

Assessing Atmospheric Rivers Damages and Impacts on South America



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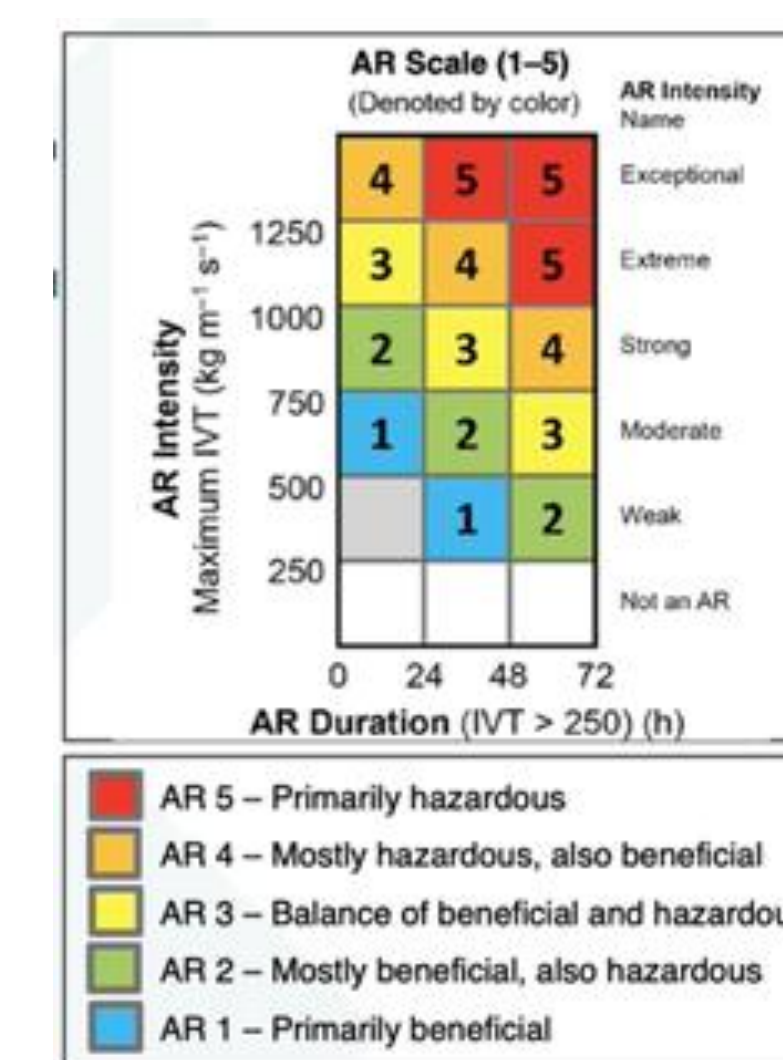
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We have now AR Categories & an Hydrometeorological Impact Database for Chile

