Implementation of <u>non-constant advection time </u>into <u>MCP</u> methods to improve correlation between space-distributed wind datasets
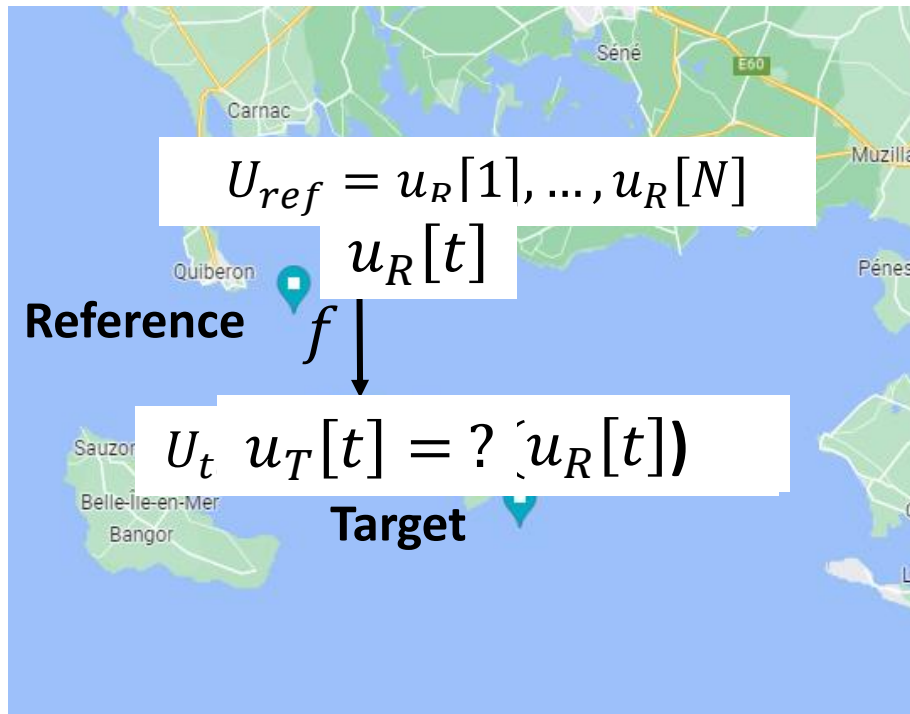
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MCP (Measure-Correlate-Predict)

$$U_{ref} = u_R[1], \ldots, u_R[N]$$

$$u_R[t]$$

Reference

$$f$$

$$U_t \quad u_T[t] = ? \; (u_R[t])$$
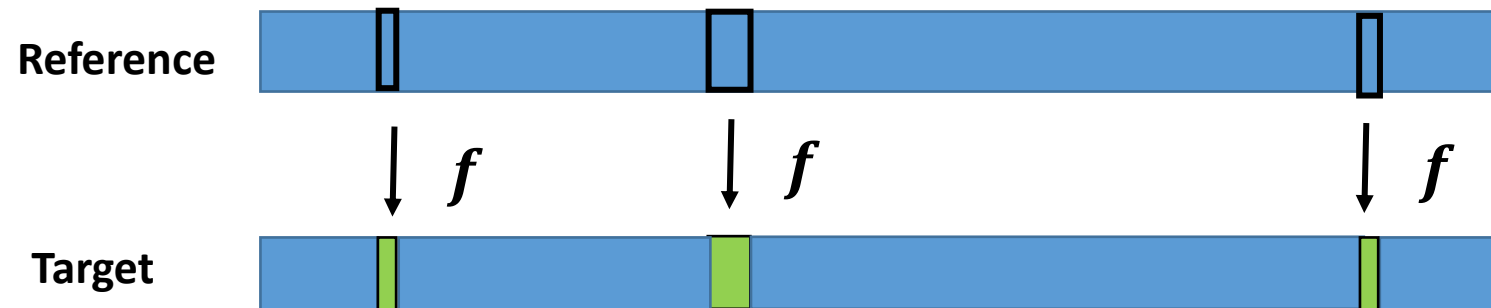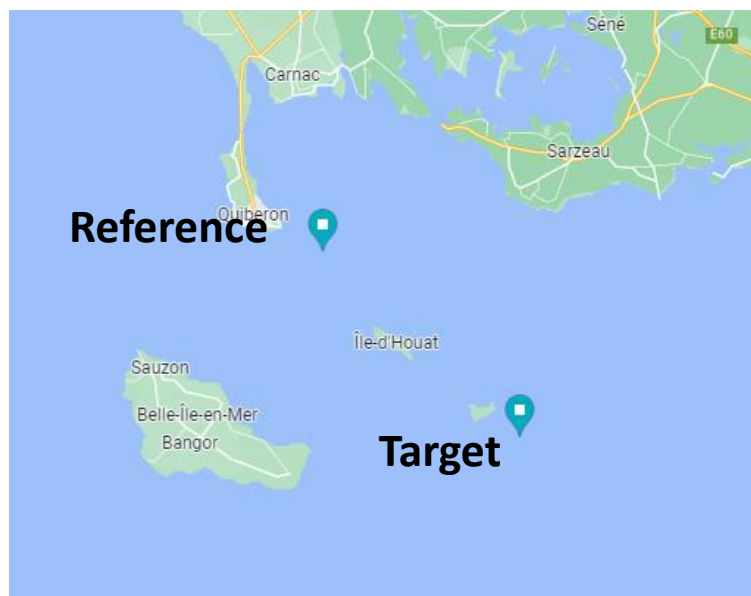
Target

