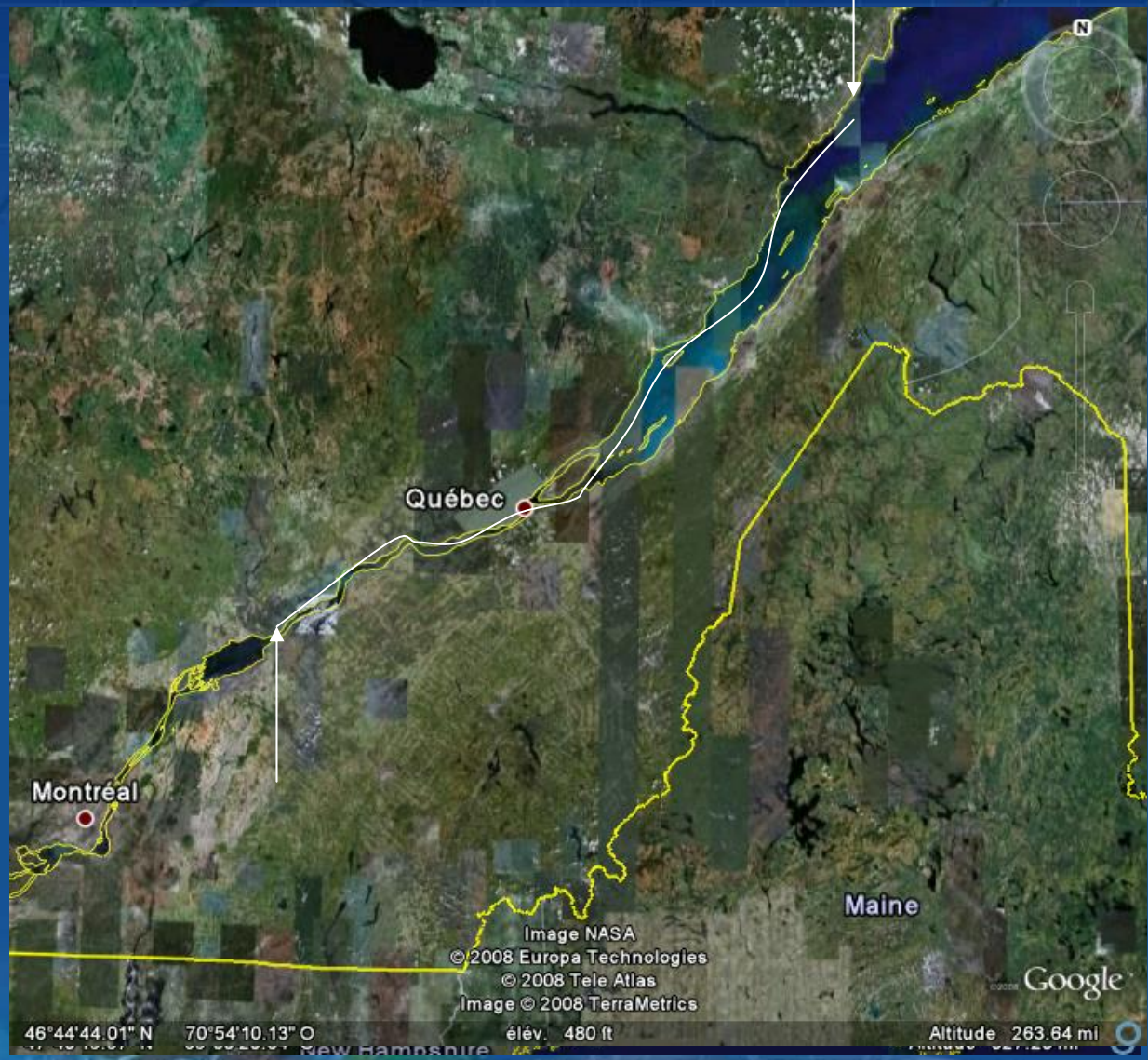

OPtide
MARITIME
INNOVATION
INSTITUT MARITIME DU QUÉBEC
24/11/2008

Distance 200 nm

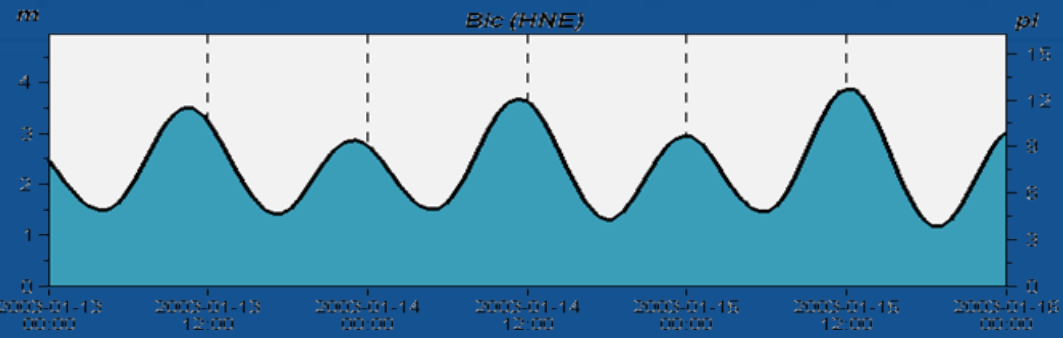
Tide range 15 m