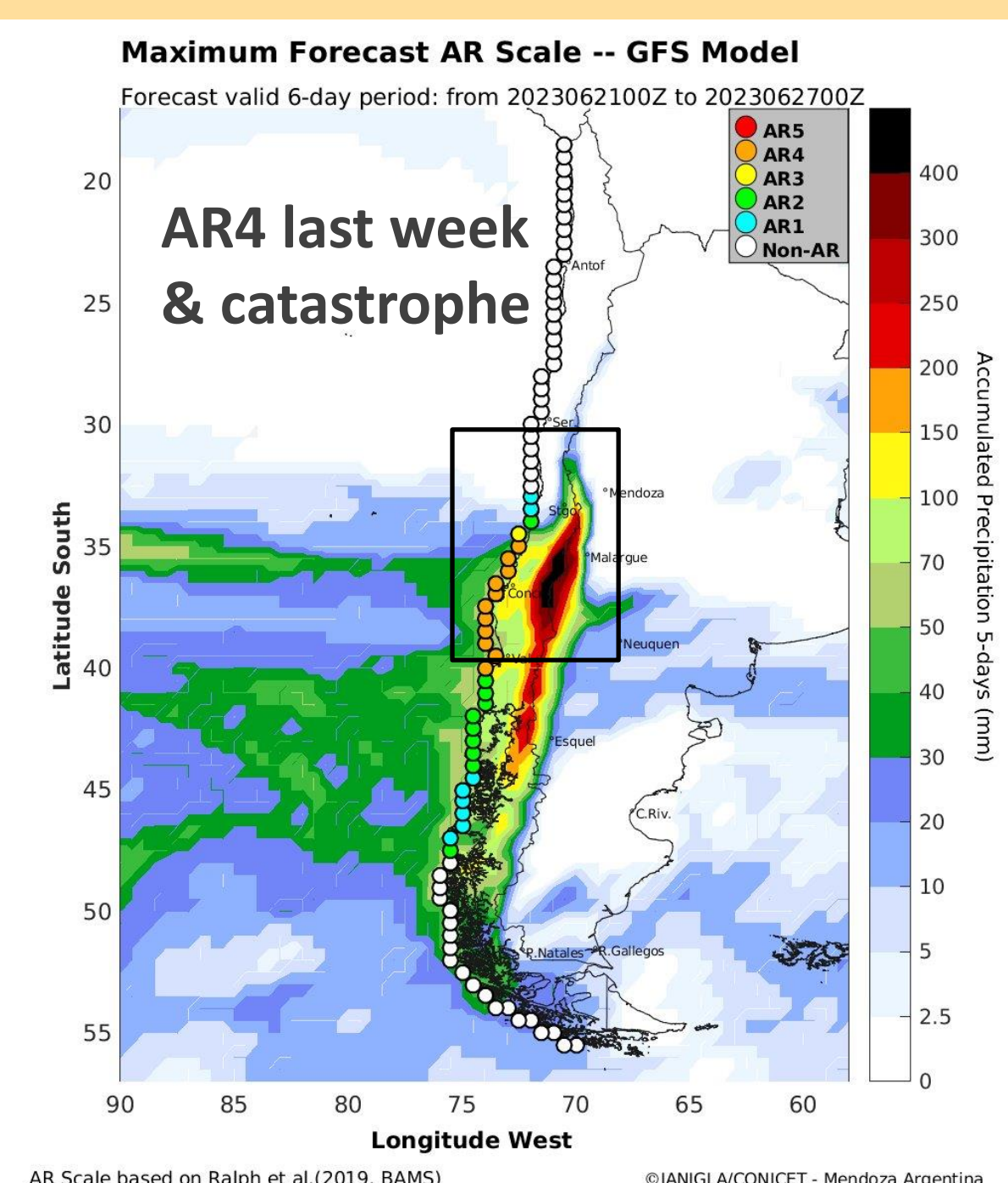
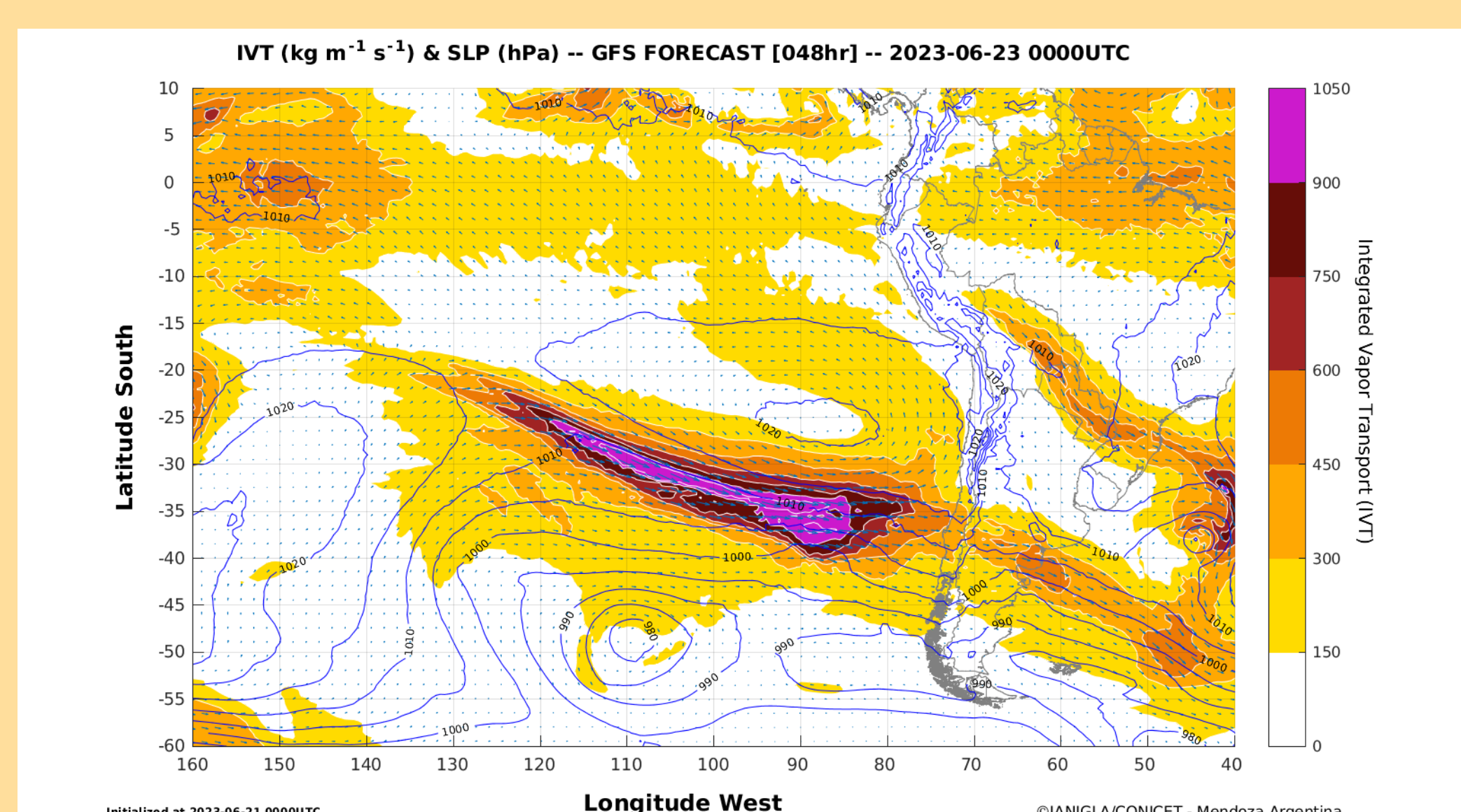
Valuable Social Impact database linked with hydrometeorological events in Chile has been related with the AR categories (Ralph et al. 2019). Database is gathering by the SENAPRED civil protection agencies in Chile



