

## CURRICULUM VITAE: JAMES P.M. SYVITSKI

Last update May 2008



**Title:** Executive Director, of CSDMS — Community Surface Dynamics Modeling System & Professor of Geological Sciences

**Address: Work** INSTAAR, University of Colorado-Boulder  
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*Residence* 2134 Kalmia Circle  
Boulder, Colorado, USA, 80304-1912

**Citizenship: Dual – United States and Canada**

**Professional Specialization:** *Oceanography, Geological Sciences, Hydrology, Numerical Modeling, Geophysics.*

**Research Interests:** *Fjords, Rivers, Deltas, Estuaries, Particle Dynamics, Simulation of Sediment Transport & Stratigraphy, Continental Margin Sedimentation, Gravity Flows, Animal-Sediment Interactions,*

**Non-professional Interests:** *Guitarist; Sensei; Gardening; and Literature*

*I have expertise in earth system science, reflecting an education in the fields of sedimentology, oceanography, mathematics, geophysics, and geochemistry — achieving double bachelors and double doctorate degrees. I have worked in industry, academia (U. Calgary, Dalhousie U., U. Laval, Memorial U., INRS-océanologie, and U. Colorado), government (DOE; DEMR, DNRC), and as an environmental consultant. I work to balance applied and pure research, and economic potential given environmental concerns. I appreciate the multi-layered meaning of “the public good”.*

*I work in the forefront of Computational Geosciences: Sediment transport, land-ocean interactions and landscape evolution. I am less reliant on established paradigms and remain flexible in my problem solving exercises, resulting in a well-cited (>3000) publication record. I have experience as a scientific editor (journals, books, and reports) and have worked with various international publishing houses.*

*Science is a team effort, and I have appreciated being both a player and leader of large international scientific teams. My 150 co-authors come from industry, government, and academia and from many countries. Science is an international effort and I have been fortunate to work at a variety of levels in world scientific bodies (IUGS, IGBP, INQUA, LOICZ, and IAS). Canadian, Polish, Chinese and US scientific academies have sought my advice, on issues related to the environment and global change. I have provided confidential advice to the Canadian government, US Departments of Justice, Commerce, Interior and Defense. I respect their security arrangements and confidence.*

*I supervise undergraduate and graduate students, post-graduate fellows, laboratory and field technicians, research faculty, teaching faculty, finance and clerical staff. As Head, Sediment Dynamics (Geological Survey of Canada - Atlantic), I coordinated a staff of 20 engaged in environmental marine problems, from tidal power plants to iceberg scouring of the seafloor, from cable routing to slope stability problems. As Director of INSTAAR, a research Institute of the University of Colorado, I coordinated 300 employees, 94 are at the Ph.D. level, with faculty from 7 academic departments. INSTAAR specializes in global change and environmental science, earth surface processes and extreme environments: ecosystem science, biogeochemistry, glaciology, hydrology, environmental geophysics and modeling. As Executive Director, CSDMS — Community Surface Dynamics Modeling System, I lead an international effort to develop, support, and disseminate to the earth-science research and teaching community integrated software modules that are aimed at predicting the erosion, transport, and deposition of sediment and solutes in landscapes and their repository sedimentary basins.*

*I believe in focused and intense science, yet science that can be easily understood by, and justified to, the public. I enjoy simplifying science for others and strongly believe in educating the public on science issues.*

## Education

<i>B.Sc.</i>	<i>Lakehead University</i>	<i>1974</i>	<i>Geology; minor Mathematics</i>
<i>H.B.Sc.</i>	<i>Lakehead University</i>	<i>1975</i>	<i>Geochemistry</i>
<i>Ph. D.</i>	<i>U. British Columbia</i>	<i>1978</i>	<i>Geological Sciences &amp; in Oceanography</i>

**Languages:** *English & University Russian*

## University Courses Taken:

<i>General</i>	<i>Geology</i>	<i>Mathematics</i>	<i>Sed. - Strat.</i>	<i>Geochemistry</i>	<i>Geophysics</i>	<i>Oceanography</i>
<i>Astronomy</i>	<i>Geology</i>	<i>Dif. Calculus</i>	<i>Sed. &amp; Strat.</i>	<i>Phys. Chemistry</i>	<i>Gen. Physics</i>	<i>Synoptic Ocgy.</i>
<i>Phys. Geog.</i>	<i>Structural Geol</i>	<i>Comp. Science</i>	<i>PreCamb. Strat.</i>	<i>Geochemistry</i>	<i>Exploration G.P.-1</i>	<i>Chemical Ocgy.</i>
<i>Russian</i>	<i>Crystallography</i>	<i>Theory Dif. Eqns.</i>	<i>Phanerozoic Strat.</i>	<i>Unstable Isotopes</i>	<i>Electricity &amp; Magn.</i>	<i>Biological Ocgy.</i>
	<i>Ore Microscopy</i>	<i>Prob. &amp; Statistics</i>	<i>Seminar in Sed.</i>	<i>Stable Isotopes</i>	<i>Physics of the Earth</i>	<i>Dynamic Ocgy.</i>
	<i>Mineral Deposits</i>	<i>App. Comp. Sim.</i>	<i>Colloidal Prop.</i>	<i>Thesis</i>	<i>Exploration G.P.-2</i>	<i>Thesis</i>
	<i>Petrology</i>	<i>Geomathematics</i>	<i>Problems in Sed.</i>			
	<i>Petrography &amp; Min.</i>		<i>Thesis</i>			
	<i>Metamorphic Pet.</i>					
	<i>Reading Course</i>					

## Theses:

*H.B.Sc.* *Water-Sediment Interactions in a Fresh Water Environment: Western Thunder Bay*

Supervisor: J.S. Mothersill

*Ph.D./Ph.D.* *Sedimentological Advances Concerning the Flocculation and Zooplankton Pelletization of Suspended Sediment in Howe Sound, British Columbia: A Fjord Receiving Glacial Meltwater*

Supervisor: J.W. Murray

## University Courses Taught:

<i>Geology for Engineers</i>	<i>University of Calgary</i>	<i>2nd year</i>
<i>Sedimentary Petrology</i>	<i>University of Calgary</i>	<i>3rd year</i>
<i>Field School</i>	<i>University of Calgary</i>	<i>3rd year</i>
<i>Sedimentary Environments</i>	<i>University of Calgary</i>	<i>4th year</i>
<i>Advanced Geomathematics</i>	<i>University of Calgary</i>	<i>graduate</i>
<i>Advanced Clastic Sedimentology</i>	<i>University of Calgary</i>	<i>graduate</i>
<i>Intro to Oceanography</i>	<i>University of Colorado</i>	<i>3rd year</i>
<i>Quantitative Dynamic Stratigraphy</i>	<i>University of Colorado</i>	<i>graduate</i>
<i>High Latitude Glacimarine Processes</i>	<i>University of Colorado</i>	<i>graduate</i>
<i>Oceanography</i>	<i>University of Colorado</i>	<i>4<sup>th</sup>yr-5<sup>th</sup>yr</i>
<i>Polar Marine Sedimentary Environments</i>	<i>University of Tromsø</i>	<i>graduate</i>
<i>Modeling Margins: Sources to Sink</i>	<i>Delft Univ. of Technology</i>	<i>graduate</i>
<i>Modeling Margins: Sources to Sink</i>	<i>CNRS/IGM-Bologna</i>	<i>graduate</i>
<i>Modeling Margins: Sources to Sink</i>	<i>University of Barcelona</i>	<i>graduate</i>

## Graduate - Supervision

<i>1995-99</i>	<i>Mark D. Morehead</i>	<i>Ph.D.</i>	<i>University of Colorado at Boulder</i>
<i>1996-01</i>	<i>Damian B. O'Grady</i>	<i>Ph.D.</i>	<i>University of Colorado at Boulder</i>
<i>1999-02</i>	<i>David Mixon</i>	<i>M.Sc.</i>	<i>University of Colorado at Boulder</i>
<i>1999-03</i>	<i>David Kinner</i>	<i>Ph.D.</i>	<i>University of Colorado at Boulder</i>
<i>2000-05</i>	<i>Gita Dunhill</i>	<i>Ph.D.</i>	<i>University of Colorado at Boulder</i>
<i>2001-07</i>	<i>Eric W.H. Hutton</i>	<i>Ph.D.</i>	<i>University of Colorado at Boulder</i>
<i>2003-04</i>	<i>David Pyles</i>	<i>Ph.D.</i>	<i>University of Colorado at Boulder</i>
<i>2004-07</i>	<i>Alex Sinclair</i>	<i>M.Sc.</i>	<i>University of Colorado at Boulder</i>
<i>2004-07</i>	<i>Albert J. Kettner</i>	<i>Ph.D.</i>	<i>Delft University of Technology</i>
<i>2007—</i>	<i>Mark T. Hannon</i>	<i>Ph.D.</i>	<i>University of Colorado — Boulder</i>

