Heat flow anomalies on the Western Mediterranean margins and the possible role of fluid flow and salt tectonics: first results of the WestMedFlux-2016 cruise. Poort J., Lucazeau F., Le Gal V., Rabineau M., Battani A., Akhmanov G., Bouzid A., Palomino D., Dal Cin M., Leroux E., Giliazetdinova D., Ferrante G., Si Bachir R., Koptev A., Khlystov O., Tremblin M., Camerlenghi A, Aloisi G., Migeon S., Ercilla G. and the WestMedFlux scientific team.

While there is now a large consensus that Western Mediterranean basins developed in a Miocene back-arc setting due to slab roll-back and that some of its domains are floored by oceanic crust, there is still a lot of speculation on the configuration, nature and evolution of its margins and the ocean-continent transitions (OCT). A thick Messinian layer of evaporites in the deep basin obscures deep seismic reflectors, and only recently seismic refraction and wide-angle studies revealed a confident picture of basement configuration. In order to further constrain models of crustal structure and margin evolution, heat flow is one of the key parameters needed. Recent heat flow studies on other margins have shown the existence of a persistent thermal anomaly under rifted margins that urges to reconsider the classical models of its evolution. The young age of OCT and ceased oceanic formation in the Western Mediterranean make it an interesting test case for a thermo-mechanical study of its margins. The presence of halokinetic structuring and salt diapirs urges the need of close spaced heat flow measurement to evaluate heat refraction and advective heat transfer by fluid migration.

During the WestMedFlux cruise on the research vessel L'Atalante in April/May this year we collected a total of 150 new heat flow measurement (123 in pogo mode, 27 with a sediment corer) in the deep basin of the Western Mediterranean where heat flow data were sparse. These data are aligned along several regional heat flow profiles crossing the OCTs of the Provencal basin and the Algero-Balearic basins, covering conjugated margins, divergent and oblique margins, transform faults and oceanic crust of different ages. Closely spaced measurements have been realized in several salt diapir and submarine mount areas. At 20 of the coring stations, pore water fluids have been extracted on board using rhizon sampling and gas was extracted using the head space method, while core description has been realized on board for 15 of the cores. Sub-bottom profiling, multi-beam data and ADCP have been collected along most of the cruise track, with water column multi-beam mode for a few selected areas.

Preliminary analysis of the heat flow data indicate the absence of a strong regional contrast between continental and oceanic domain, but shows the presence of important local heat flow anomalies, in particular on the south Balearic margin (a variation from 20 to 150 mWm² over a distance of only a few kilometers). Some of these thermal anomalies coincide with salt diapiric structures, others are located in the margin slope near the marginal fault systems. Further processing and pore water and gas analysis will help defining the source of these thermal anomalies, and to test if sub-salt fluid migration and post-Messinian salt deformation play a role in the creation of these anomalous surface heat flow patterns.