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## 4 Ma-long uplift cycles of the southern Peru forearc since Late Miocene

Vincent Regard<sup>1</sup>, Joseph Martinod<sup>2</sup>, Marianne Saillard<sup>3</sup>, Sébastien Carretier<sup>1</sup>, Laetitia Leanni<sup>4</sup>, Gérard Hérail<sup>1</sup>, Laurence Audin<sup>2</sup>, and Kevin Pedoja<sup>5</sup>

<sup>1</sup>University of Toulouse, UPS (OMP), CNRS, IRD, CNES, Geosciences Environnement Toulouse (GET), Toulouse, France (vincent.regard@get.omp.eu)

<sup>2</sup>Univ. Grenoble Alpes, Univ. Savoie Mont Blanc, CNRS, IRD, IFSTTAR, ISTerre, Grenoble, France

<sup>3</sup>Université Côte d'Azur, IRD, CNRS, Observatoire de la Côte d'Azur, Géoazur, 250 rue Albert Einstein, Sophia Antipolis 06560 Valbonne, France

<sup>4</sup>Aix Marseille Univ, CNRS, IRD, INRAE, Coll France, CEREGE, Aix-en-Provence, France

<sup>5</sup>Normandie Univ, Unicaen, Unirouen, CNRS, M2C 14000, Caen, France

We explore the coastal morphology along an uplifting 500 km-long coastal segment of the Central Andes, between the cities of Chala (Peru) and Arica (Chile). We use accurate DEM and field surveys to extract sequences of uplifted shorelines along the study area. In addition, we consider continental pediment surfaces that limit both the geographical and vertical extent of the marine landforms. We establish a chronology based on published dates for marine landforms and pediment surfaces. We expand this corpus with new <sup>10</sup>Be data on uplifted shore platforms. The last 12 Ma are marked by three periods of coastal stability or subsidence dated ~12-11 Ma, ~8-7 Ma and ~5-2.5 Ma ago. The uplift that accumulated between these stability periods has been ~1000 m since 11 Ma; its rate can reach 0.25 mm/a (m/ka). For the last period of uplift only, during the last 800 ka, the forearc uplift has been accurately recorded by the carving of numerous coastal sequences. Within these sequences, we correlated the marine terraces with the sea level highstands (interglacial stages and sub-stages) up to MIS 19 (790 ka), i.e., with a resolution of ~100 ka. The uplift rate for this last period of uplift increases westward from 0.18 mm/a at the Peru-Chile border to ~0.25 mm/a in the center of the study area. It further increases northwestward, up to 0.45 mm/a, due to the influence of the Nazca Ridge. In this study, we document an unusual forearc cyclic uplift with ~4 Ma-long cycles. This periodicity corresponds to the predictions made by Menant et al. (2020) based on numerical models, and could be related to episodic tectonic underplating (subducting slab stripping) beneath the coastal forearc area.