## Graduate - Examiner or Committee Support

<i>1985-86</i>	<i>Kenneth Asprey</i>	<i>M.Sc.</i>	<i>University of Wales</i>
<i>1990-92</i>	<i>J. Berry</i>	<i>M.Sc.</i>	<i>Dalhousie University</i>

1992-95	<i>Jo Birch Ph.D.</i>	<i>Dalhousie University</i>
1992-95	<i>Ken Skene</i>	<i>Ph.D. Dalhousie University</i>
1992-93	<i>Hazen Russell</i>	<i>M.Sc. Laval University</i>
1995-97	<i>Andrew Stein</i>	<i>M.Sc. University of Colorado at Boulder</i>
1995-00	<i>Donald Barber</i>	<i>Ph.D. University of Colorado at Boulder</i>
1995-96	<i>Thomas Cooper</i>	<i>M.Sc. University of Colorado at Boulder</i>
1996-00	<i>Kathy Licht</i>	<i>Ph.D. University of Colorado at Boulder</i>
1996-97	<i>Micallea Smith</i>	<i>M.Sc. University of Colorado at Boulder</i>
1996-97	<i>Dan Levish</i>	<i>Ph.D. University of Colorado at Boulder</i>
1996-99	<i>Brian Welch</i>	<i>M.Sc. University of Colorado at Boulder</i>
1997-00	<i>Stephanie Cartee</i>	<i>M.Sc. University of Colorado at Boulder</i>
1998-01	<i>Micallea Smith</i>	<i>Ph.D. University of Colorado at Boulder</i>
1998-03	<i>Greta Bjork</i>	<i>Ph.D. University of Colorado at Boulder</i>
2000-02	<i>Sarah Principato</i>	<i>Ph.D. University of Colorado at Boulder</i>
2000-01	<i>J. Scott Stewart</i>	<i>Ph.D. University of Colorado at Boulder</i>
2001-02	<i>Isla Castenada</i>	<i>M.Sc. University of Colorado at Boulder</i>
2001-02	<i>Irina Overeem</i>	<i>Ph.D. Delft University of Technology</i>
2004-06	<i>Ursula Quillman</i>	<i>M.Sc. University of Colorado at Boulder</i>
2002-07	<i>Remco Groenenberg</i>	<i>Ph.D. Delft University of Technology</i>

### Post-graduate Supervision

1987-89	<i>Dr. Jay Stravers</i>	<i>PDF</i>	<i>Bedford Institute of Oceanography</i>
1993-95	<i>Dr. Azetsu Scott</i>	<i>PDF</i>	<i>Bedford Institute of Oceanography</i>
1994-95	<i>Dr. Thierry Mulder</i>	<i>PDF</i>	<i>Bedford Institute of Oceanography</i>
1995-96	<i>Dr. Hee Jun Lee</i>	<i>PDF</i>	<i>University of Colorado at Boulder</i>
1996-98	<i>Dr. David Bahr</i>	<i>PDF</i>	<i>University of Colorado at Boulder</i>
1999-00	<i>Dr. Scott Peckham</i>	<i>PDF</i>	<i>University of Colorado at Boulder</i>
2001-02	<i>Dr. Damian O'Grady</i>	<i>PDF</i>	<i>University of Colorado at Boulder</i>
2001-03	<i>Dr. J. Scott Stewart</i>	<i>PDF</i>	<i>University of Colorado at Boulder</i>
2002-04	<i>Dr. Irina Overeem</i>	<i>PDF</i>	<i>University of Colorado at Boulder</i>
2002-05	<i>Dr. Yu'suke Kubo</i>	<i>PDF</i>	<i>University of Colorado at Boulder</i>
2007-10	<i>Dr. Albert J. Kettner</i>	<i>PDF</i>	<i>University of Colorado at Boulder</i>

### JOURNAL EDITORSHIPS

1982-1983	<i>Guest Editor, Sedimentary Geology, Elsevier</i>
1984-1988	<i>Associate Editor, Journal Sedimentary Petrology, SEPM Society</i>
1993-	<i>Associate Editor, Oceanography, TOS</i>
1995-1997	<i>Editorial Board, Arctic and Alpine Research, Allen Press</i>
1996-	<i>Editorial Board, Marine Geology, Elsevier</i>
1996-1998	<i>Guest Editor, Marine Geology, Elsevier</i>
1998-2000	<i>Guest Editor, Computers &amp; Geoscience, Elsevier</i>
1998-2002	<i>Editor, Arctic, Antarctic and Alpine Research, Allen Press</i>
2000-2003	<i>Guest Editor, Global &amp; Planetary Change, Elsevier</i>
2002-	<i>Editorial Board, Computers and Geoscience, Elsevier</i>
2002-	<i>Editorial Board, Chinese Journal of Oceanology and Limnology</i>
2004-2005	<i>Guest Editor, Oceanography, TOS</i>
2004-2005	<i>Guest Editor, Marine Geology, Elsevier</i>
2006-2008	<i>Guest Editor, Computers &amp; Geoscience, Elsevier</i>
2007-	<i>Guest Editor, Geochemistry, Geophysics, Geosystems (G<sup>3</sup>), AGU</i>

### ACTIVE PROFESSIONAL MEMBERSHIPS

<i>IAS: International Association of Sedimentologists</i>	<i>SEPM: Society of Sedimentary Geology</i>
<i>TOS: The Oceanographic Society</i>	<i>AGU: American Geophysical Union</i>
<i>IMAG: International Association of Mathematical Geology</i>	

### PROFESSIONAL EXPERIENCE

<u>Industry:</u>	<u>Position Title</u>	<u>Employer</u>
1973,1975	<i>Geophysicist, Geologist</i>	<i>Falconbridge Mines</i>
<u>University:</u>		

1978–81	Assistant Professor (Geology & Geophysics)	University of Calgary
1989–95	Adjunct Professor (Geology)	Laval University
1989–95	Adjunct Professor (Oceanography)	INRS-oceanologie
1992–95	Adjunct Professor (Ocean Sciences)	Memorial University of NFLD
1993–97	Adjunct Professor (Earth Sciences)	Dalhousie University
1995–	Professor (Geological Sciences)	University of Colorado at Boulder
1997–	Professor (Geophysics)	University of Colorado at Boulder
1995–07	Director & Fellow (INSTAAR)	University of Colorado at Boulder
2007–	Professor (Oceanography)	University of Colorado at Boulder
2007–	Executive Director of CSDMS	University of Colorado at Boulder
<b>Government:</b>		
1974	Geochemist	Ontario Department of Environment
1976	Research Scientist	Geological Survey of Canada-Pacific
1981-95	Senior Research Scientist	Geological Survey of Canada-Atlantic
1982-85	Head: Sediment Dynamics Section	Bedford Institute of Oceanography
<b>Consulting</b>		
1980-81	Consultant	Canadian Marine Geotechnical Engineering
1992-93	Consultant	Department of Justice (U.S.)
2006-07	Consultant	Earth Tech

