4800 Oak Grove Drive, MS 300-323
Pasadena, California, USA 91109

+1 (818) 354-3410

bato@jpl.nasa.gov

Mary Grace Bato

PhD in Earth Science

Education

2018 **PhD in Earth Science** — **Université Grenoble Alpes, Grenoble, France**
Institut des Sciences de la Terre (ISTerre)
Dissertation: *Towards the assimilation of deformation measurements in volcanology*
Fellowship: *Ministère de l' Enseignement Surpérieur et de la Recherche (MESR)*

2012 **M2R in Earth Science** — **Université Blaise Pascal, Clermont-Ferrrand, France**
Laboratoire Magmas et Volcans (LMV)
Memoire: *High Resolution Monitoring and Post-emplacement Characterization of the October 2010 Lava Flow of Piton de la Fournaise Using Aerospace-based Data*
Scholarship: *Centre National des Oeuvers Universitaires et Scolaires (CNOUS)*

2008 **BS in Applied Physics** — **University of the Philippines, Quezon City, Philippines**
Instrumentation Physics Laboratory
Thesis: *Emergence of Scaling Laws via Consumption Dynamics in Complex Adaptive Systems*

Relevant Experience

Nov 2018 - present **NASA/CalTech Jet Propulsion Laboratory** — **California, USA**
Postdoctoral Research Fellow
- Forecasting volcanic eruptions using ensemble-based data assimilation.
- Development and testing of a Bayesian-based software to retrieve ground deformation source parameters.

Oct 2015 – Sep 2017 **Service National d'Observation RENAG** — **Grenoble, France**
Intern
- Was engaged in the operational processing, treatment and database management of 20-year daily GPS data under the European Plate Observing System (EPOS) project.

Jan 2015 – Jul 2018 **Institute des Sciences de la Terre (ISTerre)** — **Chambéry/Grenoble, France**
Graduate Researcher
- Developed a framework to forecast volcanic eruptions using Ensemble Kalman Filter.
- Processed interferograms to generate time-series using the NSBAS processing chain.

Jan 2013 - Dec 2014 **Laboratoire Magmas et Volcans (LMV)** — **Clermont-Ferrand, France**
Research Engineer
- Published a book chapter and wrote technical reports and abstracts.
- Developed an automated routine to process and analyse huge amount of SAR data.
- Collaborated with the Piton de la Fournaise volcano observatory at La Reunion to help them in volcano monitoring.

Sep 2012 - Dec 2012 **Forum Energy Phil. Corp.** — **Makati City, Philippines**
Consulting Geophysicist
- Led a team to perform microgravity and geotechnical surveys in Northern Cebu, Philippines for natural gas and oil exploration.
- Performed regular field planning and financial budgeting for the duration of the project.

Sep 2010 - Jun 2012 **Laboratoire Magmas et Volcans (LMV)** — **Clermont-Ferrand, France**
Graduate Researcher
- Processed LiDAR and satellite data (SAR and MODIS data), and developed a semi-automated routine to analyse them.

Apr 2009 - Nov 2011 **National Institute of Geological Sciences** — **Quezon City, Philippines**
Researcher
- Engaged in various multi-disciplinary research projects related to flooding, earthquakes and crustal deformation.
- Co-authored and co-managed a multi-million-peso Department of Science and Technology (DOST) project (Project: *Satellite and Field Detection and Analysis of Ground Subsidence in KAMANAVA and Metro Manila*).

Awards

[1] 2019 Comité National Français de Géodésie et Géophysique (CNFGG) Thesis Prize Laureate, April 2019
[2] Recipient, AGU Outstanding Student Paper Award, Geodesy Section, December 2016
[3] Mention Bien (Magna Cum Laude) and rank 2 of the graduating class, Master 2 Research Program, Clermont-Ferrand, France, June 2012
[4] Best Master Thesis, June 2012

Skills and Interests

Math and Statistics:
Statistical modeling, Data Assimilation, Ensemble methods, Image and signal processing, Inversion methods

Language:
Tagalog (native), English (fluent), French (intermediate)

Programs, OS and Database:
Python, Matlab, Pandas, SQL, Diapason, NSBAS, ENVI, QGIS, Surfer, LaTeX, Wordpress, ISCE, GIAnT, Unix, OSX

Interests and hobbies:
Jazz, playing guitar and ukulele, basketball, tennis, hiking, swimming, travelling (USA, Italy, Spain, Switzerland, Germany, Iceland, Australia)

