K&C Phase 3

Pantanal: lakes inventory, distribution and landcover characteristics

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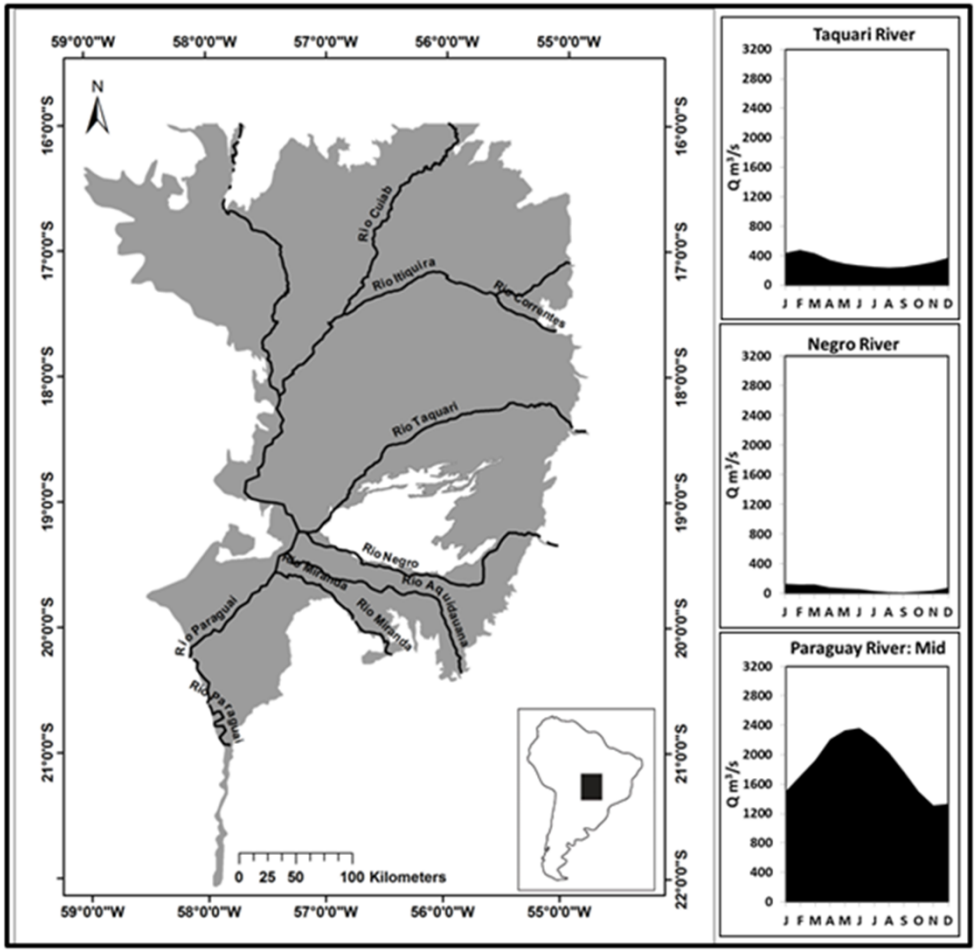
Pantanal: Nhecolandia



Project objectives and schedule

Objective: lakes and landscape dynamic and associated analysis of home range for endangered species.

K&C thematic drivers: supports International **C**onventions, Environmental **C**onservation

Milestones:

Lakes dynamics: Dec 2013

Landscape dynamic: March 2014

Home range association: March 2014

Support to JAXA's global forest mapping effort

The project supports JAXA's global forest mapping effort – Pantanal region - validate the JAXA forest cover maps.

