PHINS, an all-in-one sensor for DP applications

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INTRODUCTION

- Positioning sensor is one of the key elements of DP systems
- DGPS is a great positioning system but it may be subject to some interruptions in service:
  - Scintillation effects
  - Signal masking
  - Multipath

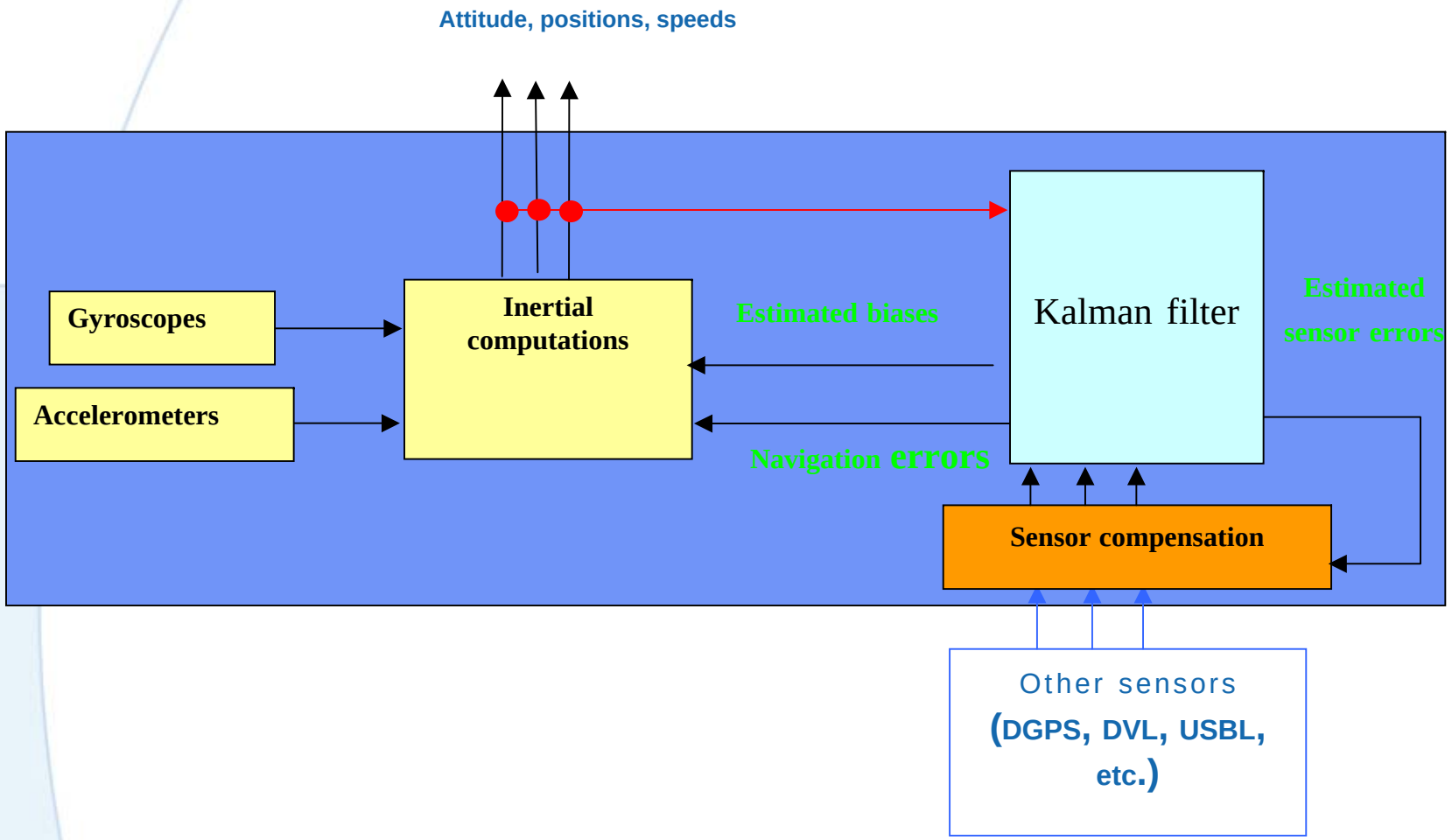
INTRODUCTION

- Continuity, integrity and availability are the characteristics needed for the positioning reference system.
- Complementing DGPS with additional sensors is a solution:
  - PHINS, an inertial navigation system
  - GAPS a compact, portable calibration free acoustic position system

