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# On the Dynamics of the Aerosol Plume in Common Bottlenose Dolphin Respiratory Events

Office of Response and Restoration

Data Set (DS) | ID: 73366 | Published / External

Created: 2024-09-04 | Last Modified: 2024-09-06

Parent: Methods Development

Project (PRJ) | ID: 69300

ID: 73366

Data Set (DS)

\* Discovery

• First Pass

» Metadata Rubric

## Item Identification

* » Title	On the Dynamics of the Aerosol Plume in Common Bottlenose Dolphin Respiratory Events
Short Name	Cetacean Surface Oil Phase 1a
* Status	Completed
Creation Date	2024
Revision Date	
• Publication Date	2024
* » Abstract	<p>This study examines the trajectories, size, and spatial distribution of aerosol during breathing events of common bottlenose dolphins (<i>Tursiops truncatus</i>) in the National Aquarium in Baltimore. Accounting for the terminal velocity of small droplets, the trajectories are used for estimating the volumes and flow rates of the exhaled and inhaled air. Data are acquired by training two male and four female dolphins to breathe at the side of the pool within the field-of-view of a high-speed holography system. Droplet-tracking and size measurements are performed for twenty-six datasets involving normal, chuff, and post-exercise breaths, some repeated to assess repeatability. The exhaled liquid originates either from the respiratory system or from the water trapped above the blowhole. The 150-400 ms exhalations have multiple velocity peaks, with the maximum air speed occurring during the first peak for post-exercise breaths. The droplet concentrations and sizes peak at the time of maximum velocity and then gradually decrease. The exhaled liquid volumes vary from 0.1 to 16 mL, peaking for post-exercise breaths. About 0.5% of the exhaled aerosol travels 3-5 times faster than the surrounding air and droplets, presumably due to ejection from deep within the respiratory tract. A fraction of the airborne liquid (0.2-0.5 mL) is subsequently inhaled during the more than 600 ms long inhalation phase, characterized by low speeds and small (150-1000 <math>\mu</math>m) droplets. The exhaled and inhaled tidal volumes</p>

	and air flow rates estimated from the trajectories are consistent with prior measurements of dolphins in the wild and other facilities
<b>* Purpose</b>	The present study aims to measure the water droplet production during exhalation and the resulting aspirated droplets and liquid volume during inhalation by bottlenose dolphins.
<b>Notes</b>	
<b>Other Citation Details</b>	
<b>• Supplemental Information</b>	
<b>DOI (Digital Object Identifier)</b>	
<b>DOI Registration Authority</b>	
<b>DOI Issue Date</b>	

## Keywords

### Theme Keywords

Thesaurus	Keyword
Global Change Master Directory (GCMD) Data Center Keywords	DOC/NOAA > National Oceanic & Atmospheric Administration
Global Change Master Directory (GCMD) Science Keywords	EARTH SCIENCE
Global Change Master Directory (GCMD) Science Keywords	EARTH SCIENCE > BIOLOGICAL CLASSIFICATION > ANIMALS/VERTEBRATES > MARINE MAMMALS > DOLPHINS
Global Change Master Directory (GCMD) Science Keywords	EARTH SCIENCE > OCEANS

Global Change Master Directory (GCMD) Service Keywords	EARTH SCIENCE SERVICES > DATA MANAGEMENT/DATA HANDLING > DATA ACCESS/RETRIEVAL

## Temporal Keywords

Thesaurus	Keyword

## \* Spatial Keywords

Thesaurus	Keyword
Global Change Master Directory (GCMD) Location Keywords	CONTINENT > NORTH AMERICA > UNITED STATES OF AMERICA > MARYLAND

## Stratum Keywords

Thesaurus	Keyword

## Instrument Keywords

Thesaurus	Keyword

## Platform Keywords

Thesaurus	Keyword

## Physical Location

• » Organization	
• » City	
• » State/Province	
• Country	
• » Location Description	

## Data Set Information

* Data Set Scope Code	Non-Geographic Data Set
• Data Set Type	CSV Files
• Maintenance Frequency	None Planned
Maintenance Note	
» Data Presentation Form	
• Entity Attribute Overview	
Entity Attribute Detail Citation	
Entity Attribute Detail URL	

<b>Distribution Liability</b>	
<b>Data Set Credit</b>	

## Support Roles

» At least one Distributor Org, one Metadata Contact, one Point of Contact, and one Data Steward should be listed.

