

Ayal Anis

Department of Marine Sciences (MARS)

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Texas A&M University at Galveston, 200 Seawolf Parkway, Galveston, TX 77553

EDUCATION

Ph.D., Oceanography, Oregon State University, Corvallis, Oregon, 1994

M.S., Applied Physics, The Hebrew University of Jerusalem, Israel, 1984

B.Sc., Physics, Tel-Aviv University, Israel, 1982

EXPERIENCE

2007- present Associate Professor, Marine Sciences, Oceanography,, Texas A&M University at Galveston

2000-2006 Assist. Professor, Marine Sciences & Oceanography, Texas A&M University at Galveston

1998-1999 Research Associate, Dept. of Oceanography, Dalhousie University, Canada

1994-1998 Research Scientist, Israel Oceanographic & Limnological Research

1987-1994 Graduate Research Assistant, College of Oceanic and Atmospheric Sciences, Oregon State University, Corvallis, OR

1984-1987 Physicist, R&D microelectronic devices, EL-OP, Israel

RESEARCH

Funded Grants (present and last 6 years)

06/2016 - 03/2020 Co-PI (Rainer Amon, PI), "Estimating fluxes of CO₂ and CH₄ along the Siberian Yensei River", funding \$49,457 (\$13,996) from NSF-Rapid.

04/2015 - 03/2020 Co-PI (Rainer Amon, PI), "Hydrocarbon Fund: Study of oceanography and evaluation of oil spill scenarios", funding \$985,883 (\$394,353) from CONACYT-SENER-HIDROCARBUROS.

08/2014 -07/2017 Co-Pi (J. Kaihatu – TAMU PI, V. Panchang – TAMU Qatar Co-PI), "Multi-Scale Modeling of Hydrodynamics in the Arabian Gulf", funding \$848,000 (\$126,000) from Qatar National Research Fund.

08/2014-07/2015 Co-PI (Rainer Amon, PI), "Dissolved Oxygen measusrements", funding \$51,000 (\$7,500) from Cameron (Industry).

01/2013-12/2015 PI, "Mixing Induced by Winter Shamals in the Northwestern Arabian Gulf", funding \$65,000 from Kuwait Foundation for the Advancement of Science.

01/2013-06/2014 US-Pi (L. Ladah, CICESE, Mexican PI), "Nearshore physical processes,

contamination, and macroalgae and invertebrate communities in a threatened bay in Baja California, Mexico”, funding \$24,000 (\$12,000) from TAMU-CONACyT.

- 10/2012-01/2014 US-Pi (A. Filonov, UDG, Mexican PI), “Hydrodynamics and Ecology of a High-Altitude Tropical Crater-Lake Ecosystem”, funding \$24,000 (\$17,000) from TAMU-CONACyT.
- 10/2007 – 09/2012 US-Pi (Z. Rosentraub, IOLR, Israeli PI), “Wintertime cross shelf circulation and mixing on the central Israeli shelf”, funding \$186,000 (\$120,000) from US – Israel Binational Science Foundation.
- 09/2010-08/2012 Pi (R. Amon and R. Brinkmeyer Co-PIs) “Acquisition of an Autonomous Underwater Glider to investigate mixing and dispersion of oil-gas mixtures”, funding \$250,000 from the National Science Foundation.
- 09/2008-02/2011 US-Pi (A. Filonov, UDG, Mexican PI) “Fluxes and Transport Mechanisms on Continental Shelves”, funding \$24,000 (\$16,000) from TAMU-CONACyT.
- 10/2008-11/2011 Co-PI (S. Ray PI, A. Quigg Co-PI), “Swan Lake: Pilot Study Site Utilizing Processed Industrial Wastewater to Manage Salinity in Lower Galveston Bay”, funding \$166,535 (\$61,000) from Texas General Land Office.

Field Research (present and last 6 years)

In the wake of the BP oil spill our lab has received NSF funding in late 2010 to acquire a state-of-the-art Webb Research Slocum G2 ocean glider equipped with a suite of physical and biochemical sensors. The glider was received in 2011 and a graduate student, a TAMUG faculty member, and a marine engineer at TAMU Oceanography were trained at the company's facilities in the operation of the glider. A couple of test deployments have been made in 2012 and 2014, and research deployments are planned during summer during 2016 and 2017 as part of TAMUG's role in the recently funded CONACYT-SENER-HIDROCARBUROS project.