Current 0 to 6 kn



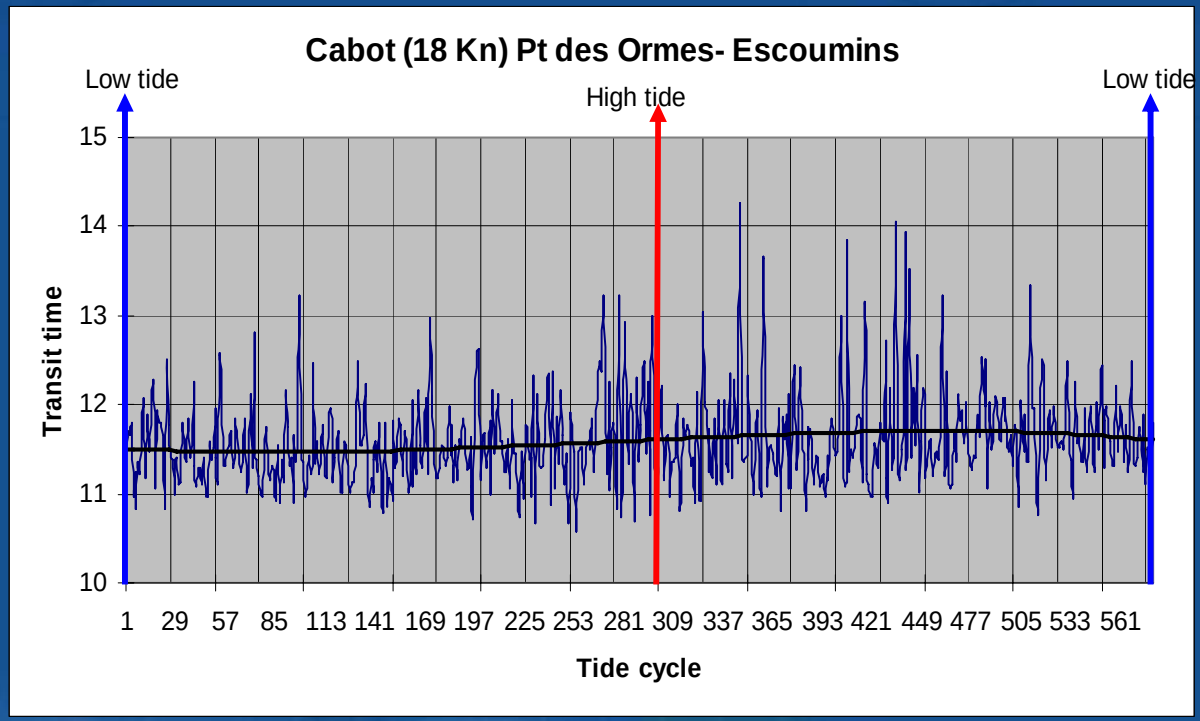
The tide: known phenomenon

- The tide of the St.-Laurent

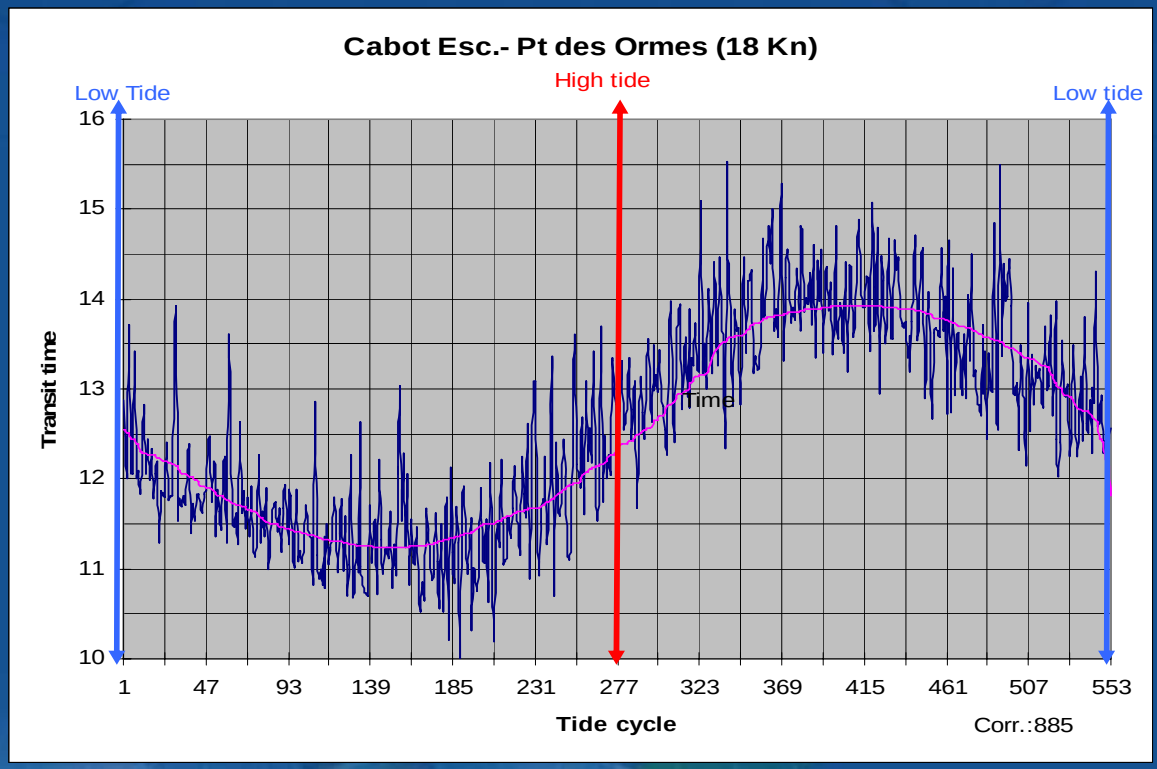


- Current application
  - Minimization of the time of transit (yatchsman)
  - Maximization of the draft (M.V. Ferbec)
  - The use of a particular current zone or period
  - Minimisation of the cost for the transit (present project)

