Fw Submerged plume studies ---

Fw: Submerged plume studies
----- Forwarded by Mark K Sogge/DO/USGS/DOI on 09/10/2010 02:50 PM -----
From: Mark K Sogge/DO/USGS/DOI
To: Christopher R Sherwood/GD/USGS/DOI@USGS
Date: 06/04/2010 08:39 AM
Subject: Fw: Submerged plume studies

Hi Chris,

Robert Pavia - one of the leads for the Brooks McCall analysis team - passed your simulation on to CJ Beegle-Krause. See his message below. It appears to open the door for you to contact CJ, if interested.

Mark

Mark Sogge
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mark_sogge@usgs.gov

----- Forwarded by Mark K Sogge/DO/USGS/DOI on 06/04/2010 10:37 AM -----
From: Robert.Pavia@noaa.gov
To: Mark K Sogge <mark_sogge@usgs.gov>
Cc: CJ Beegle-Krause <CJ.Beegle-Krause@noaa.gov>
Date: 06/04/2010 09:58 AM
Subject: Re: Fw: Submerged plume studies

Mark, I am passing this information on to CJ who is our lead for conducing 3-d simulations of the oil release. The Woods Whole team should not hesitate to contact CJ. SINTEF has also be doing 3-D simulations under contract to BP. It will be important to look a simulation in the context of the data to both validate our intuition about what the data are telling us and to verify the model outputs.

Thanks for passing this information to us. Bob

----- Original Message -----
From: Mark K Sogge <mark_sogge@usgs.gov>
Date: Friday, June 4, 2010 7:02 am
Subject: Fw: Submerged plume studies
To: Robert Pavia <Robert.Pavia@noaa.gov>

> Hi Robert,
>
> When the Brooks McCall team was getting underway, I called Chris
> Sherwood
> - one of our USGS scientists at Woods Hole who does a lot of ocean
> modeling. He was very interested in the team's activities, and
> offered to
> be of service in any way possible.
>
> I just received this email from Chris, transmitting a demo simulation.

> I
> don't know if this is of interest to the Brooks McCall team, but
> thought I
> would pass it on to you in case you want to bring it forward. You are
>
> better suited than I to determine its relevance to the team, or its
> potential future use.
>
> Mark
>
> Mark Sogge
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>
> ----- Forwarded by Mark K Sogge/DO/USGS/DOI on 06/04/2010 08:57 AM -----
>
> From:
> Christopher R Sherwood/GD/USGS/DOI
> To:
> Mark K Sogge/DO/USGS/DOI@USGS
> Cc:
> rsignell@usgs.gov, Sonya A Jones/WRD/USGS/DOI@USGS, Walter
> Barnhardt/GD/USGS/DOI@USGS, John W Haines/GD/USGS/DOI@USGS, Richard Z
>
> Poore/GD/USGS/DOI@USGS
> Date:
> 06/04/2010 06:18 AM
> Subject:
> Submerged plume studies
>
>
> Hi Mark,
>
> Attached is a demo simulation of a cloud of neutrally buoyant
> particles
> released at the blowout site with an initial depth of 800 m (red dot).
> The
> intial cloud had radial spread of 2000 and a vertical spread of 100 m.
> The
> particles were advected with the 4D current field provided by Ruoying
>
> He'sNC State SABGOM simulations using the ocean model ROMS, plus
> random
> motions that correspond to the vertical and horizontal dispersion
> estimated by the model (or guessed at). The animation simply shows
> four
> different 3D views of the same field of 1000 particles at hourly
> intervals. Note huge vertical exaggeration and truncated vertical
> axis.
> The cloud moved a net of ~10 - 15 nautical miles over 5 days, but you
> can
> see that the velocity varied. I am working on a longer simulation, but
> it
> will require some minor code changes.
>
> The simulation was performed using LTRANS, originally developed by
> Elizabeth North at Univ. Maryland - Horn Point for larval transport,
> and
> slightly modified by her programmer (Zack Schlag) and USGS for this
> case.
> The simulations were done by grabbing model output from the on-line
> repository maintained by NC State (thanks in part to USGS development

> efforts by Rich Signell for USGS projects and the NOAA IOOS project). This approach means we could run this type of simulation for a variety of cases (release points, release times, particle characteristics), and force it with various models, including forecast models and long-term hindcast statistics (e.g., the POM runs done by Oey).
>
> Particle behavior in LTRANS can vary, depending on particle age, vertical location, and ambient water properties, including water temperature, salinity, density, and light. So, for example, this approach might be able to simulate the rise velocity of oil droplets with a specific size and density, and allow either of those properties (and therefore rise/fall velocity) to vary with age.
>
> As I said in our phone conversation, there are two approaches to this kind of particle transport simulations. LTRANS takes a Lagrangian approach: given 4D fields of velocity, mixing, and water properties, it tracks particles. Another approach is to calculate particle locations at the same time that the other properties are being modelled...this is how temperature, salinity, and other tracers are moved within an ocean model....some call this an Eulerian approach. There are different advantages to both approaches, and Scott Peckham (Univ. Colorado and part of the CSDMS project) is trying to instigate NOAA RAPID funding for both of these approaches.
>
> LTRANS is an open-source model (as all good models should be) and could be enhanced to simulate far-field behavior of oil, gas, hydrate, dispersant, and drilling mud particles, using some CDOG or DeepBlow algorithms. This could be done as a purely government effort using a NOAA or Navy model to force it (bad idea) or as a collaboration with U. Maryland, NC State, and other academic modellers (better idea). It is quite reasonable to initiate real particle simulations now, but there is also work to be done to improve LTRANS performance, incorporate the correct particle behavior, and validate the model against test cases and ongoing measurements.
>
> I think we should also support development of the Eulerian approach, in collaboration with the ROMS developers at Rutgers. ROMs has very good advection schemes for moving particles both horizontally and vertically, and several sophisticated turbulence submodels for characterizing mixing.

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> My suggestion is the Hernan Arango (in charge of ROMS code at Rutgers;
>
> also an open-source model) should collaborate with USGS and experts on
>
> droplet behavior) to develop ROMS routines that should be run using an
>
> established Gulf of Mexico forcing setup (e.g., the NC State model).
>
> Please pass this along to your Submerged Plume group for
> consideration,
> and give me a shout if you have any questions.
>
> Thanks, Chris
>
> --
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>