Jul-Aug. 2016 – Preparation of scientific instrumentation that were used during a field experiment in Siberia by my graduate student to collect physical and meteorological data as a part of an NSF funded study (PI Amon). The data collected will serve as an initial step toward elucidating the role of near-surface turbulence in controlling air-sea gas fluxes as well as serve as a pilot for a larger follow-up project

Jan., Apr., and Oct. 2013; Jan. and Apr. 2014 - Led field experiments in the northern Arabian Gulf, off Kuwait. Long-term Oceanographic moorings and meteorological stations were deployed/retrieved. Participants: Anis, two scientists and a marine technician from the Kuwait Institute for Scientific Research, and a TAMU OCNG graduate student supervised by Anis.

Jun. 2013 - Led field experiment in Bahia La Paz, Baja California Sur, Mexico. Oceanographic moorings and a meteorological station were deployed and a large number of turbulence profiles were taken simultaneously from a hired dive vessel. Participants: Anis, two TAMU OCNG graduate students and a TAMUG honor undergrad student supervised by Anis.

Aug. 2012 - Field experiment in a crater lake (Santa Maria del Oro) in Mexico. Oceanographic moorings and a meteorological station were deployed and a large number of turbulence profiles were taken simultaneously from a hired small boat. Participants: Anis, two TAMU OCNG graduate students supervised by Anis,

Mexican scientist and three Mexican graduate students.

May, 2010 - Led field experiment on the Mexican Pacific shelf. Oceanographic moorings and a meteorological station were deployed and a large number of turbulence profiles were taken simultaneously from a hired small boat. Participants: Anis, TAMU OCNG graduate students supervised by Anis, Mexican scientist and a Mexican graduate student.

Dec. 2009, Mar. 2010, Field experiment in the Eastern Mediterranean. Current meters and a meteorological station were deployed on the shelf. Participants: Anis and Israeli scientists.

Jan 2009, Chief scientist on 2 cruises of 4 days each in the Eastern Mediterranean on the R/V Shikmona to collect turbulence profiles. Participants: Anis, Israeli scientist colleague, nine Israeli marine sciences undergrad and grad students.

Conferences and Presentations (present and last 6 years)

*Li Dapeng, and **A. Anis**, 2016. "Numerical Simulations of Turbulence Mixing in the Northern Arabian". AGU Fall Mtg., Dec. 2016, #187715.

*Molodtsov S., **A. Anis**, Irina Marinov, and Anna Cabre, 2016. "Decay of deep water convection in CMIP5 GCMs in the North Atlantic and Southern Ocean in the 21st century". AGU Fall Mtg., Dec. 2016.

A. Anis, and *Al Senafi F., 2016. Solar Radiation in the Northern Arabian Gulf – Evaluation of Remotely Sensed Data vs Observations from an Island Station". Oc. Sci., Feb. 2016, Final Paper Number: A34A-2631.

*Molodtsov S., **A. Anis**, and T. M. Iliffe, 2016. "Tidally induced turbulence in the Bermuda underwater cave system". Oc. Sci., Feb. 2016, Final Paper Number: PO34C-3080.

Wonhyun L. *Dapeng L., Kaihatu J. M., and **A. Anis**, 2016. "Modeling salinity changes in the Persian Gulf. Oc. Sci., Feb. 2016, Final Paper Number: PO44E-3202

Wonhyun L. *Dapeng L., Kaihatu J. M., and **A. Anis**, 2016. "Effects of Desalination on Processes in the Persian Gulf: A Modeling Study. 35th ICCE Conference, Istanbul, Turkey. Originally scheduled for 17-22 Jul. but postponed due to the political situation.

Anis A., and Tanuspong Pokavanich, 2014. Characterization of Principal Tidal Constituents in the Northern Arabian (Persian) Gulf. AGU Abstract ID and Title: 12657: Final Paper Number: OS51A-0953

*Al Senafi F., and **A. Anis**, 2014. Shamals and climate variability in the Northern Arabian/Persian Gulf from 1973 to 2012. AGU Abstract ID and Title: 3160: Final Paper Number: OS51A-0948.

*Al Senafi F., and **A. Anis**, 2014. Mixing induced by winter Shamals in the Northwestern Arabian Gulf, Jan. 2014., Invited seminar at the Kuwait Coast Guard base, Jan. 2014.

