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Tittel
Inerpretations of the Magnetic and HLEM Data from Ballangen, Norway for Outokumpu Nikkel & Olivin A/S, 1996

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Kommune Ballangen	Fylke Nordland	Bergdistrikt	1: 50 000 kartblad 13311	1: 250 000 kartblad Narvik
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Fagområde Geofysikk	Dokument type	Forekomster (forekomst, gruvefelt, undersøkelsesfelt) Bruvannsfeltet Råna Arneshesten
Råstoffgruppe Malm/metall	Råstofftype Ni, Cu	

Sammenheng, innholdsfortegnelse eller innholdsbeskrivelse

Rapporten tolker magnetiske og HLEM-målinger (Slingram) i den nordøstre del av feltet (nord og vest for Arneshesten).

Det magnetiske bildet antyder flere magnetiske soner, eller eventuelt et bredt magnetisk legeme midt i feltet. Po i skifer er årsak til flere av sonene.

Det konkluderes med at det muligens finnes et ledende og magnetisk legeme på dypet, midt i feltet som kan tilhøre det ultramafiske massivet og derfor kan inneholde malm.

Anbefaler videre undersøkelser i øst.

INTERPRETATIONS OF THE MAGNETIC AND HLEM DATA
FROM BALLANGEN, NORWAY
FOR OUTOKUMPU NIKKEL OG OLIVIN, 1996

Turo Ahokas, GX Consulting

24.10.1996

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1. Introduction

This survey area is a northern or northeastern extension of the earlier measured area around the known ore deposit. The location map is presented in Figure 1.

The survey was carried out in W - E direction with a 50 m line separation. Both magnetic and horizontal loop EM survey were carried out and the results of the ground survey are discussed in a separate report by Suomen Malmi Oy.

2. Magnetic interpretations

The magnetic map (see Appendix 2.2, report by Suomen Malmi Oy) shows mostly very weak anomalies. Only near the eastern border of the survey area there exist some stronger anomalies.

Although the weak anomalies in the middle of the area are rather due to the variation of the susceptibility inside one rock type than due to different rock types, all the measured profiles were interpreted to detect some continuing zones, which may include some mineralizations.

In the earlier works it was noticed that the ore lenses have the highest susceptibility values (> 0.01 SI) but also some pyrrhotite bearing schists have quite high susceptibilities.

Figure 2a shows the interpretation of Profile 2750N in the southern part of the area. According to this interpretation the dips of the magnetized bodies are mostly to the west (although very steep) but in the east the bodies are more vertical or even dip to the east. It is also possible that the body at 3270E is wider and its susceptibility is higher deeper.

Another possible interpretation of the eastern end of the same profile is presented in Figure 2b. This interpretation shows another magnetized body deeper on the east side of the magnetized body near the ground surface. They both can be quite vertical.

Figures 3a and 3b show the same situation on the line 2850N but now the deeper seated body is clearly wider. Notice also a highly magnetized body near the eastern end of the line.

Unfortunately there were no data available to fix the dip values to help these interpretations. Anyway these highly magnetized bodies may be located near the western edge of a bigger magnetized body outside the survey area (mineralized zones near the contact of an ultramafic massif?).

The interpretations of the profiles between the co-ordinates 3000N and 3350N show mostly quite weak anomalies (see the interpretations of Profiles 3000N, 3200N and 3350N in Figures from 4 to 6). Some of these weak anomalies may be caused by deep seated bodies but it was found too difficult to make reliable interpretations of them.

A body with very high susceptibility was detected on Profile 3400N (see Figure 7). This body may be the SW end of a body continuing to the NE, outside the survey area.

Some narrow magnetized zones were also detected in the northern part of the area but they are probably pyrrhotite bearing schists.

One magnetic profile was measured in the S - N direction to the NE of the survey area. This profile shows higher susceptibility values than detected in the systematically measured area (Figure 8) and it gives an idea that between the systematically measured area and this line 4200E there exists a big magnetized body, possibly an ultramafic massif but unfortunately there were no data available of that area.

A schematic magnetic interpretation map is presented in Figure 9 showing several narrow weakly magnetized zones in the middle of the survey area and some highly magnetized bodies near the eastern border of the area. Because of weak anomalies and narrow zones very close to each other, there may be some errors done when connecting different zones from one profile to another.

According to the interpretations it is also possible that there exist a big magnetized body deep in the middle of the area and it could be a deeper part of the possible massif to the east of the area. But because there were no useful data to confirm this idea, the interpretations were carried out assuming that there exist some very weakly magnetized rocks near the ground surface (susceptibilities < 0.002 SI).

3. HLEM interpretations

The horizontal loop EM (HLEM) survey showed several SSW - NNE trending narrow conductors (see the HLEM maps of the report by Suomen Malmi Oy). Mostly these conductors are between the magnetized zones and therefore they probably are graphite bearing schists.

In the middle of the area the measurements by 220 Hz show wider anomalies than the other frequencies. This may be due to some deeper seated conductors or the conductive zones are more horizontal deeper. The same situation can be seen also near the eastern border of the survey area between the coordinates 3200N and 3400N (see Figure 10). These possible deeper conductors are also magnetized (moderate or weak susceptibilities) as the magnetic interpretations showed.

The measurements of Profiles 2750N and 2850N indicate that there exists a good conductor to the east of the survey area and probably this conductor is the same as detected in magnetic interpretations.

4. Conclusions and recommendations

According to the magnetic interpretations there exist several weakly magnetized zones or one wide heterogeneously magnetized body in the middle of the survey area.

Some smaller parts of the detected zones are quite highly magnetized, just like the mineralized parts of the known intrusion. Mostly the magnetized zones are anyway pyrrhotite bearing schists and the conductive zones graphite bearing schists. Only those parts in the middle of the area, where may exist conductive and magnetized bodies deeper are worth of closer examination (= drilling?).

To the east of the survey area there probably exist highly magnetized bodies (and conductors), which may belong to a big ultramafic massif and they can therefore include ore deposits. Extending the survey area to the east (if possible?) is so highly recommended.