- ## Goals
1. To explore the frequency of categories of AR on the west coast of South America
 2. To quantify the fraction of annual total precipitation delivered by each AR Category
 3. To evaluate hydrometeorological Impacts of AR Categories in central Chile

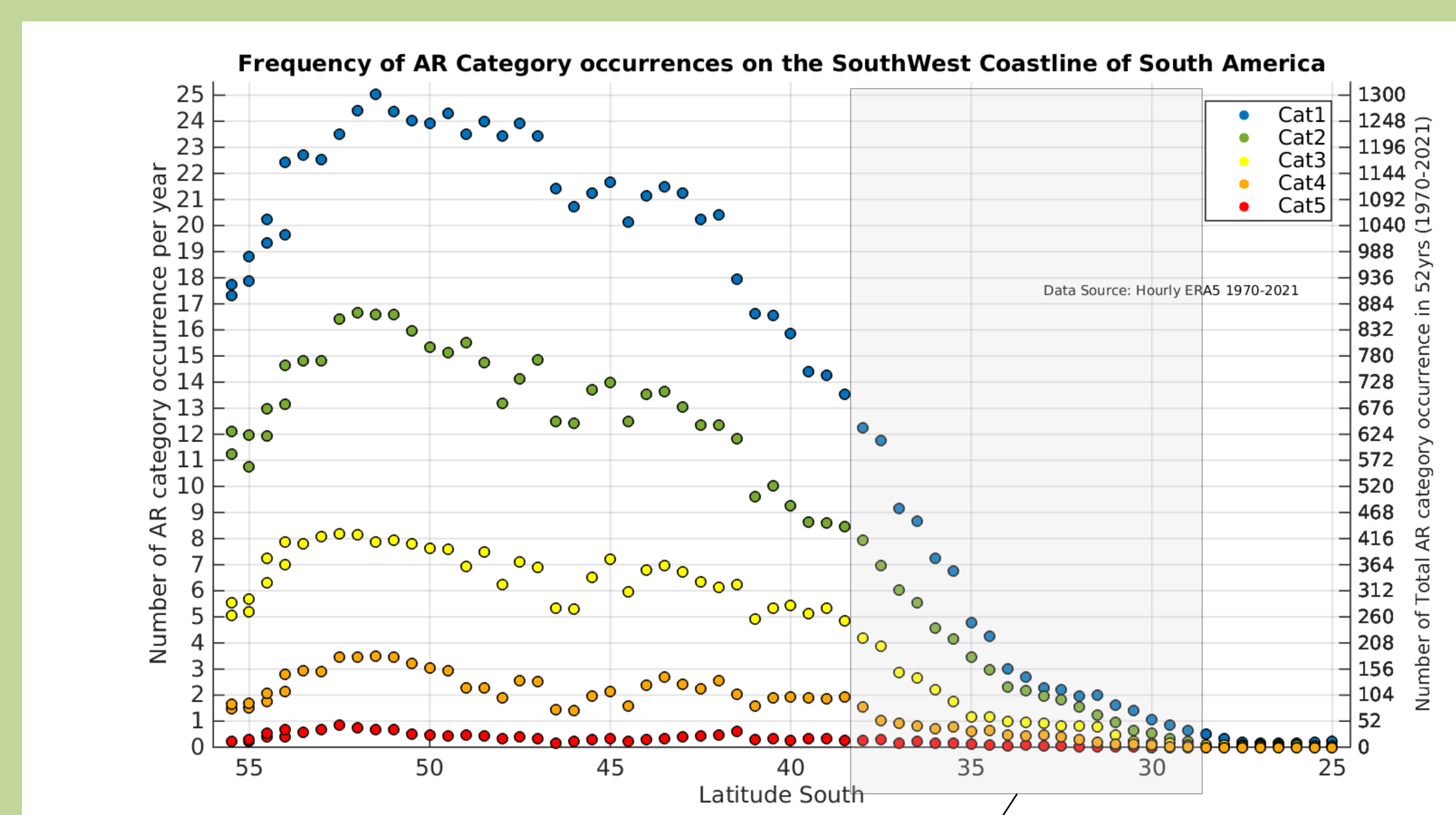
1. AR Scale forecasts in South America

The web site https://ianigla.mendoza-conicet.gob.ar/rios_atmosfericos/ provide twice daily AR forecast products derived by GFS model to assist weather forecasters in South America. AR categories on the coastline are also provided. However, we do not know so much about the AR categories and their impacts on South America