*Adhhikari A., and **A. Anis**, 2013. Hydrodynamic characterization of the Veracruz continental shelf". Poster at Oceanography Retreat (Oct 2013 and at the Texas A&M University System 11th Annual Pathways Student Research Symposium (Nov 2013).

*Al Senafi F., and **A. Anis**, 2013. Shamals and Climate Variability in the Northern Arabian Gulf 1973-2012, presentation at Kuwait Institute Scientific Research, Kuwait (Oct 2013) and at Kuwait Graduate Student Conference, San Diego (Nov 2013)

*Pettijohn B., and **A. Anis**, 2013. Turbulence Mixing and Transport Mechanisms in a

Coastal Ecosystem, Baja California Sur, Mexico. Poster at the Texas A&M University System 11th Annual Pathways Student Research Symposium (Nov 2013) and Student Research Symposium, TAMUG, 2014.

*Adhikari A., J. Nienow, **A. Anis**, 2012. A re-assessment of the diatom communities in perdido bay and pensacola bay in response to the deepwater horizon oil spill. TAMUS student research symposium, 2012.

*Al Senafi F., and **A. Anis**, 2012. Model aided study of wind forced events in the northern Arabian Gulf, F. Al Senafi and A. Anis. Poster, TAMUS student research symposium, 2012.

A. Anis, 2011. Invited speaker at seminar series of the Oceanography Dept., Ocean University China – Oct., 2011

A. Anis, A. Filonov and I. Tereschenko, 2011. Fluxes and Transport on Continental Shelves Mar. 2011, Texas A&M and CONACYT Collaborative Research Grant Program Research Symposium.

Rosentraub Z., **A. Anis**, and Ron Goldman, 2011. Wintertime cross shelf and down slope transport processes off the central Israeli coast, EGU 2011 conference.

*Zhang Z., and **A. Anis**, 2011. Bottom boundary layer processes on gently sloping coasts. Poster, TAMUG student research symposium, April 2011.

*Al Senafi F., and **A. Anis**, 2011. Effects of Solar Radiation Absorption on the Thermal Structure in Lake, Poster, TAMUG student research symposium, April 2011.

Rosentraub Z., **A. Anis**, and R. Goldman, 2010. Wintertime cross-shelf circulation and shelf/slope interaction off the central Israeli coast. The 39th CIESM Congress, Venice, 10-14 May 2010

*Zhang Z., and **A. Anis**, 2010. Bottom boundary layer processes on the TX-LA coast. TAMUG student research symposium, April 2010.

Submitted Publications

David Salas-Monreal, **A. Anis**, and David Alberto Salas-de-Leon, 2016. Tidally formed cyclonic gyre in a shallow estuary. *Estuarine, Coastal and Shelf Science*, currently (Dec, 2016) under revision for resubmission following encouragement of the editor.

Refereed Publications

*Al Senafi F., and **A. Anis**, (2015). Shamals and climate variability in the Northern Arabian/Persian Gulf from 1973 to 2012. *International Journal of Climatology*, DOI: 10.1002/joc.4302

*Dupuis, K., and **Anis A.**, 2013. Observations and modeling of wind-waves in a shallow estuary: Galveston Bay, Texas. *J. of Waterway, Port, Coastal and Ocean Engineering*, **139**, 314–325.

Kot B. W., R. Sears, **A. Anis**, D. P. Nowacek, and C. D. Marshall, 2012. Behavioral Responses of Minke Whales (*Balaenoptera acutorostrata*) to Experimental Fishing Gear in a Coastal Environment. *J. of Experimental Marine Biology and Ecology*, **413**, 13-20.

Anis, A., 2006. Similarity Relationships in the Unstable Aquatic Surface Layer. *Geophys. Res. Lett.*, **33**, L19609, doi:10.1029/2006GL027268.

Anis, A., and G. Singhal, 2006. Mixing in the Surface Boundary Layer of a Tropical

Freshwater Reservoir. *J. of Marine Systems*, **63**, 225-243.

