Tristan Salles

Research Scientist - Quantitative Geosciences

Personal details

Civility Tristan Salles (Ph.D.) French, Australian DOB: 10/10/1979

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I am a lecturer in **Geophysics** at the School of Geosciences, University of Sydney. My research fields are in **computational geosciences** with application areas in sediment transport dynamics, Earth surface evolution, and deep time interactions between climate, ocean & geomorphology. I am an expert in **quantitative methods** based on forward modelling, **data query**, transformation & visualisation, **algorithm design**, and parallelism.

Work experience

2015–present **Academic Position**, *University of Sydney*,
School of Geosciences, EarthByte & Geocoastal Research Groups.
Lecturer – Permanent Academic Staff – 40% Research, 40% Teaching & 20% Administration

- HPC model of coupled sediment-ocean-wave modelling system at geological scale
- Parallel finite volume model to study landscape dynamics
- Ecological model of climate change impact on coral reefs evolution (integrated fuzzy logic/finite element method)
- Teaching for Undergraduates & Postgraduates (part of my teaching is available at GeosLearn
- Open Learning initiative: Data Science - Analysing and plotting data with R & Python
- Faculty of Science ICT Committee Research Representative
- Supervision of PhDs, Honours, Research Assistants & Developers

2008–2015 **Senior Research Scientist**, *CSIRO Earth Sciences & Resources Engineering*,
Earth Sciences Centre, Computational Geoscience group, Technical Algorithms team.
Project leader for HPC Geosciences projects

- Software architect – Implementation of an Advance Earth Dynamic Coalescence Framework using ESMF standard
- Integrated Stratigraphy/Seismic Probing/Data Assimilation
- Parallel surface process model: conception & development under CSIRO Science Innovation Fund
- Design and development of a parallel Lagrangian hydrodynamic model
- Parallel 3D visualisation based on Hdf5, XmF and XdmF formats for geophysical dataset
- Quantitative estimation of sea-level and halokinetics variations impact on mini-basin filling

2007–2008 **Postdoctoral Fellow**, *CSIRO Wealth from Ocean Flagship*,
Australian Resources Research Centre, Predictive Geoscience group.
Design and development of new capabilities in CSIRO Stratigraphic Forward Modelling software
Quantitative seabed evolution under climate change & its implications for coastal resources and infrastructure management

- Development of an aeolian module based on Cellular Automata paradigm
- Predictive assessment of how climate change influences long-term regional seabed responses
- Mathematical model of compaction and diagenesis using predictor/corrector implicit finite-difference method

2002–2002 **Internship**, *EDF R&D LNHE*.
Laboratory model design and scaling
Numerical evaluation of wave forcings on offshore wind piles

- Data processing and upscaling
- Wave flume tank experimental model
- Numerical wave modelling

Skills

Programming Fortran, Python, C, CSS, HTML, MPI

Data Query OpenDAP, THREDDS

Comp. Geometry Triangular Irregular Network, Voronoi Diagram, Adaptive Mesh Refinment

Visualisation VTK, NetCDF, HDF5, XMF, XDMF

Deployment Docker, AWS, Jupyter Notebooks

Education

2017–2018 **Graduate Certificate in Educational Studies (Higher Education)**, *University of Sydney*.

2003–2006 **Computational Geology – PhD**, *University of Bordeaux & Institut Français du Pétrole IFP (France)*.
Modelling sub-marine canyons and meandering channels using a genetic approach
Navier-Stokes equations – Lattice-Boltzmann methods – Cellular Automata approach

2002–2003 **Physical Oceanography, Honours**, *University of Aix-Marseille II*.
HD - This formation provides solid knowledge in Oceanography & Coastal numerical modelling
Marine/environmental science – Coastal dynamics – Turbulence – Remote detection

2000–2003 **Marine Engineering, Master of Science & Engineering**, *Ecole Centrale Marseille*.
Hons – Multi-disciplinary formation that provides solid knowledge in Mathematics & Physics
Ocean hydrodynamics – Computational physics – Numerical methods – Experimental hydrodynamics

Honours & Awards

2017 **Scientific Mobility Fund**, *University of Bergen (Norway)*.
2016 **Scientific Mobility Fund**, *University of Bergen (Norway)*.
2003–2006 **CIFRE Top-up Scholarship IFPEN**, *research grant from IFPEN*.
2003–2006 **ANRT Scholarship French Government**, *Education & Research funding from the French Government*.

Peer-Reviewed Publications & Talks

A Complete list of my publications, talks & current research projects is available from my homepage

Papers since 2016

Salles T., Flament N., Muller D., 2017. *Influence of mantle flow on the drainage of eastern Australia since the Jurassic Period*. Geochem. Geophys. Geosyst.

Salles T., 2016. *Badlands: A parallel basin and landscape dynamics model*. SoftwareX, 5, 195-202.

Salles T., Hardiman. L.., 2016. *Badlands: an open-source, flexible and parallel framework to study landscape dynamics*. Computers and Geosciences

Patent

Salles T., Lopez S., Joseph P., Cacas M.C., 2007. *Use of the stable condition of cellular automata exchanging energy to model sedimentary architectures*, EP1837683.

Talks in 2017

T. Salles, 2017. *Responses of reefs to climatic forcing – A numerical perspective*, Centre for Coral Reef Studies, USyd.

T. Salles, N. Flament, D. Muller, P. Rey, 2017. *Influence of dynamic topography on the evolution of the Australian landscape since the Late Jurassic*, Workshop in High Performance Computing, EAGE IFP Paris.

T. Salles, N. Flament, D. Muller, 2017. *150 Million years of landscape evolution of eastern Australian continent*, European Geophysical Union General Assembly Vienna, Austria.

X. Ding, **T. Salles**, N. Flament, P. Rey, 2017. *Influence of dynamic topography on landscape evolution and passive continental margin stratigraphy*, European Geophysical Union General Assembly Vienna, Austria.

Interests

Outdoor **Running / Hiking / Surfing**.

Volunteer Work **Surf Life Saver**, *Surf Life Saving Australia*, Patrolling Maroubra Beach and participating in lifesaving operations
Awarded 'Bronze Medaillon / Certificate II in Public Safety' (Aquatic Rescue).