Measure: 2 Wind datasets
Reference / Target

Correlate: $\quad U_{target} = f(\, U_{ref})$
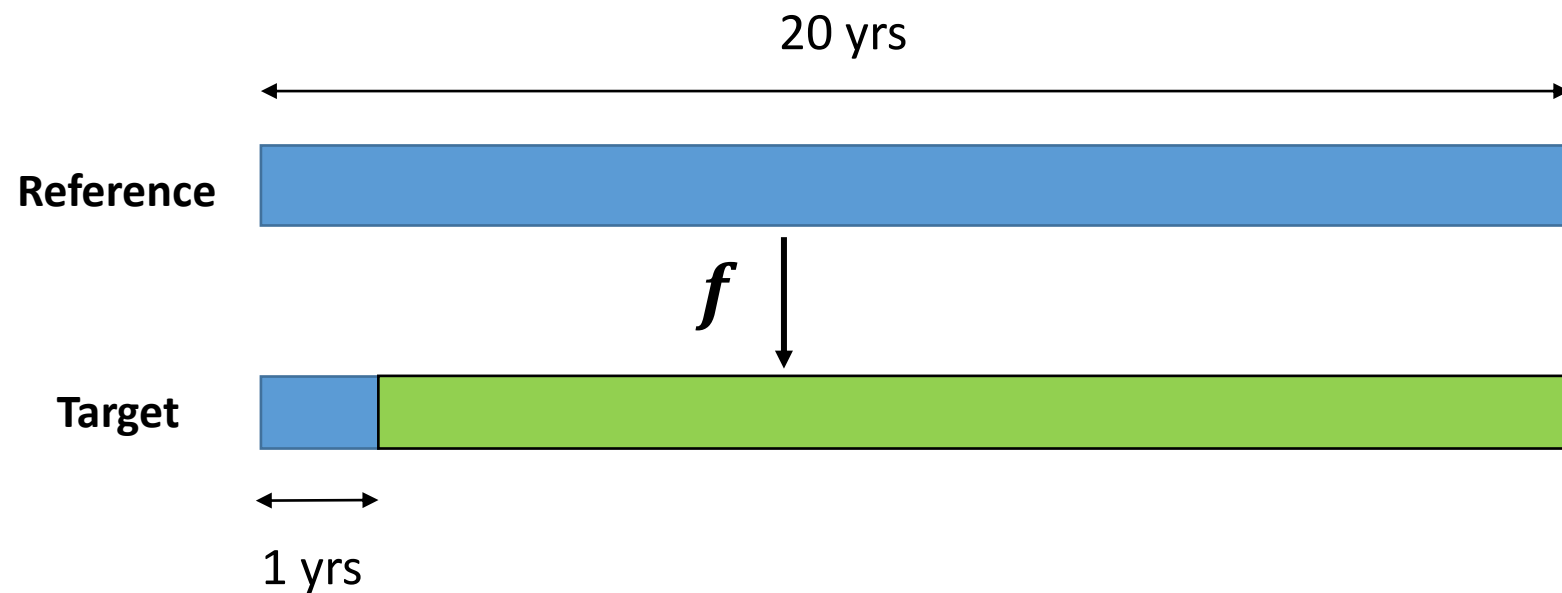
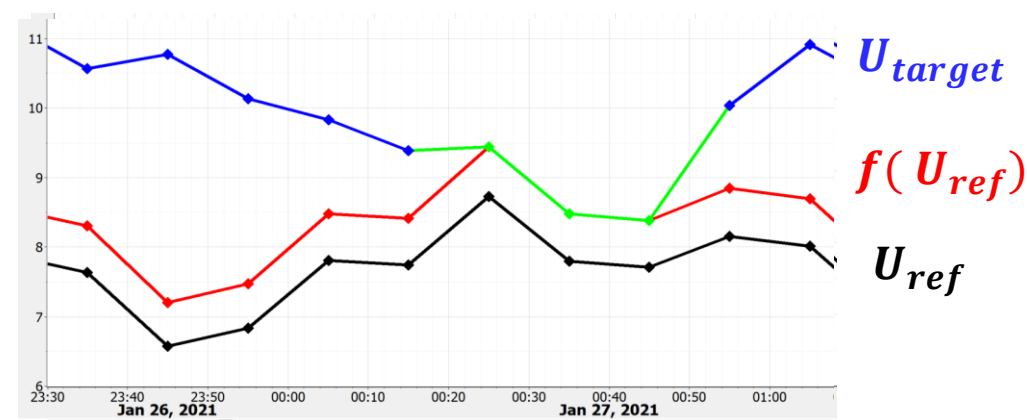**Predict:** Use f to extend target with reference
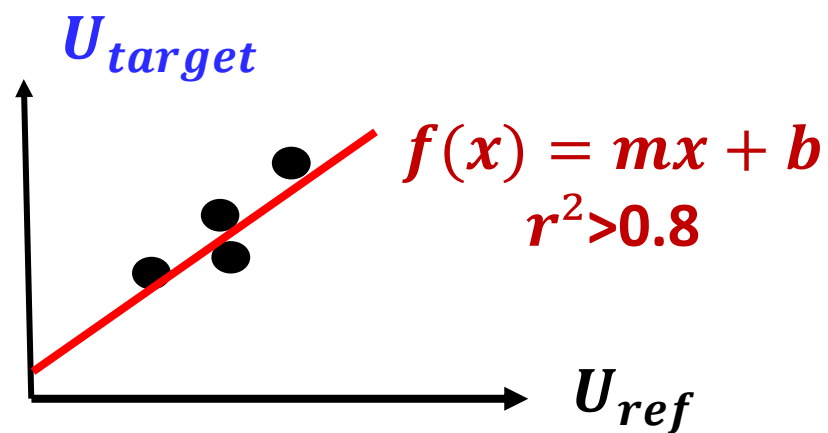
MCP (Measure-Correlate-Predict)

MCP (Measure-Correlate-Predict)

