

# **ADCP Measurement of The Blue Nile at Sennar Under High Sediment Conditions**



Jeff Woodward, MSc.



# NILE RIVER BASIN





# Nile River

# SUDAN











# River Statistics

		Length	Drainage Area	Discharge
	Continent	(longest trib)	million km <sup>2</sup>	m <sup>3</sup> /s
1. Nile	Africa	6484	2.9	1,580
2. Amazon	South America	6516	7.2	180,000
3. Yangtze	Asia	5800	2	35,000
4. Mississippi	North America	3019	1.2	17,500
8. Congo	Africa	4700	1.4	42,000
12. Mackenzie	North America	4250	0.7	7,500






# Background

- 10 countries share the Nile. Of the 10, 5 are the poorest in the world. Assistance has been on going to better monitor and manage Nile water
- FAO funded project purchased RDI 1200 ADCPs for Nile Countries.



- 
- 2005 – WSC delivered a training session for NILE countries to assist with the implementation of the technology.
  - For the majority of hydrometric programs, the technology was appropriate.
  - Under high flows and high sediment conditions, measurements were failing.



# White/Blue Nile

- White Nile flows from Uganda into South Sudan into a series of lakes and swamps.
- Blue Nile flows from Ethiopia into Sudan. It has very high sediment loads.





# Nile River

# SENNAR





# High Sediment











# Equipment Used

I brought

- Teledyne RDI 600kHz ADCP,
- Sontek 500kHz ADCP
- Sontek/YSI 1500kHz ADCP,
- Novatel Propak RTK GPS (base station and rover),
- Lowrance Sporting GPS and Depth Sounder,
- ADCP Mount,
- Panasonic Toughbook field computer,
- Miscellaneous troubleshooting equipment.

Provided by the mission participants:

- 2, 1200kHz ADCPs
- Ocean Science Tethered boat
- 12v batteries for power
- 240v generator
- Miscellaneous supplies as required.





















# Trial and Error

- Ocean Science Boat - fail
- 1200 Khz RDI – no measurement - fail
- 1.5MHz Sontek – some data – fail
- 600kHz RDI – some data - fail







