

**Postdoc announcement:**

**Aix-Marseille University, CEREGE UMR 7330, Aix – en – Provence, France**

The [Rhône Sediment Observatory](#) (OSR) invites applications for a postdoctoral researcher to work on estimating bedload transport capacities and modeling channel morphodynamics along restored reaches of the Rhône River (France).

The OSR is an inter-disciplinary platform established in 2009 in response to management questions that emerged as part of the "Plan Rhone" framework. The mission of the observatory is to carry out collaborative research between scientific researchers and managers in order to compile and manage data on sediment dynamics and associated contaminants within the Rhône in order to aid river managers and stakeholders in their decisions.

**Key words:**

sediment transport, river morphodynamics, quantitative fluvial geomorphology, hydraulic modeling, river restoration

**Context and research objectives:**

The Rhône River in France constitutes the archetype of large European Rivers that owe their present-day geomorphic character to several major periods of human modifications starting in the late 19<sup>th</sup> century. The first period of major channel modifications (1860-1930) was for the purpose of facilitating navigation along the Rhone from Lyon to the delta. This was achieved by narrowing the channel, thereby discouraging deposition and encouraging incision. Narrowing was engineered through a system of channel embankments consisting of submersible longitudinal and transverse dykes, weirs, groynes, and cross-beams. These structures were highly successful at trapping fine sediments that overtopped the banks during floods and gradually building out the banks. The result was a reduction of 40% in the width of the Rhône and concentration of the flow into a single channel along formerly multiple channel reaches. Between 1948 and 1986, sixteen dams and power plants were built along the French Rhône. The dams divert flow to canals leading to run-of-the-river hydropower plants that have little or no storage. The diverted flow bypasses the original channel and the two re-join downstream of the power plant. The sequence repeats itself at each dam. Each coupled dam – power plant scheme specifies a minimum residual flow that must be maintained in the original channel and a maximum discharge that can be diverted to the plant. During normal flow conditions, most of the flow is diverted to the canal and sediments remain trapped upstream of the dam. Sediments are flushed downstream only during high flows. While the majority of dams on the Rhône are not storage dams, they still generate hydraulic backwater zones upstream with implications for sediment transport across this zone during typical floods. In summary, dams constructed starting in the 1950's represent a divergence in the morphodynamics of subreaches along the Rhône: bypassed channels with reduced flood frequencies, average discharges, and sediment supply from upstream, subreaches that continue to receive the natural discharge, and subreaches receiving the natural discharge but subject to hydraulic backwater effects.

Major restoration efforts are underway along multiple reaches of the Rhône River and with more planned. The primary goal of these works is to promote sediment transport in order to improve biodiversity and achieve the 'good ecological status' objectives outlined by the European Water Framework Directive. Restoration schemes include sediment replenishment below dams, channel widening, and reactivation of secondary channels. In light of these restoration projects, the primary objectives of the postdoc are:

- To conduct detailed estimates of transport capacities by grain size fraction of the bed material load over a range of discharges
- To carry 1D morphodynamic numerical modeling runs of key reaches to predict their response to restoration schemes

- To compare transport estimates and morphological evolution with tracer data (active RFID tags) and bathymetric surveys being conducted along restored reaches

For recent publications, thesis...etc related to this project please refer to the documents available at this link: <https://amubox.univ-amu.fr/s/TmHFtzPXEq5t5K>

**Qualifications:**

Applicants should have a PhD degree in Earth Sciences, Engineering, Physical Geography, or closely related fields by the start of the contract. Preference will be given to candidates with demonstrated research experience in sediment transport and morphodynamic numerical modeling. Fluency in French is not required to apply but preference will be given to candidates with a basic level in oral communication.

**Start date and contract details:**

The desired start date is April 2019 for an initial period of 12 months and the contract is highly expected to be extended an additional 6 to 7 months in 2020. The net monthly salary is approximately 1900 – 2300 Euros (commensurate with number of years of previous experience). The total duration of a contract for a candidate with > 3 yrs of postdoc experience will be a couple of months shorter.

**Additional details:**

The postdoc will be based at the CEREGE laboratory (UMR 7330) and supervised by Michal Tal, assistant professor at Aix-Marseille University/CEREGE. The work will be carried out in close collaboration with the research group of Hervé Piegay, CNRS research director based at the ENS - Lyon, UMR 5600 and Benoit Camenen, researcher at Irstea-Lyon, as well as management partners (CNR, Water Agency), environmental consulting companies (GeoPeka, BURGEAP), and conservation agencies (Réserve de la Platière). The postdoc is expected to provide regular progress updates and manage communication amongst the different groups as well as write an annual OSR report.

CEREGE is located on the outskirts of Aix-en-Provence and 30 km from Marseille. It is possible to live in either city and commute by car or bus to the lab. It is also possible to live in one of the small villages in the area. University housing can also be requested.

**Application procedure:**

Applications will be accepted until Feb. 4. Interested candidates should send a cover letter, CV, PDFs of up to 3 publications, and contact information for 2 persons that can provide references.

**Contact for applications and inquiries:**

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