

problems. Additional considerations relevant for the interdisciplinary case include: 1) the number of important interdisciplinary processes and state variables is several times, if not orders of magnitudes, greater than those for physics alone, 2) biology involves complex physiological and behavioral effects that are either unknown or difficult to parameterize or model, 3) biological, chemical, and optical processes are often highly related: biological and chemical processes involve complex transformations (e.g., organic to inorganic forms of matter and vice versa), and require coupled sets of nonlinear equations, and 4) several biological, optical, and chemical processes have influential short time scales (minutes to days) and their rates are especially difficult to determine. Because of these many issues, interdisciplinary data assimilation is especially important for advancing interdisciplinary oceanography.

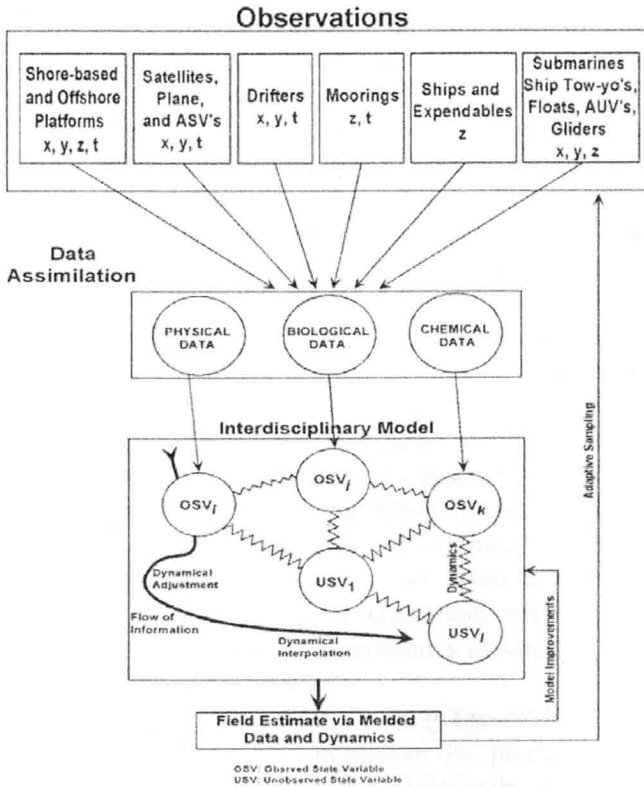


Figure 13. Schematic diagram showing data assimilation system components and their inter-relationships and feedbacks (based on Robinson et al., 1998). Network observational platforms and their primary spatial and temporal capabilities are shown at the top.