Ballangen / Magnetic profile 2750N

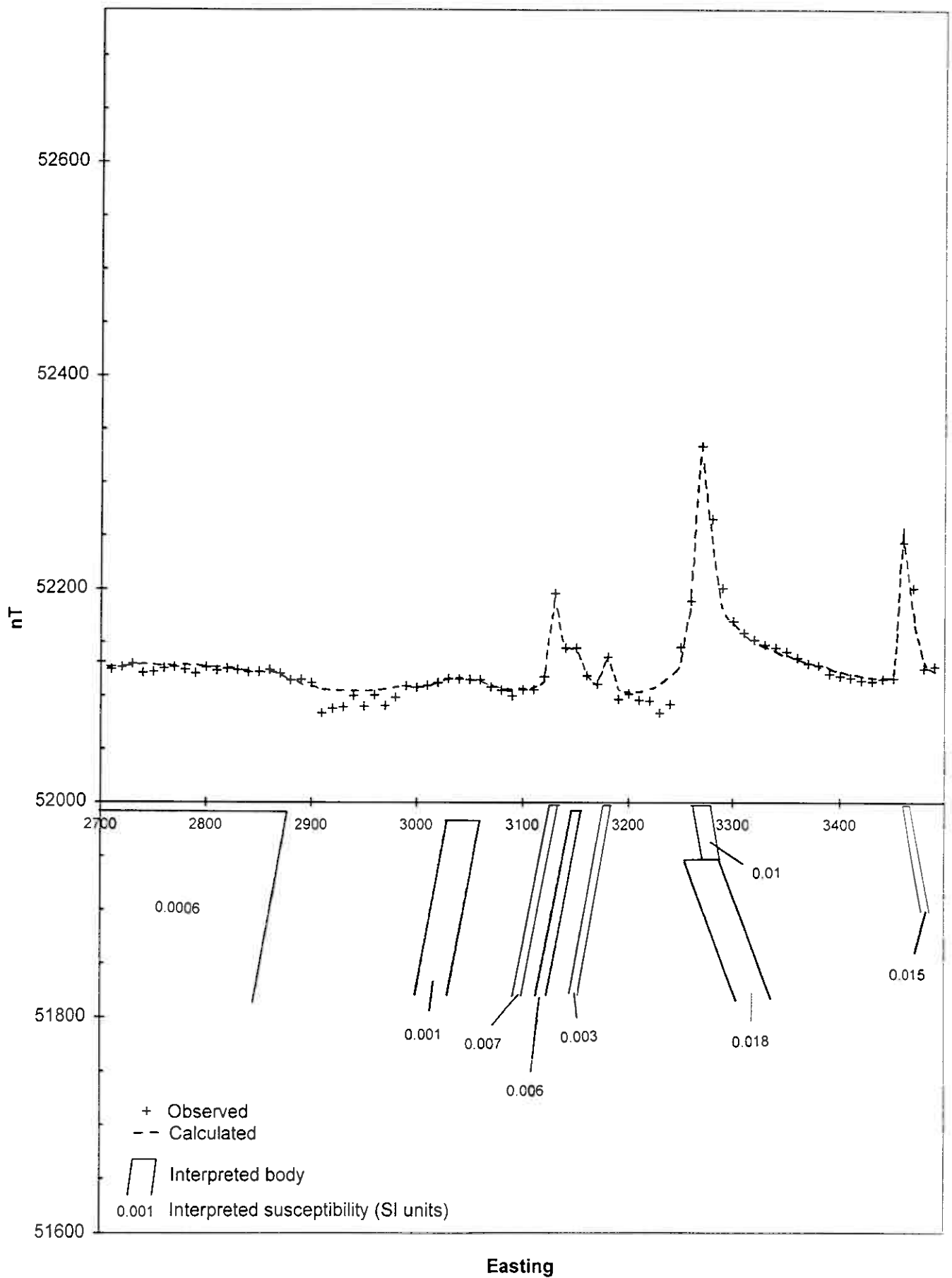


Fig. 2a

Ballangen / Magnetic profile 2750N