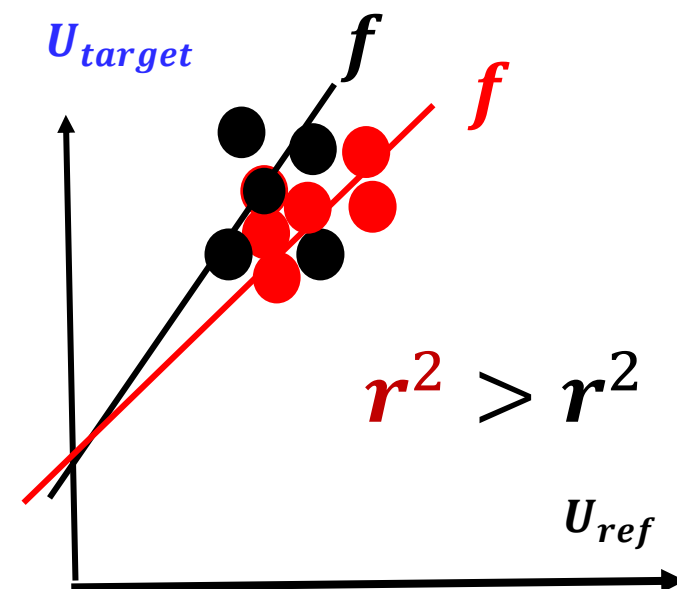# How to get f ?

Linear regression analysis

U_{target}

$f(x) = mx + b$

$r^2 > 0.8$

U_{ref}

U_{target}

$f(U_{ref})$

U_{ref}

How to get f ?

U_{target} U_{ref} (m/s)

12,5

12

50 min advection

Compare same date

$\sim$

No advection
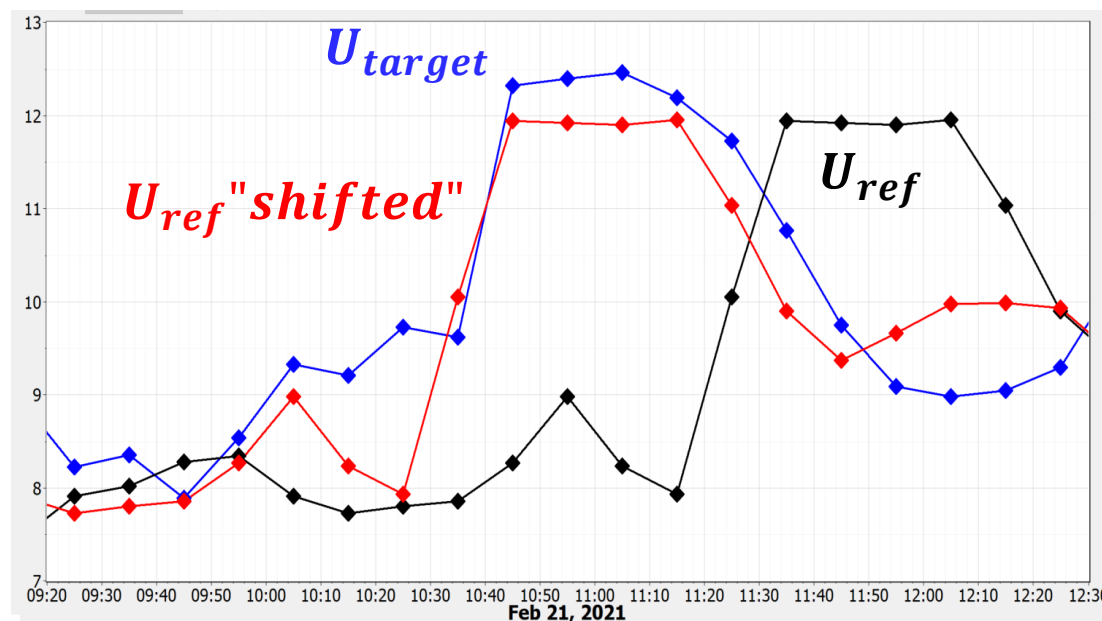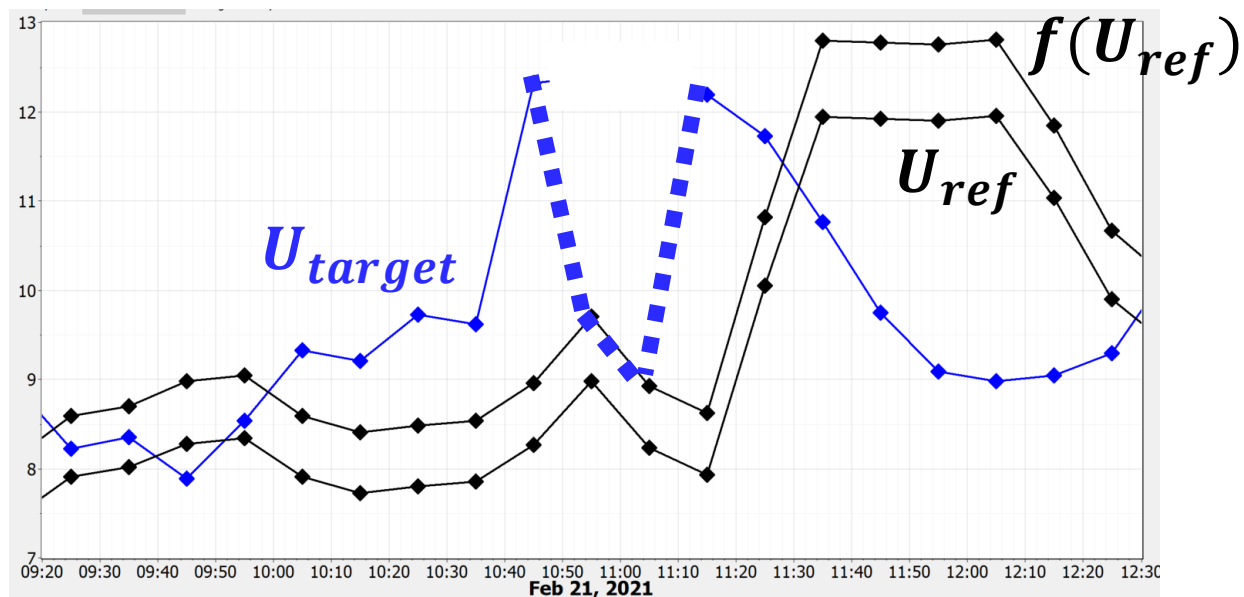
U_{target}

