

Interactive comment on “Geodynamical processes in the channel connecting the two lobes of the Large Aral Sea” by E. Roget et al.

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I am not an oceanographer and therefore not qualified to comment on the more technical aspects of this paper. I have spent considerable years studying the Aral Sea and have visited the remnants of the sea a number of times. The authors of this paper have carefully studied the channel (commonly referred to as the Kulandy Channel) connecting the Western and Eastern Basin of the Large (southern) Aral Sea during several field investigations. The data collected and the analysis of these are certainly of value to understanding the dynamic processes underway here. In a "global" sense, this is a valuable paper and worthy of publication. I do, however, take issue with some aspects of the manuscript as indicated below.

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1. The authors argue that the desiccation of the Aral Sea is an example of the influence of climate change and human influence as if these two factors were of equal consequence. This is misleading. The overwhelming factor in the lake's drying has been human activity in the form of expanding irrigation that greatly decreased the inflow to the sea from its two tributary rivers (Amu and Syr). Certainly human induced climate change is real and in recent years has had and will in the future have an influence on the Aral. But, at least until recently, the dominant cause of the Aral's shrinkage is development of irrigation in the sea's basin. Furthermore, the initial impact of "Global Warming" will likely increase (for a period) the inflow to the Aral as the glaciers feeding the Amu and Syr melt at an accelerated rate. This of course might be counterbalanced or exceeded by heightened evaporation from the sea's surface.

2. The authors state that the only bathymetric map of the Aral dates from the 1950s. However, I have versions at 1:500,000 and 1:200,000 that are dated 1981. Is this the same charts to which they refer? I don't know. However, where they found major discrepancies between the bathymetry of the northern part of the Large Sea and the emerging shoreline revealed by satellite imagery as the sea shrank, I have found just the opposite: an amazingly close correspondence between the bathymetric maps and MODIS 250 meter natural color images. Indeed, I have been able to use the two to estimate the level of the Aral within one meter as the sea has declined.

3. The authors note that the channel doesn't appear on the existing bathymetric maps. They attribute this to the inaccuracy of these. However, the argument may be made that the channel didn't appear on the maps because it was buried under sediment. Over the history of the Aral (past 10 millennia) the sea has risen and fallen a number of times. The cause of major regressions was the diversion of the Amu westward to the Caspian Sea and away from the Aral. The last instance of this was in the 13th to 15th centuries. When the Amu turned (or was turned) westward, the only inflow was from the Syr, entering from the N.E. Given the bottom topography of the Aral as sea level fell, part of the flow of the Syr would have passed from the Eastern Basin to the

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Western and carved the Kulandy Channel. When the Amu returned to the Aral and sea level raised, the channel would have filled with sediment. So, the modern desiccation may have again caused the excavation of this buried channel. Examination of high resolution (30 meter) Landsat imagery from 2007 and 2008 clearly shows the old bed of the Syr crossing the dried northern part of the Eastern Basin of the Large Aral and ending not far east of the current channel.

4. The authors do mention it, but perhaps need to place more emphasis on the role of flow from the Small Aral to the Large on channel dynamics. During Spring/early Summer (May into July) most years the Small Aral has a "positive" water balance, leading to outflow (now overflow of the dam regulating the discharge from the Small Aral). This flow raises the level of the Eastern Basin so that there is a flow through the channel of relatively fresh surface water from the Eastern to the Western Basin. Other times of the year, as the authors note, flow is in the opposite direction or is governed by winds.

5. Finally, it should be noted that the channel will soon be a thing of the past. The Eastern Aral for several years has received little or (in 2009) no flow, either from the Syr or Amu rivers. The Eastern Basin is nearly dry and has divided into a small piece into which the Kulandy channel flows and a larger piece to the south. The southern end of the channel where it flows into the Eastern Basin is nearly closed and the channel has become an arm of the Western Large Aral. MODIS and Landsat imagery from August and September 2009 clearly show these changes.

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