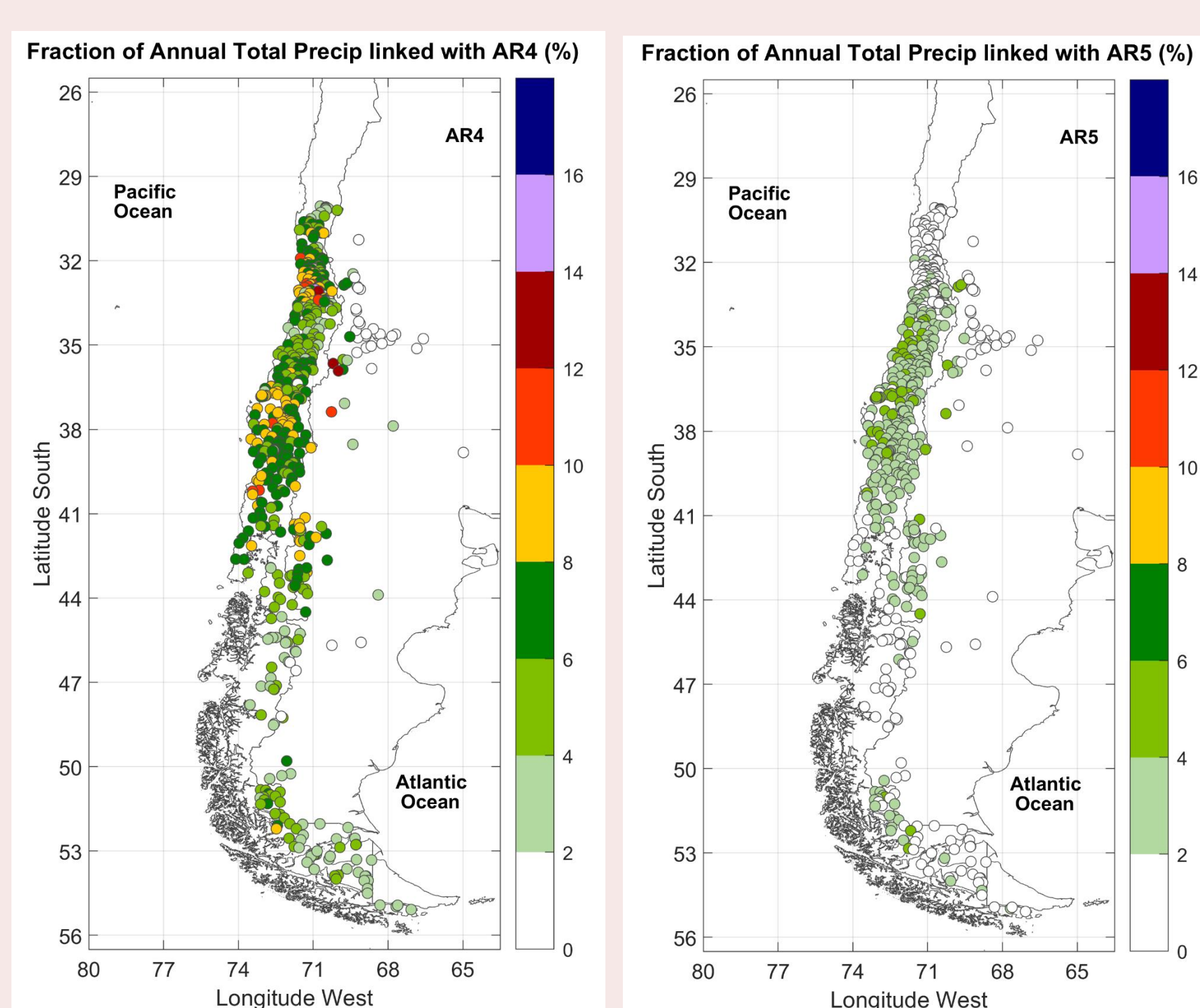
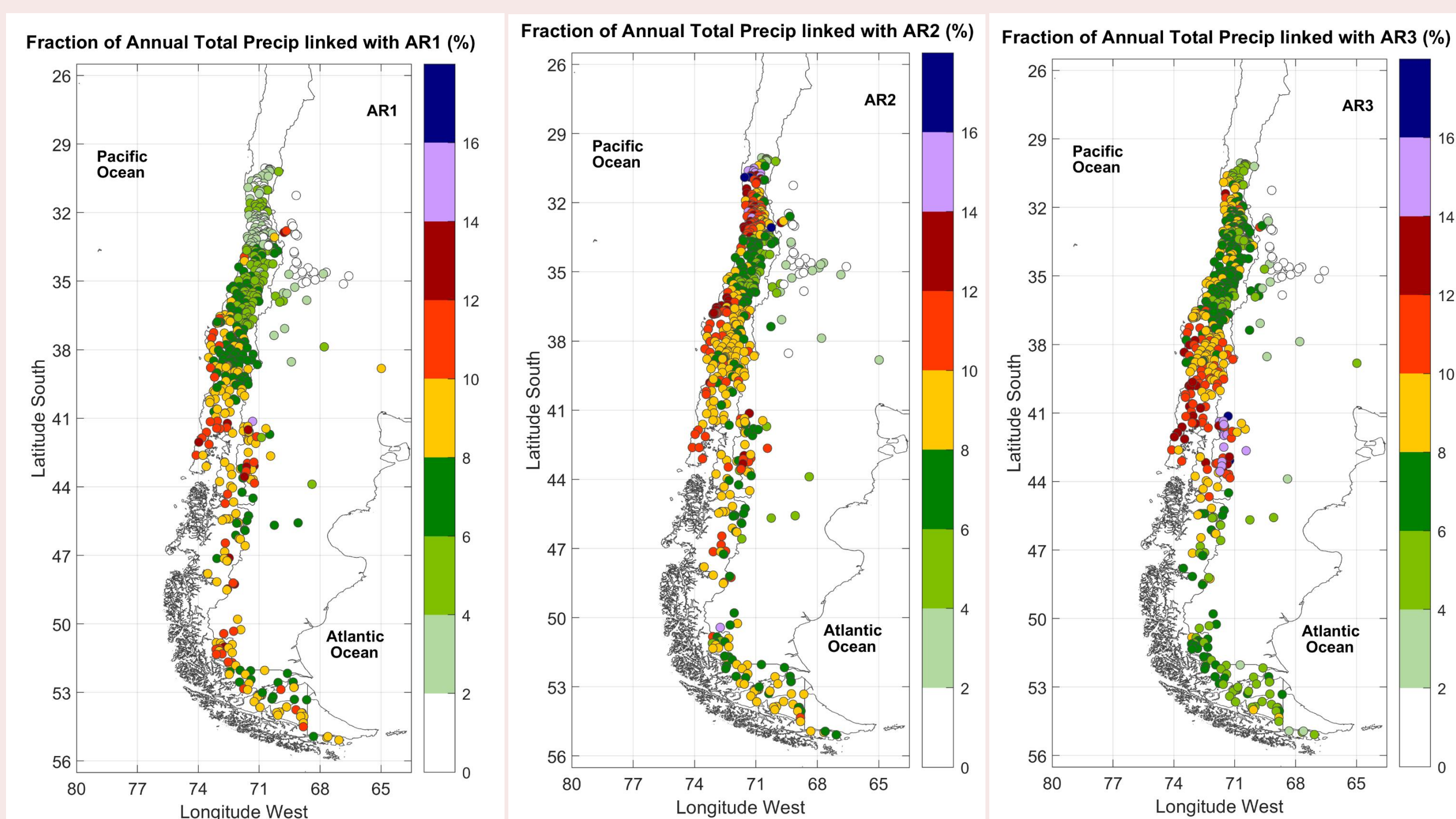
2. Frequency of AR Categories