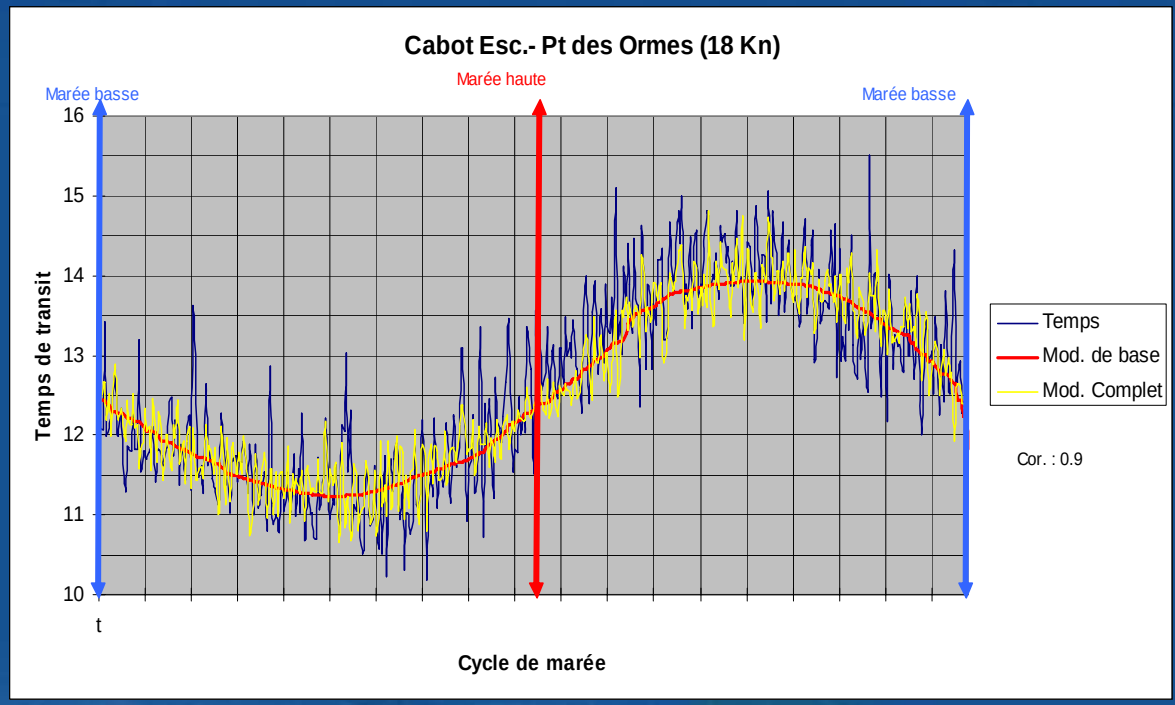
Transit time vs. Tide cycle



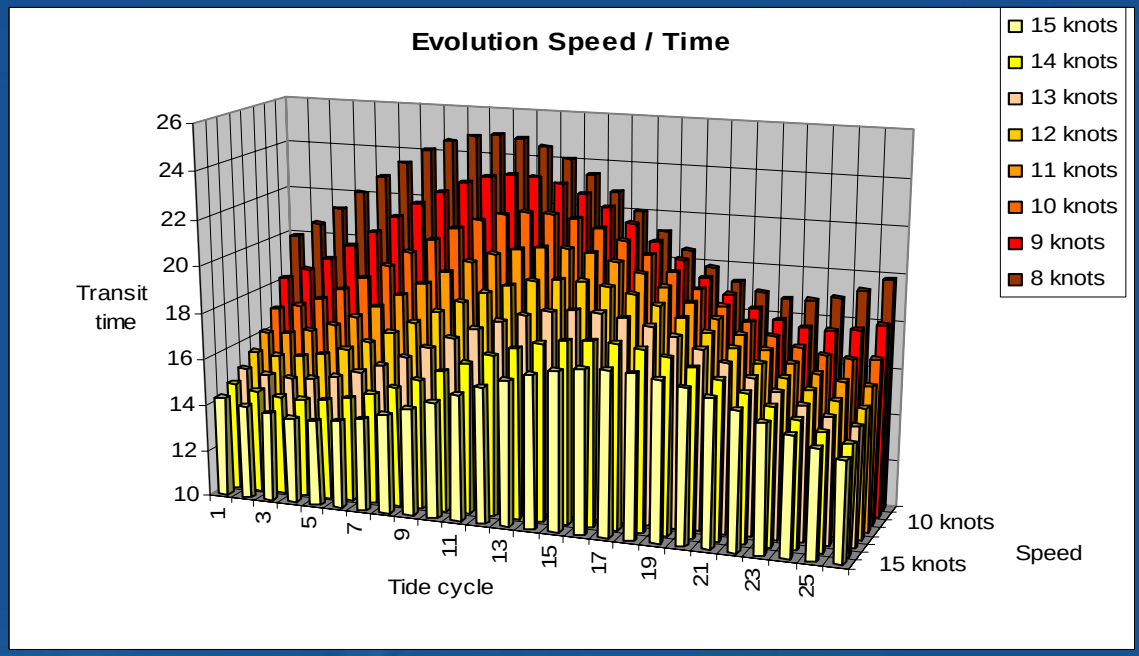
Transit time vs. Tide cycle



Modelisation



Modelisation in fonction of the speed



Minimization of the transit time

- Monetarily measurable loss of time
- Monetarily measurable gain related to fuel savings

Optimisation of the transit → Monetary measurable net gain

