1 Overview

Note: This is the same code as in the quickstart guide. See the guide for a more in detail explanation.

```
from esbmtk import Model, Element, Species, Reservoir
from esbmtk import Signal, Connect, Source, Sink, Flux
from esbmtk import ExternalData

# create model
Model(
    name="C_Cycle",  # model name
    stop=100,        # end time of model
    time_unit="yr",  # time units
    dt=1,            # time step
)
```

```
# Element properties
Element(
    name="C",                   # Element Name
    model=C_Cycle,              # Model handle
    mass_unit="mmol",           # base mass unit
    li_label="C^{12$S",         # Name of light isotope
    hi_label="C^{13}$S",        # Name of heavy isotope
    d_label="$\delta^{13}$C",       # Name of isotope delta
    d_scale="VPDB",             # Isotope scale. End of plot labels
    r=0.0112372,  # VPDB C13/C12 ratio https://www-pub.iaea.org/MTCD/publications/PDF/te_825_
)

# add species
Species(name="CO2", element=C)  # Name & element handle
Species(name="DIC", element=C)
Species(name="OM", element=C)
Species(name="CaCO3", element=C)
```

```
Signal(name = "ACOR",
       species = CO2,
       duration = 100, # must match what is in the file
       filename = "test-data.csv"
)
```

Once a signal instance has been created, it can be passed to a connector object in order to associate it with a flux (see the first connection below as an example).

```
Source(name="Fossil_Fuel_Burning", species=CO2)
Source(name="Carbonate_Weathering", species=CO2)
Source(name="Organic_Weathering", species=CO2)
Source(name="Volcanic", species=CO2)
Sink(name="Carbonate_burial", species=CaCO3)
Sink(name="OM_burial", species=OM)

Reservoir(
    name="Ocean",        # Name of reservoir
    species=DIC,         # Species handle
    delta=0,             # initial delta
    concentration=2.62, # concentration
    unit="mmol",         # mass unit
    volume=1.332E18,     # reservoir size (m^3)
)
```

```
# connect source to reservoir
Connect(
    source=Fossil_Fuel_Burning,  # source of flux
    sink=Ocean,          # target of flux
    rate=0,               # weathering flux in
    delta=0,             # set a default flux
    pl=[ACOR],
)

Connect(
    source=Carbonate_Weathering,  # source of flux
    sink=Ocean,          # target of flux
    rate=12.3E12,        # flux rate
    delta=0,             # isotope ratio
)

Connect(
    source=Organic_Weathering,  # source of flux
    sink=Ocean,           # target of flux
    rate=4.0E12,          # flux rate
    delta=-20,            # isotope ratio

```

```
)

Connect(
    source=Volcanic,  # source of flux
    sink=Ocean,       # target of flux
    rate=6.0E12,      # flux rate
    delta=-5,         # set a default isotope ratio
)

Connect(
    source=Ocean,   # source of flux
    sink=OM_burial, # target of flux
    rate=4.2E12,    # flux rate
    alpha=-26.32,   # isotope fractionation
)

Connect(
    source=Ocean,  # source of flux
    sink=Carbonate_burial,    # target of flux
    rate=18.1E12,             # flux rate
    delta=0,        # isotope fractionation
)
```

```
# Run the model
C_Cycle.run()

# plot the results
C_Cycle.plot_data()
C_Cycle.save_data()
```