Ground truth data that will be shared with JAXA: field data with vegetation description and classified products

Deliverables

- First regional based description of lakes and associated landscape in the Pantanal.
- Lakes and associated elevation
- Landscape dynamic
- Endangered species home range

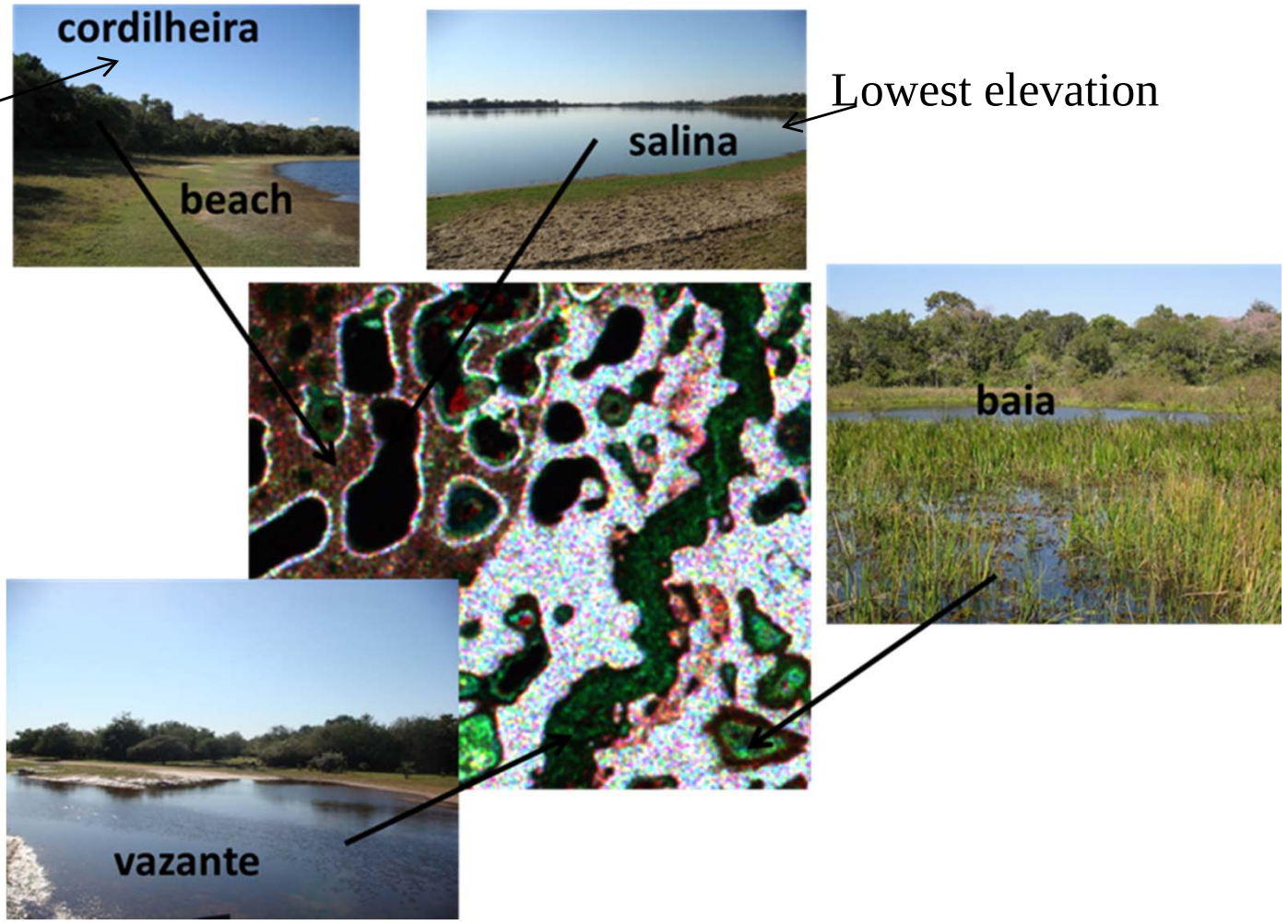
Lakes in the Pantanal – landscape and elevation

- In the Pantanal, one distinctive feature is the occurrence of thousands of geochemically diverse lakes, generally called *salinas* and *baías*. Saline lakes (*salinas*) are used by animals as a plentiful source of dietary minerals. Freshwater lakes (*baias*) support floating mats of vegetation, which are important as habitats for several species.
- Why are these lakes different? Current hypotheses state the cause of the formation of salinas is an increase in salt concentration through continuous evaporation and hydrological isolation from surface flow.
- The scale of the majority of lakes studies in the Pantanal is generally specific to a local region, often on or adjacent to a farm. Only now with the ALOS/PALSAR lakes classification we can study salinas and baias for the entire region

