艾都慧测

MT电磁勘探金箍棒Pro

MT Electromagnetic Exploration Golden Rod Pro

操作手册

OPERATION MANUAL

官网/WEBSITE:WWW.AIDUSH.COM

上海艾都慧测智能科技有限公司

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目录

一、仪器概述

MT 电磁勘探金箍棒 Pro 是在传统 MT 电法物探理论的基础上，参照国内外先进的物探找矿仪设计，结合物联网、AI 等先进技术综合研制而成，数据采集电路和算法经过了近 50 年技术迭代累积，能去除全球绝大部分地区的地形、地面环境干扰，特制的 MN（电极）和 TT（电磁探头）两种测量模式可以切换测量，在一些干扰特别大的地方尽量使用 MN（电极）测量，较大程度解决野外数据采集干扰问题，获得多项国家专利 （201110454869.X、201310205318.9、202121767124.4、202121767138.6 等等）。特别是发明专利《地球电磁场场源修正的物探方法及测量装置》解决场源随时变化问题。

2016 年公司上市以来，深受全球广大用户的支持与信任，同时也收集了一些不足和希望提升之处，于是在 2024 年改款升级了全新的电磁勘探金箍棒，在多方面进行优化升级：提升测量精度，优化测量频率精度这样可极大的提升仪器测量精度，优化 MN 电极接地性能，提升数据采集稳定性；增加了深度分层模式，1G 系列可选 2 米、4 米两种深度间隔，1600 系列可选 5 米、10 米、20 米三种深度间隔，可满足用户对深度分层不同的需求；增加了深度分段选择，可设置测量起、止深度，满足用户只需要测量某段深度的特殊需求；增加数据处理功能，根据型号来设置数据处理参数，自动生成 2D、3D 和切片图；增加 AI 自动分析功能，可在线 AI 自动分析功能，24 小时在线数据分析。

MT 电磁勘探金箍棒 Pro 主要用于水文地质勘查、找矿及一些工程物探工作等。金箍棒仪器通过 WiFi 无线来连接操控主机、手机和平板电脑（目前仅支持安卓和鸿蒙系统）设备终端来对进行相关参数设置、数据采集、数据处理、快速反演计算、2D/3D 自动成图、AI 自动分析等。还可以通过 WEB 端在 PC 上与云服务器间数据共享，实现 APP 端对采集数据进行各项数据处理功能。

二、主要特点

1、提升准确率和稳定性：优化测量频率精度这样可极大的提升仪器测量精度，优化 MN 电极接地性能，提升数据采集稳定性；

2、增加了深度间隔可选：1G 系列分为 2 米、4 米两种深度间隔可选；1600 系列分为 5 米、10 米、20 米三种深度间隔可选，可满足用户对深度分层不同的需求；

3、增加了深度分层模式：增加了深度分段选择，可设置测量起、止深度，满足用户只需要测量某段深度的特殊需求；

3、全新的软件:自带数据处理功能，自动生成 2D、3D 和切片图，还有在线 AI 自动分析功能，24 小时在线数据分析。

4、增加离线测量键：通过 WiFi 完全无线连接，无需连接任何电缆，即使在无手机和平板的连接下实现离线测量

三、工作原理介绍

电磁勘探金箍棒是在 MT 电磁法基础上简化升级，利用大地电磁场作为场源来研究地球内部的电性结构，依据不同频率的电磁波在导电媒质中具有不同趋肤深度的原理，在地表测量由高频至低频的地球电磁响应序列，研究地下不同深度地质体的电性变化差异，确定地下地质体的赋存状态。

3.1 电磁波传播理论、亥姆霍兹方程

地面电磁波发送到地下，电磁波在岩土中的传播遵循 Maxwell 方程。如果假设大多数地下岩土为无磁性物质，并且宏观上均匀导电，不存在电荷积累，那么 Maxwell 方程就可简化为：

$$\left.\begin{aligned}\nabla^2 H + k^2 H = 0\\ \nabla^2 E + k^2 E = 0\end{aligned}\right\} \qquad (1)$$

式中 k 称为波数（或传播系数）。

$$k = [\omega^2 \mu\varepsilon - i\omega\sigma\mu]^{\frac{1}{2}} \qquad (2)$$

考虑到传播系数 k 为复数，令$k = b + ia$，其中：a 称为相位系数，b 称为吸收系数。

本产品的电磁波频率范围内（0.01Hz-8KHz）,通常可以忽略位移电流，这时 K 进一步简化为：

$$k = -i\omega\mu\sigma \qquad (3)$$

3.2 波抗阻与电阻率

有亥姆霍兹方程变化的磁场感生出变化的电场，我们有磁电关系：

$$\frac{E}{H} = -\frac{i\omega\rho}{k} \qquad (4)$$

表面阻抗 Z 定义为地表电场和磁场水平分量的比值。在均匀大地的情况下，此阻抗与入射场的极化无关，和地电阻率以及电磁场的频率有关：

$$Z = \frac{E}{H} = \sqrt{\omega\mu\rho}e^{i\pi/4} \qquad (5)$$

（5）式可用于确定大地的电阻率。

$$\rho = \frac{1}{5f}\left|\frac{E}{H}\right|^2 \qquad (6)$$

3.3 趋肤深度

在无磁性介质中，趋肤深度公式为：$\delta \approx 503\sqrt{\rho/f}$ （7）

由上式可知，电磁波的穿透深度与频率、电阻率有关系。频率一定，电阻率越高穿透深度越大，电阻率一定，频率越低穿透深度越大。

四、仪器整体介绍

电磁勘探金箍棒因外形极像中国神话故事中孙悟空的神器金箍棒（图1），主要用途用于找矿，所以得名为电磁勘探金箍棒。它高度集成了采集电路、MN 电极、TT 传感器、高性能锂电池、开关按钮、充电口（图 2）。

其中电磁传感器采用经过特殊热处理后的合金材料作为电磁传导铁芯。在铁芯的外层使用模具骨架精心绕制一定数量线圈，精密匹配调试出不同精度的传感器来适用不同深度的测量要求。一般来说，电磁传感器的铁芯长度越长测量精度越高，性能也越稳定。特别在低频段测量效果好，测量深度会越深，常用几个型号长度有 34cm、65cm、79cm、94cm、109cm，长度不同重量也不同。

图 1

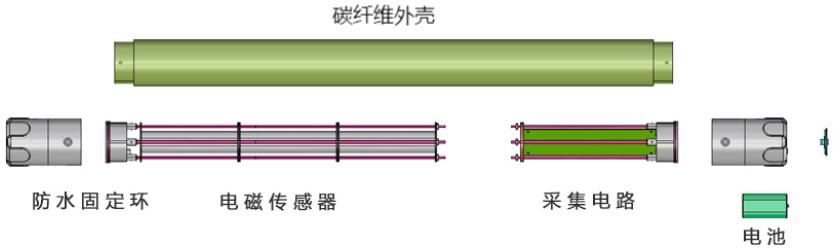

图 2

4.1 主要技术参数

升级款物探金箍棒 主要技术参数

参数 \ 型号	ADMT-1G	ADMT-1GT2	ADMT-1GT3	ADMT-1600WT4	ADMT-1600WT5
最大深度	100m			1600m	
深度间隔	2/4(m)			5/10/20(m)	
电池功耗	7.4V2600mAH锂电池，功耗约140mA				
连接方式	WIFI				
MN电极	100*95*30mm L形合金电极4只				
主要功能	可选起止深度范围、深度间隔可设置、2D/3D自动绘图、AI自动分析、在线离线测量方式				
TT电磁感应线圈（mm/w）	——	300/0.2	450/0.3	450/8	450/12
TT电磁感应铁芯（KmH/m）	——	120	200	300	400
工作环境	能插地面	任何地面			
频率范围(HZ)	1-8K				
测量模式	MN	MN/TT			
分辨率	0.1mV±5%			0.01mV±1%	
采样时间（秒）	14-350			14-2240	
主机重量(kg)	0.8	1.9	2.6	3.3	4
主机尺寸（mm）	340*71	650*71	790*71	940*71	1090*71
运输重量(kg)	4.5	6	7.5	8.5	9.5
运输尺寸(mm)	540*225*195	785*225*195	940*225*195	1090*225*195	1240*225*195

图 3

五、操作软件主页面介绍

图 4

5.1 系统设置

主要包含有参数下载、蓝牙、WiFi、语言、WiFi 热点、移动数据、智能配网、屏幕亮度等系统功能，根据实际需要来使用，部分功能暂时可能不用到。

5.2 文件浏览

可以看到已经测量或该账户上下载的文件，并且可以对文件进行删除、云端（分享、下载、删除）、备份、查看、绘图等操作功能。

5.3 用户信息

主要包含注册登录、退出登录、个人信息、扫码登录、设备绑定、关于我们、系统消息、检查更新等功能。

5.4 电池电量

显示操控主机、金箍棒设备电量，交替滚动显示，‘SYSTEM：电量百分比’表示当前操控主机的电量；金箍棒设备连接后显示“ID 编号：电量百分比”。

5.5 中央区域

显示软件 APP 版本号、电磁勘探金箍棒的固件版本、产品名称、产品型号、连接状态、TCP 服务开启状态等。产品名称和型号首次使用时会显示为空，在初始化连接了设备后会默认显示最后一次连接的产品名称和型号。

5.6 仪器设置

连接设备、测量模式、间隔模式、叠加次数、开始深度、结束深度、测量起点、测点增量等操作功能。

5.7 数据处理

包含剖面数据合并、测区数据合并、设备型号、配置方案、选择数据文件、查看更多设备、保存设置、执行处理等操作功能。

5.8 绘图分析

主要包含数据处理开关、（垂向等值线图/平面等值线图/平面曲线图等切换）、测线/深度选项、保存图片等。

5.9 新建测量

新建一个项目或选择已有项目继续测量。

5.10 系统控制栏

从左往右依次是隐藏系统控制栏、调大音量、返回、返回桌面、功能键（查看当前后天正在运行的程序）、截图键、调大音量。

六、初始化设置

6.1 选择操作主机或软件安装

使用操作主机直接打开“艾都慧测”APP 软件，如果是使用手机或平板电脑目前仅支持安卓和鸿蒙系统）设备终端来连接电磁勘探金箍棒，先扫描二维码（图 5）或输入下载链接（http://d.aidush.com/d4）来下载“艾都慧测”APP 软件，安装完成后并打开该软件来使用。

图 5

图 6

6.2 初始化流程图

首次时，应进行初始化连接注册，可参照以下流程图（图 7）：

图 7

6.3 WiFi 热点设置

在软件主界面，选择系统设置→WiFi 热点→设置热点→设置 WLAN 热点（图 8）→网络名称设置为该仪器的型号全称（如:ADMT-1GT2）→安全性：WPA2 PSK→

密码：88888888→保存→开启 WLAN 热点  →返回上一级界面→开启服务→完成，连接成功可能需要 1-3 分钟。

或在系统设置中打开个人热点设置，按照以上流程进行设置。

图 8

6.4 连接电磁勘探金箍棒

个人热点设置完成并打开后，长按电磁勘探金箍棒一端的面板上电源按键开机红灯至常亮为开机成功，WF 灯（蓝灯）慢速闪烁。在 APP 软件主界面（图 9）按下“未开启”按钮，等待 10-30 秒左右，会显示“已连接”和“已开启”，金箍棒面板上的蓝灯将会常亮，软件中央区域会显示版本号、电磁勘探金箍棒及具体型号，初始化成功。

图 9

6.5 日常连接电磁勘探金箍棒

初始化后，日常连接就方便很多，在软件主界面，选择系统设置→WiFi 热点→开启 WLAN 热点  →返回上一级界面→开启服务。

长按电磁勘探金箍棒一端面板上的电源（红灯）至常亮，WF 灯（蓝灯）慢速闪烁。在 APP 软件主界面按下“未开启”按钮，等待 10-30 秒左右，会显示“已连接”和“已开启”，金箍棒面板上的蓝灯将会常亮，软件中央区域会显示版本号、电磁勘探金箍棒及具体型号，这样便连接成功了。

七、简易操作使用方法

7.1 仪器设置

按照（6.5）日常连接后，首先检查一下在电磁勘探金箍棒中有没有数据。具体操作方法参照为：

在“仪器设置”内点击“还原数据”→在“新建项目”中随意或根据自己习惯输入项目名和测线号→点击“读取数据”，如果读取到数据说明之前有测量数据未读取，确认是否是需要保持的数据来保持记录；如果未读取数据，则说明电磁勘探金箍棒没有数据，可以重新设置相关参数进行新的测量任务了。

点击“仪器设置”，确认连接设备已上线（出现设备 ID 号以及绿灯亮起），选择测量模式→间隔模式→叠加次数→开始深度→结束深度→测量起点

→测点增量→设置，点击设置后会提示“设置参数成功”。

图 10

电磁勘探金箍棒支持“在线测量”和“离线测量”两种操作方式，“在线测量”是指利用操控主机、手机或平板电脑上 APP 操作软件来设置相关参数后，直接进行数据测量、数据读取、数据处理、绘图分析等功能。“离线测量”是指利用操控主机、手机或平板电脑上 APP 操作软件来设置相关参数后，就不在操作主机、手机或平板电脑上操作了，而是利用电磁勘探金箍棒上“测量”按键来测量，测量完成后与操作主机、手机或平板电脑连接，一次性读取数据及完成数据处理、绘图分析等功能。

7.2 在线测量

在“仪器设置”完成后，直接“新建测量”（图 11）测量数据，页面中需要输入“新建项目”和“第几测线”，其中测量模式、设备型号、间隔模式、开始深度、结束深度部分为仅查看，不能设置，因为在“仪器设置”中已经完成的设置，如需更改这些设置需到“仪器设置”中去设置更改。

图 11

在“新建项目”中输入项目名和测线号→进入测量页面（图 12）→点击“仪器自检”→点击“数据采集”→待进度条走完，测量即完成。

图 12

读取数据：读取电磁勘探金箍棒内的当前测量数据，在线测量或离线测量均可以完成测量后，一致性读取数据。

删除数据：删除上一条读取的数据，当读取了多条数据时，删除最后一条。

自动绘图：跳转至绘图分析页面，自动绘制前数据的垂向剖面图，也可以进展绘图的其他相关操作。

仪器自检：仪器自检能坚持连接通道是否有效连接、或其他相关功能。

数据采集：仪器在测点布置完成后点击，进行数据采集。

7.3 读取数据

“在线测量”方式下，自己确认已经完成本次剖面测量后，直接点击“读取数据”按钮，一次性把本次测量剖面数据读取过来。

“离线测量”方式下，按照第 6.5 日常连接后，在“仪器设置”内点击“还原数据”→再“新建项目”中随意或根据自己习惯输入项目名和测线号→点击“读取数据”，一次性把本次测量剖面数据读取过来。

7.4 离线测量

在“仪器设置”完成后可以关闭或不连接 APP 软件，使用电磁勘探金箍棒一端“测量”键来实现离线测量，长按“测量”键后发出两声提示声，测量灯 MEAS（绿色）会闪烁，表示已经在测量中。待电磁勘探金箍棒再次发出两声提示声，并且测量灯 MEAS（绿色）停止闪烁为常亮，这时表示该测点已经测量完成，可以下移至下一个测点重复测量，直至完成整条剖面数据的测量。

7.5 简易操作流程图

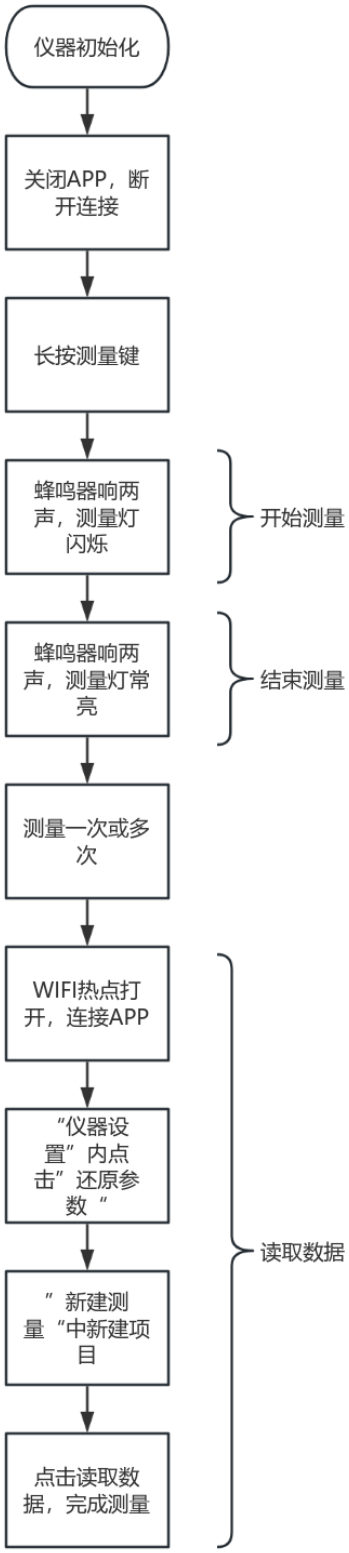

图 13

7.6 简易操作注意事项

1、在测量过程中有可能退出 APP 软件界面或软件后台进程被中断，可通过电磁勘探金箍棒面板上的测量灯 MEAS（绿色）会闪烁或停止来判断是否测量结束，一般闪烁时还在测量中，长亮是测量结束。

2、在测量过程中 APP 软件界面点击测量（在线测量）和电磁勘探金箍棒面板测量键测量（离线测量），可以交叉使用。APP 软件界面点击测量时，如果电磁勘探金箍棒在测量中，APP 软件会提示“正忙中”。

3、测量结束后数据是储存在电磁勘探金箍棒内部，不会自动上传到 APP 软件中，需要手动点击“读取数据”将数据上传至 APP 软件端。

4、测量过程中操作主机、平板或手机没电，但是电磁勘探金箍棒还有电量，是可以继续使用“离线测量”方式进行测量的，待操作主机、平板或手机充电完成后再进行连接读取数据即可。

5、金箍棒在测量过程中断电或死机，当前测量的数据会丢失，但是之前的数据都会保留。

八、绘图分析

8.1 绘图功能进入方式

艾都慧测 APP 软件有三个地方可以进入绘图分析功能，第一是在“新建测量”界面读取数据结束后，直接点击“自动绘图”按钮进入绘图分析功能；第二是软件主界面直接点击“绘图分析”按钮进入绘图分析功能；第三是在软件主界面的文件浏览页面，选择某个文件后点击“绘图”按钮进入绘图分析功能。

8.2 垂向剖面图

其中第一、第二种方式进入绘图功能后，会直接显示当前最新文件的“垂向剖面图”（图 14），可以通过右上角的“垂向等值线图¬”来切换“平面曲线图、平面等值线图”等图形，也可以通过左上角数据处理开关来切换显示数

据处理前、后的图形。点击“项目”可切换到其他项目文件。

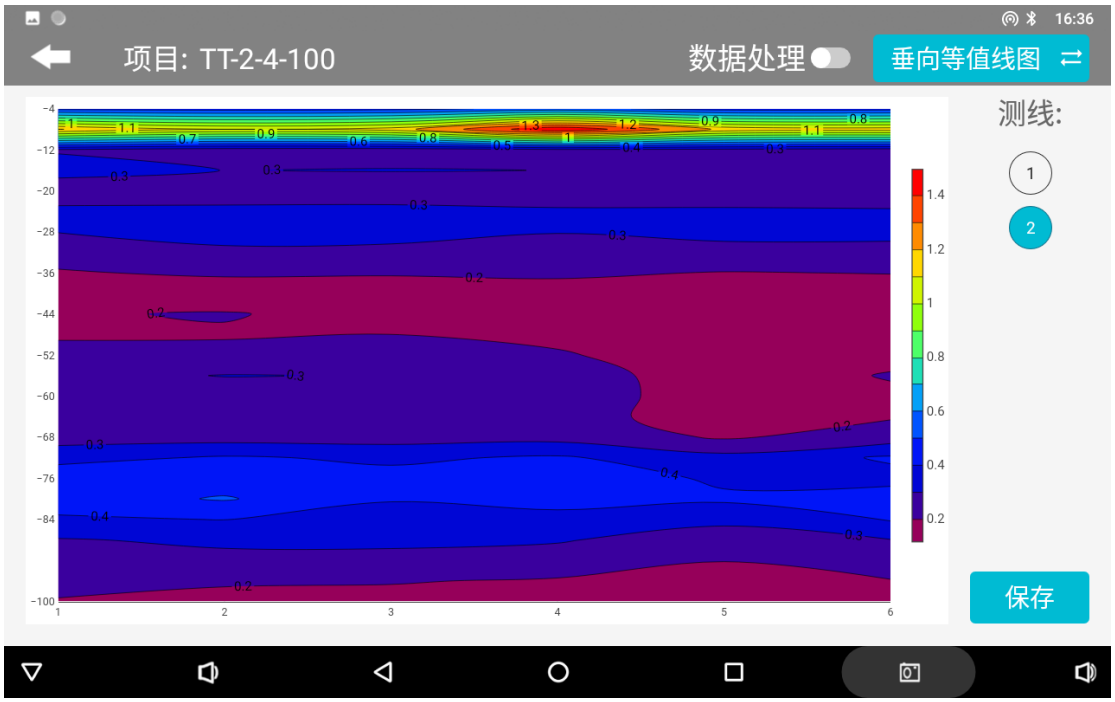

图 14

呈现当前项目文件中所有测线的垂向等值线图，在左侧可以选择测线，在等值线图中点击会显示点击处的 XYZ 值（X-测点号，Y-深度，Z-具体数值）。左下角“保存”可以保存当前图像到平板或手机中。需要最少 1 条测线，每条测线上最少 6 个测点才能成图。

8.3 平面曲线图

呈现当前项目文件中所有测线的具体深度数据曲线（图 15），左侧可选择该文件下不同深度，左下角“保存”可以保存当前图像。

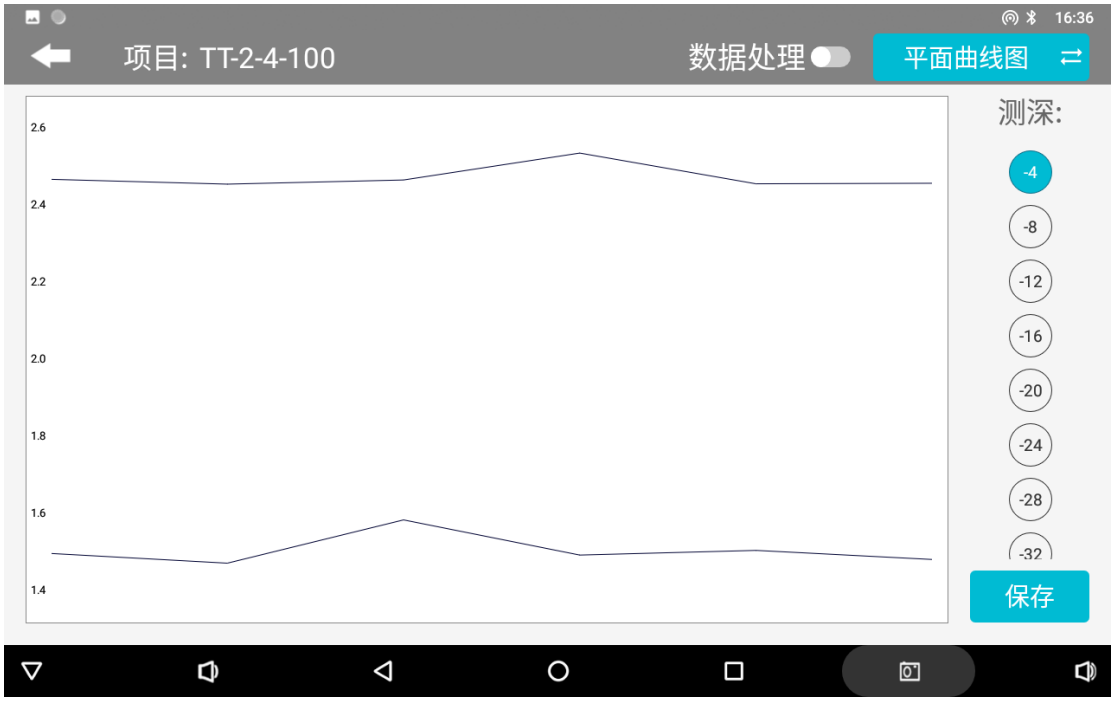

图 15

8.4 平面等值线图

呈现当前项目文件中所有测线的平面等值线图（图 16），左侧可选择该文件下不同的深度图形，在等值线图中会显示 XYZ 值（X-测点号，Y-测线号，Z-具体数值）。左下角“保存”可以保存当前图像。一般至少需要 2 条测线、每条测线最少 6 个测点才能平面等值线图。