ISI Publications

[1] **MG Bato**, V Pinel, Y Yan, F Jouanne, "[Near] real time forecasting of the rupture of a magma chamber using sequential data assimilation", *in preparation for Journal of Geophysical Research: Solid Earth*

[2] **MG Bato**, V Pinel, Y Yan, F Jouanne, J Vandemeulebrouck "Possible deep connection between volcanic systems evidenced by sequential assimilation of geodetic data", *Nature Scientific Reports* (2018) 8:11702, https://doi.org/10.1038/s41598-018-29811-x

[3] **MG Bato**, V Pinel, Y Yan, "Assimilation of Deformation Data for Eruption Forecasting: Potentiality Assessment Based on Synthetic Cases", *Frontiers in Earth Science* 5 (2017): 48, https://doi.org/10.3389/feart.2017.00048.

[4] **MG Bato**, JL Froger, AJL Harris, N Villeneuve, "Monitoring an effusive eruption at Piton de la Fournaise using radar and thermal infrared remote sensing data: insights into the October 2010 eruption and its lava flows", From: Harris, A. J. L., De Groeve, T., Garel, F. & Carn, S. A. (eds) Detecting, Modelling and Responding to Effusive Eruptions. *Geological Society, London, Special Publications*, (2016) 426, http://doi.org/10.1144/SP426.30

[5] AMF Lagmay, R Rodolfo, H Cabria, J Soria, P Zamora, C Abon, C Lit, MRT Lapus, E Paguican, **MG Bato**, G Tiu, E Obille, NE Pellejera, PC Francisco, RN Eco & J Aviso, "Geological hazards of southwestern Natib Volcano, site of the Bataan Nuclear Power Plant, Philippines", *Geological Society, London, Special Publications361.1 (2012): 151-169,* https://doi.org/10.1144/SP361.13

[6] AMF Lagmay, R Rodolfo, **MG Bato**, "The perfect storm, Floods devastate Manila" *EARTH* (2010), Vol. 55, no.4, pp. 50-55

International Conference Proceedings and/or Abstracts (last 5 years)

[1] **MG Bato,** V Pinel, Y Yan, "Volcanic data assimilation: Towards and beyond [near] real-time eruption forecasting", American Geophysical Union Fall Meeting 2018, Washington D.C., USA, 10-14 December 2018. *(invited talk)*

[2] **MG Bato,** V Pinel, Y Yan, "Forecasting the rupture of a magma chamber using sequential data assimilation: Application to Grímsvötn volcano, Iceland", 19th General Assembly of WEGENER, Grenoble, France, 10-13 September 2018. *(poster presentation)*

[3] **MG Bato,** V Pinel, Y Yan, "Forecasting the rupture of a magma chamber using sequential data assimilation: Application to Grímsvötn volcano, Iceland", Cities on Volcanoes 10, Napoli, Italy, 2-7 September 2018. *(oral presentation)*

[4] **MG Bato,** L Pousse, JD Dianala, F Jouanne, R Jolivet, J Hollingsworth, V Pinel, R Walker, GJ Perez, K Vergel, "Imaging [Recent] Philippine Earthquakes from Space", New Dimensions for Natural Hazards in Asia: An AOGS-EGU Joint Conference, Tagaytay, Cavite, Philippines, 04-08 February 2018. *(poster presentation)*

[5] **MG Bato,** V Pinel, Y Yan, "Towards the Assimilation of Deformation Data for Eruption Forecasting", New Dimensions for Natural Hazards in Asia: An AOGS-EGU Joint Conference, Tagaytay, Cavite, Philippines, 04-08 February 2018. *(oral presentation)*

[6] **MG Bato,** V Pinel, Y Yan, "Towards the Assimilation of Deformation Data for Eruption Forecasting", MDIS-Form@ter 2017, Clermont-Ferrand, Besse-en-Chandesse, Auvergne, France, 16-20 October 2017. *(invited talk)*

[7] JL Froger, V Cayol, M Tridon, **MG Bato**, D Remy, Y Chen, D Smittarello, V Pinel, JM Prival, N Villeneuve, A Peltier, A Augier, S Rivet, Y Guehenneux, "Indian Ocean InSAR Observatory (OI2)—Routine Interferometric Monitoring of a Volcanic Island", Fringe 2017, Helsinki, Finland, 05-09 June 2017. *(poster presentation)*

[8] A Socquet, A Déprez, N Cotte, L Maubant, A Walpersdorf, **MG Bato**, "Present-day deformation in Europe, as seen by the EPOS-GNSS prototype solution in double difference, and first co- and post-seismic displacements associated with 2016 Amatrice and Norcia earthquakes (Italy)", European Geosciences Union General Assemby 2017, Vienna, Austria, 23-28 April 2017. *(poster presentation)*