Dataset

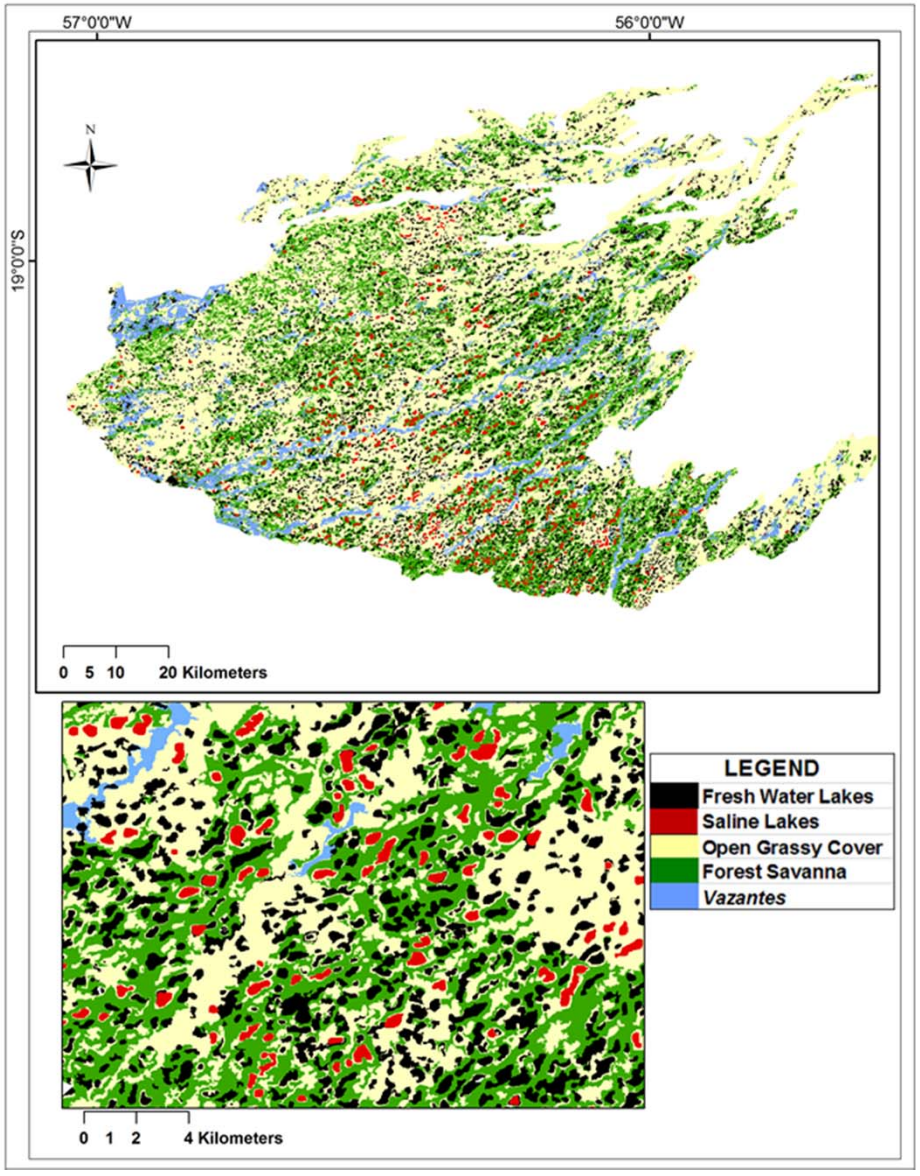
- ALOS/PALSAR lake classification = lakes inventory and spatial distribution
- ALOS/PALSAR landscape units = lakes surrounding landscape
- SRTM data and ALOS/PALSAR lakes classification = altitude of salinas and baias
- Lake geochemistry = mechanism controlling the high concentration of dissolved solids