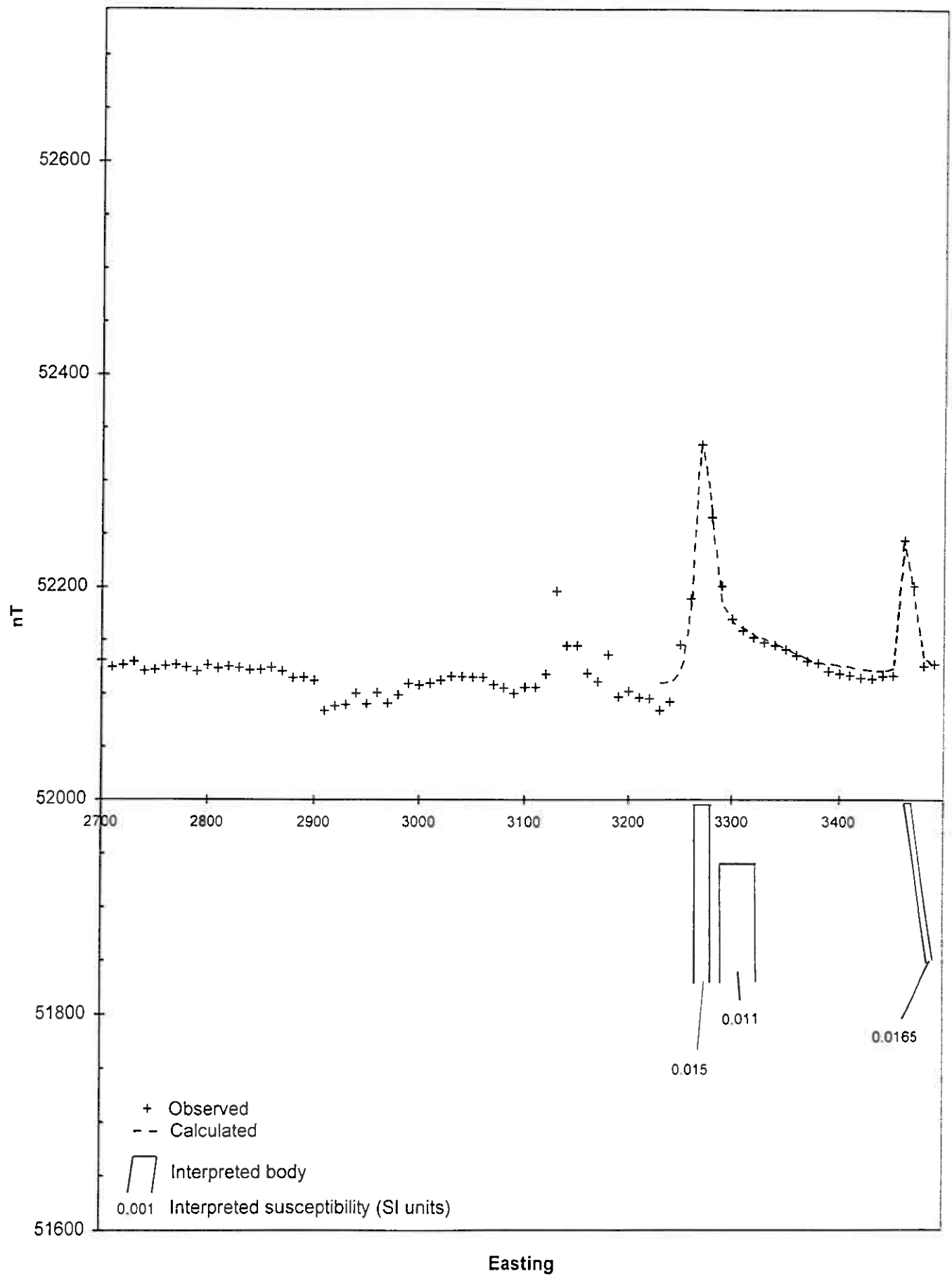


Fig. 2b

Ballangen / Magnetic profile 2850N

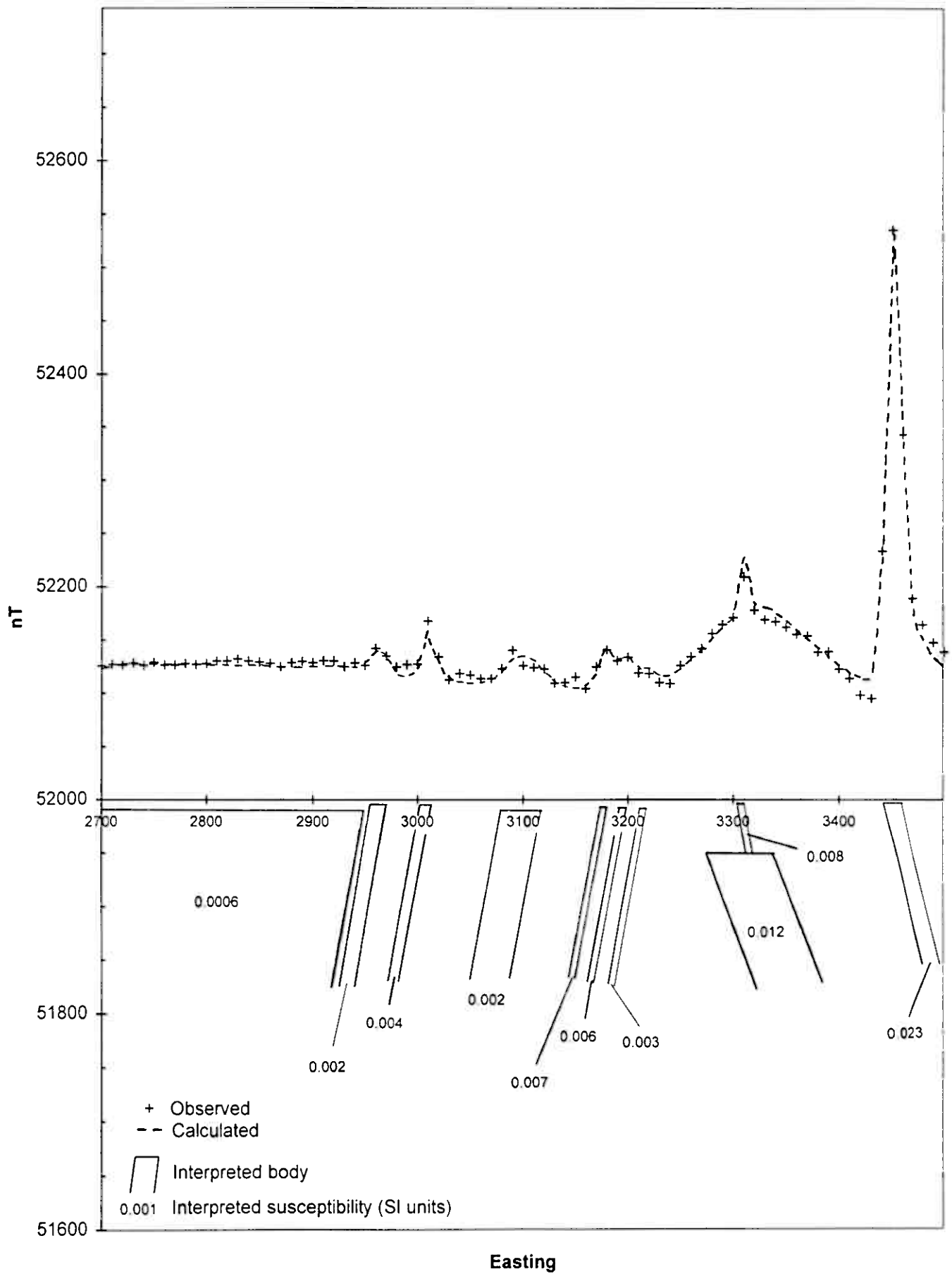


Fig. 3a

Ballangen / Magnetic profile 2850N

