Conservative interpolation

Evaluation of the flux trough the target grid by calculating the intersections of the target grid cells (t) with the source grid cells (s)

1- Conservation locale ➔ $$F_t = (1/A_t) * \int_{A_t} f_s * dA$$

Sum over the source cells i intersecting t

$$F_t = (1/A_t) * \sum_i \int_{A_{it}} f_{si} * dA$$

First order approximation f_{si} = cst over cell **i**

$$F_t = \sum_i f_{si} * (1/A_t) \int_{A_{it}} dA \quad \Leftrightarrow \quad F_t = \sum_i f_{si} * w_{1it}$$

$1/A_t$ = normalisation, **W** = weights calculated by linear integral along intersections

Destarea ➔ $A_t = A_t$ The energy is conserved by not the flux

Fracarea ➔ $A_t = \sum_i \int_{A_{it}} dA$ A_{it} area of the target grid cell covered by the source grid unmasked cell

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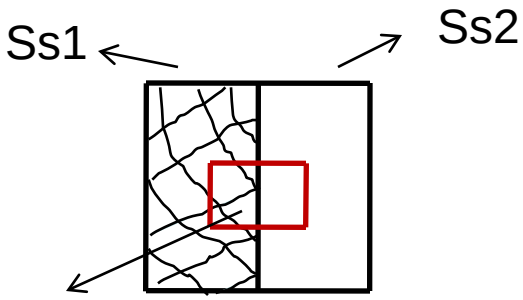

Sti1+Sti2 = St

Source :

Target :

Destarea : norm = St
Ft = FSs1/St
Fracarea : norm = Sti2
Ft = FSs1

1- ➔ $\sum_i f_{si} A_{si} = \sum_j F_{tj} A_{tj}$

Local conservation➔ Global conservation

$\sum_i f_{si} A_{si} = \sum_j \sum_i f_{si} * w_{1itj} * A_{tj}$

$$\boxed{\rightarrow A_{si} = \sum_j w_{1itj} * A_{tj}}$$

In the formulae above (until december 2011), the areas were calculated by the SCRIP from the corners, not from the real areas given in areas.nc

$$w_{1itj} = (A_{tj} \cap A_{si}) / A_{tj}$$

$$A_{si\_false} = \sum_{j} w_{1itj} * A_{tj\_false}$$

$$A_{si\_true} = \sum_{j} w_{1itj\_new} * A_{tj\_true}$$

$$\Leftrightarrow A_{si\_false} * (A_{si\_true} / A_{si\_false}) = \sum_{j} W_{1itj\_new} * A_{tj\_false} * (A_{tj\_true} / A_{tj\_false})$$

$$\boxed{\Leftrightarrow w_{1itj\_new} = w_{1itj} * ((A_{si\_true} / A_{si\_false}) / (A_{tj\_true} / A_{tj\_false}))}$$