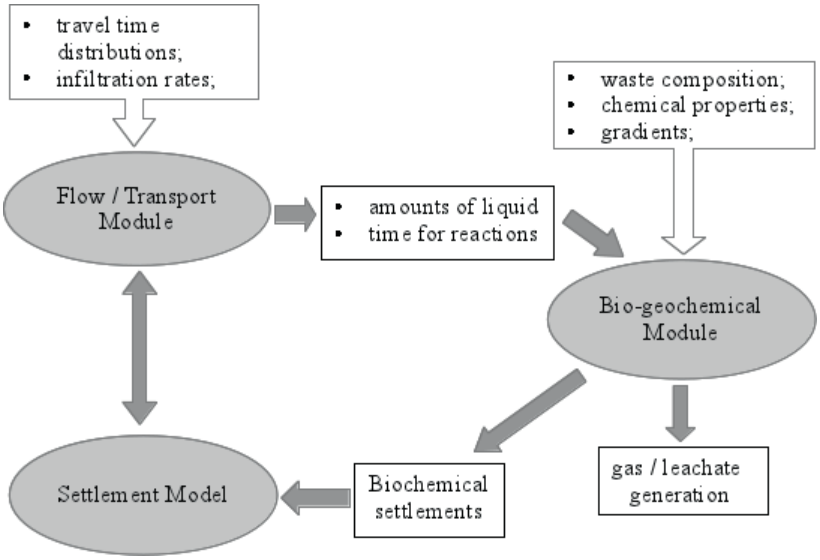

Figure 1. Multiphysics modelling framework for landfills

We assume that during its lifetime water will react with the matter within the landfill body. Each water particle enters one of the available pathways with individual composition and chemical properties. These properties and waste composition are also considered to be random however homogeneous for each column/pathway. A chemical equilibrium model designed within ORCHESTRA framework and biodegradation model use previously modeled amounts of water input into the landfill and its reaction time. Other chemical parameters and their gradients/distributions will be obtained from geophysical measurements. The bio-geochemical module computes amounts of landfill gases and leachate produced as well as the amounts of compounds remaining in the landfill, thus allowing estimates of the remaining emission potential of the landfill.
Bio-geochemical processes occurring within the landfill will cause settlements which will affect water flow. Therefore the usage of the settlement model may serve an additional way to validate results. Another important effect of settlements is their effect on the water flow. This however is very difficult if not impossible to quantify.
The results modeled for each water particle/pathway are summed up will represent overall trends for the entire landfill.

Conclusions

Integrating water flow/transport, bio-geochemical and settlement models as well as geophysical measurements will provide us with the valuable information on what gas/leachate emission potential remains in the landfill while application of the stochastic approach appears to be a feasible way to handle high heterogeneity of solid waste landfills. This framework allows quantitative assessment of when the emission potential from the landfill is low enough and hence it is safe to stop aftercare.