Lagrangian Models: Action Items from plenary discussions

- Representing entrainment when oil reaches the surface
- Using conditions of large scale models for oil spill (small scale) → sub grid scale
- Droplet Size issue must be addressed. What are these? Paris et al assume 100 micrometers.
- Issue: Big 3d LEM models can have big errors. Not that good on reliable forecasts out for a few days (error bars are mainly km)
- Test models with same circulation models and see how well they do
- Issue of Science (very sophisticated models) publications vs. response models
- What processes that led to “disappearance” of oil and how well solved?

Working group session

1. Identifying gaps in R&D
   a) Diffusion

   Incorporate turbulent diffusion in the model. It would be interesting but in practice it is not so easy. It would be useful to get them from CFD models, but it is a tough process. It is difficult to capture it from the LM. For one particle it is pretty feasible, but with a million of particles. For surface oil we have very well calibrated diffusion, for subsurface we do not have those observations. There is a European paper addressing the spatial variable of diffusivity, with the model working at the scale of each grid. A random flight model could be the solution.

   b) Test LM with different circulation model. That could be a good one.

   c) Test LM with different drifters. GOMRI can act as a host to test the LM (Matthew Howard).

   d) Using an Eulerian model could be a good choice to test both circulation and LM.

   e) Can we model the particles that encounter the model? This is a function of stickiness.

   f) At what point it is appropriate to use concentration equations vs Lagrangian particle tracking for hydrocarbon distribution. Elisabeth and Claire calculate concentration. Elisabeth divided by the volume of the cube.
g) Uncertainty estimates. A way to do that can be to compare it with ensemble models. Gnome release uncertainty particles, forced by the hyrod. Model in which the velocities are modified.

h) Skill assessment

i) Coupling NFM with LM. In particular the spatial varying trap height.

j) Dissolution equations

k) Simulate the mixed layer instead some

2. **Collaborations**

   - Testing the LM using the circulation models in ensemble mode in hindcast mode... To share the LM s and couple them with single model ensemble (from Chevron), GOMEX-PPP phase 2. This can be an optimal opportunity to test the Lagrangian model.

   - Standard tests. Test systems with different types of flow and stratifications, and see what time steps the LM needs and the RSM (random model). Time steps for the output rate is important, e.g., every 3h in estuaries, 2h on the open ocean.

3. **Action items**

   - To create a working group to test the LM.
   - Cross collaboration among consortia from GOMRI.
   - To show our collaboration results in the Lagrangian conference that is held in Miami 3 year (A Mariano)
   - Net CDF standard