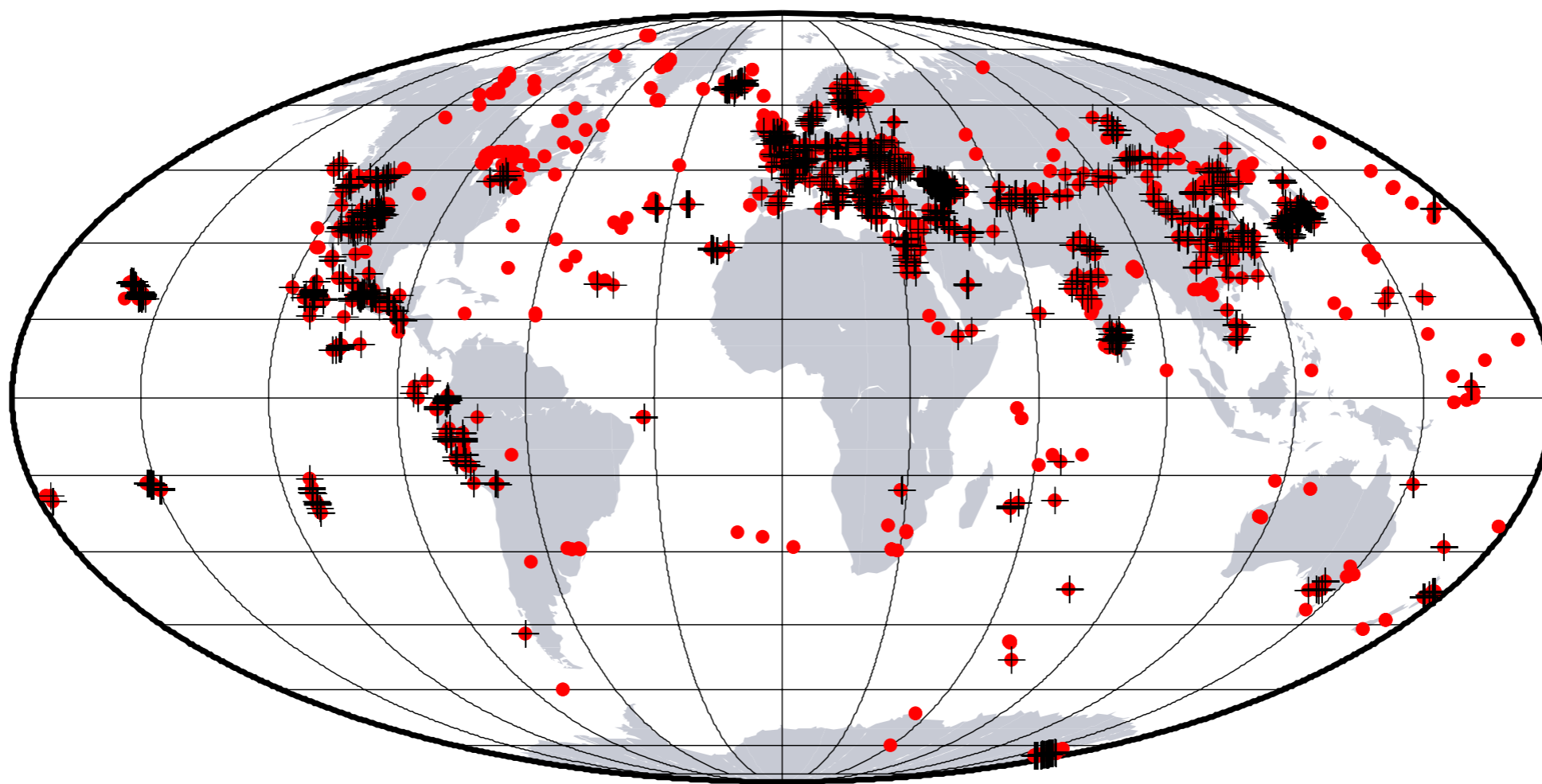


Tauxe & Yamazaki 2007

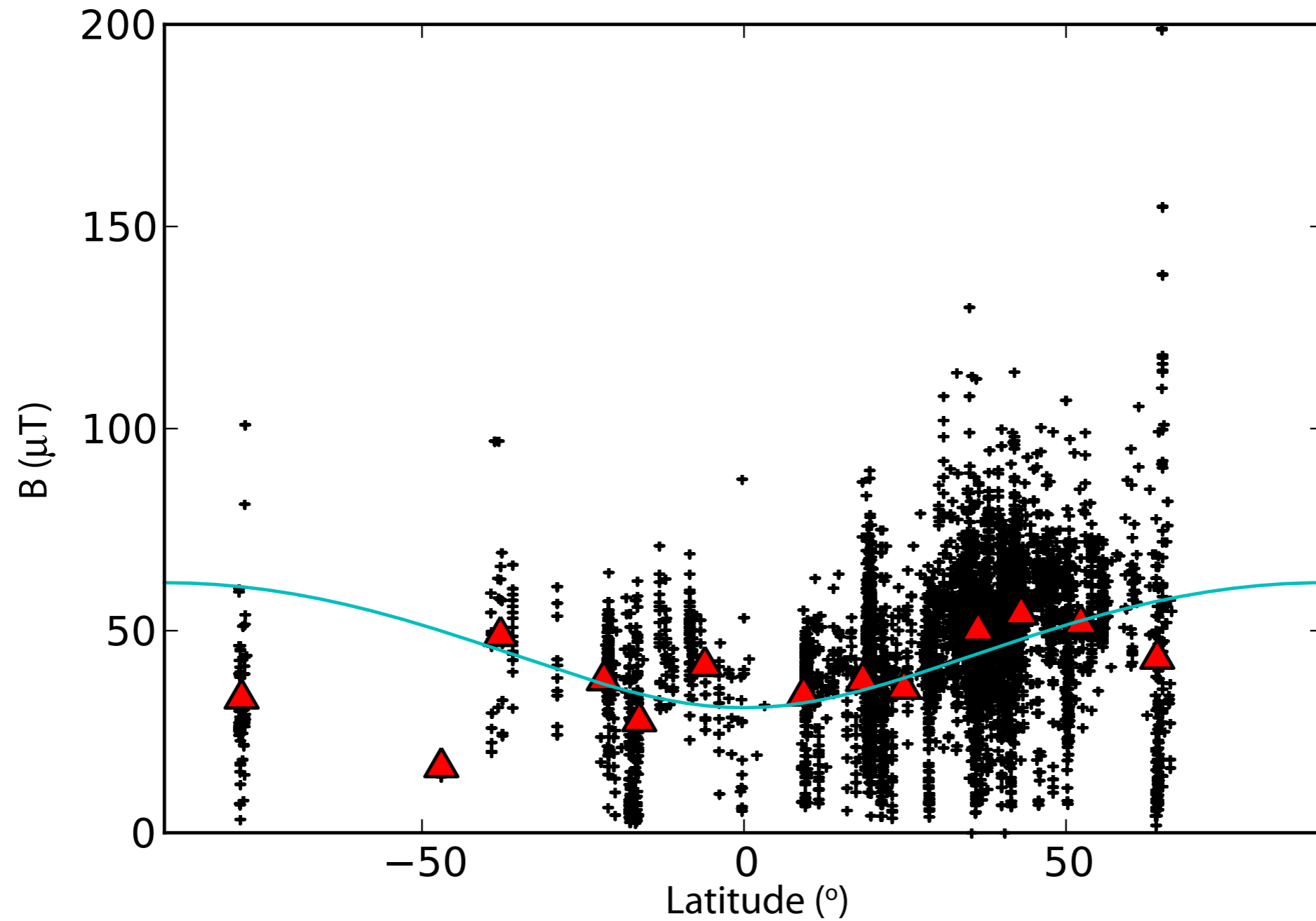
CURRENT STATE

- Donadini made a Web interface for GEOMAGIA (0-50 ka) and Biggin did same for 50 ka- 4.5 Ga PINT database.
- The MagIC database team has now begun going through all the PINT contributions: reviewing, revising and re-uploading smartbooks
- There are now 3994 sites from 194 publications labeled PINT in MagIC
- There are another 3672 from 140 publications labeled GEOMAGIA, not included in PINT
- In all: 12,997 sites from 503 pubs with “LP-PI-TRM” method code (absolute paleointensity)

Data Distribution



All API for last 5 Ma (N=9080)