1-4 m higher elevation than salinas



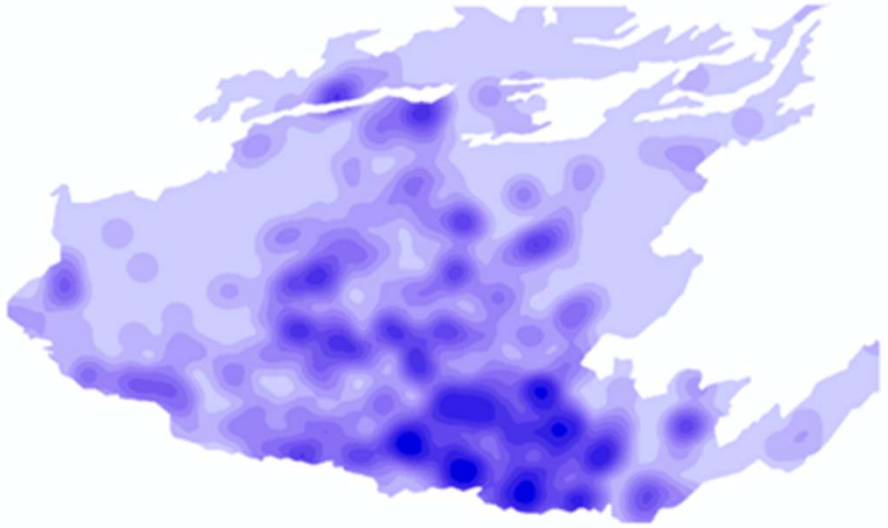
Lowest elevation

SAR imagery and pictures showing the landscape units in the Lower Nhecolândia region.