PHINS, a Fiber Gyro Navigation System

- Small, light
- Provides :
  - Position
  - Roll, Pitch
  - Heading
  - Heave, Altitude
  - Rate of turn

PHINS



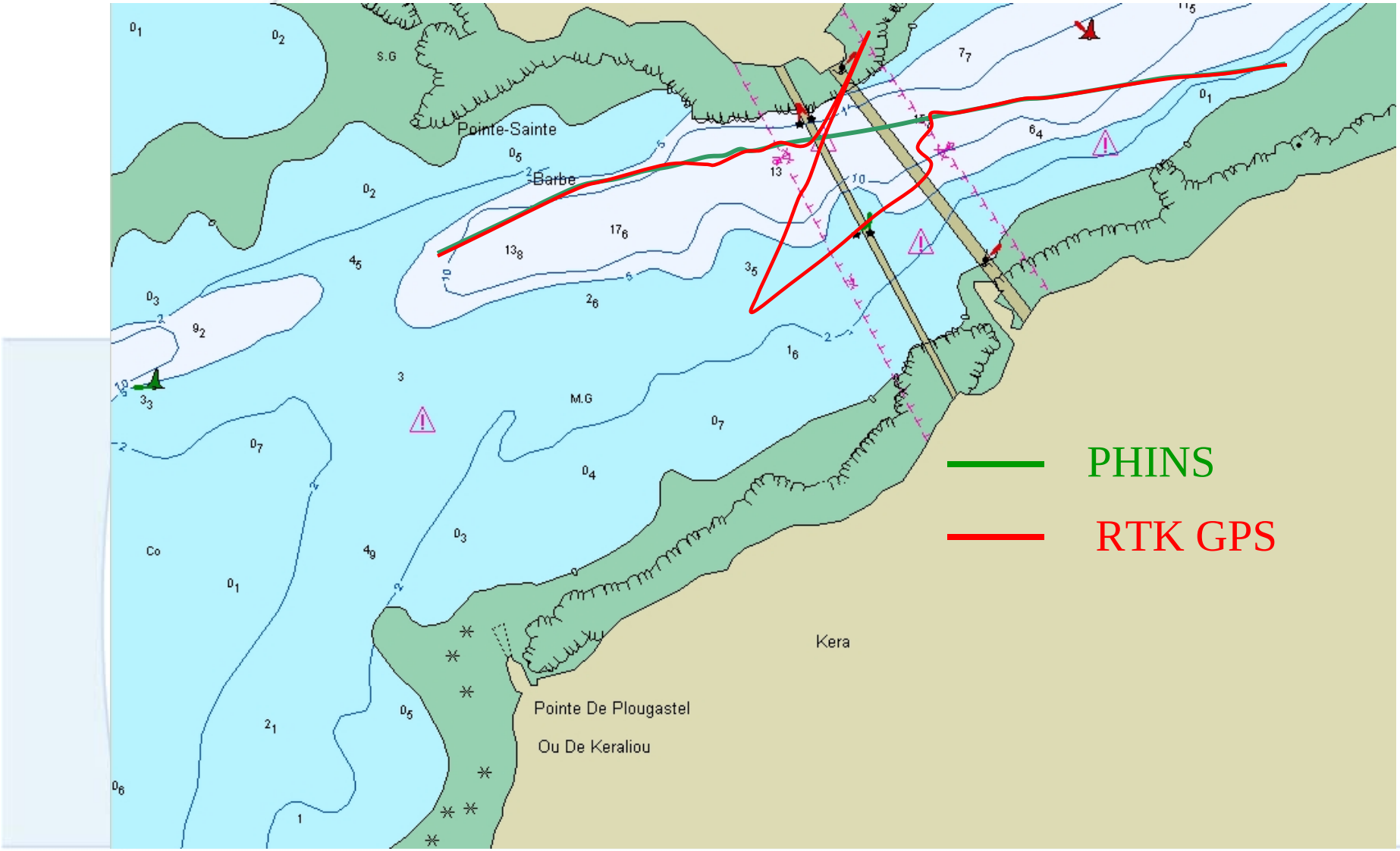
PHINS

GPS data

DVL data

USBL data