<b>* » Support Role</b>	Data Steward
<b>* » Date Effective From</b>	2024
<b>Date Effective To</b>	
<b>Organization</b>	Office of Response and Restoration (ORR)
<b>Address</b>	1305 East-West Highway Silver Spring, MD 20910
<b>Email Address</b>	
<b>Phone</b>	
<b>Fax</b>	
<b>Mobile</b>	
<b>URL</b>	<a href="https://response.restoration.noaa.gov/">https://response.restoration.noaa.gov/</a>
<b>Business Hours</b>	
<b>Contact Instructions</b>	

<b>* » Support Role</b>	Distributor
<b>* » Date Effective From</b>	2024
<b>Date Effective To</b>	
<b>Organization</b>	Office of Response and Restoration (ORR)
<b>Address</b>	1305 East-West Highway Silver Spring, MD 20910
<b>Email Address</b>	
<b>Phone</b>	
<b>Fax</b>	
<b>Mobile</b>	

<b>URL</b>	<a href="https://response.restoration.noaa.gov/">https://response.restoration.noaa.gov/</a>
<b>Business Hours</b>	
<b>Contact Instructions</b>	

<b>* » Support Role</b>	Metadata Contact
<b>* » Date Effective From</b>	2024
<b>Date Effective To</b>	
<b>Organization</b>	Office of Response and Restoration (ORR)
<b>Address</b>	1305 East-West Highway Silver Spring, MD 20910
<b>Email Address</b>	
<b>Phone</b>	
<b>Fax</b>	
<b>Mobile</b>	
<b>URL</b>	<a href="https://response.restoration.noaa.gov/">https://response.restoration.noaa.gov/</a>
<b>Business Hours</b>	
<b>Contact Instructions</b>	

<b>* » Support Role</b>	Originator
<b>* » Date Effective From</b>	2021
<b>Date Effective To</b>	2023
<b>Organization</b>	Johns Hopkins Whiting School of Engineering
<b>Email Address</b>	
<b>Phone</b>	
<b>Fax</b>	
<b>Mobile</b>	
<b>URL</b>	<a href="https://engineering.jhu.edu/contact/">https://engineering.jhu.edu/contact/</a>
<b>Business Hours</b>	
<b>Contact Instructions</b>	

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<b>* » Support Role</b>	
<b>* » Date Effective From</b>	
<b>Date Effective To</b>	
<b>* » Contact</b>	
<b>* Contact Instructions</b>	

<b>* » Support Role</b>	
<b>* » Date Effective From</b>	
<b>Date Effective To</b>	
<b>* » Contact</b>	
<b>* Contact Instructions</b>	

<b>* » Support Role</b>	
<b>* » Date Effective From</b>	
<b>Date Effective To</b>	
<b>* » Contact</b>	
<b>* Contact Instructions</b>	

## Extents

<b>Currentness Reference</b>	
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## Extent Group 1

<b>Extent Description</b>	
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## Extent Group 1 / Geographic Area 1

<b>* » W° Bound</b>	
<b>* » E° Bound</b>	
<b>* » N° Bound</b>	
<b>* » S° Bound</b>	
<b>* » Description</b>	Data were collected at the National Aquarium in Baltimore, MD. Analysis was conducted at Johns Hopkins University

## Extent Group 1 / Vertical Extent

<b>EPSG Code</b>	
<b>Vertical Minimum</b>	
<b>Vertical Maximum</b>	

## Extent Group 1 / Time Frame 1

<b>* » Time Frame Type</b>	Discrete
<b>* » Start</b>	2022
<b>End</b>	
<b>Alternate Start As Of Info</b>	
<b>Alternate End As Of Info</b>	
<b>Description</b>	