[9] **MG Bato,** V Pinel, Y Yan, "Volcano Deformation and Eruption Forecasting using Data Assimilation: Building the strategy", American Geophysical Union Fall Meeting 2016, San Francisco, California, USA, 12-16 December 2016. *(poster presentation)*

[10] **MG Bato,** V Pinel, Y Yan, "Assimilating GPS and InSAR Data to Forecast Volcanic Eruptions: Building the strategy", Colloque National d'Assimilation de Données, Grenoble, France, 30 November – 02 December 2016. *(poster presentation)*

[11] **MG Bato,** V Pinel, Y Yan, "Volcano Deformation and Eruption Forecasting using Data Assimilation: Case of Grimsvötn volcano in Iceland", European Geosciences Union General Assembly 2016, Vienna, Austria, 17-22 April 2016. *(oral presentation)*

[12] **MG Bato,** V Pinel, Y Yan, "Volcano Deformation and Eruption Forecasting using Data Assimilation: Is it Feasible?", MDIS-Form@ter, Autrans, France, 7-9 October 2015. *(poster presentation)*

[13] **MG Bato,** JL Froger, M Tridon, V Cayol, AJL Harris, N Villeneuve, "InSAR Mapping of the 2010 and 2014 Deformation Fields and Lava Flows of Piton de la Fournaise", MultiTemps 2015, Annecy, France, 22-24 March, 2015. *(oral presentation)*

[14] **MG Bato,** JL Froger, M Tridon, V Cayol, AJL Harris, N Villeneuve, "InSAR Mapping of displacements and lava flows related to recent eruptions (2010-2014) at Piton de la Fournaise", Fringe 2015, Frascati, Italy, 23-27 March 2015. *(poster presentation)*

[15] **MG Bato**, JL Froger, AJL Harris, N Villeneuve, "Insights on the 2010 Lava Flows of Piton de la Fournaise Using Cosmo-SkyMed and TanDEM-X Data: Lava Displacement Rates, Thicknesses, and Volume Estimates", American Geophysical Union Fall Meeting 2014, San Francisco, California, USA, 15-19 December 2014. (*oral presentation)*

[16] **MG Bato**, JL Froger, AJL Harris, N Villeneuve, T Souriot, "Characterizing the October 2010 Eruption of Piton de la Fournaise using X-band InSAR data", MDIS Form@Terre Meeting, Autrans, France, 17-18 October 2013. *(poster presentation)*

[17] **MG Bato**, JL Froger, AJL Harris, N Villeneuve, T Souriot, "Characterizing the October 2010 lava flow of Piton de la Fournaise using X-Band InSAR data", IEEE International Geoscience and Remote Sensing Symposium, Melbourne, Australia, 21-26 July 2013. *(oral presentation)*

[18] **Mary Grace Bato**, Jean-Luc Froger, Andrew JL Harris, Nicolas Villeneuve, Thierry Souriot, "Characterizing the October 2010 lava flow of Piton de la Fournaise using space-based data", International Association of Volcanology and Chemistry of the Earth's Interior Scientific Assembly, Kagoshima, Japan, 20-24 July 2013. *(poster presentation)*

[19] **MG Bato**, JL Froger, N Villeneuve, T Souriot, "TanDEM-X data for early mapping and volume estimation of lava flows: October 2010 Lava flow of Piton de la Fournaise case study", 5th TSX and 4th TDX Scientific Meeting, Munich, Germany, 10-14 June 2013. *(oral presentation)*

[20] **MG Bato,** JL Froger, AJL Harris, N Villeneuve, T Souriot, "InSAR Volcano Monitoring in Piton de la Fournaise: What have we been doing over the last 3 years?", Internatinal Workshop on Satellite-Data-Driven Detection, Tracking and Modeling of Volcanic Hot Spots, Clermont-Ferrand, France, 28-30 May 2013. *(oral presentation)*

Selected Press Mentions

[1] Volcano Forecast? New Technique Could Better Predict Eruptions, Scientific American, June 2017

[2] Scientists are trying to use satellites to forecast volcanic eruptions, CNBC, June 2017

[3] Think weather forecasts are bad? Try forecasting a volcanic eruption, Popular Science, June 2017

[4] Predicting eruptions using satellites and math, Eurekalert, June 2017

[5] Scientists predict volcanic eruptions with satellites and GPS, CNN Tech, June 2017