## PROFESSIONAL SERVICES

<i>Steering Committee:</i>	<i>Turbid Water Symposia, 1982, Halifax, Canada</i>
<i>Symposia Chair</i>	<i>Sedimentology of Fjords, ISC, 1982, Hamilton, Canada</i>
<i>Chair</i>	<i>Arctic Fjords, GSC, 1983, Dartmouth, Canada</i>
<i>Technical Chair</i>	<i>Arctic Land-Sea Interactions, 1985, Dartmouth, Canada</i>
<i>Chair</i>	<i>Particle Characterization, IUGS, 1986-87, Dartmouth, Canada, Heidelberg, Germany</i>
<i>Session Chair</i>	<i>Glaciomarine Processes, Geol Soc, 1989, London, UK</i>
<i>Symposia Chair</i>	<i>Glaciomarine Facies Models, ISC, 1990, Nottingham, UK</i>
<i>Session Chair</i>	<i>Record of the Continental Ice Sheets, GAC, 1991, Toronto</i>
<i>Convener</i>	<i>ONR STRATAFORM Modelers Workshops, 1995-2000.</i>
<i>Convener:</i>	<i>High res. seismic Stratigraphy of Quaternary deposits, 1991-1996</i>
<i>Session Chair</i>	<i>Quaternary Sedimentation, GAC, 1992, Wolfville, Canada</i>
<i>Session Chair</i>	<i>Numerical Modeling of Basins, GAC, 1993, Edmonton, Canada</i>
<i>Session Chair:</i>	<i>Numerical Experiments in Stratigraphy, Lawrence, Kansas, 1996</i>
<i>Session Chair:</i>	<i>High-resolution records of Climate from Marginal Seas, GSA, Denver, 1996.</i>
<i>Session Chair:</i>	<i>Geophysical Flows and Sediment Transport, AGU, San Francisco, 1997.</i>
<i>Co-Convenor:</i>	<i>AOSB's Arctic Paleo River Discharge conference, 1997, Boulder, CO.</i>
<i>Session Chair:</i>	<i>STRATCON '98, IAS-SEPM, 1998, Sicily</i>
<i>Steering Committee</i>	<i>IGBP Land Ocean Interactions in the Coastal Zone 1998 - 2004</i>
<i>Co-Convenor</i>	<i>The Oceanographic Society: Extreme &amp; Unexpected Phenomena, Reno 1999</i>
<i>Convener</i>	<i>IGBP-Water Group Sediments Meeting, Boulder, CO 2000</i>
<i>Session Chair</i>	<i>37<sup>th</sup> Society of Engineering Science: Sediment Transport, Columbia, SC, 2000</i>
<i>Session Chair</i>	<i>MSG Geological Society, Glacier-influenced Sedimentation, Bristol, UK, 2001</i>
<i>Session Chair</i>	<i>Changes in Climate &amp; Environment at High-Latitudes: Tromsø, Norway, 2001</i>
<i>Session Chair</i>	<i>Glacial Sediment Systems from Source to Sink, AGU San Francisco, 2001</i>
<i>Session Chair</i>	<i>Littoral Sediment Transport. EuroDelta Workshop, Bologna, 2002</i>
<i>Session Chair</i>	<i>Processes, record, utilization management of Continental Shelves, Hong Kong, 2002</i>
<i>Session Chair</i>	<i>Dynamics of the Coastal Zone, LOICZ Futures Meeting, Miami, 2002.</i>
<i>Session Chair</i>	<i>Sediment Transport and Deposition in Prodeltas Conference, Aix, Fr, 2003</i>
<i>Session Chair</i>	<i>Sedimentation and Architecture of European Margins, AGU San Francisco, 2003</i>
<i>Session Chair</i>	<i>Marine Records, 33<sup>rd</sup> Arctic Workshop, Tromsø, Norway, 2003</i>
<i>Session Chair</i>	<i>River-Estuary Interactions, ERF, Seattle, 2003</i>
<i>Session Chair</i>	<i>Coastal Processes and Evolution, Oceans Conference, San Diego, 2003</i>
<i>Session Chair</i>	<i>Mechanisms and Magnitudes: Global Water System Project: Portsmouth, 2003</i>
<i>Session Chair</i>	<i>Coupled process-response models, IGC, Florence 2004</i>
<i>Session Chair</i>	<i>Strata Formation on European Continental Margins, AGU San Francisco, 2004</i>
<i>Session Chair</i>	<i>34<sup>th</sup> Arctic Workshop, Boulder, 2004</i>
<i>Steering Committee</i>	<i>SCOR-sponsored Sediment Retention in Estuaries</i>
<i>Session Chair</i>	<i>Large Continental Rivers, AGU New Orleans, 2005</i>

Ex-officio SSC  
 Session Chair  
 Session Chair  
 Session Chair  
 Session Chair  
 Session Chair  
 Session Chair

*IGBP Land Ocean Interactions in the Coastal Zone 2005*  
*Ecological Dynamics of Deltas, LOICZ, 2005, Egmond von Zee, Netherlands*  
*Dynamics of the Adriatic, EuroSTRATAFORM, Salamanca, Spain, 2005*  
*Particle Dynamics of Rivers, Coasts, Estuarine Morphodynamics – Urbana, 2005*  
*Integrated Strata Analysis, IAS Congress, Fukuoka, Japan, 2006*  
*New Models for Fluvial and Coastal Sediment Transport and Surface Dynamics, AGU San Francisco, 2006*  
*Sediment Transfer From Land Through the Ocean, AGU San Francisco, 2006*

<b>FUNDED RESEARCH PROJECTS AS PI</b>				
<b>Canada:</b> does not include salaries, overhead, capital, and ship time				
<b>Period</b>	<b>\$Can</b>	<b>Agency</b>	<b>Research Site</b>	<b>Project Funded</b>
1978-79	\$20 K	NSERC	University of Calgary	Sedimentation in Lakes
1979-80	\$50 K	NSERC	University of Calgary	Particle Flootation
1981-89	\$820 K	EMR	GSC	Sedimentology of Arctic Fjords Experiment
1982-89	\$190 K	EMR	GSC	Suspended Particulate Matter In Situ
1986-95	\$1100 K	EMR	GSC & NSERC	Transfer of Sediment from Land to Sea
1987-93	\$2200 K	EMR/NSERC/NGI	GSC	ADFEX: Arctic Delta Failure Experiment
1992-95	\$700 K	NRCan	GSC-Global Change	Marine Proxy Climatic Record & Models
1995	\$130 K	ONR	GSC	STRATAFORM: Formation of strata on Margins
<b>United States</b>				
<b>Period</b>	<b>\$US</b>	<b>Agency</b>	<b>Research Site</b>	<b>Project Funded</b>
1996-99	\$110 K	ONR	INSTAAR	Numerical Coupling of discharge to sedimentation models
1995-02	\$702 K	ONR	INSTAAR	STRATAFORM
1997-98	\$91 K	ONR	INSTAAR	Particle Dynamic Laser and Camera System
1997-99	\$360 K	Mobil	INSTAAR	Data Base Development and Models for Stratigraphy
1998-99	\$135 K	Raytheon	INSTAAR	Satellite Data Model Fusion: Littoral Sed. Transport
2000-01	\$1100 K	ONR&Sun	INSTAAR	Environmental Computation & Imaging (ECI) Facility
2000-04	\$650 K	ONR	INSTAAR	Geoclutter: Buried Channels on Continental Shelves
2001-04	\$200 K	ONR	INSTAAR	Sediment Flux to the Coastal Zone: Prediction for the Navy
2001-04	\$143 K	NSF	INSTAAR+	MARGINS: Experimental and Theoretical Studies
2001-04	\$437 K	ExxonMobil	INSTAAR	Development of 2D and 3D-SedFlux
2001-04	\$343 K	ONR	INSTAAR+	Seabed variability and its influence on acoustic prediction
2002-03	\$440 K	ONR	INSTAAR	EuroSTRATAFORM: Modeling Margin Sedimentation
2001-02	\$50 K	NSF	INSTAAR	Community Sediment Model
2004-06	\$189 K	NASA	INSTAAR	Changing C & N & Water Cycles in the Earth System
2004-06	\$24 K	Indiana St U	INSTAAR	Sediment production & buffering in the Waipaoa R., NZ
2005-09	\$440 K	ONR	INSTAAR	Sediment dynamics of World deltas & Estuaries
2006-11	\$4.5 M	NSF	INSTAAR	Community Surface Dynamics Modeling System
2007-10	\$313 K	NASA	INSTAAR	Analysis of inland and coastal water fluxes
2007-09	\$150 K	ConocoPhil	INSTAAR	Arctic Sedimentary Environments
2008-09	\$60 K	ExxonMob	INSTAAR	Community Surface Dynamics Modeling System
<b>FUNDED RESEARCH PROJECTS AS CO-PI</b>				
<b>Period</b>	<b>\$US</b>	<b>Agency</b>	<b>Research Site</b>	<b>Project Funded</b>
1996-99	\$325 K	NSF/ATM	INSTAAR	Paleoclimate of W/NW Iceland (PALE)
1996-97	\$50 K	NSF/ANS	INSTAAR	Greenland Margin - Denmark Strait Paleooceanography
1998-00	\$450 K	NSF	UMinn	Experimental Study of Basin Stratigraphy
1999-01	\$366 K	NSF	INSTAAR	IMAGES: High Resolution Holocene Paleoclimate (Ic/Gr)
2001-05	\$2.2 M	NSF	INSTAAR/CIRES	HARC: Coastal Erosion in Barrow Alaska
2008-11	\$4.0 M	NSF/CU	U. Colorado	High Performance Front Range Supercomputer

**MARINE ACTIVITIES:**

1974 M/V Martin Carlsson  
 1976 M/V Sea Lion  
 1977 HMAV Endeavor  
 1976-77 M/V Active Lass  
 1979 M/V Pandora II

Lake Superior  
 Fraser River  
 Georgia Straight  
 Howe Sound  
 B.C. Fjords  
 Geochemist  
 Sedimentologist  
 Sedimentology/Geophysics  
 Chief Scientist  
 Chief Scientist

1980 HMAV St. Anthony & Pisces IV	B.C. Fjords	Chief Scientist
1981 HMAV St. Anthony & Pisces IV	B.C. Fjords	Sedimentologist/Diver
1981 M/V Pandora II & Pisces IV	Gulf of St. Lawrence	Chief Scientist
1982 CSS Dawson	Saguenay	Watch Leader
1982 CSS Hudson	Baffin Fjords	Senior Scientist
1983 CSS Hudson	Baffin Fjords	Chief Scientist
1984 CSS Louis Lauzier	Saguenay	Chief Scientist
1985 M/V Pandora II & Pisces IV	Baffin Fjords	Chief Scientist
1986 CSS Dawson	Gulf of St. Lawrence	Cruise Coordinator
1987 CSS Dawson	Gulf of St. Lawrence	Chief Scientist
1988 CSS Dawson	Lake Melville	Watch Leader
1988 Chinese Ferry Boat	South China Sea	Watch Leader
1989 CSS Dawson	Gulf of St. Lawrence	Chief Scientist
1989 CSS Baffin	Lake Melville	Watch Leader
1991 CSS Hudson	Lake Melville	Chief Scientist
1993 CSS Hudson	Greenland, Iceland	Chief Scientist