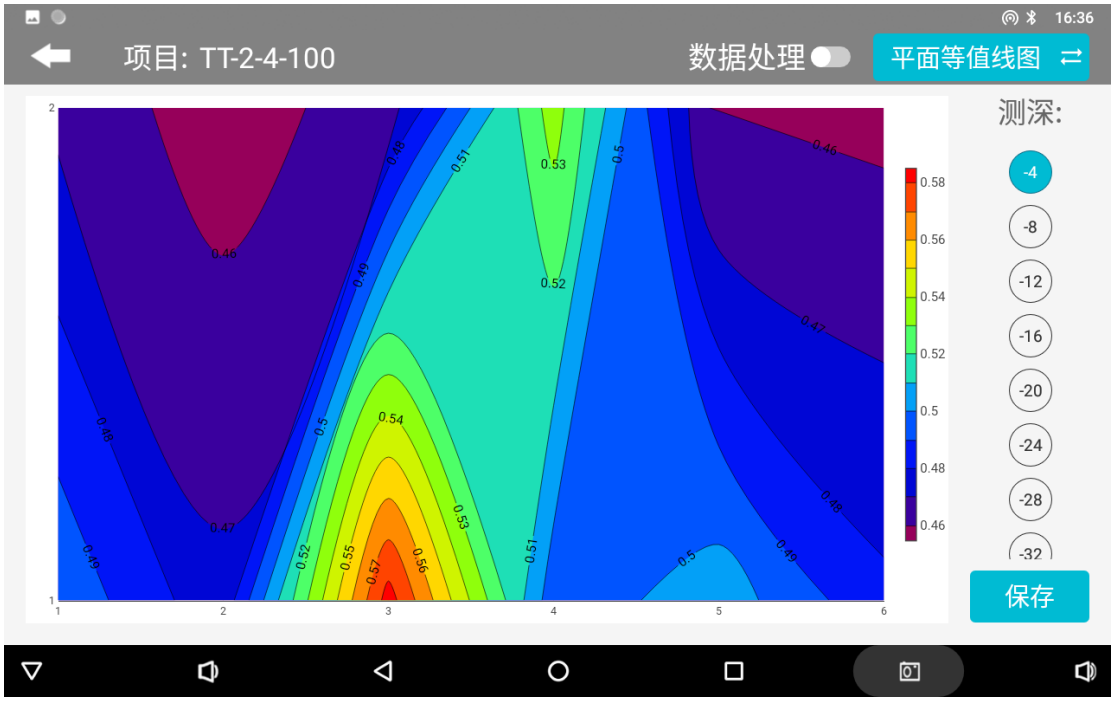

图 16

8.5 AI 自动分析

点击“AI 分析”后系统会进入到该文件数据 AI 分析的结果（图 17），在底部会提示“测点 xx-xx 附近，深度为 XX-XX 米的黑色（红色）框标识区内为异常区域”等提示，这个异常区一般是仪器设置的常规异常判断，也是指导您打井的位置或深度，一般 AI 会提示 1-2 个区域供您选择，您可结合您的经验和实际水文地质环境做出综合判断，做出决策。

同时，如果您觉得结果不满意，可点击屏幕右下方第一个操作图标可进入 AI 分析设置界面（图 18）， 点击“数据下载”可以下载最新的 AI 分析参数，也可点击“参数类型”中可选择“默认”或“AI 推荐”，其中“默认”为公司旗下某型号产品设置的理想分析参数，“AI 推荐”为 AI 分析系统根据用户反馈记录结果来建立数据模型后，AI 自动学习调整生成相关分析参数，原则上这组参数更加贴近真实分析，当然这需要用户自身标记的数据是否准确和标记的数量多寡来决定。

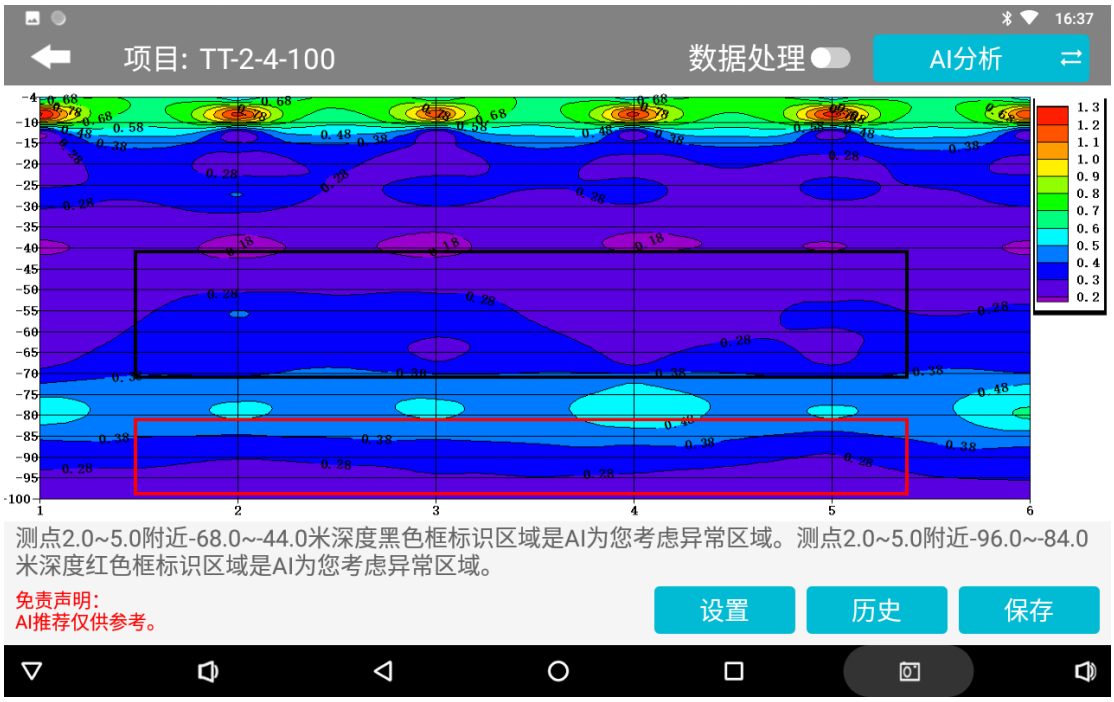

图 17

图 18

也可选择“添加”功能来手动添加属于您这个账户下的 AI 分析参数，我们所有的分析算法已经集中到一个百分比表示，您可手动左右滑动取值范围的百分比来调整 AI 分析的结果，一般百分百越小会显示似电阻率低值区域，百分比越大会显示似电阻率高值区域，也可以是某个中间等，通过对这个百分比的调整来显示到您认为最准确的区域，这样后期 AI 分析时会按照此设置来分析，这样会更准确。也可以设置标记区域为 1，这样只显示一个最优标记区域。

本 AI 参数设置，一般需要非常熟练的使用本仪器，并且有一定实际使用经验和该型号仪器在当地数据表现为依据来设置，如果初级使用本仪器，暂不建议使用。

选择“删除”会删除该组设置 AI 分析参数。

8.6 记录 AI 分析结果反馈

AI 分析结果反馈是非常重要的，因为 AI 是根据用户反馈来机器学习，建立有效的分配规则，所有 AI 自动分析是“越用越准确、反馈越多越准确”。

在 AI 分析界面点击屏幕右下方第二个操作按钮来找到历史记录界面（图 19），选择分析过的数据文件后面的“有效性”栏中的“默认”按钮，如果分析的结果与实际情况一致，则点击“是”（图 20），这时系统会记录有效数据，记录越多准确的数据，AI 分析会越来越准确。

不符合则点击“否”，点击“否”后会弹出绘图效果操作框（图 21），可通过可手动左右滑动取值范围的百分比范围来调整 AI 分析的结果，一般百分百

越小会显示越低值区域，百分比越大会显示越高阻区域，也可以是中间某值，调整分析结果与实际结果一致再标记为有效，这样增加标记有效的数据量，如不调整则不记录。

图 19

图 20

图 21

8.7 保存 AI 分析结果

在 AI 分析界面点击屏幕右下方第三个操作按钮（图 22），可以保存 AI 自动分析的图片。

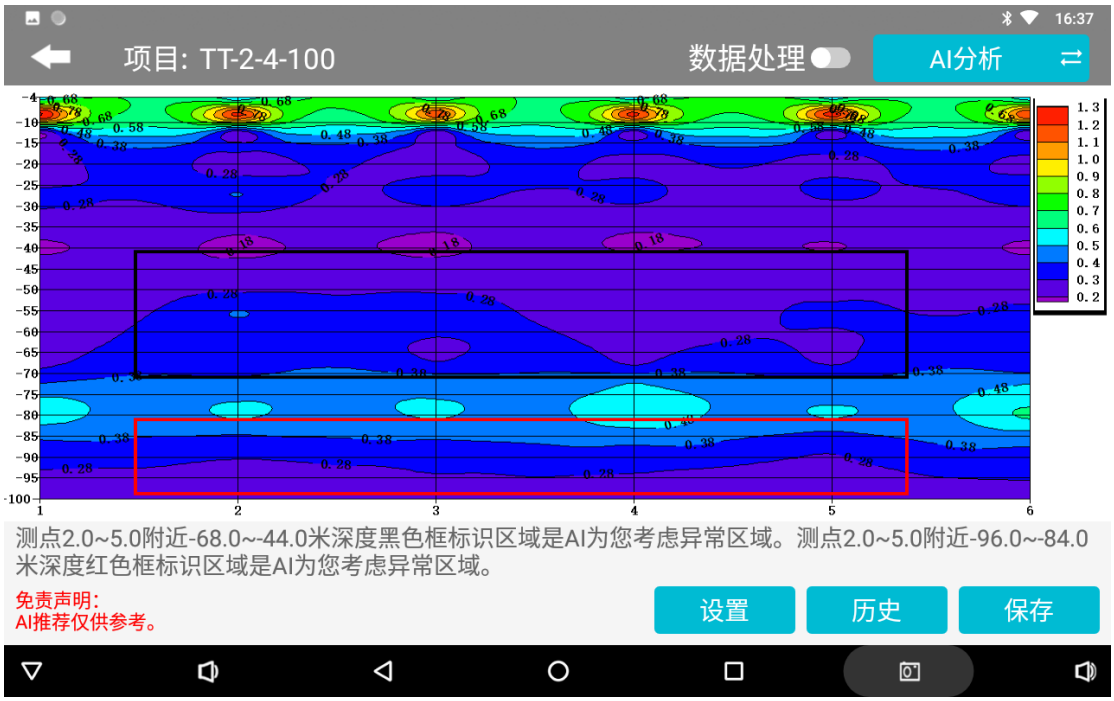

图 22

九、仪器设置

连接好仪器后，从艾都慧测 APP 软件主界面直接进入仪器设置界面（图 23）

图 23

9.1 连接设备

显示连接设备的 ID 号和连接状态，绿灯代表连接正常，红灯代表断开连接。

9.2 测量模式

有 TT（探头）和 MN（电极）两种模式可选，如选择 MN 模式，要把 4 只小电极插入地面，选择 TT 模式则不使用到 4 只小电极，其中 ADMT-1G 这款因为没有电磁传感器，不能使用 TT 模式。一般默认为 TT。

9.3 间隔模式

电磁勘探金箍棒的升级改款后，1G 系列有两种更深度间隔模式选择，“1”模式为 2 米间隔，测量深度按照-2、-4、-6.....来进行；“2”模式为 4 米间隔，测量深度按照-4、-8、-12.....来进行。1600 系列有三种深度间隔模式选择，“1”模式为 5 米间隔，测量深度按照-5、-10、-15.....来进行；“2”模式 10 米间隔，测量深度按照-10、-20、-30.....来进行；“3”模式

为 20 米间隔，测量深度按照-20、-40、-60.....来进行。一般默认为“2”。

每层深度测量时间约 7 秒，比如最小深度为-5，最大深度为-300，选择模式“1”需要测量 30 个分层，这样测量时间为 210 秒做左右。

9.4 叠加次数

这是设置 AD 转换的叠加次数，一般选择次数越高，数据将会越准确，但测量时间也会越长，软件默认是“4”，可选范围是“4-16”用户可根据实际需要来设置调整。

9.5 开始深度

选择测量的开始深度，可选择在该电磁勘探金箍棒最大深度范围内的，并且在“1”、“2”、“3”任何一个模式下的任意一个开始深度，一般默认为该型号模式“2”下的最小深度值。

9.6 结束深度

选择测量的结束深度，可选择在该电磁勘探金箍棒最大深度范围内的任何深度，但不能与开始深度相同，一般默认为该型号模式“2”下的最大深度值。

9.7 测量起点

输入该剖面的测点的最开始编号，一般是 0、1，也可以是其他值，正负值都可以，该剖面文件的起点就按照设置起来来自动增加，默认值是 1。

9.8 测点增量

输入测量编号的自动增量，一般是 1 或以上值（也可以是负值），该剖面在起点的基础上，根据测点增量来自动增加到下一个测点值，默认值是 1。

9.9 恢复参数

可以读取电磁勘探金箍棒中上次设置的的相关参数。

9.10 设置

点击“设置”键来完成设置，并将相关参数设置传输至电磁勘探金箍棒仪器内。

十、数据处理

图 24

10.1 设备型号

在 APP 软件连接过一款仪器型号后，软件会自动识别仪器型号；也可以在“用户信息”来“设备绑定”中绑定过使用设备后，选择当前使用的设备型号。艾都慧测升级改款后更加遵守地球物探勘探原则，按照不同仪器的不同用途、不同深度等应用场景来设置不同的数据处理方法，原则上每个仪器型号的数据处理方法是不一样的。

10.2 配置方案

电磁勘探金箍棒升级改款后根据不同的型号下提供“默认”的参数设置外，也可以自定义数据处理参数的详细设置，可以更好地符合使用者当地水文地质环境和个人使用习惯。当然需要设置参数一般是需要非常熟练使用该型号的仪器后或相对非常专业人士，一般情况下不建议使用，使用“默认”为佳。

10.3 选择数据文件

选择需要进行数据处理的某个文件，来进行数据再处理。

10.4 执行处理

选择好“设备型号”、“配置方案”和“数据文件”后点击“执行处理，会弹出窗口提示输入生成的文件名，输入完成后点击确认即完成数据处理。如果不需要处理数据文件则不需要使用改功能。

10.5 下载参数

下载公司在云端为该型号匹配的最新参数来进行数据处理，会让数据处理工作更准确。

10.6 保存设置

保存当前的数据处理参数设置，在数据中、绘图分析中使用。无论是下载的、自动匹配的、自定义的各项数据处理参数，都点击“保存设置”来保存设置。

10.7 查看主要设置

点开后可以在左侧进行参数方案修改（图 25），完成参数修改后可以新建当前方案至云端--“添加方案”，保存当前参数配置到当前方案--“修改方案”，删除当前方案--“删除方案”。

图 25

10.8 剖面数据合并

可以合并多个数据文件形成一个剖面文件（图 26），填入“测量起点”，“测点增量”，“生成的文件名”→按下“添加文件”，选取需要合并的数据文件→点击确认即可。需要进行合并的文件必须先经过数据处理。

图 26

10.9 测区数据合并

可以合并多个数据文件形成一个测区文件（图 27），填入“测量起点”，“测点增量”，“第一条测线编号”，“侧线间距”和“生成的文件名”→按下“添加文件”，选取需要合并的数据文件→点击确认即可。需要进行合并的文件必须先经过数据处理。

图 27

十一、系统设置

图 28

11.1 参数下载

部分仪器参数需要下载，一般都不需要使用，电磁勘探金箍棒不需要参数

下载。

11.2 蓝牙设置

用于开启操控主机、手机或平板电脑中的系统蓝牙设置功能。

11.3 WIFI 设置

用于开启操控主机、手机或平板电脑中的系统 WiFi 功能，在仪器初始化需要使用来设置 WiFi 热点名称和密码。

11.4 语言设置

切换软件语言设置，有中英文可选。

11.5 WIFI 热点

用于开启操控主机、手机或平板电脑中的系统 WiFi 热点功能，初始化后的日常连接时经常进入本功能来开启 WiFi 热点，因为在于安卓或鸿蒙系统的系统中有自动保护机制，长时间不使用 WiFi 热点连接后会自动关闭。

11.6 移动数据设置

用于开启操控主机、手机或平板电脑中的移动数据开关设置功能，如果操控主机支持 4G 上网可选择，自行控制使用情况。

11.7 智能配网

用于智能配网设备，电磁勘探金箍棒不需要使用该功能。

11.8 屏幕亮度

用于开启操控主机、手机或平板电脑中的屏幕亮度和熄屏时间。

十二、文件浏览

图 29

12.1 文件列表

可查看所存储文件的文件名称、项目名称、测线数、测点数和时间等详细信息，可单选、全选该文件来进行其他功能操作。

12.2 帮助

帮助可以查询相关帮助信息，如果有的话。

12.3 删除

选中需要删除的文件后，点击“删除”键会提示“确认删除选择的文件吗？删除后不可恢复”。

12.4 云端

进入云端界面（图 30），可以分享云端文件给其他用户，下载云端文件或删除云端文件。

图 30

12.5 备份

选中文件后点击备份文件可以备份至云端。

12.6 查看

选中文件后点击查看文件可以进入到当前测量文件中查看数据。

12.7 绘图

选中文件后点击绘图，可以进入到对应文件的‘绘图分析’界面中，具体参照第七章的绘图分析。

十三、用户信息

图 31

13.1 用户登录/退出

用户登录：输入手机号，获取登录密码，输入手机短信中的登录密码后可以直接登录，登录要求阅读并同意用户协议和隐私保护政策，如果之前没有注册过，登录即注册。

用户退出： 退出当前账号。

13.2 个人信息

查看当前账号的个人信息。

13.3 扫码登录

使用有摄像头的操控主机、手机或平板电脑可扫码登录艾都数据处理系统 http://web.aidush.com，登录时请选择‘艾都慧测’账号。

13.4 设备绑定

可以把已经连接的仪器设备型号绑定到该登录的账号下，也可以解除绑定。

13.5 关于我们

显示 APP 软件版本，用户协议和隐私保护政策详情。

13.6 系统消息

可以查询系统消息。

13.7 检查更新

检查 APP 软件是否有最新新版更新，根据需求选择更新。

十四、艾都 WEB 智能数据处理系统

14.1 艾都 WEB 数据处理系统登录

使用浏览器访问艾都数据处理系统（http://web.aidush.com），选择“艾都慧测”的账号类型，用仪器或手机一样的手机号、密码来登录，这样就共享该账号下所有数据了，也可通过手机中艾都勘探 APP 来扫码登录（图 32-36）。

图 32


艾都智能数据处理系统
中文
系统操作说明
账号类型:
艾都慧测
艾都勘探
艾都慧测
艾都应急
艾都找水
手机登录
邮箱登录
扫码登录
86
请输入手机号
密码
发送密码
登录

图 33


艾都智能数据处理系统
中文
系统操作说明
账号类型:
艾都慧测
手机登录
邮箱登录
扫码登录
86
请输入手机号
密码
发送密码
登录

图 34


艾都智能数据处理系统
中文
系统操作说明
账号类型:
艾都慧测
手机登录
邮箱登录
扫码登录
打开APP扫描二维码

图 35

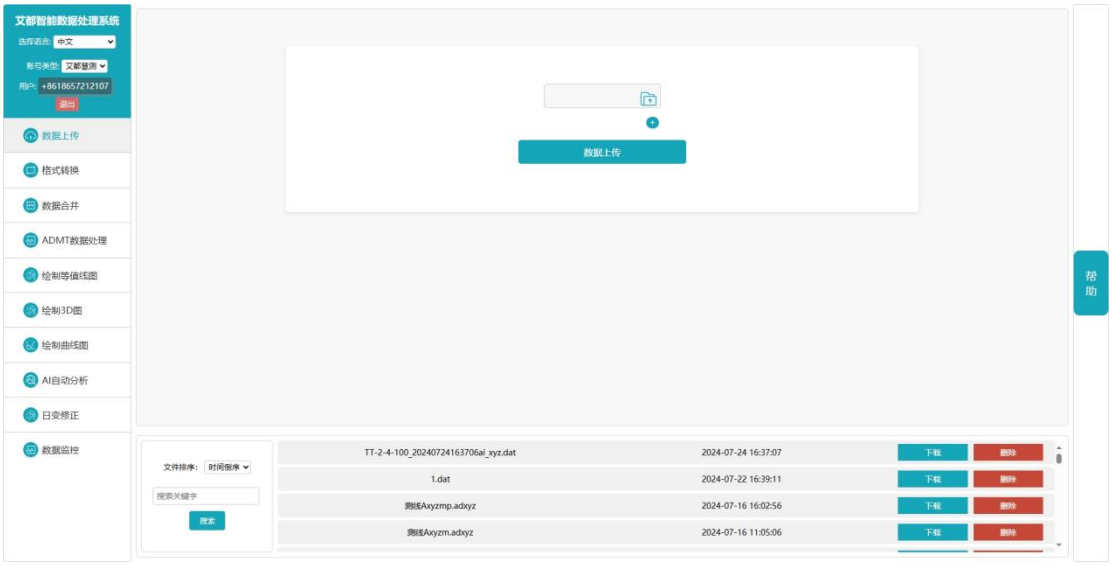

图 36

14.2 数据上传

选择左侧的“数据上传”后可以在中部的 文件夹图标选择电脑中的数据文件进行上传，点击+号可以选择多个文件，点击“数据上传”后会把数据上传到当前账号的当前应用类型的云端数据库中。如果是仪器中的数据，一般选择数据备份，就会自动存现在底部的数据文件列表中，无需使用本上传功能。

14.3 数据导出

方法一：登录账户，备份到网页上再下载到电脑。

方法二：手机用数据线连接到电脑，在手机上选管理文件模式，再按照以下路径打开文件夹：计算机名\手机型号\内部存储设备\Android\data\com.aidush.app.meaure\files\aidu_measure\data，里面的,dat 文件就是数据文件。

14.4 数据格式转换

点击“格式转换”,选择“老文件转换 ADXYZ”是将原来艾都旧款仪器数据的.dat 文件转换成.adxyz 文件（旧款仪器数据的.dat 文件的数据列是频率、行是测点数据）转换成.adxyz 文件后就可以网站功能的操作了；选择“新文件转换 ADXYZ”后选择需要转换的文件,可以选择 X、Y、Z 数据列用被转换文件的哪一列来组成，同时在还可以选择深度和测点的范围；选择“R2D 数据转换”可以把所选文件转转换成瑞典 Res2dinv 高密度仪器所需要反演数据格式，选择

“下载”该数据后，可以用瑞典 Res2dinv 软件进一步反演绘图；选择“VOXLER 格式转换”后可以把所选文件转转换成 VOXLER 三维软件来绘制三维图。

在艾都设备或 APP 中已经使用过 AI 分析或成图会生成 _xyz.DAT 文件，该类型文件可以直接用于网页 AI 分析（图 37-38）。

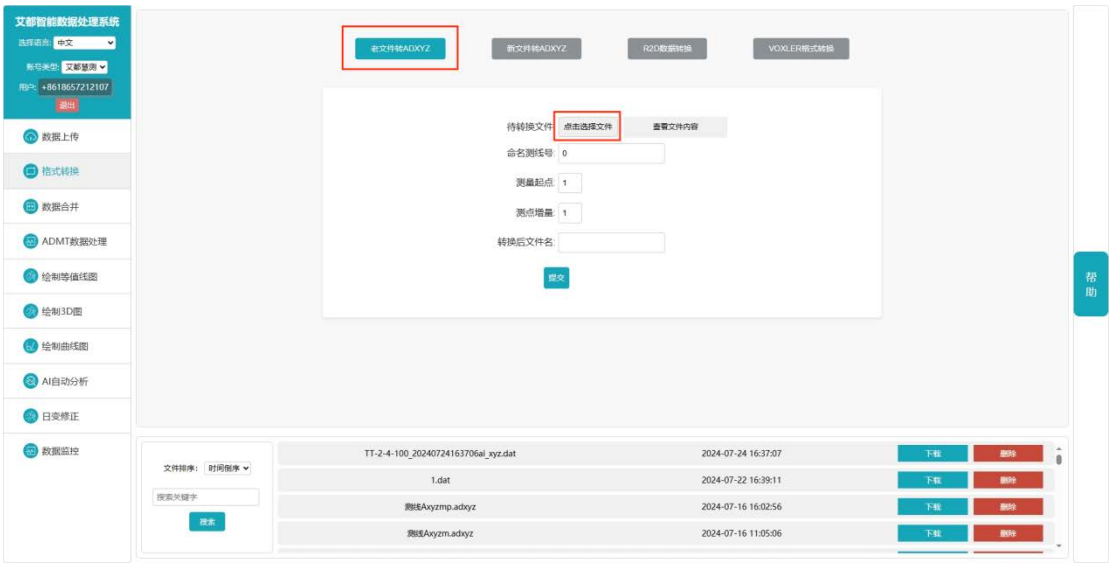

图 37

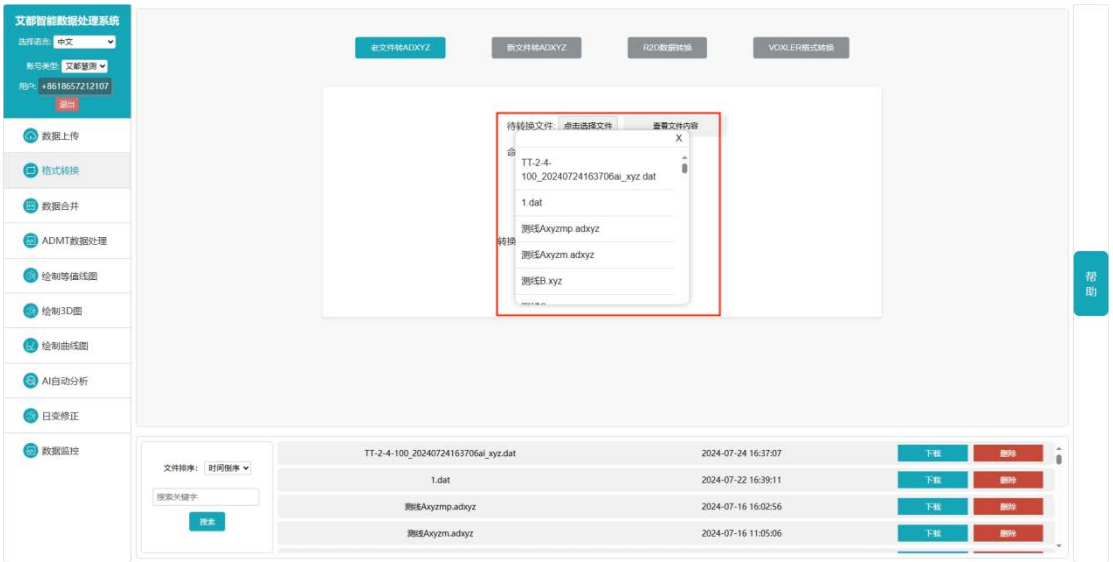

图 38

14.5 数据合并

数据合并分为剖面数据合并和测区数据合并。

剖面数据合并可以把多次测量文件合并到一个剖面数据中，具体操作为在剖面数据合并下“点击选择文件”来选择需要合并的第一个文件名称，可以点击加号⊕增加“点击选择文件”的对话框来选择其他文件，直到把需要合并的文件按顺序选择完成后，重新设置测量起点和测点增量，可以都默认为 1，并