## Spatial Information

### Spatial Resolution

<b>Angular Distance</b>	
<b>Angular Distance Units</b>	
<b>Horizontal Distance</b>	

<b>Horizontal Distance Units</b>	
<b>Vertical Distance</b>	
<b>Vertical Distance Units</b>	
<b>Equivalent Scale Denominator</b>	
<b>Level of Detail Description</b>	

## Spatial Representation

<b>Grid Representation Used?</b>	
<b>Vector Representation Used?</b>	
<b>Text / Table Representation Used?</b>	
<b>TIN Representation Used?</b>	
<b>Stereo Model Representation Used?</b>	
<b>Video Representation Used?</b>	

## Grid Representation

<b>Dimension Count</b>	
<b>Cell Geometry</b>	
<b>Transformation Parameter Available?</b>	

## Axis Dimension

<b>Dimension Type</b>	
<b>Size</b>	

<b>Resolution</b>	
<b>Resolution Units</b>	
<b>Resolution Type</b>	
<b>Description</b>	

### Axis Dimension

<b>Dimension Type</b>	
<b>Size</b>	
<b>Resolution</b>	
<b>Resolution Units</b>	
<b>Resolution Type</b>	
<b>Description</b>	

### Vector Representation

<b>Topology Level</b>	
<b>Complex Object Present?</b>	
<b>Complex Object Count</b>	
<b>Composite Object Present?</b>	
<b>Composite Object Count</b>	
<b>Curve Object Present?</b>	
<b>Curve Object Count</b>	
<b>Point Object Present?</b>	
<b>Point Object Count</b>	
<b>Solid Object Present?</b>	

<b>Solid Object Count</b>	
<b>Surface Object Present?</b>	
<b>Surface Object Count</b>	

## Reference Systems

### Reference System

<b>EPSG Code</b>	
------------------	--

### Horizontal Resolution

<b>Horizontal Encoding Method</b>	
<b>Latitude Resolution</b>	
<b>Longitude Resolution</b>	
<b>Coordinate X Resolution</b>	
<b>Coordinate Y Resolution</b>	
<b>Row Resolution</b>	
<b>Column Resolution</b>	
<b>Horizontal Units</b>	
<b>Distance Resolution</b>	
<b>Distance Units</b>	
<b>Bearing Resolution</b>	
<b>Bearing Units</b>	
<b>Reference Direction</b>	
<b>Reference Meridian</b>	

### Vertical Resolution

<b>Vertical Encoding Method</b>	
<b>Vertical Resolution</b>	
<b>Vertical Units</b>	

## Access Information

<b>Data License</b>	CC0-1.0
<b>Data License URL</b>	<a href="https://creativecommons.org/publicdomain/zero/1.0/">https://creativecommons.org/publicdomain/zero/1.0/</a>
<b>Data License Statement</b>	These data were produced by NOAA and are not subject to copyright protection in the United States. NOAA waives any potential copyright and related rights in these data worldwide through the <a href="https://creativecommons.org/publicdomain/zero/1.0/">Creative Commons Zero 1.0 Universal Public Domain Dedication (CC0-1.0)</a> .
<b>* » Security Class</b>	Unclassified
<b>* Security Classification System</b>	
<b>Security Handling Description</b>	
<b>• Data Access Policy</b>	
<b>» Data Access Procedure</b>	
<b>• » Data Access Constraints</b>	None
<b>• Data Use Constraints</b>	
<b>Metadata Access Constraints</b>	

<b>Metadata Use Constraints</b>	
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## Distribution Information

<b>Start Date</b>	2024
<b>End Date</b>	Present
<b>» Download URL</b>	<a href="https://www.diver.orr.noaa.gov/documents/d/guest/aerosols_exhaled_and_inhaled_by_dolphins_plots">https://www.diver.orr.noaa.gov/documents/d/guest/aerosols_exhaled_and_inhaled_by_dolphins_plots</a>
<b>Distributor</b>	Office of Response and Restoration (ORR) (2024 - Present)
<b>File Name</b>	Aerosols_Exhaled_and_Inhaled_by_Dolphins_plots.zip
<b>Description</b>	
<b>File Date/Time</b>	
<b>File Type (Deprecated)</b>	
<b>Distribution Format</b>	CSV - Comma Separated Values (Text)
<b>File Size</b>	6.9 MB
<b>Application Version</b>	
<b>Compression</b>	Zip
<b>Review Status</b>	