## EXAMPLES OF SCIENTIFIC CREATIVITY

1. Redefined paradigms of ice marginal sedimentation through a mass balance approach using high res. geophysical data.
2. Determined the *in situ* behavior of marine suspended particles including settle velocity, size, concentration and density.
3. Developed numerical models to demonstrate
  - climate-driven predictions of discharge and sediment load data for ungauged rivers.
  - how changes in global climate affect ice sheet size, river hydrology and the architecture of river deltas.
  - how multiple transport pathway affect the long term fill of sedimentary basins under complex sea level fluctuations
4. Developed new concepts and data on the interaction on biological-sediment interactions, including
  - zooplankton response to the ingestion of suspended sediment
  - large sea mammals resuspending seafloor sediment in deep high arctic environments
  - the role corals play in moving large boulders through their current drag.
  - arctic benthos responding to the proximity of tidewater glaciers.
5. Monitored underwater slides and sediment gravity flows.
6. Developed complex standards and methods for the first world inter-instrument, inter-lab calibration experiment to ascertain the accuracy of commercial and non-commercial methods of particle size analysis.
7. Emplaced oceanographic moorings in the offshore arctic via helicopter prior to the shipping season.
8. Provided new theory for the formation of arctic placer deposits as related to the concept of thermal erosion.
9. Demonstrated use of organic carbon as a stratigraphic method to hindcast sedimentation rates and summer temperatures in coastal arctic environments.
10. Developed method for estimating the rating coefficients for river flux measurements
11. Developed a web-based approach to modeling the sediment discharge of world rivers
12. Redefined the paradigm of delta morphology under the influence of human activity.

## PROFESSIONAL INFLUENCE

1. Sedimentology advisor to publishers Elsevier, Springer-Verlag, Cambridge University Press, Allen Press.
2. Consultant to the U.S. Office of Naval Research and NATO Naval Geoscience initiatives (Arctic seafloor acoustics, Mine Burial, Mine Countermeasures, Antisubmarine Warfare, Arctic Submarine Operations, Special Operations, Uncertainty, Korean Tidal Flats)
3. ARCUS (Arctic Research Consortium of the US) Board of Directors, representing 30 US universities/institutes (1995-98) Secretary and Executive Committee of the ARCUS Bd of Directors (1997 -98)
4. Journal reviewer for 15 journals;  $\approx$  15 manuscripts per year.
5. Journal Editor, Assoc. Editor, and Editorial Board of over half of dozen international journals.
5. Annual reviewer of grant proposals to US, Canadian and European funding agencies.
6. Advisor to the Academies of Poland, China, Canada and the US on Global Change issues.
7. Scientific Advisory Board for the Institute of Arctic & Alpine Research, University of Colorado (92-95).
8. Selection Panel for the Huntsman Award for Outstanding Achievements in Oceanography (1991-96).
9. Convenor of the IUGS Working Group of Particle Size Characterization (1984-90).
10. Convenor of the INQUA W. G. on High Res. Seismic Stratigraphy of Glacigenic Deposits (1990-96).
11. Advisor to U.S. Dept. of Justice with respect to marine pollution (1992-93).
12. Director, INSTAAR, University of Colorado at Boulder (1995-2007)
13. Co-leader of ONR's project STRATAFORM (Strata Formation on Continental Margins) 35 PIs: (1994-2002)
14. Scientific Advisory Committee and Panel Reviewer for NSF/ONR SCICEX US Nuclear Submarine Science (1996-99).

15. Scientific Advisory Committee for NSF RAISE Land-Shelf Interaction Program (1996-00).
16. Scientific Steering Committee IGBP Land Ocean Interactions in the Coastal Zone 1998 – 2002
17. Scientific Steering Committee for AOSB Arctic Paleo River Discharge (1998-01).
18. Scientific Advisor to IGBP (Global Change) Water Initiative (2000-02)
19. Co-leader of EuroSTRATAFORM with ONR and EC funding 100 PIs: (2002-)
20. Scientific Advisory Committee for NSF Arctic Hydrology Program CHAMPS (2002-03)
21. Scientific Advisory Committee for NSF Margins: Source to Sink Program (2001-02)
22. Co-leader of the Community Surface Dynamic Modeling Initiative (2001-06); Executive Director CSDMS (2007-)
23. Co-leader of the Deltas at Risk GWSP/LOICZ/CSDMS Initiative (2007-)
24. Co-leader of the Sediment Retention in Estuaries SCOR/LOICZ Initiative (2006-08)

## RECOGNITION

### 1. International project leader:

- SAFE: 4 countries (Canada, US, UK, Netherlands); 35 scientists
- IUGS Size Characterization: 20 countries (North America, Western Europe, Asia, Africa and India); 54 scientists
- ADFEX: 5 countries (Can., Norway, France, UK, Poland); 22 scientists
- SEDFLUX: 6 countries (Canada, US, Iceland, China, Denmark, Germany); 40 scientists
- ODP/CCDP Global Change Drilling: 4 countries (Canada, US, UK, Norway), 19 scientists
- STRATAFORM (US, Canada): 35 PIs and 45 Co-Is
- EuroSTRATAFORM (US, Canada, Europe); 100 PIs
- CSDMS (US, Europe): 200 PIs

### 2. Executive member of ad hoc committee on Sedimentology of the International Union of Geological Sciences, 1985-88

### 3. Panel Expert on the International Geosphere/Biosphere Program (IGBP: Global Change):

- US-Canada agreement on Arctic Interactions (foundation of NSF-ARCSYS)
- Royal Society of Canada IGBP Arctic Working Group & Paleoclimate Working Group
- Science Steering Committee IGBP/LOICZ

## PROGRAM PLANNING

Arctic Global Change Workshop, UQAR, Boulder CO, 1987

ARCUS: Arctic Research Consortium of the US, Seattle, WA 1995; Washington, DC, 1996

Circum-Arctic Paleo Environments (CAPE), Copenhagen, DK, 1995

IGOS-WCRP Water Theme Meeting, National Academy of Sciences, Irvine CA, 2001

LOICZ SSC: Netherlands, 1997; Tokyo, 1998, Amsterdam, 1999, Arcachon, Fr, 2000, Bahia Blanca, Arg, 2001, Miami, FL, 2002, Banff, Can, 2003, Singapore 2004, Netherlands, 2005

MOBIL SRC Strategic Meeting, Dallas TX, 1997

NSF Siliciclastics Workshop, Upper Brandon, VA, 1996

NSF Geology/Paleontology Futures Workshop, Boulder, CO, 1999

NSF MARGINS: Source to Sink Workshop, Quinalt WA, 2000, Lake Tahoe NV, 2001, Arlington, 2002, San Francisco, 2007, Orlando, 2008

NSF Community Surface Dynamics Modeling Workshop, Boulder CO, 2002, Arlington, 2003, Minneapolis, 2004, Berkley 2007, Orlando, 2008, Boulder 2008 San Antonio 2008

NSF: Impacts of Arctic bathymetry and fresh water inputs on shelf and ocean circulation, Monterey, CA 1999

NSF: Ocean Drilling Program: COMPLEX, Vancouver, BC, 1999; ODP and Industry, Houston, TX, 1999

NSF: Community Sediment Model for Carbonate Systems, 2008, Golden CO

NSF: Studying Earth Surface Processes with HR Topographic Data, Boulder CO, 2008

NSF: Cyber-Informatics in Earth Systems, DC 2006, Denver, CO 2007, Boulder CO, 2008

ONR Arctic Workshop, Arlington VI, 1984; Woods Hole MA, 1988

ONR Continental Terrace Workshop Stony Brook, NY, 1993

ONR DRI: Environmental Complexity for the operational Navy, Arlie, VA, 2000; APL-Seattle: 2001; ARL-Penn, 2001; UNH-CCOM-2002; Scripps -2002, Arlington-2004;

ONR DRI: Tidal Flats: Ansan Korea, 2006; Honolulu HI, 2007; Incheon Korea, 2007

ONR EUROSTRATAFORM, Arlington VA, 1999, 2000; Paris Fr, 1999; Bologna It, 2000; San Francisco CA, 2000; PASTA & PREMISE: 2001, Arlington; EuroDelta & EuroSTRATAFORM: 2002 Bologna, It, Winchester, UK, 2002, Aix, Fr, 2003, Keystone CO, 2004; Salamanca, 2005; Charlottesville, 2006

