URANIUM EXPLORATION

Observe (fact)

Record (fact)

Interpret (fiction?)

FIRST CONSIDERATION IS BUDGET

- 1 maximize available $
- 2 transport $
- 3 field sampling $
- 4 analysis $

FIELD PROCEDURES

- PLANNING – Check all old records for evidence of anomalous U values
- TECHNIQUES –
  - » Samples
  - » Radiometric measurements
  - » On-site analysis
  - » Ground geophysics

SAMPLES

- Field work is expensive so collect as many samples as possible
- Make sure the samples are large enough for various types of processing later
- Locate sample site as accurately as possible

RADIOMETRIC MEASUREMENTS

- Scintillometers $
  - » inexpensive
- Spectrometers $$
  - » require careful calibration

ON-SITE ANALYSIS

- Chemical analysis
  - » operating field laboratories is difficult
- XRF analysis
  - » expensive equipment and poor detection limit

Ground Geophysics

- Many techniques available
  - » Magnetic
  - » Electromagnetic
  - » Electric
  - » Gravity
  - » Seismic

FIELD PROCEDURES CONCLUSIONS

- Initially keep it simple
  - » collect lots of samples
  - » use basic scintillometers and/or spectrometers

LABORATORY WORK

- Essentially this means chemical analysis
- Analyse for labile and stabile U
- Analyse for as many other elements as the budget will allow for

From these data estimates of leachable U, of disequilibrium (U vs eU), and of multielement haloes are possible

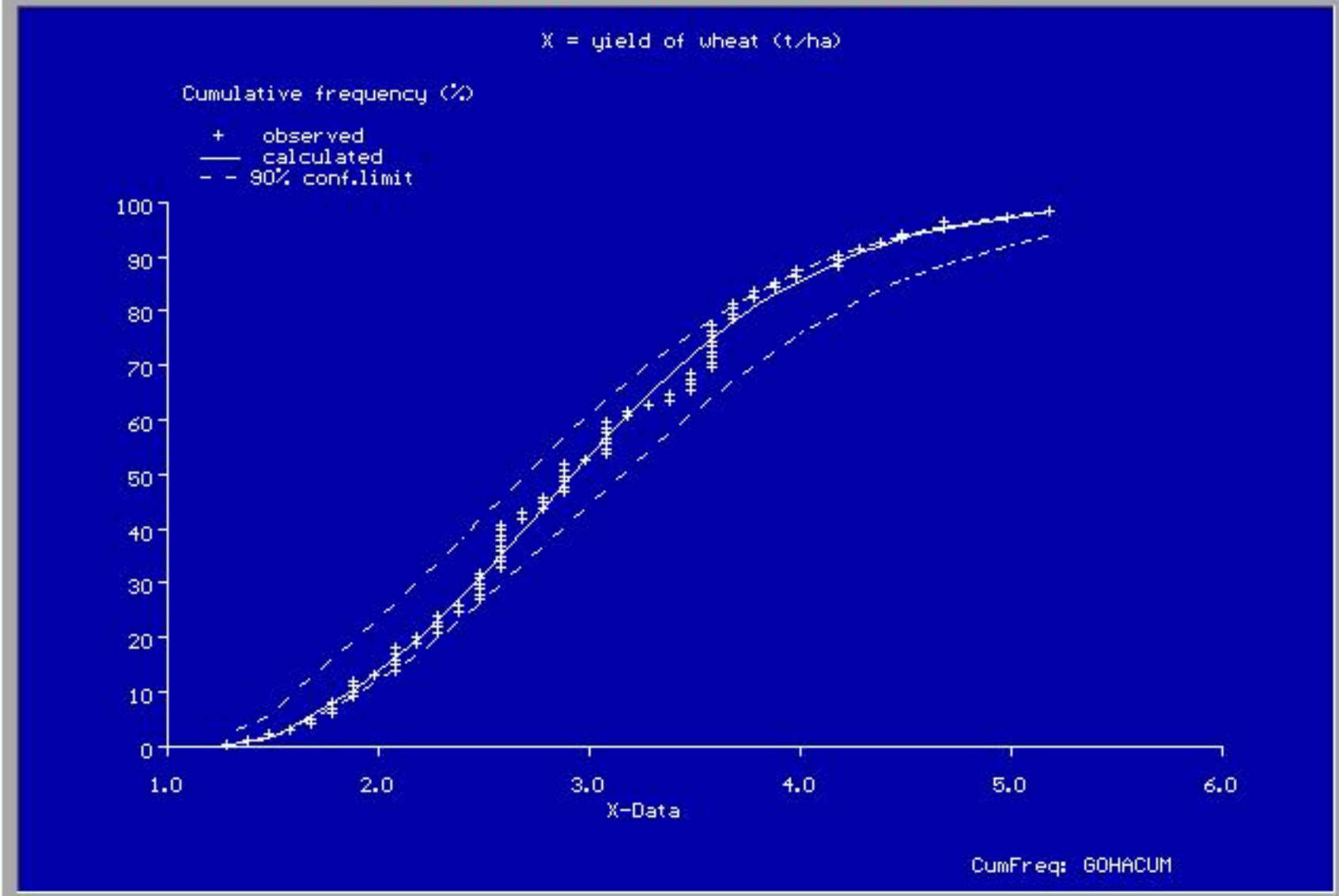
INTERPRETATION

- This is the most difficult but the most important aspect of exploration
  - » Use statistics with care
  - » Use basic statistics