Transit Escoumins – Trois-Rivières

- 1- Normal transit time
  - No waiting time, regular transit
- 2- Modifiy transit time
  - Wait for the tide
  - Transit time shorter
  - Total time longer

Waiting for the tide

Possible Scenario

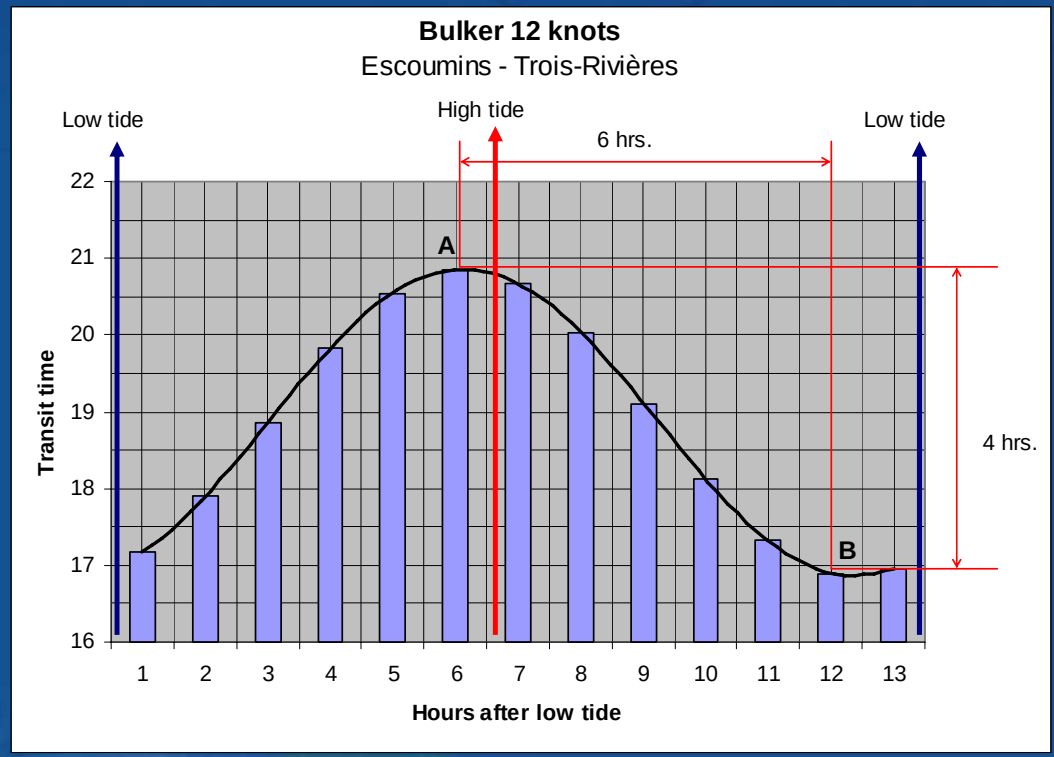
- Stop the ship
- Stop one engine
- Ajust the speed 24 h before
- Ajust the speed at 66 W

