



Institut Agronomique et Vétérinaire Hassan II
School of Geomatic Sciences & Surveying Engineering

**Testing the performances of dual frequency GPS
Real Time in The operations of
implanting and survey**

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Outline

- ▣ **OBJECTIVE**
- ▣ **RESULTS OF EXPERIMENTAL TESTS**
- ▣ **INTERPRETATION & DISCUSSION**
- ▣ **CONCLUSION**



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OBJECTIVE

- ❑ Experiment the use of dual frequency real Time GPS in surveying and implanting in two projects of allotment
- ❑ Conduct Several experimental tests using GPS in different modes (RTK, RTK post processing, STOP &GO).
- ❑ Compare results to those achieved using total station.

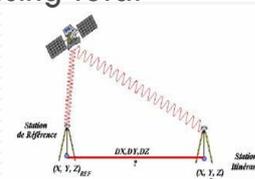



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TESTING THE PERFORMANCES OF GPS in surveying

In the first project

$DX = X_{Gps\ mode} - X_{Total\ ST}$; $DY = Y_{Gps\ mode} - Y_{Total\ ST}$

Statistical Parameters	Differences between coordinates					
	RTK		RTKpp		STOP and GO	
	DX (cm)	DY (cm)	DX (cm)	DY (cm)	DX (cm)	DY (cm)
Min	1	0	1	0	0	1
Max	5	4	5	5	5	5
Average	3	1	3	1	2	3
St dev	1	1	1	1	1	1

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■ TESTING THE PERFORMANCES OF GPS in Implanting

In the first project

$DX = X \text{ (case n° 1, 2, 3, 4)} - X \text{ (Implantation)}$

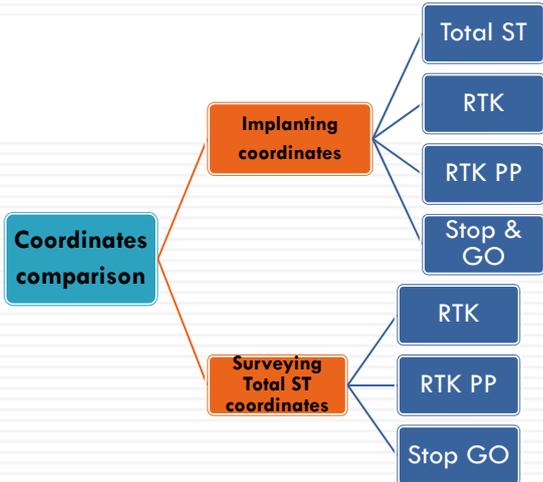
$DY = Y \text{ (case n° 1, 2, 3, 4)} - Y \text{ (Implantation)}$

Parameters	Differences between coordinates (cm)							
	total Station		RTK		RTKpp		STOP and GO	
	DX	DY	DX	DY	DX	DY	DX	DY
Min	0	0	0	0	1	0	1	1
Max	7	5	4	5	5	6	4	8
Average	1	2	2	2	2	3	3	5
St dev	2	2	1	2	1	2	1	2