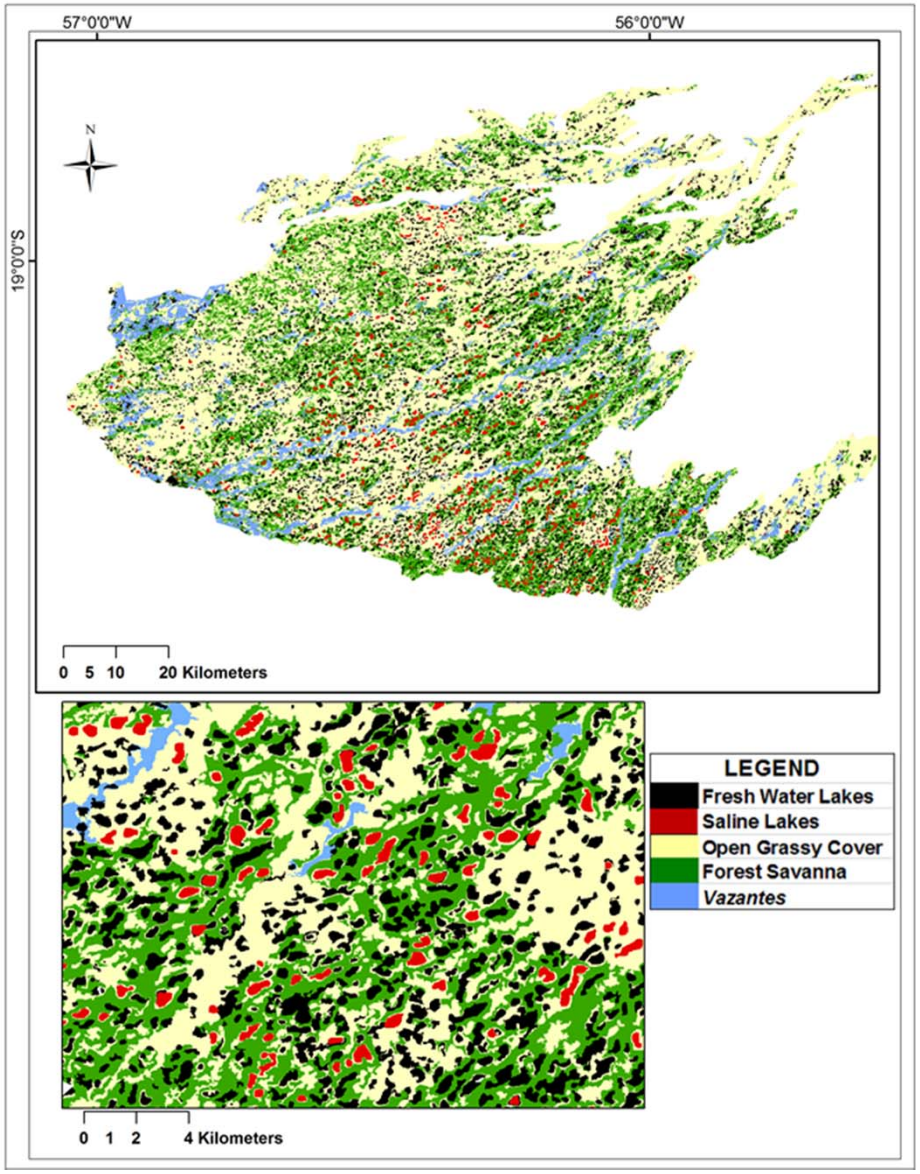


Landcover classification

702 *salinas* were classified in the region (98% accuracy). These lakes have a circular to elongated shape, following a NW-SE orientation, and mostly associated with forest savanna.

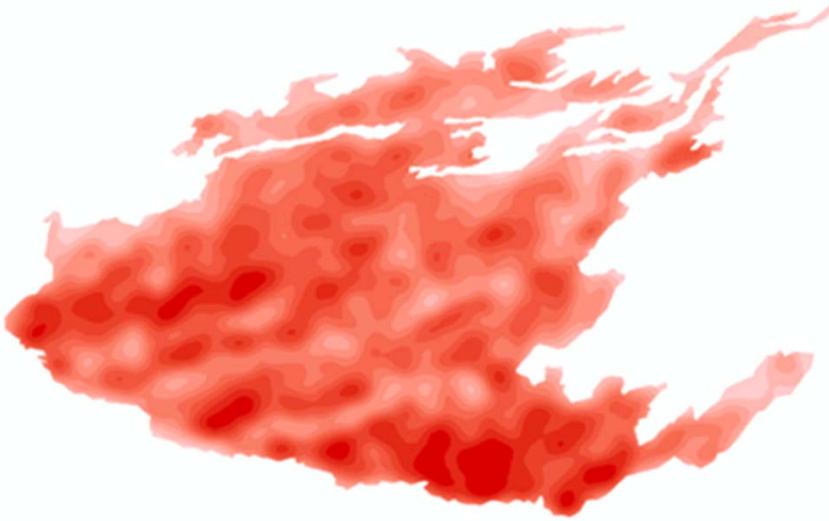


Kernal Density Estimation – indication of cluster of salinas



Landcover classification

Baias correspond to about 8,217 lakes; these lakes also have a circular to elongated shape, but a more irregular border compared to the *salinas*; they are evenly distributed in the region, and highly associated with forested and grassy covers.