<b>Start Date</b>	
<b>End Date</b>	
<b>» Download URL</b>	
<b>Distributor</b>	
<b>File Name</b>	
<b>Description</b>	
<b>File Date/Time</b>	

<b>File Type</b>	
<b>FGDC Content Type</b>	
<b>File Size</b>	
<b>Application Version</b>	
<b>Compression</b>	
<b>Review Status</b>	

<b>Start Date</b>	
<b>End Date</b>	
<b>» Download URL</b>	
<b>Distributor</b>	
<b>File Name</b>	
<b>Description</b>	
<b>File Date/Time</b>	
<b>File Type</b>	
<b>FGDC Content Type</b>	
<b>File Size</b>	
<b>Application Version</b>	
<b>Compression</b>	
<b>Review Status</b>	

<b>Start Date</b>	
<b>End Date</b>	
<b>» Download URL</b>	
<b>Distributor</b>	
<b>File Name</b>	
<b>Description</b>	
<b>File Date/Time</b>	

<b>File Type</b>	
<b>FGDC Content Type</b>	
<b>File Size</b>	
<b>Application Version</b>	
<b>Compression</b>	
<b>Review Status</b>	

## Archive Information

<b>Location</b>	
<b>File Identifier</b>	
<b>File Name</b>	
<b>URL</b>	
<b>Description</b>	
<b>DOI</b>	
<b>Archive Date</b>	
<b>Archive Update Frequency</b>	

<b>Location</b>	
<b>File Identifier</b>	
<b>File Name</b>	
<b>URL</b>	
<b>Description</b>	
<b>DOI</b>	
<b>Archive Date</b>	
<b>Archive Update Frequency</b>	

<b>Location</b>	
<b>File Identifier</b>	

<b>File Name</b>	
<b>URL</b>	
<b>Description</b>	
<b>DOI</b>	
<b>Archive Date</b>	
<b>Archive Update Frequency</b>	

## URLs

<b>URL</b>	<a href="https://engineering.jhu.edu/">https://engineering.jhu.edu/</a>
<b>Name</b>	Johns Hopkins Whiting School of Engineering
<b>URL Type</b>	Online Resource
<b>File Resource Format</b>	
<b>Description</b>	Johns Hopkins Whiting School of Engineering home page

<b>URL</b>	<a href="https://response.restoration.noaa.gov/">https://response.restoration.noaa.gov/</a>
<b>Name</b>	NOAA Office of Response and Restoration
<b>URL Type</b>	Online Resource
<b>File Resource Format</b>	
<b>Description</b>	NOAA Office of Response and Restoration home page

<b>URL</b>	
<b>Name</b>	
<b>URL Type</b>	
<b>File Resource Format</b>	
<b>Description</b>	

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<b>URL</b>	
<b>Name</b>	
<b>URL Type</b>	
<b>File Resource Format</b>	
<b>Description</b>	

<b>URL</b>	
<b>Name</b>	
<b>URL Type</b>	
<b>File Resource Format</b>	
<b>Description</b>	

## Activity Log

<b>Activity Time</b>	
<b>Activity Type</b>	
<b>Responsible Party</b>	
<b>Description</b>	

<b>Activity Time</b>	
<b>Activity Type</b>	
<b>Responsible Party</b>	
<b>Description</b>	

<b>Activity Time</b>	
<b>Activity Type</b>	
<b>Responsible Party</b>	
<b>Description</b>	