ONR Geoclutter Workshop, Arlington, VA, 1999, 2000, 2002; San Francisco 2000; Boulder 2001, 2002;

ONR High Frequency Acoustics Workshop, Golden, CO, 1996

ONR Mine Burial Workshop, Stennis Space Center, MI, 2000; St. Petersburg, 2001; San Diego, 2002, Phoenix, 2002;

ONR STRATAFORM Workshop, Eureka, CA, 1995; Modelers Workshops, San Francisco, Boulder, Minneapolis, Dallas, Durham, Arlington; 1995-2002; Plume Workshop, Arlington, VA, 1996; Shelf Transport Workshop, Woods Hole,

MA, 1996

ONR Submarine Sediment Failure Workshop, College Station TX, 1991  
ONR Submarine Slope Workshop, Arlington, VA, 1994  
NSF-ONR Data Management for Marine Geology and Geophysics, San Diego, 2001  
NOAA, NASA, ESA, IGBP, IHDP, WCRP: International Global Observing System for Hydrology, Orange County, 2001  
SCOR-LOICZ Sediment Retention in Estuaries Working Group: Faro, Portugal, 2004, Texel, Netherlands, 2005  
NSF High Performance Computing Collaboratory in Geosciences, Boulder CO, 2006  
NSF Cyberinformatics in Geosciences, Federal Center, Denver, 2007  
LOICZ/GWSP Executive Planning Meeting for Phase Two cooperation, Yale, New Haven, CN, 2006  
LOICZ/GWSP Deltas at Risk: Planning meeting at U. New Hampshire  
GWSP: Dams and Reservoirs: Planning meeting at U. New Hampshire

### **PRESENTATIONS & ADDRESSES Nat'l - INTL Symposia, Congresses, Conferences, Workshops**

Annual Arctic Workshop, 13th Boulder CO, 1983; 14th Dartmouth NS, 1985; 15th, Boulder CO, 1986; 19th, Boulder CO, 1989; 22nd, Boulder CO, 1992; 23rd, Columbus, OH, 1993; 25th, Quebec City, QU, 1995; 26th, Boulder, CO, 1996; 28<sup>th</sup>, Boulder CO, 1998; 29<sup>th</sup> Seattle, WA, 1999; 30<sup>th</sup> Boulder, CO, 2000, 32<sup>nd</sup> Boulder, CO, 2000, 33<sup>rd</sup> Tromso, Norway, 2003, 34<sup>th</sup> Boulder CO, 2004  
2nd Canadian Workshop of Ocean Drilling Program, Waterloo ON, 1989  
2nd Canadian Geotech. Workshop on Offshore In Situ Techniques, Quebec QU, 1990  
53rd Congress Assoc. of Canadian Francophone Academics, Chicoutimi QU, 1985  
12th International Congress of Quaternary Research, Ottawa ON, 1987  
International Geological Congress, 28<sup>th</sup> Washington DC, 1989, 29<sup>th</sup> Kyoto, Japan, 1992, 32<sup>nd</sup> Florence, Italy 2004  
International Sedimentological Congress, 11<sup>th</sup> Hamilton ON, 1982, 13<sup>th</sup> Nottingham UK, 1990; 17<sup>th</sup> Fukuoka, Japan, 2006  
1st Mid-year SEPM Conference, San Jose CA, 1984  
4th PONAM Workshop, Cambridge UK, 1993.  
American Geophysical Union (AGU) Fall meeting, San Francisco, 1995-2007  
American Geophysical Union (AGU) Spring meeting, New Orleans, 2005  
AGU Chapman Conference, Puerto Rico, 2001  
Antarctic Offshore Acoustic Stratigraphy Symposium, Siena Italy, 1994  
Canadian Hydrology Symposia - 1990, Burlington ON,  
Canadian Quaternary Association: Coastal Glaciomarine Environments, Fredricton NB, 1991  
Canyons Workshop –European Commission: Sitges, Spain 2002  
COLDSEIS Workshop, Halifax, Canada, 1995  
Conference of the Geological Association of Canada, Halifax NS, 1980; Victoria BC, 1983; Toronto ON, 1991; Wolfville NS, 1992; Edmonton, AL, 1993 ; Victoria, BC, 1995  
AAPG/SEPM Conference, Calgary, Canada, 1997; Houston, 2006, Orange County, 2007, San Antonio, 2008  
Geological Society London - Deltas, London UK, 1986  
- Glaciomarine Processes, London UK, 1988  
- Glacier-influenced Sedimentation, Bristol UK, 2001  
Geological Society of America (GSA), Denver, 1996; Philadelphia, 2006  
George Bush 3<sup>rd</sup> China-US Relations: Energy, Security, Environment, DC, 2007,  
ExxonMobil, Huston TX, Margins Source to Sink Short Course, 2002  
International Conf. Abrupt Climate Change in Clastic Sedimentary Environments, Stockholm, Sw, 1998  
International Workshop on Sedimentary Processes and Paleoenvironments in Fjords, Tromso, Norway, 1998.  
International Assoc. of Mathematical Geologists, 3rd Barcelona Spain, 1997; 7<sup>th</sup> Cancun Mexico, 2001  
IUGS-COS Workshop on Particle Characterization, Dartmouth NS, 1986; Heidelberg Germany, 1987  
ICARP: International Conference on Arctic Research Planning, Hanover, NH, 1996  
Land-Ocean Interaction in the Coastal Zone (LOICZ) Noordwijkerhout, Netherlands, 1998; Bahia Blanca, Argentina; 1999; Shonan, Japan, 2000; Archachon, France, 2000; Amsterdam, 2001; Miami 2002  
Quantitative Dynamic Stratigraphy Workshop, Golden CO, 1988  
Quatriemes Entretiens Jacques Cartier re: Hazards, Lyon/Grenoble FRA, 1990  
Québec Quaternary Association Workshop, Rimouski QU, 1988  
Ocean Sciences Meeting (AGU/ASLO/TOS), San Diego, 1996; Honolulu, 2006, Orlando, 2008  
ONR Microstructure Workshop - Stennis Space Centre, Slidell LA, 1988  
ONR STRATAFORM Workshop, San Diego, CA, 1996; San Francisco, CA, 1997; Keystone, CO, 1998; Monterey, CA, 1999  
ONR STRATAFORM Modelers Workshop, Boulder, CO, 1996; Minneapolis, MN, 1997; Dallas, TX, 1998; Durham, NC, 2000; Arlington, 2001  
ONR STRATAFORM Slope Workshop, Arlington, VA, 1995; Monterey, CA, 1997; Boulder, CO, 1999  
Numerical Experiments in Stratigraphy, Lawrence, KS, 1996



Paleoceanography of the North Atlantic Margin, Edinburgh UK, 1995  
 Pierre Beghin Slope Stability Workshop, Grenoble, France, 1993  
 SEPM Fine-grained Sediment Research Workshop, San Jose CA, 1984  
 SEPM-IAS STRATCON 98, Sicily, 1998  
 SEPM-AAPG, Denver, CO, 2001  
 TEXACO workshop on Dynamic Geological Modeling, Houston TX, 1991

**INVITED LECTURES Universities, Institutes, Learned Societies, Academies**

ARCO, Plano, TX	St. Mary's University, Canada
Cambridge University, UK	TEXACO Technology, Dallas
Chinese Geological Academy, Beijing, China	University of Alberta, Canada
Colorado School of Mines, Golden USA	University of Barcelona, Spain
Columbia University, USA	University of Bellingham, USA
Dalhousie University, Canada	University of Bergen, Norway
Delft University of Technology, Netherlands	University of Bergen, Norway
Desert Research Institute, Reno, USA	University of British Columbia, Canada
Duke University, Durham, NC, USA	University of Calgary, Canada
ExxonMobil Technology, Huston, TX	University of Chicago, IL
Geological Society, Edinburgh, UK	University of East Anglia, UK
Geological Survey of Canada Branches: Vancouver, Ottawa, Dartmouth, Calgary, Victoria	University of Glasgow, UK
Institute of Arctic and Alpine Research, Boulder, USA	University of Heidelberg, Germany
Institute Of Hydroengineering, Gdansk, Poland	University of Illinois at Chicago
Institute of Marine Geology (CNR)- Bologna	University of Milwaukee, USA
Institute of Ocean Sciences, Patricia Bay, Canada	University of Nebraska, Lincoln, USA
Institute of Ocean Sciences, Wormley, UK	University of New Hampshire, Durham
Korean Ocean Research Development Institute, Assan 2006	University of Northern Illinois, Dekalb, USA
Korean Polar Research Institute, Incheon 2006	University of Oslo, Norway
Lakehead University, Canada	University of Québec at Montreal, Canada
Lamont-Doherty Geological Observatory, USA	University of Québec at Rimouski, Canada
Laval University, Canada	University of Stockholm, Sweeden
McGill University, Canada	University of Texas, Austin, USA
MOBIL Technology Center, Dallas	University of Toronto, Canada
Mount Sinai Medical Center, New York, USA	University of Tromsø, Norway
Polish Geological Academy, Krakow, Poland	University of Virginia, Charlottesville, USA
SAGA Petroleum, Oslo, Norway	University of Wyoming, Laramie, USA
Scipps Oceanographic Institute, La Jolla CA	Woods Hole Oceanographic Institute, USA
Simon Fraser, University, Canada	Yale, New Haven, USA