Optimal Position data



PHINS

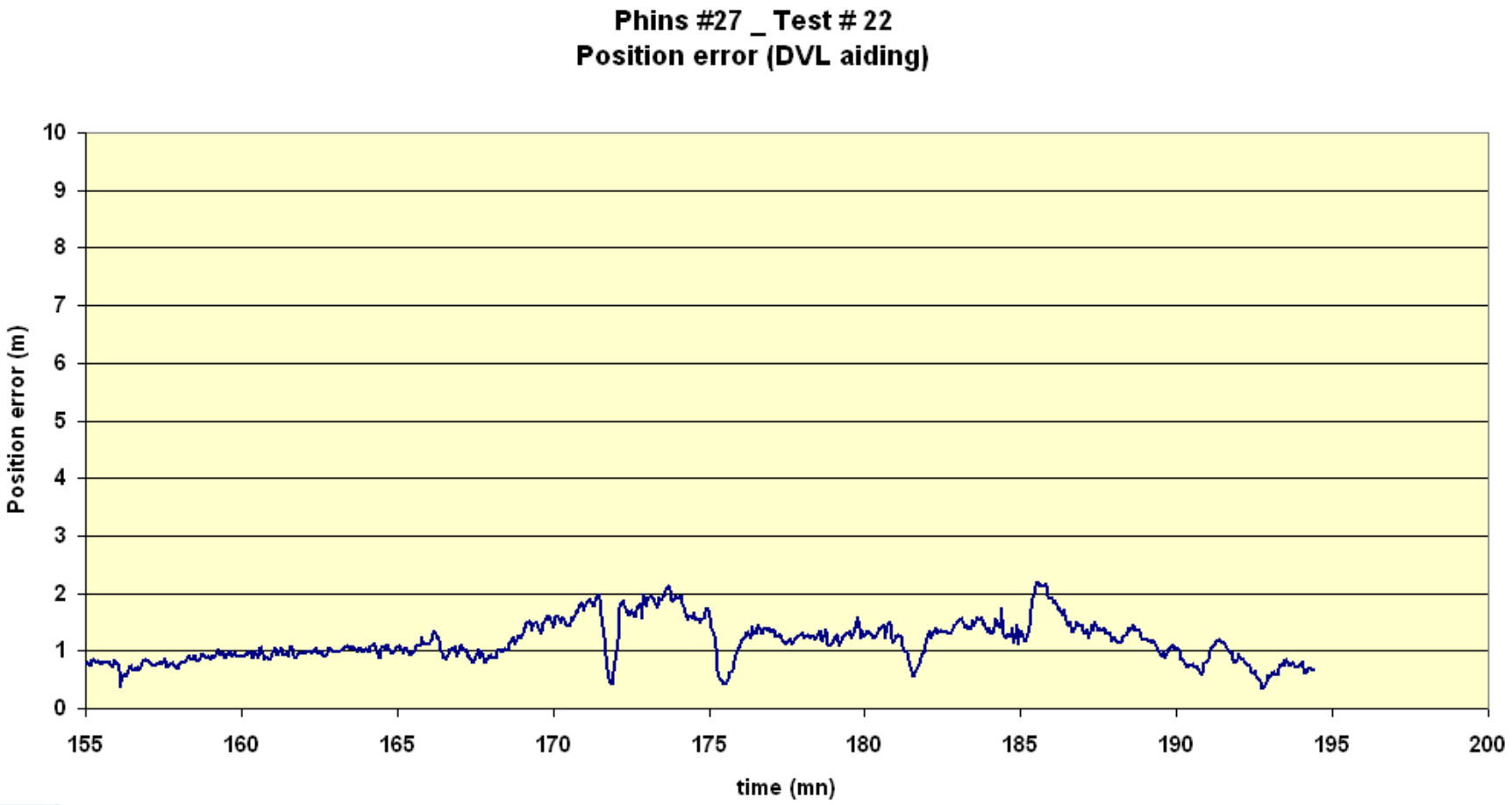
GPS data

DVL data

USBL data

Optimal Position data

PHINS TEST RESULTS



PHINS

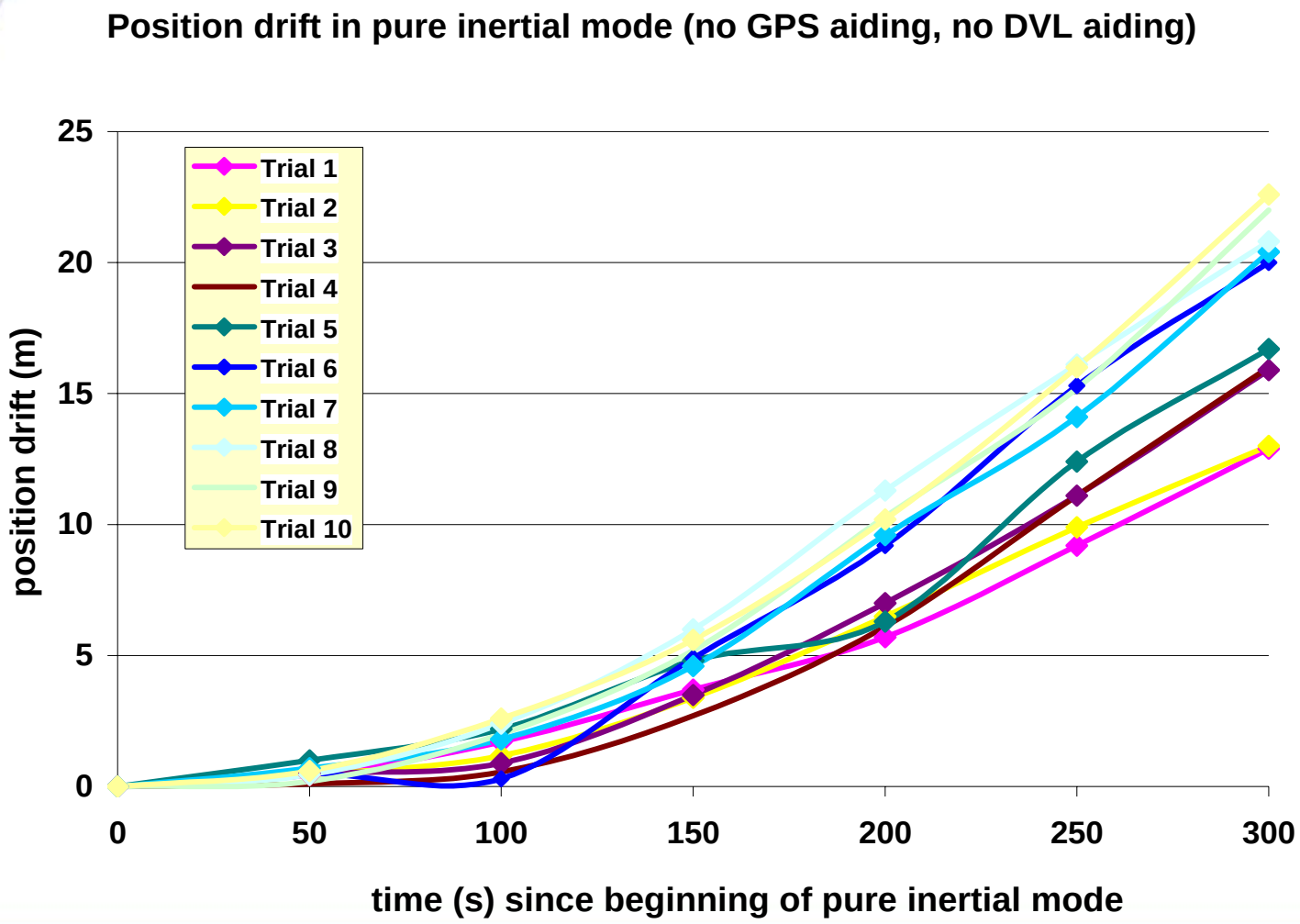
GPS data

DVL data