且设置好新的文件名称，点击“提交”后完成合并，完成后在数据行的前端显示新的文件名称，这各新的文件将是一个完整的剖面文件。

测区数据合并可以把测区内的多条测线（剖面）数据文件合并在一起，这样可以绘制三维图和平面剖面图等，具体操作为测区数据合并菜单下“点击选择文件”来选择需要合并的第一个文件名称，可以点击加号⊕增加“点击选择文件”的对话框来选择其他文件，直到把需要合并的文件按顺序选择完成后，重新定义测量起点、测点增量、第一测线编号、测线间距、新文件名称等参数，后“提交”执行合并，完成后在数据行的前端显示新的文件名称，这各新的文件是一个合并后完整测区文件。测量起点、测点增量可默认为 1、第一测线编号可默认为 0，测线间距可默认为 1 或相邻两条测线垂直距离、新文件名称自定义，各测线之间的线间距自动增加。

14.6 ADMT 数据处理

ADMT 数据处理功能可以对仪器的原始数据进行相应的数据处理，能处理的文件为. adxyz 文件。

数据处理参数可以参照本说明书的第 9.7 条操作说明。

14.7 绘制等值线图

绘制等值线图可以把处理好的数据文件来绘制等值线图，具体操作为选择左侧“绘制等值线图”功能后，点击所需要绘制的文件名称并可以绘制等值线图，默认为“经典等值线图”可以在右上角切换到“新版等值线图”后再选择文件绘图，如果是测区数据文件可以切换“垂向等值线图”和“平面等值线图”如何获得测区数据文件可以在仪器操作测量时设置各测线，也可以参照本说明书的第 9.9 条的测区数据合并功能来获得。

14.8 绘制曲线图

选择“绘制曲线图”可以绘制多种样式的曲线图，具体操作为选择左侧“绘制曲线图”功能后，点击所需要绘制的文件名称并可以绘制曲线图，可以切换右上角的多色折线图、灰色折线图、渐变折线图来切换不同的曲线图类型。

14.9 AI 自动分析

点击左侧的“AI 自动分析”的功能后，然后选择 adxyz 或 xyz.DAT 文件，也可以在网页右侧操作栏修改 AI 分析效果。在艾都仪器或艾都 APP 中已经连接

过仪器的账户已经自动绑定该仪器，在“设备型号”中会默认显示已绑定的仪器（图 39）。

没有绑定过仪器的账号需要在“型号查询”中手动输入使用的仪器型号。在手动输入“型号查询”后，可以在下方的“配置名称”中选择推荐的配置，或在“值”和“目标区域数量”中输入自己想要的值。

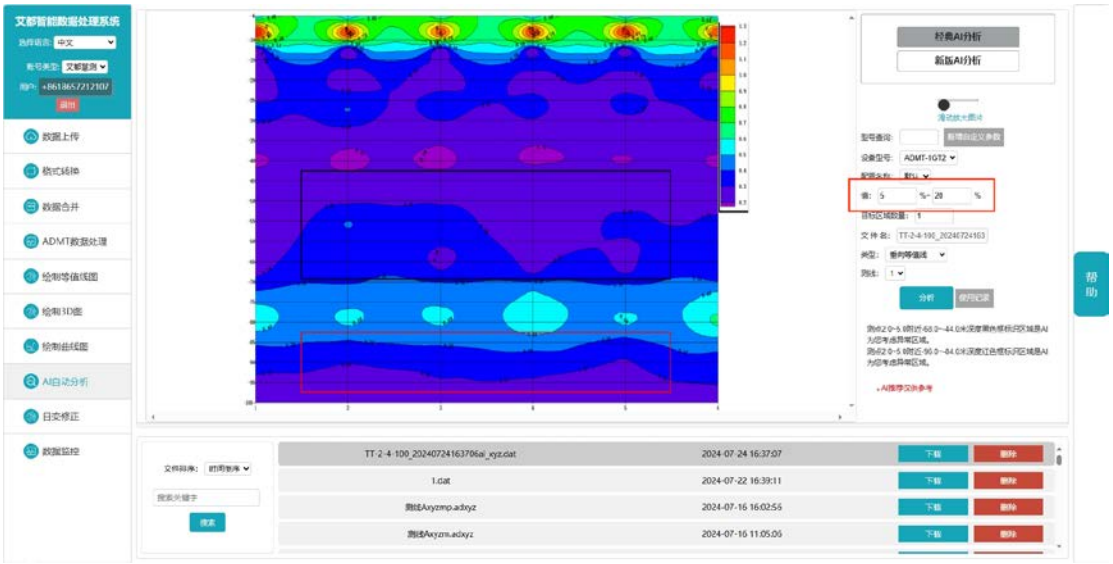

图 39

记录 AI 分析结果是否有效，点击右侧操作栏“使用记录”，选择分析过的数据文件后面的“有效”“无效”（图 40）。

如果分析结果和实际情况一致，则勾选有效，这时系统会记录有效数据，记录越多有效准确的数据，AI 分析会越来越准确。

不符合则勾选“无效”，会弹出提示框，可以手动调整分析结果和实际结果一致，再重新记录有效，如不调整则不记录（图 41）。

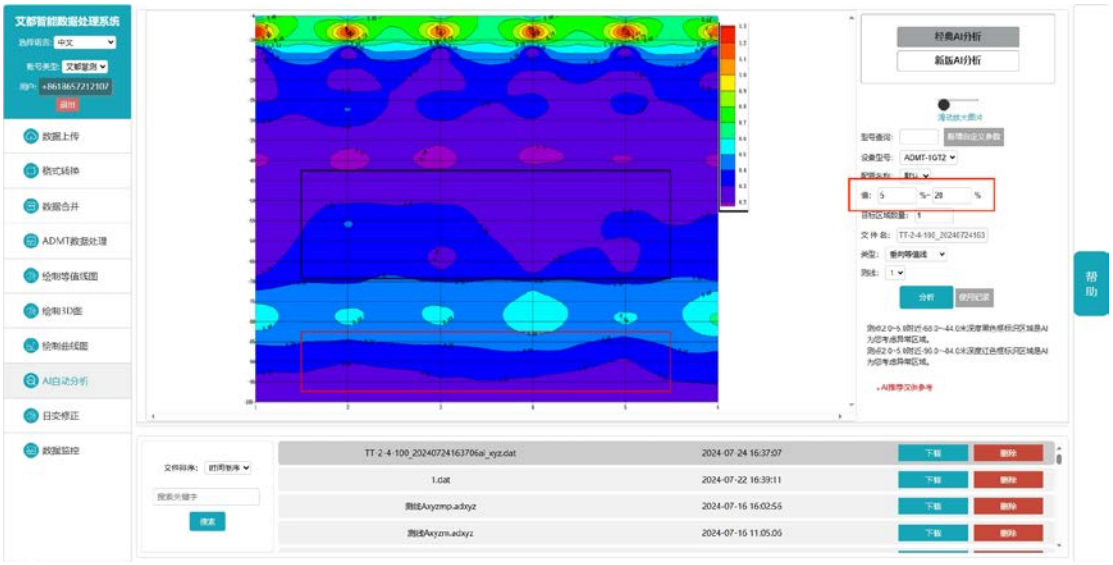

图 40

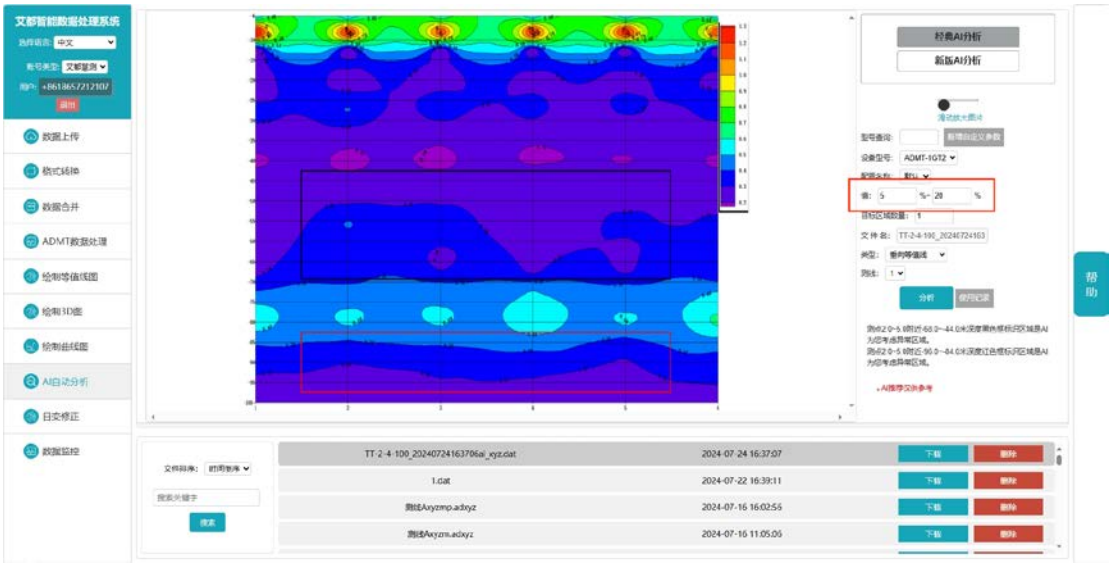

图 41

十五、MN 和 TT 两种测量模式使用方法

15.1 MN 电极模式测量方法

把电磁勘探金箍棒的 MN 金属电极连接好，仪器初始化和日常连接设置等参照本说明书的第四、五章介绍。

设备开机后，选择好测量深度、测量模式选择 MN 电极，将安装好的 MN 金属电极插入大地中，并可开始在线测量或离线测量方式下进行数据采集，测点记录点电磁勘探金箍棒的位置，完成第一次测量 01 后移动至第二次测量 02,依次类推完成点第三次测量 03、04、 05、06、…直至完成整条剖面测量（图

42）。其中 01 和 02、02 和 03 之间的距离叫做点距，点距一般≤勘探目标物尺寸大小单位为米。

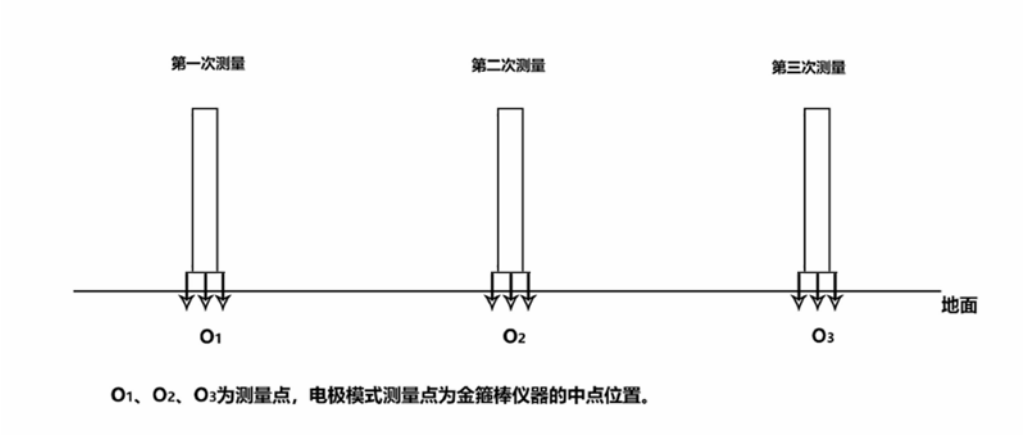

图 42

15.2 TT 电磁探头测量模式

设备开机后，选择好测量深度、测量模式选择 TT 探头，将设备平放地面上并可开始在线测量或离线测量方式下进行数据采集，记录点设备中心位置 0，完成第一次测量 01 后移动至第二次测量 02,依次类推完成点第三次测量 03、04、05、06、…直至完成整条剖面测量（图 43）。其中 01 和 02、02 和 03 之间的距离叫做点距，点距一般 ≤ 勘探目标物尺寸大小，单位为米。

当然，也可像 MN 电极模式一样竖着测量（图 44），将安装好的 MN 金属电极插入大地中或置于地面（不用到 MN 金属电极，以固定或放平为主），并可开始在线测量或离线测量方式下进行数据采集，测点记录点电磁勘探金箍棒的位置，完成第一次测量 01 后移动至第二次测量 02,依次类推完成点第三次测量 03、04、 05、06、…直至完成整条剖面测量。其中 01 和 02、02 和 03 之间的距离叫做点距，点距一般≤勘探目标物尺寸大小，单位为米。

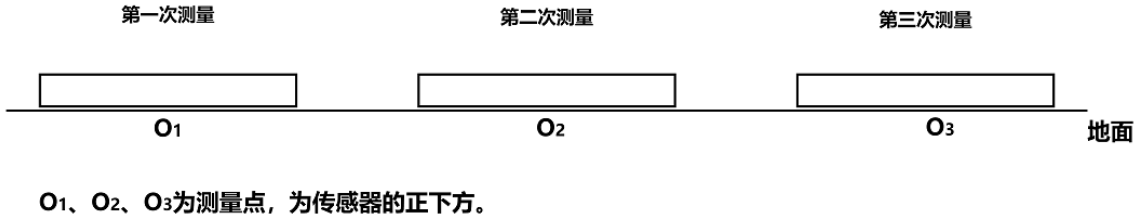

图 43

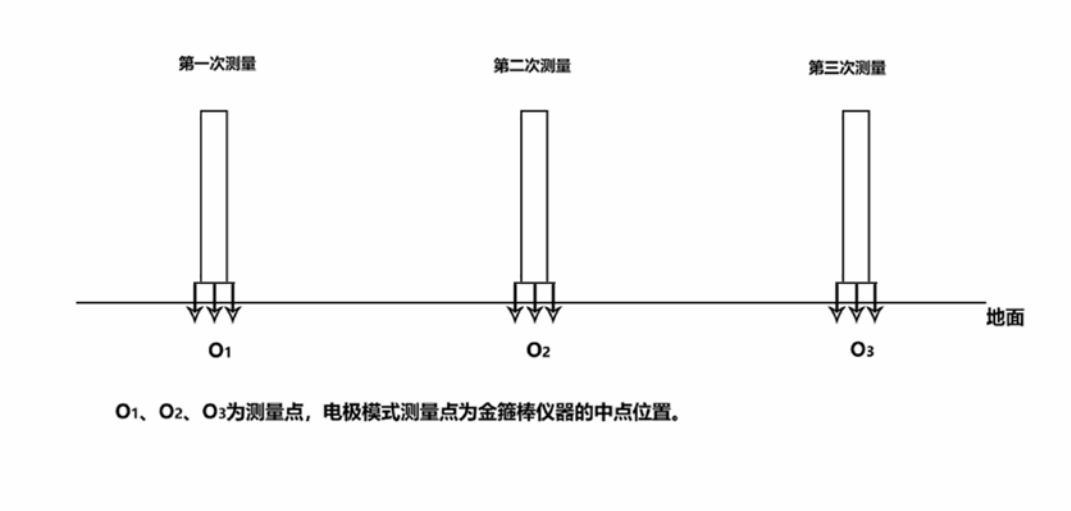

图 44

十六、野外测线布设方法

测线布设是勘探中非常重要环节，测线布设好坏会直接影响到测量精度和提高抗干扰能力，基本原则是测线方向最好能垂直勘探目标体走向，直线剖面尽量直、圆形剖面尽量圆、地面尽量平。根据实际地形地貌选择不同的测线布设方法。

16.1 直线剖面的平行布设方法

直线剖面是最常用的一种布设方法，并且由多条直线剖面平行形成多直线剖面，这样的方法可以快速判断勘探目标物的走向。首先假设和判断出勘探目标物的走向，垂直勘探目标物方向来布置测线（如图 45）直线剖面可布设一条或多条，一般布置 2-3 条可以快速判断异常体的走向，根据勘探目标物的长度来布设多条直线剖面，每条直线剖面之间的距离叫做线距，线距一般 ≤ 勘探目标物的长度，单位为米。

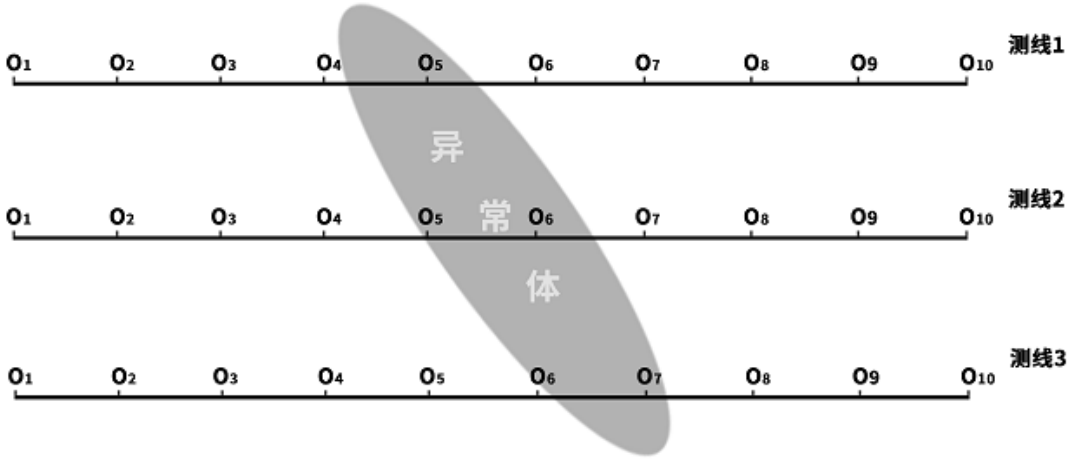

图 45

16.2 直线剖面的十字交叉或斜线交叉布设方法

测量完一条直线剖面后发现有异常体或场地比较有限难以布设多条直线剖面时，可以使用十字交叉（如图 46）或斜线交叉（如图 47）来布设第二条直线剖面，结合两条直线剖面异常区域可以重复确认勘探目标物的存在，也可以辅助判断确认勘探目标物的大致走向。

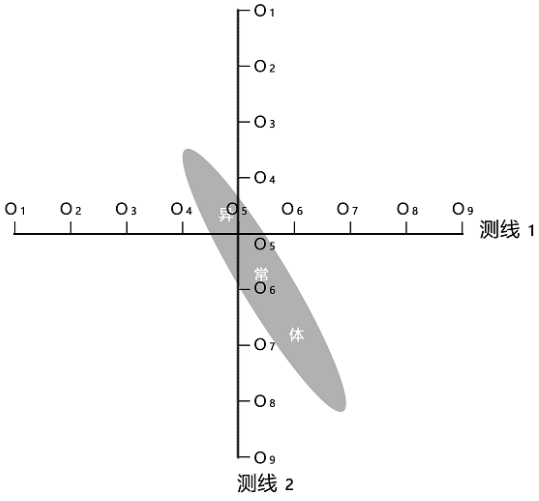

图 46

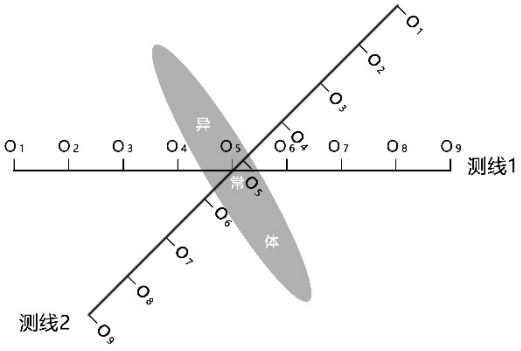

图 47

16.3 圆形剖面布设方法

部分区域勘测场地确实比较窄小或者附近有类似变压器、信号发射塔等点状干扰物时，以场地或干扰物为中心做圆形（图 48）或半圆形（图 49）布设剖面来测量，也可快速追索勘探目标物体（水脉、矿脉等）走向和位置。

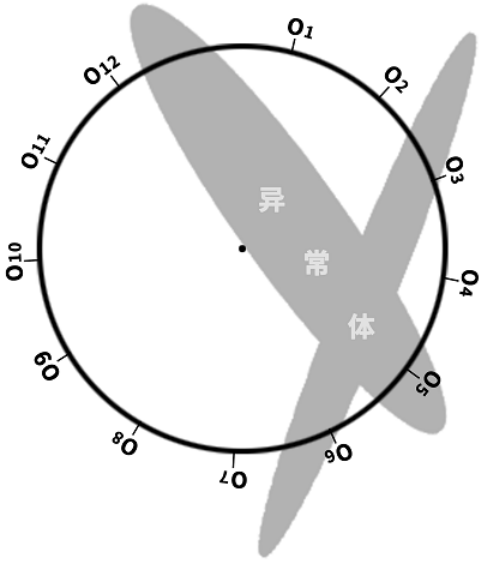
O1
O2
O3
O4
O5
O6
O7
O8
O9
O10
O11
O12
异
常
体

图 48

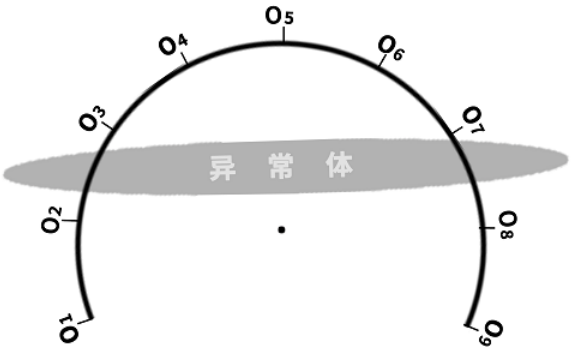
O1
O2
O3
O4
O5
O6
O7
O8
O9
异 常 体

图 49

16.4 野外测线布置的几个原则

1、在山坡上测量时尽量选择相同海拔高度布设，遇到无法等高布设时，尽量选择坡度一致或者坡度较缓方向布设，相邻点之间的高差最好不超过 2 米。

2、测线应尽可能地远离高压输电线和电话线，当不能远离时，布线方向尽可能与其平行。

3、测量时尽可能保证 M、N 电极在同一平面，记录点为 M、N 电极中心点或设备传感器下方。

4、在同一测区中的点距尽量保持相同、线距保持相同，方便记录和分析。

5、MN 电极模式测量时尽量保持 M、N 电极接地一致性。

6、测线布设应尽量垂直异常体走向，直线剖面尽量直、圆形剖面尽量圆、地面尽量平。可以借助用罗盘或标杆三点一线的方法确定测线尽量直。

7、在山坡上测量时尽量选择相同海拔高度布设，遇到无法等高布设时，尽量选择坡度一致或者坡度较缓方向布设，相邻点之间的高差最好不超过 2 米。

8、测线应尽可能地远离高压输电线和电话线，当不能远离时，布线方向尽可能与其他平行。

9、测量时尽可能保证 M、N 电极在同一平面，记录点为 M、N 电极中心点或设备传感器下方。

10、在同一测区中的点距尽量保持相同、线距保持相同，方便记录和分析。

11、MN 电极模式测量时尽量保持 M、N 电极接地一致性。

十七、仪器的使用注意事项

1、请定期检查设备电池电量，定期充电。工作时间保持电量充足，工作结束后及时关闭电源。

2、设备在运输或使用过程中要有专人保管，避免仪器受剧烈震动、撞击和进水受潮。

3、每次工作结束后，保持设备及 MN 电极干净，放置在通风干燥处。

4、MN 电极或者电磁传感器未连接或者断开会提示测量失败，请检查线路是否连接好。

5、设备测量中遇到每个测点的测量数据都偏小且数值基本一致时，可能是仪器故障，请联系售后确认。

1. Overview of the instruction

On the basis of traditional MT electrical geophysical prospecting theory, referring to the design of advanced geophysical prospecting instruments at home and abroad, and combining with advanced technologies such as Internet of Things and AI, the golden hoop stick has been developed, and the data acquisition circuit and algorithm have been accumulated iteratively for nearly 50 years, which can remove the terrain and ground environment interference in most parts of the world. The special MN (electrode) and TT (electromagnetic probe) measurement modes can be switched for measurement, and MN (electrode) measurement is used as far as possible in some places where the interference is particularly large, so as to solve the problem of field data acquisition interference to a greater extent. Obtained a number of national patents (201110454869.X、201310205318.9、202121767124.4、202121767138.6, etc.). In particular to a geophysical prospecting method and a measuring device for correcting the field source of the earth electromagnetic field, which solves the problem that the field source changes at any time. Since the listing of the company in 2016, it has been deeply supported and trusted by the vast number of users around the world. At the same time, it has collected some shortcomings and hopes for improvement, so in 2024, it upgraded a new MT electromagnetic mineral dowsing rod to optimize and upgrade in many aspects: improve the measurement accuracy, optimize the measurement frequency accuracy, which can greatly improve the measurement accuracy of the instrument and optimize the grounding performance of the MN electrode. The stability of data acquisition is improved; a depth layering mode is added, and the depth layering mode is divided into three selectable depth intervals of 5 meters, 10 meters and 20 meters, so that different requirements of a user on depth layering can be met; a depth segmentation selection is added, and the measurement starting depth and the measurement ending depth can be set, so that the special requirement that the user only needs to measure a certain depth can be met; Add data processing function, set data processing parameters according to the model, and automatically generate 2D, 3D and slice images; add AI automatic analysis function, online AI automatic analysis function, and 24-hour online data analysis. MT Electromagnetic Exploration Golden Rod Pro for geophysical exploration and prospecting, and can also be used for hydrogeological exploration, mineral exploration and some engineering geophysical exploration. The MT electromagnetic mineral dowsing rod connects the control host, mobile phone and tablet computer (currently only supporting Android and Hongmeng systems) through WiFi wireless to set relevant parameters, collect data, process data, perform rapid inversion calculation, 2D/3D automatic mapping, AI automatic analysis, etc. It can also

share data with the cloud server on the PC through the web side, so as to realize the data processing function of the app side on the collected data.

