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Collaborative data-modelling approach to infer Oldest Ice sites in the vicinity of Concordia.

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Recovering a 1.5 million years record of climate and greenhouse gases from Antarctica is a major objective of the ice core community. There is an agreement concerning the most important criteria to retrieve such old ice: low horizontal velocity; low accumulation rate and no (or very little) basal melting. These criteria indicate that such "Oldest Ice" could be found close to the divides of the East Antarctic Plateau and the region around the permanent station of Concordia (East Antarctica) appears to be amongst the few possible candidate sites. By 2015, this region was already relatively well documented because of the proximity of Concordia station and the fact that geophysical survey had been performed in the context of the EPICA drilling. However, the detection/selection of an appropriate drilling site requires to complete the geophysical data coverage and to develop modeling tools to make the best use of the data. This constitutes a major objective of the BE-OI (Beyond EPICA Oldest Ice) European Project and we present here the approach used to join data acquisition, interpretation and modeling as well as the current status of this collaborative work.

The approach is based on several steps. 1) On the basis of existing data (essentially bedmap2) a broad region of interest was defined and airborne radar survey was performed in January 2016 by a UTIG/AAD team over a grid ($\sim$ 40 x 100 km, resolution 1 km in one direction). 2) Interpretation of these data allowed to produce a high resolution bedrock map. Moreover, using the EPICA ice core data, it was possible to date internal layers back to 360 kyr all over the surveyed domain. 3) Ice flow and thermal inverse modeling extrapolated the age and its vertical gradient (vertical resolution) down to the bedrock and evaluated the associated basal melting (see Parrenin et al. Presentation) 4) smaller patches of interests (5 x 5 km) were defined from the model results (and related uncertainties), morphology of the internal layers and basal hydrology patterns (including sublgacial lakes) that can be inferred from the radar echoes, 5) these patches are now surveyed with a ground based radar with a very high horizontal resolution (250 m in both direction). Stations for ApRES measurements and strain net (GPS) are also set up. After revisit next year they will give information concerning ice flow. 6) the ultimate task will be to use the synthesis of all data/models to decide the precise drilling site for the fast drilling tool “Subglacior”