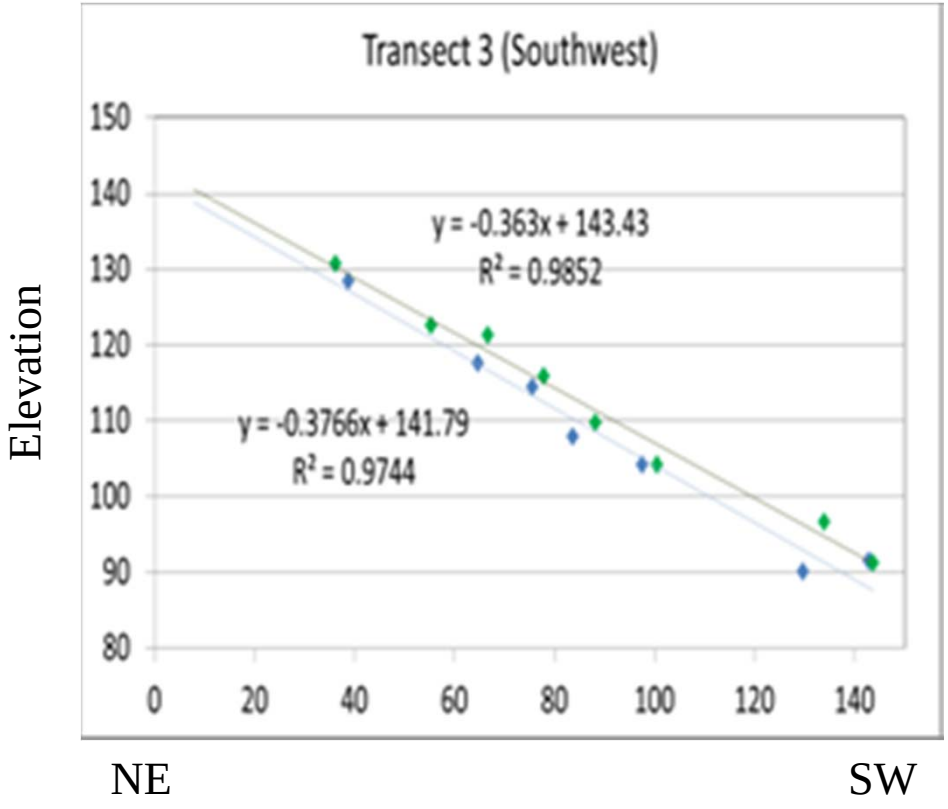


Kernal Density Estimation – indication of cluster of baias

ALOS/PALSAR lakes classification + SRTM = salinas and baias altitude on a 150 km NE-SW transect.

Results show that:

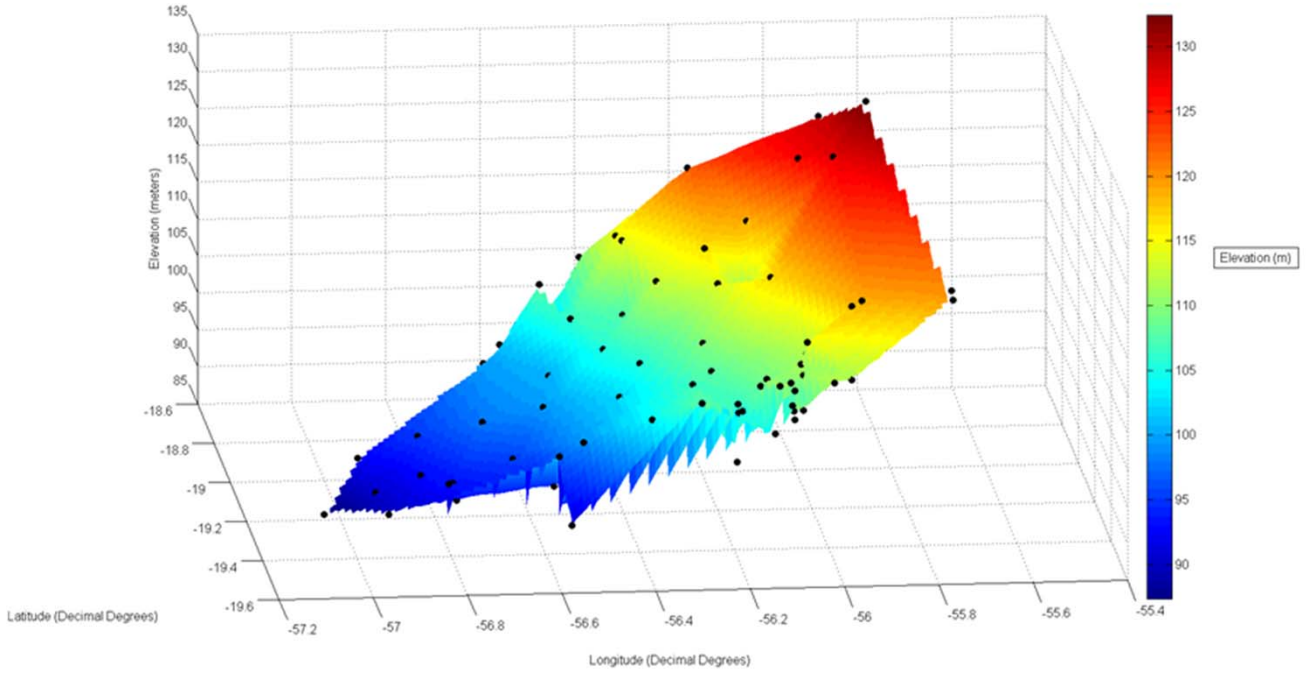
- Salinas are always lower altitude than baias
- General altitude gradient of 33cm/Km, NE-SW, similar to the water flow



