

Initial model implementation
There are many choices to be made, see Sections 2.1, 2.2. This step may include parameter optimization, see Section 3.3.

Unconstrained hindcast

Validation
See metrics and criteria in Section 3.2.

Does the model have sufficient skill in its representation of the relevant processes?

No Yes

Model refinement and testing of alternative formulations
This typically involves:
• sensitivity analyses of parameters, parameterizations, and model structures;
• formal parameter optimization;
• obtaining more observations ideally guided by OSSEs (see Section 4.2).

Is there non-deterministic or unconstrained variability that hampers the model's utility for the intended application?

Yes No

Apply DA to produce constrained hindcast, nowcast, or forecast.

Analyze "forecast" skill by assessing model against observations not used in DA. Is it satisfactory?

No Yes

Model is ready to be used for unconstrained hindcasts and scenario simulations.

For simulations of OAE impacts, validation of simulated anomalies between baseline and perturbed simulation is desirable (see Section 3.2).

Model is ready to be used for its intended application.