2. Main features

(1) Improve the accuracy and stability: optimize the measurement frequency accuracy, which can greatly improve the measurement accuracy of the instrument, optimize the grounding performance of MN electrode, and improve the stability of data acquisition;
(2) A depth layering mode is added: the depth layering mode is different for 1G series and 1600 series, 1G series is divided into two optional depth intervals of 2 and 4 meters; 1600 series is divided into three optional depth intervals of 5, 10 and 20 meters, which can meet the different requirements of users for depth layering;
(3) The depth layering mode is added: the depth segmentation selection is added, and the starting and ending depths of the measurement can be set to meet the special requirement that the user only needs to measure a certain depth;
(4) New software: built-in data processing function, automatic generation of 2D, 3D and slice maps, and online AI automatic analysis function, 24-hour online data analysis.
(5) Add an offline measurement key to the fully wireless connection through WiFi, no need to connect any cables, even without the connection of mobile phones and tablets to achieve offline measurement.

3. Introduction of the working principle of the instrument

The AIDU series instruments use natural electromagnetic field of the earth as the working field source to study the electrical structure inside the earth. According to the principle that different frequencies of electromagnetic waves have different skin depths in the conductive coal, the surface is measured from high frequency to The low-frequency Earth electromagnetic response sequence studies the difference in electrical variation of geological bodies at different depths in the subsurface and determines the occurrence of underground geological bodies.

3.1 Electromagnetic wave propagation theory, Helmholtz equation

Ground electromagnetic waves are sent to the ground, and the propagation of

electromagnetic waves in the earth and soil follows the Maxwell equation. If it is assumed that most of the subterranean geotechnical soil is non-magnetic and is uniformly conductive macroscopically, there is no charge accumulation, then the Maxwell equation can be simplified to:

$$\left.\begin{aligned}\nabla^2 H + k^2 H = 0 \\ \nabla^2 E + k^2 E = 0\end{aligned}\right\} \quad (1)$$

（1）where k is called the wave number (or propagation coefficient)

$$k = [\omega^2 \mu\varepsilon - i\omega\sigma\mu]^{\frac{1}{2}} \quad (2)$$

Considering that the propagation coefficient k is a complex number, let k = b + ia, where: a is called the phase coefficient and b is called the absorption coefficient.
In the electromagnetic frequency range measured by the ADMT series of natural electric field geophysical instruments (0.1Hz to 8KHz), the displacement current can usually be ignored, and K is further simplified as:

$$k = -i\omega\mu\sigma \quad (3)$$

3.2 Wave group resistance and resistivity

A magnetic field with a change in the Helmholtz equation induces a changing electric field, and we have a magnetoelectric relationship:

$$\frac{E}{H} = -\frac{i\omega\rho}{k} \quad (4)$$

The surface impedance Z is defined as the ratio of the surface electric field and the horizontal component of the magnetic field. In the case of uniform earth, this impedance is independent of the polarization of the incident field and is related to the earth resistivity and the frequency of the electromagnetic field:

$$Z = \frac{E}{H} = \sqrt{\omega\mu\rho}e^{i\pi/4} \quad (5)$$

（5）The formula can be used to determine the resistivity of the earth:

$$\rho = \frac{1}{5f}\left|\frac{E}{H}\right|^2 \quad (6)$$

3.3 Skin depth

In non-magnetic media, the skin depth formula is:

$$\delta \approx 503\sqrt{\rho/f} \quad (7)$$

It can be seen from the above equation that the penetration depth of electromagnetic waves is related to frequency and resistivity. The frequency is certain, the higher the resistivity, the greater the penetration depth, the higher the resistivity, and the lower the frequency, the greater the penetration depth.

4. Instrument instruction

Acquisition circuit, MN electrode, TT sensor, high-performance lithium battery, switch button and charging port are highly integrated in the MT electromagnetic mineral dowsing rod(Fig. 2). Wherein the electromagnetic sensor adopts an alloy material subjected to special heat treatment as an electromagnetic conduction iron core. A certain number of coils are meticulously wound on the outer layer of the iron core by using a mold skeleton, and sensors with different precisions are precisely matched and debugged to meet the measurement requirements of different depths. Generally speaking, the longer the iron core of the electromagnetic sensor is, the higher the measurement accuracy is, and the more stable the performance is. Especially in the low frequency band, the measurement effect is good, and the measurement depth will be deeper. The length of several commonly used models is 34cm, 65cm,79cm,94cm and 109cm, and the weight is different with different length.

Figure 1

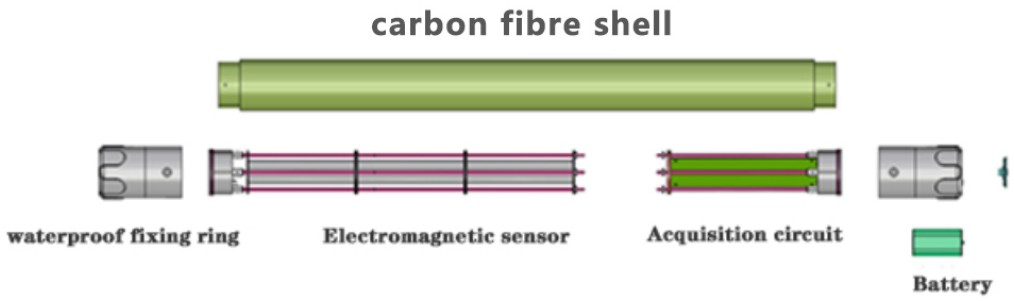

Figure 2

4.1 Main parameters

TECHNICAL PARAMETERS

Version / Parameter	ADMT-1G	ADMT-1GT2	ADMT-1GT3	ADMT-1600WT4	ADMT-1600WT5
Max Depth	100m			1600m	
Scan Interval	2/4(m)			5/10/20(m)	
Battery	7.4V 2600mAH lithium battery, Power consumption approx. 140mA				
Connection	WIFI				
MN Electrodes	Four L-shaped alloy electrodes, each with a size of 100*95*30mm				
Core Features	selectable depth sections, variety in scan interval options, auto 2D/3D imaging, AI expert interpretation of image, on/offline operation				
TT Coil(mm/w)	——	300/0.2	450/0.3	450/8	450/12
TT Iron Core(KmH/m)	——	120	200	300	400
Ground Conditions	soft ground only	all grounds			
Freq. Range(Hz)	1-8K				
Sensing Mode	MN	MN/TT			
Discrim.	0.1mV±5%			0.01mV±1%	
Acquisition Time (s)	14-350			14-2240	
Main Unit Weight (kg)	0.8	1.9	2.6	3.3	4
Main Unit Size (mm)	340*71	650*71	790*71	940*71	1090*71
Shipping Weight (kg)	4.5	6	7.5	8.5	9.5
Shipping Size (mm)	540*225*195	785*225*195	940*225*195	1090*225*195	1240*225*195

Figure 3

5. Introduction to the main page of the software

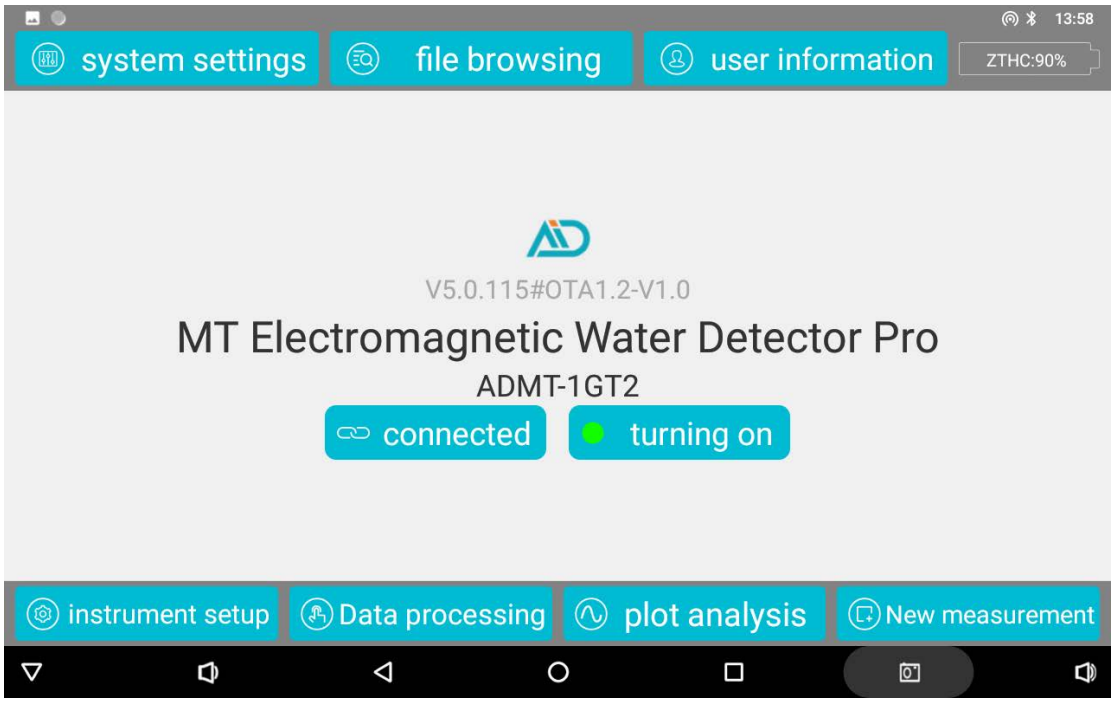

Figure 4

5.1 System settings

It mainly includes parameter download, Bluetooth, WiFi, language, WiFi hotspot, mobile data, intelligent distribution network, screen brightness and other system functions, which can be used according to actual needs, and some functions may not be used temporarily.

5.2 File browsing

You can see the files that have been measured or downloaded from the account, and you can delete, cloud (share, download, delete), backup, view, draw and other operations on the files.

5.3 User Information

It mainly includes registration login, logout login, personal information, scanning login, device binding, about us, system messages, check updates and other functions.

5.4 Battery level

Display the electric quantity of the control host and the golden-rod device, and scroll alternately. "SYSTEM: electric quantity percentage" indicates the current electric quantity of the control host; after the golden-rod device is connected, "ID number: electric quantity percentage" is displayed.

5.5 Central area

Display the version number of the software APP, the firmware version of the MT electromagnetic mineral dowsing rod, the product name, the product model, the connection status, the TCP service opening status, etc. The product name and model number are displayed as empty when they are first used, and the product name and model number of the last connection are displayed by default after the device is initially connected.

5.6 Instrument settings

Connection device, measurement mode, depth gap mode, stacking times, start depth, end depth, measurement starting point, point increment and other operation functions.

5.7 Data processing

Including profile data merging, survey area data merging, equipment model, configuration scheme, data file selection, more equipment viewing, setting saving, processing execution and other operation functions.

5.8 Drawing analysis

It mainly includes data processing switch, (vertical contour map/plane contour map/plane curve map, etc.), survey line/depth option, picture saving, etc.

5.9 New Measurement

Create a new project or select an existing project to continue measuring.

5.10 System Control Bar

From left to right, they are Hide System Control Bar, Turn Up Volume, Return, Return to Desktop, Function Key (to view the programs currently running), Screenshot Key, and Turn Up Volume.

6. Initialize settings

6.1 Selection of operation host or software installation

If you use the mobile phone or tablet computer (which currently only supports Android and Hongmeng systems) to connect to the MT electromagnetic mineral dowsing rod, you can scan the two-dimensional code (Fig. 5) or enter the download link (http://d.aidush.com/d4) to download the "Aidu detection" APP software. After the installation is completed, open the software to use.

Figure 5

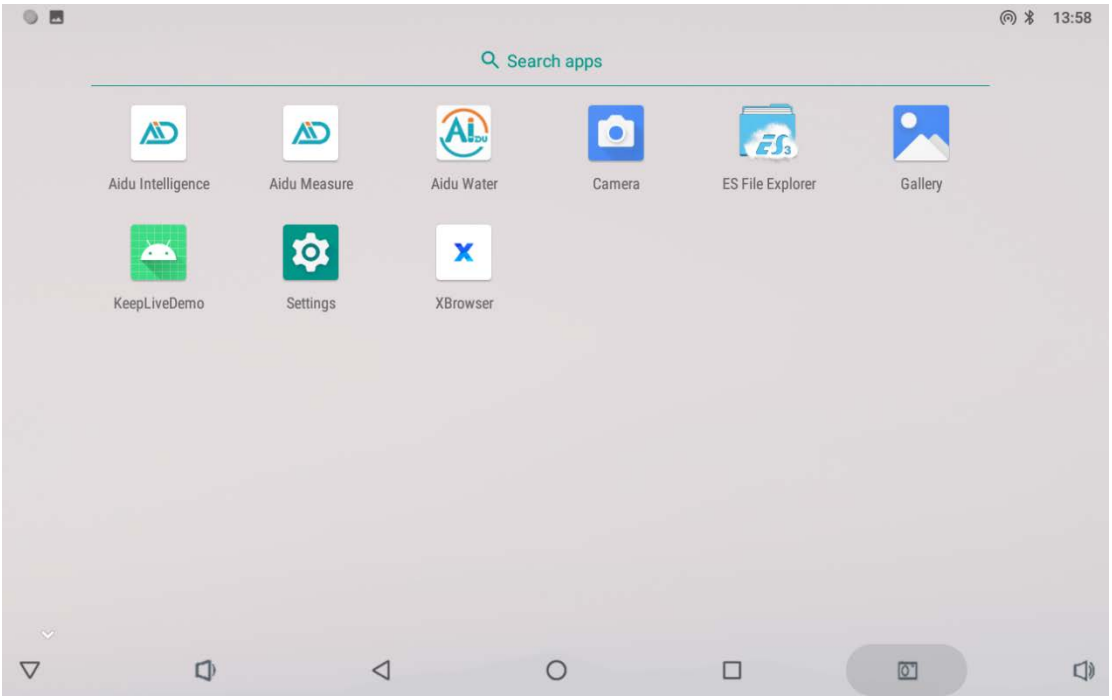

Figure 6

6.2 Initialization flow chart

For the first time, the initial connection registration shall be carried out. Refer to the following flow chart (Figure 7):

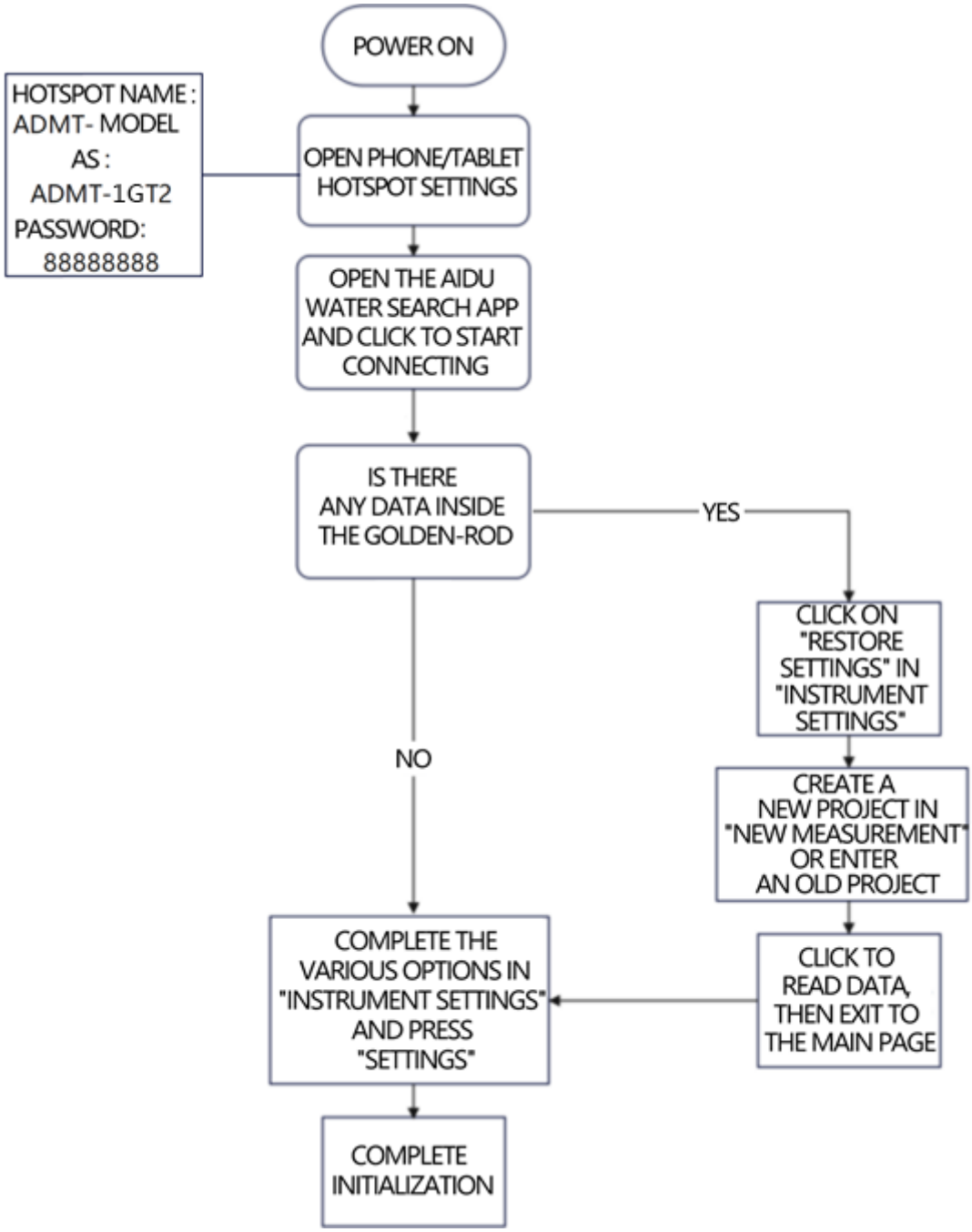

Figure 7

6.3 WiFi Hotspot Settings

On the main interface of the software, Select System Settings → WiFi Hotspot → Hotspot Settings → WLAN Hotspot Settings (Figure 8) → Set the network name to the full model name of the instrument (such as ADMT-1GT2) → Security: WPA2 PSK → Password: 88888888 → Save → Enable WLAN Hotspot → Return to the previous interface → Enable Service → Finish. It may take 1-3 minutes to connect successfully. Or open the personal hotspot settings in the system settings and set it according to the above process.

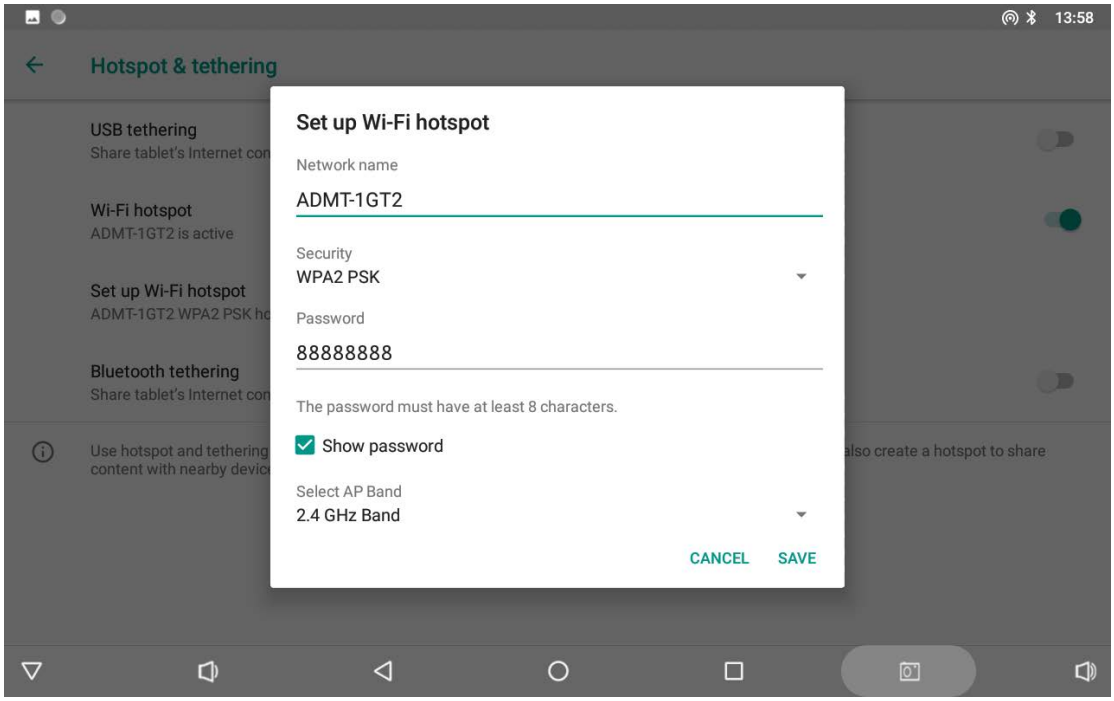

Figure 8

6.4 Connecting the MT electromagnetic mineral dowsing rod

After the personal hotspot is set and turned on, long press the power button on the panel at one end of theMT electromagnetic mineral dowsing rod to turn on the red light until it is always on, which means that the startup is successful, and the WF light (blue light) flashes slowly. Press the "Not open" button on the main interface of APP software (Figure 9), wait for about 10-30 seconds, "Connected" and "Open" will be displayed, the blue light on the golden-rod panel will be on, the version number, MT electromagnetic mineral dowsing rodand the specific model will be displayed in the central area of the software, and the initialization is successful.

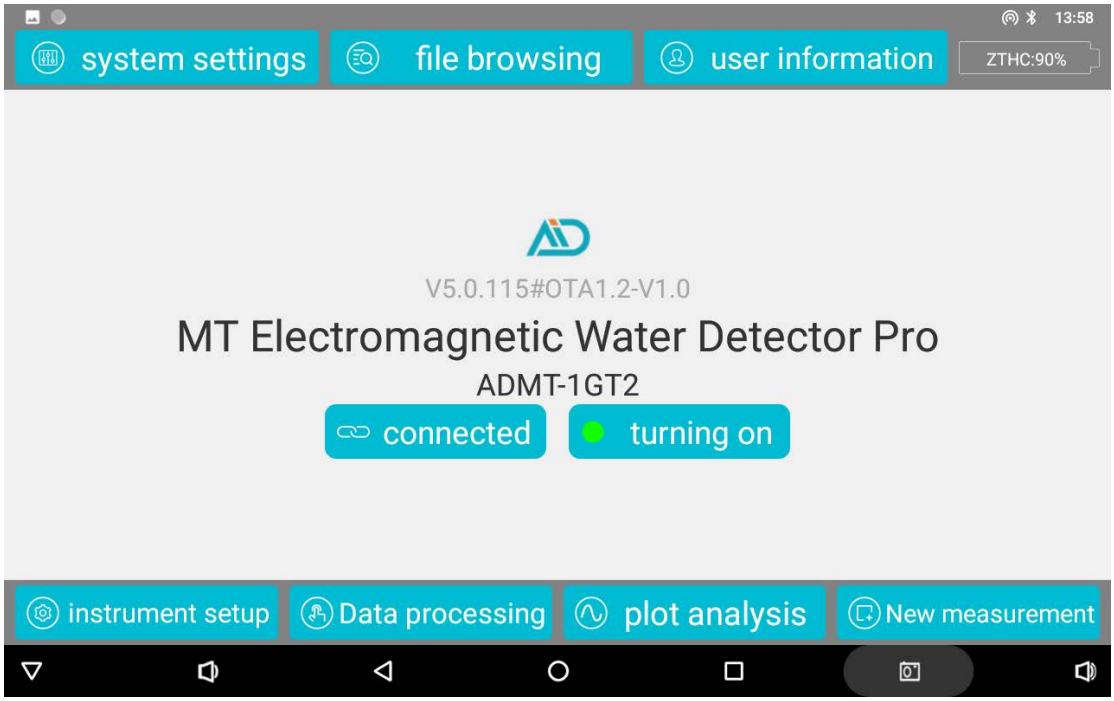

Figure 9

6.5 Daily connection of MT electromagnetic mineral dowsing rod

After initialization, the daily connection is much more convenient. In the main interface of the software, select System Settings → WiFi Hotspot → Open WLAN Hotspot → Return to the previous interface → Open Service. Press and hold the power supply (red light) on the panel at one end of the MT electromagnetic mineral dowsing roduntil it is normally on, and the WF light (blue light) flashes slowly. Press the "Not open" button on the main interface of the APP software, wait for about 10-30 seconds, "Connected" and "Open" will be displayed, the blue light on the panel of the golden-rod will always be on, and the version number, MT electromagnetic mineral dowsing rodand the specific model will be displayed in the central area of the software, so that the connection is successful.

7. Simple operation and use method

7.1 Instrument setup

After daily connection according to (6.5), first check whether there is data in the MT electromagnetic mineral dowsing rod. The specific operation method is as follows:

Click "Restore Data" in "Instrument Settings" → input the project name and line number in "New Project" at will or according to your own habits → click "Read Data". If the data is read, it indicates that there is measurement data that has not been read

before, confirm whether it is the data that needs to be kept to keep the record; If the data is not read, it means that there is no data for the MT electromagnetic mineral dowsing rod, and the relevant parameters can be reset for a new measurement task.

Click "Instrument setting" to confirm that the connected equipment is online (the equipment ID number appears and the green light is on). Select the measurement mode → depth gap mode → stacking times → start depth → end depth → measurement starting point → Point increment → setting.