Savings obtained

- **Consumption saving** **(net gain)**
  - Gain by reduction of the transit time at full speed
  - Gain by speed reduction while waiting for tide
- **Time saving** **(net loss)**
  - Gain by reduction of the transit time
  - Loss of time while waiting for the tide
- **Measurable gain** **(net gain)**
  - Gain of time during transit
  - Loss of time while waiting for the tide
  - Gain in fuel consumption

Example

- Bulk carrier (Laker)
  - 12 knots
  - 24 t/d à 271$US/t
- Loss in time
  - Gain 4 hours
  - Loss 6 hours
- Gain in fuel
  - Transit $1 084 US
  - Delay $2 342 US
- Net Results
  - Loss 2 hours
  - Gain $ 3 426 US



Model optimisation

- Profitability start when:

Direct transit cost = Modify transit cost

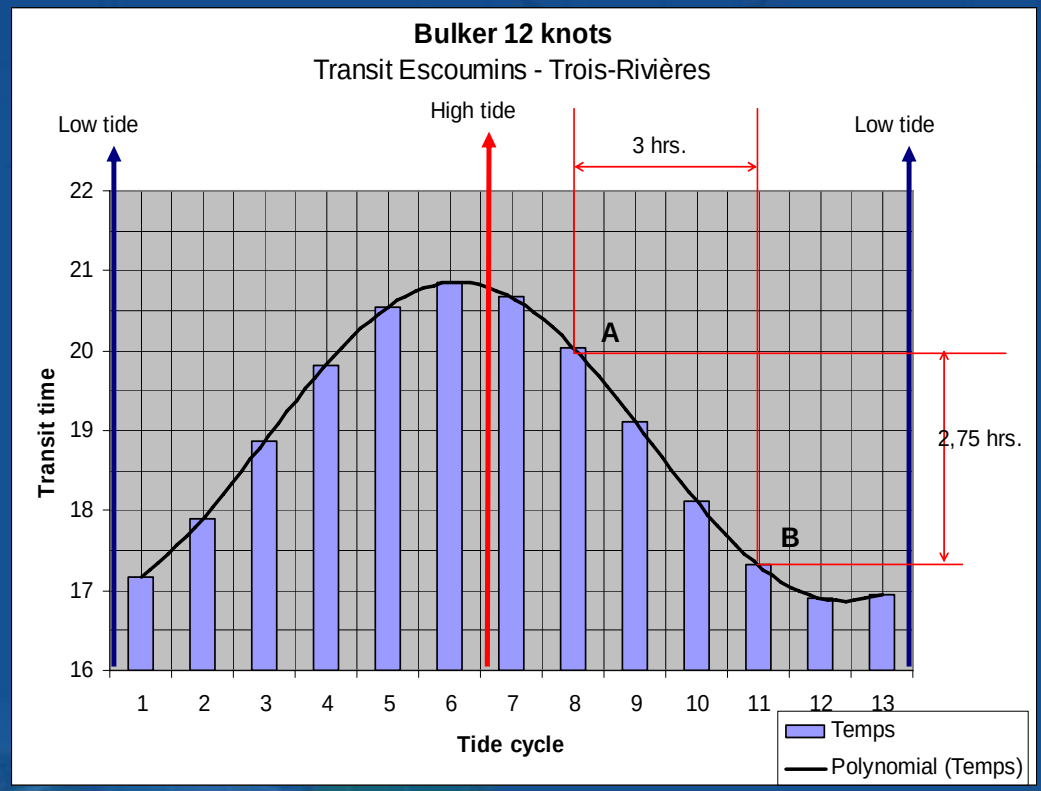
Transit time+ cons. = Waiting time + Transit time + cons. – Fuel saving

$$(Ti * R) + (Ti * Ci * P) = (I * R) + (To * R) + (To * Ci * P) - (D * Ci * P) + ((D + I) * Cr * P)$$

