AI-assisted structural interpretation of complex faulting and salt pillows on the shelf and slope of the Camamu basin, northeastern Brazil

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As the overall Central Atlantic segment opened in an east-west direction during the early Cretaceous, the Camamu basin in northeastern Brazil experienced a more oblique northwest-to-southeast opening that led to its more complex rifting history. The Camamu covers a 12,000 km^2 area, is bounded to the north by the Jacuípe and Recôncavo basins and to the south by the Almada basin. The basin preserves pre-rift, syn-rift, and post-rift sequences, and has been previously interpreted as the northern limit of Aptian salt. We map faults and salt bodies on the shelf and slope of the Camamu basin by applying Bluware's deep-learning algorithms and AI-assisted interpretation methodologies to a 1,400 km^2 3D survey kindly provided by the Agência Nacional do Petróleo, Gás Natural e Biocombustíveis (ANP). Our workflow included labeling key geologic features and iteratively training the neural network with our picks as the training data. We fully interpreted eight inlines and seven crosslines before creating final models of both fault planes and salt bodies within the survey. The results show that most deformation of the shelf and slope of the Camamu basin occurs across detached, listric normal fault systems that generally sole out along prominent unconformities, likely a result of successive uplift and erosional events in the late Cretaceous, Eocene, and Miocene, or mid-crustal levels. Shallow faults generally dip offshore, though important antithetic faults are resolved within the shelf and in water depths greater than 1.6 seconds. In map view, faults within the shelf are oriented parallel to the shelf break, while faults on the slope display strikes that are curvilinear, and concave-seaward. Deeper faults within pre-rift and basement rock are listric and sole out across a mid-crustal detachment at a depth of 6.5 seconds TWT. Imaged and interpreted salt is rare and occurs as isolated pillows that were active prior to the Eocene or Miocene. Salt evacuation of thicker Aptian salt may have occurred as previous workers have proposed for the southern Almada basin to the north.