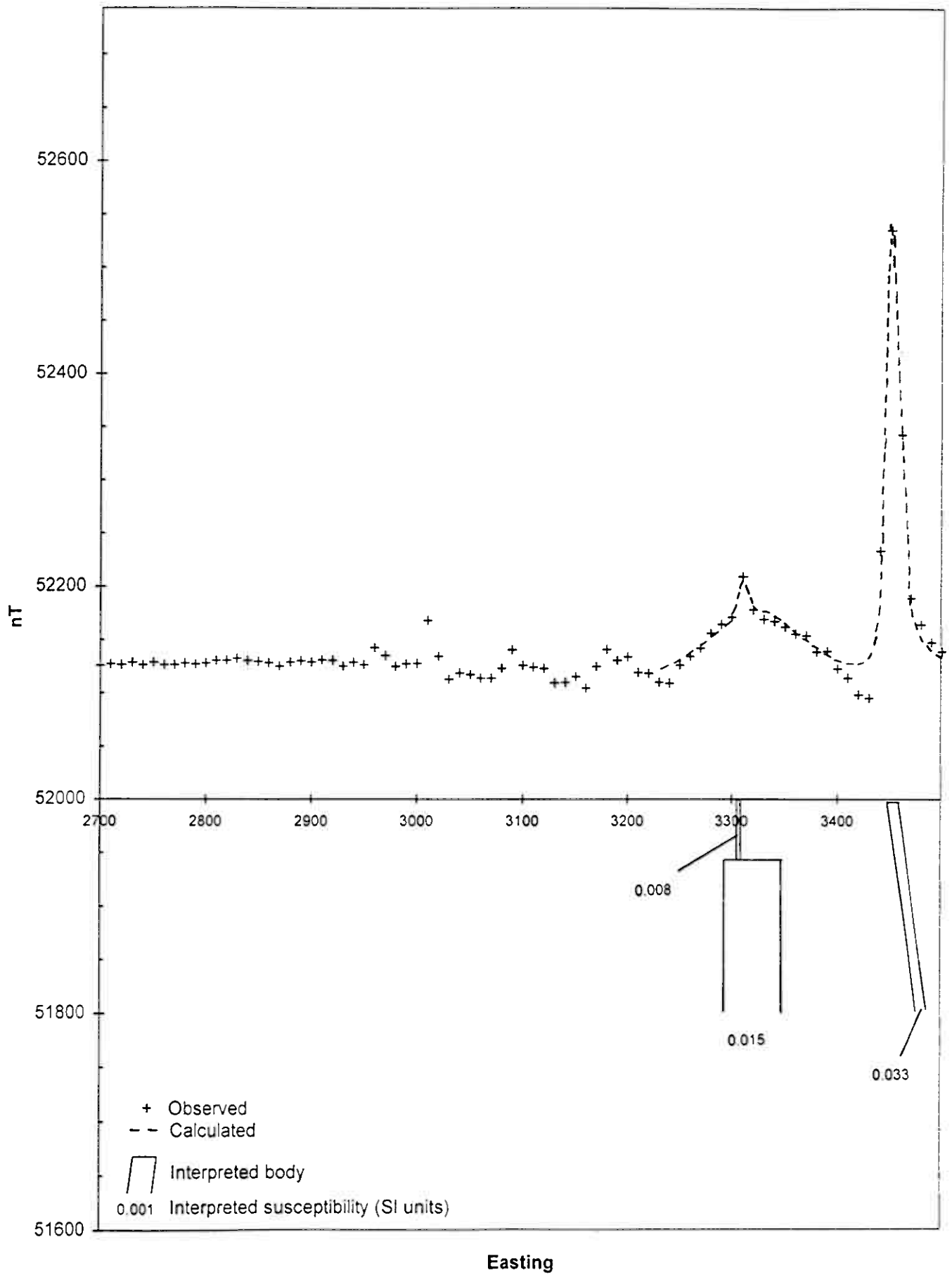


Fig. 3b

Ballangen / Magnetic profile 3000N

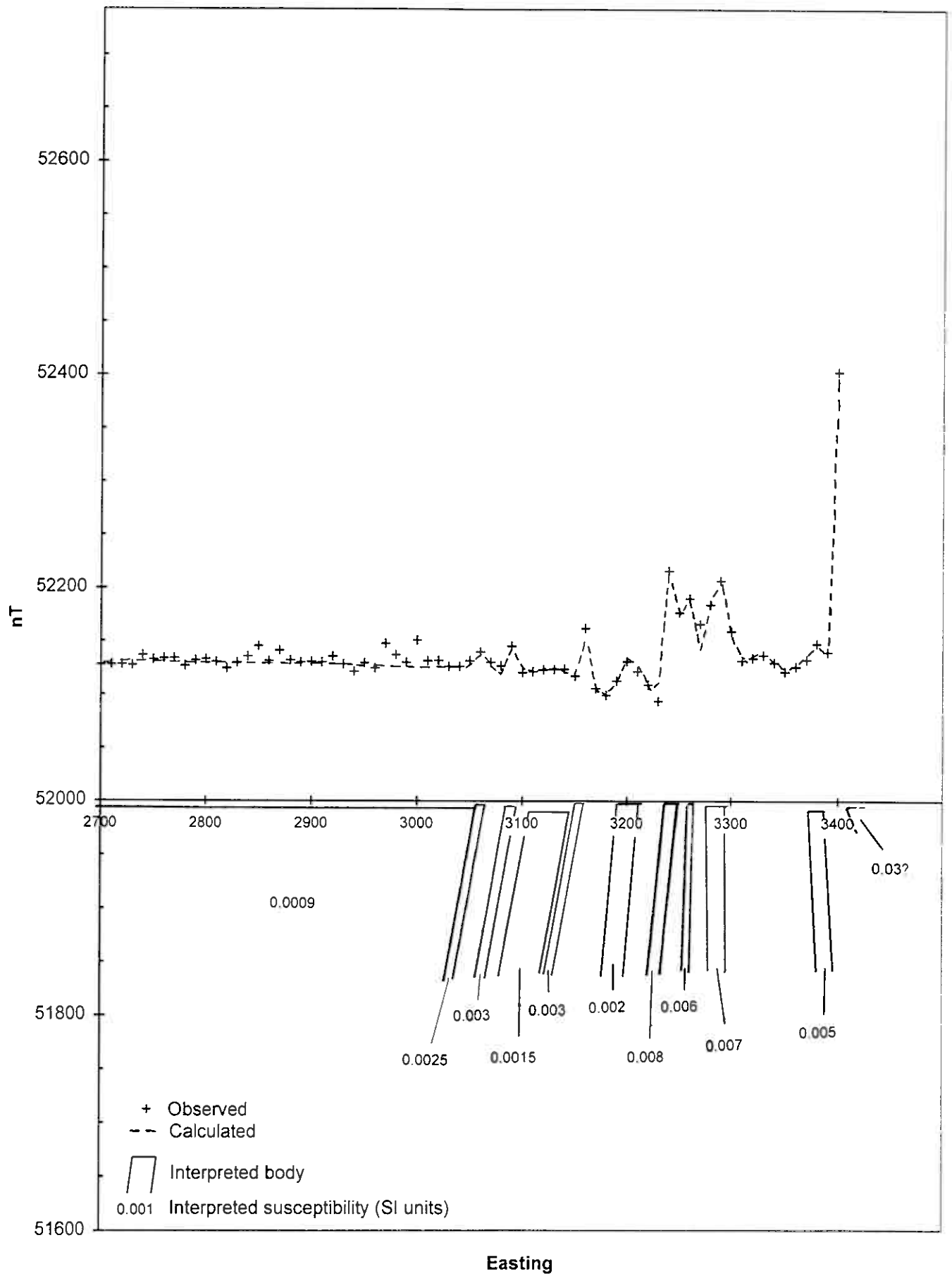