12,5

8

U_{ref}

8   12
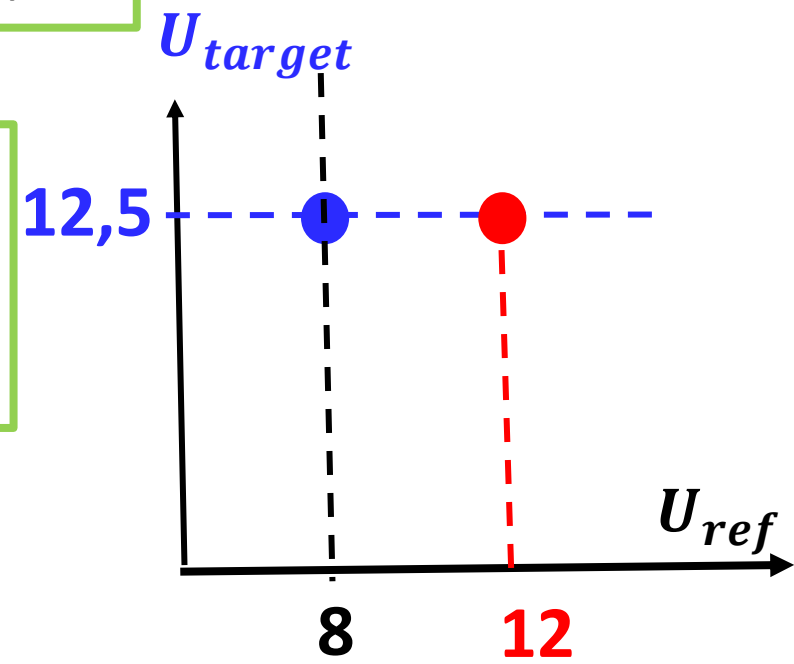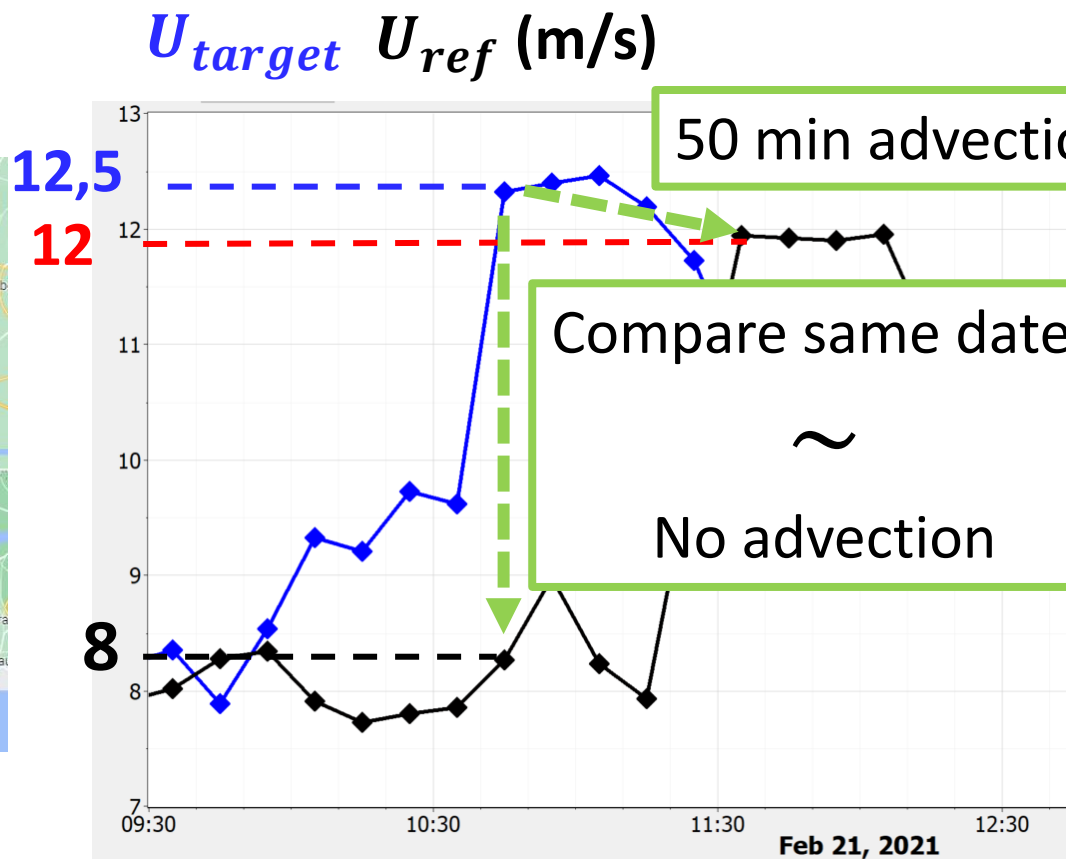
Reference