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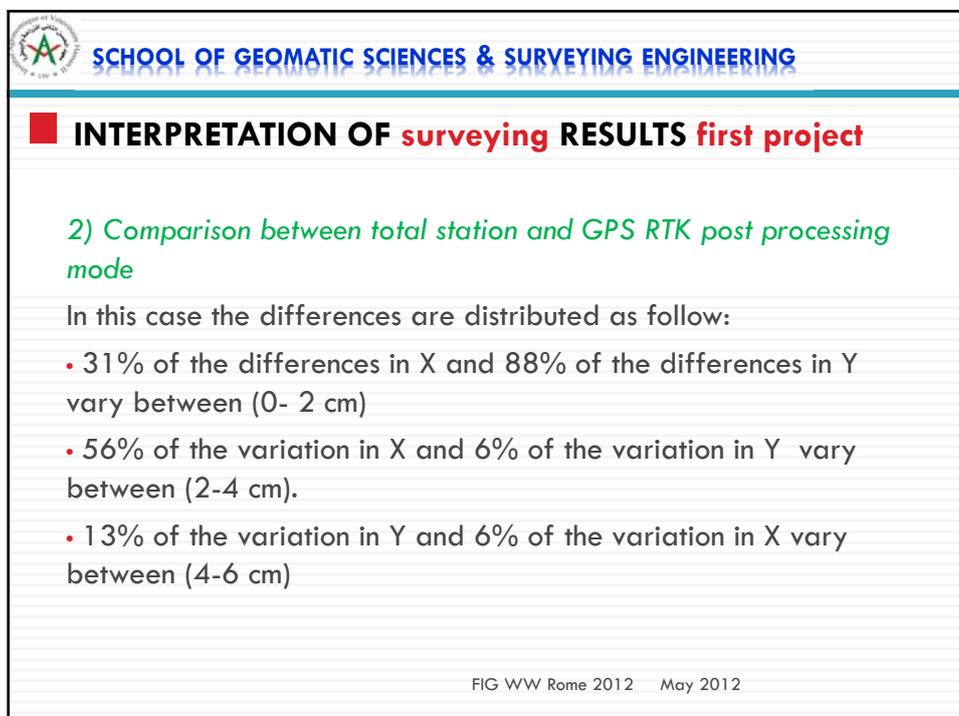
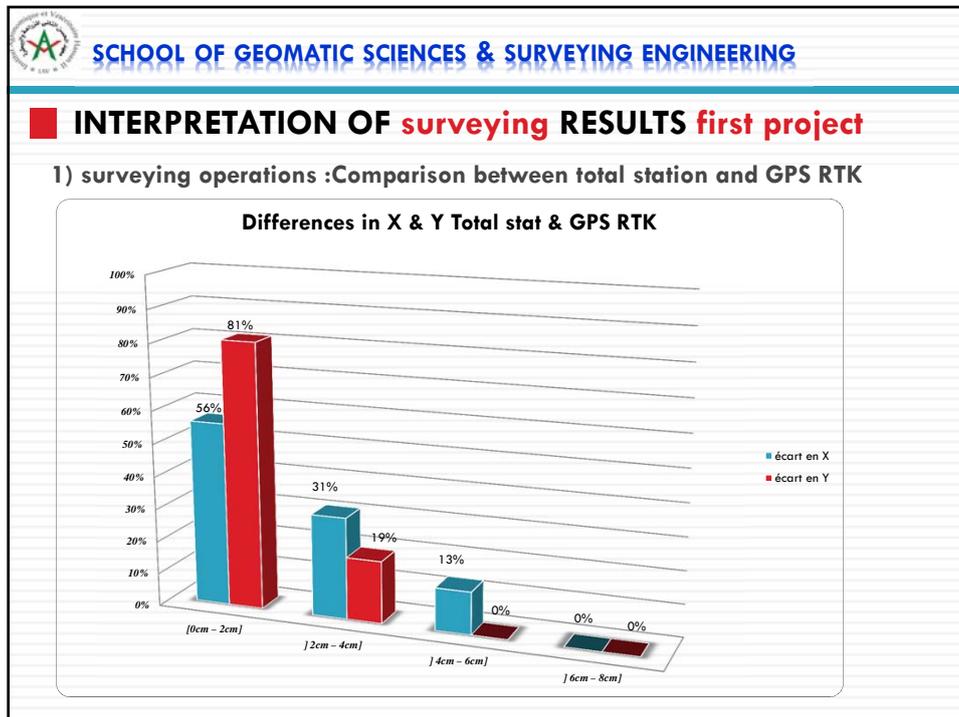
■ INETRPRETATION OF RESULTS



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graph LR
    A[Coordinates comparison] --> B[Implanting coordinates]
    A --> C[Surveying Total ST coordinates]
    B --> B1[Total ST]
    B --> B2[RTK]
    B --> B3[RTK PP]
    B --> B4[Stop & GO]
    C --> C1[RTK]
    C --> C2[RTK PP]
    C --> C3[Stop GO]
    
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■ INTERPRETATION OF *surveying* RESULTS first project

3) *Comparison between total station & STOP and GO mode*

In this third case the differences are distributed as follow:

- 56% of the differences in X and 39% of the differences in Y vary between 0 and 2 cm.
- 39% of the differences in X and 44% of the differences in Y vary between 2 and 4 cm.
- 6% of X differences and 17% of Y differences vary between 4 cm and 6 cm.