- Vernieres, G., **A. Anis**, R. N. Miller, and L. L. Ehret, 2006: Generalized Inversion of Thermistor-Chain Data and a Layer Model of Lake Kinneret. *Ocean Modeling*, **12**, 112-139.
- Gal, G., J. Imberger, T. Zohary, J. Antanucci, **A. Anis**, and T. Rosenberg (2003). Simulating the thermal dynamics of Lake Kinneret. *Ecol. Modelling*, **162**, 69-86.
- Reiss, C. S., **A. Anis**, J. F. Dower, C. T. Taggart, and B. Ruddick. 2002. Relationships among vertically structured in situ measures of turbulence, larval fish, their feeding success, and copepods on Western Bank, Scotian Shelf. *Fish. Oceanogr.*, **11:3**, 156-174.
- Pawlowicz, R., B. Beardsley, S. Lenz, E. Dever, and **A. Anis**, 2001: Software simplifies air-sea data estimates. *EOS*, January 2, 2001, and http://www.agu.org/eos_elec/00179e.html.
- Ruddick, B., **A. Anis**, K. Thompson, 2000. Maximum Likelihood Spectral Fitting: The Batchelor Spectrum. *J. Atmos. Oceanic. Tech.*, **17**, 1541-1555.
- Anis, A.**, 1998. On the structure of the upper oceanic boundary layer and the impact of surface waves. *Physical Processes in Lakes and Oceans, Coastal and Estuarine studies*, **54**, 47-60.
- Anis, A.** and J. N. Moum, 1995. Surface wave-turbulence interactions: scaling $\nu^{\frac{1}{2}}(z)$ near the sea surface. *J. Phys. Oceanogr.*, **25**, 2025-2045.
- Anis, A.** and J. N. Moum, 1994. Prescriptions for heat flux and entrainment rates in the upper ocean during convection. *J. Phys. Oceanogr.*, **24**, 2142-2155.
- Anis, A.** and J. N. Moum, 1992. The superadiabatic surface layer of the ocean during convection. *J. Phys. Oceanogr.*, **22**, 1221-1227.

* **Grad. Student**

TEACHING

Courses (present and last 6 years)

- 2009-2016 MARS 410 (undergraduate, each Fall) – Intro to Physical Oceanography
- 2016 MARS 101 (First time in fall, 2106) – presenting a physical oc. perspective
- 2009-2015 MASE 310 (undergraduate; each fall; now MASE 261 in spring) – Engineering Analysis
- 2009-2016 OCNG 608 (graduate, each Fall) – Physical Oceanography core course
- 2014-2016 MARS 491 (undergraduate, Spring) – Directed Studies
- 2010-2013 MARS 485 (undergraduate, Spring 2010, 2011, Fall 2012, 2013) – Directed Studies
- 2011-2016 PHYS 218 (undergraduate; each Fall) – Mechanics
- 2010-2011 OCNG 685 (graduate, each Fall); 2016, Spring – Directed Studies
- 2009-2011 MARS/MARB 681 (graduate, each Spring & Fall) - Seminar

Graduate Students Mentoring (present and last 6 years)

Committee Chair – Bingyu Yang (started Fall 2015, PhD OCNG), Sergey Molodtsov (Ph.D.OCNG, started summer 2015), Dapeng Li (Ph.D. OCNG, started fall 2014, dissertation title: Multi-scale modeling of flow dynamics in the Arabian/Persian Gulf); Fahad Al Senafi (M.Sc. 2012, Thesis title: Model aided observational study of physical processes in fresh water reservoirs; Ph.D OCNG, 2015; Dissertation title: model aided observational study of physical processes in the northwestern Arabian/Persian gulf in response to the shamal wind event), Arjun Adhikari (dismissed from OCNG grad. program, May 2014), Zheng Zhang (Ph.D. OCNG, 2013; Dissertation:title: Observational and numerical modeling studies of turbulence on the Texas-Louisiana continental shelf).

Committee Member – Andrew Whitley (OCNG, in progress; T. Dellapenna chair), Tariq Alrushaid (OCNG, in progress, T. Dellapenna chair), Myeonghee Han (Ph.D. OCNG, in progress, K. Park chair), Russell Carvalho (Ph.D. OCNG, 2013, A. Schulze chair), Lei Wang (Ph.D. Ocean Eng., 2012, B. Sweetman chair), Gyeongbo Kim (M.Sc. Ocean Eng., 2012, J. Horrillo chair), Jonathan Stoffer (M.Sc. WFSC, 2011, T. Iliffe chair), Myoungkeun Choi (Ph.D. Ocean Eng., 2009, B. Sweetman chair).

Undergraduate Students Mentoring (present and last 6 years)

Mr. Joseph Tang - honor student, MARS 491, Fall 2016

Mr. Josiah Coad - honor student, OCNG 491, Fall 2015 and Spring 2016.

Mr. Burkely Pettijohn - honor student thesis adviser, MARS 491, Spring 2014.