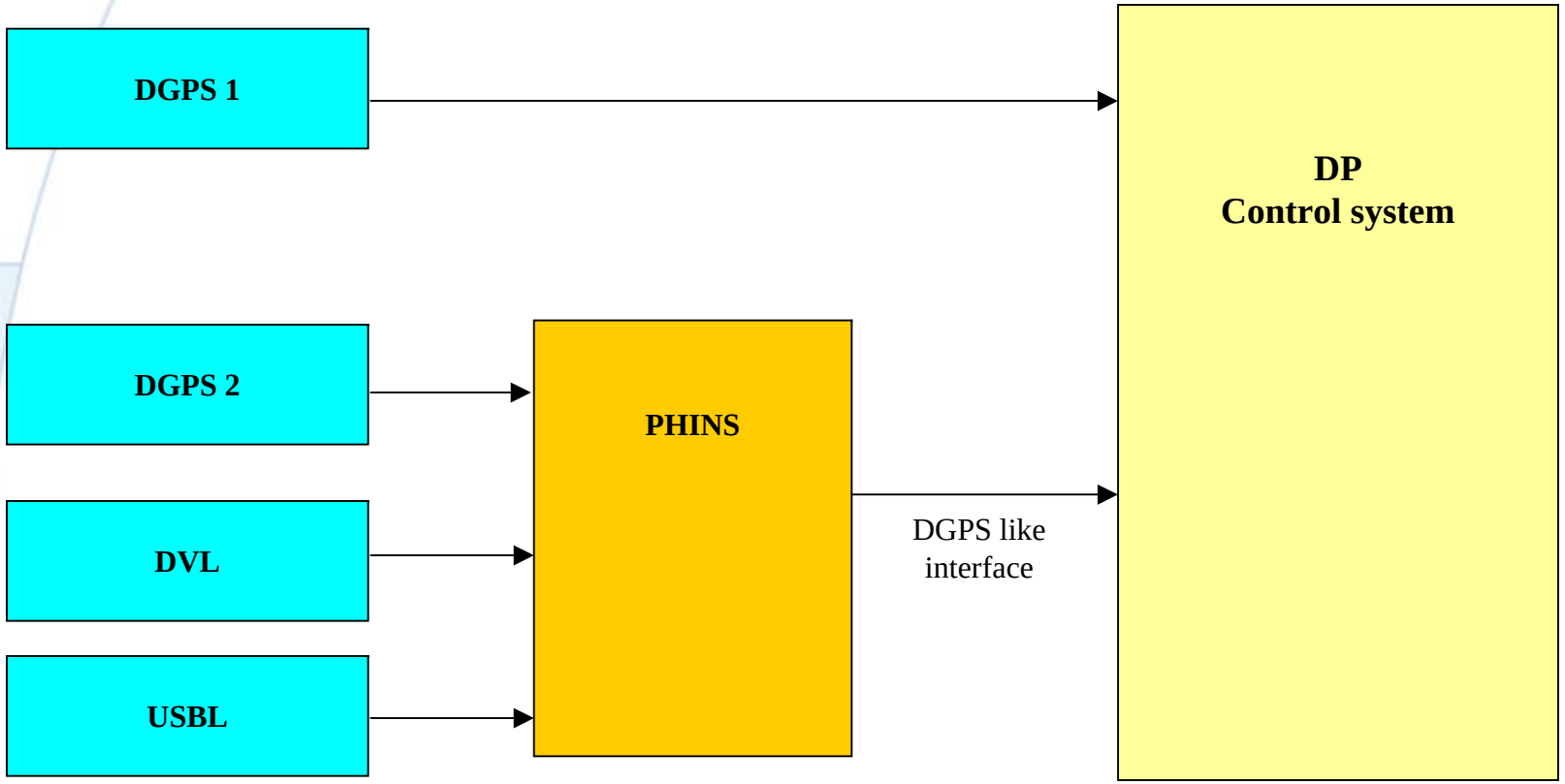
USBL data

Optimal Position data

PHINS test results



PHINS



PHINS

- Detects and rejects any DGPS position jump
- Able to maintain 2 meter accuracy for one hour with DVL aiding
- Can use USBL data and no GPS at all for eliminating common mode errors
- Provides data at high rate (up to 100 Hz)

GAPS

- USBL :
- Contains :
  - 3D acoustic antenna
  - Broadband signal processing
  - FOG based navigation system
  - Kalman filter