- All AR categories occurrence maximize South of 40°S
- AR occurrence and its categories drops abruptly North of 40°S
- AR conditions reaching at least AR1 are rare North of 30°S



3. Impacts on Total Precipitation

AR3 and AR4 have the largest contribution to total precip between 30°-45°S

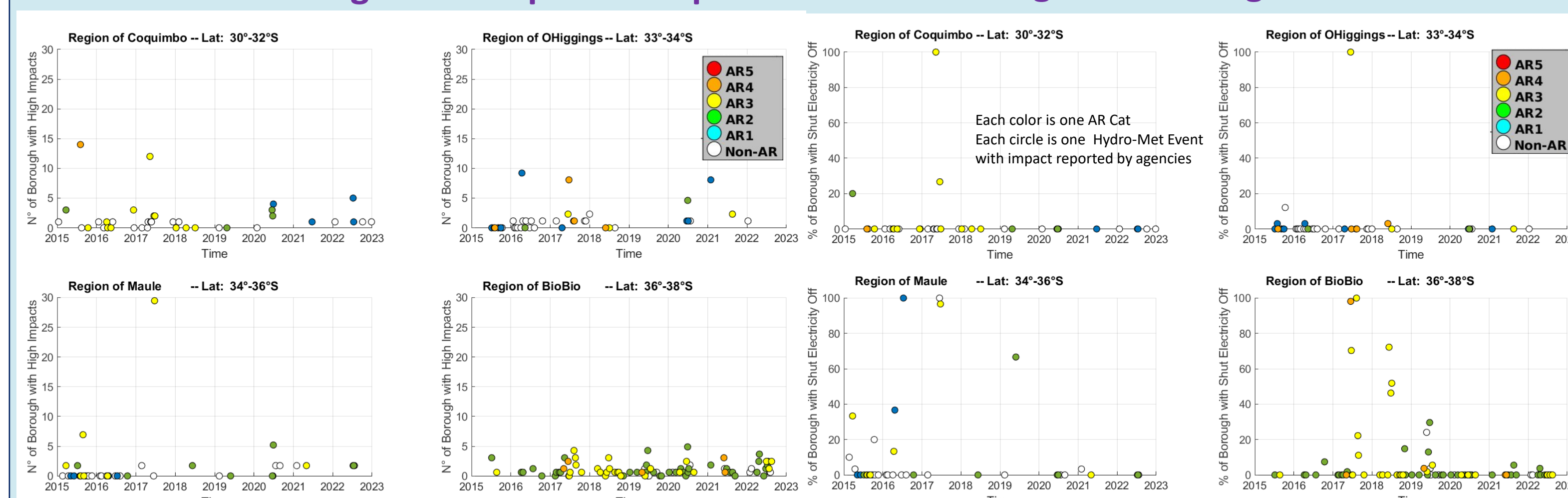


- Low AR1-AR2 categories contribute most to total precipitation on austral zone (South 50°S)
- Despite AR5 rarely occurs north of 40°S, they provide 4-8% of total precipitation
- High AR4-AR5 categories have larger impacts on northern than southern coastal zones

4. Social Impacts of AR in central Chile

- Most of Hydro-meteo Events reported by Protection Agencies of Chile were related with AR conditions.
- The signal make stronger btwn ARs and the Highest Impact Events, those with occurrences of Landslides, flood or river overflow as reported by local agencies.
- Non-AR5 occurrences in this period and latitude range 38°-30°S.

Number of Boroughs that reported Impacts % of Boroughs in the Region with Shut-Off



- The relationship btw Hydro-Met events with social impact and the dif AR categories is not straightforward. The highest AR cat does not necessarily produce the highest social impacts.

5. Conclusion

- AR scale is also a useful tool for forecast in South America
- AR scale may be refined equatorward of 35°S. More study is needed
- ARs closely relate with social impacts south of 35°S, but not straightforward with the AR cat ranking. More dispersion north of 35°S