Fig. 4

Ballangen / Magnetic profile 3200N

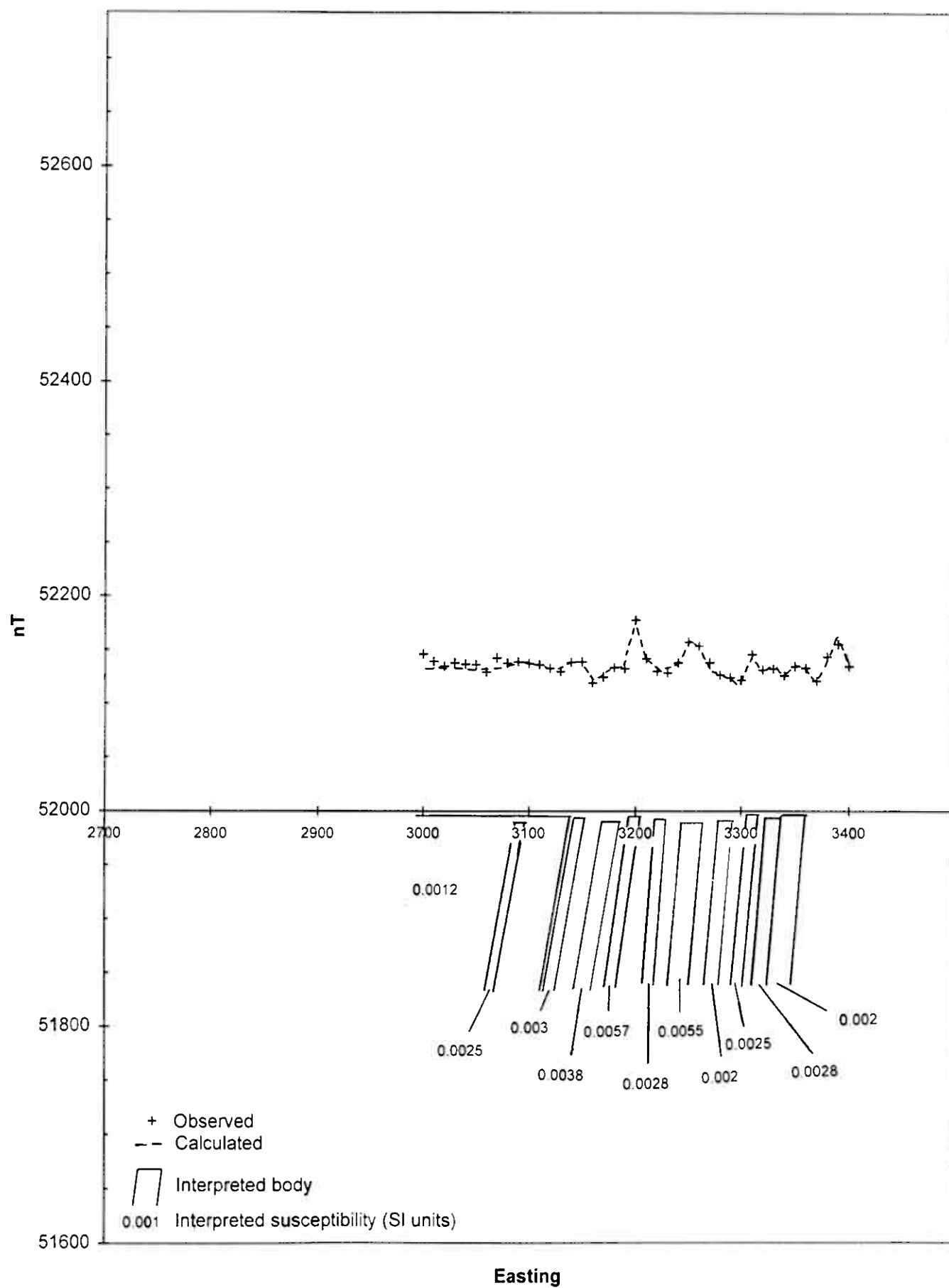


Fig. 5

Ballangen / Magnetic profile 3350N