Target

Shift the reference time serie to consider the advection

No shift
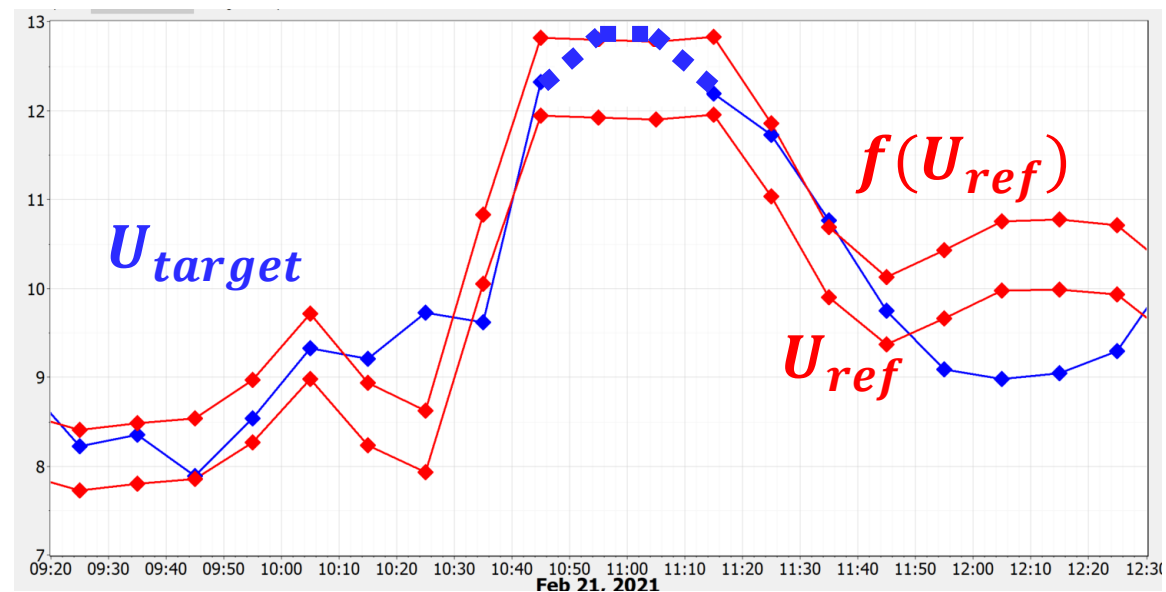
Shifted

Currently in the industry : constant time shift

R2

No time shift

Max at +20min

U_{ref} U_{target} $U_{ref,"lag\ corrected"}$

+20

+20

+20

+20

+20
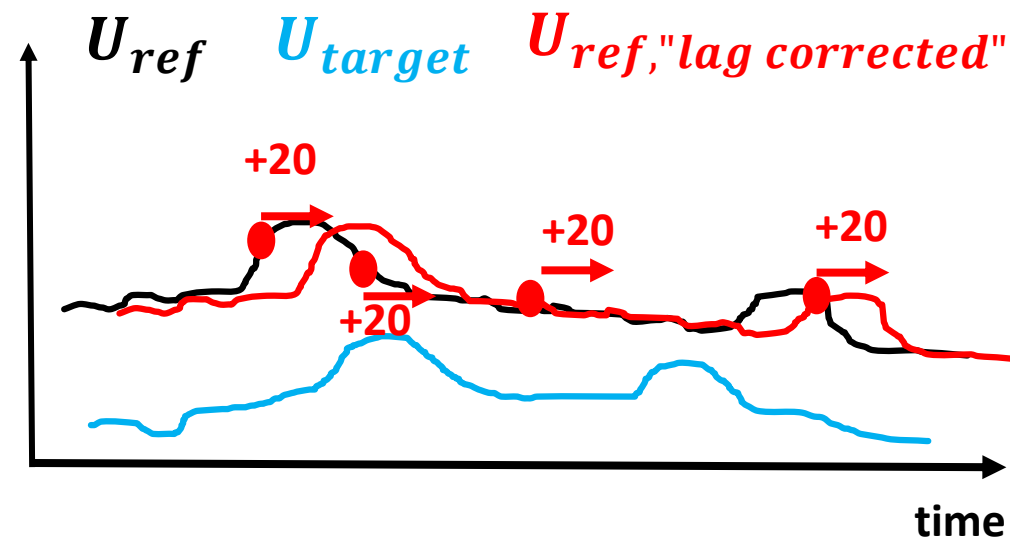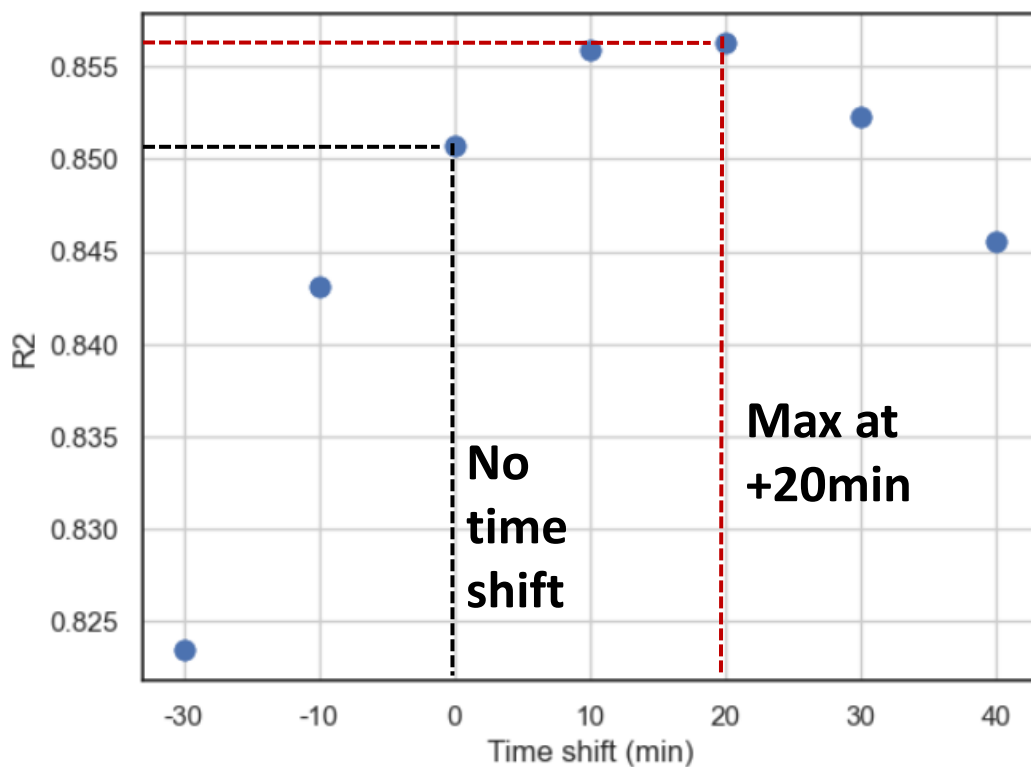
time