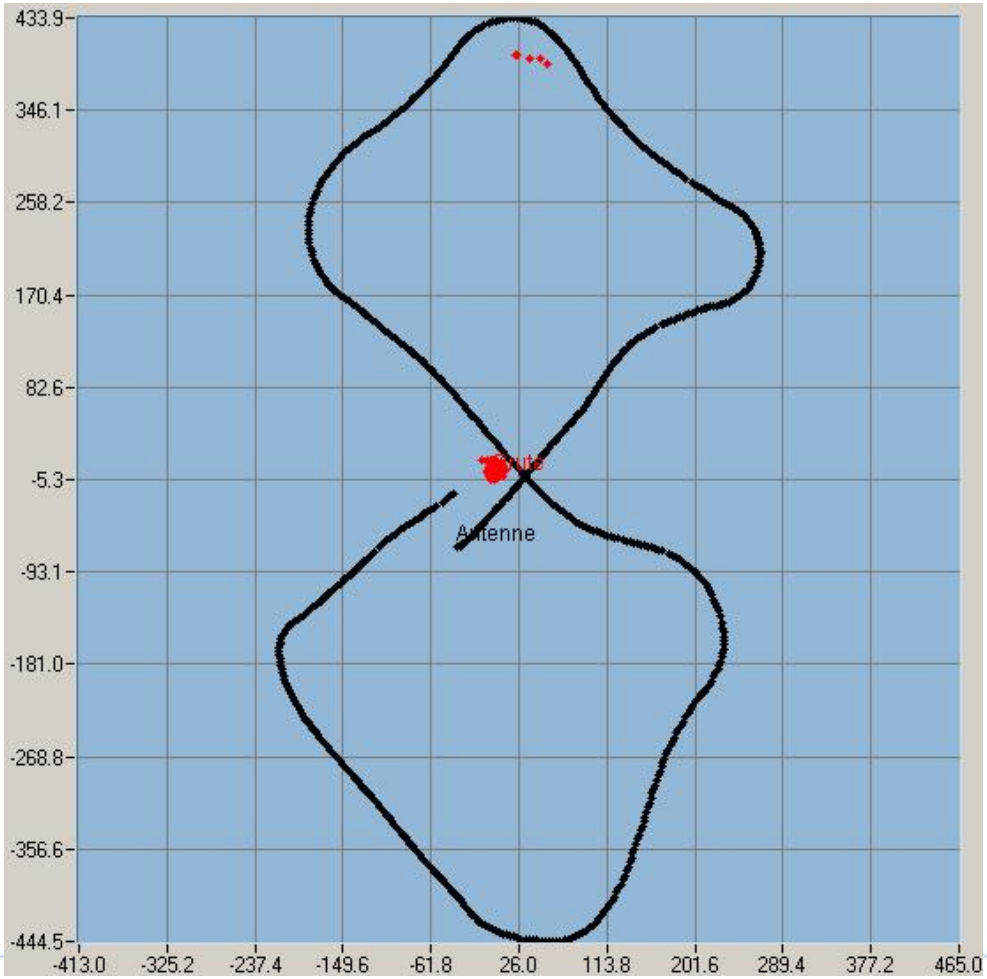
GAPS

- Single, minimally sized housing
- Free of calibration
- Improved accuracy and higher acoustic position update rate
- Short time update of subsea positions during acoustic drop-out
- Complete acoustic coverage with tracking close to surface
- Robust to GPS outage
- Cost savings and outstanding value-for-money for hardware and performance

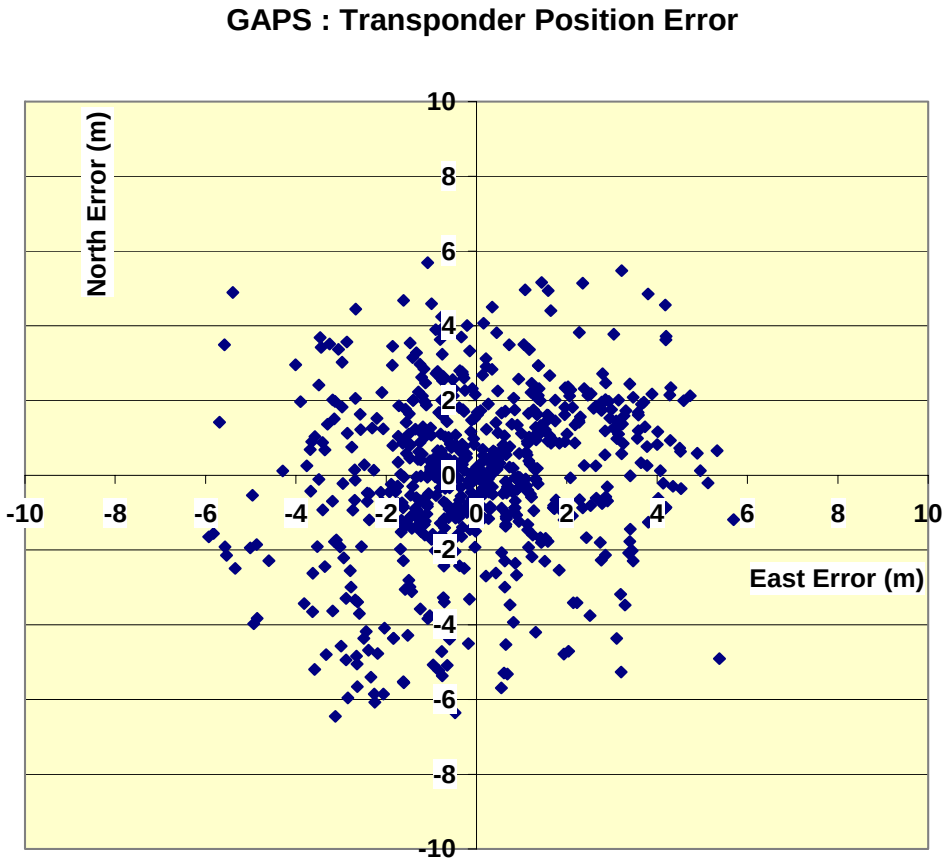
GAPS

- Operates in the 19-30 KHz frequency range
- 4000 meters range
- Accuracy : 0.2 % of slant range

GAPS TESTS RESULTS



GAPS TEST RESULTS



GAPS USE

- The beacon is moored
- While DGPS is available, GAPS computes automatically beacon position
- When DGPS no more available, GAPS computes vessel position using beacon position and acousti measurements.

CONCLUSION

- PHINS and GAPS are alternative sensors that would allow enhancing
  - Integrity
  - Availability
  - Redundancy

  of DP positioning reference systems