Click "Setting" to prompt "Setting parameters successfully".

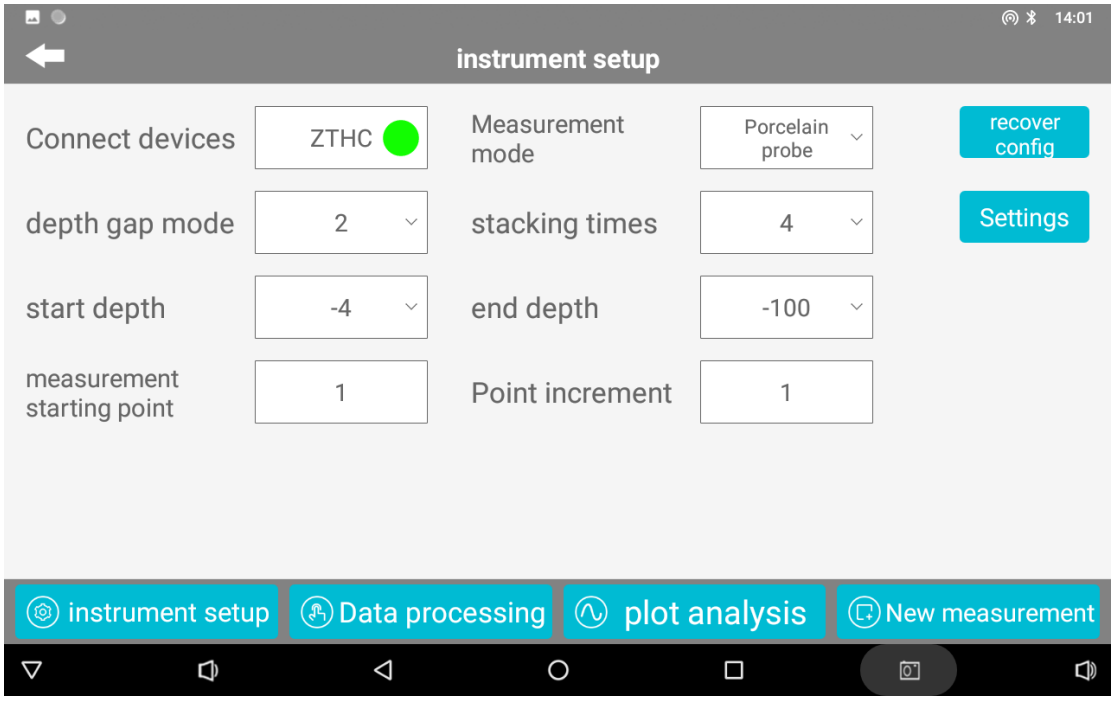

Figure 10

"Online measurement" refers to the direct data measurement, data reading, data processing, drawing analysis and other functions after setting relevant parameters by using the APP operating software on the control host, mobile phone or tablet computer. "Off-line measurement" refers to the use of APP operating software on the host, mobile phone or tablet computer to set the relevant parameters, instead of operating on the host, mobile phone or tablet computer, it uses the "measurement" button on the MT electromagnetic mineral dowsing rod to measure, and after the measurement is completed, it connects with the host, mobile phone or tablet computer. Read data and complete data processing, drawing analysis and other functions at one time.

7.2 Online measurement

After the "Instrument Settings" is completed, the "New measurement" (Figure 11) is directly used to measure the data. The "New Project" and "Line No." Need to be entered on the page. The survey mode, equipment model, depth gap mode, start depth and end

depth are only for viewing and cannot be set, because the settings have been completed in the "Instrument Settings". To change these settings, go to "Instrument Settings".

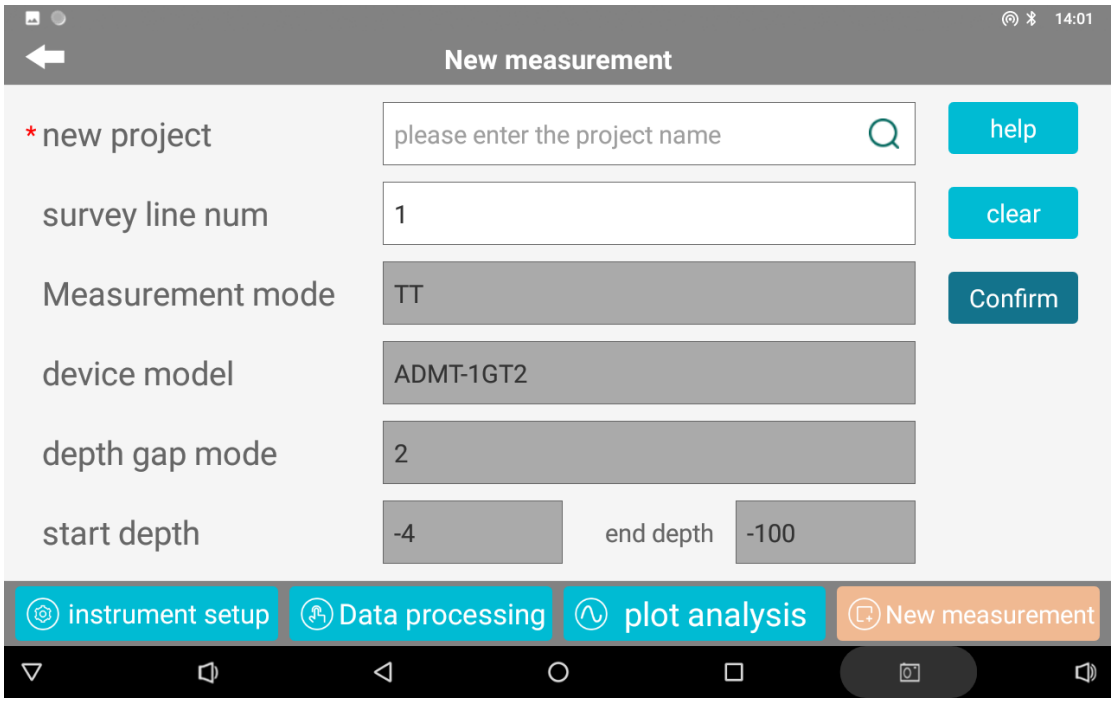

Figure 11

Enter the project name and line number in "New Project" → enter the measurement page (Fig. 12) → click "device detect" → click "sample" → the measurement is completed after the progress bar is completed.

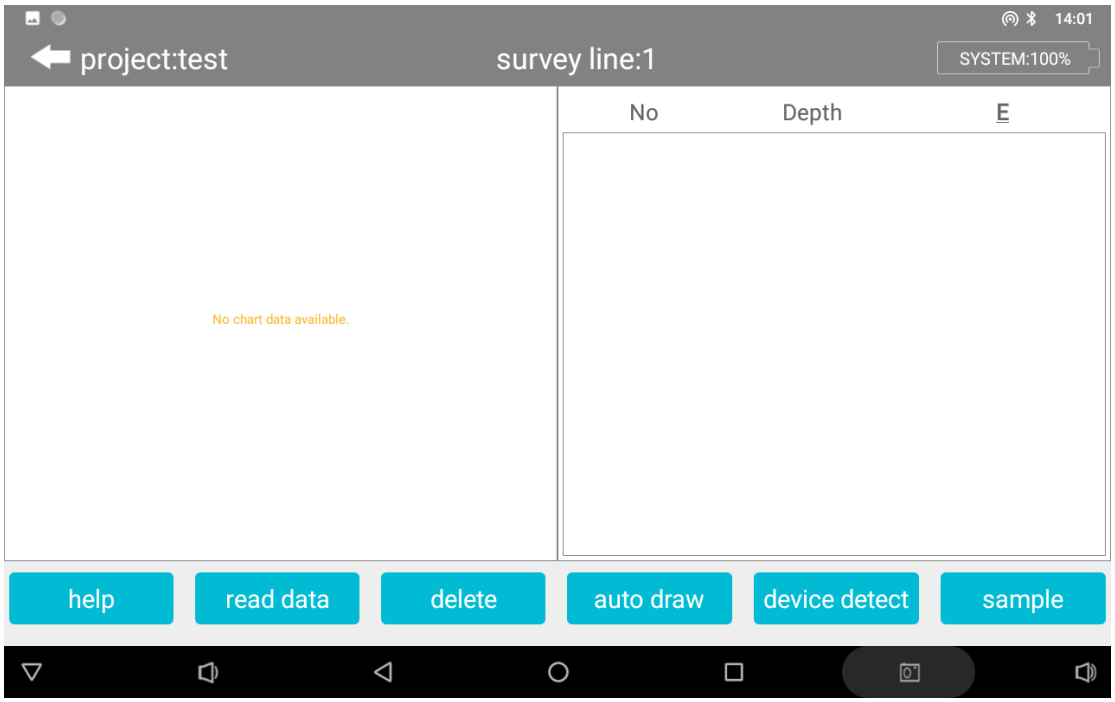

Figure 12

Read data: read the current measurement data in the MT electromagnetic mineral dowsing rod. After the online measurement or offline measurement can be completed,

read the data consistently.

Delete: delete the last read data. When multiple data are read, delete the last one.

Auto draw: jump to the drawing analysis page, automatically draw the vertical contour map of the front data, and also proceed to other related operations of the drawing.

device detect: The device detect can insist whether the connection channel is effectively connected or not, or other related functions.

sample: click the instrument after the arrangement of measuring points is completed for sample.

7.3 Read Data

In the "online measurement" mode, after confirming that the profile measurement has been completed, directly click the "read data" button to read the profile data of this measurement at one time.

In the mode of "offline measurement", after daily connection according to Section 6.5, click "Restore Data" in "Instrument Settings" → enter the project name and line number in "New Project" at will or according to your own habits → click "Read Data" to read the profile data of this measurement at one time.

7.4 Off-line measurement

After the "instrument setting" is completed, the APP software can be closed or not connected, and the "measurement" key at one end of the MT electromagnetic mineral dowsing rodcan be used to realize offline measurement. After pressing the "measurement" key for a long time, two prompts will be given, and the measurement lamp MEAS (green) will flash, indicating that the measurement is in progress. When the MT electromagnetic mineral dowsing rodgives two prompt sounds again and the measuring lamp MEAS (green) stops flashing and is normally on, it indicates that the measurement of the measuring point has been completed, and it can move down to the next measuring point for repeated measurement until the measurement of the whole profile data is completed.

7.5 Simple Operation Flow Chart

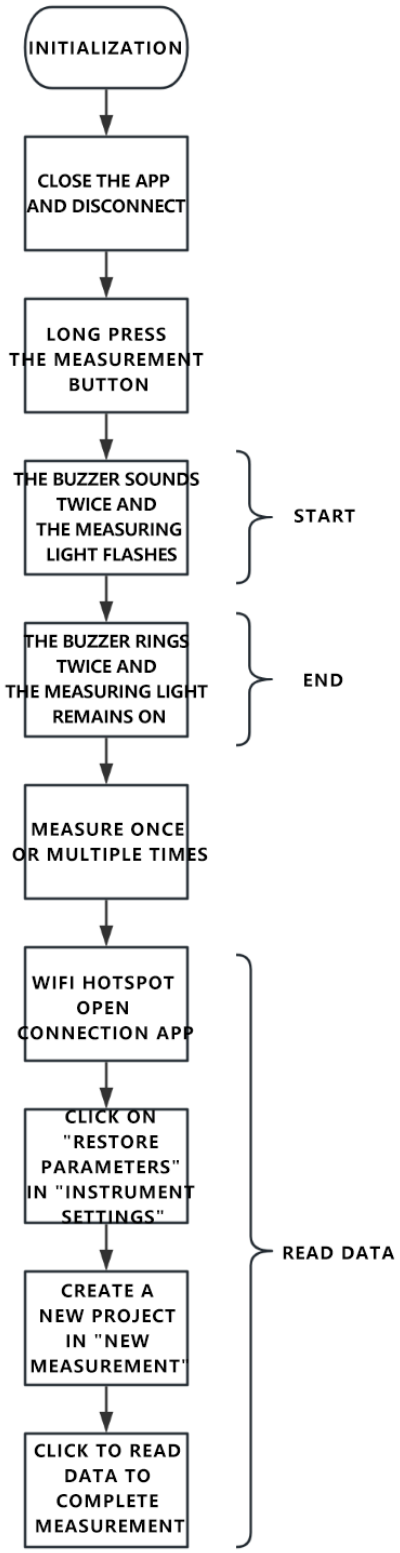

Figure 13

7.6 Precautions for simple operation

1、In the process of measurement, it is possible to exit the software interface or the background process of the software is interrupted. It can be judged whether the measurement is over by the measurement lamp MEAS (green) on the panel of the MT electromagnetic mineral dowsing rodflashing or stopping. Generally, the measurement is still in progress when it flashes, and the measurement is over when it is on for a long time.

2、In the process of measurement, the software interface can be used alternately by clicking the measurement key (online measurement) and the measurement key (offline measurement) on the panel of the MT electromagnetic mineral dowsing rod. When the software interface clicks on the measurement, if the MT electromagnetic mineral dowsing rodis in the process of measurement, the software will prompt "busy".

3、After the measurement, the data is stored inside thegolden-rod and will not be automatically uploaded to the software. You need to manually click "Read Data" to upload the data to the software.

4、In the process of measurement, the operating host, tablet or mobile phone is out of power, but the MT electromagnetic mineral dowsing rodstill has power, so it can continue to use the "offline measurement" method to measure, and then connect to read the data after the operating host, tablet or mobile phone is charged.

5、If thegolden-rod is powered off or crashed during the measurement, the current measured data will be lost, but the previous data will be retained.

8. Drawing Analysis

8.1 Entry mode of drawing function

There are three places to enter the drawing analysis function in Aidu detection APP. The first is to directly click the "auto draw" button to enter the drawing analysis function after reading the data in the "New Measurement" interface. The second is to directly click the "Drawing Analysis" button in the main interface of the software to enter the drawing analysis function. Third, on the file browsing page of the main interface of the software, select a file and click the "Drawing" button to enter the drawing analysis function.

8.2 vertical contour map

After entering the drawing function in the first and second modes, the "vertical contour map" (Figure 14) of the current latest file will be directly displayed. The "vertical

contour map" in the upper right corner can be used to switch the "plane curve map, plane contour map" and other graphics, and the data processing switch in the upper left corner can also be used to switch the graphics before and after data processing. Tap Project to switch to a different project file.

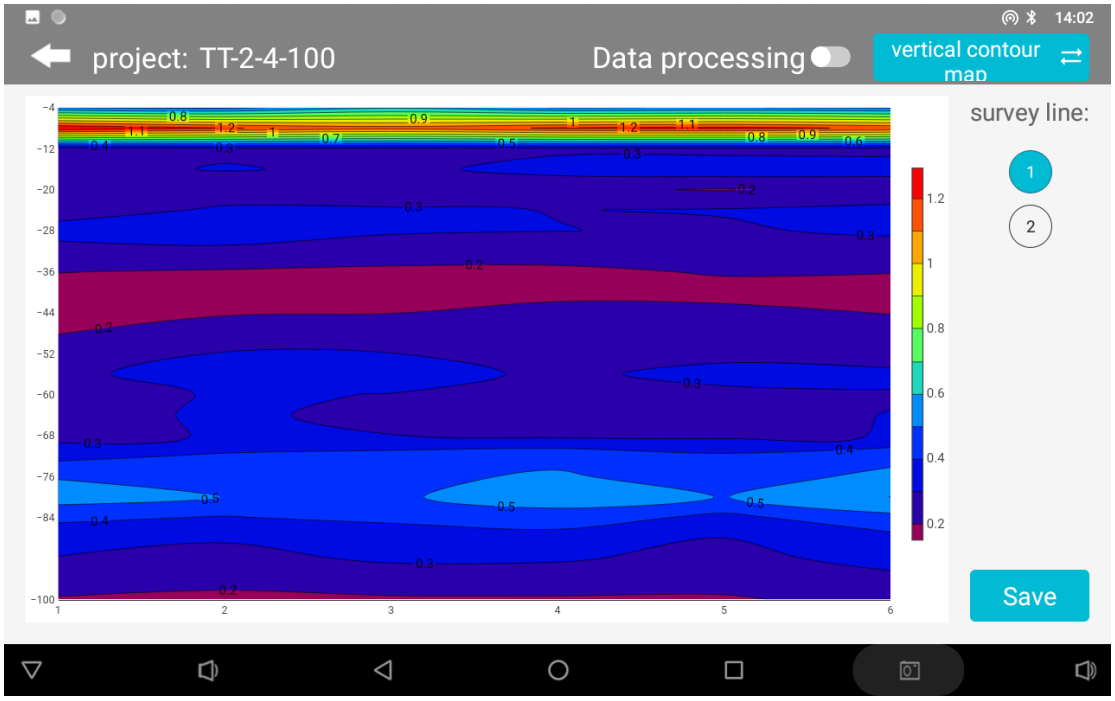

Figure 14

The vertical contour map of all survey lines in the current project file is displayed. You can select the survey line on the left side. Click in the contour map to display the XYZ value at the clicked position (X-survey point number, Y-depth, Z-specific value). "Save" in the lower left corner can save the current image to the tablet or mobile phone. A minimum of one survey line is required, and a minimum of six survey points on each survey line are required for mapping.

8.3 Plane curve diagram

The specific depth data curve of all survey lines in the current project file is displayed (Figure 15). Different depths in the file can be selected on the left, and the current image can be saved by "Save" in the lower left corner.

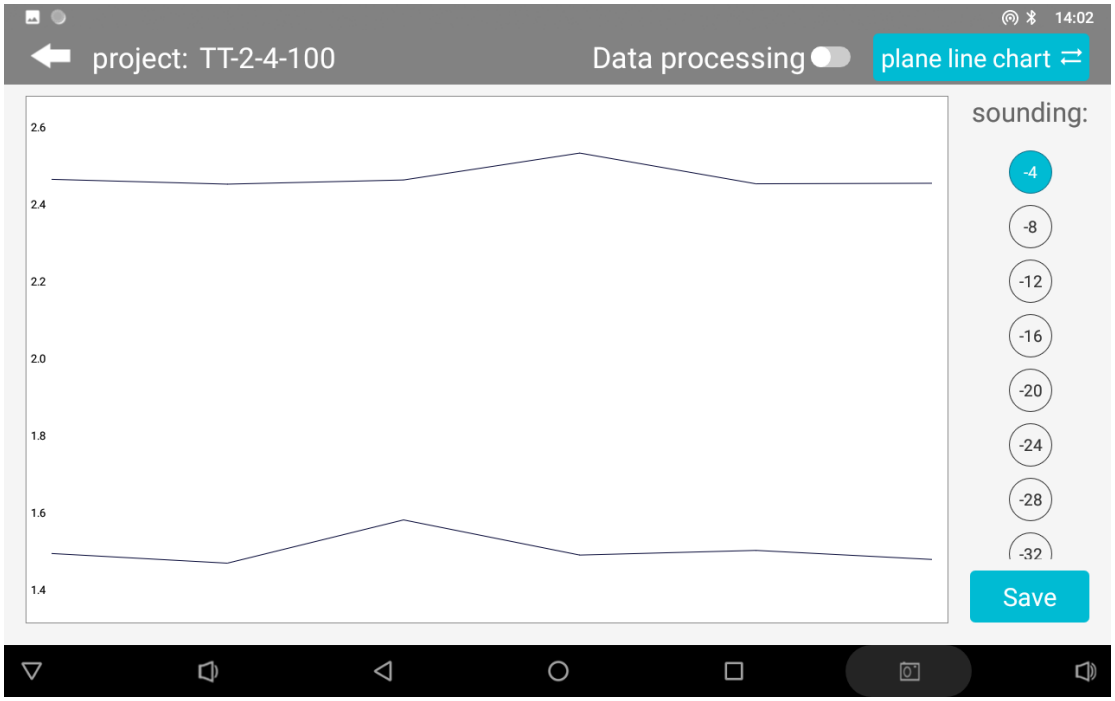

Figure 15

8.4 Plane contour map

The plane contour map (Figure 16) of all survey lines in the current project file is displayed. On the left side, you can select different depth maps under the file. XYZ values (X-survey point number, Y-survey line number, Z-specific value) will be displayed in the contour map. Save in the lower left corner saves the current image. Generally, at least 2 survey lines and at least 6 survey points for each survey line are required for the plane contour map.

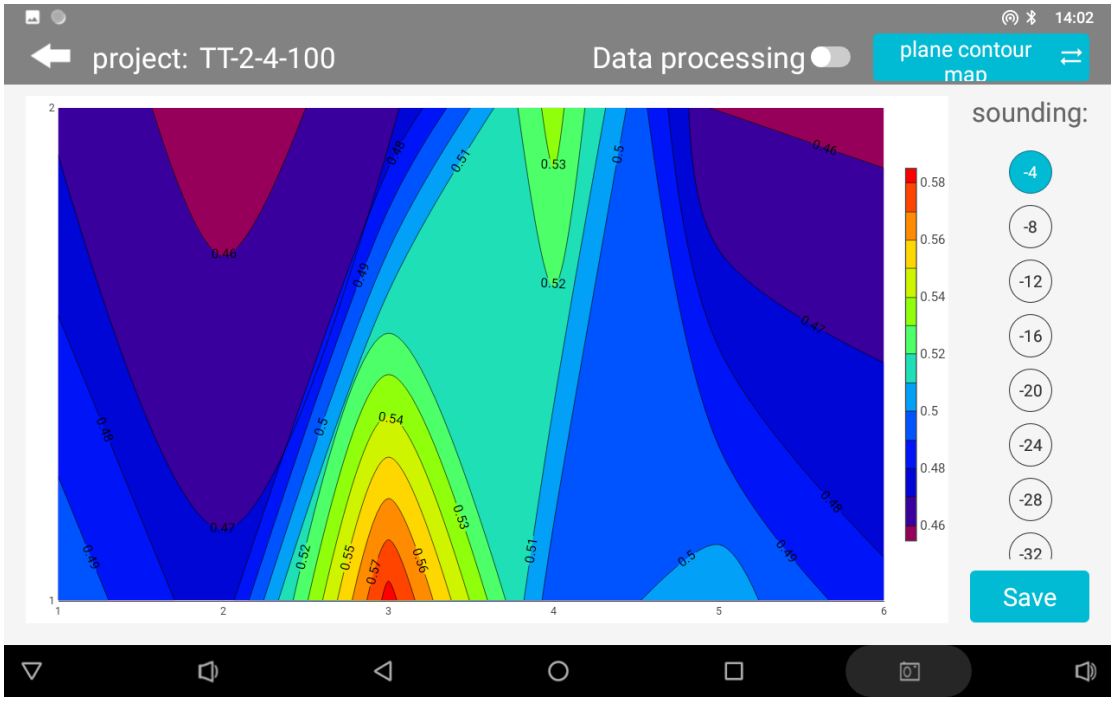

Figure 16

8.5 AI Automatic Analysis

After clicking "AI Analysis", the system will enter the result of AI analysis of the file data (Fig. 17), and the bottom will prompt "The black (red) box with the depth of XX-XX meters near the measuring point xx-xx is an abnormal area" and other prompts. This abnormal area is generally the routine abnormal judgment set by the instrument, and also the location or depth to guide you to drill. Generally, AI will prompt 1-2 areas for you to choose. You can make a comprehensive judgment and make a decision based on your experience and the actual hydrogeological environment.

At the same time, if you are not satisfied with the results, you can click the first operation icon at the bottom right of the screen to enter the AI analysis setting interface (Figure 18), click "Data Download" to download the latest AI analysis parameters, or click "Parameter Type" to select "Default" or "AI Recommendation". Among them, "default" is the ideal analysis parameter set for a certain type of product of the company, and "AI recommendation" is that after the AI analysis system establishes the data model according to the results of user feedback records, AI automatically learns and adjusts the generation of relevant analysis parameters, which in principle is closer to the real analysis. Of course, this needs to be determined by the accuracy of the data marked by the user himself and the number of marks.