Green – baias
Blue - salinas

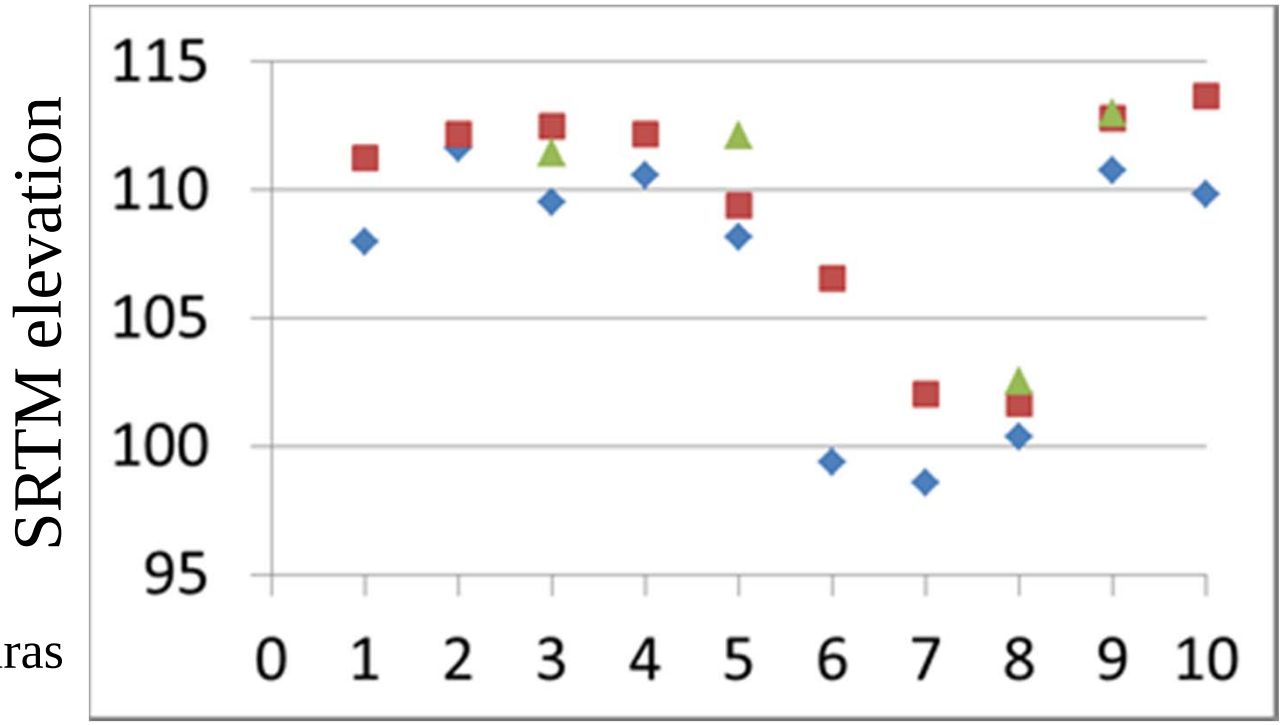
First detailed elevation of the region – based on SRTM elevation of *salinas* (black points) as input points

- Results show that the elevation of salinas follows a NE-SW direction similar to the water flow.