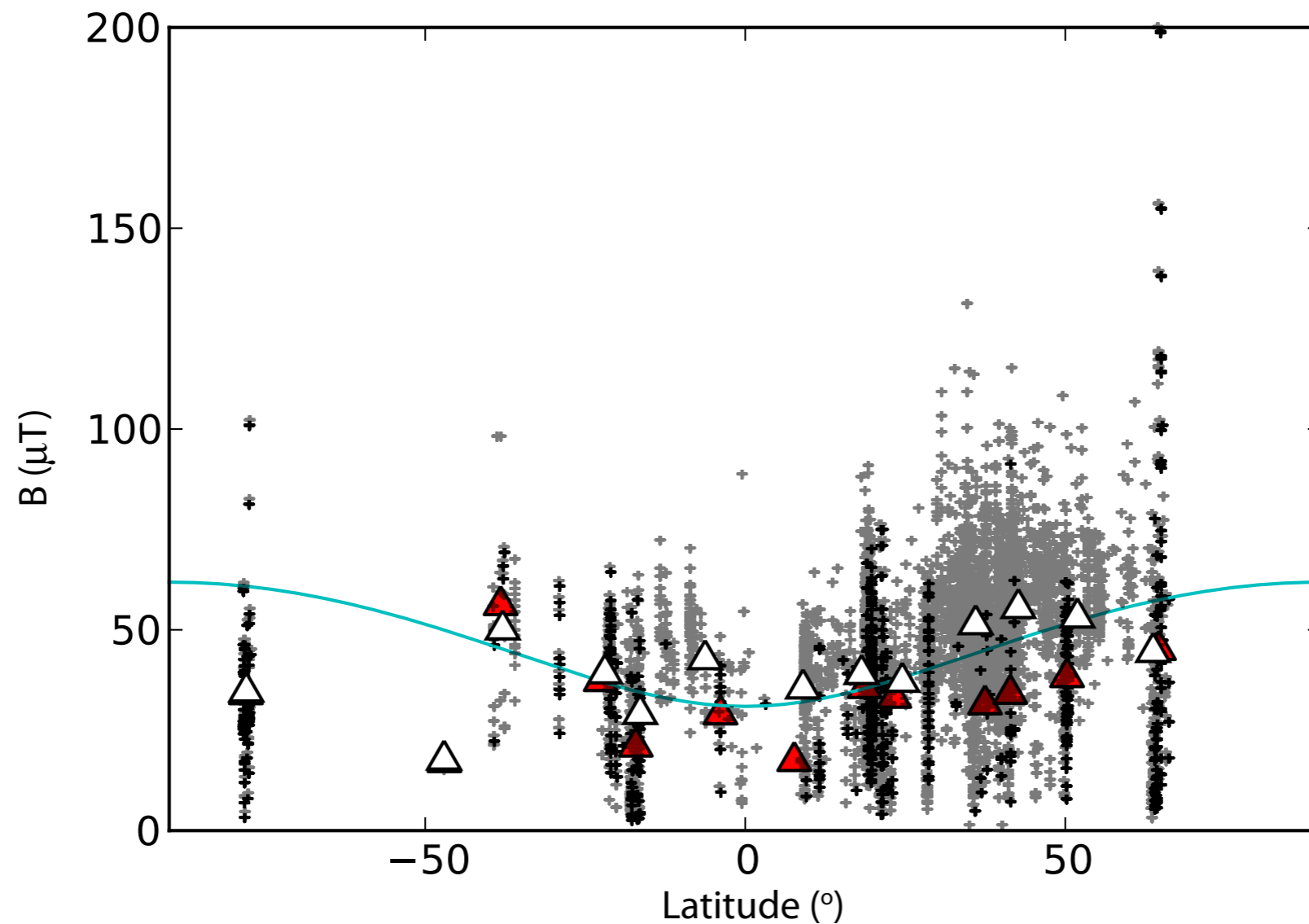
Where's the dipole?

CAUSES OF SCATTER

- Geomagnetic field: “spikes”, excursions and reversals (temporal sampling, regional bias)
- Comparing data of different ages in a time varying process
- Failure to weed out bad data
 - Experimental design didn't test for right things
 - Data selection didn't reject the right thing
 - Typos, mistakes, duplicates in the database itself [why all contributions need review]

Effect of filtering

- Excluding < 50 ka ($N=4083$)
- with “pTRM checks” ($N=2047$)
- with $\sigma \% < 15\%$ ($N=963$)



WHAT ARE WE STILL MISSING?

- Can conclude that average field is much less than present field
- BUT lack of strong dipole signal means something else is missing
- Still have problem with temporal/spatial sampling
- API methods all rely on single domain assumption and there is no way in the database to check this

PROPECTS FOR PROGRESS

- Some things are SD (but very rare!)
- Experimental design CAN reveal non-ideal behavior
- While the database has no meaningful reliability criteria, providing the original data (in, e.g., MagIC) MAY provide clues to reliability.
- WE NEED TO SHARE ALL THE MEASUREMENT DATA IF WE ARE TO MOVE FORWARD: send your contributions to the MagIC database :)

Only 1-5 Ma (N=501)