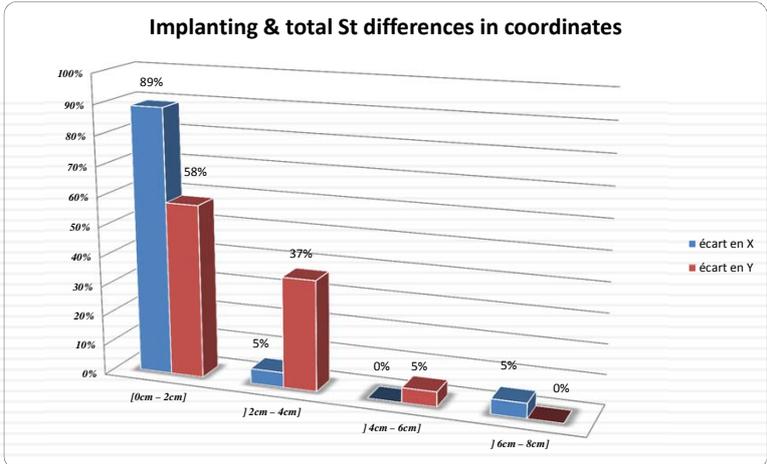
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■ INTERPRETATION OF *implanting* RESULTS

1) *Comparison between implanting and total station coordinates*

Implanting & total St differences in coordinates



Range (cm)	écart en X (%)	écart en Y (%)
[0cm - 2cm]	89%	58%
]2cm - 4cm]	5%	37%
]4cm - 6cm]	0%	5%
]6cm - 8cm]	5%	0%

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■ INTERPRETATION OF **implanting** RESULTS

2) Comparison between implanting and RTK modes coordinates

In this second case the differences are distributed as follow:

- 73% of the differences in X and 53% of differences in Y are less than 2 cm.
- 27% of the differences in X and 33% of differences in Y are located between 2 and 4 cm.
- 14% of differences in Y vary between 4 cm and 6 cm.

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■ INTERPRETATION OF **implanting** RESULTS

3) Comparison between implanting and RTK post processing coordinates

In this third case, the differences are distributed as follow:

- 69% of differences in X and 44% of differences in Y are less than 2 cm
- 25% of differences in X and 25% of differences in Y are between 2 and 4 cm.
- 6% of X differences and 31% of Y differences are between 4 cm and 6 cm.

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■ INTERPRETATION OF **implanting** RESULTS

4) Comparison between implanting and Stop & GO coordinates

In this case the differences are distributed as follow:

- 37% of the differences in X and 11% of the differences in Y are less than 2 cm.
- 63% of the differences in X and 26% of the differences in Y are between 2 and 4 cm.
- 42% of the variation in Y are between 4 cm and 6 cm.
- 21% of the variation in Y are between 6 cm and 8 cm.

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■ CONCLUSION

In terms of accuracy

- The differences between computed and observed distances using different methods of observation , In major cases, are less **than 2 cm**.
- In this study the implanting coordinates have accuracies within 10 cm of the project coordinates.
- The results of RTK and RTK post processing modes are similar

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■ **CONCLUSION**

From a practical point of view

- The Dual-frequency GPS is equivalent to the total station in case of a small area project
- The Dual-frequency GPS is more effective in the case of a large project area
- The number of GPS field stations needed for survey operations is very reduced compared to total station needs.
- GPS and the total station have each other qualities that can be more effective in a case without being powerful in another.
- we can say that the GPS and the total station can be used with equivalent accuracy in survey and implanting as well.

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THANK YOU FOER YOUR ATTENTION

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