## Issues

<b>Issue Date</b>	
<b>Author</b>	
<b>Issue</b>	

<b>Issue Date</b>	
<b>Author</b>	
<b>Issue</b>	

<b>Issue Date</b>	
<b>Author</b>	
<b>Issue</b>	

## Technical Environment

<b>Description</b>	
--------------------	--

## Data Quality

<b>Representativeness</b>	
---------------------------	--

<p><b>Accuracy</b></p>	<p>While NOAA makes every effort to ensure that its databases are error-free, errors do occur. We ask that you notify us immediately of any errors that you discover in our data.</p>
<p><b>Analytical Accuracy</b></p>	
<p><b>Horizontal Positional Accuracy</b></p>	
<p><b>Vertical Positional Accuracy</b></p>	
<p><b>Quantitation Limits</b></p>	
<p><b>Bias</b></p>	
<p><b>Comparability</b></p>	
<p><b>Completeness Measure</b></p>	
<p><b>Precision</b></p>	
<p><b>Analytical Precision</b></p>	
<p><b>Field Precision</b></p>	
<p><b>Sensitivity</b></p>	

<b>Detection Limit</b>	
<b>Completeness Report</b>	
<b>Conceptual Consistency</b>	
<b>» Quality Control Procedures Employed</b>	

## Data Management

<b>» Have Resources for Management of these Data Been Identified?</b>	
<b>» Approximate Percentage of Budget for these Data Devoted to Data Management</b>	Unknown
<b>» Do these Data Comply with the Data Access Directive?</b>	No
<b>» Is Access to the Data Limited Based on an Approved Waiver?</b>	No
<b>» If Distributor (Data Hosting Service) is Needed, Please Indicate</b>	
<b>» Approximate Delay Between</b>	

<b>Data Collection and Dissemination</b>	
<b>» If Delay is Longer than Latency of Automated Processing, Indicate Under What Authority Data Access is Delayed</b>	
<b>» Actual or Planned Long-Term Data Archive Location</b>	
<b>» If World Data Center or Other, Specify</b>	
<b>» If To Be Determined, Unable to Archive, or No Archiving Intended, Explain</b>	
<b>» Approximate Delay Between Data Collection and Archiving</b>	
<b>» How Will the Data Be Protected from Accidental or Malicious Modification or Deletion Prior to Receipt by the Archive?</b>	

## Lineage

<b>» Lineage Statement</b>	The experiments were performed at the National Aquarium in Baltimore by training four female and two male bottlenose dolphins to swim just under the field-of-view of a high-speed holography system and offer, on cue, three different breath types: normal, chuff (forced exhale) and post-exercise.
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## Sources

<b>Citation Title</b>	On the Dynamics of the Aerosol Plume in Common Bottlenose Dolphin Respiratory Events
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<b>Contact Role Type</b>	Originator
<b>Contact Type</b>	Organization
<b>Contact Name</b>	Johns Hopkins Whiting School of Engineering
<b>Publish Date</b>	
<b>Extent Type</b>	
<b>Extent Start Date/Time</b>	
<b>Extent End Date/Time</b>	
<b>Scale Denominator</b>	
<b>Citation URL</b>	
<b>Citation URL Name</b>	
<b>Citation URL Description</b>	
<b>Source Contribution</b>	

<b>Citation Title</b>	
<b>Contact Role Type</b>	
<b>Contact Type</b>	
<b>Contact Name</b>	
<b>Publish Date</b>	
<b>Extent Type</b>	
<b>Extent Start Date/Time</b>	
<b>Extent End Date/Time</b>	
<b>Citation URL</b>	
<b>Citation URL Name</b>	
<b>Citation URL Description</b>	

<b>Scale Denominator</b>	
--------------------------	--

<b>Citation Title</b>	
<b>Contact Role Type</b>	
<b>Contact Type</b>	
<b>Contact Name</b>	
<b>Publish Date</b>	
<b>Extent Type</b>	
<b>Extent Start Date/Time</b>	
<b>Extent End Date/Time</b>	
<b>Citation URL</b>	
<b>Citation URL Name</b>	
<b>Citation URL Description</b>	
<b>Scale Denominator</b>	