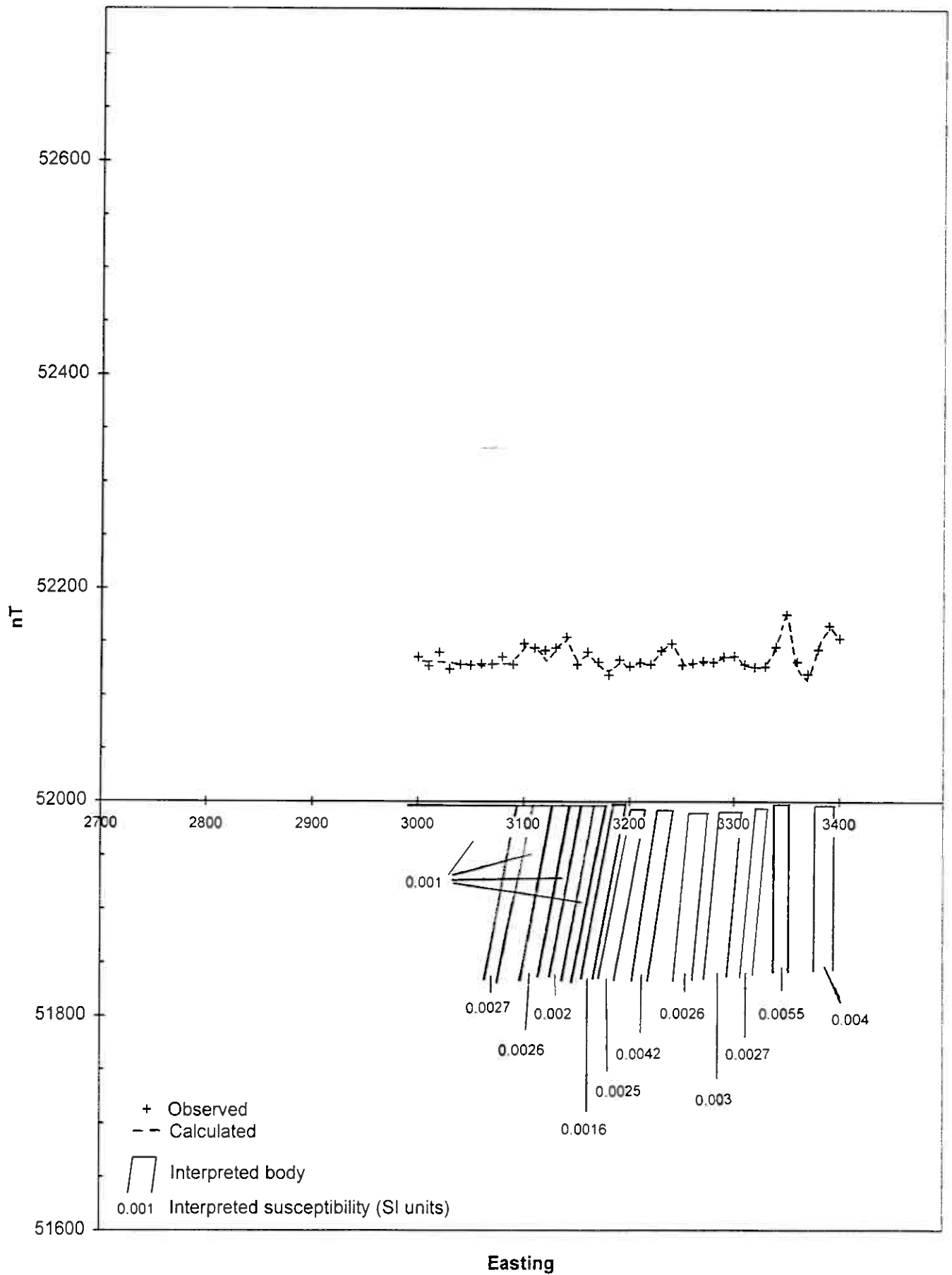


Fig. 6

Ballangen / Magnetic profile 3400N

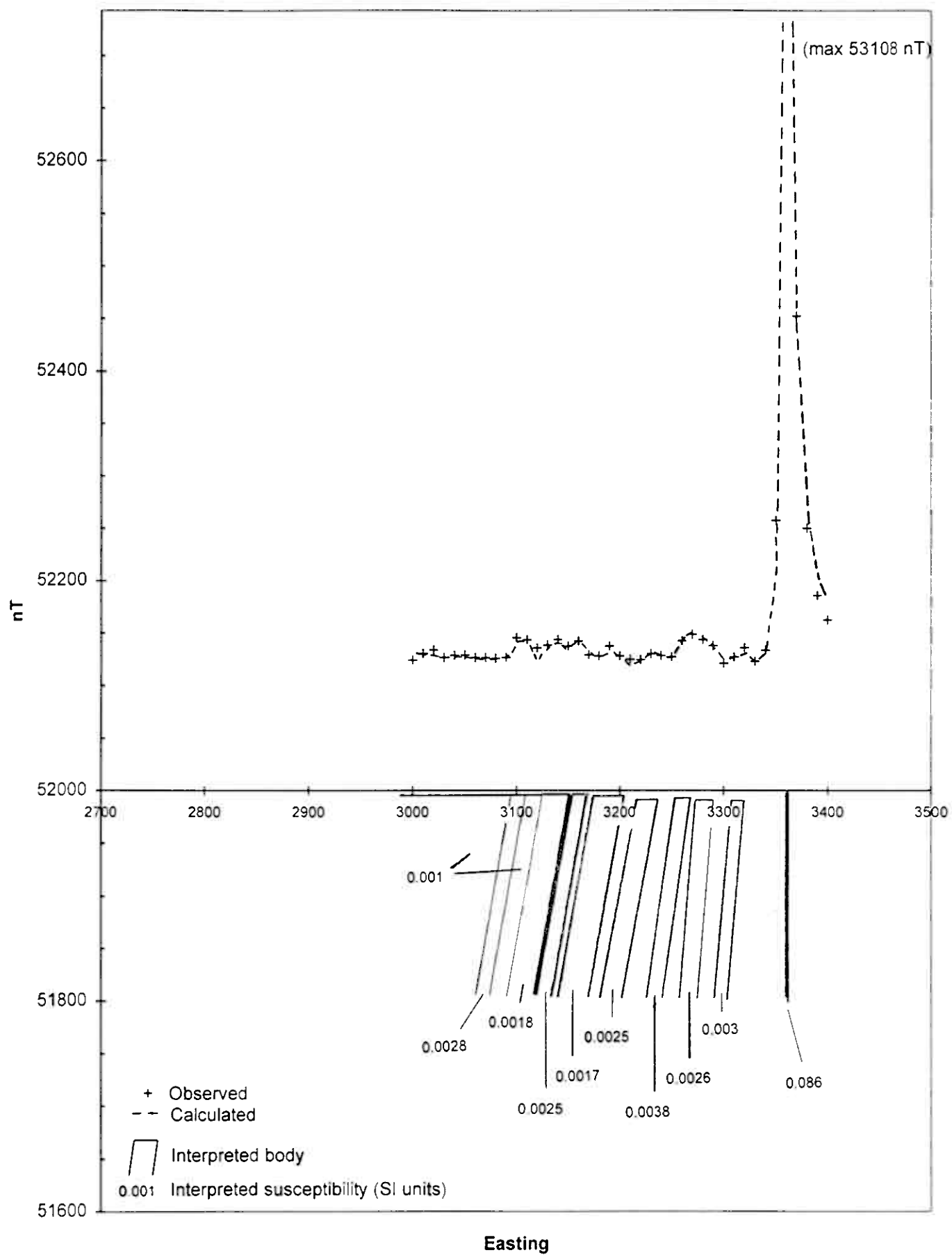


Fig. 7