time shift ~ advection time

Constant ~~X~~

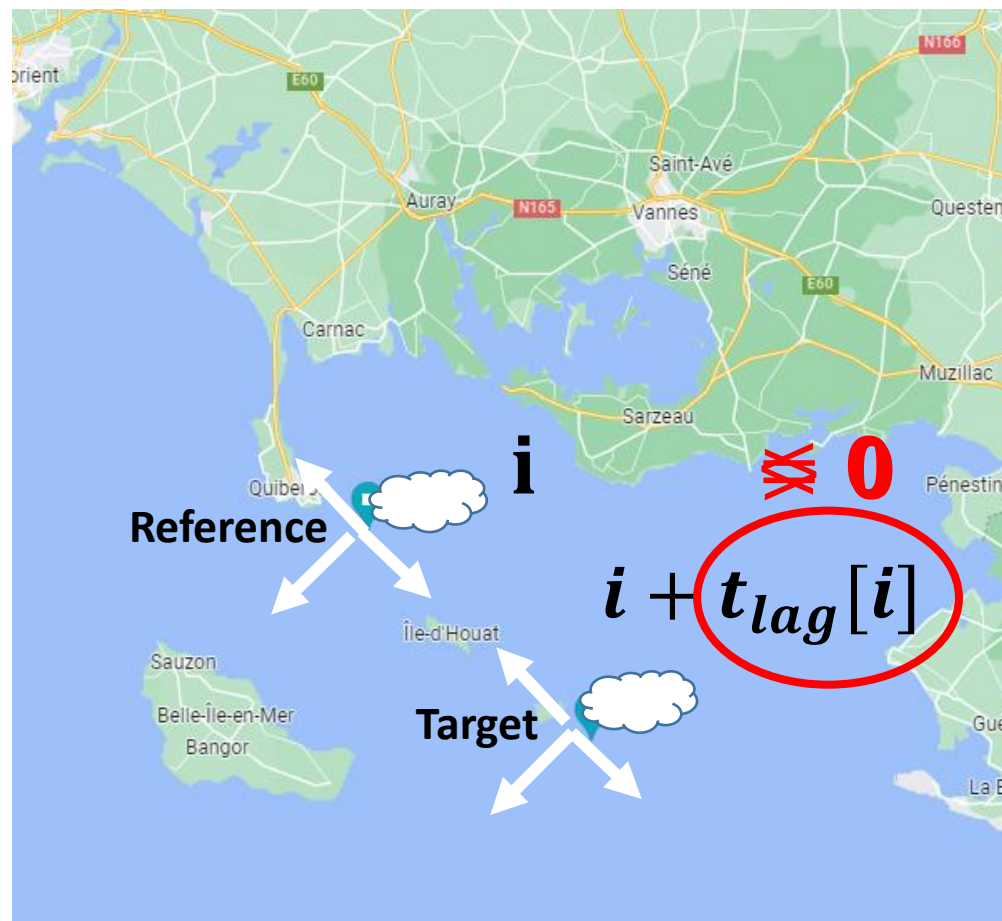**f(speed, direction)**

Variable t_{lag} definition

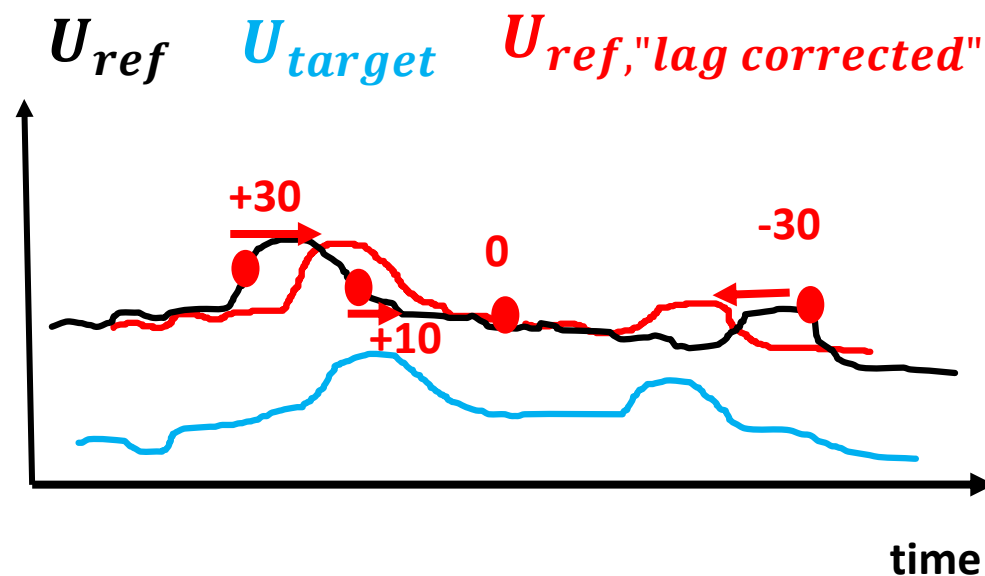Wind (Reference , i)

$\sim$

Wind (Target , $i + t_{lag}[\text{i}]$)