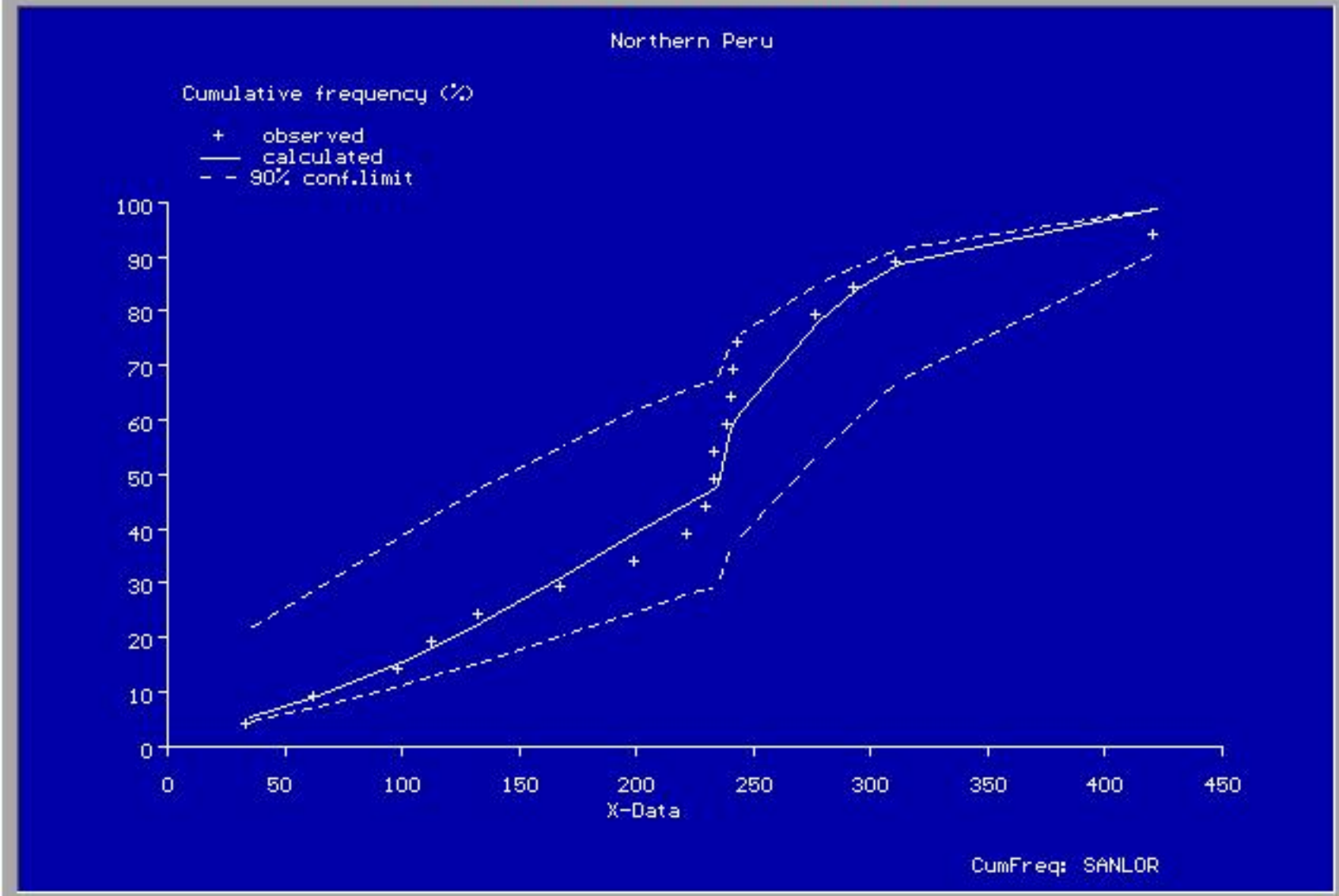
DID YOU KNOW?

- If you do linear, quadratic, and cubic regressions using random numbers you get fits of 1.6%, 10%, and 30% respectively.

DATA FROM FARMERS' FIELDS, GOHANA, HARYANA, INDIA



Monthly rainfall November 1948-1966 in mm



SIMPLE INITIAL PROCEDURES

- Mean – Median comparisons
- Probit calculation

U TD (AF)		*kaolin (Al)*	
Mean	0.386435935	Mean	19.25737408
Standard Error	0.006285952	Standard Error	0.688041576
Median	0.36	Median	15.197
Mode	0.36	Mode	0
Standard Devia	0.163797013	Standard Devia	17.92873174
Sample Varian	0.026829462	Sample Varian	321.4394219
Kurtosis	88.17680407	Kurtosis	2.953938977
Skewness	7.35035621	Skewness	1.704398553
Range	2.73	Range	93.69
Minimum	0.09	Minimum	0
Maximum	2.82	Maximum	93.69
Sum	262.39	Sum	13075.757
Count	679	Count	679

illite (AJ)		*chlor (AL)*	
Mean	76.68699705	Mean	4.055630339
Standard Error	0.824211521	Standard Error	0.62606701
Median	82.469	Median	0
Mode	100	Mode	0
Standard Devia	21.47699757	Standard Devia	16.31382154
Sample Varian	461.2614247	Sample Varian	266.1407731
Kurtosis	3.00296282	Kurtosis	25.07943036
Skewness	-1.775111569	Skewness	4.978257205
Range	100	Range	100
Minimum	0	Minimum	0
Maximum	100	Maximum	100
Sum	52070.471	Sum	2753.773
Count	679	Count	679

The Probit

- Probit = ((value – mean) / std dev) +5

  The above gives results from 0 -10

  Ignore the +5 and the results are from -5 to +5

FINALLY, REMEMBER

- THE REASON WE NEED A LOT OF EXPLORATION GEOLOGISTS IS BECAUSE ORE DEPOSITS ARE DIFFICULT TO FIND