Regional sea level variability is more important for most of society than global mean sea level changes. Much of this regional variability is driven by re-distribution of ocean mass by the wind field. Here we present results which demonstrate that regression analysis of sea level against reconstructed sea level pressure has significant skill in hindcasting regional sea level change and that this is unrelated to the inverse barometer (IB) effect. The method is shown to have utility in identifying problems such as offsets in data records. By identifying the re-distribution signal within sea level records, greater confidence can be assigned to mean trends.