<b>PUBLICATION STATISTICS</b>	
Peer-reviewed Government Reports	56
Peer-reviewed Journal Publications & Books (includes in press).	175
Peer-reviewed Conference Proceedings	41
Journal Book Reviews	11
Published Conference Abstracts	202
Unpublished & Limited-Distribution Manuscripts	9
Manuscripts in preparation or review	<u>9</u>
<b>TOTAL</b>	<b>503</b>

Last update June 2008

These papers are listed chronologically in the next section

**FJORD RESEARCH**

My first love in environmental research was to explore the dynamics of fjords: biology, hydrology, physical oceanography, biogeochemistry, glaciology, sedimentology and stratigraphy. I considered fjords simple enough to be employed as giant experimental systems from which fundamental theorems could be developed. My fjord research began in 1975, at the University of British Columbia, where I later obtained my Doctorate in 1978. The cumulative effort led to 35 published papers (1-4 are best cited papers), a special issue of a journal (5), a major multidisciplinary text (6), and a number

of review articles (7). Fundamentals of river plumes, turbidity currents, sediment failure, flocculation dynamics, carbon sequestration, ice age processes were advanced (8, 9). The scholarly text (6) was well received (e.g. “*simply outstanding in breadth and depth*” Science, 1988). In 1998 in Tromsø Norway, I offered as the keynote address a 25-yr retrospective on fjord research.

1. Syvitski, J.P.M. 1989. On the deposition of sediment within glacier-influenced fjords: Oceanographic controls. Marine Geology, 85: 301-329.
2. Syvitski, J.P.M. and Farrow, G.E., 1989. Fjord sedimentation as an analogue for small hydrocarbon-bearing submarine fans. In: M.K.G. Whateley & K.T. Pickering (eds.) Deltas: Sites and Traps for Fossil Fuels. Geological Society of London Special Publication No. 41: 21-43.
3. Syvitski, J.P.M., Andrews, J.T., and Dowdeswell, J.A. 1996. Sediment deposition in an iceberg-dominated glacial marine environment, East Greenland: basin fill implications. Global and Planetary Change: 12: 251-270.
4. Syvitski, J.P.M. and Schafer, C.T. 1996. Evidence for an earthquake-triggered basin collapse in Saguenay Fjord, Canada. Sedimentary Geology, 104: 127-153.
5. Syvitski, J.P.M. & Skei J.M. (eds.) 1983. Sedimentology of Fjords. Sedimentary Geology, 36, Elsevier, 285 pp.
6. Syvitski, J.P.M., Burrell, D.C. & Skei, J.M. 1987 Fjords: Processes & Products. Springer-Verlag, N.Y. 379 pp.
7. Syvitski, J.P.M. and Shaw, J. 1995. Sedimentology and Geomorphology of Fjords. Edited by G.M.E. Perillo, Geomorphology and Sedimentology of Estuaries, Elsevier Publ., p. 113-178.
8. Syvitski, J.P.M. and Hein, F.J. 1991. Sedimentology of an arctic basin: Itirbilung Fiord, Baffin Island, Canada. Geological Survey of Canada Professional Paper 91-11, 67 pp.
9. Syvitski, J.P.M., LeBlanc, K.W.G. and Cranston, R.E. 1990. The flux and preservation of organic carbon in Baffin Island fjords. In: J.A. Dowdeswell and J.D. Scourse (eds.) Glaciomarine Environments: Processes and Sediments. Geological Society, London, Spec. Publ. 53: 217-239.

## **SEDIMENT DELIVERY BY RIVERS**

The coastal zone is the energy filter between land and sea. A fundamental problem was to predict the sediment delivery rate by World Rivers (1), since very few of them were monitored. Twenty-five papers were published on this hydrological topic, including review papers (2), and a special journal issue (3). One of Geosciences most quoted papers was with colleague John Milliman (4), and led to insight into the long-term fluvial fluxes could be predicted (1, 5). With other colleagues, more advanced methods were developed for predicting fluxes across shorter (dynamic) time scales (6-8) and subsequently applied to ice-age (9), global warming scenarios (10), and the impact of humans (11-13).

1. Syvitski, J.P.M., Peckham, S.D., Hilberman, R.D., and Mulder, T. 2003. Predicting the terrestrial flux of sediment to the global ocean: A planetary perspective. Sedimentary Geology, 162: 5-24.
2. Wang Y., Ren, M.-e and Syvitski, J.P.M. 1998. Sediment Transport and Terrigenous Fluxes. In: K.H. Brink & A.R. Robinson (editors) The Sea: Volume 10 - The Global Coastal Ocean: Processes and Methods. John Wiley & Sons, New York, p. 253-292.
3. Syvitski, J.P.M., (Ed.) 2003. The supply and flux of sediment along hydrological pathways: Anthropogenic influences at the global scale. Global and Planetary Change. 39 (1/2): 1-199
4. Milliman, J.D. and Syvitski, J.P.M. 1992. Geomorphic/tectonic control of sediment discharge to the ocean: The importance of small mountainous rivers. Journal of Geology 100: 525-544.
5. Mulder, T. and Syvitski J.P.M. 1996. Climatic and morphologic relationships of rivers. Implications of sea level fluctuations on river loads. Jour. of Geology 104: 509-523.
6. Syvitski, J.P. and Morehead, M.D., 1999. Estimating river-sediment discharge to the ocean: application to the Eel Margin, northern California. Marine Geology, 154: 13-28.
7. Syvitski, J.P.M., Morehead, M.D., Bahr, D., and Mulder, T., 2000. Estimating fluvial sediment transport: the Rating Parameters. Water Resource Research, 36: 2747-2760.
8. Morehead, M.D., Syvitski, J.P.M., Hutton, E.W.H., and Peckham, S.D. 2003. Modeling the inter-annual and intra-annual variability in the flux of sediment in ungauged river basins. Global and Planetary Change. 39 (1/2): 95-110.
9. Andrews, J.T. and Syvitski, J.P.M. 1994. Sediment fluxes along high latitude glaciated continental margins: Northeast Canada and Eastern Greenland. In: W. Hay (ed.) Global Sedimentary Geofluxes. National Academy of Sciences Press, Washington, Ch. 7: p. 99-115.
10. Syvitski, J.P.M. 2002, Sediment Transport Variability in Arctic Rivers: Implications for a Warmer Future. Polar Research, 21(2): 323-330.
11. Syvitski, J.P.M., Vörösmarty C, Kettner A.J., Green, P. 2005, Impact of humans on the flux of terrestrial sediment

- to the global coastal ocean. Science, 308: 376-380.
12. Restrepo, J. D., Syvitski, J.P.M., 2006, Assessing the effect of natural controls and land use change on sediment yield in a major Andean river: The Magdalena drainage basin, Colombia. Ambio, 35, 65-74.
  13. Syvitski, J.P.M. and Milliman, J.D., 2007, Geology, geography and humans battle for dominance over the delivery of sediment to the coastal ocean. J. Geology, 115: 1-19.

## SUSPENDED PARTICLE DYNAMICS

From early graduate times, I have led an effort to understand how river sediment clumps together once it reaches the marine environment (1-4). The work led to pioneering understanding of sedimentation beneath river plumes through the complexities of flocculation. Later, by determining the *in situ* behavior of marine suspended particles using underwater photography (5), settle velocity, size, concentration and density of individual particles was determined leading to new theories on sedimentation (6-10).