Ballangen / Magnetic profile 4200E

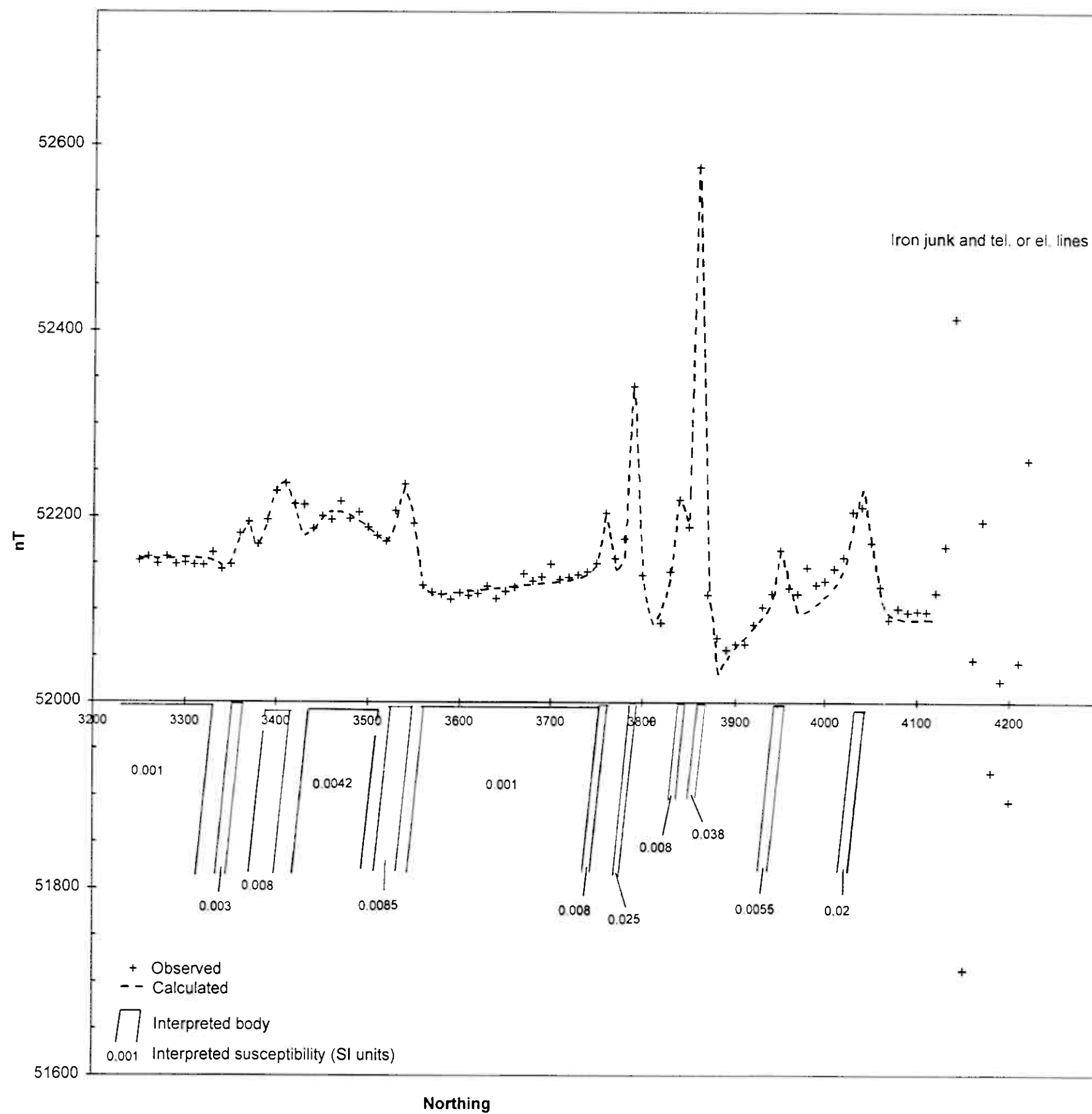
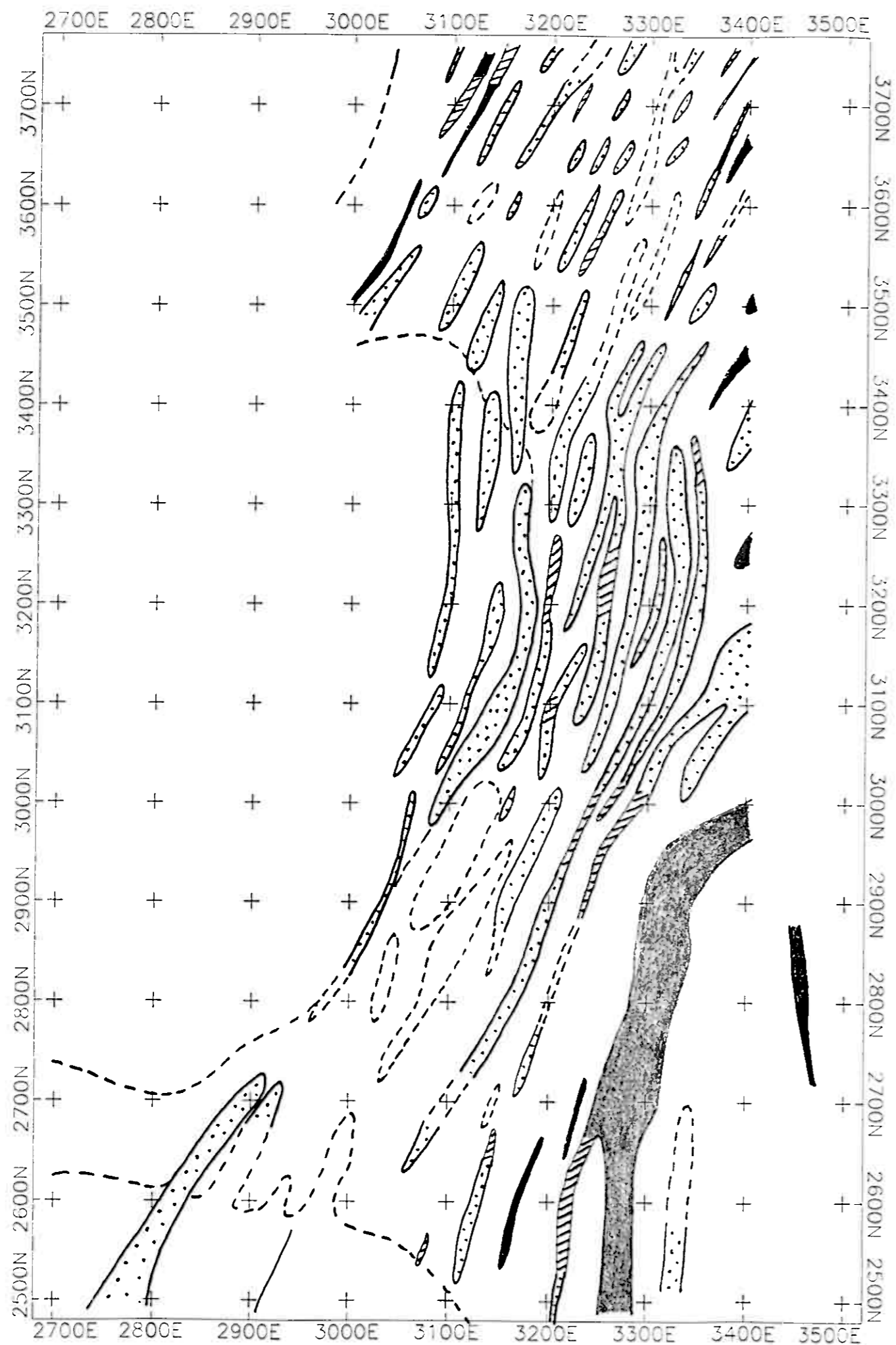
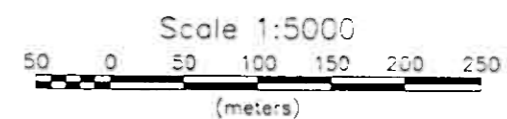


