Use a 1st and 2nd harmonic approach dependent on latitude

\[
\text{flux}(t) = \frac{\text{Annual flux}}{12} + 0.01[ A1 \cos(t+\text{shift}) + A2 \cos(2t+\text{shift}) ]
\]

\[
\text{phi} > 50 : \quad A1 = [2 - 0.01(90 - \text{phi})] \times (\text{Annual flux}) ; \quad A2 = 0
\]

\[
35 < \text{phi} < 50 : \quad A1 = [1.6 - 0.1(50 - \text{phi})] \times (\text{Annual flux}) ; \quad A2 = 0.04 \times (50 - \text{phi}) \times (\text{Annual flux})
\]

\[
15 < \text{phi} < 35 : \quad A1 = 0 ; \quad A2 = [0.6 - 0.03(35 - \text{phi})] \times (\text{Annual flux})
\]

\[
0 < \text{phi} < 15 : \quad A1 = 0 ; \quad A2 = 0
\]

**Conclusions**

Anthropogenic CO₂ emissions has significant seasonality and can contribute 1-6 ppm CO₂ to the amplitude of the seasonal cycle of atmospheric CO₂

This harmonic analysis can be applied to any 'annual' anthropogenic CO₂ flux

Implications for atmospheric CO₂ inversions

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