1. Syvitski, J.P.M. and Murray, J.W. 1981. Particle interaction in fjord-suspended sediment. Marine Geology, 39: 215-242.
2. Syvitski, J.P.M., Asprey, K.W., Clattenburg, D.A. and Hodge, G.D. 1985. The prodelta environment of a fjord: suspended particle dynamics. Sedimentology, 32: 40-65.
3. Syvitski, J.P.M. 1991. The changing microfabric of suspended particulate matter - the fluvial to marine transition: flocculation, agglomeration and pelletization. In: R.H. Bennett, W.R. Bryant and M.H. Hulbert (eds.) The Microstructure of Fine-grained Sediment - from Muds to Shale. Frontiers in Sedimentary Geology, Springer-Verlag, New York: 131-137.
4. Syvitski, J.P.M., and Lewis, A.G. 1992. The seasonal distribution of suspended particles, and their iron and manganese loading, in a glacial runoff fjord Geoscience Canada 19(1): 13-20.
5. Syvitski, J.P.M. and Hutton, E.W.H. 1996. *In situ* characteristics of suspended particles as determined by the Flocc Camera Assembly FCA. Journal of Sea Research 36: 1-12.
6. Syvitski, J.P.M., Asprey, K.W. and LeBlanc, K.W.G. 1995. In-situ characteristics of particles settling within a deep-water estuary. Deep-Sea Research II 42(1): 223-256.
7. Syvitski, J.P.M. and Hutton, E.W.H., 1997. FLOC: Image analysis of marine suspended particles. Computers and Geoscience, 23(9): 967-974.
8. Hill, P.; J.P. Syvitski, R.D. Powell, E.A. Cowan. 1998. Flocc settling velocities under a buoyant discharge plume in Glacier Bay, Alaska. Marine Geology, 145 (1-2): p. 85-94.
9. Azetsu-Scott, K., and Syvitski, J.P.M. 1999. How melting icebergs influence particle distribution in the water column. Journal of Geophysical Research, 104: 5321-5328.
10. Curran, K.J., Hill, P.S., Milligan, T.G., Cowan, E.A., Syvitski, J.P.M., and Konings, S.M. 2004. Fine-grained sediment packaging below the Hubbard Glacier meltwater plume, Disenchantment Bay, Alaska. Marine Geology. 203: 83-94.

## DELTAS and PRODELTAS

I began with an early appreciation for how deltas result from both autocyclic responses and allocyclic forces (1), as do their prodelta environments (2). The behavior of river plumes play the all important crucial role in sediment dispersal (3-5). The number, dimensions and shapes of distributary channels became a more recent focus (6-8), with the redefining of the ternary diagram of waves, tides, and river power that earlier textbooks had as their paradigm for understanding the morphodynamics of deltas, and how our understanding has been biased by the strong impact of humans (9-11)

1. Syvitski, J.P.M. and Farrow, G.E. 1983. Structures and processes in bayhead deltas: Knight and Bute Inlet, British Columbia. Sedimentary Geology, 36: 217-244.
2. Syvitski, J.P.M., Smith, J.N., Boudreau, B. and Calabrese, E.A. 1988. Basin sedimentation and the growth of prograding deltas. Journal of Geophysical Research, 93: 6895-6908.
3. Morehead, M.D., and Syvitski, J.P., 1999. River Plume Sedimentation Modeling for Sequence Stratigraphy: Application to the Eel Shelf, California. Marine Geology 154:29-41.
4. Syvitski, J.P.M., Kettner, A., in press, On the flux of water and sediment into the Northern Adriatic. Continental Shelf Research
5. Trincardi, F., and Syvitski, J.P.M. (Eds.) 2005, Mediterranean prodelta systems. Marine Geology Special Issue, vol. 222-223: 520 pp.
6. Overeem, I., Syvitski, J.P.M., and Hutton, E.W.H., 2005, Three-dimensional numerical modeling of deltas. In: L.

Giosan and J.P. Bhattacharya (Eds.) River Deltas — Concepts, Models, and Examples. SEPM Special Publication No. 83, pp. 13-30.

7. Syvitski, J.P.M., Kettner, A.J., Correggiari, A., Nelson, B.W. 2005, Distributary channels and their impact on sediment dispersal. Marine Geology 222-223: 75-94.
8. Syvitski, J.P.M., 2005, The morphodynamics of deltas and their distributary channels. In: G. Parker and M. Garcia (Eds.) River, Coastal and Estuarine Morphodynamics, Taylor and Francis Group, London, pp. 143-160.
9. Syvitski, J.P.M., Saito, Y. 2007, Morphodynamics of Deltas under the Influence of Humans. Global and Planetary Changes. 57: 261-182.
10. Syvitski, J.P.M., Harvey, N., Wollanski, E., Burnett, W.C., Perillo, G.M.E., and Gornitz, V. 2005. Dynamics of the Coastal Zone. In: C. J. Crossland, H.H. Kremer, H.J. Lindeboom, J.I. Marshall Crossland, M.D.A. Le Tissier (Eds.) Global Fluxes in the Anthropocene. Springer, Berlin, pp. 39-94.
11. Syvitski, J.P.M., 2008. Deltas at Risk. Sustainability Science, 3: 23-32.

## **GLACIAL & PARAGLACIAL SEDIMENTATION and STRATIGRAPHY**

Likely the largest body of literature I have written (i.e. > 60 papers, books, map series) is on the imprint of former ice sheets as they advanced and retreated across world continental margins. The body of work redefined paradigms of ice marginal sedimentation through a mass balance approach using very-high resolution geophysical data (1-4). Through efforts at leading the COLDSEIS INQUA Working Group (5) an acoustic atlas edited by Davies, T.W. et al., (Chapman & Hall, London), was dedicated to me. The 82 pg review (Ballantyne, C. 2002, QSR) states: “no other aspect of paraglacial geomorphology has advanced so far, so fast or so fruitfully, largely through the compelling advocacy of D.L. Forbes, J.P.M. Syvitski and their research collaborators.” (e.g. 6). Field work has ranged from the Maritimes (7), through Baffin Island (8) to Iceland (9-10).

1. Syvitski, J.P.M. and Praeg, D.B. 1989. Quaternary sedimentation in the St. Lawrence Estuary and adjoining areas. An overview based on high-resolution seismo-stratigraphy. Géog. physique et Quaternaire, 43(3): 291-310.
2. Syvitski, J.P.M. 1991. Towards an understanding of sediment deposition on glaciated continental shelves: sequence stratigraphy. Continental Shelf Research 11: 897-937
3. Syvitski, J.P.M. 1993. Glacimarine environments in Canada: An overview. Canadian Journal of Earth Sciences 30: 354-371.
4. Syvitski, J.P., Stoker, M., and Cooper, A. K. (Editors) 1997. COLDSEIS: Seismic Facies of Glacigenic Deposits. Marine Geology 143 (1/4): 262 p.
5. Syvitski, J.P.M. Lewis, C.F.M., and Piper, D.J.W. 1996. Paleooceanographic information derived from acoustic surveys of glaciated continental margins: examples from eastern Canada. In: J.T. Andrews, W.E.N. Austin, H. Bergsten, and A.E. Jennings (eds.) Late Quaternary Palaeoceanography of the North Atlantic Margins, Geological Society Special Publication No. 111, pp. 51-76.
6. Forbes, D. and Syvitski, J.P.M., 1995. Paraglacial Coasts. In C. Woodruffe and R.W.G. Carter (eds.) Coastal Evolution. Cambridge University of Press, Cambridge, UK. Chapter 10: p. 373-424.
7. Syvitski, J.P. and Lee, H.J. 1997. Sequence stratigraphy of Lake Melville, Labrador, during ice-sheet retreat since 10,000 years BP. Marine Geology. 143:55-80.
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## **SIMULATION OF SEDIMENT TRANSPORT AND STRATIGRAPHY**

Over the last half of my career, I have combined my understanding of transport physics with numerical skills to develop a suite of computer models. The models are used to: (i) predict discharge and sediment flux from ungauged rivers, (ii) investigate the impact of climate on the architecture of river deltas, and (iii) show how multiple transport pathway affect the long term fill of sedimentary basins under complex sea level fluctuations. The models are being applied to understand the seafloor environment for the U.S. Navy, and to aid in the characterization of petroleum reservoirs. The effort forms my second largest body of literature (>50 papers and books). The INSTAAR models was recently highlighted in the review by Chris Paola (Sedimentology, 2000), where it was stated that the developing INSTAAR models “would be to sedimentary

geology what global climate models are to atmospheric science”. A few are listed below.

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12. Syvitski, J.P.M., Pratson, L.F., Wiberg, P.L., Steckler, M.S., Garcia, M.H., Geyer, W.R., Harris, C.K., Hutton, E.W.H., Imran, J., Lee, H.J., Morehead, M.D., and Parker, G., 2007. Prediction of margin stratigraphy. In: C.A. Nittrouer, J.A. Austin, M.E. Field, J.H. Kravitz, J.P.M. Syvitski, and P.L. Wiberg (Eds.) Continental-Margin Sedimentation: From Sediment Transport to Sequence Stratigraphy. IAS Spec. Publ. No. 37: 459-530.

## CONTINENTAL MARGIN SEDIMENTATION

Andrew Miall in his 1995 review “Whither Stratigraphy” (Sedimentary Geology) states that three revolutions in sedimentary geology have taken place: (i) plate tectonics, (ii) process-response sedimentary models, and (iii) sequence stratigraphy. While my contribution to ii (see above) is undeniable, it is only recently that my application of these models to understanding the formation of continental margins has taken place. I have led field efforts to understand how the sediment dispersal patterns on continental slopes (e.g. 1), how rare events combine with ambient processes (2,3), and how models can be used to calibrate sea level curves (4). By characterizing global data on margin morphology (5) with experimental data (6), new understandings on defining processes have been established (7-11).