$$(Ti - To) = \left(\frac{I(R + CrP) - 24P(Ci - Cr)}{(R + CiP)} \right)$$

Example with optimisation

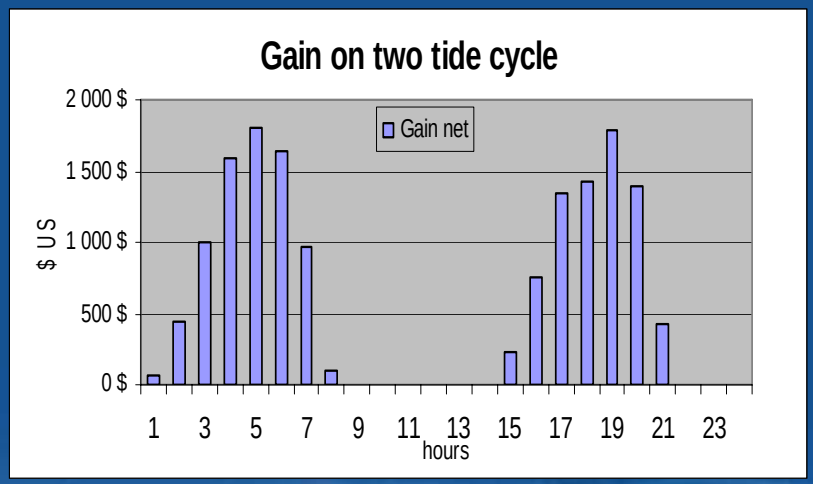
- **Bulk carrier (laker)**
  - 12 knots
  - 24 t/d à 271$US/t
- **Loss in time**
  - Gain 2,75 hours
  - Loss 3 hours
- **Gain in fuel**
  - Transit $ 813 US
  - Delay $1 502 US
- **Results**
  - Loss 0.25 hours
  - Gain $ 2 315 US



Results

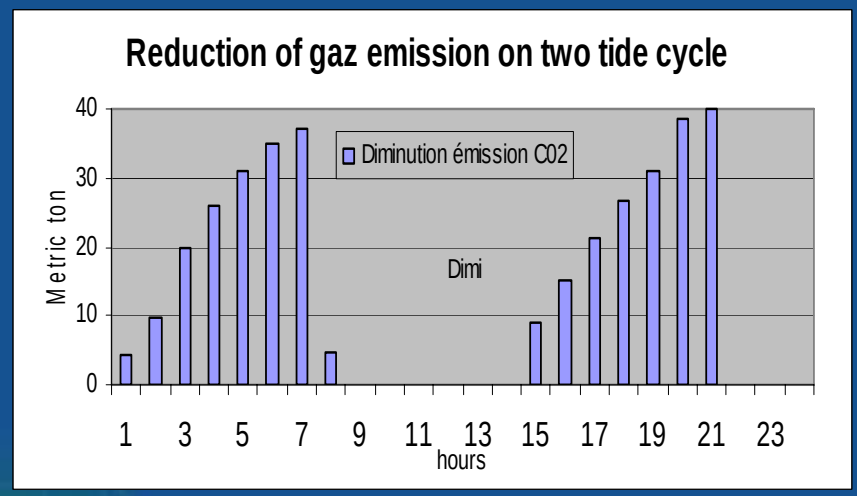
Net gain

Average by transit: $ 1036 US



Environmental gain

Average by transit: 14.6 tons



Results

- Advantages
  - Diminution of the consumption
  - Better control on the ETA
  - Safer transit
  - Pilotage expenses reduction

- Disadvantage
  - Loss of time

Test and trial

Information input
Position, Speed, E.T.A.,
Bunker price, Ship earning etc.

Go - No Go
Master or Owner
decision

Tide cycle and range
Environmental effects
Calculation
Recommendation

Speed to go
E.T.A. Arrived Esc.
E.T.A. Destination
Gain and loss

Conclusion

Profitability	→	Demonstrated
Technology	→	Available
Validation	→	Completed
Start up	→	…