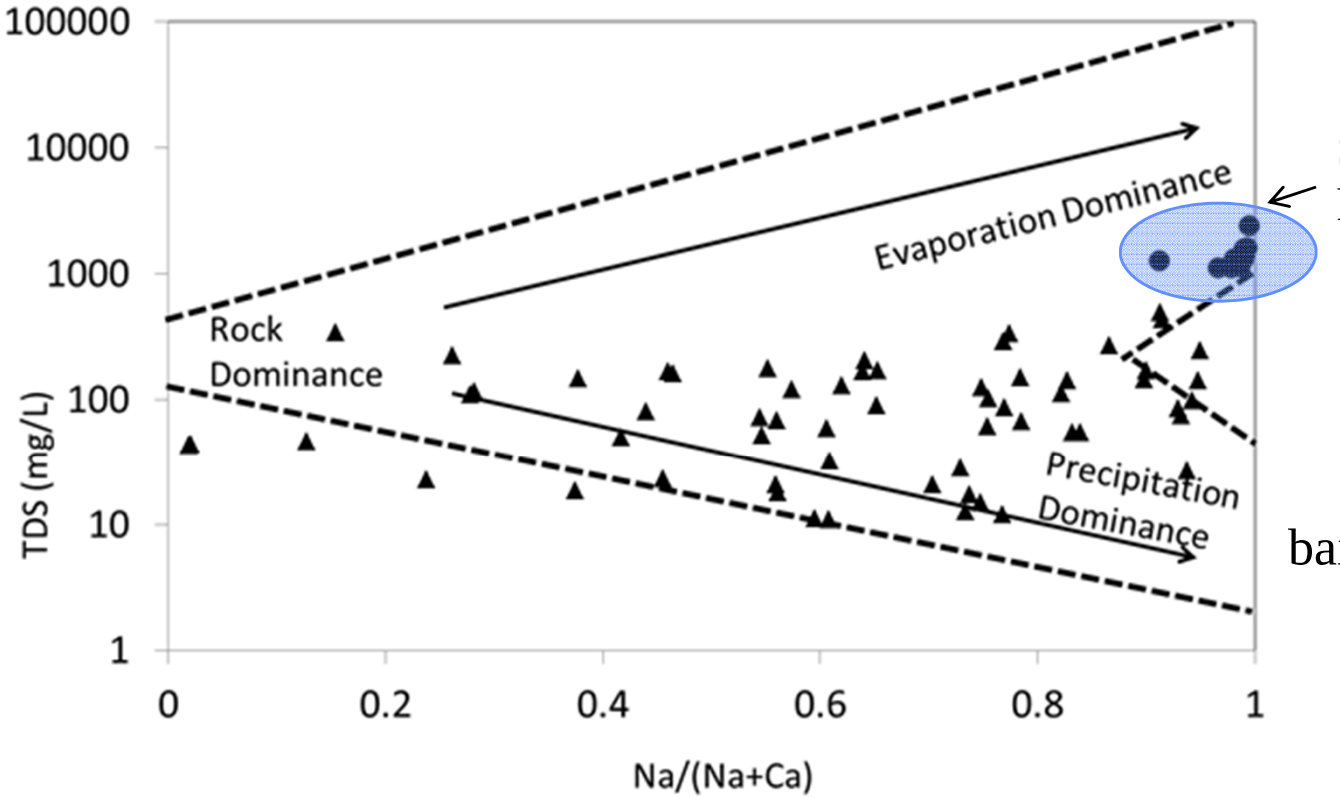
SRTM elevation of ALOS/PALSAR classified salinas and "cordilheiras" - with tree height correction

- Results show that "cordilheiras" are about 2.7m higher in elevation compared with the salinas



Blue – salinas
Reg/green - cordilheiras

Geochemistry of lakes based on field data



Salinas: high TDS;
high Na/(Na+Ca)

baias

Results suggest that:

- Salinas follow a NW-SE orientation and are associated with forest savanna; this indicates that forest savanna contributes to isolation of salinas from annual water surface flow.
- Forest savanna (cordilheiras) are about 2.6 m higher than salinas; this contributes for isolation from the annual surface flow.
- Salinas are lower elevation than baias; this indicates that ground water flow is likely towards salinas.
- Geochemistry suggests that the high salinity of the “salinas” is a result of evaporative mechanism.
- Together the evidences suggest that salinas are “closed systems”, with low exchange with surface water.
- This is important for management of the region, and protection of these unique landscape units.