Fig. 8



Interpreted susceptibility (SI)



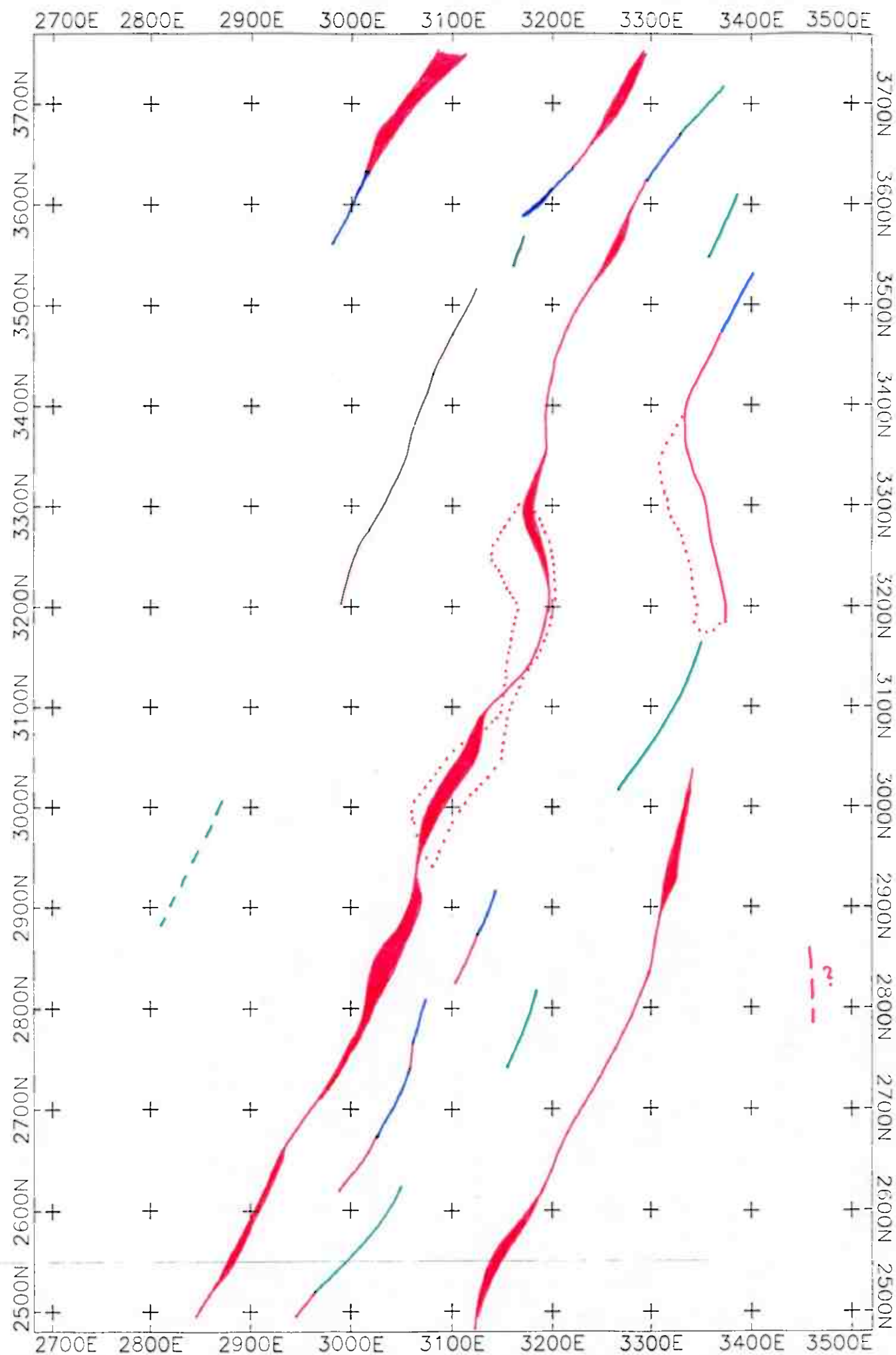
Nikkel og Olivin AS

Ballangen

Magnetic interpretation map

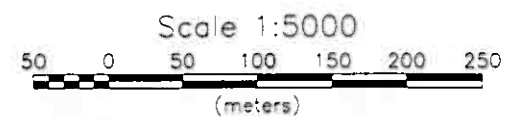
Ground surface projections of
magnetized bodies

Fig. 9



Interpreted conductivity

- High
- Medium
- Weak
- ⋯ Possible deep seated conductor



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Ballangen HLEM interpretation map
Ground surface projections of conductive bodies

Fig. 10