<b>Citation Title</b>	
<b>Contact Role Type</b>	
<b>Contact Type</b>	
<b>Contact Name</b>	
<b>Publish Date</b>	
<b>Extent Type</b>	
<b>Extent Start Date/Time</b>	
<b>Extent End Date/Time</b>	
<b>Citation URL</b>	
<b>Citation URL Name</b>	
<b>Citation URL Description</b>	

<b>Scale Denominator</b>	
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## Process Steps

<b>Process Step Number</b>	
<b>» Description</b>	
<b>Process Date/Time</b>	
<b>Process Contact</b>	
<b>Phone (Voice)</b>	
<b>Email Address</b>	
<b>Source</b>	

<b>Process Step Number</b>	
<b>» Description</b>	
<b>Process Date/Time</b>	
<b>Process Contact</b>	
<b>Phone (Voice)</b>	
<b>Email Address</b>	
<b>Source</b>	

<b>Process Step Number</b>	
<b>» Description</b>	
<b>Process Date/Time</b>	
<b>Process Contact</b>	
<b>Phone (Voice)</b>	

<b>Email Address</b>	
<b>Source</b>	

## Acquisition Information

### Instruments

<b>Identifier</b>	Phantom v2640 high-speed CMOS
<b>Docucomp UUID</b>	
<b>Instrument / Gear</b>	Instrument
<b>Instrument Type</b>	Camera
<b>Description</b>	The Phantom v2640 is a high-speed CMOS camera from Vision Research that has a 4 megapixel (MPx) sensor and can capture images at up to 6,600 frames per second (fps)

<b>Identifier</b>	
<b>Docucomp UUID</b>	
<b>Instrument / Gear</b>	
<b>Instrument Type</b>	
<b>Description</b>	

<b>Identifier</b>	
<b>Docucomp UUID</b>	
<b>Instrument / Gear</b>	
<b>Instrument Type</b>	
<b>Description</b>	

<b>Identifier</b>	
<b>Docucomp UUID</b>	
<b>Instrument / Gear</b>	

<b>Instrument Type</b>	
<b>Description</b>	

## Platforms

<b>Identifier</b>	Aquarium Tank
<b>Docucomp UUID</b>	
<b>Description</b>	National Aquarium in Baltimore dolphin tank

## Mounted Instruments

<b>Identifier</b>	Phantom v2640 high-speed CMOS
-------------------	-------------------------------

<b>Identifier</b>	
<b>Docucomp UUID</b>	
<b>Description</b>	

## Mounted Instruments

<b>Identifier</b>	
<b>Identifier</b>	
<b>Identifier</b>	

<b>Identifier</b>	
<b>Docucomp UUID</b>	
<b>Description</b>	

## Mounted Instruments

<b>Identifier</b>	
-------------------	--

<b>Identifier</b>	
<b>Identifier</b>	

<b>Identifier</b>	
<b>Docucomp UUID</b>	
<b>Description</b>	

### Mounted Instruments

<b>Identifier</b>	
<b>Identifier</b>	
<b>Identifier</b>	

### FAQs

<b>Date</b>	
<b>Author</b>	
<b>Question</b>	
<b>Answer</b>	

### Child Items

Rubric scores updated every 15m

Score	Type	Title

### Related Items

Item Type	Relationship Type	Title


## Catalog Details

<b>Catalog Item ID</b>	73366
<b>Metadata Record Created By</b>	Jay Coady
<b>Metadata Record Created</b>	2024-09-04 17:24+0000
<b>Metadata Record Last Modified By</b>	Adam Rotert
<b>» Metadata Record Last Modified</b>	2024-09-06 17:10+0000
<b>Metadata Record Published</b>	2024-09-06
<b>Owner Org</b>	ORR
<b>Metadata Publication Status</b>	Published Externally
<b>Do Not Publish?</b>	N
<b>Metadata Workflow State</b>	Published / External
<b>Metadata Last Review Date</b>	2024-09-06
<b>Metadata Review Frequency</b>	1 Year
<b>Metadata Next Review Date</b>	2025-09-06
<b>Tags</b>	