Cst time lag
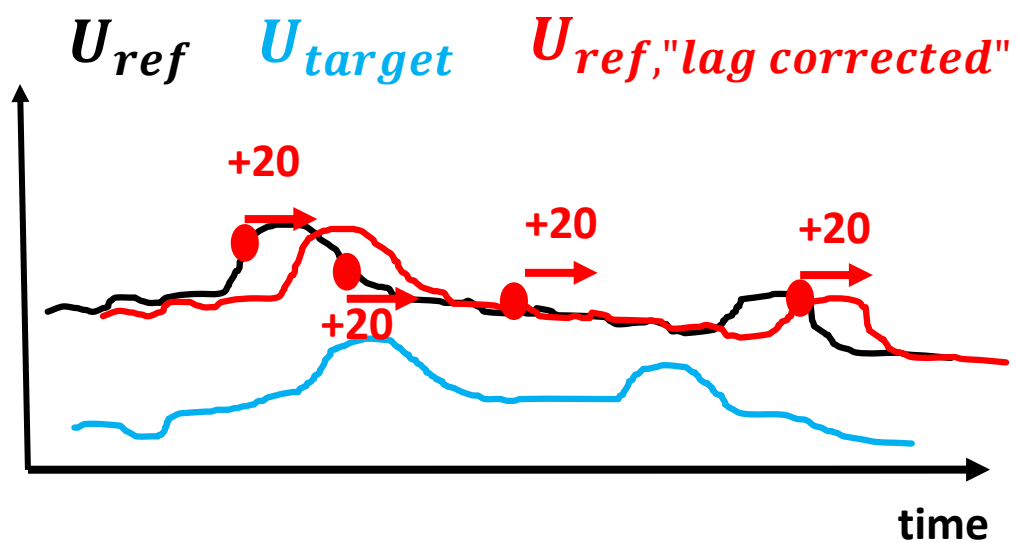
Variable time lag
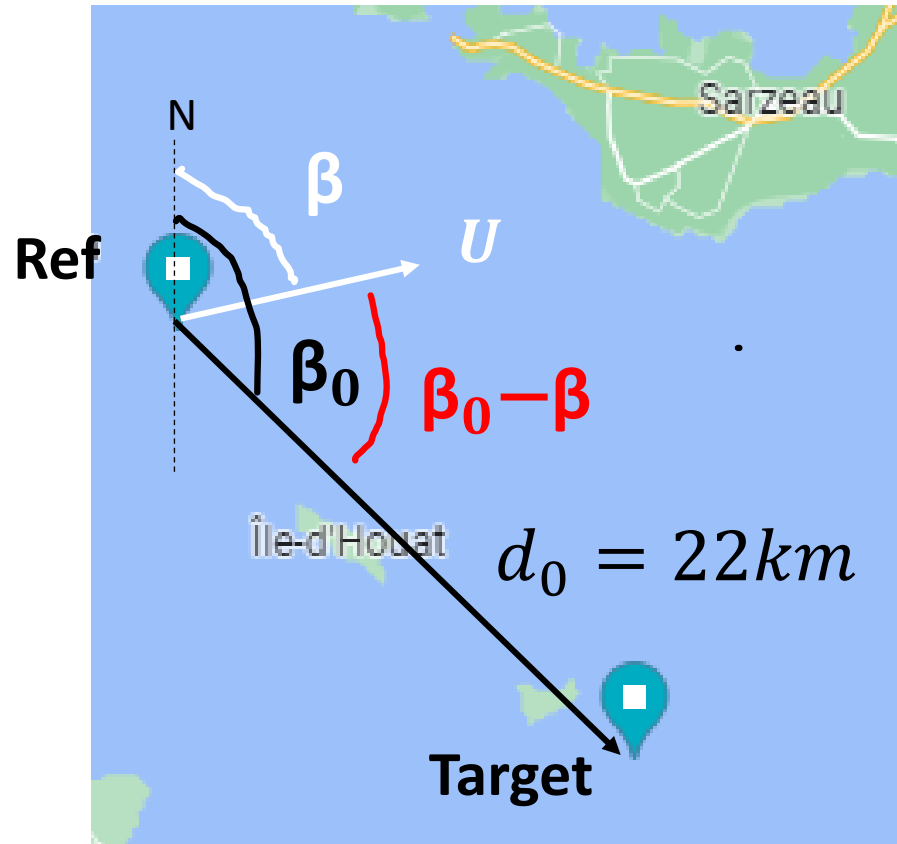
t_{lag} **calculation**

$$t_{lag} = \frac{d_0 \cos(\beta_0 - \beta)}{speed}$$

β

U

Ref

β_0

$\beta_0 - \beta$

$d_0 = 22km$

Target

r2 of U_{ref} vs U_{target}

First results:

Does it work ?

