

ACTIVITY REPORT:

Gravity Wave Activity

Activity leads:

Riwal Plougonven, Laboratoire de Meteorologie Dynamique,
Ecole Polytechnique, France

Laura Holt, NorthWest Research Associates, USA

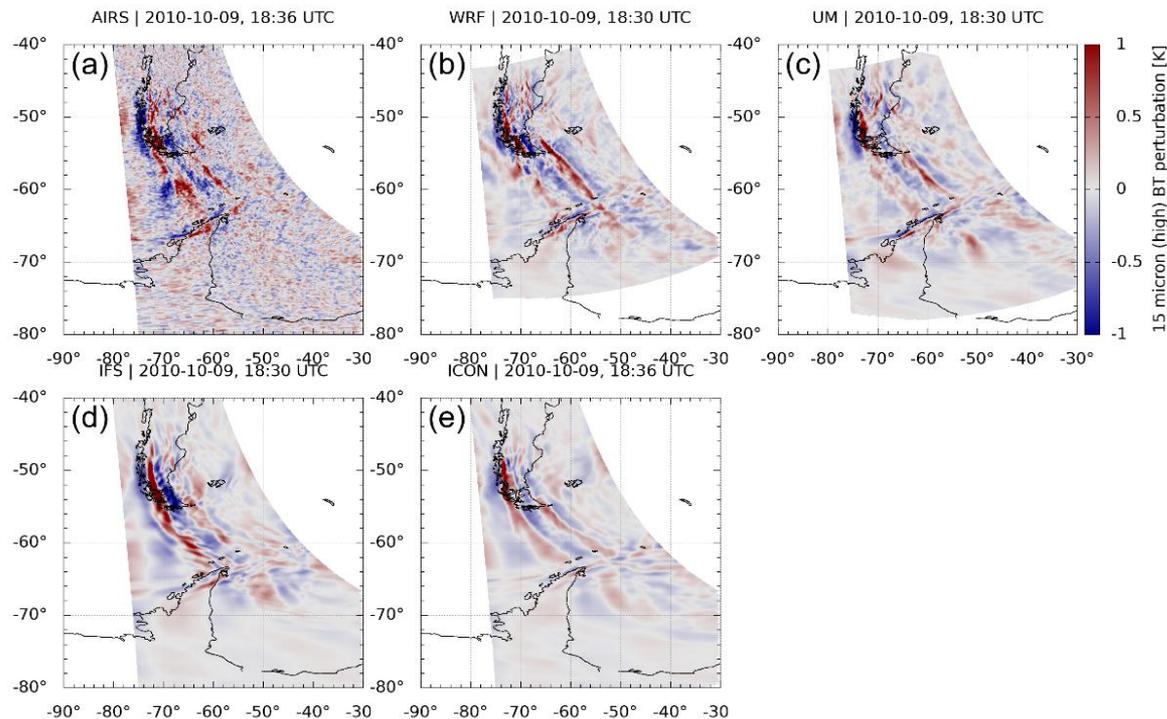
28th SPARC SSG meeting

February 2021

SPARC Gravity Wave Activity aims to understand the **role of gravity waves in driving the general circulation** of the middle atmosphere. To develop and maintain **observational records** of gravity waves and **improve their modelling**, both resolved and parameterized.

- A discussion of the difficulties of constraining parameterizations has been published in the *Quarterly Journal of the Royal Meteorological Society*: “How does knowledge of atmospheric gravity waves guide their parameterizations?” (Plougonven et al 2020)
- The ISSI team “New Quantitative Constraints on Orographic Gravity Wave Stress and Drag: Satisfying emerging needs in seasonal to sub-seasonal and climate prediction” held two virtual meetings, from March 16 to 19, 2020 and October 19 to 22, 2020.
- The first ISSI results were presented at EGU in our paper titled, “Middle-Atmosphere Mountain Waves and Drag Near the Drake Passage: Observations, mini-MIP, and an OSSE” (Kruse et al., 2020)

GOAL: ISSI project aims to combine observations and gravity wave resolving models to provide the best possible estimates of momentum flux and drag to constrain parameterizations



METHOD: Observations are used to validate high resolution models (shown here), models in turn are used to evaluate observational methods of estimating momentum flux.

The existing dataset has great potential for further investigations, and several are currently underway:

- An in-depth evaluation of current methods of estimating gravity wave momentum flux from observations
- A more detailed investigation of wave events and of the finer-scale gravity waves by comparison to other observations (i.e., superpressure balloons)
- A comparison of the forcing from the modelled gravity waves to the forcing from different gravity wave parameterizations

- GW Activity has begun collaborating with QBOi
 - A joint virtual seminar (first one is scheduled for February 17)
 - We have discussed the possibility of GW Activity involvement in planning experiments for Phase 2 of the QBOi

- Tentative dates are planned for an in-person ISSI meeting in Bern in September, 2021. We have requested support for three early career scientists.
- The results of the ISSI team are being prepared for a journal article (Kruse et al., 2021).
- The 5-year GW symposium was postponed from September 2021 until April 2022 (COVID). We have requested support for 5-10 travel grants for young and/or underrepresented scientists.

- An emerging issue we would like to bring to the attention of the SSG is the buying of **RO data** from companies. NASA and NOAA purchase these data, but their contracts don't allow them to share the data freely.
- There are many limitations, including that many scientists can't even know how many profiles per day are available and where they are located (e.g. a latitude distribution). These are considered “proprietary”, and with those restrictions it is not possible for scientists without access to write proposals to use the data.
- Without coordination, research will suffer in the long term. This commercialization issue is a growing trend, and some compromises need to be made.
- This is a really complex and rapidly developing issue. For GW research, we would need essentially every profile to get high enough density in both space and time.

As the upper stratosphere and mesosphere receive more attention, there is a growing need for **future observations of upper stratospheric winds**, particularly near the equator where waves are crucial and models perform poorly. Also as indicated last year, we advocate for **new satellite limb-imaging sensors** to provide high stratospheric vertical and horizontal resolution for wave and wave-mean-flow-interaction studies.