Regulated Research Institutional/Industrial Setting Form (1C)

This form must be completed AFTER experimentation by the adult supervising the student research conducted in a regulated research institution, industrial setting or any work site other than home, school or field.

Student's Name(s) Serena Zhao

Title of Project Targeting Marine Plastic Pollution with Numerical Data Modeling: Predicting Plastic Transport in Massachusetts Bay Through Flow Map Composition

To be completed by the Supervising Adult in the Setting (NOT the Student(s)) after experimentation:
(Responses must be on the form as it is required to be displayed at student's project booth; please do not print double-sided.)

The student(s) conducted research at my work site:

1. Did you or your proxy (e.g. graduate student, postdoc, employee) mentor or provide substantial guidance to the student researcher? ☑ Yes ☐ No
   a. If no, describe your and/or your institution's role with the student researcher and his/her project (e.g. supervised use of equipment on site without ongoing mentorship and sign below.

   b. If yes, complete questions 2–5.

2. Is the student's research project a subset of your ongoing research or work? Use questions 3, 4 and 5 to detail how the student's project was similar and/or different from ongoing research or work at your site. ☑ Yes ☐ No

3. Describe the independence and creativity with which the student:
   a. developed the hypotheses or engineering goals for the research project

      The student developed the research questions, hypotheses, and goals independently with knowledge of available resources at the lab (eg. existing MSEAS passive transport model, velocity simulations of Massachusetts Bay) and past work of the lab. The only help provided was regarding explanation of the information detailed above. Once the student had ideas, she verified the doability of the project, accessibility of the necessary resources, and other logistics of the project with her mentors. Besides this, the hypotheses and engineering goals for the project were independently developed.

   b. designed the methodology for his/her research project

      The methodology of this project was largely based on past work of the lab group with some individual contribution by the student. The passive transport model that was modified in this study was the product of the mentors and group's past work, and the process of modifying the model (methodology of editing MATLAB code to incorporate new aspects of plastic flow) is based on the lab's past work. In addition, the data simulations utilized in the methodology is completely the work of the lab but is only a "material" of this project and was not part of the student's research plan. However, the specific modifications done on the model were designed by the student herself based on her own research, planning, and goals. The student independently decided which source concentration factors to include and what cases to model, and her implementation of these cases was also done independently with minimal help from the mentors.

   c. analyzed and interpreted data

      Data analysis and interpretation was performed independently. The student generated her own figures and analyzed trends based on these figures with no aid from mentors.

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Regulated Research Institutional/Industrial Setting Form (1C) Continued

Student's Name(s) Serena Zhao

4. Detail the student's role in conducting the research (e.g. data collection, specific procedures performed). Differentiate what the student observed and what the student actually did.

   The student held an independent role in conducting the research, with help provided only when necessary for guidance. After independently developing a research plan with knowledge of available resources at the lab and past work of the lab for guidance, the student independently modified the existing MSEAS passive transport model (which was provided by the lab and was the past work of the lab) with only occasional and necessary help provided by mentors. The existing passive transport model (that was modified in the study) and the data simulations used by the student were provided by the lab and are not the student's work; everything else was the student's personal contribution and a product of her own research. The student selected the velocity simulation datasets that she wished to use and implemented them into the model independently. Data collection and generation of figures used to draw conclusions for this study were both performed independently. Lastly, conclusions were drawn and analysis was performed independently by the student.

5. Did the student(s) work on the project as part of a group? ☐ Yes ☑ No
   If yes, how many individuals were in the group and who were they (e.g. high school students, graduate students, faculty, professional researchers)?

   The student worked with 2 graduate students. However, the graduate students only provided necessary guidance and introduction of basic knowledge necessary for the student to conduct the study independently. The project itself consisted vastly of the student's independent work and was not worked on in a group.

I attest that the student has conducted the work as indicated above and that any required review and approval by institutional regulatory board (IRB/IACUC/IBC) has been obtained. Copies are attached if applicable.
I further acknowledge that the student will be presenting this work publicly in competition and I have communicated with the student research regarding any requirements for my review and/or restrictions of what is publicized.

Manan Doshi	M.M.Doshi	Graduate Student
Supervising Adult's Printed Name	Signature	Title
Massachusetts Institute of Technology - Multidisciplinary Simulation, Estimation, Assimilation Systems Group		11/19/19
Institution		Date Signed (must be after experimentation) (mm/dd/yy)
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