+0.01
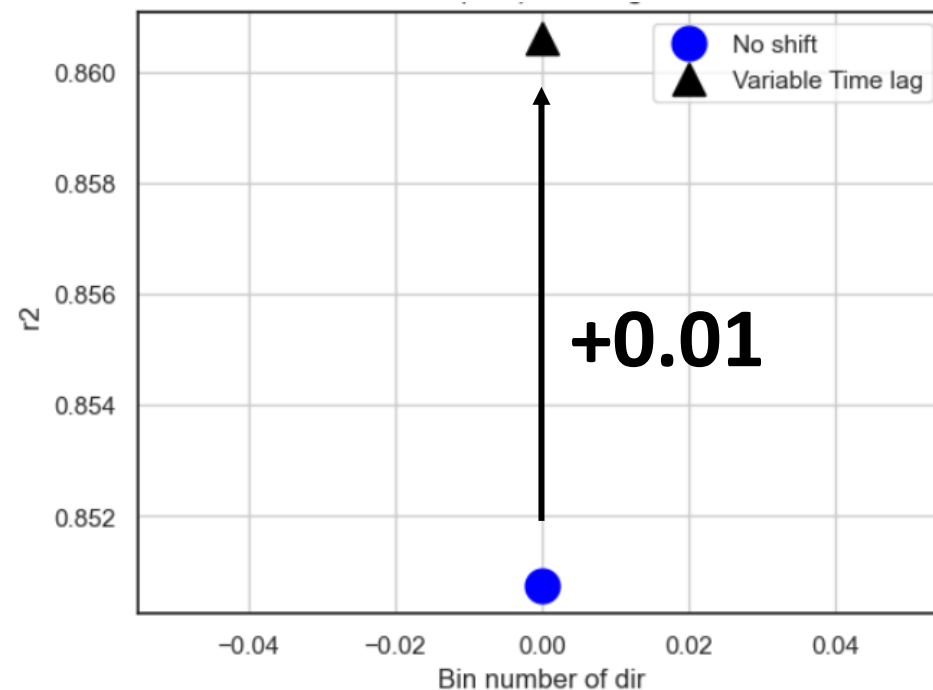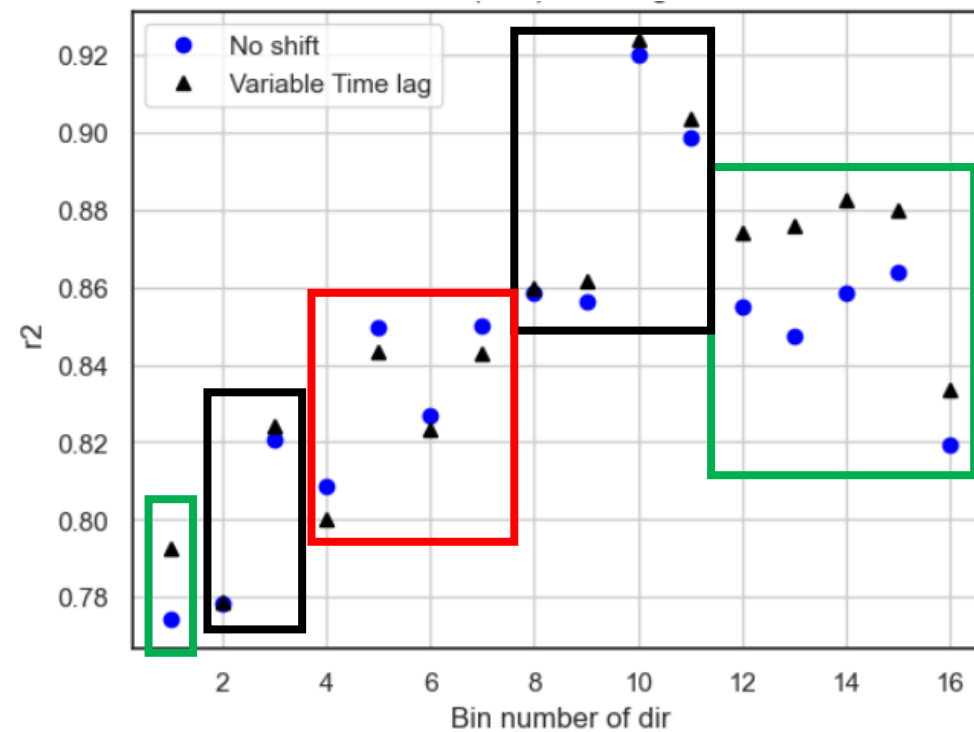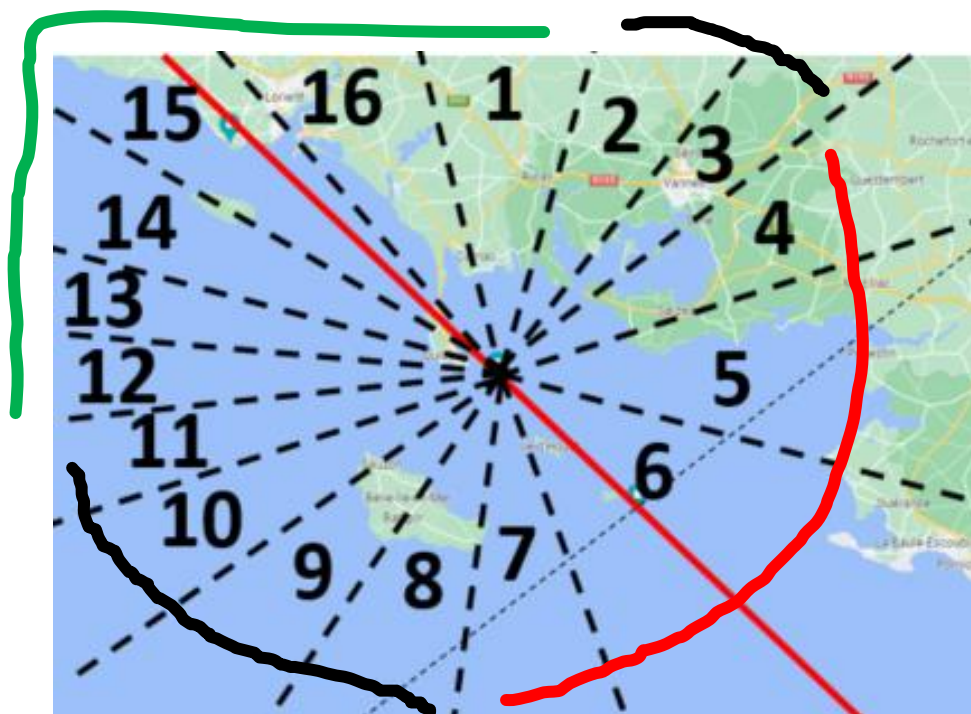
Direction: 16 bins of equal size

r2 of U_{ref} vs U_{target}

Future work

Understand why it works in some directions and not in others

Thank you !