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## HYPERPYCNAL FLOWS

Work that I have done with colleague Thierry Mulder (former post-doc) and others has revolutionized our understanding of when rivers discharging to the ocean carry so much sediment that they generate currents that can transport sediment long distances into the ocean, bypassing the continental shelf environment.

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## SEDIMENT-ANIMAL INTERACTIONS

I have always been fascinated on the interactions between biology and geology. This interest has led to research on the impact and response of zooplankton to the ingestion of suspended sediment (e.g. 1-5), how large sea mammals resuspend seafloor sediment in deep arctic environments (6), the role corals play in moving large boulders through their current drag (7), and how benthos adapt to turbid river mouths and tidewater glaciers (e.g. 8-10).

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### GRAIN SIZE ANALYSIS

While not glamorous, developmental work for the International Union of Geological Sciences, led to the standardization of analytical techniques in sediment laboratories. This effort was built on my experience in running arguably the largest and most advanced sediment lab in the world while working for the Geological Survey of Canada. The work below is a subset of that effort. "*The [Syvitski] book provides fundamental and detailed practical information to any scientist, who wants to apply sediment particle characterization ... we now have a comprehensive and balanced synthesis of this broad theme*" Earth Science Reviews. The book is now in its 3<sup>rd</sup> edition (2007).

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### MAPS

While maps are not the modern method of disseminating field data, which now utilizes GIS techniques, the production of maps from early field efforts remains the foundation of our earth system knowledge. Below are examples of map series produced while employed at the Geological Survey of Canada.

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**Statistical Applications in the Earth Sciences.** 1989. Geol. Survey Canada  
**Deltas: Sites and Traps for Fossil Fuels.** 1989. Geol. Society, London  
**Quantitative Dynamic Stratigraphy.** 1989. Prentice-Hall  
**Geology of Canada,** 1990. Geol. Soc. America  
**Glaciomarine Environments: Processes and Sediments.** 1990. Geol. Society, London  
**The Microstructure of Fine-grained Sediment - from Muds to Shale.** 1991. Springer-Verlag  
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**Coastal Evolution.** 1995. Cambridge University of Press  
**Geomorphology and Sedimentology of Estuaries.** 1995. Elsevier  
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**Glaciated Continental Margins: An Atlas of Acoustical Images.** 1997. Chapman & Hall  
**The Sea: V. 10 - The Global Coastal Ocean: Processes and Methods.** 1998. John Wiley & Sons  
**Geological Processes on Continental Margins: Sedimentation, Mass Wasting and Stability.** 1998. Geol. Society, London  
**Numerical Experiments in Stratigraphy: Recent Advances in Stratigraphic and Computer Simulations.** 1999. SEPM spec. publ.  
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**Published comments on the 1987 Fjord book**

*“useful for a wide variety of scientific specialists...well written, logically constructed and clearly presented”*  
Sedimentology

*“coverage of the subject matter is extensive...a commendable effort”* Chemical Geology

*“the breadth of well-presented material on each of these aspects of the fjord environment is impressive...one of the most thorough and well-integrated books on a specific earth science topic”* Journal of Quaternary Science

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*“an important contribution to our general knowledge of fjords and the various processes interacting in the fjord environment...of great use to many people, especially environmental scientists, research professionals, and advanced students in the earth sciences, as well as the oceanographic community”* Jour. of Sedimentary Petrology

*“the authors should be congratulated on a work of such scholarship”* Earth Science Reviews

*“a well-structured, clearly written and comprehensive text...it is a pleasure”* Geological Magazine

*“sound and attractive”* Indian Jour. of Earth Sciences

*“the excellent work fully accomplishes the expectations, and it can be recommended to all scientists interested in this field”* Internationale Revue der gesamten Hydrobiologie

*“beautiful”* ESRISAT

*“ce livre est un ouvrage de reference indispensable non seulement pour des etudiants avances mais encore pour tout chercheur des sciences de la terre et de l’oceanographie se preoccupant de cette interface continent glacie/ocean”* Annales de la Societe geologique de Belgique

*“a comprehensive monograph that is carefully thoughtout and presented...a must for any scientist in fjords...highly recommend”* Bulletin of Canadian Petroleum Geology

*“the Environmental Problems: Case Histories presented in the implications/applications section have provided ... an excellent source of teaching examples”* Journal of Coastal Research

*“A book for which many scientists have been waiting”* American Scientist

*“welcomed by coastal geomorpholgists, oceanographers and Pleistocene climatologists ... suburb summary ... a bibliography goldmine”* Geo journal

**Some published comments on the 1991 Grain Size book**

*“The volume is a must for every worker or institution spending time with particle-size analysis”*  
AAPG Bulletin

*“The book provides fundamental and detailed practical information to any scientist, who wands to apply sediment particle characterization ... we now have a comprehensive and balanced synthesis of this broad theme”*  
Earth Science Reviews

*“This book is a must to own for all who are involved in the field”* Basin Research

## Collaborators on large projects

### ADFEX

Environment Canada CCIW – Hamblin  
UBC -LeBlond,  
MUN -Hay,  
CEMAGREF - Brugnot, Beghin  
GSC Terrain Science - Dave Sharp  
Petrobras – Rorigues  
USGS Menlo - Lee

Norwegian Geotechnical Institute - Norem, Karlsrud  
Laval -Locat, Konrad  
U Calgary -Hein  
INRS-Océanologie - Long  
Polish Inst. Hydroengineering - Sawicki  
UAlberta -Robertson

### SAFE

UAlberta -Hein, Longstaffe, Sego, Reasoner,  
Laval -Locat, Masson  
Canadian Hydrography -Rodgers, Lamplugh  
Short  
UEast Anglia- Boulton  
UGlasgow-Farrow  
Simon FraserU-Albright, Stroh  
UNetherlands -van der Meer, Cameraat  
C-CORE - Emory-Moore

Environment Canada, NHRI  
MUN -Hay, Foley, Colbourne, Gardner, Macko, Pulchan, Ivy  
INSTAAR-Stravers, Andrews, Jennings, Osterman, Williams,  
Royal Roads Military College-Mothersill, Tabrez  
QueensU-Gilbert, Dale, Aitken, McKenna-Neuman, Horvath  
US. ONR -Kravitz  
DFO-Smith, Ellis, Trites, Petrie  
Scottish Biol. Station - Atkinson, Moore

### SEDFLUX

McGill -D' Anglejan  
UQAM -Occhiatti,  
Dalhousie –Gibling  
Environment Canada CCIW -Hamblin, Coakley  
UCalgary -Hein,  
INSTAAR – Andrews  
GSC-PGC – Luternauer  
QueensU – Gilbert  
WHOI - Milliman

UQAR -Hill  
NIU -Stravers, Powell  
MUN -Hay, Aksu  
Water survey of Canada - Day  
ULaval - Chagnon, Locat, Frenette  
INRS-Océanologie - Long  
GSC -TS - Dredge  
COGLA - Hale

### CANAM-PONAM

Geomar – Meinert  
Danish Geological Survey –Larsen  
Scott Polar Research Institute – Dowdeswell  
W&M VIMS –Milliman  
UOslo -Elverhoi

British Geological Survey -Stoker,  
Icelandic Marine Institute - Thors  
Norwegian Polar Institute - Solheim  
INSTAAR -Andrews, Jennings, Williams

### COLDSEIS

U. Bergen – Aarseth  
Rice U – Anderson  
RutgersU - Ashley  
USGS - Barnes, Carlson, Cooper, Hampton, Molnia  
Victoria U Wellington - Barrett, Henrys  
U Edinburgh - Boulton, Praeg  
Hamilton College – Domack  
U Oslo Elverhoi  
Norsk Polar Institute - Forsberg, Solheim  
QueensU – Gilbert  
BGS - Holmes, Stoker, Wingfield

Penn. State - Alley  
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Scott Polar Research Institute - Dowdeswell  
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UToronto - Gipp  
Liverpool Polytechnic - Hambrey  
ONR - Kravitz

University of Wales – Kidd  
British Antarctic Survey – Larter  
UNew Brunswick - Mayer  
Uillinois at Chicago Circle - Philips, Smith  
Hi-Res Geoservice – Stewart  
UAberystwyth- Whittington

Geological Survey of Denmark - Larsen  
UConnecticut - Lewis  
GEOMAR - Meinert  
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### **Reservoir (HydroCarbon) MODELLING**

Marathon Oil - Ross, Watts  
Texaco Oil - Matthews, Perlmuetter;  
Mobil Oil – Sarg, Gouvies, Deutsch, Cullick  
ExxonMobil — Jones, Gosslin, Sarg, Patterson, Sun

### **STRATAFORM**

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Swift	Old Dominion U.	Lee, Gardner, Field	USGS-Menlo Park
Borgeld	Humboldt U.	Irish, Lynch, Driscoll, Traykovski, Geyer	WHOI
Locat	Laval U.	Mayer	U. New Hampshire
Garcia	U. Illinois-Urbana Champagne	Steckler, Mountain	Lamont-Doherty EO
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