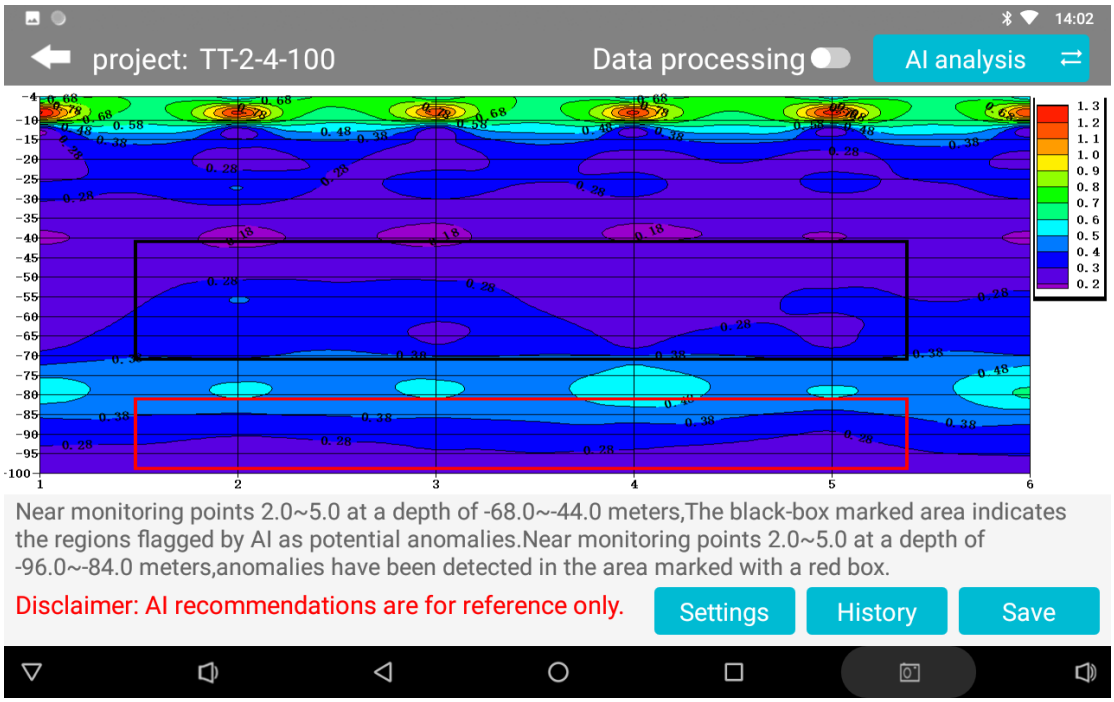

Figure 17

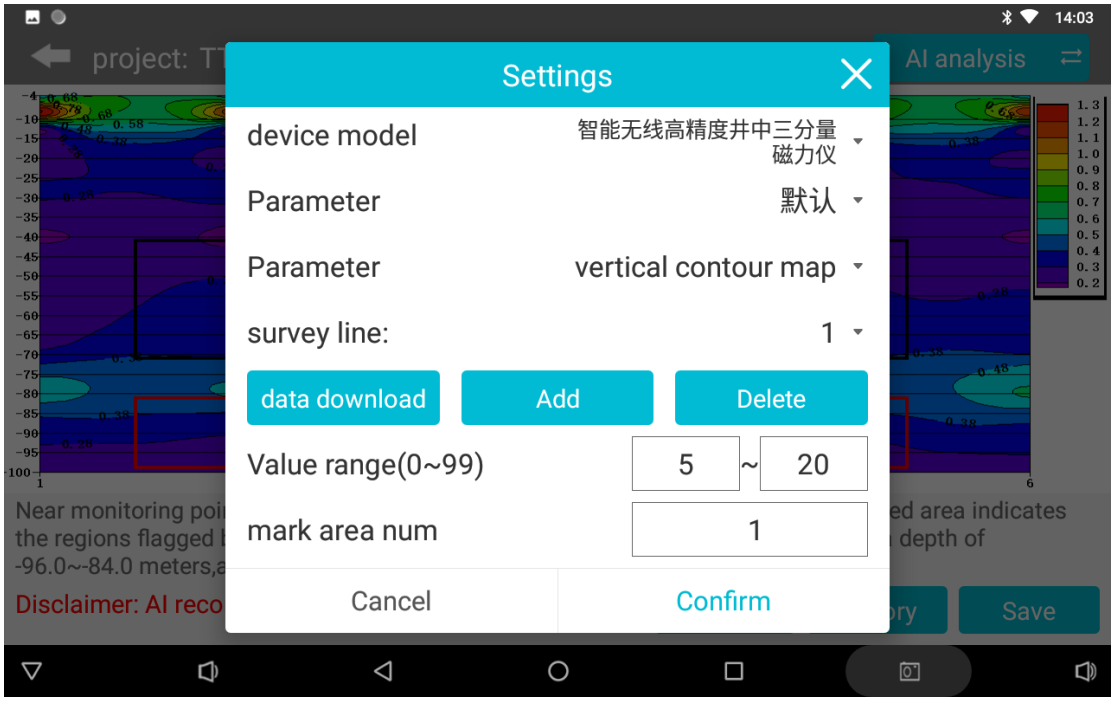

Figure 18

You can also select the "Add" function to manually add the AI analysis parameters belonging to your account. All our analysis algorithms have been concentrated on a percentage representation. You can manually slide the percentage of the value range left and right to adjust the AI analysis results. Generally, the smaller the percentage is, the lower the apparent resistivity will be displayed. The larger the percentage is, the higher the apparent resistivity will be displayed. It can also be an intermediate area, etc. By adjusting this percentage, it can be displayed to the area you think is the most accurate. In this way, AI will analyze according to this setting later, which will be more accurate. You can also set the mark area to 1 so that only one optimal mark area is displayed.

This AI parameter setting generally requires very skilled use of this instrument, and has some practical experience and local data performance of this type of instrument as the basis for setting. If the primary use of this instrument, it is not recommended to use it.

Select Delete to delete this set of Set AI Analysis parameters.

8.6 Record AI analysis result feedback

AI analysis result feedback is very important, because AI is based on user feedback to machine learning, establish effective allocation rules, all AI automatic analysis is "the more accurate, the more feedback the more accurate".

In the AI analysis interface, click the second operation button at the bottom right of the screen to find the history interface (Figure 19). Select the "Default" button in the "Validity" column behind the analyzed data file. If the analysis result is consistent with the actual situation, click "Yes" (Figure 20). At this time, the system will record the

valid data. AI analysis will be more and more accurate.

If not, click "No". After clicking "No", the drawing effect operation box (Figure 21) will pop up. The result of AI analysis can be adjusted by manually sliding the percentage range of the value range left and right. Generally, the smaller the percentage is, the lower the value area will be displayed, and the larger the percentage is, the higher the resistance area will be displayed. It can also be a certain value in the middle. Adjust the analysis result to be consistent with the actual result, and then mark it as valid, so as to increase the amount of data marked as valid. If it is not adjusted, it will not be recorded.

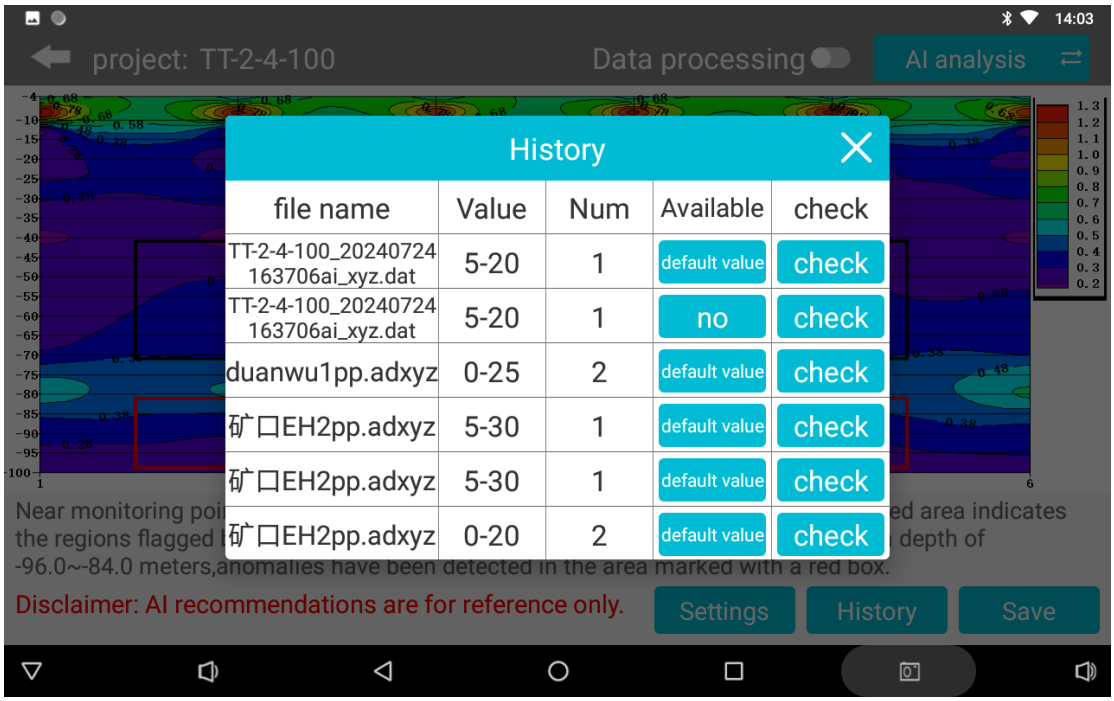

Figure 19

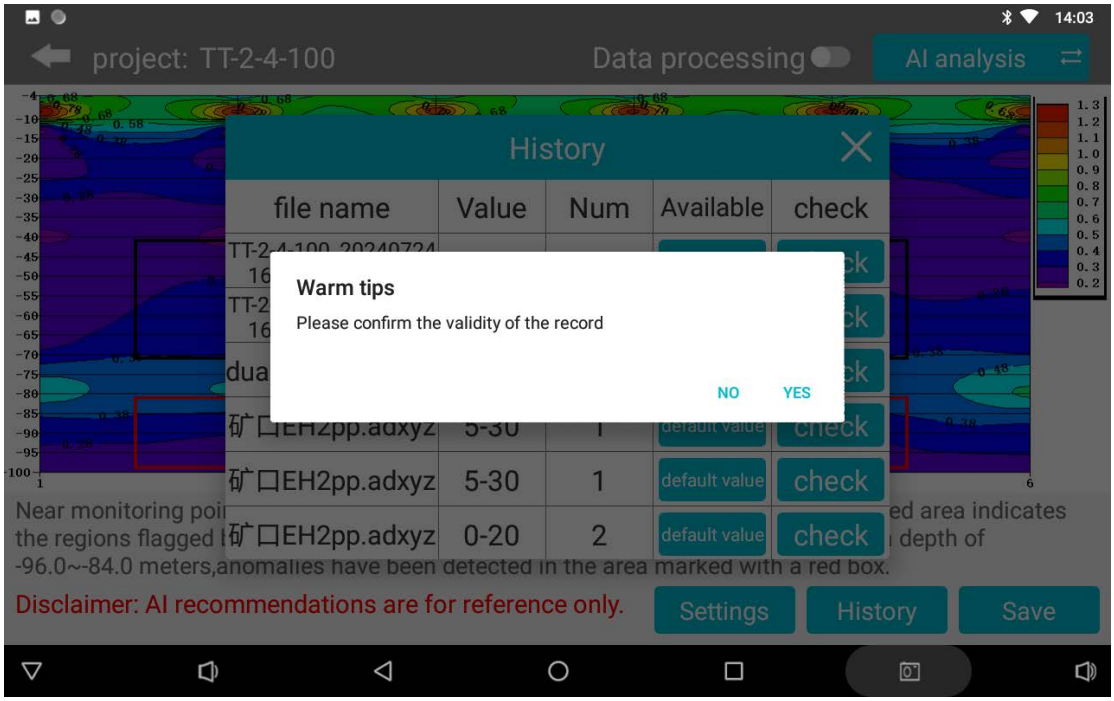

Figure 20

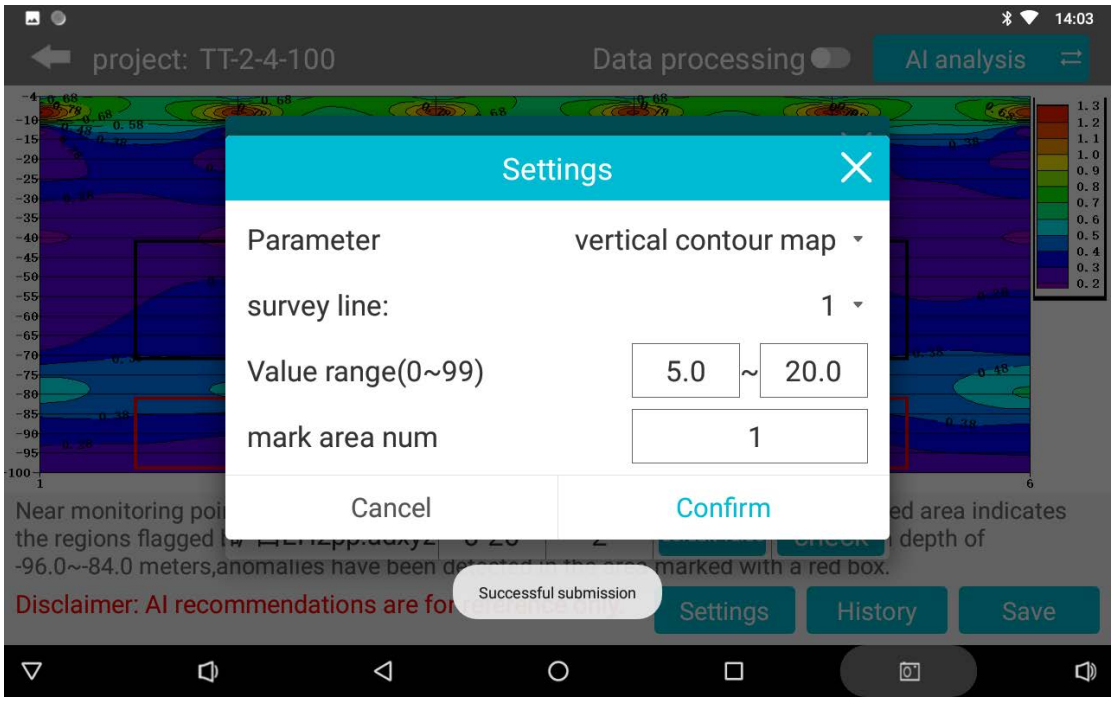

Figure 21

8.7 Save AI Analysis Results

In the AI analysis interface, click the third operation button at the bottom right of the screen (Figure 22) to save the images automatically analyzed by AI.

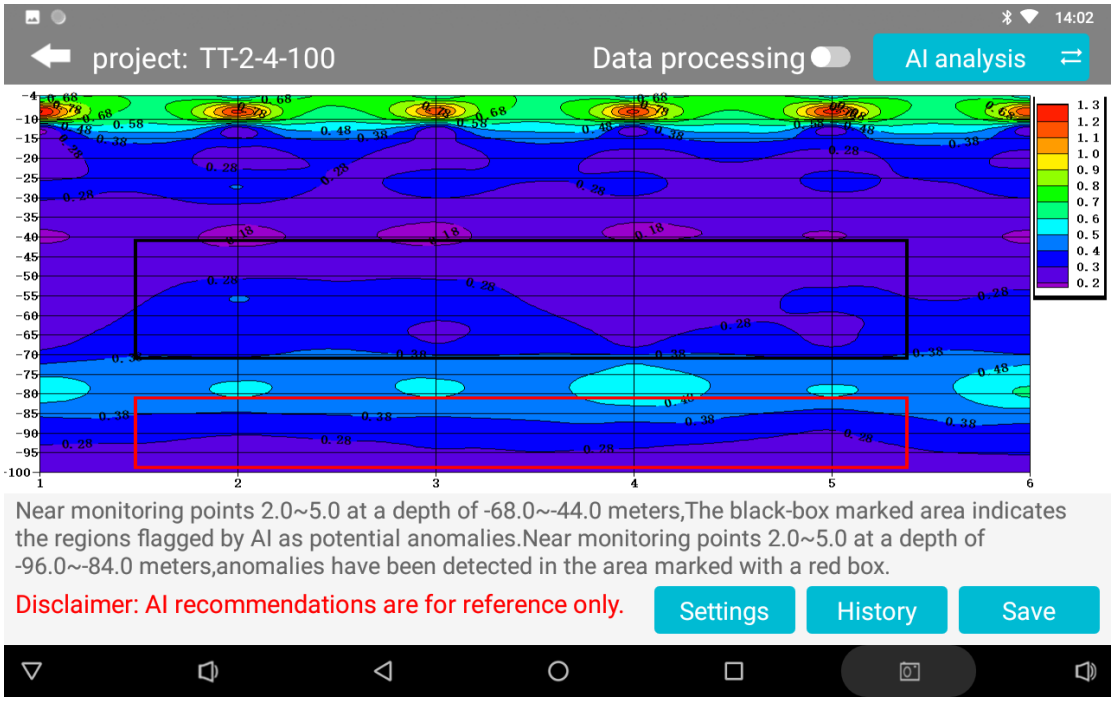

Figure 22

9. Instrument Settings

After connecting the instrument, directly enter the instrument setting interface from the main interface of Aidu detection APP (Fig. 23).

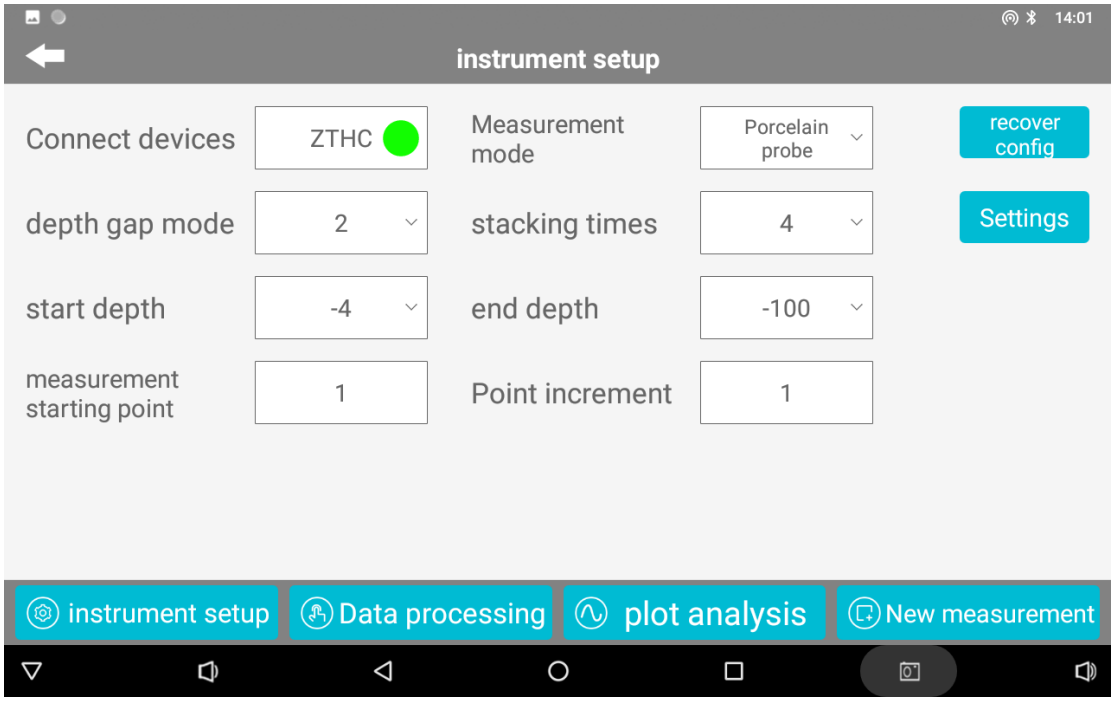

Figure 23

9.1 Connection equipment

The ID number and connection status of the connected device are displayed, with a green light for normal connection and a red light for disconnection.

9.2 Measurement mode

TT (probe) and MN (electrode) modes are available. If MN mode is selected, 4 small electrodes are inserted into the ground. If TT mode is selected, 4 small electrodes are not used. ADMT-3 H has no electromagnetic sensor, so TT mode cannot be used. The default is generally TT.

9.3 depth gap mode

After the upgrade and modification of the MT electromagnetic mineral dowsing rod. For 1G series, there are two depth gap mode to select, “1” mode is 2 meters interval, and the measurement depth is -2, -4, -6 and carried out; “2” mode is 4 meters interval, the measurement depth is -4, -8, -12 and carried out. For 1600 series, there are three depth gap modes to select, "1" mode is 5 meters interval, and the measurement depth is -5, -10, -15 to be carried out; "2" mode 10 m interval, measurement depth is -10, -20, -30 The "3" mode is 20 m interval, and the measurement depth is -20, -40, -60 to carry out. The default is "2".

The depth measurement time of each layer is about 7 seconds, for example, the minimum depth is -5, the maximum depth is -300, and the selection mode "1" needs to measure 30 layers, so the measurement time is about 210 seconds.

9.4 Number of Stacks

This is to set the superposition times of AD conversion. Generally, the higher the selection times, the more accurate the data will be, but the longer the measurement time will be. The default value of the software is "4", and the optional range is "4-16". Users can set and adjust it according to actual needs.

9.5 Start depth

Select the starting depth of the survey. You can select any starting depth within the maximum depth range of the MT electromagnetic mineral dowsing rod and under any mode of "1", "2" and "3". Generally, the default is the minimum depth value under the mode "2" of the model.

9.6 End depth

Select the end depth of the survey. Any depth within the maximum depth range of the

MT electromagnetic mineral dowsing rodcan be selected, but it cannot be the same as the start depth. Generally, the default value is the maximum depth value under the model mode "2".

9.7 Starting point of measurement

Enter the initial number of the measuring point of the profile, generally 0, 1, or other values, both positive and negative, and the starting point of the profile file will automatically increase according to the settings. The default value is 1.

9.8 Point increment

Enter the automatic increment of the survey number, which is generally 1 or more (it can also be a negative value). The profile is automatically incremented to the next survey point value based on the survey point increment on the basis of the start point. The default value is 1.

9.9 Recovery config

You can read the relevant parameters set last time in the MT electromagnetic mineral dowsing rod.

9.10 Setup

Click the "Set" key to complete the setting, and transmit the relevant parameter settings to the MT electromagnetic mineral dowsing rodinstrument.

10. Data processing

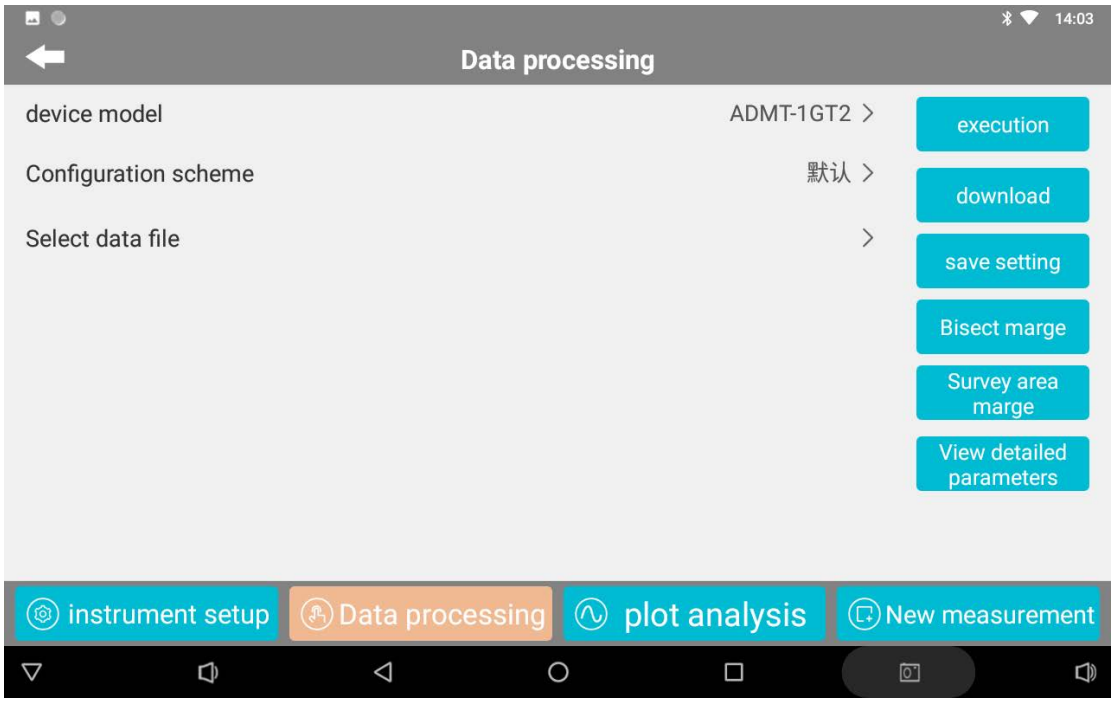

Figure 24

10.1 Equipment model

After the APP software is connected to an instrument model, the software will automatically identify the instrument model; You can also select the currently used device model after binding the used device in "Device Binding" in "User Information". After the upgrade and modification of Aidu detection, the principle of geophysical exploration is more followed, and different data processing methods are set according to the application scenarios of different instruments, such as different uses and different depths. In principle, the data processing methods of each instrument model are different.

10.2 Configuration Scheme

In addition to the "default" parameter settings provided according to different models after the upgrade and modification of the MT electromagnetic mineral dowsing rod, the detailed settings of data processing parameters can also be customized, which can better meet the user's local hydrogeological environment and personal use habits. Of course, it is generally necessary to set the parameters after being very skilled in using this type of instrument or relatively very professional people. In general, it is not recommended to use it. It is better to use "default".

10.3 Selecting a Data File

Select a file to be processed for data reprocessing.

10.4 Execution processing

After selecting "Equipment Model", "Configuration Scheme" and "Data File", click "Execute Processing", and a window will pop up to prompt to enter the generated file name. After entering, click OK to complete the data processing. If you do not need to work with data files, you do not need to use this function.

10.5 Download parameters

Downloading the latest parameters that the company matches for the model in the cloud for data processing will make the data processing more accurate.

10.6 Save Settings

Saves the current data processing parameter settings for use in data and plot analysis. Click "Save Settings" to save the data processing parameters, whether they are downloaded, automatically matched or customized.

10.7 Viewing Main Settings

Click to modify the parameter scheme on the left side (Figure 25). After the parameter modification, you can create the current scheme to the cloud -- "Add Scheme", save the current parameter configuration to the current scheme -- "Modify Scheme", and delete the current scheme -- "Delete Scheme".