Mr. Steven Figueroa - assisted with turbulence data analysis, Spring 2014.

Mr. Burkely Pettijohn - MARS 485, Fall 2013.

Mr. Steven Figueroa - MARS 485, Summer 2013.

Mr. Steven Figueroa, Mr. Burkely Pettijohn, and Mr. Kadyrbek (international student from Kyrgystan) - Summer 2012; volunteered to assist with e research project.

Mr. Borrego, Martin Andres – MARS 485, Fall 2012.

Mr. Kuniyoshi, Masatoshi – MASE 485, Spring 2011.

Ms. Theresa King – REU student, summer 2010.

Mr. Jared Granberry – MARS 485, 3 credits, Spring 2010.

SERVICE (present and last 6 years)

TAMUG/TAMU Level

2010-2015 TAMUG student preview and recruiting, yearly participation

- 2010-2016 TAMUG Student Research Symposium – judge, graduate students posters
- 2014-2016 MARS Chemistry and Physics faculty search committee member
- 2014-2015 MARS Physics lab director search committee - chair
- 2014-2015 MARS Curriculum committee - member
- 2014, 2016 MARS P&T committee - member
- 2014 OCSE P&T committee for Dr. Juan Horillo - member
- 2013-2014 OCSE – Structural engineer search committee - chair
- 2012-2016 OCNG Recruiting and admission comm. – member (TAMUG representative)
- 2012-2013 GERG director search committee – member (Galveston representative)
- 2013 OCSE mid-term review committee for Dr. Juan Horillo - chair
- 2011 MASE – faculty search committee - chair
- 2009-2010 OCNG Curriculum Committee – member (TAMUG representative)
- 2010 T&P committee for General Academics – member
- 2010 Search committee for TAMU Faculty Ombuds Officer – TAMUG representative

Regional and State Level

- 2010-2016 Judge, Texas Science Olympiad, Physical Sciences
- 2010 Several Radio and TV interviews related to the Gulf of Mexico oil-spill.

National Level

- 2015 NSF OCE Physical – panelist
- 2012 External reviewer for P&T for Dr. Stephen M. Henderson, Washington State University
- 2009-present Reviewer for National Science Foundation, National Oceanic and Atmospheric Administration, Canada Foundation for Innovation, Limnology and Oceanography, Geophysical Research Letters, Journal of Physical Oceanography, Journal of Geophysical Research-Oceans, Journal of Geophysical Research-Atmosphere, Estuarine, Coastal and Shelf Science, Deep-Sea Research II, Ocean Dynamics, Journal of Atmospheric and Oceanic Technology, Journal of Waterway, Port, Coastal and Ocean Engineering.

Other

- 2014 Hosted a visiting professor (Dr. D. Salas-Monreal) on Sabbatical leave from the University of Veracruz, Mexico, Jan.-Dec. 2014.
- 2012 Hosted a graduate student (Mr. José Otilio Avendaño Alvarez) from the University of Veracruz, Mexico, Jul.-Oct. 2012.
- 2012 Hosted a visiting professor (Dr. Dongliang Zhao) from the Oceanography Dept., Ocean University, China, Feb. 2012.
- 2009- 2013 Multiple visits by Dr. Zvi Rosentraub (Israel Oceanographic & Limnological

Research) as part of a US-ISRAEL Binational Science Foundation (BSF) project.

COLLABORATORS (present and last 6 years)

F. Al Senafi (KU), G. Rowe, A. Quigg, S. Ray, R. Amon, R. Brinkmeyer, T. Iliffe, B. Kot (all at TAMUG); S. DiMarco (TAMU); D. Bogucki (TAMU-Corpus Christi); H. Wijesekera, D. W. Wang, and A. D. Weidemann (NRLSSC); S. Herzka, and Paula Pérez Brunius (CICESE, MX), Z. Rosentraub (IOLR, Israel); Y. Melzer (Research Dept., Survey of Israel); L. Ladah (CICESE, MX); A. Filonov (Universidad de Guadalajara, MX); D. Salas Sr. (UNAM, MX); D. Salas Jr. (Universidad Vera Cruzana, MX), J. Leichter (SCRIPPS); D. R. Hayes (University of Cyprus), T. Pokavanich (Kuwait Institute for Scientific Research), B. Knox-Holmes (Cameron, UK), M. Alkhaldi, and Fahad Al Senafi (Kuwait University), H. Dashti (Head, Kuwait Met Office)