Fail

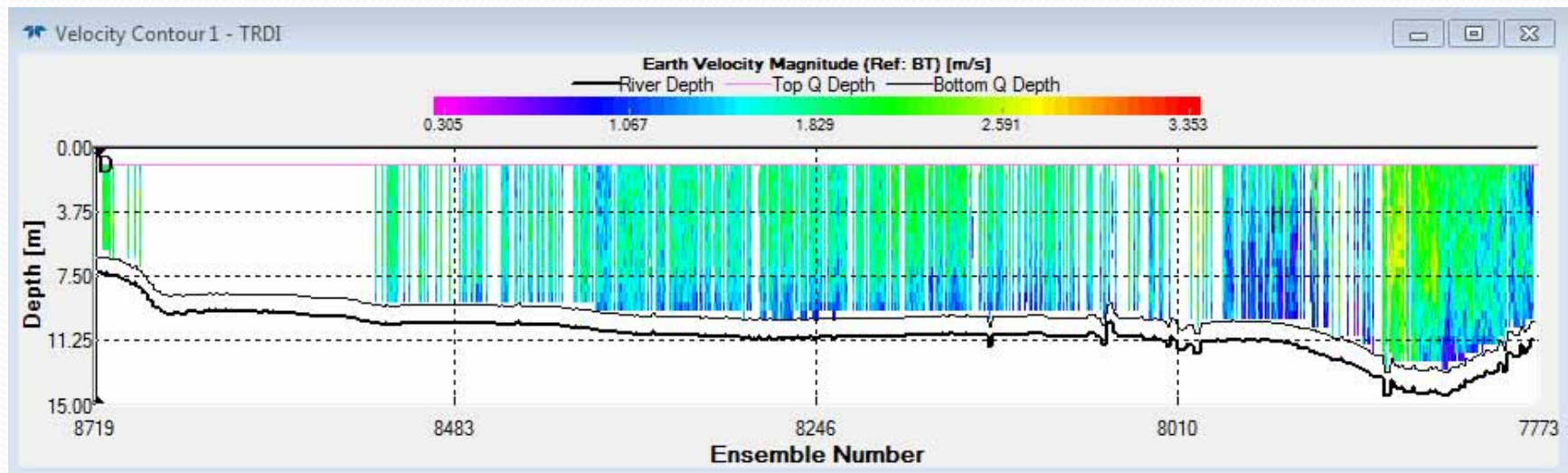


# SONTEK 1.5MHz ADP





# 600kHz RDI



Partial Measurement One  
Direction

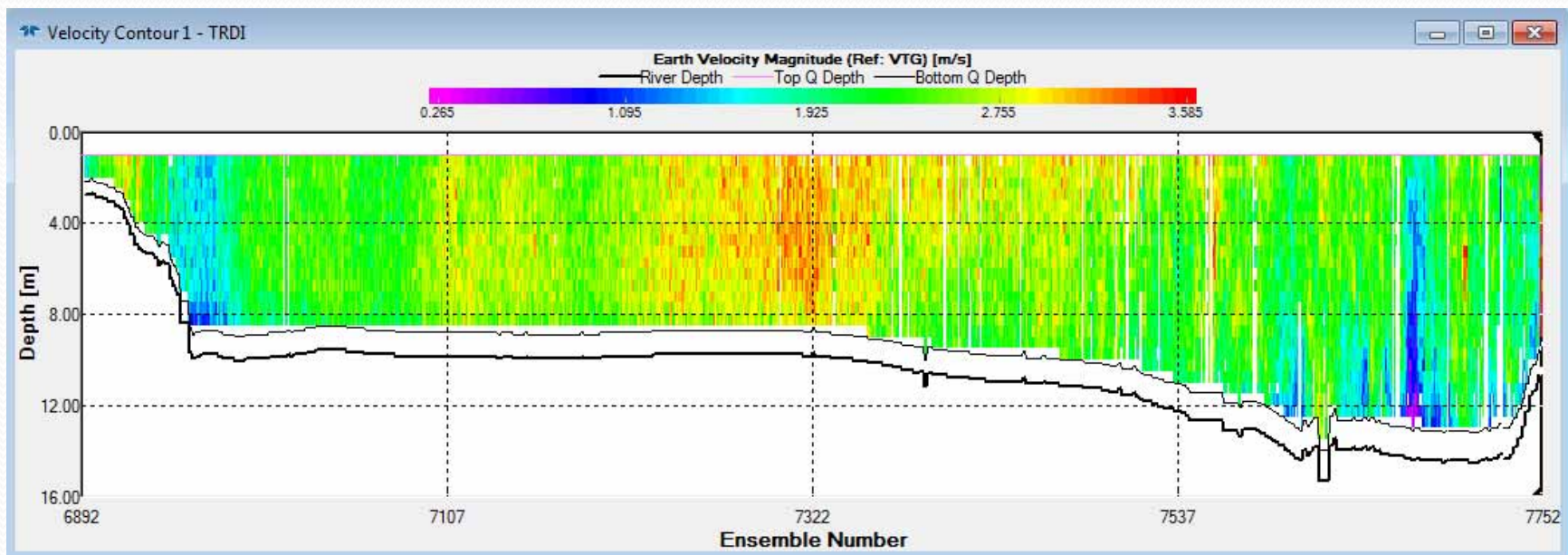
# GPS and Depth Sounder







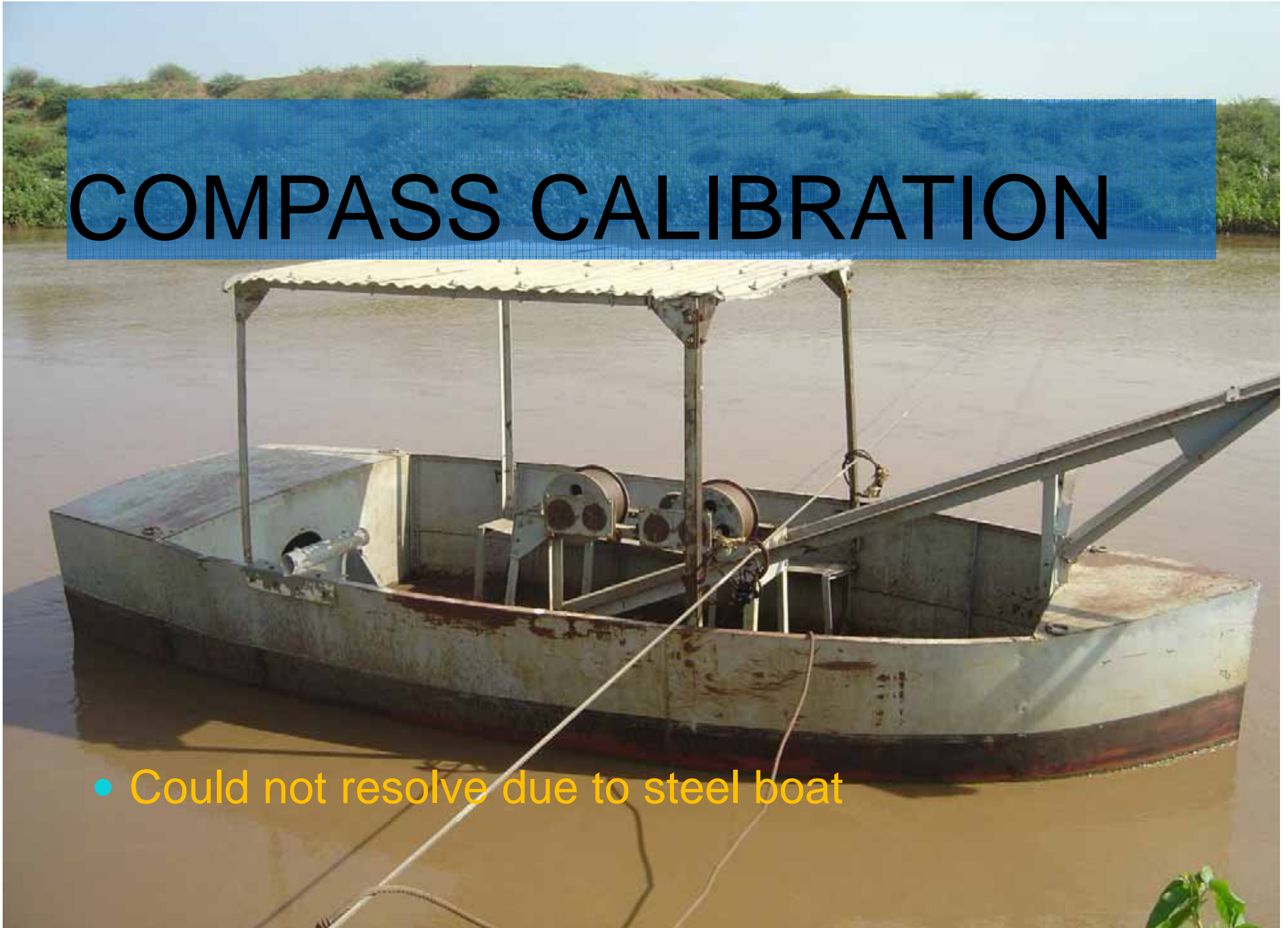






# COMPASS CALIBRATION

- Could not resolve due to steel boat





# Recommendation

- 600kHz RDI ADCP
- RTK GPS for positioning in moving bed conditions.
- Depth sounder required
- GPS Compass is an option
- Different Measurement boats – aluminum/fiberglass

















The End