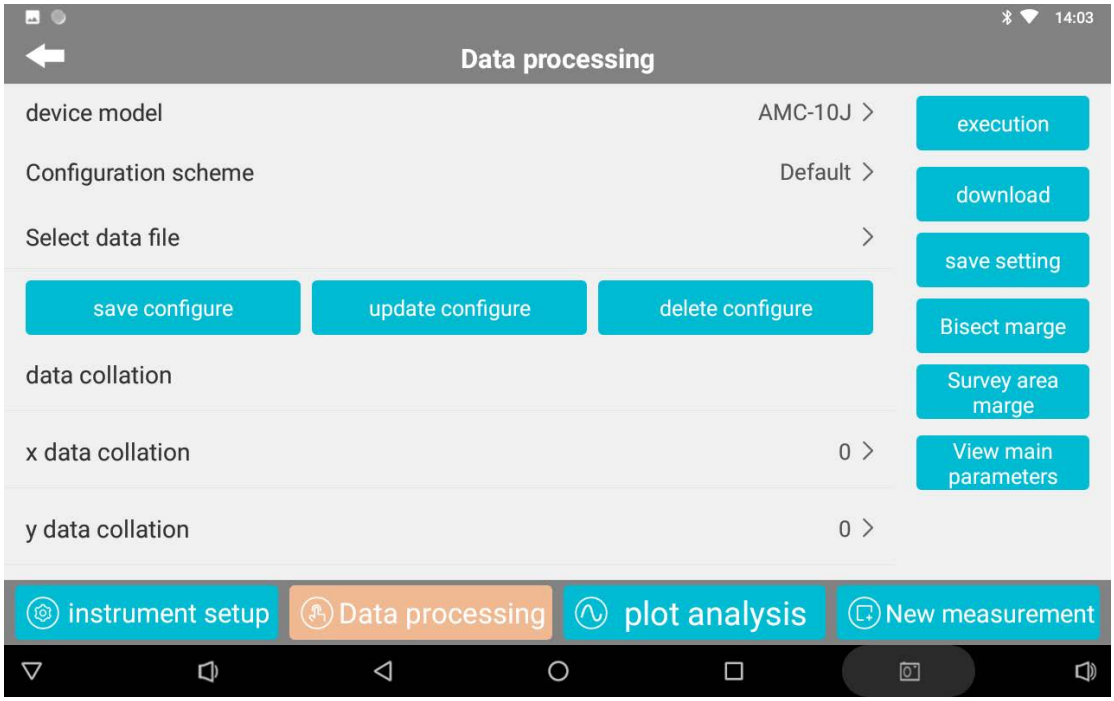

Figure 25

10.8 Merging of profile data

Multiple data files can be merged to form a profile file (as shown in Fig. 26). Fill in "Measurement starting point", "Point increment" and "Generated file name" → press "Add file" and select the data file to be merged → click to confirm. Files that need to be merged must first be data processed.

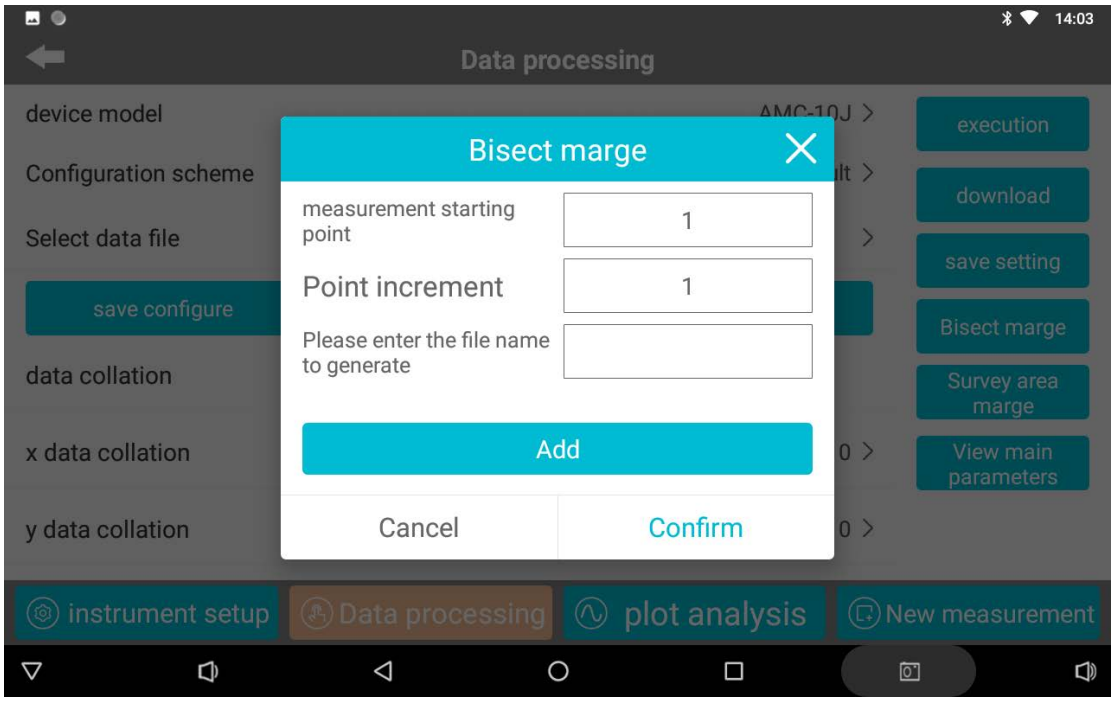

Figure 26

10.9 Data consolidation of survey area

Multiple data files can be merged to form a survey area file (Fig. 27). Fill in "Survey starting point", "Survey point increment", "Number of the first survey line", "Lateral line spacing" and "Generated file name" → press "Add file" and select the data file to be merged → click to confirm. Files that need to be merged must first be data processed.

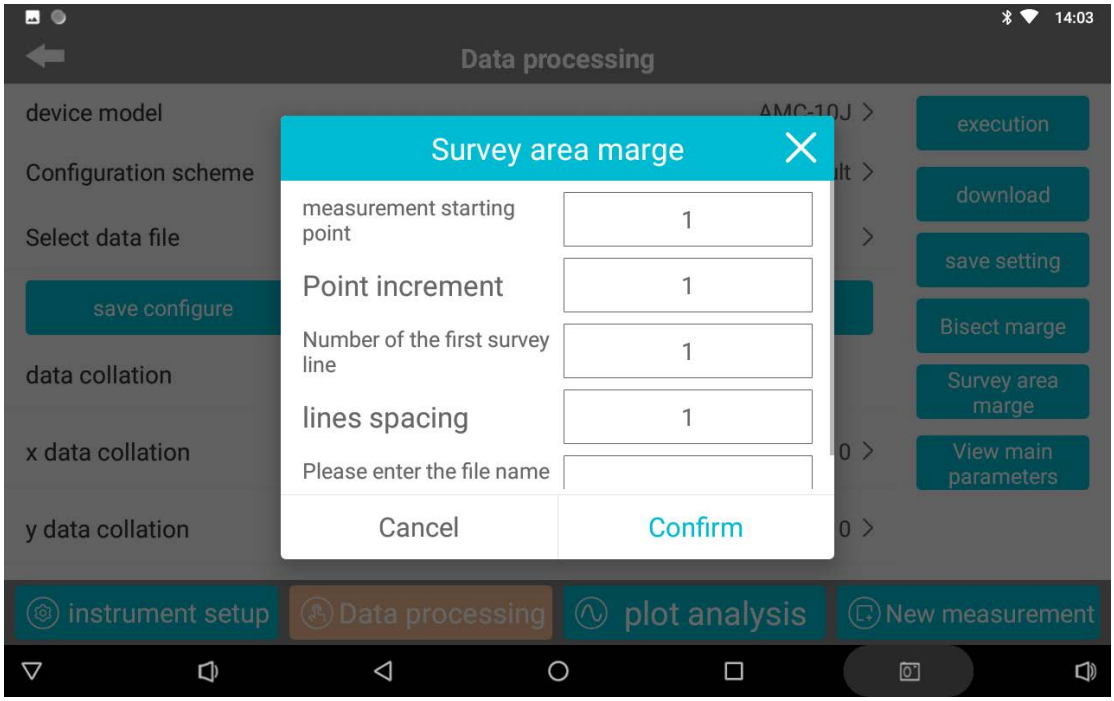

Figure 27

11. System Settings

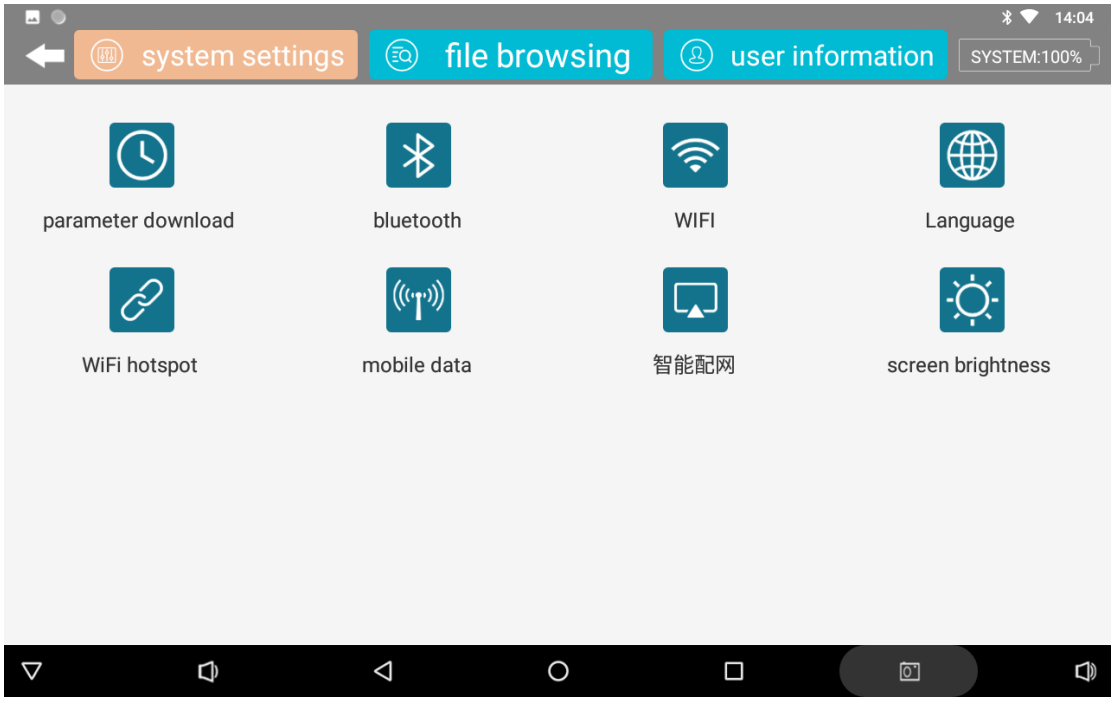

Figure 28

11.1 Parameter Download

Some instrument parameters need to be downloaded, but generally do not need to be used, and the MT electromagnetic mineral dowsing roddoes not need to download

parameters.

11.2 Bluetooth settings

It is used to open the system Bluetooth setting function in the control host, mobile phone or tablet computer.

11.3 WIFI settings

It is used to open the system WiFi function in the control host, mobile phone or tablet computer. It is used to set the WiFi hotspot name and password when the instrument is initialized.

11.4 Language Settings

Switch software language settings, with Chinese and English options.

11.5 WIFI Hotspot

It is used to open and control the system WiFi hotspot function in the host, mobile phone or tablet computer. After initialization, this function is often used to open the WiFi hotspot during daily connection. Because there is an automatic protection mechanism in the Android or Hongmeng system, the WiFi hotspot will be automatically closed after a long time of non-use.

11.6 Mobile Data Settings

It is used to open the mobile data switch setting function in the control host, mobile phone or tablet computer. If the control host supports 4G Internet access, you can choose to control the use by yourself.

11.7 Intelligent distribution network

For intelligent distribution network equipment, this function is not required for the MT electromagnetic mineral dowsing rod.

11.8 Screen Brightness

It is used to turn on and control the screen brightness and screen off time in the host, mobile phone or tablet computer.

12. Document browsing

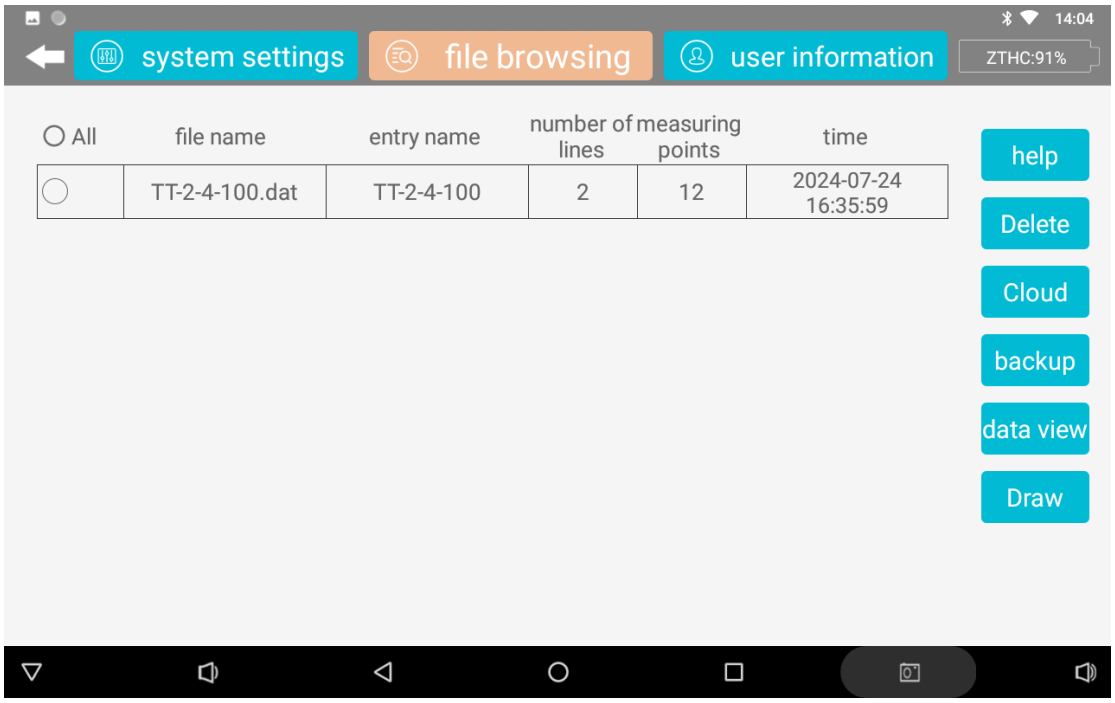

Figure 29

12.1 List of documents

You can view the file name, project name, number of survey lines, number of survey points, time and other detailed information of the stored file. You can select one or all of the file to perform other functional operations.

12.2 Help

Help can be queried for relevant help information, if any.

12.3 Deletion

After selecting the file to be deleted, clicking the "Delete" key will prompt "Are you sure to delete the selected file? Cannot be restored after deletion.

12.4 Cloud

Enter the cloud interface (Figure 30) to share the cloud files to other users, download the cloud files or delete the cloud files.

Figure 30

12.5 Backup

After selecting a file, click Backup File to back it up to the cloud.

12.6 View

After selecting the file, click View File to view the data in the current measurement file.

12.7 Drawing

After selecting a file, click Plot to enter the "Plot Analysis" interface of the corresponding file. For details, refer to Plot Analysis in Chapter 7.

13. User Information

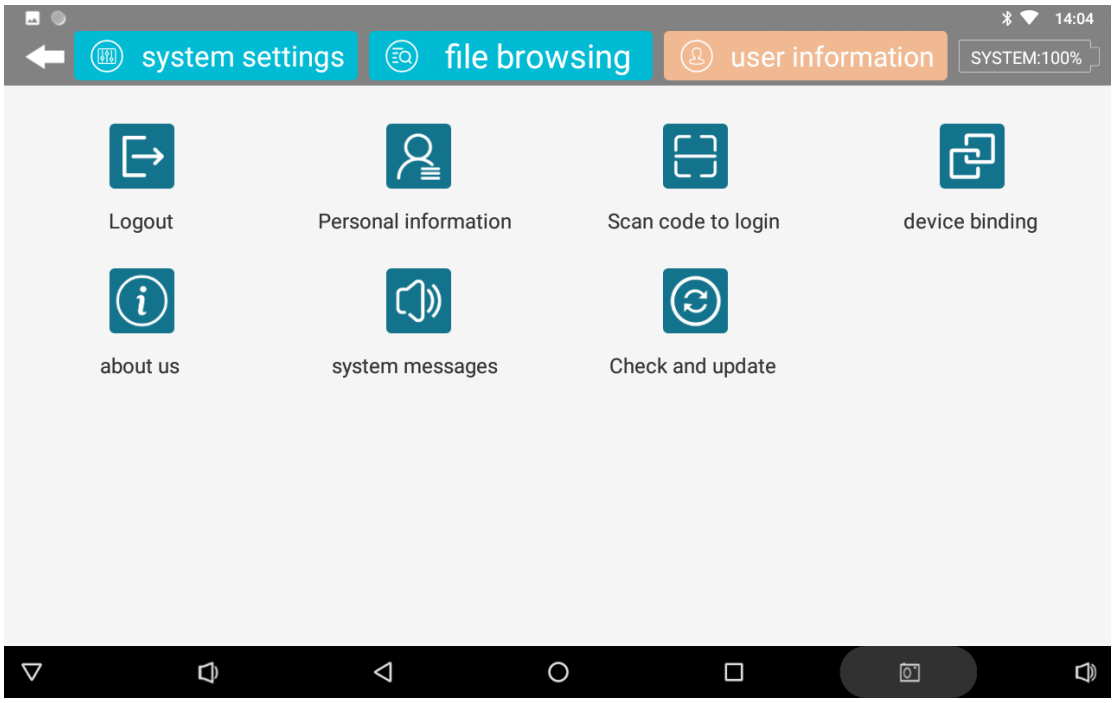

Figure 31

13.1 User Login/Logout

User login: Enter the mobile phone number to get the login password. After entering the login password in the SMS, you can log in directly. Login requires reading and agreeing to the user agreement and privacy protection policy. If you have not registered before, login is registration.

User exit: exit the current account.

13.2 Personal Information

View the personal information of the current account.

13.3 Login by scanning code

Use the control host, mobile phone or tablet computer with camera to scan the code to log in the http://web.aidush.com of Aidu Data Processing System. Please select the account of "Aidu detection" when logging in.

13.4 Device Binding

The connected instrument and equipment model can be bound to the login account or unbound.

13.5 About Us

Display software version, user agreement and privacy protection policy details.

13.6 System messages

System messages can be queried.

13.7 Checking for updates

Check whether the software is updated with the latest version, and select the update as required.

14. Aidu WEB Intelligent Data Processing System

14.1 Aidu WEB Data Processing System Login

Use the browser to access the Aidu data processing system (http://web.aidush.com), select the account type of "AIDU detection", and log in with the same mobile phone number and password as the instrument or mobile phone, so as to share all the data under the account, or scan the code to log in through the Aidu Exploration APP in the mobile phone (Figure 32-36).

Figure 32

Figure 33

Figure 34

Figure 35

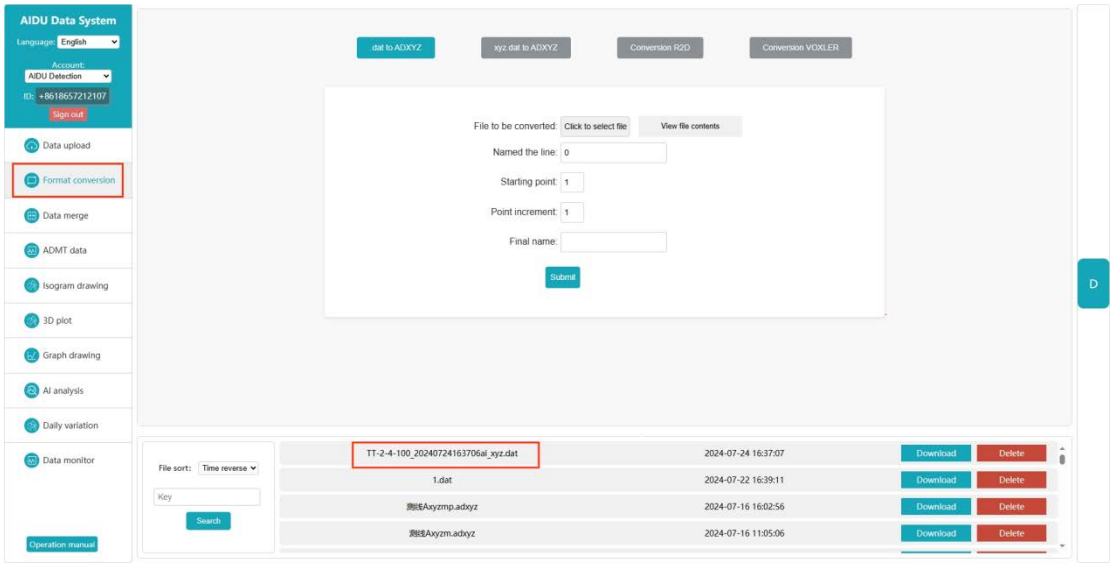

Figure 36

14.2 Data upload

After selecting "Data Upload" on the left, you can select the data files in the computer from the folder icon in the middle to upload. Click the + sign to select multiple files. After clicking "Data Upload", the data will be uploaded to the cloud database of the current application type of the current account. If the data in the instrument is selected for backup, it will be automatically saved in the data file list at the bottom, and there is no need to use this upload function.

14.3 Data export

Method 1: Log in to your account, backup to a webpage, and then download to your computer.

Method 2: Connect the phone to the computer with a data cable, select the file management mode on the phone, and then open the folder according to the following path: computer name \ phone model \ internal storage device \ Android \ data \ com. aidush. app. measure \ files \ aiduw_measure \ data. The dat file inside is the data file.

14.4 Data format conversion

Click "Format Conversion" and select "Old File Conversion ADXYZ" to convert the.dat file of the old Aidu instrument data into an.adxyz file (the data column of the.dat file of the old instrument data is frequency, and the row is measuring point data), and then you can operate the website function. Select the file to be converted after selecting "New file conversion ADXYZ". You can select which column of the converted file is used to compose the X, Y and Z data columns. At the same time, you can also select the range of depth and measuring point. Select "R2D data conversion" to convert the selected file into the inversion data format required by the Swedish Res2dinv high-density instrument. After selecting "Download" the data, the Swedish Res2dinv software can be used for further inversion mapping; Select "VOXLER Format Conversion" to convert the selected file to VOXLER 3D software to draw 3D drawings. AI analysis or mapping that has been used in Aidu equipment or APP will generate _ XYZ. DAT files, which can be directly used for AI analysis of web pages (Figure 37-38).

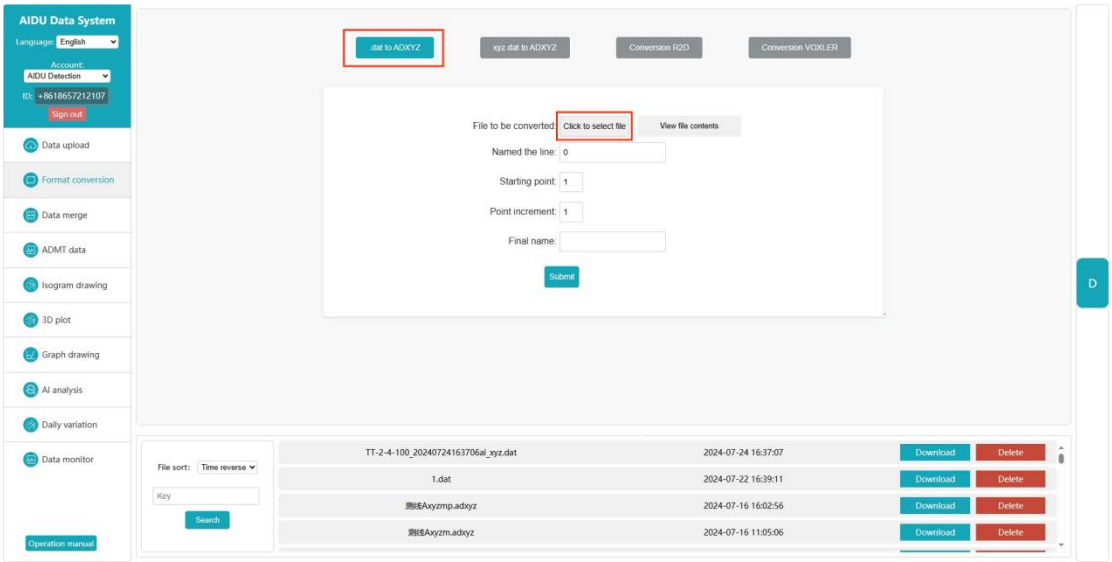

Figure 37

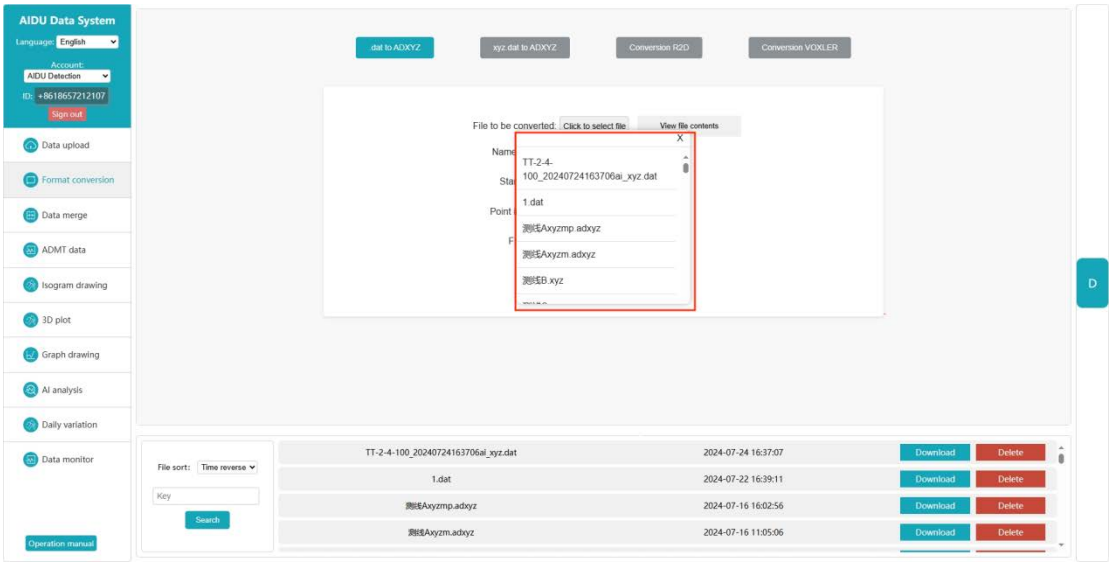

Figure 38

14.5 Data consolidation

Data merging is divided into profile data merging and survey area data merging.

Profile data merging can merge multiple measurement files into one profile data. The specific operation is to select the name of the first file to be merged by clicking "Select File" under profile data merging. You can click the plus sign to add the dialog box of "Select File by Clicking" to select other files until the files to be merged are selected in order. Reset the measurement starting point and Point increment, both of which can be defaulted to 1, and set a new file name. Click "Submit" to complete the merging. After that, the new file name will be displayed at the front of the data line. Each new file will be a complete profile file.

Survey area data merging can merge multiple survey line (profile) data files in the survey area together, so as to draw three-dimensional maps and plane profiles, etc. The specific operation is to select the name of the first file to be merged by clicking "Select File" under the survey area data merging menu, and to select other files by clicking the plus sign to add the dialog box of "Select File". After the files to be merged are selected in sequence, the parameters such as the measurement starting point, the Point increment, the first survey line number, the survey line spacing, and the new file name are redefined, and then the merge is executed by "Submit". After the merge is completed, the new file name is displayed at the front of the data line, and each new file is a merged complete survey area file. The measurement starting point and Point increment can be defaulted to 1, the number of the first measuring line can be defaulted to 0, the distance between measuring lines can be defaulted to 1 or the vertical distance between two adjacent

measuring lines, the name of the new file can be customized, and the distance between measuring lines can be automatically increased.

14.6 ADMT Data Processing

The ADMT data processing function can perform corresponding data processing on the original data of the instrument. The file that can be processed is the.adxyz file.
The data processing parameters can refer to the operating instructions in 9.7 of this manual.

14.7 Contour mapping

The contour map can be drawn from the processed data file. The specific operation is to select the function of "drawing contour map" on the left, click the name of the file to be drawn and draw the contour map. The default is "classic contour map". You can switch to "new contour map" in the upper right corner and then select the file to draw. If it is a survey area data file, the "vertical contour map" and "plane contour map" can be switched. How to obtain the survey area data file can be obtained by setting each survey line during instrument operation and measurement, or by referring to the survey area data merging function in Article 9.9 of this manual.

14.8 Plotting the graph

Select "Draw Curve Chart" to draw various types of curves. The specific operation is to select the "Draw Curve Chart" function on the left, click the file name to be drawn and draw the curve. You can switch the multi-color broken line chart, gray broken line chart and gradient broken line chart in the upper right corner to switch different types of curves.

14.9 AI Automatic Analysis

Click the function of "AI automatic analysis" on the left, and then select adxyz or XYZ. DAT file. You can also modify the AI analysis effect in the operation bar on the right side of the webpage. The account that has been connected to the instrument in Aidu Instrument or Aidu APP has been automatically bound to the instrument, and the bound instrument will be displayed by default in "Device Model" (Figure 39).
If the account has not been bound to the instrument, you need to manually enter the instrument model in the "Model Query". After manually entering the "Model Query", you can select the recommended configuration in the "Configuration Name" below, or enter the desired values in the "Value" and "Number of Target Areas".

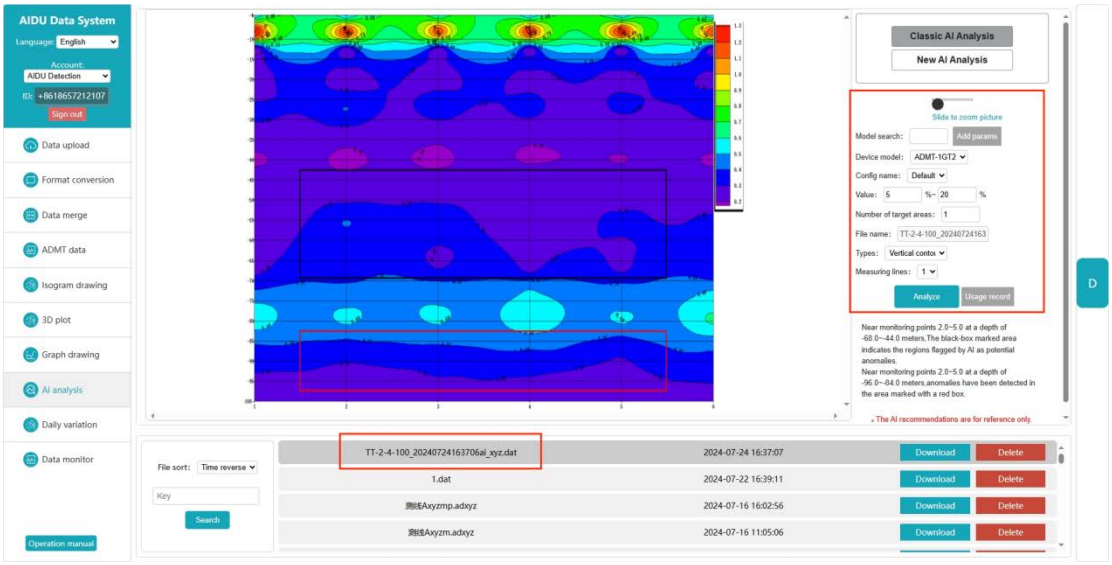

Figure 39

To record whether the AI analysis result is valid, click "Use Record" in the right operation bar, and select "Valid" and "Invalid" behind the analyzed data file (Figure 40). If the analysis result is consistent with the actual situation, check Valid. At this time, the system will record valid data. The more valid and accurate data are recorded, the more accurate the AI analysis will be.

If not, check "Invalid", and a prompt box will pop up. You can manually adjust the analysis result to be consistent with the actual result, and then record it again. If it is not adjusted, it will not be recorded (Figure 41).

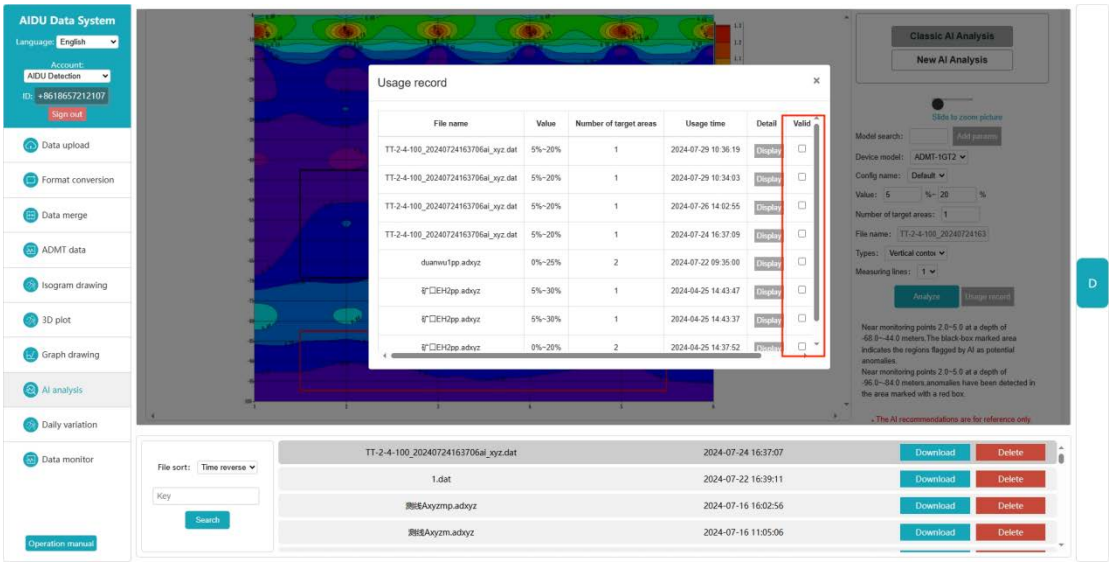

Figure 40

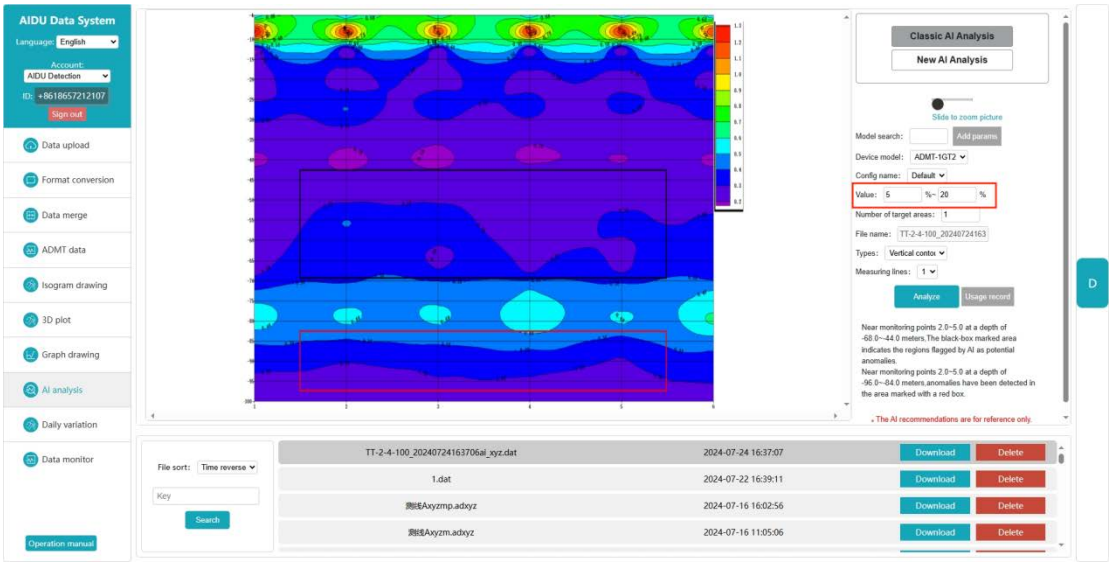

Figure 41

15. Usage of MN and TT Measurement Modes

15.1 MN electrode mode measurement method

Connect the MN metal electrode of the MT electromagnetic mineral dowsing rod. Refer to Chapter IV and V of this manual for instrument initialization and daily connection settings.

After the equipment is started, the measurement depth and the measurement mode are selected to select the MN electrode, the installed MN metal electrode is inserted into the ground, the sample can be started in the on-line measurement or off-line measurement mode, the positions of the MT electromagnetic mineral dowsing rods are recorded at the measuring points, and the measuring points are moved to the second measurement O2 after the first measurement O1 is completed. And so on to complete the third measurement of O3, O4, O5, O6, … Until the entire profile is measured (Figure 42). The distance between O1 and O2, and between O2 and O3 is called point spacing, which is generally ≤ the size of the exploration target, and the unit is meter.

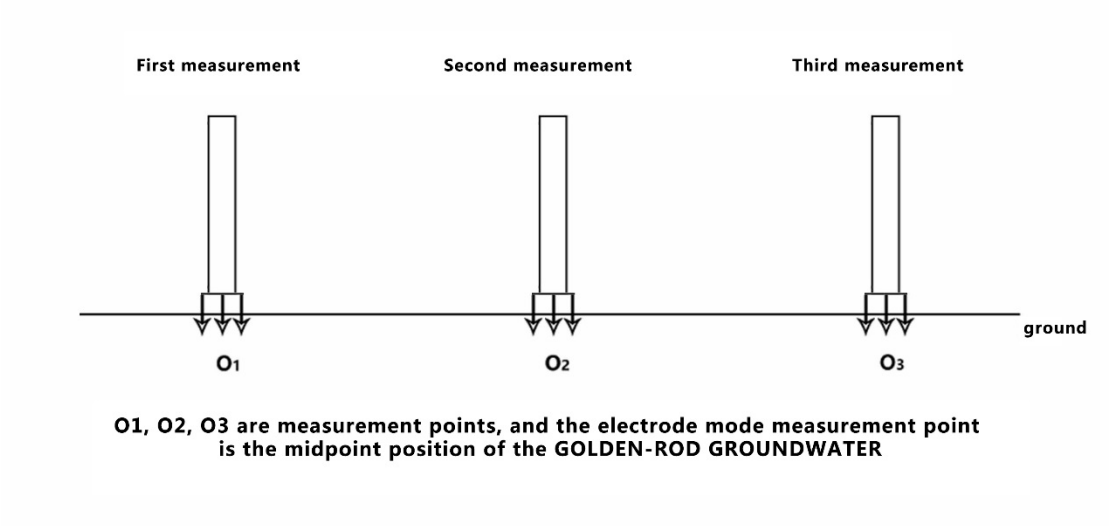

Figure 42

15.2 TT Electromagnetic Probe Measurement Mode

After the equipment is started, select the measurement depth and the measurement mode to select the TT probe, lay the equipment flat on the ground and start sample in the online measurement or offline measurement mode, record the central position O of the equipment, move to the second measurement O2 after completing the first measurement O1, and then complete the third measurement O3, O4, O5, O6 Until the entire profile is measured (Figure 43). The distance between O1 and O2, and between O2 and O3 is called point spacing, which is generally ≤ the size of the exploration target, and the unit is meter.

Of course, it can also be measured vertically like the MN electrode mode (Fig. 44). Insert the installed MN metal electrode into the ground or place it on the ground (the MN metal electrode is not used, and it is mainly fixed or placed horizontally), and start to collect data in the online or offline measurement mode, and record the position of the MT electromagnetic mineral dowsing rod at the measuring point. After completing the first measurement O1, move to the second measurement O2, and so on, complete the third measurement O3, O4, O5, O6, … Until the measurement of the whole profile is completed. The distance between O1 and O2, and between O2 and O3 is called point spacing, which is generally ≤ the size of the exploration target, and the unit is meter.

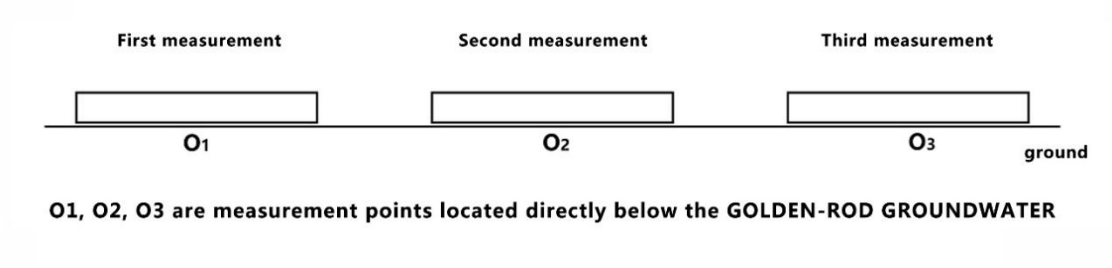

Figure 43

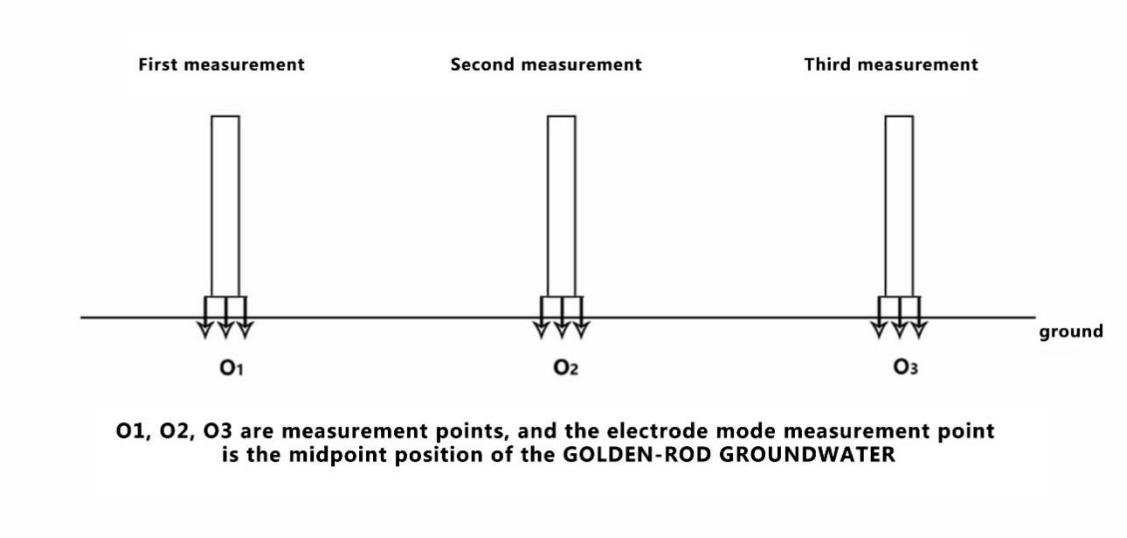

Figure 44

16. Field Survey Line Layout Method

The layout of survey line is a very important link in the exploration. The layout of survey line will directly affect the measurement accuracy and improve the anti-interference ability. The basic principle is that the direction of the survey line should be perpendicular to the direction of the exploration target, the straight line profile should be as straight as possible, the circular profile should be as round as possible, and the ground should be as flat as possible. Select different survey line layout methods according to the actual topography and landform.

16.1 Parallel layout method of straight line section

Straight line section is the most commonly used layout method, and multiple straight line sections are formed by multiple straight line sections in parallel, which can quickly determine the trend of the exploration target. First, suppose and judge the strike of the exploration target, and arrange the survey line perpendicular to the direction of the exploration target (as shown in Figure 45). One or more straight sections can be arranged, and generally 2-3 straight sections can be arranged to quickly judge the strike

of the abnormal body. Multiple straight sections can be arranged according to the length of the exploration target, and the distance between each straight section is called the line distance. The line spacing is generally ≤ the length of the exploration target, and the unit is m.

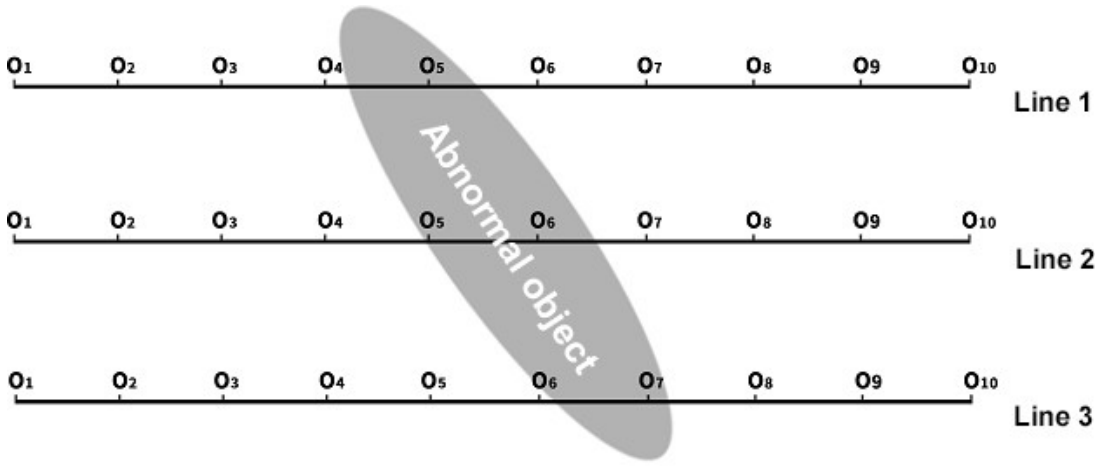

Figure 45

16.2 Cross or Oblique Line Cross Layout Method of Straight Line Section

When an abnormal body is found after measuring a straight line profile or the site is relatively limited and it is difficult to lay multiple straight line profiles, the cross (as shown in Figure 46) or oblique line (as shown in Figure 47) can be used to lay the second straight line profile. Combining the abnormal areas of the two straight line profiles can repeatedly confirm the existence of the exploration target, and can also assist in judging and confirming the general trend of the exploration target.

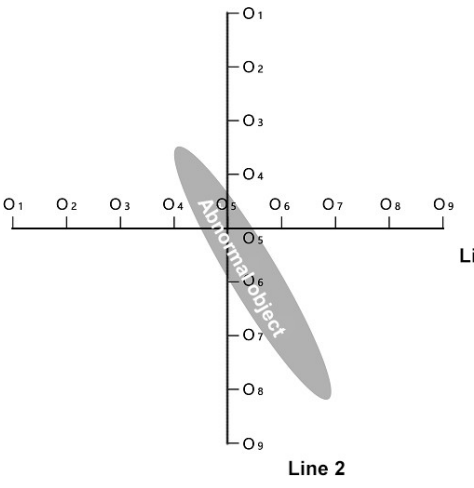

Figure 46

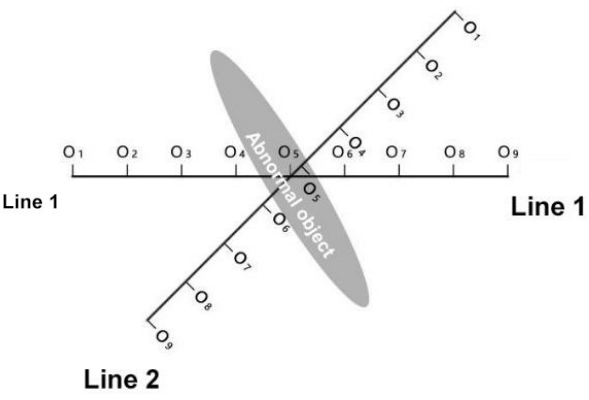

Figure 47

16.3 Circular section layout method

When the survey site in some areas is indeed narrow or there are point-like interfering objects such as transformers and signal transmission towers nearby, a circular (Fig. 48) or semicircular (Fig. 49) profile is laid with the site or interfering objects as the center for measurement, and the trend and location of the exploration target objects (water veins, mineral veins, etc.) can also be quickly traced.

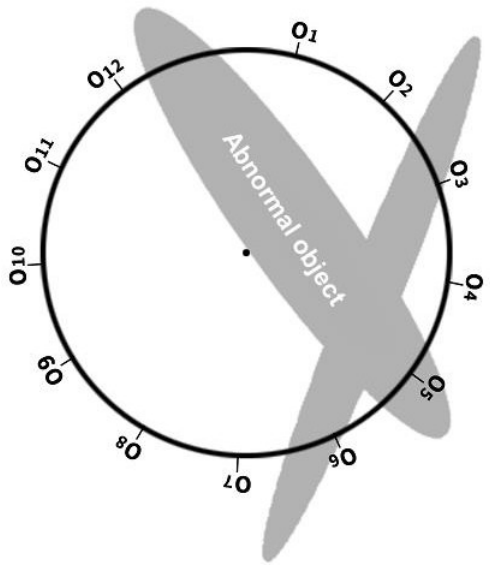

Figure 48

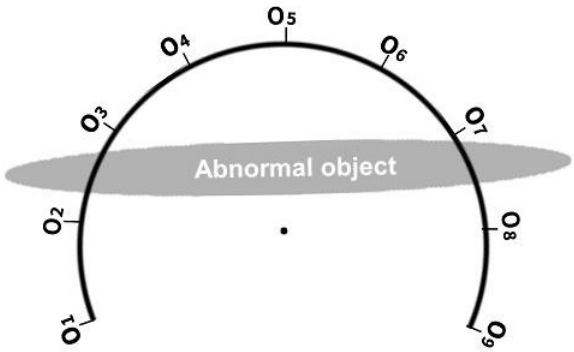

Figure 49

16.4 Several principles of field survey line layout

1、When measuring on the hillside, the same altitude shall be selected as far as possible. When the same altitude cannot be selected, the same slope or gentle slope shall be selected as far as possible. The height difference between adjacent points shall not exceed 2 meters.

2、The measuring line shall be as far away from the high-voltage transmission line and telephone line as possible, and when it cannot be, the wiring direction shall be parallel to it as far as possible.

3、When measuring, try to ensure that the M and N electrodes are in the same plane, and the recording point is the center point of the M and N electrodes or below the equipment sensor.

4、The point spacing and line spacing in the same survey area shall be kept the same as far as possible to facilitate recording and analysis.

5、The grounding consistency of M and N electrodes shall be kept as much as possible

during the measurement of MN electrode mode.

6、The survey line shall be laid perpendicular to the strike of the abnormal body as far as possible, the straight line section shall be as straight as possible, the circular section shall be as round as possible, and the ground shall be as flat as possible. The survey line can be determined as straight as possible by using the compass or the method of three points and one line.

7、When measuring on the hillside, the same altitude shall be selected as far as possible. When the same altitude cannot be selected, the same slope or gentle slope shall be selected as far as possible. The height difference between adjacent points shall not exceed 2 meters.

8、The measuring line shall be as far away from the high-voltage transmission line and telephone line as possible, and when it cannot be, the wiring direction shall be as parallel as possible to others.

9、When measuring, try to ensure that the M and N electrodes are in the same plane, and the recording point is the center point of the M and N electrodes or below the equipment sensor.

10、The point spacing and line spacing in the same survey area shall be kept the same as far as possible to facilitate recording and analysis.

11、The grounding consistency of M and N electrodes shall be kept as much as possible during the measurement of MN electrode mode.

17. Precautions for use of the instrument

1、Please check the battery power of the equipment regularly and charge it regularly. Keep sufficient power during working hours, and turn off the power supply in time after work.

2、The equipment shall be kept by a special person during transportation or use to avoid severe vibration, impact and dampness.

3、After each work, keep the equipment and MN electrode clean, and place them in a ventilated and dry place.

4、If MN electrode or electromagnetic sensor is not connected or disconnected, it will prompt measurement failure. Please check whether the line is connected properly.

5、When the measured data of each measuring point is too small and the values are basically the same during the equipment measurement, it may be the instrument failure. Please contact the after-sales service for confirmation.

MT 电磁勘探金箍棒 Por 操作手册

MT Electromagnetic Exploration Golden Rod Pro Operating Manual

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